



Test Report: NDR-480-24

480W Single Output Industrial DIN RAIL

■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Component Stress Test

■ SAFETY & E.M.C. TEST

Safety Test

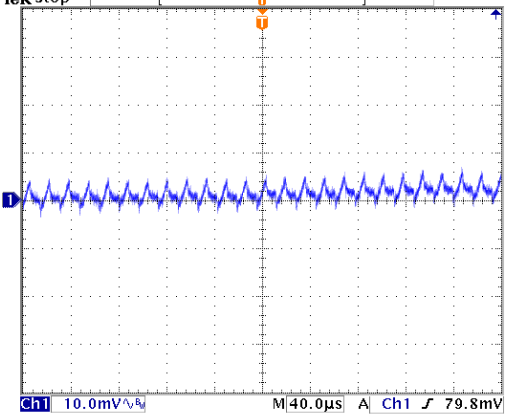
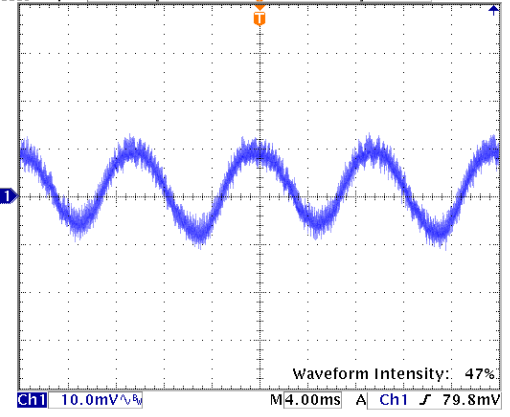
E.M.C. Test

■ RELIABILITY TEST

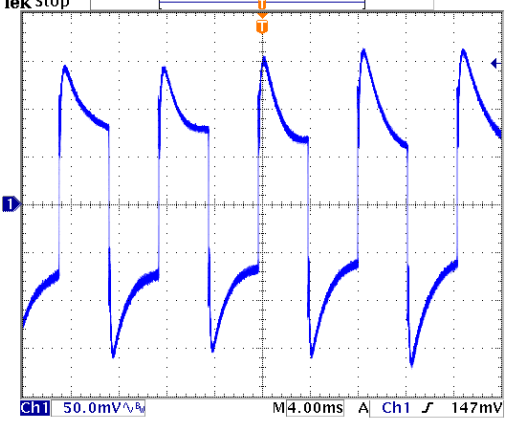
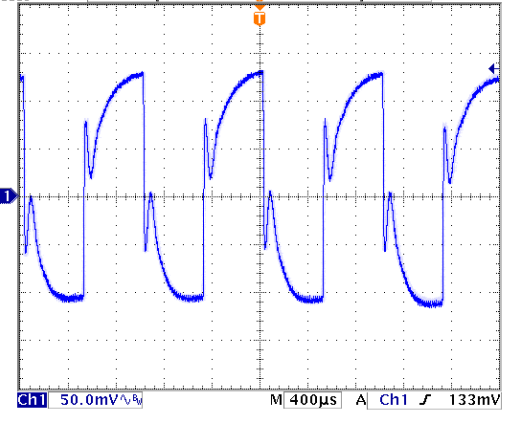
ENVIRONMENT TEST

DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

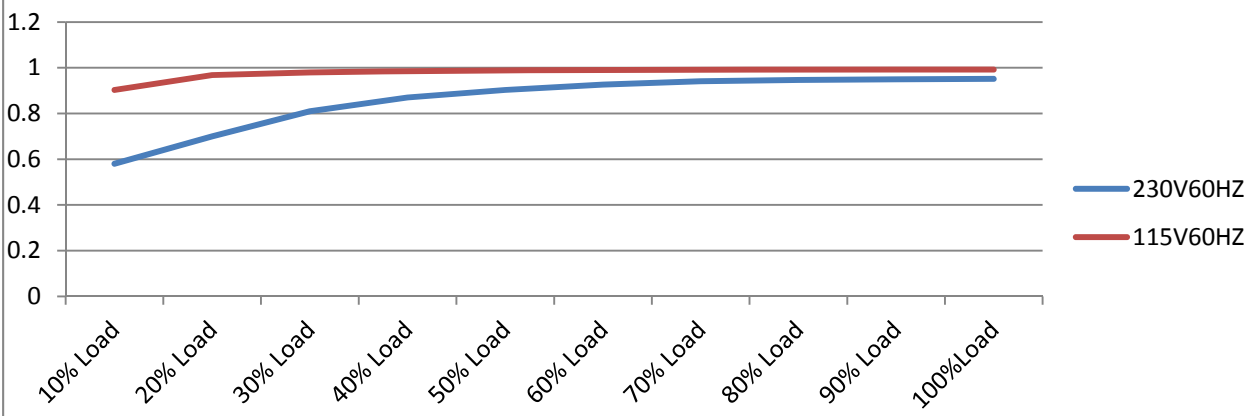
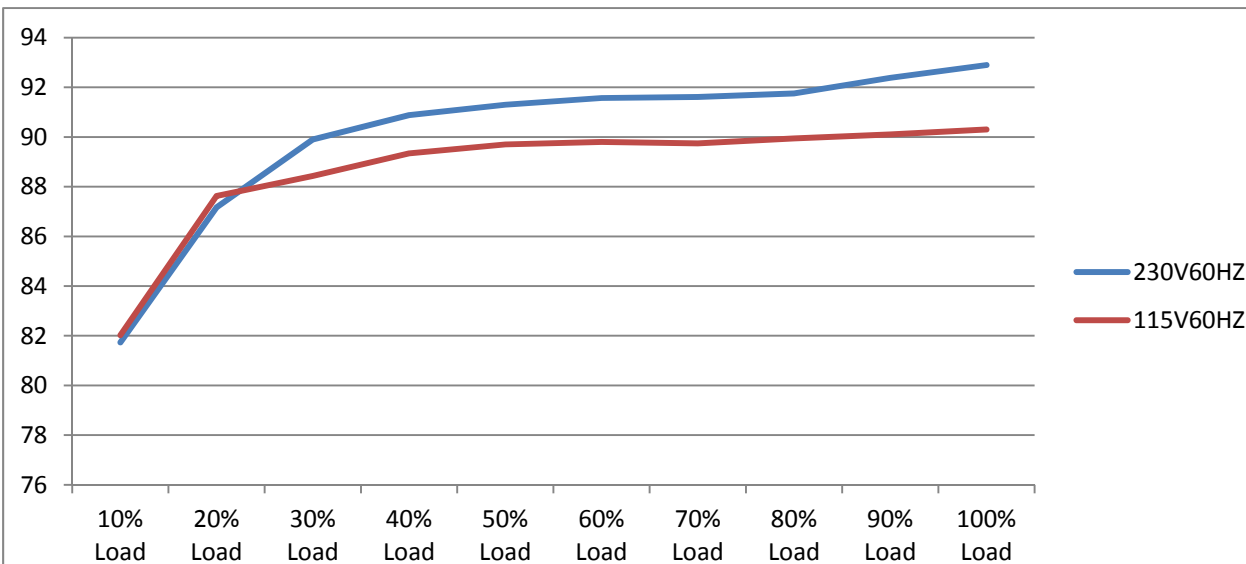
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 24V~ 28V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	23.29V~ 28.73V/230VAC 23.29V~28.73 V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -1%~ -1%	I/P: 100VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.37 %~0.37 %
3	LINE REGULATION (Max)	V1: -0.5%~ 0.5%	I/P: 100VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: 0 %~ 0%
4	LOAD REGULATION(Max)	V1: -1%~ 1%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.37 %~ 0.37 %
5	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	< ±5%
6	RIPPLE & NOISE(Max)	V1: 150mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 24.6mVp-p
high frequency :  Ch1 Pk-Pk 10.4mV low frequency :  Ch1 Pk-Pk 24.6mV				
7	SET UP TIME(Max)	230VAC/1500ms 115VAC/3000ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 872 ms 115VAC/ 1688 ms
INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage			INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	

