



1~4 Output Medical Type

120W Medical series



Specification

AC INPUT VOLTAGE

90~264 VAC, 47~440Hz / 127~370VDC.

AC INPUT CURRENT (Typ.)

Maximum input current 2.9A at 115VAC, 60Hz or 1.7A at 230VAC, 60Hz with 100% output load.

INRUSH CURRENT (Typ.)

Inrush current is less than 22A at 115VAC or less than 45A at 230VAC under cold start conditions. Limiting provided by internal thermistors.

SETUP, RISE TIME

MPS-120: 800ms, 20ms / 230VAC at full load
2000ms, 50ms / 115VAC at full load
MPD,T,Q-120:500ms, 20ms / 230VAC at full load
1200ms, 50ms / 115VAC at full load

HOLD-UP TIME (Typ.)

80ms / 230VAC at full load
14ms / 115VAC at full load

LEAKAGE CURRENT

Leakage current is less than 180 μ A at 264VAC

DC OUTPUT ADJ. RANGE

DC output voltage (or Ch1 of multiple output models) can be adjusted between -5%~+10% rated output voltage by potential meter.

OVERLOAD PROTECTION

Fully protected against short circuit and output overload. The hiccup type protection will be activated at 110~150% (For MPD,T,Q-120), 120~160%(For MPS-120) rated load and recovers automatically after fault condition is removed.

OVER VOLTAGE PROTECTION

Provided on output channel 1 only at 115%~135% rated output voltage. (120%~140% for MPS-120-15/24/48). Output will be shut down when this protection is activated.

POWER GOOD / FAIL SIGNAL (OPTIONAL)

TTL logic high for power good and TTL low for power fail. When the output voltage reaches 90% of rated value, a +5V TTL signal will be sent out with a 10~500ms delay; At least 1ms before the output voltage goes below 90% of the rated value, the TTL signal will be turned off.

* MPS-120-3.3 does not have this optional function.

WORKING TEMP.

Whole series can operate from -20~70 $^{\circ}$ C. Please refer to the derating curves.

WORKING HUMIDITY

20~90% RH non-condensing.

STORAGE TEMP., HUMIDITY

-40~+85 $^{\circ}$ C, 10~90% RH

Features

- Universal AC input / Full range
- Low leakage current <180 μ A
- Protections: Short circuit / Overload / Over voltage
- UL60601-1 medical safety approved
- With power good and fail signal output (Optional)
- 100% full load burn-in test
- Fixed switching frequency at 45KHz
- 3 years warranty



TEMP. COEFFICIENT

$\pm 0.04\%/^{\circ}$ C on all outputs at full load between 0~50 $^{\circ}$ C of ambient temperature.

VIBRATION

2G of acceleration, vibrating frequency adjust from 10Hz ~500Hz within a 10-minute cycle. 6 testing cycles (60 minutes) each along X, Y, Z axes.

SAFETY STANDARDS

Medical : UL60601-1, TUV EN60601-1, IEC60601-1 approved
Commercial : Also design refer to UL60950-1, TUV EN60950-1

WITHSTAND VOLTAGE

4000VAC between input and output
1500VAC between input and F.G.
500VAC between output and F.G.

ISOLATION RESISTANCE

>100M Ohms for I/P-O/P, I/P-FG, O/P-FG by using 500VDC test voltage.

EMI COMPLIANCE

EMI Specifications
Conducted & Radiation

Compliance Level
EN55011, Class B
EN55022, Class B
EN61000-3-2
EN61000-3-3

Harmonic distortion
Voltage flicker

EMS COMPLIANCE

EMS Specification
ESD air
ESD contact
RF field susceptibility

Compliance Level
EN61000-4-2, Level 3, 8KV
EN61000-4-2, Level 2, 4KV
EN61000-4-3, Level 2, 3V/m
Level 3, 10V/m
EN61000-4-4, Level 2, 1KV/5KHz
Level 3, 2KV/5KHz
EN61000-4-5, Level 4, 2KV/Line-Line
4KV/Line-Earth
EN61000-4-6, Level 2, 3Vrms/m
Level 3, 10Vrms/m
EN61000-4-8, Level 2, 3A/m
Level 3, 10A/m
EN61000-4-11, Compliance
ENV50204, Level 2, 3V/m, 900MHz
Level 3, 10A/m, 900MHz

