



# Test Report: DRS-240-48

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240W All-In-One Intelligent Security Power

## ■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Control Function Test

Component Stress Test

## ■ SAFETY & E.M.C. TEST

Safety Test

E.M.C. Test

## ■ RELIABILITY TEST

ENVIRONMENT TEST

## DESIGN VERIFY TEST

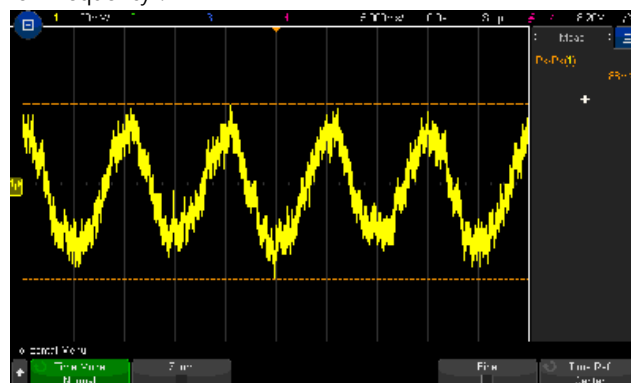
### OUTPUT FUNCTION TEST

| NO | TEST ITEM                        | SPECIFICATION       | TEST CONDITION                                       | RESULT               |
|----|----------------------------------|---------------------|------------------------------------------------------|----------------------|
| 1  | OUTPUT VOLTAGE(Max)<br>TOLERANCE | V1: -1.0 % ~ +1.0 % | I/P: 90VAC /305VAC<br>O/P:FULL/ MIN. LOAD<br>Ta:25°C | V1: -0.075%~ 0.0417% |
| 2  | LINE REGULATION (Max)            | V1: -0.5 % ~ +0.5 % | I/P: 90VAC~ 305VAC<br>O/P:FULL LOAD<br>Ta:25°C       | V1: -0.0167%~0.0251% |
| 3  | LOAD REGULATION(Max)             | V1: -0.5 % ~ +0.5 % | I/P: 230VAC<br>O/P:FULL ~MIN LOAD<br>Ta:25°C         | V1: -0.075%~ 0.0417% |
| 4  | OVER/UNDERSHOOT TEST             | < +5%               | I/P: 230VAC<br>O/P:FULL LOAD<br>Ta:25°C              | 1.30%                |
| 5  | RIPPLE & NOISE(Max )             | V1: 480mVp-p        | I/P:230VAC<br>O/P: TESTING LOAD<br>Ta:25°C           | V1: 88mVp-p          |

high frequency :

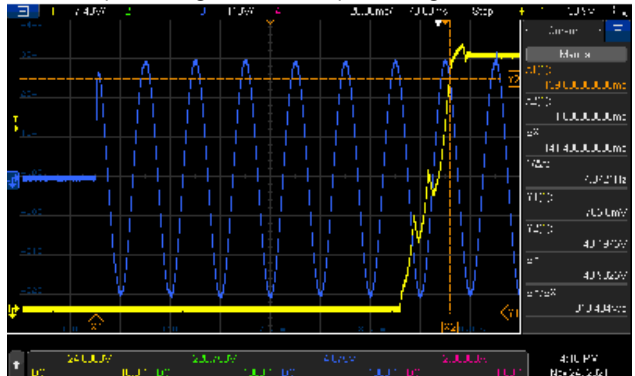


low frequency :

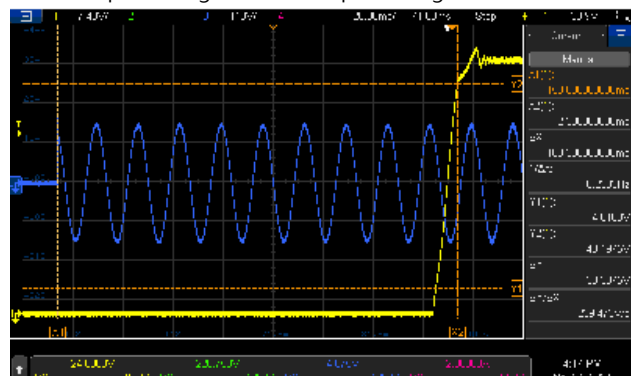


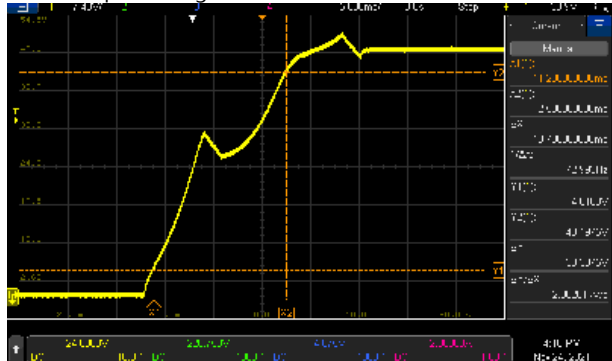
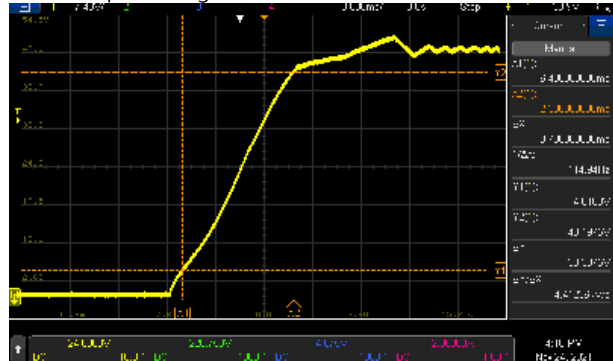
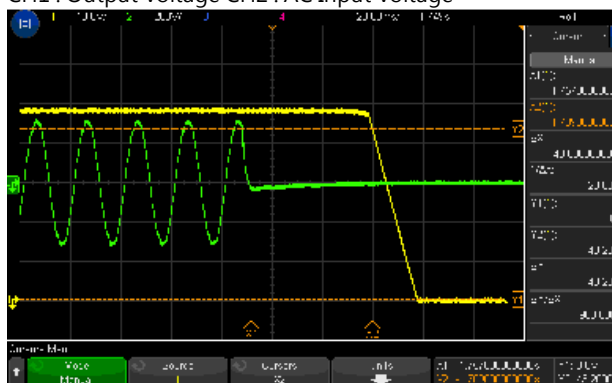
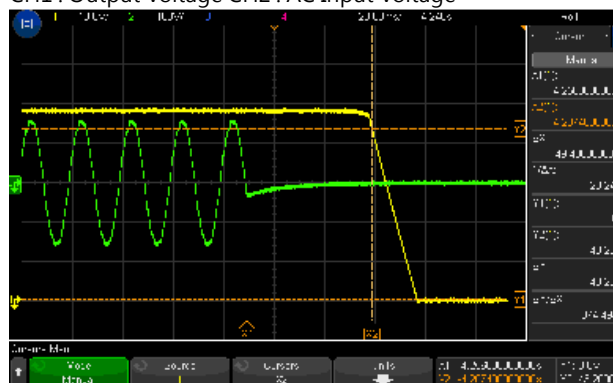
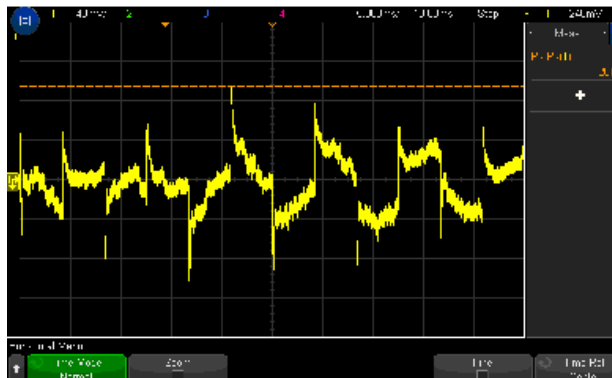
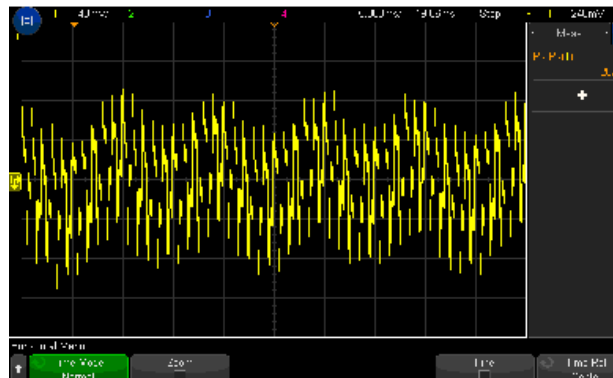
|   |                  |                                |                                                                |                                  |
|---|------------------|--------------------------------|----------------------------------------------------------------|----------------------------------|
| 6 | SET UP TIME(Max) | 230VAC/2400ms<br>115VAC/2400ms | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : FULL LOAD<br>Ta : 25°C | 230VAC/141.4ms<br>115VAC/160.3ms |
|---|------------------|--------------------------------|----------------------------------------------------------------|----------------------------------|

