



Test Report: MDC1850500

185W Single Output Switching Power Supply

■ DESIGN VERIFY TEST

Output Function Test
Input Function Test
Protection Function Test
Other Test
Component Stress Test

■ SAFETY & E.M.C. TEST

Safety Test
E.M.C. Test

■ RELIABILITY TEST

Approved by	Checked by	Tested by
Albert YH Chen	Casio Lin	Leo Chung

DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	Vo: 2000mVp-p	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	Vo: 1820mVp-p	P
2	OUTPUT VOLTAGE RANGE	CH1: 200V~400V	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	400.1V / 115VAC 400.2V / 230VAC	P
3	RATED CURRENT	500mA ±5%	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	499mA	P
4	CONSTANT CURRENT REGION	200V~400V	I/P: 230 VAC O/P: CV MODE Ta: 25°C	O/P=200V : 500mA O/P=400V : 498mA	P
5	LINE REGULATION	Io: ±1%	I/P: 100 VAC ~305 VAC O/P: FULL LOAD Ta: 25°C	Io: ±0.4%	P
6	TRUN ON TIME	115VAC/ <1500ms 230VAC/ <500ms	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	115 VAC/ 521ms 230 VAC/ 117ms	P
7	RISE TIME	115VAC/ <100ms 230VAC/ <100ms	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	115 VAC/ 21.51ms 230 VAC/ 20.52ms	P
8	HOLD UP TIME	115VAC/ >12ms	I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	115 VAC/ 15.1ms	P
9	OVER/UNDERSHOOT TEST	< +5%	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	TEST: < 5%	P

10	DIMMER TEST (B Type only)	<p>SPEC:</p> <p>*Reference resistance value for output current adjustment (Typical)</p> <table border="1"> <tr> <th>Resistance value</th> <th>Short</th> <th>10K</th> <th>20K</th> <th>30K</th> <th>40K</th> <th>50K</th> <th>60K</th> <th>70K</th> <th>80K</th> <th>90K</th> <th>100K</th> </tr> <tr> <td>Output current</td> <td>0%</td> <td>10%</td> <td>20%</td> <td>30%</td> <td>40%</td> <td>50%</td> <td>60%</td> <td>70%</td> <td>80%</td> <td>90%</td> <td>100%</td> </tr> </table> <p>*1 ~ 10V dimming function for output current adjustment (Typical)</p> <table border="1"> <tr> <th>Dimming value</th> <th>0V</th> <th>1V</th> <th>2V</th> <th>3V</th> <th>4V</th> <th>5V</th> <th>6V</th> <th>7V</th> <th>8V</th> <th>9V</th> <th>10V</th> </tr> <tr> <td>Output current</td> <td>0%</td> <td>10%</td> <td>20%</td> <td>30%</td> <td>40%</td> <td>50%</td> <td>60%</td> <td>70%</td> <td>80%</td> <td>90%</td> <td>100%</td> </tr> </table> <p>*10V PWM signal for output current adjustment (Typical); Frequency Range: 100~3KHz</p> <table border="1"> <tr> <th>Duty value</th> <th>0%</th> <th>10%</th> <th>20%</th> <th>30%</th> <th>40%</th> <th>50%</th> <th>60%</th> <th>70%</th> <th>80%</th> <th>90%</th> <th>100%</th> </tr> <tr> <td>Output current</td> <td>0%</td> <td>10%</td> <td>20%</td> <td>30%</td> <td>40%</td> <td>50%</td> <td>60%</td> <td>70%</td> <td>80%</td> <td>90%</td> <td>100%</td> </tr> </table> <p>TEST RESULT: I/P : 230 VAC ;Ta : 25°C</p>											Resistance value	Short	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Dimming value	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Duty value	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
		Resistance value	Short	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K																																																																							
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		Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%																																																																							
		1	Resistance value	Short	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K																																																																						
			Output current	0	0.041	0.090	0.141	0.193	0.243	0.294	0.345	0.396	0.448	0.498																																																																						
			%	0.0%	8.20%	18.00%	28.20%	38.60%	48.60%	58.80%	69.00%	79.20%	89.60%	99.6%																																																																						
2	Dimming value	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V																																																																								
	Output current	0	0.042	0.093	0.144	0.195	0.247	0.298	0.349	0.400	0.451	0.500																																																																								
	%	0.0%	8.40%	18.60%	28.80%	39.00%	49.40%	59.60%	69.80%	80.00%	90.20%	100.0%																																																																								
3	Duty value	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%																																																																								
	Output current	0	0.042	0.092	0.143	0.194	0.245	0.296	0.348	0.398	0.449	0.500																																																																								
	%	0.0%	8.40%	18.40%	28.60%	38.80%	49.00%	59.20%	69.60%	79.60%	89.80%	100.0%																																																																								
<p>Note: The output current drops down to 0% when the dimming input is about 1KΩ or 0.1Vdc or 10V PWM signal with 1% duty cycle.</p>																																																																																				

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INPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90 VAC~305 VAC	I/P: TESTING O/P: FULL LOAD Ta: 25°C	85V~305V	P
			I/P: (1)LOW-LINE=90 V (2)HIGH-LINE=305 V O/P:FULL/MIN LOAD ON: 30 Sec. OFF: 30 Sec. 10MIN (AC POWER ON/OFF NO DAMAGE)	OK	
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P: 90 VAC ~305VAC O/P: FULL~MIN LOAD Ta: 25°C	OK	P
3	POWER FACTOR	0.98 / 115VAC FULL LOAD (TYP) 0.95 / 230VAC FULL LOAD (TYP) 0.93 / 264VAC FULL LOAD (TYP)	I/P: 115 VAC I/P: 230 VAC I/P: 264 VAC O/P:FULL LOAD Ta:25°C	PF=0.998/115VAC PF=0.982/230VAC PF=0.970/264VAC	P
4	EFFICIENCY	92% (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	94.5%	P
5	INPUT CURRENT	115 V / 2.00A 230 V / 1.00A 277 V / 0.85A	I/P: 115 VAC I/P: 230 VAC I/P: 277 VAC O/P:FULL LOAD Ta:25°C	I = 1.905 A/ 115VAC I = 0.934 A/ 230VAC I = 0.817 A/ 277VAC	P
6	INRUSH CURRENT	230 V/ 75A (Typ) COLD START	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	I = 60.4A/ 230VAC	P
7	THD	230VAC/ <10%	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	6.87%	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	OVER VOLTAGE PROTECTION	Vo: 420V~ 450V	I/P: 90 VAC I/P: 230 VAC I/P: 305VAC O/P: NO LOAD Ta:25°C	445V / 90VAC 445V / 230VAC 447V / 305VAC Latch o/p voltage; Auto-recovery	P
2	OVER TEMPERATURE PROTECTION (Phase 1)	SPEC: Ta: 70±10°C .	I/P: 230 VAC O/P: FULL LOAD	Output de-rate to 70%±5%	P
3	OVER TEMPERATURE PROTECTION (Phase 2)	SPEC: Ta: 85±10°C O.T.P. NO DAMAGE	I/P: 230 VAC O/P: FULL LOAD	O.T.P. Active Shut down o/p current; Auto-recovery.	P
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 305VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE Shut down o/p voltage & current; Auto-recovery.	P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	QM1 Rated 15A 600V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full Load continue Ta : 25°C	(1) 426 V (2) 430 V	P
		QM2 Rated 15A 600V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full Load continue Ta : 25°C	(1) 440 V (2) 413 V	P
2	Diode Peak Voltage	DP5 Rated 600V4A	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full Load continue Ta : 25°C	(1) 392 V (2) 386 V	P
		DP6 Rated 600V4A	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full Load continue Ta : 25°C	(1) 392 V (2) 386 V	P
3	Input Capacitor Voltage	CEP1 Rated 100u /450V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full Load continue Ta : 25°C	(1) 415 V (2) 416 V	P
4	Control IC Voltage Test	U2 Rated 30V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full Load continue Ta : 25°C	(1) 21.9 V (2) 21.7 V	P
5	P.F.C Transistor (D to S) or (C to E) Peak Voltage	QP1 Rated 30A 600V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full Load continue Ta : 25°C	(1) 440 V (2) 435 V	P

SAFETY & EMC TEST

SAFETY TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	IEC61347-1/-2-13 I/P-O/P:3.75KVAC/min<10mA I/P-PE:2KVAC/min<10mA O/P-PE:0.5KVAC/min<10mA	I/P-O/P: 3.75 KVAC/min I/P-PE: 2KVAC/min O/P-PE:0.5KVAC/min<10mA Ta:25°C	I/P-O/P: 2.39mA I/P-PE: 2.95mA O/P-PE: 0.248mA NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ I/P-PE:500VDC>100MΩ O/P-PE:500VDC>100MΩ	I/P-O/P: 500 VDC I/P- PE: 500 VDC O/P- PE: 500 VDC Ta:25°C	I/P-O/P: 25.9GΩ I/P- PE: 26.1GΩ O/P- PE: 27.5GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	IEC61347-1/-2-13 PE TO CHASSIS OR TRACE < 0.5 Ω	25A / 1min Ta:25°C	39mΩ	P

E.M.C TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A CLASS C	I/P: 240VAC/50HZ LOAD:LED/ELECTRONIC LOAD O/P:100%/50% LOAD Ta:25°C	PASS	P
2	CONDUCTION	EN55022 EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL/50% LOAD Ta:25°C	PASS Test by certified Lab	P
3	RADIATION	EN55022 EN55015 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 INDUSTRY AIR:8KV / Contact:4KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
5	E.FT	EN61000-4-4 INDUSTRY INPUT: 1KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
6	SURGE	IEC61000-4-5 INDUSTRY L-N :5KV L,N-PE:10KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P

Reliability Test

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT		
1	TEMPERATURE RISE TEST	MODEL : MDC1850500			P		
		1. Room Ambient Burn-in : 3 HRS I/P : 230VAC O/P : Full Load Ta= 25.1°C					
		2. High Ambient Burn-in : 6 HRS I/P : 230VAC O/P : Full Load Ta=60.2°C					
			NO	Position		ROOM AMBIENT Ta= 25.1°C	HIGH AMBIENT Ta= 60.2°C
			1	LF1		56.0°C	79.3°C
			2	LF2		57.6°C	81.0°C
			3	VZ1		51.1°C	74.5°C
			4	BD1		59.6°C	82.9°C
			5	T1		67.0°C	90.0°C
			6	DP2		60.7°C	84.3°C
			7	QP1		59.7°C	83.0°C
			8	CEP1		59.5°C	83.2°C
			9	U1		58.3°C	82.5°C
			10	QM1		61.3°C	85.8°C
			11	QM2		60.6°C	84.6°C
			12	TM1		67.6°C	90.3°C
			13	U2		60.8°C	84.0°C
			14	DP5		62.1°C	85.7°C
			15	DP7		61.8°C	85.3°C
			16	CES4		59.1°C	82.4°C
			17	CES5		60.7°C	83.5°C
	18	CES6	59.5°C	82.6°C			
	19	CES8	59.0°C	82.0°C			
	20	TR4	61.3°C	84.8°C			
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 305 VAC O/P : O/P SHORT TEST Ta : 25°C	OK	P		
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 4 HOUR	I/P : 100VAC / 305VAC O/P : 95% LOAD Ta= -40 °C	OK	P		
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60 °C NO DAMAGE	I/P : 305 VAC O/P : 95% Ta= 60 °C HUMIDITY= 95 %R.H	OK	P		
5	TEMPERATURE COEFFICIENT	+ 0.03 % (0~50°C)	I/P : 230 VAC O/P : FULL LOAD	+ 0.002 % (0~50°C)	P		