EFT(Electrical Fast Transient)/Burst

Lightning/Surge

Conducted RF susceptibility

Magnetic field immunity

Voltage dip, interruption

Digital phone carrier immunity

MTBF

262,100 hours min. at full load and 25 $^{\circ}$ C of ambient temperature, calculated per MIL-HDBK-217F.

DIMENSION (L*W*H)

177.8x107.95x35.5mm or 7"x4.25"x1.4"

PACKING

0.55Kg; 24pcs/14.5Kg/1.04CUFT



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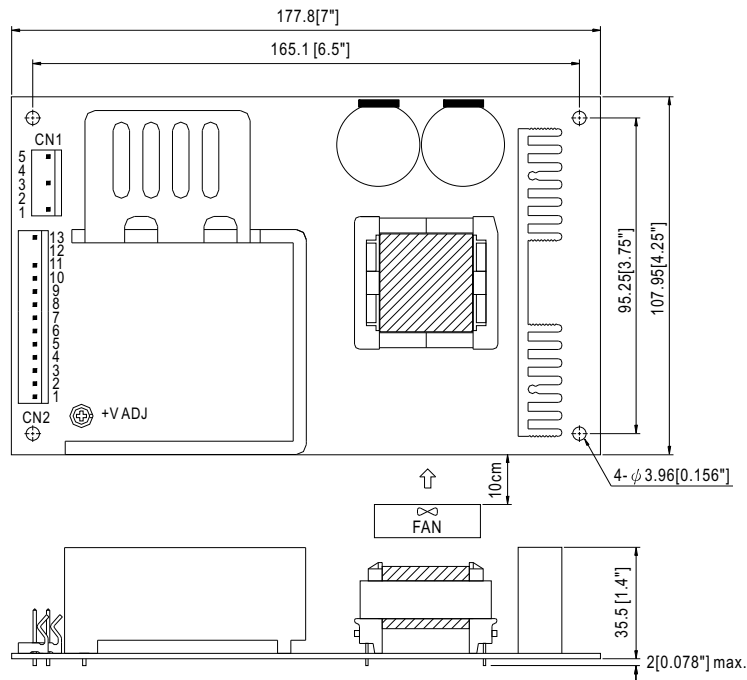
Output Chart

