Quality Engineering Test Report

MODEL : QP375-5E 378 W AC-DC QUAD OUTPUT SWITCHING POWER SUPPLY

V1 : +5 V/ 30 A V2 : +12 V/ 9 A

V3 : 24 V/ 3 A V4 : 24 V/ 2 A

(1) INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	85 VAC~ 264 VAC (Typ)	I/P:TESTING O/P:FULL LOAD Ta:25°C	57 V~ 264 V	P
			I/P: LOW-LINE-3V= 82 V HIGH-LINE+15%= 300 V O/P:FULL/MIN LOAD ON: 1 Sec. OFF: 5 Sec. 300 TIMES (AC POWER ON/OFF)	TEST: OK	
2	INPUT FREQUENCY RANGE	47 HZ ~ 63 HZ(Typ) NO DAMAGE OSC	I/P: 115 VAC ~ 264 VAC O/P:FULL~MIN LOAD Ta:25°C	TEST: OK	P
3	INPUT CURRENT	230V/ 3 A(Max) 115V/ 6 A(Max)	I/P: 230/115 VAC O/P:FULL LOAD	I = 2.1 A/ 230 VAC I = 4.3 A/ 115 VAC	P
4	INRUSH CURRENT	230 V/ 45 A(Max) COLD START	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	I = 32 A/ 230 VAC	P
5	LINE REGULATION	V1: +0.5 %~ -0.8 %(Max) V2: +0.5 %~ -0.8 %(Max) V3: +0.5 %~ -0.8 %(Max) V4: +0.5 %~ -0.8 %(Max)	I/P: 264 VAC ~ 115 VAC O/P:FULL LOAD Ta:25°C	V1: +0.1 %~ -0.1 % V2: 0 %~ 0 % V3: +0.02 %~ -0.02 % V4: 0 %~ 0 %	P
6	EFFICIENCY	78 %(Typ)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	80.8 %	P
7	POWER FACTOR	230 V/ 0.95(Typ) 115 V/ 0.98 (Typ)	I/P: 230 / 115 VAC O/P:FULL LOAD Ta:25°C	PF= 0.96 / 230 VAC PF= 0.99 / 115 VAC	P

(2) OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	SET UP TIME	230 VAC/ 800 ms(Max) ---- VAC/ ---- ms(Max)	I/P: 230/115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 163ms 115VAC/ 183 ms	P
2	RISE TIME	230VAC/ 50 ms(Max) ---- VAC/ ---- ms(Max)	I/P: 230/115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 16 ms 115VAC/ 17 ms	P
3	HOLD UP TIME	230VAC/ 20 ms(Max) ---- VAC/ ---- ms(Max)	I/P: 230/115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 32 ms 115VAC/ 32 ms	P
4	OVER/UNDERSHOOT TEST	< ±5%(Max)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	TEST: <5%	P

5	OUTPUT VOLTAGE ADJUST RANGE	CH1: +10 %~ -5 % (TYP) CH2: +10 %~ -5 % (TYP) CH3: +10 %~ -5 % (TYP) CH4: +10 %~ -5 % (TYP)	I/P: 85 / ---- VAC O/P:MIN LOAD Ta:25°C	V1: -12 %~ +26 % V2: -13 %~ +15 % V3: 15 %~ +16 % V4: -14 %~ +16 %	P
			I/P: 85 VAC O/P:FULL LOAD (AC Turn ON/OFF in Vout Hi/Low Limit)	NO Damage	P
6	LOAD REGULATION	V1: +0.8 %~ -0.8 %(Max) V2: +0.8 %~ -0.8 %(Max) V3: +0.8 %~ -0.8 %(Max) V4: +0.8 %~ -0.8 %(Max)	I/P: 230 VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: +0.3 %~ -0.5 % V2: +0.01%~ -0.01 % V3: +0.1 %~ -0.05 % V4: +0.2 %~ -0.1 %	P
7	OUTPUT VOLTAGE TOLERANCE	V1: +1 %~ -1 %(Max) V2: +1 %~ -1 %(Max) V3: +1 %~ -1 %(Max)) V4: +1 %~ -1 %(Max)	I/P: 264 VAC ~ 115 VAC O/P:FULL/ Min % LOAD Ta:25°C	V1: +0.2 %~ -0.37 % V2: +0.1 %~ -0.1 % V3: +0..05 %~ -0.02 % V4: +0.1 %~ -0.1 %	P
8	RIPPLE & NOISE	V1: 100 mVp-p (Typ) V2: 120 mVp-p (Typ) V3: 120 mVp-p (Typ) V4: 240 mVp-p (Typ)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	V1: 20 mVp-p V2: 9 mVp-pP V3: 9 mVp-p V4: 24 mVp-p	P
9	DYNAMIC LOAD	CH1: 1000 mVp-p	I/P: 230 VAC O/P:FULL / Min LOAD 90% DUTY/1KHZ Ta:25°C	294 mVp-p	P