6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -45°C~ +90°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 : -35°C~ +65°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 TURN ON/58SEC.;TURN OFF/2SEC.	OK	P
8	VIBRATION TEST	(1) Waveform : Sine Wave (2) Frequency : 5~500Hz (3) Sweep Time : 2S/sweep cycle (4) Acceleration : 1G (5) Test Time : 1 time in each axis (X.Y.Z) (6) Ta : 25°C	OK	P
9	CAPACITOR LIFE CYCLE	Suppose CES5 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= 60 °C LIFE TIME (3) I/P : 230VAC O/P : 75% Load Ta= 60 °C LIFE TIME (4) I/P : 230VAC O/P : 50% Load Ta= 60 °C LIFE TIME	(1) 382180 Hrs (2) 78663.6 Hrs (3) 126574.4 Hrs (4) 158022.9 Hrs	P
10	MTBF	TOTAL FAILURE RATE : 220K HRS Ta: 25°C	OK	P
11	DMTBF/ Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 50,000 hours @ T case 70°C	OK 58731 Hrs	P



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■ RELIABILITY TEST

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DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	Vo: 1500mVp-p	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	Vo: 1290mVp-p	P
2	OUTPUT VOLTAGE RANGE	CH1: 143V~286V	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	286.01V / 115VAC 286.00V / 230VAC	P
3	RATED CURRENT	700mA ±5%	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	700mA	P
4	CONSTANT CURRENT REGION	143V~286V	I/P: 230 VAC O/P: CV MODE Ta: 25°C	O/P=143V : 703mA O/P=286V : 700mA	P
5	LINE REGULATION	Io: ±1%	I/P: 100 VAC ~305 VAC O/P: FULL LOAD Ta: 25°C	Io: ±0.4%	P
6	SET UP TIME	115VAC/ <1500ms 230VAC/ <500ms	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	115 VAC/ 924ms 230 VAC/ 64.8ms	P
7	RISE TIME	115VAC/ <100ms 230VAC/ <100ms	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	115 VAC/ 31.61ms 230 VAC/ 30.16ms	P
8	HOLD UP TIME	115VAC/ >12ms	I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	115 VAC/ 14.4ms	P
9	OVER/UNDERSHOOT TEST	< +5%	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	TEST: < 5%	P

10	DIMMER TEST (B Type only)	SPEC:											
		*Reference resistance value for output current adjustment (Typical)											
		Resistance value	Short	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K
		Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
		*1 ~ 10V dimming function for output current adjustment (Typical)											
		Dimming value	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V
		Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
		*10V PWM signal for output current adjustment (Typical); Frequency Range: 100~3KHz											
		Duty value	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
		Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
TEST RESULT: I/P : 230 VAC ;Ta : 25°C													
	1	Resistance value	Short	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K
		Output current	0	0.059	0.130	0.203	0.274	0.346	0.417	0.490	0.562	0.633	0.697
		%	0.0%	8.43%	18.57%	29.00%	39.14%	49.43%	59.57%	70.00%	80.29%	90.43%	99.57%
	2	Dimming value	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V
		Output current	0	0.058	0.128	0.198	0.267	0.339	0.409	0.476	0.553	0.622	0.691
		%	0.0%	8.29%	18.29%	28.29%	38.14%	48.43%	58.43%	68.00%	79.00%	88.86%	98.71%
	3	Duty value	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
		Output current	0	0.057	0.127	0.199	0.269	0.340	0.411	0.481	0.552	0.623	0.693
		%	0.0%	8.14%	18.14%	28.43%	38.43%	48.57%	58.71%	68.71%	78.86%	89.00%	99.00%
Note: The output current drops down to 0% when the dimming input is about 1KΩ or 0.1Vdc or 10V PWM signal with 1% duty cycle.													

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INPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90 VAC~305 VAC	I/P: TESTING O/P: FULL LOAD Ta: 25°C	81V~305V	P
			I/P: (1)LOW-LINE=90 V (2)HIGH-LINE=305 V O/P:FULL/MIN LOAD ON: 30 Sec. OFF: 30 Sec. 10MIN (AC POWER ON/OFF NO DAMAGE)	OK	
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P: 90 VAC ~305VAC O/P: FULL~MIN LOAD Ta: 25°C	OK	P
3	POWER FACTOR	0.98 / 115VAC FULL LOAD (TYP) 0.95 / 230VAC FULL LOAD (TYP) 0.93 / 264VAC FULL LOAD (TYP)	I/P: 115 VAC I/P: 230 VAC I/P: 264 VAC O/P:FULL LOAD Ta:25°C	PF=0.999/115VAC PF=0.988/230VAC PF=0.978/264VAC	P
4	EFFICIENCY	92% (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	93.1%	P
5	INPUT CURRENT	115 V / 2.00A 230 V / 1.00A 277V / 0.85A	I/P: 115 VAC I/P: 230 VAC I/P: 277VAC O/P:FULL LOAD Ta:25°C	I = 1.941 A/ 115VAC I = 0.964 A/ 230VAC I = 0.805 A/ 277VAC	P
6	INRUSH CURRENT	230 V/ 75A (Typ) COLD START	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	I = 60.4A/ 230VAC	P
7	THD	230VAC/ <10%	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	4.45%	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	OVER VOLTAGE PROTECTION	Vo: 320V~ 350V	I/P: 90 VAC I/P: 230 VAC I/P: 305VAC O/P: NO LOAD Ta:25°C	340V / 90VAC 341V / 230VAC 341V / 305VAC Latch o/p voltage; Auto-recovery	P
2	OVER TEMPERATURE PROTECTION (Phase 1)	SPEC: Ta: 70±10°C .	I/P: 230 VAC O/P: FULL LOAD	Output de-rate to 70%±5%	P
3	OVER TEMPERATURE PROTECTION (Phase 2)	SPEC: Ta: 85±10°C O.T.P. NO DAMAGE	I/P: 230 VAC O/P: FULL LOAD	O.T.P. Active Shut down o/p current; Auto-recovery.	P
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 305VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE Shut down o/p voltage & current; Auto-recovery.	P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	QM1 Rated 15A 600V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 425 V (2) 431 V	P
		QM2 Rated 15A 600V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 443 V (2) 415 V	P
2	Diode Peak Voltage	DP5 Rated 600V4A	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 290 V (2) 277 V	P
		DP6 Rated 600V4A	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 290 V (2) 277 V	P
3	Input Capacitor Voltage	CEP1 Rated 100u /450V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 413 V (2) 415 V	P
4	Control IC Voltage Test	U2 Rated 30V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 21.8 V (2) 21.7 V	P
5	P.F.C Transistor (D to S) or (C to E) Peak Voltage	QP1 Rated 30A 600V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 441 V (2) 436 V	P

SAFETY & EMC TEST

SAFETY TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	IEC61347-1/-2-13 I/P-O/P:3.75KVAC/min<10mA I/P-PE:2KVAC/min<10mA O/P-PE:0.5KVAC/min<10mA	I/P-O/P: 3.75 KVAC/min I/P-PE: 2KVAC/min O/P-PE:0.5KVAC/min<10mA Ta:25°C	I/P-O/P: 2.29mA I/P-PE: 2.37mA O/P-PE: 0.231mA NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ I/P-PE:500VDC>100MΩ O/P-PE:500VDC>100MΩ	I/P-O/P: 500 VDC I/P- PE: 500 VDC O/P- PE: 500 VDC Ta:25°C	I/P-O/P: 23.9GΩ I/P- PE: 26.8GΩ O/P- PE: 28.1GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	IEC61347-1/-2-13 PE TO CHASSIS OR TRACE < 0.5 Ω	25A / 1min Ta:25°C	36mΩ	P

E.M.C TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A CLASS C	I/P: 240VAC/50HZ LOAD:LED/ELECTRONIC LOAD O/P:100%/50% LOAD Ta:25°C	PASS	P
2	CONDUCTION	EN55022 EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL/50% LOAD Ta:25°C	PASS Test by certified Lab	P
3	RADIATION	EN55022 EN55015 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 INDUSTRY AIR:8KV / Contact:4KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
5	E.FT	EN61000-4-4 INDUSTRY INPUT: 1KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
6	SURGE	IEC61000-4-5 INDUSTRY L-N :5KV L,N-PE:10KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P

Reliability Test

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT		
1	TEMPERATURE RISE TEST	MODEL : MDC1850700			P		
		1. Room Ambient Burn-in : 3 HRS I/P : 230VAC O/P : Full Load Ta= 24.9°C					
		2. High Ambient Burn-in : 6 HRS I/P : 230VAC O/P : Full Load Ta=60.1°C					
			NO	Position		ROOM AMBIENT Ta= 24.9°C	HIGH AMBIENT Ta= 60.1°C
			1	LF1		57.1°C	80.9°C
			2	LF2		58.8°C	82.7°C
			3	VZ1		52.2°C	76.1°C
			4	BD1		60.9°C	84.6°C
			5	T1		68.3°C	91.8°C
			6	DP2		61.9°C	86.0°C
			7	QP1		61.0°C	84.7°C
			8	CEP1		60.7°C	84.8°C
			9	U1		59.5°C	84.2°C
			10	QM1		62.6°C	87.5°C
			11	QM2		61.8°C	86.3°C
			12	TM1		69.0°C	92.1°C
			13	U2		62.0°C	85.7°C
			14	DP5		63.3°C	87.4°C
			15	DP7		63.1°C	87.0°C
			16	CES4		60.3°C	84.1°C
			17	CES5		62.0°C	85.2°C
	18	CES6	60.7°C	84.3°C			
	19	CES8	60.2°C	83.7°C			
	20	TR4	62.5°C	86.6°C			
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 305 VAC O/P : O/P SHORT TEST Ta : 25°C	OK	P		
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 4 HOUR	I/P : 100VAC / 305VAC O/P : 95% LOAD Ta= -40 °C	OK	P		
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60 °C NO DAMAGE	I/P : 305 VAC O/P : 95% Ta= 60 °C HUMIDITY= 95 %R.H	OK	P		
5	TEMPERATURE COEFFICIENT	+ 0.03 % (0~50°C)	I/P : 230 VAC O/P : FULL LOAD	+ 0.002 % (0~50°C)	P		