INPUT=230VAC/50HZ @ FULL LOAD  
CH1 : Output Voltage CH2 : AC Input Voltage



INPUT=115VAC/60HZ @ FULL LOAD  
CH1 : Output Voltage CH2 : AC Input Voltage



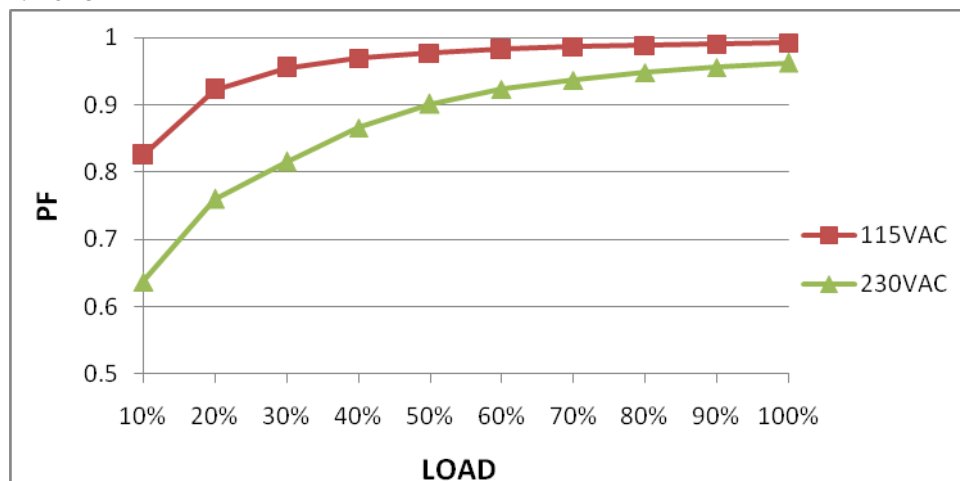
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|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------------------|---------------------------------------------------------------------------------------------------------|-------------------------------|
| 7                                                                                                                                                                                                                                                                                                                                                                           | RISE TIME (Max)     | 230VAC/1000ms<br>115VAC/1000ms | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                          | 230VAC/13.7ms<br>115VAC/8.7ms |
| <div> <div> INPUT=230VAC/50HZ @ FULL LOAD<br/>CH1 : Output Voltage  </div> <div> INPUT=115VAC/60HZ @ FULL LOAD<br/>CH1 : Output Voltage  </div> </div>                                                   |                     |                                |                                                                                                         |                               |
| 8                                                                                                                                                                                                                                                                                                                                                                           | HOLD UP TIME (Typ.) | 230VAC/16ms<br>115VAC/10ms     | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                          | 230VAC/48ms<br>115VAC/49.4ms  |
| <div> <div> INPUT=230VAC/50HZ @ FULL LOAD<br/>CH1 : Output Voltage CH2 : AC Input Voltage  </div> <div> INPUT=115VAC/60HZ @ FULL LOAD<br/>CH1 : Output Voltage CH2 : AC Input Voltage  </div> </div> |                     |                                |                                                                                                         |                               |
| 9                                                                                                                                                                                                                                                                                                                                                                           | DYNAMIC LOAD        | V1: 4800mVp-p                  | I/P: 230VAC<br>O/P:<br>(1)FULL /50% LOAD 50%DUTY / 120HZ<br>(2)FULL /50% LOAD 50%DUTY / 1KHZ<br>Ta:25°C | (1)201mVp-p<br>(2)207mVp-p    |
| <div> <div> FULL /50% LOAD 50%DUTY / 120HZ  </div> <div> FULL /50% LOAD 50%DUTY / 1KHZ  </div> </div>                                                                                                |                     |                                |                                                                                                         |                               |

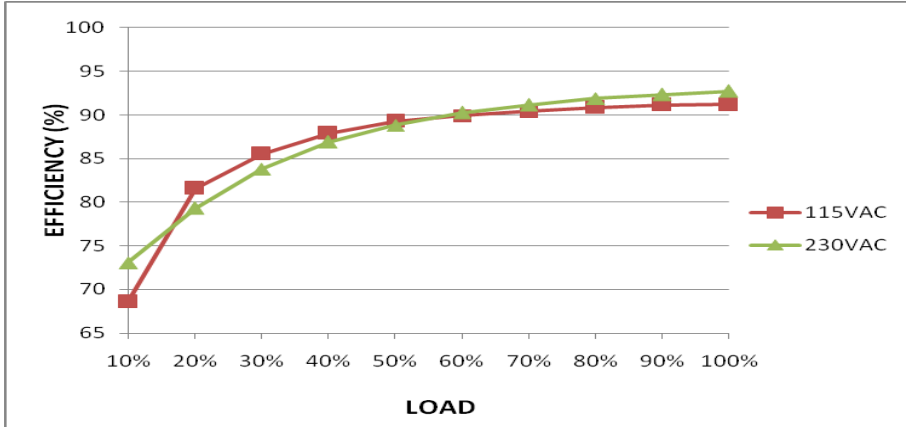
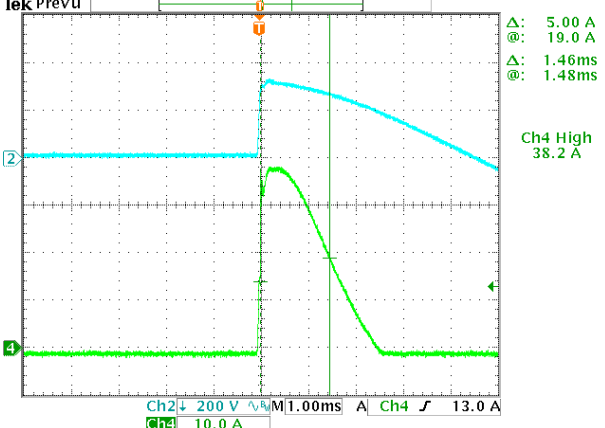
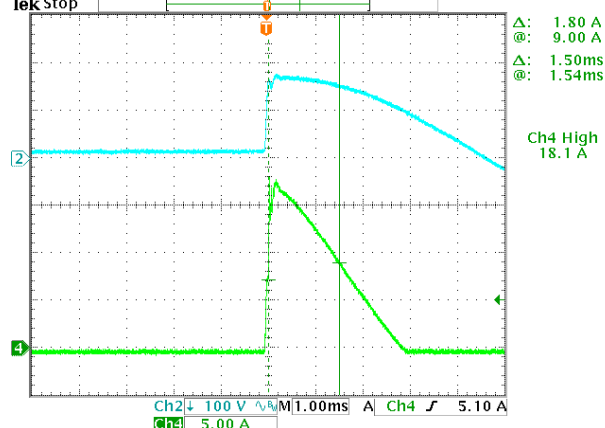
|    |                         |               |                                                              |          |
|----|-------------------------|---------------|--------------------------------------------------------------|----------|
| 10 | TRANSIENT RECOVERY TIME | V1: 4800mVp-p | I/P: 230VAC<br>O/P:40% LOAD CHANGE<br>50%DUTY/120HZ 1.25A/us | 213mVp-p |
|----|-------------------------|---------------|--------------------------------------------------------------|----------|

