MODEL：QP-320D

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	V1:100 mVp-p (Max) V2:150 mVp-p (Max) V3:150 mVp-p (Max) V4:150 mVp-p (Max)	I/P: 230VAC O/P:FULL LOAD Ta:25℃	V1: 76 mVp-p (Max) V2: 95 mVp-p (Max) V3: 45 mVp-p (Max) V4: 60 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1: 4.75V~ 5.5V CH2: 11.4V~ 13.2 V	I/P: 230 VAC O/P:MIN LOAD Ta:25℃	4.54 V~ 5.9 V/ CH1 10.37 V~ 13.89 V/ CH2	P
3	OUTPUT VOLTAGE TOLERANCE	V1: 3 %~ -3 % (Max) V2: 3 %~ -3 % (Max) V3: 10 %~ -6 % (Max) V4: 10 %~ -10 % (Max)	I/P: VAC / 264 VAC O/P:FULL/ MIN LOAD Ta:25℃	V1: 0.3 %~ -0.3 % V2: 0.13 %~ -0.13 % V3: 2.2 %~ -2.2 % V4: 2.4 %~ -2.4 %	P
4	LINE REGULATION	V1: 1 %~ -1 % (Max) V2: 2 %~ -2 % (Max) V3: 2 %~ -2 % (Max) V4: 3 %~ -3 % (Max)	I/P: VAC ~ 264 VAC O/P:FULL LOAD Ta:25℃	V1: 0.12 %~ -0.12 % V2: 0 %~ 0 % V3: 0.03 %~ -0.03 % V4: 0.1 %~ -0.1 %	P
5	LOAD REGULATION	V1: 2 %~ -2 % (Max) V2: 3 %~ -3 % (Max) V3: 6 %~ -6 % (Max) V4: 8 %~ -8 % (Max)	I/P: 230 VAC O/P:FULL ~MIN LOAD Ta:25℃	V1: 0.4 %~ -0.4 % V2: 0.21 %~ -0.21 % V3: 1.6 %~ -1.6 % V4: 0.4 %~ -0.4 %	P
6	CROSS REGULATION	V1: 2 %~ -2 % (Max) V2: 3 %~ -3 % (Max) V3: 6 %~ -6 % (Max) V4: 8 %~ -8 % (Max)	I/P: 230 VAC O/P: Testing O/P 60%LOAD Other O/P 40%LOAD Change Ta:25℃	V1: 0.25 %~ -0.25 % V2: 0.05 %~ -0.05 % V3: 2.2 %~ -2.2 % V4: 2.4 %~ -2.4 %	P
7	SET UP TIME	230VAC: 800 ms (Max)	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	230VAC/ 479 ms	P
8	RISE TIME	230VAC: 50 ms (Max)	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	230VAC/ 26 ms	P
9	HOLD UP TIME	230VAC: 16 ms (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	230VAC/ 22 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℃	270 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℃	68V~264V	P
			I/P: LOW-LINE-3V= 97 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 ~63 HZ 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 / 115 VAC(TYP)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	PF= 0.96 / 230 VAC PF= 0.99 / 115 VAC	P
4	EFFICIENCY	83% (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	84.9%	P
5	INPUT CURRENT	230V/ 2.5 A (TYP) 115V/ 5 A (TYP)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	I = 1.73 A/ 230 VAC I = 3.51 A/ 115 VAC	P
6	INRUSH CURRENT	230V/ 45 A (TYP) 115V/ 25 A(TYP) COLD START	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	I = 38 A/ 230 VAC I = 19 A/ 115 VAC	P
7	LEAKAGE CURRENT	< 2 mA / 240 VAC	I/P: 254 VAC O/P:Min LOAD Ta:25℃	L-FG: 0.8 mA N-FG: 0.8 mA	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	105 %~ 150%	I/P: 230 VAC I/P: 115 VAC O/P:TESTING Ta:25℃	125 %/ 230 VAC 125 %/ 115 VAC Foldback Current Limiting	P
2	OVER VOLTAGE PROTECTION	CH1: 5.75 V~ 6.75 V CH2: 13.8 V~ 16.2 V	I/P: 230 VAC I/P: 115 VAC O/P:MIN LOAD Ta:25℃	CH1: 5.91 V/ 230 VAC 5.91 V/ 115 VAC CH2: 15.1 V/ 230 VAC 15.1 V/ 115 VAC Shunt down Re- power ON	P
3	OVER TEMPERATURE PROTECTION	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 volotage，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 Foldback Current Limiting	P

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	FAN SPEED CONTROL	-------	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	Fan Voltage= 11.76V	P
2	POWER GOOD SIGNAL	DELAY 10ms ~ 500ms	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	124 ms/ 230VAC 124 ms/ 115VAC	P
3	POWER FAIL SIGNAL	> 1ms	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	13 ms/ 230 VAC 13 ms/ 115 VAC	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： QP-320D
1. ROOM AMBIENT BURN-IN：12 HRS
I/P: 230VAC O/P: FULL LOAD Ta= 31 ℃
2. HIGH AMBIENT BURN-IN： 2 HRS
I/P: 230VAC O/P: FULL LOAD Ta= 60.7 ℃