6	STORAGE TEMPERATURE TEST	<ol style="list-style-type: none"> 1. Thermal shock Temperature : -45°C~ +90°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	<ol style="list-style-type: none"> 1. Thermal shock Temperature : -35°C~ +65°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 TURN ON/58SEC.;TURN OFF/2SEC. 	OK	P
8	VIBRATION TEST	<ol style="list-style-type: none"> (1) Waveform : Sine Wave (2) Frequency : 5~500Hz (3) Sweep Time : 2S/sweep cycle (4) Acceleration : 1G (5) Test Time : 1 time in each axis (X.Y.Z) (6) Ta : 25°C 	OK	P
9	CAPACITOR LIFE CYCLE	<p>Suppose CES5 is the most critical component</p> <ol style="list-style-type: none"> (1) I/P : 230VAC O/P : Full Load Ta= 25 °C LIFE TIME (2) I/P : 230VAC O/P : Full Load Ta= 60 °C LIFE TIME (3) I/P : 230VAC O/P : 75% Load Ta= 60 °C LIFE TIME (4) I/P : 230VAC O/P : 50% Load Ta= 60 °C LIFE TIME 	<ol style="list-style-type: none"> (1) 292558.9 Hrs (2) 58305.4 Hrs (3) 94659.4 Hrs (4) 118698.3 Hrs 	P
10	MTBF	<p>TOTAL FAILURE RATE : 220K HRS Ta: 25°C</p>	OK	P
11	DMTBF/ Accelerated Life Test	<p>Demonstration Mean Time Between Failure(Expected Life) : 50,000 hours @ T case 70°C</p>	<p>OK 58731 Hrs</p>	P



Test Report: MDC1851050

185W Single Output Switching Power Supply

■ DESIGN VERIFY TEST

Output Function Test
Input Function Test
Protection Function Test
Other Test
Component Stress Test

■ SAFETY & E.M.C. TEST

Safety Test
E.M.C. Test

■ RELIABILITY TEST

Approved by	Checked by	Tested by
Albert YH Chen	Casio Lin	Leo Chung

DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	Vo: 1000mVp-p	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	Vo: 851mVp-p	P
2	OUTPUT VOLTAGE RANGE	CH1: 95V~190V	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	190.00V / 115VAC 190.00V / 230VAC	P
3	RATED CURRENT	1050mA ±5%	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	1052mA	P
4	CONSTANT CURRENT REGION	95V~190V	I/P: 230 VAC O/P: CV MODE Ta: 25°C	O/P=95V : 1055mA O/P=190V : 1052mA	P
5	LINE REGULATION	Io: ±1%	I/P: 100 VAC ~305 VAC O/P: FULL LOAD Ta: 25°C	Io: ±0.3%	P
6	SET UP TIME	115VAC/ <1500ms 230VAC/ <500ms	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	115 VAC/ 931ms 230 VAC/ 62.1ms	P
7	RISE TIME	115VAC/ <100ms 230VAC/ <100ms	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	115 VAC/ 32.11ms 230 VAC/ 31.56ms	P
8	HOLD UP TIME	115VAC/ >12ms	I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	115 VAC/ 13.9ms	P
9	OVER/UNDERSHOOT TEST	< +5%	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	TEST: < 5%	P

10	DIMMER TEST (B Type only)	SPEC:											
		*Reference resistance value for output current adjustment (Typical)											
		Resistance value	Short	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K
		Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
		*1 ~ 10V dimming function for output current adjustment (Typical)											
		Dimming value	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V
		Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
		*10V PWM signal for output current adjustment (Typical); Frequency Range: 100~3KHz											
		Duty value	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
		Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
TEST RESULT: I/P : 230 VAC ;Ta : 25°C													
1	1	Resistance value	Short	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K
		Output current	0	0.097	0.204	0.311	0.418	0.525	0.632	0.740	0.847	0.953	1.050
		%	0.0%	9.24%	19.43%	29.62%	39.81%	50.00%	60.19%	70.48%	80.67%	90.76%	100.0%
	2	Dimming value	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V
		Output current	0	0.094	0.195	0.296	0.402	0.504	0.613	0.721	0.821	0.924	1.037
		%	0.0%	8.95%	18.57%	28.19%	38.29%	48.00%	58.38%	68.67%	78.19%	88.00%	98.76%
	3	Duty value	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
		Output current	0	0.095	0.199	0.304	0.409	0.515	0.620	0.724	0.830	0.934	1.039
		%	0.0%	9.05%	18.95%	28.95%	38.95%	49.05%	59.05%	68.95%	79.05%	88.95%	98.95%
Note: The output current drops down to 0% when the dimming input is about 1KΩ or 0.1Vdc or 10V PWM signal with 1% duty cycle.													

P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90 VAC~305 VAC	I/P: TESTING O/P: FULL LOAD Ta: 25°C	81V~305V	P
			I/P: (1)LOW-LINE=90 V (2)HIGH-LINE=305 V O/P:FULL/MIN LOAD ON: 30 Sec. OFF: 30 Sec. 10MIN (AC POWER ON/OFF NO DAMAGE)	OK	
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P: 90 VAC ~305VAC O/P: FULL~MIN LOAD Ta: 25°C	OK	P
3	POWER FACTOR	0.98 / 115VAC FULL LOAD (TYP) 0.95 / 230VAC FULL LOAD (TYP) 0.93 / 264VAC FULL LOAD (TYP)	I/P: 115 VAC I/P: 230 VAC I/P: 264 VAC O/P:FULL LOAD Ta:25°C	PF=0.999/115VAC PF=0.987/230VAC PF=0.978/264VAC	P
4	EFFICIENCY	92% (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	93.12%	P
5	INPUT CURRENT	115 V / 2.00A 230 V / 1.00A 277 V / 0.85A	I/P: 115 VAC I/P: 230 VAC I/P: 277 VAC O/P:FULL LOAD Ta:25°C	I = 1.931 A/ 115VAC I = 0.944 A/ 230VAC I = 0.798 A/ 277VAC	P
6	INRUSH CURRENT	230 V/ 75A (Typ) COLD START	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	I = 60.4A/ 230VAC	P
7	THD	230VAC/ <10%	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	6.78%	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	OVER VOLTAGE PROTECTION	V1: 210V~ 240V	I/P: 90 VAC I/P: 230 VAC I/P: 305VAC O/P: NO LOAD Ta:25°C	230V / 90VAC 231V / 230VAC 231V / 305VAC Latch o/p voltage; Auto-recovery	P
2	OVER TEMPERATURE PROTECTION (Phase 1)	SPEC: Ta: 70±10°C .	I/P: 230 VAC O/P: FULL LOAD	Output de-rate to 70%±5%	P
3	OVER TEMPERATURE PROTECTION (Phase 2)	SPEC: Ta: 85±10°C O.T.P. NO DAMAGE	I/P: 230 VAC O/P: FULL LOAD	O.T.P. Active Shut down o/p current; Auto-recovery.	P
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 305VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE Shut down o/p voltage & current; Auto-recovery.	P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	QM1 Rated 15A 600V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 424 V (2) 430 V	P
		QM2 Rated 15A 600V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 444 V (2) 412 V	P
2	Diode Peak Voltage	DP5 Rated 600V4A	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 236 V (2) 212 V	P
		DP6 Rated 600V4A	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 236 V (2) 212 V	P
3	Input Capacitor Voltage	CEP1 Rated 100u /450V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 412 V (2) 414 V	P
4	Control IC Voltage Test	U2 Rated 30V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 22.1 V (2) 22.2 V	P
5	P.F.C Transistor (D to S) or (C to E) Peak Voltage	QP1 Rated 30A 600V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 442 V (2) 438 V	P

SAFETY & EMC TEST

SAFETY TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	IEC61347-1/-2-13 I/P-O/P:3.75KVAC/min<10mA I/P-PE:2KVAC/min<10mA O/P-PE:0.5KVAC/min<10mA	I/P-O/P: 3.75 KVAC/min I/P-PE: 2KVAC/min O/P-PE:0.5KVAC/min<10mA Ta:25°C	I/P-O/P: 2.43mA I/P-PE: 2.35mA O/P-PE: 0.231mA NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ I/P-PE:500VDC>100MΩ O/P-PE:500VDC>100MΩ	I/P-O/P: 500 VDC I/P- PE: 500 VDC O/P- PE: 500 VDC Ta:25°C	I/P-O/P: 23.1GΩ I/P- PE: 22.9GΩ O/P- PE: 27.6GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	IEC61347-1/-2-13 PE TO CHASSIS OR TRACE < 0.5 Ω	25A / 1min Ta:25°C	35mΩ	P

E.M.C TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A CLASS C	I/P: 240VAC/50HZ LOAD:LED/ELECTRONIC LOAD O/P:100%/50% LOAD Ta:25°C	PASS	P
2	CONDUCTION	EN55022 EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL/50% LOAD Ta:25°C	PASS Test by certified Lab	P
3	RADIATION	EN55022 EN55015 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 INDUSTRY AIR:8KV / Contact:4KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
5	E.FT	EN61000-4-4 INDUSTRY INPUT: 1KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
6	SURGE	IEC61000-4-5 INDUSTRY L-N :5KV L,N-PE:10KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P

Reliability Test

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT		
1	TEMPERATURE RISE TEST	MODEL : MDC1851050			P		
		1. Room Ambient Burn-in : 3 HRS I/P : 230VAC O/P : Full Load Ta= 25.3°C					
		2. High Ambient Burn-in : 6 HRS I/P : 230VAC O/P : Full Load Ta=60.3°C					
			NO	Position		ROOM AMBIENT Ta= 25.3°C	HIGH AMBIENT Ta= 60.3°C
			1	LF1		58.6°C	83.0°C
			2	LF2		60.3°C	84.8°C
			3	VZ1		53.5°C	78.0°C
			4	BD1		62.4°C	86.7°C
			5	T1		70.1°C	94.2°C
			6	DP2		63.5°C	88.2°C
			7	QP1		62.5°C	86.8°C
			8	CEP1		62.2°C	87.0°C
			9	U1		61.1°C	86.3°C
			10	QM1		64.2°C	89.8°C
			11	QM2		63.4°C	88.5°C
			12	TM1		70.8°C	94.5°C
			13	U2		63.6°C	87.9°C
			14	DP5		65.0°C	89.7°C
			15	DP7		64.7°C	89.3°C
			16	CES4		61.8°C	86.3°C
			17	CES5		63.5°C	87.4°C
	18	CES6	62.3°C	86.4°C			
	19	CES8	61.7°C	85.9°C			
	20	TR4	64.1°C	88.8°C			
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 305 VAC O/P : O/P SHORT TEST Ta : 25°C	OK	P		
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 4 HOUR	I/P : 100VAC / 305VAC O/P : 95% LOAD Ta= -40 °C	OK	P		
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60 °C NO DAMAGE	I/P : 305 VAC O/P : 95% Ta= 60 °C HUMIDITY= 95 %R.H	OK	P		
5	TEMPERATURE COEFFICIENT	+ 0.03 % (0~50°C)	I/P : 230 VAC O/P : FULL LOAD	+ 0.002 % (0~50°C)	P		

6	STORAGE TEMPERATURE TEST	<ol style="list-style-type: none"> 1. Thermal shock Temperature : -45°C~ +90°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	<ol style="list-style-type: none"> 1. Thermal shock Temperature : -35°C~ +65°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 TURN ON/58SEC.;TURN OFF/2SEC. 	OK	P
8	VIBRATION TEST	<ol style="list-style-type: none"> (1) Waveform : Sine Wave (2) Frequency : 5~500Hz (3) Sweep Time : 2S/sweep cycle (4) Acceleration : 1G (5) Test Time : 1 time in each axis (X.Y.Z) (6) Ta : 25°C 	OK	P
9	CAPACITOR LIFE CYCLE	<p>Suppose CES5 is the most critical component</p> <ol style="list-style-type: none"> (1) I/P : 230VAC O/P : Full Load Ta= 25 °C LIFE TIME (2) I/P : 230VAC O/P : Full Load Ta= 60 °C LIFE TIME (3) I/P : 230VAC O/P : 75% Load Ta= 60 °C LIFE TIME (4) I/P : 230VAC O/P : 50% Load Ta= 60 °C LIFE TIME 	<ol style="list-style-type: none"> (1) 313934.9 Hrs (2) 60030.7 Hrs (3) 98744.7 Hrs (4) 124582.7 Hrs 	P
10	MTBF	<p>TOTAL FAILURE RATE : 220K HRS Ta: 25°C</p>	OK	P
11	DMTBF/ Accelerated Life Test	<p>Demonstration Mean Time Between Failure(Expected Life) : 50,000 hours @ T case 70°C</p>	<p>OK 58731 Hrs</p>	P



