



Test Report: DRC-60A

60W Single Output With Battery Charger(UPS Function)

■ 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	VERDICT
1	RIPPLE & NOISE	V1 : 120 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 12.2 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 12 V ~ 15 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	11.51 V ~ 15.42 V / 230 VAC 11.51 V ~ 15.42 V / 115 VAC	P
3	OUTPUT VOLTAGE TOLERANCE	V1 : 1 % ~ -1 % (Max)	I/P : 90 VAC / 264 VAC O/P : FULL / MIN LOAD Ta : 25°C	V1 : -0.405 % ~ 0.361 %	P
4	LINE REGULATION	V1 : 0.5 % ~ -0.5 % (Max)	I/P : 90VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0 % ~ 0.04 %	P
5	LOAD REGULATION	V1 : 0.5 % ~ -0.5 % (Max)	I/P : 230 VAC O/P : FULL ~ MIN LOAD Ta : 25°C	V1 : -0.405 % ~ 0.361 %	P
6	SET UP TIME	230VAC : 400 ms (Max) 115VAC : 800 ms (Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC / 287.372 ms 115VAC / 612.098 ms	P
7	RISE TIME	230VAC : 50 ms (Max) 115VAC : 50 ms (Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC / 10.156 ms 115VAC / 7.910 ms	P
8	HOLD UP TIME	230VAC : 50 ms (TYP) 115VAC : 10 ms (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC / 70.404 ms 115VAC / 14.305 ms	P
9	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : <5 %	P
10	DYNAMIC LOAD	V1 : 1380 mVp-p	I/P : 230 VAC (1).O/P : FULL / Min LOAD 90%DUTY / 1KHZ (2).O/P : FULL / Min LOAD 90%DUTY / 3KHZ (3).O/P : FULL / Min LOAD 90%DUTY / 5KHZ (4).O/P : FULL / Min LOAD 50%DUTY / 120HZ Ta : 25°C	(1)290 mVp-p (2)212 mVp-p (3)203 mVp-p (4)528 mVp-p	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90VAC~264 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25℃ I/P : (1)LOW-LINE-3V=87 V HIGH-LINE+15%=300 V O/P: 75%/MIN LOAD 75% ON: 30 Sec OFF: 30 Sec 10MIN (2)230Vac ON: 0.5 Sec OFF: 0.5 Sec 20MIN (3)230Vac ON:3Sec OFF:3Sec 12HOURS (POWER ON/OFF NO DAMAGE)	70.625V~264V TEST : (1)OK (2)OK (3)OK	P
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P : 90 VAC ~ 264 VAC O/P : FULL~MIN LOAD Ta : 25℃	TEST : OK	P
3	EFFICIENCY	86 % (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25℃	86.72 %	P
4	INPUT CURRENT	230V/ 0.8 A (TYP) 115V/ 1.3 A (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25℃	I = 0.57 A/ 230 VAC I = 1.06 A/ 115 VAC	P
5	INRUSH CURRENT	230V/ 60 A (TYP) 115V/ 30 A(TYP) COLD START	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25℃	I = 56.000 A/ 230 VAC I = 29.367 A/ 115 VAC	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	105 % ~ 150 %	I/P : 230 VAC I/P : 115 VAC O/P : TESTING Ta : 25°C	130.00%/ 230 VAC 128.37%/ 115 VAC Hiccup Mode, recovers automatically after fault condition is removed	P
2	OVER VOLTAGE PROTECTION	CH1 : 14.49 V ~ 18.63 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	17.3 V/ 230 VAC 17.4 V/ 115 VAC Shut down Re- power ON	P
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P : 264 VAC O/P : FULL LOAD Ta : 25°C	NO DAMAGE Hiccup Mode, recovers automatically after fault condition is removed	P
4	BATTERY CUT OFF	10±0.5V	I/P : 230 VAC O/P : MIN LOAD Ta : 25°C	10.3 V/230VAC	P

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	AC OK	RELAY CONTACT OUTPUT ON:AC OK OFF:AC FAIL MAX RATING:30V/1A	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	OK :AC OK OK :AC FAIL	P
2	BATTERY LOW	RELAY CONTACT OUTPUT OFF :BATTERY OK ON :BATTERY LOW MAX RATING:30V/1A BATTERY LOW VOLTAGE:<11V	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	OK :BATTERY OK OK : BATTERY LOW 10.8 :BATTERY LOW	P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated : 10A/600V	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1) 514 V (2) 432 V (3) 510 V	P
2	Diode Peak Voltage	D100 Rated : 20A/100V	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C	(1) 68.8 V (2) 56.0 V (3) 68.4 V	P
3	Input Capacitor Voltage	C 5 Rated : 100u/400V 105°C 18*25	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on /Off	(1) 358 V (2) 360 V	P