## INPUT FUNCTION TEST

| NO | TEST ITEM             | SPECIFICATION                  | TEST CONDITION                                                                                                                                                                                                                                                                                                              | RESULT                                                                                                                                                                                    |
|----|-----------------------|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | INPUT VOLTAGE RANGE   | 90VAC~305VAC<br>127VDC~ 431VDC | (1) I/P:TESTING<br>O/P:FULL LOAD<br>(2) I/P:DC TESTING(L:+ N:-)<br>O/P: FULL / 50% LOAD<br>(3) I/P:DC TESTING(L:- N:+)<br>O/P: FULL / 50% LOAD<br>Ta:25°C<br>I/P:<br>LOW-LINE=90V<br>HIGH-LINE+10=315 V<br>O/P:FULL/MIN LOAD<br>(PLEASE CHECK DERATING CURVE)<br>ON: 30 Sec OFF: 30 Sec 10MIN<br>( POWER ON/OFF NO DAMAGE ) | (1) 85.1V~305V/full load<br>84.9V ~305V/90% load<br>(2) 120.0Vdc~431Vdc/FULL LOAD<br>120.0Vdc~431Vdc/50% LOAD<br>(3) 120.0Vdc~431Vdc/FULL LOAD<br>120.0Vdc~431Vdc/50% LOAD<br>TEST:<br>OK |
| 2  | INPUT FREQUENCY RANGE | 47HZ ~63 HZ<br>NO DAMAGE       | I/P:90 VAC ~305VAC<br>O/P:FULL~MIN LOAD<br>Ta:25°C                                                                                                                                                                                                                                                                          | TEST: OK                                                                                                                                                                                  |
| 3  | INPUT CURRENT (Typ.)  | 230V/ 1.4 A<br>115V/2.8 A      | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                                                                                                                                                                                                                                              | I =1.17A/ 230VAC<br>I =2.31A/ 115VAC                                                                                                                                                      |
| 4  | POWER FACTOR (Typ.)   | 0.95/ 230VAC<br>0.98/115VAC    | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                                                                                                                                                                                                                                              | PF=0.9663/230VAC<br>PF=0.9925/115VAC                                                                                                                                                      |

P.F vs LOAD



|                                                                                                                                                                                                                                                                                                                                                                                                                                |                      |                                    |                                                                |                                                         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|------------------------------------|----------------------------------------------------------------|---------------------------------------------------------|
| 5                                                                                                                                                                                                                                                                                                                                                                                                                              | EFFICIENCY(Typ.)     | 92%(POWER)                         | I/P:230 VAC<br>O/P:FULL LOAD<br>Ta:25°C                        | 92.47%                                                  |
| EFFICIENCY vs LOAD<br>                                                                                                                                                                                                                                                                                                                       |                      |                                    |                                                                |                                                         |
| 6                                                                                                                                                                                                                                                                                                                                                                                                                              | INRUSH CURRENT(Typ.) | 230V/60A<br>115V/30A<br>COLD START | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : FULL LOAD<br>Ta : 25°C | I =38.2A/ 230VAC<br>I =18.1A/ 115VAC<br>T50=1.46ms/230V |
| <div> <div>           INPUT=230VAC/50HZ @ FULL LOAD<br/>           CH2 : AC Input Voltage CH4 : Input current<br/>  </div> <div>           INPUT=115VAC/ 60HZ @ FULL LOAD<br/>           CH2 : AC Input Voltage CH4 : Input current<br/>  </div> </div> |                      |                                    |                                                                |                                                         |

## PROTECTION FUNCTION TEST

| NO | TEST ITEM            | SPECIFICATION                                                                                 | TEST CONDITION                                                      | RESULT                                                                                                                                |
|----|----------------------|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| 1  | OVER LOAD PROTECTION | 105%~135 %<br>Protection type: Constant current limiting, shutdown output voltage after 5 sec | I/P: 305VAC<br>I/P: 230VAC<br>I/P: 100VAC<br>O/P:TESTING<br>Ta:25°C | 119.4%/ 305VAC<br>119.66%/ 230VAC<br>119.8%/100VAC<br>Protection type: Constant current limiting, shutdown output voltage after 5 sec |

|   |                             |                                                                                                                                          |                                                                      |                                                                                                                                                           |
|---|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2 | OVER VOLTAGE PROTECTION     | Load main output : 64.8V~74.5V<br>Protection type : Shut down o/p voltage, re-power on to recover                                        | I/P: 305VAC<br>I/P: 230VAC<br>I/P: 90VAC<br>O/P: MIN LOAD<br>Ta:25°C | 68.4V/ 305VAC<br>68.4V / 230VAC<br>68.4V/ 90VAC<br>Protection type : Shut down o/p voltage, re-power on to recover                                        |
| 3 | OVER TEMPERATURE PROTECTION | Automatically drop load with temperature only for bat. load<br>Shut down o/p voltage, recovers automatically after temperature goes down | I/P: 305VAC<br>I/P: 90VAC<br>O/P: FULL LOAD                          | O.T.P. Active<br>Automatically drop load with temperature only for bat. load<br>Shut down o/p voltage, recovers automatically after temperature goes down |
| 4 | SHORT PROTECTION            | Constant current Range : 5.25A~6.75A<br>1 HOUR NO DAMAGE                                                                                 | I/P: 305VAC<br>I/P: 90VAC<br>O/P: FULL LOAD<br>Ta:25°C               | NO DAMAGE OK<br>Constant current Range: <u>6.58</u> A<br>PROTECTION TYPE : Constant current limiting, shutdown output voltage after 5 sec, re-power on    |
| 5 | BATTER CUT OFF              | 41.8±1V                                                                                                                                  | I/P: 230 VAC<br>O/P: BAT. LOAD<br>Ta:25°C                            | <u>41.92</u> V                                                                                                                                            |
| 6 | REVERSE POLARITY            | By internal MOSFET, no damage, recovers automatically after fault condition is removed.                                                  | I/P: 230 VAC<br>O/P: BAT. LOAD<br>Ta:25°C                            | OK<br>By internal MOSFET, no damage, recovers automatically after fault condition is removed.                                                             |