<table>
<tr><th>NO</th><th>Position</th><th>P/N</th><th>ROOM AMBIENT Ta= 31 ℃</th><th>HIGH AMBIENT Ta= 60.7 ℃</th></tr>
<tr><td>1</td><td>LF1</td><td>TF-360</td><td>50.4℃</td><td>75.2℃</td></tr>
<tr><td>2</td><td>BD1</td><td>D10XB60 10A/600V</td><td>57.2℃</td><td>83.5℃</td></tr>
<tr><td>3</td><td>L1</td><td>TR-337</td><td>49.7℃</td><td>76.0℃</td></tr>
<tr><td>4</td><td>D3</td><td>BYC10-600 10A/600V</td><td>48.6℃</td><td>74.8℃</td></tr>
<tr><td>5</td><td>Q2</td><td>K2082 9A/900V</td><td>55.3℃</td><td>84.7℃</td></tr>
<tr><td>6</td><td>Q1</td><td>IRFP460A 20A/500V</td><td>45.3℃</td><td>72.4℃</td></tr>
<tr><td>7</td><td>C5</td><td>120U/400V NCC 105℃</td><td>43.5℃</td><td>69.7℃</td></tr>
<tr><td>8</td><td>U1</td><td>ML4800CP</td><td>50.6℃</td><td>77.9℃</td></tr>
<tr><td>9</td><td>T1 COIL</td><td>TF-1364</td><td>63.2℃</td><td>91.6℃</td></tr>
<tr><td>10</td><td>D4</td><td>HER208 2A/1KV</td><td>56.1℃</td><td>83.2℃</td></tr>
<tr><td>11</td><td>D101</td><td>S60SC4M 60A/40V</td><td>70.2℃</td><td>97.4℃</td></tr>
<tr><td>12</td><td>L200</td><td>TR-628</td><td>68.5℃</td><td>96.1℃</td></tr>
<tr><td>13</td><td>D401</td><td>YG805C10 20A/100V</td><td>61.3℃</td><td>88.4℃</td></tr>
<tr><td>14</td><td>D100</td><td>S60SC4M 60A/40V</td><td>70.6℃</td><td>97.6℃</td></tr>
<tr><td>15</td><td>L100</td><td>TR-629</td><td>56.1℃</td><td>83.9℃</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: 115 % LOAD
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: 100% LOAD
Ta= -10 ℃</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>± 0.03 %(0~50℃)</td><td>I/P: 230 VAC
O/P:FULL LOAD</td><td>± 0.01 %(0~50℃)</td><td>P</td></tr>
<tr><td>6</td><td>VIBRATION TEST</td><td colspan="2">1 Carton & 1 Set
(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: 3 KVAC/min I/P-FG: 1.5 KVAC/min O/P-FG: 0.5 KVAC/min	I/P-O/P: 3.6 KVAC/min I/P-FG: 1.8 KVAC/min O/P-FG: 0.6 KVAC/min Ta:25℃	I/P-O/P: 5.43 mA I/P-FG: 5.05 mA O/P-FG: 3.64 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: 10 GΩ I/P-FG: 10 GΩ O/P-FG: 12 GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta:25℃	2 mΩ	P
4	APPROVAL	TUV: Cerificate NO ：R50073099 UL: File NO ：E183223			P

E.M.C TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS D	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 LIGHT 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 LIGHT INDUSTRY INPUT: 1KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25℃	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℃	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 C 110 IS THE MOST CRITICAL COMPONENT I/P: 230VAC O/P:FULL LOAD Ta= 25 ℃ LIFE TIME= 474329 HRS I/P: 230VAC O/P:FULL LOAD Ta= 50 ℃ LIFE TIME= 106138 HRS			P
2	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE: 213.5 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**	Q2 Rated 2SK2082 : 900 V 9A	I/P:High-Line +3V = 267 V O/P: (1)Full Load Turn on (2) Full Load (3)Output Short Ta:25℃	(1) 796 V (2) 796 V (3) 836 V	P
2	Diode Peak **Voltage**	D100 Rated S60SC4M : 40V 60A D200 Rated C25P06Q : 60V 25A D300 Rated F20NC15 : 150V 20A D400 Rated YG805C10 : 120V 20A	I/P:High-Line +3V = 267 V O/P: (1)Full Load Turn on (2) Full Load (3)Output Short Ta:25℃	(1) 19.7 V (2) 20.5 V (3) 20.5 V (1) 55.4 V (2) 50.4 V (3) 56.8 V (1) 78.4 V (2) 74.8 V (3) 80.4 V (1) 46.4 V (2) 44.4 V (3) 47.2 V	P
3	Clamp Diode Peak **Voltage**	D4 Rated HER208 : 1KV 2A	I/P:High-Line +3V = 267 V O/P: (1)Full Load (2) Dynamic Load 90%Duty/1KHz Ta:25℃	(1) 792 V (2) 792 V	P
4	**Input Capacitor Voltage**	C5 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) 390 V (2) 384 V (3) 390 V (4) 390 V	P
5	**Control IC Voltage Test**	U1 Rated ML4800 : 18V	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) 14.8 V (2) 14.8 V (3) 14.8 V	P
6	P.F.C 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) 424 `V (2) 426 V (3) 436 V	P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2005/5/18	RD SAMPLE	PASS	VINCENT TSENG	MAX LIN
2005/12/2	PRODUCT SAMPLE W0510C53	PASS	VINCENT TSENG	MAX LIN
2005/12/26	PRODUCT SAMPLE W0512B52	PASS	VINCENT TSENG	MAX LIN

2003/12/12 A50-F023