Test Report: MDC1851400

185W Single Output Switching Power Supply

■ DESIGN VERIFY TEST

Output Function Test
Input Function Test
Protection Function Test
Other Test
Component Stress Test

■ SAFETY & E.M.C. TEST

Safety Test
E.M.C. Test

■ RELIABILITY TEST

Approved by	Checked by	Tested by
Albert YH Chen	Casio Lin	Leo Chung

DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	Vo: 1000mVp-p	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	Vo: 845mVp-p	P
2	OUTPUT VOLTAGE RANGE	CH1: 71V~143V	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	143.02V / 115VAC 143.02V / 230VAC	P
3	RATED CURRENT	1400mA ±5%	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	1404mA	P
4	CONSTANT CURRENT REGION	71V~143V	I/P: 230 VAC O/P: CV MODE Ta: 25°C	O/P=71V : 1407mA O/P=143V : 1404mA	P
5	LINE REGULATION	Io: ±1%	I/P: 100 VAC ~305 VAC O/P: FULL LOAD Ta: 25°C	Io: ±0.2%	P
6	SET UP TIME	115VAC/ <1500ms 230VAC/ <500ms	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	115 VAC/ 925ms 230 VAC/ 63.8ms	P
7	RISE TIME	115VAC/ <100ms 230VAC/ <100ms	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	115 VAC/ 31.55ms 230 VAC/ 30.18ms	P
8	HOLD UP TIME	115VAC/ >12ms	I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	115 VAC/ 13.3ms	P
9	OVER/UNDERSHOOT TEST	< +5%	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	TEST: < 5%	P

10	DIMMER TEST (B Type only)	SPEC:											P	
		*Reference resistance value for output current adjustment (Typical)												
		Resistance value	Short	10K	20K	30K	40K	50K	60K	70K	80K	90K		100K
		Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%		100%
		*1 ~ 10V dimming function for output current adjustment (Typical)												
		Dimming value	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V		10V
		Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%		100%
		*10V PWM signal for output current adjustment (Typical); Frequency Range: 100~3KHz												
		Duty value	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%		100%
		Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%		100%
TEST RESULT: I/P : 230 VAC ;Ta : 25°C														
1	1	Resistance value	Short	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	
		Output current	0	0.133	0.276	0.419	0.561	0.705	0.846	0.991	1.133	1.274	1.403	
		%	0.0%	9.50%	19.71%	29.93%	40.07%	50.36%	60.43%	70.79%	80.93%	91.00%	100.2%	
	2	2	Dimming value	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V
			Output current	0	0.118	0.256	0.399	0.546	0.675	0.821	0.961	1.100	1.251	1.397
			%	0.0%	8.43%	18.29%	28.50%	39.00%	48.21%	58.64%	68.64%	78.57%	89.36%	99.79%
	3	3	Duty value	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
			Output current	0	0.130	0.276	0.411	0.551	0.694	0.832	0.962	1.114	1.255	1.394
			%	0.0%	9.29%	19.71%	29.36%	39.36%	49.57%	59.43%	68.71%	79.57%	89.64%	99.57%
Note: The output current drops down to 0% when the dimming input is about 1KΩ or 0.1Vdc or 10V PWM signal with 1% duty cycle.														

INPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90 VAC~305 VAC	I/P: TESTING O/P: FULL LOAD Ta: 25°C	81V~305V	P
			I/P: (1)LOW-LINE=90 V (2)HIGH-LINE=305 V O/P:FULL/MIN LOAD ON: 30 Sec. OFF: 30 Sec. 10MIN (AC POWER ON/OFF NO DAMAGE)	OK	
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P: 90 VAC ~305VAC O/P: FULL~MIN LOAD Ta: 25°C	OK	P
3	POWER FACTOR	0.98 / 115VAC FULL LOAD (TYP) 0.95 / 230VAC FULL LOAD (TYP) 0.93 / 264VAC FULL LOAD (TYP)	I/P: 115 VAC I/P: 230 VAC I/P: 264 VAC O/P:FULL LOAD Ta:25°C	PF=0.999/115VAC PF=0.987/230VAC PF=0.978/264VAC	P
4	EFFICIENCY	92% (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	93.56%	P
5	INPUT CURRENT	115 V / 2.00A 230 V / 1.00A 277 V / 0.85A	I/P: 115 VAC I/P: 230 VAC I/P: 277 VAC O/P:FULL LOAD Ta:25°C	I = 1.934 A/ 115VAC I = 0.946 A/ 230VAC I = 0.804 A/ 277VAC	P
6	INRUSH CURRENT	230 V/ 75A (Typ) COLD START	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	I = 60.4A/ 230VAC	P
7	THD	230VAC/ <10%	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	7.45%	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	OVER VOLTAGE PROTECTION	Vo: 160V~ 170V	I/P: 90 VAC I/P: 230 VAC I/P: 305VAC O/P: NO LOAD Ta:25°C	166V / 90VAC 166V / 230VAC 166V / 305VAC Latch o/p voltage; Auto-recovery	P
2	OVER TEMPERATURE PROTECTION (Phase 1)	SPEC: Ta: 70±10°C .	I/P: 230 VAC O/P: FULL LOAD	Output de-rate to 70%±5%	P
3	OVER TEMPERATURE PROTECTION (Phase 2)	SPEC: Ta: 85±10°C O.T.P. NO DAMAGE	I/P: 230 VAC O/P: FULL LOAD	O.T.P. Active Shut down o/p current; Auto-recovery.	P
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 305VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE Shut down o/p voltage & current; Auto-recovery.	P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	QM1 Rated 15A 600V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 425 V (2) 429 V	P
		QM2 Rated 15A 600V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 444 V (2) 413 V	P
2	Diode Peak Voltage	DP5 Rated 600V4A	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 318 V (2) 282 V	P
		DP7 Rated 600V4A	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 318 V (2) 282 V	P
3	Input Capacitor Voltage	CEP1 Rated 100u /450V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 413 V (2) 414 V	P
4	Control IC Voltage Test	U2 Rated 30V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 22.0 V (2) 22.1 V	P
5	P.F.C Transistor (D to S) or (C to E) Peak Voltage	QP1 Rated 30A 600V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 443 V (2) 438 V	P

SAFETY & EMC TEST

SAFETY TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	IEC61347-1/-2-13 I/P-O/P:3.75KVAC/min<10mA I/P-PE:2KVAC/min<10mA O/P-PE:0.5KVAC/min<10mA	I/P-O/P: 3.75 KVAC/min I/P-PE: 2KVAC/min O/P-PE:0.5KVAC/min<10mA Ta:25°C	I/P-O/P: 2.91mA I/P-PE: 2.89mA O/P-PE: 0.231mA NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ I/P-PE:500VDC>100MΩ O/P-PE:500VDC>100MΩ	I/P-O/P: 500 VDC I/P- PE: 500 VDC O/P- PE: 500 VDC Ta:25°C	I/P-O/P: 27.8GΩ I/P- PE: 26.9GΩ O/P- PE: 28.1GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	IEC61347-1/-2-13 PE TO CHASSIS OR TRACE < 0.5 Ω	25A / 1min Ta:25°C	37mΩ	P

E.M.C TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A CLASS C	I/P: 240VAC/50HZ LOAD:LED/ELECTRONIC LOAD O/P:100%/50% LOAD Ta:25°C	PASS	P
2	CONDUCTION	EN55022 EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL/50% LOAD Ta:25°C	PASS Test by certified Lab	P
3	RADIATION	EN55022 EN55015 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 INDUSTRY AIR:8KV / Contact:4KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
5	E.FT	EN61000-4-4 INDUSTRY INPUT: 1KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
6	SURGE	IEC61000-4-5 INDUSTRY L-N :5KV L,N-PE:10KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P

Reliability Test

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT		
1	TEMPERATURE RISE TEST	MODEL : MDC1851400			P		
		1. Room Ambient Burn-in : 3 HRS I/P : 230VAC O/P : Full Load Ta= 25.0°C					
		2. High Ambient Burn-in : 6 HRS I/P : 230VAC O/P : Full Load Ta=60.3°C					
			NO	Position		ROOM AMBIENT Ta= 25.0°C	HIGH AMBIENT Ta= 59.9°C
			1	LF1		59.8°C	84.7°C
			2	LF2		61.5°C	86.5°C
			3	VZ1		54.6°C	79.6°C
			4	BD1		63.7°C	88.5°C
			5	T1		71.5°C	96.1°C
			6	DP2		64.8°C	90.0°C
			7	QP1		63.8°C	88.6°C
			8	CEP1		63.5°C	88.8°C
			9	U1		62.3°C	88.1°C
			10	QM1		65.5°C	91.6°C
			11	QM2		64.7°C	90.3°C
			12	TM1		72.2°C	96.4°C
			13	U2		64.9°C	89.7°C
			14	DP5		66.3°C	91.5°C
			15	DP7		66.0°C	91.1°C
			16	CES4		63.1°C	88.0°C
			17	CES5		64.8°C	89.2°C
	18	CES6	63.6°C	88.2°C			
	19	CES8	63.0°C	87.6°C			
	20	TR4	65.4°C	90.6°C			
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 305 VAC O/P : O/P SHORT TEST Ta : 25°C	OK	P		
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 4 HOUR	I/P : 100VAC / 305VAC O/P : 95% LOAD Ta= -40 °C	OK	P		
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60 °C NO DAMAGE	I/P : 305 VAC O/P : 95% Ta= 60 °C HUMIDITY= 95 %R.H	OK	P		
5	TEMPERATURE COEFFICIENT	+ 0.03 % (0~50°C)	I/P : 230 VAC O/P : FULL LOAD	+ 0.002 % (0~50°C)	P		

6	STORAGE TEMPERATURE TEST	<p>1. Thermal shock Temperature : -45°C~ +90°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</p>	OK	P
7	THERMAL SHOCK TEST	<p>1. Thermal shock Temperature : -35°C~ +65°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 TURN ON/58SEC.;TURN OFF/2SEC.</p>	OK	P
8	VIBRATION TEST	<p>(1) Waveform : Sine Wave (2) Frequency : 5~500Hz (3) Sweep Time : 2S/sweep cycle (4) Acceleration : 1G (5) Test Time : 1 time in each axis (X.Y.Z) (6) Ta : 25°C</p>	OK	P
9	CAPACITOR LIFE CYCLE	<p>Suppose CES5 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= 60 °C LIFE TIME (3) I/P : 230VAC O/P : 75% Load Ta= 60 °C LIFE TIME (4) I/P : 230VAC O/P : 50% Load Ta= 60 °C LIFE TIME</p>	<p>(1) 239021.5 Hrs (2) 44188.4 Hrs (3) 73495.7 Hrs (4) 93137.8 Hrs</p>	P
10	MTBF	<p>TOTAL FAILURE RATE : 220K HRS Ta: 25°C</p>	OK	P
11	DMTBF/ Accelerated Life Test	<p>Demonstration Mean Time Between Failure(Expected Life) : 50,000 hours @ T case 70°C</p>	<p>OK 58731 Hrs</p>	P