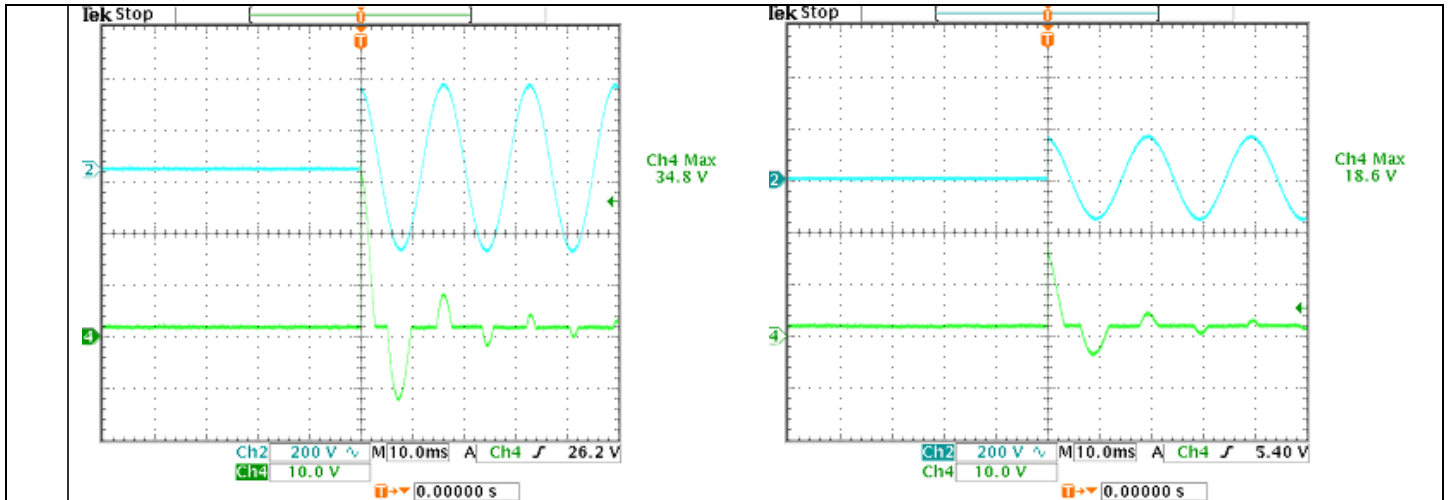
8	RISE TIME (Max) 230VAC/100ms 115VAC/100ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 44.4 ms 115VAC/ 42.8ms	
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage 		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage 	
9	HOLD UP TIME (Typ.) 230VAC/16ms 115VAC/16ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 18.4 ms 115VAC/ 18.8 ms	
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 	

10	DYNAMIC LOAD	V1: 2400mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C	331mVp-p 248mVp-p
FULL /50% LOAD 50%DUTY / 120HZ  Ch1 Pk-Pk 331mV FULL /50% LOAD 50%DUTY / 1KHZ  Ch1 Pk-Pk 248mV				
11	TRANSIENT RECOVERY TIME	V1: 2400mVp-p <500us	I/P: 230VAC O/P:40% LOAD CHANGE 50%DUTY/120HZ 1.25A/us	259mVp-p

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~264VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	66.8V~264V
			I/P: LOW-LINE-3V=87 V HIGH-LINE+15%=300 V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	TEST:OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P:100 VAC ~264 VAC O/P:FULL~MIN LOAD Ta:25°C	TEST: OK
3	INPUT CURRENT (Typ.)	230V/ 2.4A 115V/ 4.8A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 2.358A/ 230VAC I = 4.683A/ 115VAC
4	LEAKAGE CURRENT	<2 mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.874 mA N-FG : 0.874 mA
5	POWER FACTOR (Typ.)	0.94/ 230VAC 0.98/115VAC	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	PF= 0.954/230VAC PF= 0.992/115VAC
	P.F vs LOAD			