## CONTROL FUNCTION TEST

| N O | TEST ITEM    | SPECIFICATION | TEST CONDITION                                                                                                                                                                                     | RESULT                                                                   |
|-----|--------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| 1   | FORM-C RELAY | AC FAIL       | Signals AC failure and activates when input voltage drops below :<br>79V~89V of 120VAC,<br>132V~187 of 220VAC.<br>Relay contact output,<br>ON : AC OK ;<br>OFF : AC Fail ;<br>max. rating : 30V/1A | TEST : <u>OK</u><br><u>85.3V</u> of 120VAC,<br><u>174.58V</u> of 220VAC. |
|     |              | CHARGER FAIL  | Relay contact output, ON :<br>Charger OK ; OFF : Charger Fail ;<br>max. rating : 30V/1A                                                                                                            | TEST : <u>OK</u>                                                         |

|          |                              | DC OK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Signals normal DC output and activates when output voltage > 90% rated value.<br>Relay contact output, ON : DC OK ; OFF : DC Fail ; max. rating : 30V/1A                                        | TEST : <u>43.27V</u>                        |             |                 |         |         |                                                                                         |       |                                                                                         |       |         |                                                                                         |       |                                                                                           |        |                 |       |                                                                                           |                 |                                                                                            |                  |              |                                                                                                                                                                                                 |                                                |                                                                                                                                                                                                 |                          |                                                                                                                                                                                                 |                                      |                                                                                                                                                                                                 |                   |                                                                                                                                                                                                 |                  |                                                                                                                                                                                                 |                     |                                                                                                                                                                                                 |                  |
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|          |                              | BATTERY LOW/<br>ABNORMAL/<br>DISCONNECTED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Relay contact output, ON : Battery OK ; OFF : Battery Low ; max. rating : 30V/1A ;<br>Battery low voltage : < 44V                                                                               | TEST : <u>OK</u><br><u>Vbat &lt; 44.09V</u> |             |                 |         |         |                                                                                         |       |                                                                                         |       |         |                                                                                         |       |                                                                                           |        |                 |       |                                                                                           |                 |                                                                                            |                  |              |                                                                                                                                                                                                 |                                                |                                                                                                                                                                                                 |                          |                                                                                                                                                                                                 |                                      |                                                                                                                                                                                                 |                   |                                                                                                                                                                                                 |                  |                                                                                                                                                                                                 |                     |                                                                                                                                                                                                 |                  |
| 2        | BATTER START                 | Restart system directly from battery and does not require AC power                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | I/P: BAT<br>O/P:FULL LOAD<br>Ta:25°C                                                                                                                                                            | TEST : <u>OK</u>                            |             |                 |         |         |                                                                                         |       |                                                                                         |       |         |                                                                                         |       |                                                                                           |        |                 |       |                                                                                           |                 |                                                                                            |                  |              |                                                                                                                                                                                                 |                 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                                                                                                         |                     |                                                                                                                                                                                                 |                  |
| 3        | DC-UPS                       | UPS switch to battery power within 10ms of AC failure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | I/P: 230 VAC<br>O/P:BAT. LOAD<br>Ta:25°C                                                                                                                                                        | TEST : <u>OK</u>                            |             |                 |         |         |                                                                                         |       |                                                                                         |       |         |                                                                                         |       |                                                                                           |        |                 |       |                                                                                           |                 |                                                                                            |                  |              |                                                                                                                                                                                                 |                                                |                                                                                                                                                                                                 |                          |                                                                                                                                                                                                 |                                      |                                                                                                                                                                                                 |                   |                                                                                                                                                                                                 |                  |                                                                                                                                                                                                 |                     |                                                                                                                                                                                                 |                  |
| 4        | ADJUSTABLE CURRENT RANGE     | 20% ~ 100% charging current adjustable by VR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | I/P : 230 VAC<br>O/P : TESTING LOAD<br>Ta : 25°C                                                                                                                                                | 17.06%~99.76%                               |             |                 |         |         |                                                                                         |       |                                                                                         |       |         |                                                                                         |       |                                                                                           |        |                 |       |                                                                                           |                 |                                                                                            |                  |              |                                                                                                                                                                                                 |                 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                                                                                                         |                     |                                                                                                                                                                                                 |                  |
| 5        | LED INDICATOR                | <div>4.LED alarm</div> <table><thead><tr><th>Function</th><th>Description</th><th>Output of alarm</th></tr></thead><tbody><tr><td rowspan="2">AC fail</td><td>AC fail</td><td>Red </td></tr><tr><td>AC OK</td><td>OFF </td></tr><tr><td rowspan="2">DC OK</td><td>DC fail</td><td>OFF </td></tr><tr><td>DC OK</td><td>Green </td></tr><tr><td rowspan="9">Status</td><td rowspan="2">Charging status</td><td>Float</td><td>Green </td></tr><tr><td>Charging: CC/CV</td><td>Orange </td></tr><tr><td rowspan="7">System diagnosis</td><td>Charger fail</td><td>Red : 1 Blink/Pause  </td></tr><tr><td>Battery overvoltage / Battery reverse polarity</td><td>Red : 2 Blink/Pause  </td></tr><tr><td>Battery low / No Battery</td><td>Red : 3 Blink/Pause  </td></tr><tr><td>Battery discharge peak power &gt; 4min.</td><td>Red : 4 Blink/Pause  </td></tr><tr><td>Over load / short</td><td>Red : 5 Blink/Pause  </td></tr><tr><td>Over temperature</td><td>Red : 6 Blink/Pause  </td></tr><tr><td>Communication error</td><td>Red : 7 Blink/Pause  </td></tr></tbody></table> <div>I/P: TESTING VAC<br/>O/P:TESTING LOAD<br/>Ta:25°C</div> |                                                                                                                                                                                                 | Function                                    | Description | Output of alarm | AC fail | AC fail | Red  | AC OK | OFF  | DC OK | DC fail | OFF  | DC OK | Green  | Status | Charging status | Float | Green  | Charging: CC/CV | Orange  | System diagnosis | Charger fail | Red : 1 Blink/Pause   | Battery overvoltage / Battery reverse polarity | Red : 2 Blink/Pause   | Battery low / No Battery | Red : 3 Blink/Pause   | Battery discharge peak power > 4min. | Red : 4 Blink/Pause   | Over load / short | Red : 5 Blink/Pause   | Over temperature | Red : 6 Blink/Pause   | Communication error | Red : 7 Blink/Pause   | TEST : <u>OK</u> |
| Function | Description                  | Output of alarm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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| AC fail  | AC fail                      | Red                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          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                      |                     |                                                                                                                                                                                                 |                  |
|          | AC OK                        | OFF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          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                      |                     |                                                                                                                                                                                                 |                  |
| DC OK    | DC fail                      | OFF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          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| Status   | Charging status              | Float                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        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|          |                              | Charging: CC/CV                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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|          | System diagnosis             | Charger fail                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 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|          |                              | Battery overvoltage / Battery reverse polarity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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|          |                              | Battery low / No Battery                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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|          |                              | Battery discharge peak power > 4min.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         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|          |                              | Over load / short                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            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                                         |       |                                                                                         |       |         |                                                                                         |       |                                                                                           |        |                 |       |                                                                                           |                 |                                                                                            |                  |              |                                                                                                                                                                                                 |                                                |                                                                                                                                          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|          |                              | Over temperature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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                                                                                                                                                       |                  |
|          |                              | Communication error                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          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                                         |       |                                                                                         |       |         |                                                                                         |       |                                                                                           |        |                 |       |                                                                                           |                 |                                                                                            |                  |              |                                                                                                                                                                                                 |                                                |                                                                                                                                          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                                                                                                                                                       |                  |
| 6        | FORCE BUTTON                 | Bat over discharge protection < 70%Bat rated                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | I/P: 230 VAC<br>O/P:BAT. LOAD<br>Ta:25°C                                                                                                                                                        | TEST : <u>(33.561V) 69.91% OK</u>           |             |                 |         |         |                                                                                         |       |                                                                                         |       |         |                                                                                         |       |                                                                                           |        |                 |       |                                                                                           |                 |                                                                                            |                  |              |                                                                                                                                                                                                 |                                                |                                                                                                                                                                                                 |                          |                                                                                                                                                                                                 |                                      |                                                                                                                                                                                                 |                   |                                                                                                                                                                                                 |                  |                                                                                                                                                                                                 |                     |                                                                                                                                                                                                 |                  |
| 7        | Battery Discharge Peak power | a) 2 Peak power > 4 min ;<br>b) 3 Peak power > 4 s                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | I/P: 230 VAC<br>O/P:BAT. LOAD<br>Ta:25°C                                                                                                                                                        | a) TEST : <u>OK</u><br>b) TEST : <u>OK</u>  |             |                 |         |         |                                                                                         |       |                                                                                         |       |         |                                                                                         |       |                                                                                           |        |                 |       |                                                                                           |                 |                                                                                            |                  |              |                                                                                                                                                                                                 |                                                |                                                                                                                                                                                                 |                          |                                                                                                                                                                                                 |                                      |                                                                                                                                                                                                 |                   |                                                                                                                                                                                                 |                  |                                                                                                                                                                                                 |                     |                                                                                                                                                                                                 |                  |