Test Report: MDC1853150

185W Single Output Switching Power Supply

■ DESIGN VERIFY TEST

Output Function Test
Input Function Test
Protection Function Test
Other Test
Component Stress Test

■ SAFETY & E.M.C. TEST

Safety Test
E.M.C. Test

■ RELIABILITY TEST

Approved by	Checked by	Tested by
Albert YH Chen	Casio Lin	Leo Chung

DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	Vo: 200mVp-p	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	Vo: 175mVp-p	P
2	OUTPUT VOLTAGE RANGE	CH1: 32V~58V	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	57.94V / 115 VAC 57.95V / 230 VAC	P
3	RATED CURRENT	3150mA ±5%	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	3148mA	P
4	CONSTANT CURRENT REGION	32V~58V	I/P: 230 VAC O/P: CV MODE Ta: 25°C	O/P=32V : 3158mA O/P=58V : 3148mA	P
5	LINE REGULATION	Io: ±1%	I/P: 100 VAC ~305 VAC O/P: FULL LOAD Ta: 25°C	Io: ±0.3%	P
6	SET UP TIME	115VAC/ <1500ms 230VAC/ <500ms	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	115 VAC/ 776ms 230 VAC/ 48.8ms	P
7	RISE TIME	115VAC/ <50ms	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	115 VAC / 27.02ms 230 VAC/ 26.38 ms	P
8	HOLD UP TIME	115VAC/ >12ms	I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	115 VAC/15.2 ms	P
9	OVER/UNDERSHOOT TEST	< +5%	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	TEST: < 5%	P

10	DIMMER TEST (B Type only)	<p>SPEC:</p> <p>*Reference resistance value for output current adjustment (Typical)</p> <table border="1"> <tr> <th>Resistance value</th> <th>Short</th> <th>10K</th> <th>20K</th> <th>30K</th> <th>40K</th> <th>50K</th> <th>60K</th> <th>70K</th> <th>80K</th> <th>90K</th> <th>100K</th> </tr> <tr> <td>Output current</td> <td>0%</td> <td>10%</td> <td>20%</td> <td>30%</td> <td>40%</td> <td>50%</td> <td>60%</td> <td>70%</td> <td>80%</td> <td>90%</td> <td>100%</td> </tr> </table> <p>*1 ~ 10V dimming function for output current adjustment (Typical)</p> <table border="1"> <tr> <th>Dimming value</th> <th>0V</th> <th>1V</th> <th>2V</th> <th>3V</th> <th>4V</th> <th>5V</th> <th>6V</th> <th>7V</th> <th>8V</th> <th>9V</th> <th>10V</th> </tr> <tr> <td>Output current</td> <td>0%</td> <td>10%</td> <td>20%</td> <td>30%</td> <td>40%</td> <td>50%</td> <td>60%</td> <td>70%</td> <td>80%</td> <td>90%</td> <td>100%</td> </tr> </table> <p>*10V PWM signal for output current adjustment (Typical); Frequency Range: 100~3KHz</p> <table border="1"> <tr> <th>Duty value</th> <th>0%</th> <th>10%</th> <th>20%</th> <th>30%</th> <th>40%</th> <th>50%</th> <th>60%</th> <th>70%</th> <th>80%</th> <th>90%</th> <th>100%</th> </tr> <tr> <td>Output current</td> <td>0%</td> <td>10%</td> <td>20%</td> <td>30%</td> <td>40%</td> <td>50%</td> <td>60%</td> <td>70%</td> <td>80%</td> <td>90%</td> <td>100%</td> </tr> </table>											Resistance value	Short	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Dimming value	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Duty value	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	P
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		1	Resistance value	Short	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K																																																																							
			Output current	0	0.290	0.610	0.920	1.250	1.550	1.870	2.190	2.510	2.820	3.148																																																																							
%	0.0%		9.21%	19.37%	29.21%	39.68%	49.21%	59.37%	69.52%	79.68%	89.52%	99.94%																																																																									
2	Dimming value	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V																																																																									
	Output current	0	0.296	0.625	0.931	1.259	1.559	1.876	2.200	2.526	2.836	3.149																																																																									
	%	0.0%	9.40%	19.84%	29.56%	39.97%	49.49%	59.56%	69.84%	80.19%	90.03%	99.97%																																																																									
3	Duty value	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%																																																																									
	Output current	0	0.310	0.629	0.935	1.268	1.600	1.895	2.210	2.524	2.837	3.149																																																																									
	%	0.0%	9.84%	19.97%	29.68%	40.25%	50.79%	60.16%	70.16%	80.13%	90.06%	99.97%																																																																									
Note: The output current drops down to 0% when the dimming input is about 1KΩ or 0.1Vdc or 10V PWM signal with 1% duty cycle.																																																																																					

INPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90 VAC~305 VAC	I/P: TESTING O/P: FULL LOAD Ta: 25°C	81V~305V	P
			I/P: (1)LOW-LINE=90 V (2)HIGH-LINE=305 V O/P:FULL/MIN LOAD ON: 30 Sec. OFF: 30 Sec. 10MIN (AC POWER ON/OFF NO DAMAGE)	OK	
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P: 90 VAC ~305VAC O/P: FULL~MIN LOAD Ta: 25°C	OK	P
3	POWER FACTOR	0.98 / 115VAC FULL LOAD (TYP) 0.95 / 230VAC FULL LOAD (TYP) 0.93 / 264VAC FULL LOAD (TYP)	I/P: 115 VAC I/P: 230 VAC I/P: 264 VAC O/P:FULL LOAD Ta:25°C	PF=0.999/115VAC PF=0.980/230VAC PF=0.966/264VAC	P
4	EFFICIENCY	91.0% (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	92.84%	P
5	INPUT CURRENT	115 V / 2.00A 230 V / 1.00A 277 V / 0.85A	I/P: 115 VAC I/P: 230 VAC I/P: 277 VAC O/P:FULL LOAD Ta:25°C	I = 1.762A/ 115VAC I = 0.872A/ 230VAC I = 0.764A/ 277VAC	P
6	INRUSH CURRENT	230 V/ 75A (Typ) COLD START	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	I = 57.6A/ 230VAC	P
7	THD	230VAC/ <10%	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	6.29%	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	OVER VOLTAGE PROTECTION	Vo: 62~80V	I/P: 90 VAC I/P: 230 VAC I/P: 305VAC O/P: NO LOAD Ta:25°C	73.9 V / 90VAC 74.5 V / 230VAC 78.1 V / 305VAC Latch o/p voltage; Auto-recovery	P
2	OVER TEMPERATURE PROTECTION (Phase 1)	SPEC: Ta: 70±10°C.	I/P: 230 VAC O/P: FULL LOAD	Output de-rate to 70%±5%	P
3	OVER TEMPERATURE PROTECTION (Phase 2)	SPEC: Ta: 85±10°C O.T.P. NO DAMAGE	I/P: 230 VAC O/P: FULL LOAD	O.T.P. Active Shut down o/p current; Auto-recovery.	P
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 305VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE Shut down o/p voltage & current; Auto-recovery.	P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	QM1 Rated 15A 600V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 424 V (2) 422 V	P
		QM2 Rated 15A 600V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 420 V (2) 418 V	P
2	Power Transistor (D to S) or (C to E) Peak Voltage	QS1 Rated 20A 200V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 117 V (2) 109 V	P
3	Input Capacitor Voltage	CEP1 Rated 100u /450V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 416 V (2) 414 V	P
4	Control IC Voltage Test	U2 Rated 30V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 18.4 V (2) 18.3 V	P
5	P.F.C Transistor (D to S) or (C to E) Peak Voltage	QP1 Rated 30A 600V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 426 V (2) 418 V	P

SAFETY & EMC TEST

SAFETY TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	IEC61347-1/-2-13 I/P-O/P:3.75KVAC/min<10mA I/P-PE:2KVAC/min<10mA O/P-PE:0.5KVAC/min<10mA	I/P-O/P: 3.75 KVAC/min I/P-PE: 2KVAC/min O/P-PE:0.5KVAC/min<10mA Ta:25°C	I/P-O/P: 1.72mA I/P-PE: 1.95mA O/P-PE: 0.28mA NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ I/P-PE:500VDC>100MΩ O/P-PE:500VDC>100MΩ	I/P-O/P: 500 VDC I/P- PE: 500 VDC O/P- PE: 500 VDC Ta:25°C	I/P-O/P: 27.2GΩ I/P- PE: 18.9GΩ O/P- PE: 29.0GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	IEC61347-1/-2-13 PE TO CHASSIS OR TRACE < 0.5 Ω	25A / 1min Ta:25°C	40mΩ	P

E.M.C TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A CLASS C	I/P: 240VAC/50HZ LOAD:LED/ELECTRONIC LOAD O/P:100%/50% LOAD Ta:25°C	PASS	P
2	CONDUCTION	EN55022 EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL/50% LOAD Ta:25°C	PASS Test by certified Lab	P
3	RADIATION	EN55022 EN55015 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 INDUSTRY AIR:8KV / Contact:4KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
5	E.FT	EN61000-4-4 INDUSTRY INPUT: 1KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
6	SURGE	IEC61000-4-5 INDUSTRY L-N :5KV L,N-PE:10KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P

Reliability Test

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT			
1	TEMPERATURE RISE TEST	MODEL : MDC1853150			P			
		1. Room Ambient Burn-in : 3 HRS I/P : 230VAC O/P : Full Load Ta= 25.0°C						
		2. High Ambient Burn-in : 6 HRS I/P : 230VAC O/P : Full Load Ta=60.1°C						
		2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)		I/P : 305 VAC O/P : O/P SHORT TEST Ta : 25°C	OK	P
		3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 4 HOUR		I/P : 100VAC / 305VAC O/P : 95% LOAD Ta= -40 °C	OK	P
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60 °C NO DAMAGE	I/P : 305 VAC O/P : 95% Ta= 60 °C HUMIDITY= 95 %R.H	OK	P			
5	TEMPERATURE COEFFICIENT	+ 0.03 % (0~50°C)	I/P : 230 VAC O/P : FULL LOAD	+ 0.002 % (0~50°C)	P			