				
6	EFFICIENCY(Typ.)	92.5%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	92.9%
	EFFICIENCY vs LOAD 			
7	INRUSH CURRENT(Typ.)	230V/35A 115V/20A COLD START	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 34.8A/ 230VAC I = 18.6A/ 115VAC
	INPUT=230VAC/50HZ @ FULL LOAD CH2 : AC Input Voltage CH4 : Input current (1V=1A)		INPUT=115VAC/ 60HZ @ FULL LOAD CH2 : AC Input Voltage CH4 : Input current (1V=1A)	



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105%~ 130 %	I/P: 264VAC I/P: 230VAC I/P: 100VAC O/P: TESTING Ta: 25°C	116.6%/ 264VAC 116.55%/ 230VAC 116.6%/100VAC PROTECTION TYPE : constant current limiting, unit will shut down after 3sec., re-power on to recover
2	OVER VOLTAGE PROTECTION	29V~33V	I/P: 264VAC I/P: 230VAC I/P: 90VAC O/P: MIN LOAD Ta: 25°C	30.47V/ 264VAC 30.50V/ 230VAC 30.45V/ 90VAC PROTECTION TYPE : shut down o/p voltage, re-power on to recover
3	OVER TEMPERATURE PROTECTION	Protection type : shut down o/p voltage, recovers automatically after temperature goes down	I/P: 264VAC I/P: 90VAC O/P: FULL LOAD	O.T.P. Active Protection type : shut down o/p voltage, recovers automatically after temperature goes down
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC I/P: 90VAC O/P: FULL LOAD Ta: 25°C	NO DAMAGE PROTECTION TYPE : constant current limiting, recovers automatically after fault condition is removed

COMPONENT STRESS TEST

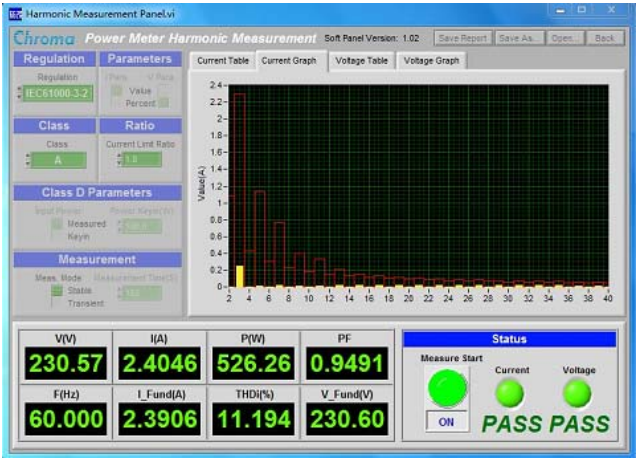
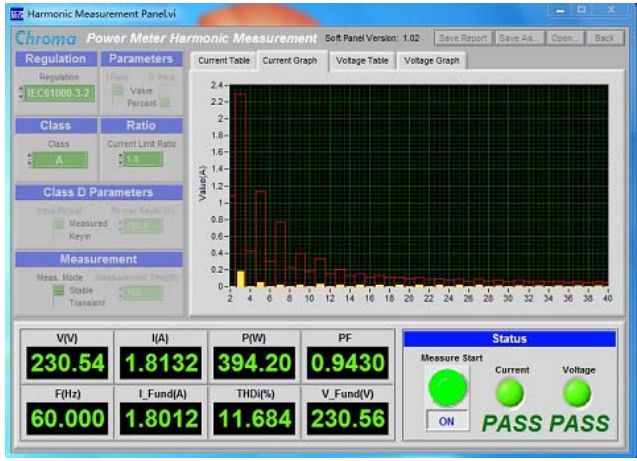
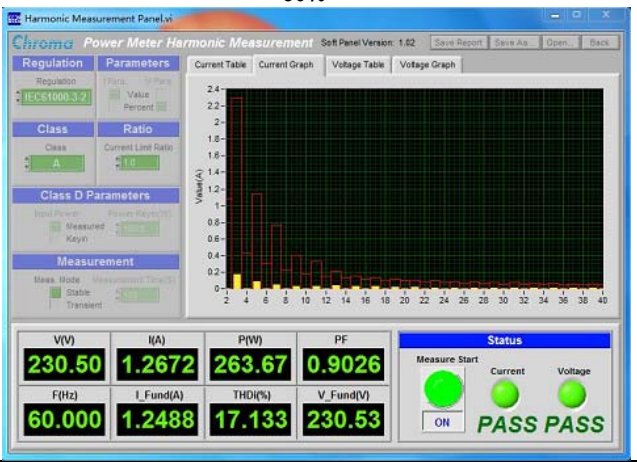
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated : 20A/ 600V	I/P: High-Line +3V = 267V AC ON/OFF VDS: O/P: (1) Full Load (2) Output Short (3) Full Load Continue Ta: 25°C	VDS: (1) 452V (2) 422V (3) 434V
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q902 Rated : 20A/ 600V	I/P: High-Line +3V = 267V AC ON/OFF O/P: (1) Full Load (2) Output Short (3) Full Load Continue	VDS: (1) 498V (2) 504V (3) 460V