|   |                             |                                           |                  |                  |
|---|-----------------------------|-------------------------------------------|------------------|------------------|
| 8 | TEMPERATURE<br>COMPENSATION | I/P: 230 VAC<br>O/P: BAT. LOAD<br>Ta:25°C |                  |                  |
|   |                             | Constant Voltage                          |                  |                  |
|   |                             | SPEC:                                     | Ta=0°C ( 17K Ω ) | Ta=25°C ( 5K Ω ) |
|   |                             |                                           | 59.4±0.48V       | 57.6±0.48V       |
|   |                             | TEST RESULT:                              | 59.166V          | 57.409V          |
|   |                             |                                           |                  | 56.334V          |

## COMPONENT STRESS TEST

| NO | TEST ITEM                                                 | SPECIFICATION                                                | TEST CONDITION                                                                                                                                                                                                                                                                                                                                             | RESULT                                                                                          |                                                                                                 |
|----|-----------------------------------------------------------|--------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| 1  | PWM Transistor<br>( D to S) or (C to E)<br>Peak Voltage   | Q 15/Q16ated<br>: 18A/ 600V                                  | AC ON/OFF<br>I/P: High-Line +3V =308V<br>VDS:<br>O/P:(1) Full Load<br>(2) Output Short<br>(3) Dynamic Load Full Load/<br>Min. Load 90%Duty/1KHz<br>(4) Dynamic Load Full Load/<br>Min. Load 90%Duty/3KHz<br>(5) Dynamic Load Full Load/<br>Min. Load 90%Duty/5KHz<br>(6) Dynamic Load 100% Load/<br>Min. Load 50%Duty/120Hz<br>(7)0%→400% Load.<br>Ta:25°C | Q15<br>VDS:<br>(1) 477V<br>(2) 513V<br>(3) 485V<br>(4) 489V<br>(5) 481V<br>(6) 485V<br>(7) 477V | Q16<br>VDS:<br>(1) 488V<br>(2) 548V<br>(3) 468V<br>(4) 472V<br>(5) 472V<br>(6) 472V<br>(7) 468V |
| 2  | P.F.C Transistor<br>( D to S) or (C to E)<br>Peak Voltage | Q1/Q2 Rated<br>: 13 A/ 600 V                                 | I/P: High-Line +3V =308V<br>AC ON/OFF<br>O/P: (1)Full Load<br>(2)Output Short<br>(3) Dynamic Load Full Load/<br>Min. Load 90%Duty/1KHz<br>(4) Dynamic Load Full Load/<br>Min. Load 90%Duty/3KHz<br>(5) Dynamic Load Full Load/<br>Min. Load 90%Duty/5KHz<br>(6) Dynamic Load 100% Load/<br>Min. Load 50%Duty/120Hz<br>(7)0%→400% Load.<br>Ta:25°C          | Q1<br>VDS:<br>(1) 524V<br>(2) 544V<br>(3) 528V<br>(4) 532V<br>(5) 528V<br>(6) 528V<br>(7) 520V  |                                                                                                 |
| 3  | AUX MOS                                                   | U505 Rated<br>: 1.04A / 725 V<br><br>Q504 Rated<br>: 5A/200V | I/P: High-Line +3V =308 V<br>AC ON/OFF<br>O/P: (1)Full Load<br>(2)Output Short<br>(3) Dynamic Load Full Load/                                                                                                                                                                                                                                              | U505<br>VDS:<br>(1) 623V<br>(2) 617V<br>(3) 617V                                                | Q504<br>VDS:<br>(1) 147V<br>(2) 147V<br>(3) 147V                                                |

|   |                         |                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                             |                                                                                                               |                                                                                                               |
|---|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
|   |                         |                                                                                                                                        | Min. Load 90%Duty/1KHz<br>(4) Dynamic Load Full Load/<br>Min. Load 90%Duty/3KHz<br>(5) Dynamic Load Full Load/<br>Min. Load 90%Duty/5KHz<br>(6) Dynamic Load 100% Load/<br>Min. Load 50%Duty/120Hz<br>(7)0%→400% Load.<br>Ta:25°C                                                                                                                           | (4) 629V<br>(5) 629V<br>(6) 629V<br>(7) 617V                                                                  | (4) 146V<br>(5) 148V<br>(6) 147V<br>(7) 147V                                                                  |
| 4 | P.F.C DIODE             | D 8 Rated<br>: 8A/600V                                                                                                                 | I/P:High-Line +3V =308V<br>AC ON/OFF<br>O/P: (1)Full Load<br>(2)Output Short<br>(3)Dynamic Load Full Load/<br>Min. Load 90%Duty/5KHz<br>(4)Dynamic Load 100% Load/<br>Min. Load 50%Duty/120Hz<br>Ta:25°C                                                                                                                                                    | (1) 539V<br>(2) 539V<br>(3) 533V<br>(4) 533V                                                                  |                                                                                                               |
| 5 | Diode Peak Voltage      | Q101/Q102 Rated:<br>27.4A/150V                                                                                                         | AC ON/OFF<br>I/P:High-Line +3V =308V<br>O/P: (1)Full Load<br>(2)Output Short<br>(3)Dynamic Load Full Load/<br>Min. Load 90%Duty/1KHz<br>(4)Dynamic Load Full Load/<br>Min. Load 90%Duty/3KHz<br>(5)Dynamic Load Full Load/<br>Min. Load 90%Duty/5KHz<br>(6)Dynamic Load 100% Load/<br>Min. Load 50%Duty/120Hz<br>(7)0%→400% Load.<br>(8).NO LOAD<br>Ta:25°C | Q101:<br>VDS:<br>(1) 131V<br>(2) 138V<br>(3) 132V<br>(4) 131V<br>(5) 131V<br>(6) 132V<br>(7) 137V<br>(8) 130V | Q102:<br>VDS:<br>(1) 131V<br>(2) 137V<br>(3) 131V<br>(4) 131V<br>(5) 130V<br>(6) 131V<br>(7) 131V<br>(8) 123V |
| 6 | Input Capacitor Voltage | C5 Rated:<br>: 150 μ / 450 V                                                                                                           | I/P:High-Line +3V =308V<br>O/P: (1)Full Load input on/off<br>(2) Min load input on /Off<br>(3)Full Load /Min load Change<br>(4)Full load continue<br>Ta:25°C                                                                                                                                                                                                | (1)441V<br>(2)429V<br>(3)441V<br>(4)441V                                                                      |                                                                                                               |
| 7 | Control IC Voltage Test | PWM IC U3 Rated<br>8.9V~15.5V<br><br>PFC IC U1 Rated<br>9.75V~ 35V<br><br>O/P IC U100 Rated<br>8V~24V<br><br>IC U801 Rated<br>4.5V~36V | AC ON/OFF<br>I/P:High-Line +3V =308V<br>O/P(1)FULL LOAD<br>(2) Output Short<br>(3)O.L.P<br>(4)O.V.P.<br>(5)NO LOAD (LOW LINE)<br>Ta:25°C                                                                                                                                                                                                                    | U3<br>(1) 13.7V<br>(2) 14.2V<br>(3) 13.6V<br>(4) 13.6V<br>(5) 13.7V<br><br>U1<br>(1) 14.4V<br>(2) 14.2V       | U801<br>(1) 12.4V<br>(2) 12.4V<br>(3) 12.4V<br>(4) 12.4V<br>(5) 12.4V<br><br>U303<br>(1) 3.31V<br>(2) 3.31V   |

