MODEL: MPQ-200D

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	V1: 80 mVp-p (Max) V2: 180 mVp-p (Max) V3: 80 mVp-p (Max) V3: 80 mVp-p (Max)	I/P: 230VAC O/P:FULL LOAD Ta:25℃	V1: 12 mVp-p (Max) V2: 92 mVp-p (Max) V3: 31 mVp-p (Max) V4: 24 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1: 4.75 V~ 5.5 V	I/P: 230 VAC I/P: 115 VAC O/P:MIN LOAD Ta:25℃	4.53 V~ 5.61 V/ 230 VAC 4.53 V~ 5.61 V/ 115 VAC	P
3	OUTPUT VOLTAGE TOLERANCE	V1: 2 %~ -2 % (Max) V2: 8 %~ -8 % (Max) V3: 5 %~ -5 % (Max) V4: 5 %~ -5 % (Max)	I/P: 115 VAC / 264 VAC O/P:FULL/ MIN LOAD Ta:25℃	V1: 0.3 %~ -0.3 % V2: 2.8 %~ -2.8 % V3: 0.1 %~ -0.1 % V4: 0.1 %~ -0.1 %	P
4	LINE REGULATION	V1: 0.5 %~ -0.5 % (Max) V2: 1 %~ -1 % (Max) V3: 0.5 %~ -0.5 % (Max) V4: 0.5 %~ -0.5 % (Max)	I/P: 115 VAC ~ 264 VAC O/P:FULL LOAD Ta:25℃	V1: 0 %~ 0 % V2: 0.03 %~ -0.03 % V3: 0.05 %~ -0.05 % V4: 0.05 %~ -0.05 %	P
5	LOAD REGULATION	V1: 1 %~ -1 % (Max) V2: 5 %~ -5 % (Max) V3: 1 %~ -1 % (Max) V4: 1 %~ -1 % (Max)	I/P: 230 VAC O/P:FULL ~MIN LOAD Ta:25℃	V1: 0.24 %~ -0.24 % V2: 2.1 %~ -1 % V3: 0.1 %~ -0.1 % V4: 0.05 %~ -0.05 %	P
6	CROSS REGULATION	V1: 1 %~ -1 % (Max) V2: 5 %~ -5 % (Max) V3: 1 %~ -1 % (Max) V4: 1 %~ -1 % (Max)	I/P: 230 VAC O/P: Testing O/P 60%LOAD Other O/P 40%LOAD Change Ta:25℃	V1: 0 %~ 0 % V2: 2.8 %~ -2.8 % V3: 0 %~ 0 % V4: 0.05 %~ -0.05 %	P
7	SET UP TIME	230VAC: 1000 ms (Max) 115 VAC: 3000 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	230VAC/ 701 ms 115VAC/ 1926 ms	P
8	RISE TIME	230VAC: 20 ms (Max) 115VAC: 20 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	230VAC/ 15 ms 115VAC/ 14 ms	P
9	HOLD UP TIME	230VAC: 16 ms(TYP) 115VAC: 16 ms (TYP)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	230VAC/ 19 ms 115VAC/ 19 ms	P
10	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	TEST: <5 %	P
11	DYNAMIC LOAD	V1: 1000 mVp-p	I/P: 230 VAC O/P:FULL /Min LOAD 90%DUTY/1KHZ Ta:25℃	248 mVp-p	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90VAC~264 VAC)	I/P:TESTING O/P:FULL LOAD Ta:25℃	71V~264V	P
			I/P: LOW-LINE-3V= 87 V HIGH-LINE+15%=300 V O/P:FULL/MIN LOAD ON: 30 Sec . OFF: 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE)	TEST: OK	
2	INPUT FREQUENCY RANGE	47HZ ~440HZ NO DAMAGE OSC	I/P: 90 VAC ~ 264 VAC O/P:FULL~MIN LOAD Ta:25℃	TEST: OK	P
3	POWER FACTOR	0.95/ 230 VAC(TYP) 0.98/1150 VAC(TYP)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	PF= 0.97 /230 VAC. PF= 0.99 /115 VAC	P
4	EFFICIENCY	79 % (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	79.9 %	P
5	INPUT CURRENT	230V/ 1.6 A (TYP) 115V/ 3.5 A (TYP)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	I = 1.1 A/ 230 VAC I = 2.3 A/ 115 VAC	P
6	INRUSH CURRENT	230V/ 40 A(TYP) 115V/ 25 A (TYP) COLD START	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	I = 26 A/ 230 VAC I = 13 A/ 115 VAC	P
7	LEAKAGE CURRENT a. For earth leakage current b. For patient leakage current	a. <180 uA / 264 VAC b. <100 uA / 264 VAC	I/P: 264 VAC O/P:Min LOAD Ta:25℃	a. 74 uA b. 41 uA	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	120 %~ 160 %	I/P: 230 VAC I/P: 115 VAC O/P:TESTING Ta:25℃	141 %/ 230 VAC 141 %/ 115 VAC Hiccup Mode	P
2	OVER VOLTAGE PROTECTION	CH1: 5.75 V~ 6.75 V	I/P: 230 VAC I/P: 115 VAC O/P:MIN LOAD Ta:25℃	6.1 V/ 230 VAC 6.1 V/ 115 VAC Shunt down Re- power ON	P
3	OVER TEMPERATURE ROTECTION	SPEC: TSW1: 95 ± 5℃ O.T.P. NO DAMAGE	I/P: 230 VAC O/P:FULL LOAD	O.T.P. Active Shut down o/p voltage，recovers automatically after temperature goes down	P
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264 VAC O/P:FULL LOAD Ta:25℃	NO DAMAGE Hiccup Mode	P