			Ta:25℃	
3	P.F.C DIODE	D902 Rated : 6A/ 600V	I/P:High-Line +3V =267 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (4)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz Ta:25℃	(1) 450V (2) 434V (3) 446V (4) 444V
4	Diode Peak Voltage	Q100 Rated : 130A/ 75V Q102 Rated : 130A/ 75 V	I/P:High-Line +3V =267 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load Continue Ta:25℃	Q100: VDS: (1) 60.0V (2) 2.76V (3) 60.2V Q102: VDS: (1) 58.0V (2) 15.2V (3) 58.2V
5	Input Capacitor Voltage	C5 Rated: : 150 μ / 400 V 105 ℃	I/P:High-Line +3V =267 V O/P: (1)Full Load input on/off (2) Min load input on /Off (3)Full Load /Min load Change Ta:25℃	(1) 428V (2) 404V (3) 428V
6	Control IC Voltage Test	PWM IC U2 Rated : 16 V 8.85V(MIN.)	I/P:High-Line +3V =267 V AC ON/OFF O/P:(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. (5)NO LOAD VR 下限.LOW LINE Ta:25℃	(1) 14.5V (2) 14.5V (3) 14.5V (4) 13.5V (5) 13.8V

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3KVAC/min I/P-FG :2KVAC/min O/P-FG:0.5KVAC/min	I/P-O/P: 3.6 KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG:0.6 KVAC/min Ta:25℃	I/P-O/P: 9.73mA I/P-FG: 9.31mA O/P-FG: 7.89m A NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100M Ω I/P-FG: 500VDC>100M Ω O/P-FG:500VDC>100M Ω	I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25℃	I/P-O/P:> 9999M Ω I/P-FG: >9999M Ω O/P-FG: >9999M Ω NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 m Ω	40A / 2min Ta:25℃	15m Ω

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A	I/P:230VAC/50HZ O/P:FULL LOAD Ta:25°C	PASS
100%  75%  50% 				
2	CONDUCTION	EN55022	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	EN55022	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 INDUSTRY AIR : 8KV / Contact : 4KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 INDUSTRY INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-4-5 INDUSTRY L-N : 2KV L,N-PE : 4KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
7	Test by certified Lab & Test Report Prepare			

■ RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																																																
1	TEMPERATURE RISE TEST	MODEL : NDR-480-24 1. ROOM AMBIENT BURN-IN : 1 HRS I/P : 230VAC O/P : FULL LOAD Ta= 35.1 ℃ 2. HIGH AMBIENT BURN-IN : 1 HRS I/P : 230VAC O/P : FULL LOAD Ta= 50 ℃ <table><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta= 35.1 ℃</th><th>HIGH AMBIENT Ta= 50 ℃</th></tr><tr><td>1</td><td>L3</td><td>56.3℃</td><td>72.3℃</td></tr><tr><td>2</td><td>L4</td><td>62.9℃</td><td>79.1℃</td></tr><tr><td>3</td><td>LF1</td><td>59.5℃</td><td>75.5℃</td></tr><tr><td>4</td><td>LF2</td><td>67.4℃</td><td>83.3℃</td></tr><tr><td>5</td><td>L6</td><td>67.5℃</td><td>83℃</td></tr><tr><td>6</td><td>BD1</td><td>81.6℃</td><td>97.1℃</td></tr><tr><td>7</td><td>C196</td><td>87.1℃</td><td>102.6℃</td></tr><tr><td>8</td><td>ZNR2</td><td>70.8℃</td><td>86.5℃</td></tr><tr><td>9</td><td>L901</td><td>79.7℃</td><td>94℃</td></tr><tr><td>10</td><td>C904</td><td>72.9℃</td><td>88.4℃</td></tr><tr><td>11</td><td>D902</td><td>77.5℃</td><td>93.3℃</td></tr><tr><td>12</td><td>Q901</td><td>80.3℃</td><td>95.7℃</td></tr><tr><td>13</td><td>Q1</td><td>73.6℃</td><td>89.9℃</td></tr><tr><td>14</td><td>C42</td><td>72.8℃</td><td>89.4℃</td></tr><tr><td>15</td><td>C5</td><td>72.3℃</td><td>88.3℃</td></tr><tr><td>16</td><td>C102</td><td>59.8℃</td><td>75.6℃</td></tr><tr><td>17</td><td>Q100</td><td>104.5℃</td><td>120.5℃</td></tr><tr><td>18</td><td>T1 一次側</td><td>91.3℃</td><td>106.4℃</td></tr><tr><td>19</td><td>T1 二次側</td><td>90.7℃</td><td>105.8℃</td></tr><tr><td>20</td><td>C51</td><td>77.8℃</td><td>94.2℃</td></tr><tr><td>21</td><td>TSW</td><td>71.1℃</td><td>86.8℃</td></tr><tr><td>22</td><td>U2</td><td>76.7℃</td><td>92.4℃</td></tr><tr><td>23</td><td>U150</td><td>78.8℃</td><td>94.2℃</td></tr></table>			NO	Position	ROOM AMBIENT Ta= 35.1 ℃	HIGH AMBIENT Ta= 50 ℃	1	L3	56.3℃	72.3℃	2	L4	62.9℃	79.1℃	3	LF1	59.5℃	75.5℃	4	LF2	67.4℃	83.3℃	5	L6	67.5℃	83℃	6	BD1	81.6℃	97.1℃	7	C196	87.1℃	102.6℃	8	ZNR2	70.8℃	86.5℃	9	L901	79.7℃	94℃	10	C904	72.9℃	88.4℃	11	D902	77.5℃	93.3℃	12	Q901	80.3℃	95.7℃	13	Q1	73.6℃	89.9℃	14	C42	72.8℃	89.4℃	15	C5	72.3℃	88.3℃	16	C102	59.8℃	75.6℃	17	Q100	104.5℃	120.5℃	18	T1 一次側	91.3℃	106.4℃	19	T1 二次側	90.7℃	105.8℃	20	C51	77.8℃	94.2℃	21	TSW	71.1℃	86.8℃	22	U2	76.7℃	92.4℃	23	U150	78.8℃	94.2℃
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 111 % LOAD Ta : 25℃	TEST : OK																																																																																																
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC O/P : 100 % LOAD Ta= -25 ℃	TEST : OK																																																																																																
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 ℃ NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta= 51.4 ℃ HUMIDITY= 95 %R.H	TEST : OK																																																																																																
5	TEMPERATURE COEFFICIENT	± 0.03 %/℃ (0~50℃)	I/P : 230 VAC O/P : FULL LOAD	± 0.005 %/℃ (0~50℃)																																																																																																



480W Single Output Industrial DIN RAIL

NDR-480 series

6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40°C ~ +85°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 5 CYCLE 5. Input/Output condition : STATIC	OK
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -20°C ~ +70°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 10 CYCLE 5. Input/Output condition : 230VAC/Full Load AC ON/OFF TEST turn on 58sec ; turn off 2sec	OK
8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 2G (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK
9	CAPACITOR LIFE CYCLE	SUPPOSE C104 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 25 °C LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= 50 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 50 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 50 °C LIFE TIME	(1) 178628HRS (2) 31110HRS (3) 62680HRS (4) 114685HRS
10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE : 146.8 KHRS	
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 50°C	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ

2007/3/20 A50-S014