|  |  |                               |  |                                                                       |                                                                       |
|--|--|-------------------------------|--|-----------------------------------------------------------------------|-----------------------------------------------------------------------|
|  |  | MCU U303 Rated<br>2.4V~3.6V   |  | (3) 14.3V<br>(4) 14.1V<br>(5) 14.3V                                   | (3) 3.31V<br>(4) 3.31V<br>(5) 3.31V                                   |
|  |  | AUX IC U502 Rated<br>8.5V~30V |  | U100<br>(1) 11.7V<br>(2) 11.7V<br>(3) 11.7V<br>(4) 11.7V<br>(5) 11.7V | U502<br>(1) 11.7V<br>(2) 11.7V<br>(3) 11.6V<br>(4) 11.6V<br>(5) 11.6V |

## ■ SAFETY& E.M.C. TEST

### SAFETY TEST

| NO | TEST ITEM               | SPECIFICATION                                                       | TEST CONDITION                                                                  | RESULT                                                           |
|----|-------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------------------|------------------------------------------------------------------|
| 1  | WITHSTAND VOLTAGE       | I/P-O/P: 4 KVAC/min<br>I/P-FG: 2 KVAC/min<br>O/P-FG:1.5 KVAC/min    | I/P-O/P: 4.2 KVAC/min<br>I/P-FG: 2.4 KVAC/min<br>O/P-FG:1.8 KVAC/min<br>Ta:25°C | I/P-O/P:10.77mA<br>I/P-FG:8.70mA<br>O/P-FG:19.50m A<br>NO DAMAGE |
| 2  | ISOLATION RESISTANCE    | I/P-O/P:500VDC>100MΩ<br>I/P-FG: 500VDC>100MΩ<br>O/P-FG:500VDC>100MΩ | I/P-O/P: 500 VDC<br>I/P-FG: 500 VDC<br>O/P-FG: 500 VDC<br>Ta:25°C               | I/P-O/P:9999MΩ<br>I/P-FG: 9999MΩ<br>O/P-FG: 9999MΩ<br>NO DAMAGE  |
| 3  | GROUNDING<br>CONTINUITY | FG(PE) TO CHASSIS<br>OR TRACE < 100 mΩ                              | 40A / 2min<br>Ta:25°C                                                           | 5mΩ                                                              |

### E.M.C TEST

| NO | TEST ITEM  | SPECIFICATION                            | TEST CONDITION                                           | RESULT                        |
|----|------------|------------------------------------------|----------------------------------------------------------|-------------------------------|
| 1  | HARMONIC   | EN61000-3-2<br>CLASS A                   | I/P:230VAC/50HZ<br>O/P:FULL LOAD<br>Ta:25°C              | PASS                          |
| 2  | CONDUCTION | EN55032<br>CLASS B                       | I/P : 230 VAC (50HZ)<br>O/P : FULL/50% LOAD<br>Ta : 25°C | PASS<br>Test by certified Lab |
| 3  | RADIATION  | EN55032<br>CLASS B                       | I/P : 230 VAC (50HZ)<br>O/P : FULL LOAD<br>Ta : 25°C     | PASS<br>Test by certified Lab |
| 4  | E.S.D      | EN61000-4-2<br>AIR : 8KV / Contact : 4KV | I/P : 230 VAC/50HZ<br>O/P : FULL LOAD<br>Ta : 25°C       | ■ CRITERIA A                  |
| 5  | E.F.T      | EN61000-4-4<br>INPUT : 2KV               | I/P : 230 VAC/50HZ<br>O/P : FULL LOAD<br>Ta : 25°C       | ■ CRITERIA A                  |

|   |                                                                                                                                   |                                           |                                                    |              |
|---|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|----------------------------------------------------|--------------|
| 6 | SURGE                                                                                                                             | IEC61000-4-5<br>L-N : 1KV<br>L,N-PE : 2KV | I/P : 230 VAC/50HZ<br>O/P : FULL LOAD<br>Ta : 25°C | ■ CRITERIA A |
| 7 | Test by certified Lab & Test Report Prepare<br>Any contradictions of the test results, please refer to the latest EMC test report |                                           |                                                    |              |

