



# Test Report: DRC-100B

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**100W 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(Max)	V1: 240mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 36.0mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1: 24 V~ 30 V(有 VR 可調)	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	23.39V~ 31.53V/230VAC 23.39V~ 31.53V/115VAC	P
3	OUTPUT VOLTAGE(Max) TOLERANCE	V1: 1 %~ -1 %	I/P: 100VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.203%~ 0.203%	P
4	LINE REGULATION (Max)	V1: 0.5 %~ -0.5 %	I/P: 100VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: 0%~ 0.022%	P
5	LOAD REGULATION(Max)	V1: 0.5 %~ -0.5 %	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.203%~ 0.203%	P
6	SET UP TIME(Max)	230VAC/ 2400ms 115VAC/ 2400ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 761.405ms 115VAC/ 1624.177ms	P
7	RISE TIME (Max)	230VAC/ 50ms 115VAC/ 50ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 24.673ms 115VAC/ 21.219ms	P
8	HOLD UP TIME(Typ)	230VAC/ 50ms 115VAC/ 10ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 70.243ms 115VAC/ 15.589ms	P
9	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	<5%	P
10	DYNAMIC LOAD	V1: 2760 mVp-p	I/P: 230VAC O/P(1)FULL /Min LOAD 90%DUTY / 1KHZ (2) (1)FULL /Min LOAD 90%DUTY / 3KHZ (3)FULL /Min LOAD 90%DUTY / 5KHZ (4)FULL /Min LOAD 50%DUTY / 120HZ Ta:25°C	201mVp-p 142mVp-p 140mVp-p 365mVp-p	P

**INPUT FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90VAC~264VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	70.700V~264V	P
			I/P: (1)LOW-LINE-3V=87 V HIGH-LINE+15%=300 V O/P:FULL/MIN LOAD 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 )	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	P
3	EFFICIENCY(TYP)	88 %	I/P:230 VAC O/P:FULL LOAD Ta:25°C	89.35 %	P
4	INPUT CURRENT (Typ)	230V/ 1.1 A 115V/ 1.8 A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 0.758A/ 230VAC I = 1.645A/ 115VAC	P
5	INRUSH CURRENT(Typ)	230V/ 60A 115V/ 30A COLD START	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 45.531A/ 230VAC I = 28.968A/ 115VAC	P

### PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	105 %~ 150 %	I/P: 230VAC I/P: 115VAC O/P: TESTING Ta: 25°C	132.57%/ 230VAC 128.86%/115VAC Hiccup mode, recovers automatically after fault condition is removed	P
2	OVER VOLTAGE PROTECTION	CH: 28.98 V~ 37.26 V	I/P: 230VAC I/P: 115VAC O/P: MIN LOAD Ta: 25°C	33.0V/ 230VAC 32.7V/ 115VAC Shut down Re- power ON	P
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC O/P: FULL LOAD Ta: 25°C	NO DAMAGE Hiccup mode, recovers automatically after fault condition is removed	P
4	BATTERY CUT OFF	20±1V Relay contact output, ON : AC OK ; OFF : AC Fail ; max. rating : 30V/1A	I/P: 230VAC I/P: 115VAC O/P: MIN LOAD Ta: 25°C	BATTERY CUT OFF : 19.58V	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: 230VAC O/P: FULL LOAD Ta: 25°C	TEST : OK	P
2	BATTERY LOW	Battery low voltage : <22V Relay contact output, OFF : Battery OK ; ON : Battery Low ; max. rating : 30V/1A	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	Battery low voltage : 20.72V	P

### COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	PWM Transistor (D to S) or (C to E) <b>Peak Voltage</b>	Q 1 Rated 16A/600V	I/P: High-Line +3V =267V O/P: (1) Full Load input on/off (2) Output Short (3) Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4) Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5) Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6) Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz Ta: 25°C	VDS : (1) 520V (2) 430V (3) 518V (4) 518V (5) 520V (6) 520V (7) 520V	P
2	Diode <b>Peak Voltage</b>	Q100 Rated 20 40A/200V	I/P: High-Line +3V =267 V O/P: (1) Full Load input on/off (2) Output Short (3) Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4) Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5) Dynamic Load Full Load/	Q100: VDS : (1) 180V (2) 186V (3) 177V (4) 178V (5) 179V (6) 176V	P

			Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. Ta:25°C	(7) 176V	
3	Input Capacitor Voltage	C5 Rated: 150 $\mu$ /400V 105 °C	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°C	(1) 358V (2) 362V (3) 362V	P
4	Control IC Voltage Test	PWM IC U1 Rated 28 V 9.4 V(MIN.)	I/P:High-Line +3V =267 V O/P:(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. (5)NO LOAD VR MIN.LOW LINE Ta:25°C	(1) 16.9V (2) 16.9V (3) 16.9V (4) 14.5V (5) 16.8V	P
6	Clamp Diode Peak Voltage	D5 Rated : 600 V 3 A	I/P : High-Line +3V = 267 V O/P : (1) Dynamic Load 90%Duty/1KHz (2)Full load continue Ta : 25°C	(1) 452 V (2) 454 V	P

### SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
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°C	I/P-O/P: 3.666mA I/P-FG : 4.85mA O/P-FG: 3.91m A NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100M $\Omega$ I/P-FG: 500VDC>100M $\Omega$ O/P-FG:500VDC>100M $\Omega$	I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25°C	I/P-O/P: 9999M $\Omega$ I/P-FG: 9999M $\Omega$ O/P-FG: 9999M $\Omega$ NO DAMAGE	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%,75%,50%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-100A 1. ROOM AMBIENT BURN-IN : 1HRS I/P : 230VAC O/P : FULL LOAD Ta=22.4°C 2. HIGH AMBIENT BURN-IN : 1HRS I/P : 230VAC O/P : FULL LOAD Ta=44.9°C	<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta=22.4°C</th> <th>HIGH AMBIENT Ta=44.9°C</th> </tr> </thead> <tbody> <tr><td>1</td><td>T1</td><td>87.6°C</td><td>109.5°C</td></tr> <tr><td>2</td><td>D5</td><td>84.1°C</td><td>107.6°C</td></tr> <tr><td>3</td><td>Q1</td><td>65.9°C</td><td>90.2°C</td></tr> <tr><td>4</td><td>C35</td><td>67.7°C</td><td>91.9°C</td></tr> <tr><td>5</td><td>C36</td><td>66.0°C</td><td>89.7°C</td></tr> <tr><td>6</td><td>C105</td><td>61.2°C</td><td>85.8°C</td></tr> <tr><td>7</td><td>Q100</td><td>75.5°C</td><td>101.9°C</td></tr> <tr><td>8</td><td>C108</td><td>58.0°C</td><td>79.6°C</td></tr> <tr><td>9</td><td>U1</td><td>72.7°C</td><td>97.2°C</td></tr> <tr><td>10</td><td>C106</td><td>53.6°C</td><td>77.8°C</td></tr> <tr><td>11</td><td>RY1</td><td>57.3°C</td><td>78.4°C</td></tr> <tr><td>12</td><td>BD1</td><td>50.7°C</td><td>72.3°C</td></tr> <tr><td>13</td><td>C5</td><td>41.4°C</td><td>64.1°C</td></tr> <tr><td>14</td><td>LF2</td><td>40.3°C</td><td>63.2°C</td></tr> <tr><td>15</td><td>U200</td><td>63.8°C</td><td>86.7°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta=22.4°C	HIGH AMBIENT Ta=44.9°C	1	T1	87.6°C	109.5°C	2	D5	84.1°C	107.6°C	3	Q1	65.9°C	90.2°C	4	C35	67.7°C	91.9°C	5	C36	66.0°C	89.7°C	6	C105	61.2°C	85.8°C	7	Q100	75.5°C	101.9°C	8	C108	58.0°C	79.6°C	9	U1	72.7°C	97.2°C	10	C106	53.6°C	77.8°C	11	RY1	57.3°C	78.4°C	12	BD1	50.7°C	72.3°C	13	C5	41.4°C	64.1°C	14	LF2	40.3°C	63.2°C	15	U200	63.8°C	86.7°C		P
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230 VAC O/P : 131% LOAD Ta : 25°C	TEST : OK	P
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC O/P : 100 % LOAD Ta=-30°C	TEST : OK	P
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50°C NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta=45°C HUMIDITY= 95 %R.H	TEST : OK	P
5	TEMPERATURE COEFFICIENT	±0.03%/°C (0~50°C)	I/P : 230 VAC O/P : FULL LOAD	±0.003%/°C (0~50°C)	P
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	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 C105 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=45°C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta=45°C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta=45°C LIFE TIME		(1) 183812HRS (2) 39743HRS (3) 78324HRS (4) 149248HRS	P
10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE : 410.1KHRS			P
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 50,000 hours @ TA 50°C			P

TEST RESULT	TESTER	APPROVAL
PASS	FRANK	WANGDZ

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