(3) PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER VOLTAGE PROTECTION	CH1: 5.75 V~ 6.75 V(Typ)	I/P: 230 / 115 VAC O/P:MIN LOAD Ta:25ºC	6.6 V/ 230 VAC 6.6 V/ 115 VAC Shunt down -Repower ON	P
2	OVER LOAD PROTECTION	105 %~ 135 %(Typ)	I/P: 230/115 VAC O/P:TESTING Ta:25ºC	116 %/ 230 VAC 115 °C/ 115 VAC * Pulse by pulse	P
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 230 VAC O/P: 100% LOAD Ta:25ºC	NO DAMAGE * Pulse by pulse	P
4	OVER TEMPERATURE PROTECTION	SPEC:Ta 80 °C O.T.P. NO DAMAGE	I/P: 230 VAC O/P:FULL LOAD	84 °C/ 230 VAC O.T.P. Active Shunt down -Repower ON	P

(4) CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	REMOTE SENSE	> 0.25 V	I/P: 230 VAC O/P:FULL LOAD Ta:25ºC	>1 V	P
2	REMOTE CONTROL	0 V~ 0.8V POWER ON 4 V~ 10 V POWER OFF	I/P: 230 VAC O/P:FULL LOAD Ta:25ºC	<2.7 V POWER ON >2.7 V POWER OFF	P
3	POWER GOOD SIGNAL	DELAY 10ms ~ 500ms	I/P: 230/115 VAC O/P:FULL LOAD Ta:25ºC	50 ms/ 230VAC 50 ms/ 115VAC	P
4	POWER FAIL SIGNAL	> 1ms	I/P: 230/115 VAC O/P:FULL LOAD Ta:25ºC	17 ms/ 230VAC 17 ms/ 115VAC	P

(5) SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P: 3.0 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: 0.8 KVAC/min Ta:25ºC	I/P-O/P: 10 mA I/P-FG: 8 mA O/P-FG: 8 mA NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P:500VDC >100M ohms I/P-FG:500VDC >100M ohms O/P-FG:500VDC >100M ohms	I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25ºC	I/P-O/P: 3G ohms I/P-FG: 4G ohms O/P-FG: 2G ohms NO DAMAGE	P
3	LEAKAGE CURRENT	< 2 mA /240VAC	I/P:(240VAC)*1.06/ (60HZ) O/P:Min LOAD Ta:25ºC	L-FG: 1.5 mA N-FG: 1.5 mA	P
4	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 m ohms	25 A / 2min Ta:25ºC	18 m ohms	P
5	APPROVAL	TUV:Certificate NO:R50014021 UL:File No:E183223			

(6) E.M.C TEST

NO	TEST ITEM	TEST CONDITION	SPECIFICATION	RESULT	VERDICT
1	HARMONIC	IEC61000-3-2 *CLASS A	I/P:230VAC/50HZ O/P:FULL LOAD Ta:25ºC	* PASS	P
2	CONDUCTION	EN55022 * CLASS A	I/P:230VAC (50HZ) O/P:FULL/50% LOAD Ta:25ºC	*PASS Under Test by certified Lab	P
3	RADIATION	EN55022 *CLASS B	I/P:230VAC (50HZ) O/P:FULL/50% LOAD Ta:25ºC	*PASS Under Test by certified Lab	P
4	E.S.D	IEC61000-4-2 * LIGHT INDUSTRY AIR:8KV / Contac:4KV	I/P:230VAC/50HZ O/P:FULL LOAD Ta:25ºC	* CRITERIA A	P