		Surge Voltage:450V	(2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(3) 360 V	
4	Control IC Voltage Test	U1 Rated : 9.4V~28V	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1) 16.9 V (2) 16.9 V (3) 13.6 V	P

SAFETY & E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P : 3 KVAC/min I/P-FG : 2 KVAC/min O/P-FG : 0.5 KVAC/min	I/P-O/P : 3.6 KVAC/min I/P-FG : 2.4KVAC/min O/P-FG : 0.6 KVAC/min Ta : 25°C	I/P-O/P : 2.063 mA I/P-FG : 1.636 mA O/P-FG : 0.679 mA NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ I/P-FG : 500VDC>100MΩ O/P-FG : 500VDC>100MΩ	I/P-O/P : 500 VDC I/P-FG : 500 VDC O/P-FG : 500 VDC Ta : 25°C/70%RH	I/P-O/P : 482 MΩ I/P-FG : 496 MΩ O/P-FG : 504 MΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C / 70%RH	3mΩ	P

E.M.C TEST

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

RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT																																																																					
1	TEMPERATURE RISE TEST	MODEL : DRC-60A 1. ROOM AMBIENT BURN-IN : 1HRS I/P : 230VAC O/P : FULL LOAD Ta=28.6℃ 2. HIGH AMBIENT BURN-IN : 1 HRS I/P : 230VAC O/P : FULL LOAD Ta=51.5℃ <table><thead><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta=28.6℃</th><th>HIGH AMBIENT Ta=51.5℃</th></tr></thead><tbody><tr><td>1</td><td>L101</td><td>62.7℃</td><td>81.0℃</td></tr><tr><td>2</td><td>BD1</td><td>53.7℃</td><td>73.6℃</td></tr><tr><td>3</td><td>LF1</td><td>50.3℃</td><td>72.1℃</td></tr><tr><td>4</td><td>D5</td><td>72.7℃</td><td>94.4℃</td></tr><tr><td>5</td><td>Q1</td><td>61.7℃</td><td>82.7℃</td></tr><tr><td>6</td><td>T1</td><td>83.0℃</td><td>99.7℃</td></tr><tr><td>7</td><td>C106</td><td>74.4℃</td><td>92.7℃</td></tr><tr><td>8</td><td>D100</td><td>85.0℃</td><td>101.6℃</td></tr><tr><td>9</td><td>L100</td><td>61.2℃</td><td>81.0℃</td></tr><tr><td>10</td><td>U1</td><td>69.1℃</td><td>87.8℃</td></tr><tr><td>11</td><td>U200</td><td>66.7℃</td><td>85.0℃</td></tr><tr><td>12</td><td>C5</td><td>49.0℃</td><td>68.5℃</td></tr><tr><td>13</td><td>C36</td><td>65.4℃</td><td>84.0℃</td></tr><tr><td>14</td><td>C200</td><td>71.7℃</td><td>89.2℃</td></tr><tr><td>15</td><td>RY1</td><td>65.7℃</td><td>84.2℃</td></tr><tr><td>16</td><td>RY2</td><td>60.3℃</td><td>78.5℃</td></tr></tbody></table>			NO	Position	ROOM AMBIENT Ta=28.6℃	HIGH AMBIENT Ta=51.5℃	1	L101	62.7℃	81.0℃	2	BD1	53.7℃	73.6℃	3	LF1	50.3℃	72.1℃	4	D5	72.7℃	94.4℃	5	Q1	61.7℃	82.7℃	6	T1	83.0℃	99.7℃	7	C106	74.4℃	92.7℃	8	D100	85.0℃	101.6℃	9	L100	61.2℃	81.0℃	10	U1	69.1℃	87.8℃	11	U200	66.7℃	85.0℃	12	C5	49.0℃	68.5℃	13	C36	65.4℃	84.0℃	14	C200	71.7℃	89.2℃	15	RY1	65.7℃	84.2℃	16	RY2	60.3℃	78.5℃		P
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 130% LOAD Ta : 25℃	TEST : OK	P																																																																					
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC O/P : 100 % LOAD Ta=-20℃	TEST : OK	P																																																																					
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=50℃ HUMIDITY= 95 %R.H	TEST : OK	P																																																																					
5	TEMPERATURE COEFFICIENT	±0.03%/℃ (0~50℃)	I/P : 230 VAC O/P : FULL LOAD	±0.003%/℃ (0~50℃)	P																																																																					
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40℃~ +80℃ 2. Temperature change rate : 25℃ / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 5 CYCLE 5. Input/Output condition : STATIC		OK	P																																																																					

7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -30°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	P
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	P
9	CAPACITOR LIFE CYCLE	SUPPOSE C106 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) 131182HRS (2) 31876HRS (3) 51124HRS (4) 68901HRS	P
10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE : 504.1KHRS		P
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 50,000 hours @ TA 50°C		P

SAMPLE	TESTER	APPROVAL
PRODUCT SAMPLE	FRANK	WANGDZ

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