6	STORAGE TEMPERATURE TEST	<ol style="list-style-type: none"> 1. Thermal shock Temperature : -45°C~+90°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	<ol style="list-style-type: none"> 1. Thermal shock Temperature : -35°C~+65°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 TURN ON/58SEC.;TURN OFF/2SEC. 	OK	P
8	VIBRATION TEST	<ol style="list-style-type: none"> (1) Waveform : Sine Wave (2) Frequency : 5~500Hz (3) Sweep Time : 2S/sweep cycle (4) Acceleration : 1G (5) Test Time : 1 time in each axis (X.Y.Z) (6) Ta : 25°C 	OK	P
9	CAPACITOR LIFE CYCLE	<p>Suppose CES5 is the most critical component</p> <ol style="list-style-type: none"> (1) I/P : 230VAC O/P : Full Load Ta= 25 °C LIFE TIME (2) I/P : 230VAC O/P : Full Load Ta= 60 °C LIFE TIME (3) I/P : 230VAC O/P : 75% Load Ta= 60 °C LIFE TIME (4) I/P : 230VAC O/P : 50% Load Ta= 60 °C LIFE TIME 	<ol style="list-style-type: none"> (1) 283065.6 Hrs (2) 55948.8 Hrs (3) 93047.2 Hrs (4) 116745.9 Hrs 	P
10	MTBF	<p>TOTAL FAILURE RATE : 220K HRS Ta: 25°C</p>	OK	P
11	DMTBF/ Accelerated Life Test	<p>Demonstration Mean Time Between Failure(Expected Life) : 50,000 hours @ T case 70°C</p>	<p>OK 58731 Hrs</p>	P



Test Report: MDC1853850

185W Single Output Switching Power Supply

■ DESIGN VERIFY TEST

Output Function Test
Input Function Test
Protection Function Test
Other Test
Component Stress Test

■ SAFETY & E.M.C. TEST

Safety Test
E.M.C. Test

■ RELIABILITY TEST

Approved by	Checked by	Tested by
Albert YH Chen	Casio Lin	Leo Chung

DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	Vo: 200mVp-p	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	Vo: 161mVp-p	P
2	OUTPUT VOLTAGE RANGE	CH1: 32V~49V	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	49.12V / 115VAC 49.12V / 230VAC	P
3	RATED CURRENT	3850mA ±5%	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	3848mA	P
4	CONSTANT CURRENT REGION	32V~49V	I/P: 230 VAC O/P: CV MODE Ta: 25°C	O/P=32V : 3851mA O/P=49V : 3848mA	P
5	LINE REGULATION	Io: ±1%	I/P: 100 VAC ~305 VAC O/P: FULL LOAD Ta: 25°C	Io: ±0.08%	P
6	SET UP TIME	115VAC/ <1500ms 230VAC/ <500ms	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	115 VAC/ 851ms 230 VAC/ 65ms	P
7	RISE TIME	115VAC/ <100ms 230VAC/ <100ms	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	115 VAC/ 26.51ms 230 VAC/ 26.12ms	P
8	HOLD UP TIME	115VAC/ >12ms	I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	115 VAC/ 16.8ms	P
9	OVER/UNDERSHOOT TEST	< +5%	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	TEST: < 5%	P

10	DIMMER TEST (B Type only)	SPEC:											
		*Reference resistance value for output current adjustment (Typical)											
		Resistance value	Short	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K
		Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
		*1 ~ 10V dimming function for output current adjustment (Typical)											
		Dimming value	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V
		Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
		*10V PWM signal for output current adjustment (Typical); Frequency Range: 100~3KHz											
		Duty value	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
		Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
TEST RESULT: I/P : 230 VAC ;Ta : 25°C													
1	1	Resistance value	Short	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K
		Output current	0	0.332	0.697	1.099	1.497	1.896	2.294	2.675	3.091	3.485	3.850
		%	0.0%	8.62%	18.10%	28.55%	38.88%	49.25%	59.58%	69.48%	80.29%	90.52%	100.0%
	2	Dimming value	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V
		Output current	0	0.335	0.698	1.089	1.480	1.868	2.286	2.659	3.055	3.471	3.842
		%	0.0%	8.70%	18.13%	28.29%	38.44%	48.52%	59.38%	69.06%	79.35%	90.16%	99.79%
	3	Duty value	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100.0%
		Output current	0	0.332	0.695	1.081	1.468	1.852	2.249	2.638	3.029	3.417	3.803
		%	0.0%	8.62%	18.05%	28.08%	38.13%	48.10%	58.42%	68.52%	78.68%	88.75%	98.78%
Note: The output current drops down to 0% when the dimming input is about 1KΩ or 0.1Vdc or 10V PWM signal with 1% duty cycle.													

P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90 VAC~305 VAC	I/P: TESTING O/P: FULL LOAD Ta: 25°C	81V~305V	P
			I/P: (1)LOW-LINE=90 V (2)HIGH-LINE=305 V O/P:FULL/MIN LOAD ON: 30 Sec. OFF: 30 Sec. 10MIN (AC POWER ON/OFF NO DAMAGE)	OK	
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P: 90 VAC ~305VAC O/P: FULL~MIN LOAD Ta: 25°C	OK	P
3	POWER FACTOR	0.98 / 115VAC FULL LOAD (TYP) 0.95 / 230VAC FULL LOAD (TYP) 0.93 / 264VAC FULL LOAD (TYP)	I/P: 115 VAC I/P: 230 VAC I/P: 264 VAC O/P:FULL LOAD Ta:25°C	PF=0.999/115VAC PF=0.987/230VAC PF=0.977/264VAC	P
4	EFFICIENCY	91% (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	93.24%	P
5	INPUT CURRENT	115 V / 2.00A 230 V / 1.00A 277 V / 0.85A	I/P: 115 VAC I/P: 230 VAC I/P: 277 VAC O/P:FULL LOAD Ta:25°C	I = 1.816 A/ 115VAC I = 0.893 A/ 230VAC I = 0.757 A/ 277VAC	P
6	INRUSH CURRENT	230 V/ 75A (Typ) COLD START	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	I = 60.4A/ 230VAC	P
7	THD	230VAC/ <10%	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	4.71%	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	OVER VOLTAGE PROTECTION	Vo: 54V~ 73V	I/P: 90 VAC I/P: 230 VAC I/P: 305VAC O/P: NO LOAD Ta:25°C	63.6V / 90VAC 63.6V / 230VAC 63.6V / 305VAC Latch o/p voltage; Auto-recovery	P
2	OVER TEMPERATURE PROTECTION (Phase 1)	SPEC: Ta: 70±10°C .	I/P: 230 VAC O/P: FULL LOAD	Output de-rate to 70%±5%	P
3	OVER TEMPERATURE PROTECTION (Phase 2)	SPEC: Ta: 85±10°C O.T.P. NO DAMAGE	I/P: 230 VAC O/P: FULL LOAD	O.T.P. Active Shut down o/p current; Auto-recovery.	P
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 305VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE Shut down o/p voltage & current; Auto-recovery.	P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	QM1 Rated 15A 600V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 426 V (2) 424 V	P
		QM2 Rated 15A 600V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 424 V (2) 422 V	P
2	Power Transistor (D to S) or (C to E) Peak Voltage	QS1 Rated 86A 150V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 98.2 V (2) 99.0 V	P
3	Input Capacitor Voltage	CEP1 Rated 100u /450V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 415 V (2) 413 V	P
4	Control IC Voltage Test	U2 Rated 30V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 17.5 V (2) 17.4 V	P
5	P.F.C Transistor (D to S) or (C to E) Peak Voltage	QP1 Rated 30A 600V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 425 V (2) 415 V	P

SAFETY & EMC TEST

SAFETY TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	IEC61347-1/-2-13 I/P-O/P:3.75KVAC/min<10mA I/P-PE:2KVAC/min<10mA O/P-PE:0.5KVAC/min<10mA	I/P-O/P: 3.75 KVAC/min I/P-PE: 2KVAC/min O/P-PE:0.5KVAC/min<10mA Ta:25°C	I/P-O/P: 2.25mA I/P-PE: 2.31mA O/P-PE: 0.231mA NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ I/P-PE:500VDC>100MΩ O/P-PE:500VDC>100MΩ	I/P-O/P: 500 VDC I/P- PE: 500 VDC O/P- PE: 500 VDC Ta:25°C	I/P-O/P: 25.7GΩ I/P- PE: 26.1GΩ O/P- PE: 26.9GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	IEC61347-1/-2-13 PE TO CHASSIS OR TRACE < 0.5 Ω	25A / 1min Ta:25°C	34mΩ	P

E.M.C TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A CLASS C	I/P: 240VAC/50HZ LOAD:LED/ELECTRONIC LOAD O/P:100%/50% LOAD Ta:25°C	PASS	P
2	CONDUCTION	EN55022 EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL/50% LOAD Ta:25°C	PASS Test by certified Lab	P
3	RADIATION	EN55022 EN55015 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 INDUSTRY AIR:8KV / Contact:4KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
5	E.FT	EN61000-4-4 INDUSTRY INPUT: 1KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
6	SURGE	IEC61000-4-5 INDUSTRY L-N :5KV L,N-PE:10KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P

Reliability Test

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT		
1	TEMPERATURE RISE TEST	MODEL : MDC1853850			P		
		1. Room Ambient Burn-in : 3 HRS I/P : 230VAC O/P : Full Load Ta= 25.2°C					
		2. High Ambient Burn-in : 6 HRS I/P : 230VAC O/P : Full Load Ta=60.0°C					
			NO	Position		ROOM AMBIENT Ta= 25.2°C	HIGH AMBIENT Ta= 60.0°C
			1	LF1		57.4°C	81.4°C
			2	LF2		59.1°C	83.0°C
			3	VZ1		52.5°C	76.5°C
			4	BD1		61.2°C	85.0°C
			5	T1		68.4°C	92.3°C
			6	DP2		62.3°C	86.4°C
			7	QP1		61.3°C	85.1°C
			8	CEP1		61.0°C	85.3°C
			9	U1		59.9°C	84.6°C
			10	QM1		63.0°C	88.0°C
			11	QM2		62.2°C	86.7°C
			12	TM1		69.4°C	93.3°C
			13	U2		62.4°C	86.2°C
			14	QS1		64.7°C	89.3°C
			15	CES4		61.8°C	86.3°C
			16	CES5		63.5°C	87.4°C
	17	CES6	62.3°C	86.4°C			
	18	CES8	61.7°C	85.9°C			
	19	TR4	64.1°C	88.8°C			
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 305 VAC O/P : O/P SHORT TEST Ta : 25°C	OK	P		
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 4 HOUR	I/P : 100VAC / 305VAC O/P : 95% LOAD Ta= -40 °C	OK	P		
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60 °C NO DAMAGE	I/P : 305 VAC O/P : 95% Ta= 60 °C HUMIDITY= 95 %R.H	OK	P		
5	TEMPERATURE COEFFICIENT	+ 0.03 % (0~50°C)	I/P : 230 VAC O/P : FULL LOAD	+ 0.002 % (0~50°C)	P		