5	E.F.T	IEC61000-4-4 * LIGHT INDUSTRY INPUT:1KV	I/P:230VAC/50HZ O/P:FULL LOAD Ta:25ºC	* CRITERIA A	P
6	SURGE	IEC61000-4-5 * INDUSTRY L-N:2KV L,N-PE:4KV	I/P:230VAC/50HZ O/P:FULL LOAD Ta:25ºC	* CRITERIA A	P
7	Certificate By Interocean EMC Technology Corp Lab & Test Report Prepare				

(7) ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	TEMPERATURE RISE TEST T rise OF PARTS				P

MODEL:QP375-5A
1.ROOM AMBIENT BURN-IN: 2 HRS
I/P: 230 VAC O/P: 100% LOAD Ta= 24.4 ºC
2.HIGH AMBIENT BURN-IN: 16 HRS
I/P: 230 VAC O/P: 100% LOAD Ta= 44.9 ºC

NO	Position	P/N	TEMP Ta= 24.4ºC	TEMP Ta= 44.9 ºC
1	D1	SMD 3A/600V	31.3	48.7
2	D60	1N5406 3A/600V	63.0	82.5
3	BD1	KBJ608G 6A/800V	36.6	54.6
4	L1	TR-288	35.7	53.3
5	U2	ML 4800CP	28.1	45.9
6	Q1	IRFP460 20A/500V	46.4	66.1
7	Q2	IRFR460 15A/500V	44.0	64.4
8	D3	RHRP1560 15A/600V	58.6	79.3
9	Q5	2SK2652 6A/900V	53.2	74.1
10	Q4	2SK2652 6A/900V	63	84.1
11	TRC1	BTA16-600B/6A	45.7	64.2
12	TSW1	S7-22 80ºC	46.1	65.8
13	C5	470u/400V 85ºC	36.0	53.2
14	T1core	TF826	56.3	74.9
15	T1coil	TF826	68.8	88.3

2	OVER LOAD BURN-IN TEST	NO DAMAGE 1.5 HOUR (MIN)	I/P: 230 VAC O/P: 114 % Ta:25ºC	TEST: OK	P
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2.5 HOUR	I/P: 230 VAC O/P: 100 %LOAD Ta= -11.5 ºC	TEST: OK	P
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 55ºC NO DAMAGE	I/P: 230 VAC O/P:FULL LOAD Ta= 55 ºC HUMIDITY= 95 %R.H	TEST: OK	P
5	TEMPERATURE COEFFICIENT	+ 0.03 %(0~50ºC)	I/P: 230 VAC O/P:FULL LOAD	+ 0.01 %(0~50ºC)	P

(8) M.T.B.F & LIFE CYCLE CALCULATION

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	CAPACITOR LIFE CYCLE	SUPPOSE C 111 IS THE MOST CRITICAL COMPONENT I/P:230 VAC O/P:FULL LOAD Ta= 25 °C LIFE TIME= 224553 HRS I/P:230 VAC O/P:FULL LOAD Ta= 45 °C LIFE TIME= 61036 HRS			P
2	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE: 75931 HRS			P

(9) VIBRATION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	VIBRATION TEST	1 Carton & 1Set Operating at I/P:230VAC no load (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) Ta:25ºC		TEST: ----	N/A

(10) COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q 5 Rated 2SK2850 : 900 V 6 A	I/P:High-Line +3V = 267 V O/P: (1)Full Load Turn on (2) Full Load (3)Output Short Ta:25ºC	(1) 744 V (2) 800 V (3) 876 V	P
2	Diode Peak Voltage	D 102 Rated S30SC4M : 40 V 30 A	I/P:High-Line +3V = 267 V O/P: (1)Full Load Turn on (2) Full Load (3)Output Short Ta:25ºC	(1) 25.1 V (2) 16.7 V (3) 24.3 V	P

DATE	SAMPLE	TEST RESULT	TEST	APPROVAL
2003/7/18	ENGINEERING SAMPLE	PASS	Vincent Tseng	Max Lin
2003/9/19	PRODUCTION SAMPLE A210A14	PASS	Vincent Tseng	Max Lin
2004/3/31	PRODUCTION SAMPLE A301B24	PASS	Vincent Tseng	Max Lin