## ■ RELIABILITY TEST

### ENVIRONMENT TEST

| NO | TEST ITEM             | SPECIFICATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | TEST CONDITION           | RESULT |    |          |                         |                          |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |   |    |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |    |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |        |        |         |    |        |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |       |        |        |
|----|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------|----|----------|-------------------------|--------------------------|---|-----|--------|--------|---|-----|--------|--------|---|-----|--------|--------|---|----|--------|--------|---|----|--------|--------|---|----|--------|--------|---|----|--------|--------|---|-----|--------|--------|---|----|--------|--------|----|----|--------|--------|----|-----|--------|--------|----|------|--------|--------|----|------|--------|--------|----|----|--------|--------|----|----|--------|--------|----|----|--------|--------|----|-----|--------|--------|----|--------|--------|---------|----|--------|--------|--------|----|----|--------|--------|----|-----|--------|--------|----|------|--------|--------|----|------|--------|--------|----|-------|--------|--------|
| 1  | TEMPERATURE RISE TEST | MODEL : DRS-240-48<br>1. ROOM AMBIENT BURN-IN : 2 HRS<br>I/P : 230VAC O/P : FULL LOAD Ta= 25.0 °C<br>2. HIGH AMBIENT BURN-IN : 2 HRS<br>I/P : 230VAC O/P : FULL LOAD Ta= 50.0 °C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                          |        |    |          |                         |                          |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |   |    |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |    |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |        |        |         |    |        |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |       |        |        |
|    |                       | <table><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta= 25.0°C</th><th>HIGH AMBIENT Ta= 50.0 °C</th></tr><tr><td>1</td><td>LF1</td><td>38.9°C</td><td>66.2°C</td></tr><tr><td>2</td><td>LF3</td><td>47.3°C</td><td>73.9°C</td></tr><tr><td>3</td><td>BD1</td><td>58.6°C</td><td>85.8°C</td></tr><tr><td>4</td><td>C2</td><td>41.2°C</td><td>68.7°C</td></tr><tr><td>5</td><td>L1</td><td>54.0°C</td><td>79.5°C</td></tr><tr><td>6</td><td>L3</td><td>53.6°C</td><td>80.2°C</td></tr><tr><td>7</td><td>C5</td><td>50.3°C</td><td>76.0°C</td></tr><tr><td>8</td><td>C10</td><td>54.6°C</td><td>81.0°C</td></tr><tr><td>9</td><td>D8</td><td>54.7°C</td><td>80.8°C</td></tr><tr><td>10</td><td>Q1</td><td>54.1°C</td><td>80.5°C</td></tr><tr><td>11</td><td>C39</td><td>39.9°C</td><td>68.3°C</td></tr><tr><td>12</td><td>RTH1</td><td>48.9°C</td><td>75.9°C</td></tr><tr><td>13</td><td>RTH4</td><td>57.0°C</td><td>83.3°C</td></tr><tr><td>14</td><td>R4</td><td>54.5°C</td><td>80.4°C</td></tr><tr><td>15</td><td>U4</td><td>44.5°C</td><td>71.5°C</td></tr><tr><td>16</td><td>U1</td><td>46.6°C</td><td>73.9°C</td></tr><tr><td>17</td><td>Q16</td><td>50.9°C</td><td>78.3°C</td></tr><tr><td>18</td><td>T1coil</td><td>81.7°C</td><td>104.8°C</td></tr><tr><td>19</td><td>T1core</td><td>74.7°C</td><td>96.6°C</td></tr><tr><td>20</td><td>U3</td><td>49.9°C</td><td>77.5°C</td></tr><tr><td>21</td><td>C60</td><td>47.1°C</td><td>74.6°C</td></tr><tr><td>22</td><td>U100</td><td>64.8°C</td><td>91.5°C</td></tr><tr><td>23</td><td>RTH5</td><td>56.5°C</td><td>82.3°C</td></tr><tr><td>24</td><td>LF100</td><td>48.3°C</td><td>75.7°C</td></tr></table> |                          |        | NO | Position | ROOM AMBIENT Ta= 25.0°C | HIGH AMBIENT Ta= 50.0 °C | 1 | LF1 | 38.9°C | 66.2°C | 2 | LF3 | 47.3°C | 73.9°C | 3 | BD1 | 58.6°C | 85.8°C | 4 | C2 | 41.2°C | 68.7°C | 5 | L1 | 54.0°C | 79.5°C | 6 | L3 | 53.6°C | 80.2°C | 7 | C5 | 50.3°C | 76.0°C | 8 | C10 | 54.6°C | 81.0°C | 9 | D8 | 54.7°C | 80.8°C | 10 | Q1 | 54.1°C | 80.5°C | 11 | C39 | 39.9°C | 68.3°C | 12 | RTH1 | 48.9°C | 75.9°C | 13 | RTH4 | 57.0°C | 83.3°C | 14 | R4 | 54.5°C | 80.4°C | 15 | U4 | 44.5°C | 71.5°C | 16 | U1 | 46.6°C | 73.9°C | 17 | Q16 | 50.9°C | 78.3°C | 18 | T1coil | 81.7°C | 104.8°C | 19 | T1core | 74.7°C | 96.6°C | 20 | U3 | 49.9°C | 77.5°C | 21 | C60 | 47.1°C | 74.6°C | 22 | U100 | 64.8°C | 91.5°C | 23 | RTH5 | 56.5°C | 82.3°C | 24 | LF100 | 48.3°C | 75.7°C |
| NO | Position              | ROOM AMBIENT Ta= 25.0°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | HIGH AMBIENT Ta= 50.0 °C |        |    |          |                         |                          |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |   |    |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |    |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |        |        |         |    |        |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |       |        |        |
| 1  | LF1                   | 38.9°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 66.2°C                   |        |    |          |                         |                          |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |   |    |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |    |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |        |        |         |    |        |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |       |        |        |
| 2  | LF3                   | 47.3°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 73.9°C                   |        |    |          |                         |                          |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |   |    |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |    |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |        |        |         |    |        |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |       |        |        |
| 3  | BD1                   | 58.6°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 85.8°C                   |        |    |          |                         |                          |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |   |    |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |    |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |        |        |         |    |        |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |       |        |        |
| 4  | C2                    | 41.2°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 68.7°C                   |        |    |          |                         |                          |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |   |    |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |    |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |        |        |         |    |        |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |       |        |        |
| 5  | L1                    | 54.0°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 79.5°C                   |        |    |          |                         |                          |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |   |    |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |    |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |        |        |         |    |        |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |       |        |        |
| 6  | L3                    | 53.6°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 80.2°C                   |        |    |          |                         |                          |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |   |    |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |    |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |        |        |         |    |        |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |       |        |        |
| 7  | C5                    | 50.3°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 76.0°C                   |        |    |          |                         |                          |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |   |    |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |    |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |        |        |         |    |        |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |       |        |        |
| 8  | C10                   | 54.6°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 81.0°C                   |        |    |          |                         |                          |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |   |    |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |    |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |        |        |         |    |        |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |       |        |        |
| 9  | D8                    | 54.7°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 80.8°C                   |        |    |          |                         |                          |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |   |    |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |    |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |        |        |         |    |        |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |       |        |        |
| 10 | Q1                    | 54.1°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 80.5°C                   |        |    |          |                         |                          |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |   |    |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |    |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |        |        |         |    |        |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |       |        |        |
| 11 | C39                   | 39.9°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 68.3°C                   |        |    |          |                         |                          |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |   |    |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |    |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |        |        |         |    |        |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |       |        |        |
| 12 | RTH1                  | 48.9°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 75.9°C                   |        |    |          |                         |                          |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |   |    |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |    |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |        |        |         |    |        |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |       |        |        |
| 13 | RTH4                  | 57.0°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 83.3°C                   |        |    |          |                         |                          |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |   |    |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |    |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |        |        |         |    |        |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |       |        |        |
| 14 | R4                    | 54.5°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 80.4°C                   |        |    |          |                         |                          |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |   |    |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |    |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |        |        |         |    |        |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |       |        |        |
| 15 | U4                    | 44.5°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 71.5°C                   |        |    |          |                         |                          |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |   |    |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |    |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |        |        |         |    |        |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |       |        |        |
| 16 | U1                    | 46.6°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 73.9°C                   |        |    |          |                         |                          |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |   |    |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |    |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |        |        |         |    |        |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |       |        |        |
| 17 | Q16                   | 50.9°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 78.3°C                   |        |    |          |                         |                          |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |   |    |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |    |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |        |        |         |    |        |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |       |        |        |
| 18 | T1coil                | 81.7°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 104.8°C                  |        |    |          |                         |                          |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |   |    |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |    |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |        |        |         |    |        |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |       |        |        |
| 19 | T1core                | 74.7°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 96.6°C                   |        |    |          |                         |                          |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |   |    |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |    |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |        |        |         |    |        |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |       |        |        |
| 20 | U3                    | 49.9°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 77.5°C                   |        |    |          |                         |                          |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |   |    |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |    |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |        |        |         |    |        |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |       |        |        |
| 21 | C60                   | 47.1°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 74.6°C                   |        |    |          |                         |                          |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |   |    |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |    |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |        |        |         |    |        |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |       |        |        |
| 22 | U100                  | 64.8°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 91.5°C                   |        |    |          |                         |                          |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |   |    |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |    |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |        |        |         |    |        |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |       |        |        |
| 23 | RTH5                  | 56.5°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 82.3°C                   |        |    |          |                         |                          |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |   |    |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |    |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |        |        |         |    |        |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |       |        |        |
| 24 | LF100                 | 48.3°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 75.7°C                   |        |    |          |                         |                          |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |   |    |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |    |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |        |        |         |    |        |        |        |    |    |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |       |        |        |