6	STORAGE TEMPERATURE TEST	<ol style="list-style-type: none"> 1. Thermal shock Temperature : -45°C~ +90°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	<ol style="list-style-type: none"> 1. Thermal shock Temperature : -35°C~ +65°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 TURN ON/58SEC.;TURN OFF/2SEC. 	OK	P
8	VIBRATION TEST	<ol style="list-style-type: none"> (1) Waveform : Sine Wave (2) Frequency : 5~500Hz (3) Sweep Time : 2S/sweep cycle (4) Acceleration : 1G (5) Test Time : 1 time in each axis (X.Y.Z) (6) Ta : 25°C 	OK	P
9	CAPACITOR LIFE CYCLE	<p>Suppose CES5 is the most critical component</p> <ol style="list-style-type: none"> (1) I/P : 230VAC O/P : Full Load Ta= 25 °C LIFE TIME (2) I/P : 230VAC O/P : Full Load Ta= 60 °C LIFE TIME (3) I/P : 230VAC O/P : 75% Load Ta= 60 °C LIFE TIME (4) I/P : 230VAC O/P : 50% Load Ta= 60 °C LIFE TIME 	<ol style="list-style-type: none"> (1) 260739.8 Hrs (2) 49858.8 Hrs (3) 83427.3 Hrs (4) 105107.3 Hrs 	P
10	MTBF	<p>TOTAL FAILURE RATE : 220K HRS Ta: 25°C</p>	OK	P
11	DMTBF/ Accelerated Life Test	<p>Demonstration Mean Time Between Failure(Expected Life) : 50,000 hours @ T case 70°C</p>	<p>OK 58731 Hrs</p>	P



Test Report: MDC1854200

185W Single Output Switching Power Supply

■ DESIGN VERIFY TEST

Output Function Test
Input Function Test
Protection Function Test
Other Test
Component Stress Test

■ SAFETY & E.M.C. TEST

Safety Test
E.M.C. Test

■ RELIABILITY TEST

Approved by	Checked by	Tested by
Albert YH Chen	Casio Lin	Leo Chung

DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	Vo: 200mVp-p	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	Vo: 150mVp-p	P
2	OUTPUT VOLTAGE RANGE	CH1: 27V~42V	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	42.00V / 115VAC 42.00V / 230VAC	P
3	RATED CURRENT	4200mA ±5%	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	4212mA	P
4	CONSTANT CURRENT REGION	27V~42V	I/P: 230 VAC O/P: CV MODE Ta: 25°C	O/P=27V : 4218mA O/P=42V : 4212mA	P
5	LINE REGULATION	Io: ±1%	I/P: 100 VAC ~305 VAC O/P: FULL LOAD Ta: 25°C	Io: ±0.1%	P
6	SET UP TIME	115VAC/ <1500ms 230VAC/ <500ms	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	115 VAC/ 872ms 230 VAC/ 62ms	P
7	RISE TIME	115VAC/ <100ms 230VAC/ <100ms	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	115 VAC/ 26.69ms 230 VAC/ 26.58ms	P
8	HOLD UP TIME	115VAC/ >12ms	I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	115 VAC/ 17.2ms	P
9	OVER/UNDERSHOOT TEST	< +5%	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	TEST: < 5%	P

10	DIMMER TEST (B Type only)	SPEC:											
		*Reference resistance value for output current adjustment (Typical)											
		Resistance value	Short	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K
		Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
		*1 ~ 10V dimming function for output current adjustment (Typical)											
		Dimming value	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V
		Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
		*10V PWM signal for output current adjustment (Typical); Frequency Range: 100~3KHz											
		Duty value	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
		Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
TEST RESULT: I/P : 230 VAC ;Ta : 25°C													
1	1	Resistance value	Short	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K
		Output current	0	0.354	0.785	1.218	1.650	2.082	2.514	2.948	3.381	3.809	4.212
		%	0.0%	8.43%	18.69%	29.00%	39.29%	49.57%	59.86%	70.19%	80.50%	90.69%	100.2%
	2	Dimming value	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V
		Output current	0	0.352	0.785	1.210	1.621	2.027	2.456	2.930	3.350	3.750	4.138
		%	0.0%	8.38%	18.69%	28.81%	38.60%	48.26%	58.48%	69.76%	79.76%	89.29%	98.52%
	3	Duty value	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
		Output current	0	0.346	0.767	1.192	1.615	2.042	2.464	2.886	3.310	3.729	4.147
		%	0.0%	8.24%	18.26%	28.38%	38.45%	48.62%	58.67%	68.71%	78.81%	88.79%	98.74%
	Note: The output current drops down to 0% when the dimming input is about 1KΩ or 0.1Vdc or 10V PWM signal with 1% duty cycle.												

P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90 VAC~305 VAC	I/P: TESTING O/P: FULL LOAD Ta: 25°C	81V~305V	P
			I/P: (1)LOW-LINE=90 V (2)HIGH-LINE=305 V O/P:FULL/MIN LOAD ON: 30 Sec. OFF: 30 Sec. 10MIN (AC POWER ON/OFF NO DAMAGE)	OK	
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P: 90 VAC ~305VAC O/P: FULL~MIN LOAD Ta: 25°C	OK	P
3	POWER FACTOR	0.98 / 115VAC FULL LOAD (TYP) 0.95 / 230VAC FULL LOAD (TYP) 0.93 / 264VAC FULL LOAD (TYP)	I/P: 115 VAC I/P: 230 VAC I/P: 264 VAC O/P:FULL LOAD Ta:25°C	PF=0.999/115VAC PF=0.985/230VAC PF=0.974/264VAC	P
4	EFFICIENCY	91% (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	92.58%	P
5	INPUT CURRENT	115 V / 2.00A 230 V / 1.00A 277 V / 0.85A	I/P: 115 VAC I/P: 230 VAC I/P: 277 VAC O/P:FULL LOAD Ta:25°C	I = 1.707 A/ 115VAC I = 0.842 A/ 230VAC I = 0.711 A/ 277VAC	P
6	INRUSH CURRENT	230 V/ 75A (Typ) COLD START	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	I = 60.4A/ 230VAC	P
7	THD	230VAC/ <10%	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	4.86%	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	OVER VOLTAGE PROTECTION	Vo: 49V~ 65V	I/P: 90 VAC I/P: 230 VAC I/P: 305VAC O/P: NO LOAD Ta:25°C	54.8V / 90VAC 54.8V / 230VAC 55.6V / 305VAC Latch o/p voltage; Auto-recovery	P
2	OVER TEMPERATURE PROTECTION (Phase 1)	SPEC: Ta: 70±10°C .	I/P: 230 VAC O/P: FULL LOAD	Output de-rate to 70%±5%	P
3	OVER TEMPERATURE PROTECTION (Phase 2)	SPEC: Ta: 85±10°C O.T.P. NO DAMAGE	I/P: 230 VAC O/P: FULL LOAD	O.T.P. Active Shut down o/p current; Auto-recovery.	P
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 305VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE Shut down o/p voltage & current; Auto-recovery.	P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	QM1 Rated 15A 600V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 421 V (2) 419 V	P
		QM2 Rated 15A 600V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 425 V (2) 422 V	P
2	Power Transistor (D to S) or (C to E) Peak Voltage	QS1 Rated 72A 120V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 85.6 V (2) 86.1 V	P
3	Input Capacitor Voltage	CEP1 Rated 100u /450V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 412 V (2) 409 V	P
4	Control IC Voltage Test	U2 Rated 30V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 17.9 V (2) 17.8 V	P
5	P.F.C Transistor (D to S) or (C to E) Peak Voltage	QP1 Rated 30A 600V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 419 V (2) 411 V	P

SAFETY & EMC TEST

SAFETY TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	IEC61347-1/-2-13 I/P-O/P:3.75KVAC/min<10mA I/P-PE:2KVAC/min<10mA O/P-PE:0.5KVAC/min<10mA	I/P-O/P: 3.75 KVAC/min I/P-PE: 2KVAC/min O/P-PE:0.5KVAC/min<10mA Ta:25°C	I/P-O/P: 2.42mA I/P-PE: 2.45mA O/P-PE: 0.221mA NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ I/P-PE:500VDC>100MΩ O/P-PE:500VDC>100MΩ	I/P-O/P: 500 VDC I/P- PE: 500 VDC O/P- PE: 500 VDC Ta:25°C	I/P-O/P: 23.8GΩ I/P- PE: 24.1GΩ O/P- PE: 27.1GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	IEC61347-1/-2-13 PE TO CHASSIS OR TRACE < 0.5 Ω	25A / 1min Ta:25°C	32mΩ	P

E.M.C TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A CLASS C	I/P: 240VAC/50HZ LOAD:LED/ELECTRONIC LOAD O/P:100%/50% LOAD Ta:25°C	PASS	P
2	CONDUCTION	EN55022 EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL/50% LOAD Ta:25°C	PASS Test by certified Lab	P
3	RADIATION	EN55022 EN55015 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 INDUSTRY AIR:8KV / Contact:4KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
5	E.FT	EN61000-4-4 INDUSTRY INPUT: 1KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
6	SURGE	IEC61000-4-5 INDUSTRY L-N :5KV L,N-PE:10KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P

Reliability Test

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT		
1	TEMPERATURE RISE TEST	MODEL : MDC1854200			P		
		1. Room Ambient Burn-in : 3 HRS I/P : 230VAC O/P : Full Load Ta= 25.2°C					
		2. High Ambient Burn-in : 6 HRS I/P : 230VAC O/P : Full Load Ta=60.1°C					
			NO	Position		ROOM AMBIENT Ta= 25.2°C	HIGH AMBIENT Ta= 60.1°C
			1	LF1		58.0°C	82.2°C
			2	LF2		59.7°C	83.9°C
			3	VZ1		53.0°C	77.2°C
			4	BD1		61.8°C	85.8°C
			5	T1		69.1°C	93.2°C
			6	DP2		62.9°C	87.3°C
			7	QP1		61.9°C	85.9°C
			8	CEP1		61.6°C	86.1°C
			9	U1		60.5°C	85.5°C
			10	QM1		63.6°C	88.9°C
			11	QM2		62.8°C	87.6°C
			12	TM1		70.1°C	94.3°C
			13	U2		63.0°C	87.0°C
			14	QS1		65.4°C	90.2°C
			15	CES4		62.4°C	87.1°C
			16	CES5		64.2°C	88.3°C
	17	CES6	62.9°C	87.3°C			
	18	CES8	62.3°C	86.7°C			
	19	TR4	64.8°C	89.7°C			
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 305 VAC O/P : O/P SHORT TEST Ta : 25°C	OK	P		
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 4 HOUR	I/P : 100VAC / 305VAC O/P : 95% LOAD Ta= -40 °C	OK	P		
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60 °C NO DAMAGE	I/P : 305 VAC O/P : 95% Ta= 60 °C HUMIDITY= 95 %R.H	OK	P		
5	TEMPERATURE COEFFICIENT	+ 0.03 % (0~50°C)	I/P : 230 VAC O/P : FULL LOAD	+ 0.002 % (0~50°C)	P		

6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -45°C~ +90°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 : -35°C~ +65°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 TURN ON/58SEC.;TURN OFF/2SEC.	OK	P
8	VIBRATION TEST	(1) Waveform : Sine Wave (2) Frequency : 5~500Hz (3) Sweep Time : 2S/sweep cycle (4) Acceleration : 1G (5) Test Time : 1 time in each axis (X.Y.Z) (6) Ta : 25°C	OK	P
9	CAPACITOR LIFE CYCLE	Suppose CES5 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= 60 °C LIFE TIME (3) I/P : 230VAC O/P : 75% Load Ta= 60 °C LIFE TIME (4) I/P : 230VAC O/P : 50% Load Ta= 60 °C LIFE TIME	(1) 248907.3 Hrs (2) 46807.4 Hrs (3) 78831.8 Hrs (4) 99528.2 Hrs	P
10	MTBF	TOTAL FAILURE RATE : 220K HRS Ta: 25°C	OK	P
11	DMTBF/ Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 50,000 hours @ T case 70°C	OK 58731 Hrs	P