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	REMOTE CONTROL	Rc+ / Rc- 0V~ 0.8V POWER ON 4V~ 10V POWER OFF	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	0V ~ 2.5V POWER ON 2.6V ~ 10 V POWER OFF	P
2	POWER GOOD SIGNAL	DELAY 10ms ~ 500ms	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	307 ms/ 230 VAC 307 ms/ 115 VAC	P
3	POWER FAIL SIGNAL	> 1ms	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	5 ms/ 230 VAC 5 ms/ 115 VAC	P
4	REMOTE SENSE	>0.25V	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	>0.25V	P

ENVIRONMENT TEST

<table>
<tr><th>NO</th><th>TEST ITEM</th><th>SPECICATION</th><th>TEST CONDITION</th><th>RESULT</th><th>VERDICT</th></tr>
<tr><td>1</td><td>TEMPERATURE RISE TEST</td><td colspan="3">MODEL：MPQ-200B WITH FAN
1. ROOM AMBIENT BURN-IN：2HRS
I/P: 230VAC O/P: FULL LOAD Ta= 28.8 ℃
2. HIGH AMBIENT BURN-IN：2HRS
I/P: 230VAC O/P: FULL LOAD Ta= 50.7 ℃

<table>
<tr><th>NO</th><th>Position</th><th>P/N</th><th>ROOM AMBIENT Ta= 28.8℃</th><th>HIGH AMBIENT Ta= 50.7 ℃</th></tr>
<tr><td>1</td><td>LF2</td><td>LF-104</td><td>52.5℃</td><td>74.5℃</td></tr>
<tr><td>2</td><td>D23</td><td>31DF6 3A/600V</td><td>38.2℃</td><td>60.1℃</td></tr>
<tr><td>3</td><td>Q20</td><td>IRFP450 14A/500V</td><td>45.7℃</td><td>68.0℃</td></tr>
<tr><td>4</td><td>T1 COIL</td><td>TF-1171</td><td>45.3℃</td><td>66.3℃</td></tr>
<tr><td>5</td><td>D100</td><td>SBL3040PT 30A/40V LT</td><td>80.3℃</td><td>100.6℃</td></tr>
<tr><td>6</td><td>D200</td><td>S20LC20U 20A/200V SHI</td><td>57.9℃</td><td>79.1℃</td></tr>
<tr><td>7</td><td>D300</td><td>F10SC6 10A/60V SHI</td><td>57.9℃</td><td>78.8℃</td></tr>
<tr><td>8</td><td>RG70</td><td>R05PI 3A/35V KEC</td><td>58.6℃</td><td>79.3℃</td></tr>
<tr><td>9</td><td>BD1</td><td>D3SB60 4A/600V SHI</td><td>48.4℃</td><td>71.8℃</td></tr>
<tr><td>10</td><td>C5</td><td>150U/400V RUB 105℃</td><td>40.6℃</td><td>60.2℃</td></tr>
<tr><td>11</td><td>L2</td><td>TR-570</td><td>66.3℃</td><td>84.8℃</td></tr>
<tr><td>12</td><td>Q1</td><td>IRFP460A 20A/500V</td><td>63.6℃</td><td>84.4℃</td></tr>
<tr><td>13</td><td>U1</td><td>ML4800CP</td><td>45.2℃</td><td>66.7℃</td></tr>
<tr><td>14</td><td>L100</td><td>TR-523</td><td>69.3℃</td><td>91.7℃</td></tr>
<tr><td>15</td><td>C110</td><td>2200U/6.3V RUB 105℃</td><td>47.0℃</td><td>69.9℃</td></tr>
</table>
</td><td>P</td></tr>
<tr><td>2</td><td>OVER LOAD BURN-IN TEST</td><td>NO DAMAGE
1 HOUR (MIN)</td><td>I/P: 230 VAC
O/P: V1@20A
V2@9A
V3@2.4A
V4@2.4A
Ta:25℃</td><td>TEST：OK</td><td>P</td></tr>
<tr><td>3</td><td>LOW TEMPERATURE
TURN ON TEST</td><td>TURN ON AFTER 2 HOUR</td><td>I/P: 230 VAC
O/P: 80 % LOAD
Ta= -20 ℃</td><td>TEST：OK</td><td>P</td></tr>
<tr><td>4</td><td>HIGH HUMIDITY
HIGH TEMPERATURE
HIGH VOLTAGE
TURN ON TEST</td><td>AFTER 12 HOURS
IN CHAMBER ON
CONTROL 50 ℃
NO DAMAGE</td><td>I/P: 272 VAC
O/P:FULL LOAD
Ta= 50 ℃
HUMIDITY= 95 %R.H</td><td>TEST：OK</td><td>P</td></tr>
<tr><td>5</td><td>TEMPERATURE
COEFFICIENT</td><td>± 0.04 %(0~50℃)</td><td>I/P: 230 VAC
O/P:FULL LOAD</td><td>± 0.02 %(0~50℃)</td><td>P</td></tr>
<tr><td>6</td><td>VIBRATION TEST</td><td colspan="2">1 Carton & 1 Set Operating
(1) Waveform: Sine Wave
(2) Frequency:10~500Hz
(3) Sweep Time:10min/sweep cycle
(4) Acceleration:2G
(5) Test Time:1 hour in each axis (X.Y.Z)
(6) Ta:25℃</td><td>TEST：OK</td><td>P</td></tr>
</table>