|   |                                                                   |                                                                      |                                                                                                                                                                                                                                                                                                            |                  |                        |                         |
|---|-------------------------------------------------------------------|----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|------------------------|-------------------------|
|   |                                                                   |                                                                      | NO                                                                                                                                                                                                                                                                                                         | Position         | ROOM AMBIENT Ta= 25.0℃ | HIGH AMBIENT Ta= 50.0 ℃ |
|   |                                                                   |                                                                      | 25                                                                                                                                                                                                                                                                                                         | T600             | 56.1℃                  | 83.2℃                   |
|   |                                                                   |                                                                      | 26                                                                                                                                                                                                                                                                                                         | T500             | 56.5℃                  | 84.6℃                   |
|   |                                                                   |                                                                      | 27                                                                                                                                                                                                                                                                                                         | Q101             | 53.3℃                  | 81.3℃                   |
|   |                                                                   |                                                                      | 28                                                                                                                                                                                                                                                                                                         | C103             | 49.2℃                  | 76.5℃                   |
|   |                                                                   |                                                                      | 29                                                                                                                                                                                                                                                                                                         | C106             | 45.2℃                  | 73.0℃                   |
|   |                                                                   |                                                                      | 30                                                                                                                                                                                                                                                                                                         | U502             | 55.2℃                  | 82.5℃                   |
|   |                                                                   |                                                                      | 31                                                                                                                                                                                                                                                                                                         | Q522             | 37.7℃                  | 65.5℃                   |
|   |                                                                   |                                                                      | 32                                                                                                                                                                                                                                                                                                         | Q303             | 37.7℃                  | 65.5℃                   |
|   |                                                                   |                                                                      | 33                                                                                                                                                                                                                                                                                                         | U505             | 44.7℃                  | 72.2℃                   |
|   |                                                                   |                                                                      | 34                                                                                                                                                                                                                                                                                                         | D651             | 60.9℃                  | 87.8℃                   |
|   |                                                                   |                                                                      | 35                                                                                                                                                                                                                                                                                                         | Q504             | 55.2℃                  | 82.4℃                   |
|   |                                                                   |                                                                      | 36                                                                                                                                                                                                                                                                                                         | D503             | 57.4℃                  | 84.4℃                   |
|   |                                                                   |                                                                      | 37                                                                                                                                                                                                                                                                                                         | Q519             | 49.9℃                  | 77.2℃                   |
|   |                                                                   |                                                                      | 38                                                                                                                                                                                                                                                                                                         | U303             | 46.4℃                  | 73.9℃                   |
|   |                                                                   |                                                                      | 39                                                                                                                                                                                                                                                                                                         | U801             | 49.2℃                  | 76.4℃                   |
|   |                                                                   |                                                                      | 40                                                                                                                                                                                                                                                                                                         | U150             | 45.4℃                  | 72.9℃                   |
| 2 | OVER LOAD BURN-IN TEST                                            | NO DAMAGE<br>1 HOUR ( MIN )                                          | I/P : 230 VAC<br>O/P : 117%LOAD<br>Ta : 25℃                                                                                                                                                                                                                                                                | TEST : OK        |                        |                         |
| 3 | LOW TEMPERATURE<br>TURN ON TEST                                   | TURN ON AFTER 2 HOUR                                                 | I/P : 264VAC/100VAC<br>O/P : 100%LOAD<br>Ta= -35℃                                                                                                                                                                                                                                                          | TEST : OK        |                        |                         |
| 4 | HIGH HUMIDITY<br>HIGH TEMPERATURE<br>HIGH VOLTAGE<br>TURN ON TEST | AFTER 12 HOURS<br>IN CHAMBER ON<br>CONTROL 50 ℃/95 %R.H<br>NO DAMAGE | I/P : 272 VAC<br>O/P : FULL LOAD<br>Ta=50.7℃<br>HUMIDITY= 95 %R.H                                                                                                                                                                                                                                          | TEST : OK        |                        |                         |
| 5 | TEMPERATURE<br>COEFFICIENT                                        | ± 0.03%/℃(0~50℃)                                                     | I/P : 230 VAC<br>O/P : FULL LOAD                                                                                                                                                                                                                                                                           | ±0.006%/℃(0~50℃) |                        |                         |
| 6 | STORAGE TEMPERATURE<br>TEST                                       | -40~85℃                                                              | 1. Thermal shock Temperature : -45℃~ +90℃<br>2. Temperature change rate : 25℃ / MIN<br>3. Dwell time low and high temperature : 30 MIN/EACH<br>4. Total test cycle : 10 CYCLE<br>5. Input/Output condition : STATIC                                                                                        |                  |                        |                         |
| 7 | THERMAL SHOCK TEST                                                | -30~50℃                                                              | 1. Thermal shock Temperature : -35℃~ +55℃<br>2. Temperature change rate : 25℃ / MIN<br>3. Dwell time low and high temperature : 30 MIN/EACH<br>4. Total test cycle : 16 CYCLE<br>5. Input/Output condition :<br>15cycle:230V/ FULL LOAD AC ON 3sec/AC OFF 1sec TEST<br>1cycle:230V/ FULL LOAD Burn In Test |                  |                        |                         |
| 8 | VIBRATION TEST                                                    | 10 ~ 500Hz, 5G 10min./1cycle,<br>60min. each along X, Y, Z axes      | 1 Carton & 1 Set<br>(1) Waveform : Sine Wave<br>(2) Frequency : 10~500Hz<br>(3) Sweep Time : 10min/sweep cycle<br>(4) Acceleration : 6G<br>(5) Test Time : 180min in each axis (X.Y.Z)<br>(6) Ta : 25℃                                                                                                     |                  |                        |                         |

|    |                          |                                                                                                                                                                                                                                                                                                                                                                |
|----|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9  | CAPACITOR<br>LIFE CYCLE  | <p>SUPPOSE C103 IS THE MOST CRITICAL COMPONENT</p> <p>(1) I/P : 230VAC O/P : FULL LOAD Ta= 25 °C LIFE TIME (1) 698042HRS</p> <p>(2) I/P : 230VAC O/P : FULL LOAD Ta= 50 °C LIFE TIME (2) 105213.1HRS</p> <p>(3) I/P : 230VAC O/P : 75% LOAD Ta= 50 °C LIFE TIME (3) 138955.6HRS</p> <p>(4) I/P : 230VAC O/P : 50% LOAD Ta= 50 °C LIFE TIME (4) 168490.1HRS</p> |
| 10 | MTBF                     | <p>Conducted by Parts Stress Analysis Prediction</p> <p>564.7K hrs min. Telcordia SR-332 (Bellcore) ; 73.3K hrs min. MIL-HDBK-217F (25°C)</p>                                                                                                                                                                                                                  |
| 11 | Ongoing Reliability Test | <p>I/P : 230VAC O/P : FULL LOAD TA=50°C</p> <p>Demonstration Mean Time Between Failure : 30,000 hours</p>                                                                                                                                                                                                                                                      |

| TEST RESULT | TESTER | REVIEW | APPROVAL |
|-------------|--------|--------|----------|
| PASS        | Liutt  |        | Wangdz   |

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