Test Report: MDC1855250

185W Single Output Switching Power Supply

■ DESIGN VERIFY TEST

Output Function Test
Input Function Test
Protection Function Test
Other Test
Component Stress Test

■ SAFETY & E.M.C. TEST

Safety Test
E.M.C. Test

■ RELIABILITY TEST

Approved by	Checked by	Tested by
Albert YH Chen	Casio Lin	Leo Chung

DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	Vo: 200mVp-p	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	Vo: 147mVp-p	P
2	OUTPUT VOLTAGE RANGE	CH1: 25V~35V	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	35.01V / 115VAC 35.01V / 230VAC	P
3	RATED CURRENT	5250mA ±5%	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	5252mA	P
4	CONSTANT CURRENT REGION	25V~35V	I/P: 230 VAC O/P: CV MODE Ta: 25°C	O/P=25V : 5267mA O/P=35V : 5252mA	P
5	LINE REGULATION	Io: ±1%	I/P: 100 VAC ~305 VAC O/P: FULL LOAD Ta: 25°C	Io: ±0.3%	P
6	SET UP TIME	115VAC/ <1500ms 230VAC/ <500ms	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	115 VAC/ 867ms 230 VAC/ 69ms	P
7	RISE TIME	115VAC/ <100ms 230VAC/ <100ms	I/P: 115 VAC I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	115 VAC/ 26.15ms 230 VAC/ 25.98ms	P
8	HOLD UP TIME	115VAC/ >12ms	I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	115 VAC/ 16.5ms	P
9	OVER/UNDERSHOOT TEST	< +5%	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	TEST: < 5%	P

10	DIMMER TEST (B Type only)	SPEC:											
		*Reference resistance value for output current adjustment (Typical)											
		Resistance value	Short	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K
		Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
		*1 ~ 10V dimming function for output current adjustment (Typical)											
		Dimming value	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V
		Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
		*10V PWM signal for output current adjustment (Typical); Frequency Range: 100~3KHz											
		Duty value	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
		Output current	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
TEST RESULT: I/P : 230 VAC ;Ta : 25°C													
	1	Resistance value	Short	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K
		Output current	0	0.475	1.015	1.553	2.087	2.631	3.169	3.715	4.252	4.778	5.250
		%	0.0%	9.05%	19.33%	29.58%	39.75%	50.11%	60.36%	70.76%	80.99%	91.01%	100.0%
	2	Dimming value	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V
		Output current	0	0.452	0.950	1.476	2.021	2.536	3.089	3.580	4.104	4.629	5.180
		%	0.0%	8.61%	18.10%	28.11%	38.50%	48.30%	58.84%	68.19%	78.17%	88.17%	98.67%
	3	Duty value	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
		Output current	0	0.459	0.982	1.508	2.029	2.560	3.081	3.603	4.129	4.650	5.164
		%	0.0%	8.74%	18.70%	28.72%	38.65%	48.76%	58.69%	68.63%	78.65%	88.57%	98.36%
Note: The output current drops down to 0% when the dimming input is about 1KΩ or 0.1Vdc or 10V PWM signal with 1% duty cycle.													

P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90 VAC~305 VAC	I/P: TESTING O/P: FULL LOAD Ta: 25°C	81V~305V	P
			I/P: (1)LOW-LINE=90 V (2)HIGH-LINE=305 V O/P:FULL/MIN LOAD ON: 30 Sec. OFF: 30 Sec. 10MIN (AC POWER ON/OFF NO DAMAGE)	OK	
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P: 90 VAC ~305VAC O/P: FULL~MIN LOAD Ta: 25°C	OK	P
3	POWER FACTOR	0.98 / 115VAC FULL LOAD (TYP) 0.95 / 230VAC FULL LOAD (TYP) 0.93 / 264VAC FULL LOAD (TYP)	I/P: 115 VAC I/P: 230 VAC I/P: 264 VAC O/P:FULL LOAD Ta:25°C	PF=0.999/115VAC PF=0.986/230VAC PF=0.976/264VAC	P
4	EFFICIENCY	91% (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	91.63%	P
5	INPUT CURRENT	115 V / 2.00A 230 V / 1.00A 277 V / 0.85A	I/P: 115 VAC I/P: 230 VAC I/P: 277 VAC O/P:FULL LOAD Ta:25°C	I = 1.795 A/ 115VAC I = 0.884 A/ 230VAC I = 0.743 A/ 277VAC	P
6	INRUSH CURRENT	230 V/ 75A (Typ) COLD START	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	I = 60.4A/ 230VAC	P
7	THD	230VAC/ <10%	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	5.41%	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	OVER VOLTAGE PROTECTION	Vo: 41V~ 55V	I/P: 90 VAC I/P: 230 VAC I/P: 305VAC O/P: NO LOAD Ta:25°C	44.0V / 90VAC 45.2V / 230VAC 47.2V / 305VAC Latch o/p voltage; Auto-recovery	P
2	OVER TEMPERATURE PROTECTION (Phase 1)	SPEC: Ta: 70±10°C .	I/P: 230 VAC O/P: FULL LOAD	Output de-rate to 70%±5%	P
3	OVER TEMPERATURE PROTECTION (Phase 2)	SPEC: Ta: 85±10°C O.T.P. NO DAMAGE	I/P: 230 VAC O/P: FULL LOAD	O.T.P. Active Shut down o/p current; Auto-recovery.	P
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 305VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE Shut down o/p voltage & current; Auto-recovery.	P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	QM1 Rated 15A 600V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 419 V (2) 415 V	P
		QM2 Rated 15A 600V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 421 V (2) 418 V	P
2	Power Transistor (D to S) or (C to E) Peak Voltage	QS1 Rated 72A 120V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 70.5 V (2) 71.2 V	P
3	Input Capacitor Voltage	CEP1 Rated 100u /450V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 410 V (2) 406 V	P
4	Control IC Voltage Test	U2 Rated 30V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 17.7 V (2) 17.6 V	P
5	P.F.C Transistor (D to S) or (C to E) Peak Voltage	QP1 Rated 30A 600V	I/P : 305VAC O/P : (1)Full Load Turn on (2) Full load continue Ta : 25°C	(1) 415 V (2) 409 V	P

SAFETY & EMC TEST

SAFETY TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	IEC61347-1/-2-13 I/P-O/P:3.75KVAC/min<10mA I/P-PE:2KVAC/min<10mA O/P-PE:0.5KVAC/min<10mA	I/P-O/P: 3.75 KVAC/min I/P-PE: 2KVAC/min O/P-PE:0.5KVAC/min<10mA Ta:25°C	I/P-O/P: 2.52mA I/P-PE: 2.48mA O/P-PE: 0.227mA NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ I/P-PE:500VDC>100MΩ O/P-PE:500VDC>100MΩ	I/P-O/P: 500 VDC I/P- PE: 500 VDC O/P- PE: 500 VDC Ta:25°C	I/P-O/P: 24.2GΩ I/P- PE: 25.5GΩ O/P- PE: 26.8GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	IEC61347-1/-2-13 PE TO CHASSIS OR TRACE < 0.5 Ω	25A / 1min Ta:25°C	33mΩ	P

E.M.C TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A CLASS C	I/P: 240VAC/50HZ LOAD:LED/ELECTRONIC LOAD O/P:100%/50% LOAD Ta:25°C	PASS	P
2	CONDUCTION	EN55022 EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL/50% LOAD Ta:25°C	PASS Test by certified Lab	P
3	RADIATION	EN55022 EN55015 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 INDUSTRY AIR:8KV / Contact:4KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
5	E.FT	EN61000-4-4 INDUSTRY INPUT: 1KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
6	SURGE	IEC61000-4-5 INDUSTRY L-N :5KV L,N-PE:10KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P

Reliability Test

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT		
1	TEMPERATURE RISE TEST	MODEL : MDC1855250			P		
		1. Room Ambient Burn-in : 3 HRS I/P : 230VAC O/P : Full Load Ta= 25.1°C					
		2. High Ambient Burn-in : 6 HRS I/P : 230VAC O/P : Full Load Ta=60.3°C					
			NO	Position		ROOM AMBIENT Ta= 25.1°C	HIGH AMBIENT Ta= 60.3°C
			1	LF1		59.2°C	83.9°C
			2	LF2		60.9°C	85.6°C
			3	VZ1		54.1°C	78.8°C
			4	BD1		63.1°C	87.6°C
			5	T1		70.5°C	95.1°C
			6	DP2		64.2°C	89.1°C
			7	QP1		63.2°C	87.7°C
			8	CEP1		62.9°C	87.9°C
			9	U1		61.7°C	87.2°C
			10	QM1		64.9°C	90.7°C
			11	QM2		64.1°C	89.4°C
			12	TM1		71.5°C	96.2°C
			13	U2		64.3°C	88.8°C
			14	QS1		66.7°C	92.0°C
			15	CES4		63.7°C	88.9°C
			16	CES5		65.5°C	90.1°C
	17	CES6	64.2°C	89.1°C			
	18	CES8	63.6°C	88.5°C			
	19	TR4	66.1°C	91.5°C			
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 305 VAC O/P : O/P SHORT TEST Ta : 25°C	OK	P		
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 4 HOUR	I/P : 100VAC / 305VAC O/P : 95% LOAD Ta= -40 °C	OK	P		
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60 °C NO DAMAGE	I/P : 305 VAC O/P : 95% Ta= 60 °C HUMIDITY= 95 %R.H	OK	P		
5	TEMPERATURE COEFFICIENT	+ 0.03 % (0~50°C)	I/P : 230 VAC O/P : FULL LOAD	+ 0.002 % (0~50°C)	P		

6	STORAGE TEMPERATURE TEST	<ol style="list-style-type: none"> 1. Thermal shock Temperature : -45°C~ +90°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	<ol style="list-style-type: none"> 1. Thermal shock Temperature : -35°C~ +65°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 TURN ON/58SEC.;TURN OFF/2SEC. 	OK	P
8	VIBRATION TEST	<ol style="list-style-type: none"> (1) Waveform : Sine Wave (2) Frequency : 5~500Hz (3) Sweep Time : 2S/sweep cycle (4) Acceleration : 1G (5) Test Time : 1 time in each axis (X.Y.Z) (6) Ta : 25°C 	OK	P
9	CAPACITOR LIFE CYCLE	<p>Suppose CES5 is the most critical component</p> <ol style="list-style-type: none"> (1) I/P : 230VAC O/P : Full Load Ta= 25 °C LIFE TIME (2) I/P : 230VAC O/P : Full Load Ta= 60 °C LIFE TIME (3) I/P : 230VAC O/P : 75% Load Ta= 60 °C LIFE TIME (4) I/P : 230VAC O/P : 50% Load Ta= 60 °C LIFE TIME 	<ol style="list-style-type: none"> (1) 225642.6 Hrs (2) 41009.8 Hrs (3) 70190.7 Hrs (4) 89135.8 Hrs 	P
10	MTBF	<p>TOTAL FAILURE RATE : 220K HRS Ta: 25°C</p>	OK	P
11	DMTBF/ Accelerated Life Test	<p>Demonstration Mean Time Between Failure(Expected Life) : 50,000 hours @ T case 70°C</p>	<p>OK 58731 Hrs</p>	P