SAFETY TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P: 4 KVAC/min I/P-FG: 1.5 KVAC/min O/P-FG: 1.5 KVAC/min	I/P-O/P: 4.2 KVAC/min I/P-FG: 1.8 KVAC/min O/P-FG: 1.8 KVAC/min Ta:25℃	I/P-O/P: 2 mA I/P-FG: 1.19 mA O/P-FG: 1.55 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℃	I/P-O/P: 30 GΩ I/P-FG: 30 GΩ O/P-FG: 24 GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta:25℃	18 mΩ	P
4	APPROVAL	TUV: Certificate NO ：TA50069957 UL: File NO ：E227340			P

E.M.C TEST

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

M.T.B.F & LIFE CYCLE CALCULATION

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	CAPACITOR LIFE CYCLE	SUPPOSE C110 IS THE MOST CRITICAL COMPONENT I/P: 230VAC O/P:FULL LOAD Ta= 25 ℃ LIFE TIME= 437900 HRS I/P: 230VAC O/P:FULL LOAD Ta= 50 ℃ LIFE TIME= 72238 HRS			P
2	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE: 262.1k HRS			P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) **Peak Voltage**	Q20 Rated IRFP450 : 500 V 14A	I/P:High-Line +3V = 267 V O/P: (1)Full Load Turn on (2) Full Load (3)Output Short Ta:25℃	(1) 386 V (2) 390 V (3) 386 V	P
2	Diode Peak **Voltage**	D100 Rated SBL3040PT : 40 V 30 A D200 Rated S20LC20U : 200 V 20 A D300 Rated FMX-12SL : 200 V 10 A D300 Rated FMX-12SL : 200 V 10 A	I/P:High-Line +3V = 267 V O/P: (1) Full Load Turn on (2) Full Load (3)Output Short Ta:25℃	(1) 23.9 V (2) 20.7 V (3) 23.9 V (1) 104 V (2) 85.6 V (3) 105 V (1) 70.8 V (2) 55.8 V (3) 75.6 V (1) 72.4 V (2) 57.4 V (3) 73.6 V	P
3	**Input Capacitor Voltage**	C 5 Rated : 150u / 400V/ 105℃	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 (4) Burn in 1hour Ta:25℃	(1) 386 V (2) 382 V (3) 396 V (4) 390 V	P
4	**Control IC Voltage Test**	U1 Rated ML4800 : 18 V	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℃	(1) 15 V (2) 15.1 V (3) 15.6 V	P
5	Power Transistor (D to S) or (C to E) **Peak Voltage**	Q1 Rated IRFP460A : 500 V 20A	I/P:High-Line +3V = 267 V O/P: (1)Full Load Turn on (2) Full Load (3)Output Short Ta:25℃	(1) 408 V (2) 408 V (3) 390 V	P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2005/5/17	RD SAMPLE	PASS	VINCENT TSENG	MAX LIN
2005/9/3	PRODUCT SAMPLE W0507B20	PASS	VINCENT TSENG	MAX LIN
2006/4/11	PRODUCT SAMPLE W0603C35	PASS	VINCENT TSENG	MAX LIN

2003/12/12 A50-F023