MODEL	OUTPUT VOLTAGE	RATED CURRENT	OUTPUT CURRENT				RIPPLE & NOISE (Max.) (Note 2)	VOLTAGE TOLERANCE (Note 3)	LINE REGULATION	LOAD REGULATION	EFFICIENCY
			MINIMUM LOAD	CONVECTION (max.)	WITH FAN (25CFM)	PEAK LOAD WITH 25CFM FAN (Note 4)					
MPS-120-3.3	3.3V	24A	0A	16A	24A	26A	80mVp-p	±3.0%	±1.0%	±3.0%	68%
MPS-120-5	5V	22A	0A	14.7A	22A	26A	80mVp-p	±3.0%	±1.0%	±3.0%	73%
MPS-120-12	12V	10A	0A	6.7A	10A	11A	100mVp-p	±2.0%	±1.0%	±2.0%	77%
MPS-120-15	15V	8A	0A	5.3A	8A	8.8A	100mVp-p	±2.0%	±1.0%	±2.0%	79%
MPS-120-24	24V	5A	0A	3.3A	5A	5.5A	120mVp-p	±2.0%	±1.0%	±2.0%	81%
MPS-120-48	48V	2.5A	0A	1.7A	2.5A	2.8A	120mVp-p	±2.0%	±1.0%	±2.0%	82%
MPD-120A	5V	10A	2A	7.3A	10A	12A	80mVp-p	±2.0%	±0.5%	±0.5%	75%
	12V	5A	0.5A	3.6A	5A	6A	120mVp-p	±7.0%	±2.0%	±3.5%	
MPD-120B	5V	10A	2A	7A	10A	12A	80mVp-p	±2.0%	±0.5%	±0.5%	76%
	24V	2.9A	0.3A	1.9A	2.9A	3.2A	250mVp-p	±8.0%	±2.0%	±4.0%	
MPT-120A	5V	10A	2A	7.3A	10A	12A	80mVp-p	±2.0%	±0.5%	±1.0%	72%
	12V	4.8A	0.4A	3.5A	4.8A	5.8A	120mVp-p	+8,-6%	±1.5%	±3.5%	
	-5V	0.6A	0A	0.3A	0.6A	1A	80mVp-p	±5.0%	±0.5%	±1.0%	
MPT-120B	5V	10A	2A	7.3A	10A	12A	80mVp-p	±2.0%	±0.5%	±1.0%	73%
	12V	4.4A	0.4A	3.2A	4.4A	5.3A	120mVp-p	±6.0%	±1.5%	±3.5%	
	-12V	0.6A	0A	0.4A	0.6A	1A	80mVp-p	±5.0%	±0.5%	±1.0%	
MPT-120C	5V	10A	2A	7A	10A	11A	80mVp-p	±2.0%	±0.5%	±1.0%	72%
	15V	4A	0.4A	2.6A	4A	4.4A	150mVp-p	+6,-7%	±2.0%	±3.5%	
	-15V	0.6A	0A	0.4A	0.6A	1A	80mVp-p	±5.0%	±0.5%	±1.0%	
MPT-120D	5V	10A	2A	7.3A	10A	12A	80mVp-p	±2.0%	±0.5%	±1.0%	74%
	24V	2.2A	0.4A	1.6A	2.2A	2.64A	300mVp-p	+8,-6%	±3.0%	+4,-3%	
	12V	0.6A	0A	0.4A	0.6A	1A	120mVp-p	±5.0%	±0.5%	±1.0%	
MPQ-120B	5V	10A	2A	7.3A	10A	11A	80mVp-p	±2.0%	±0.5%	±0.5%	71%
	12V	4.2A	0.5A	3.1A	4.2A	5A	120mVp-p	±6.0%	±1.5%	±3.5%	
	-5V	0.6A	0A	0.4A	0.6A	1A	80mVp-p	±5.0%	±0.5%	±1.0%	
	-12V	0.6A	0A	0.4A	0.6A	1A	80mVp-p	±5.0%	±0.5%	±1.0%	
MPQ-120C	5V	10A	2A	7.3A	10A	11A	80mVp-p	±2.0%	±0.5%	±0.5%	71%
	15V	3.2A	0.5A	2.4A	3.2A	3.8A	150mVp-p	+6,-7%	±2.0%	±3.5%	
	-5V	0.6A	0A	0.4A	0.6A	1A	80mVp-p	±5.0%	±0.5%	±1.0%	
	-15V	0.6A	0A	0.4A	0.6A	1A	80mVp-p	±5.0%	±0.5%	±1.0%	
MPQ-120D	5V	10A	2A	7A	10A	11A	80mVp-p	±2.0%	±0.5%	±0.5%	74%
	12V	1A	0.2A	0.7A	1A	1.1A	150mVp-p	+8,-6%	±2.0%	±3.5%	
	24V	2.1A	0.3A	1.4A	2.1A	2.3A	300mVp-p	±8.0%	±2.0%	±3.5%	
	-12V	0.6A	0A	0.3A	0.6A	1A	80mVp-p	±5.0%	±0.5%	±1.0%	
MPQ-120E	5V	10A	2A	7.3A	10A	11A	80mVp-p	±2.0%	±0.5%	±0.5%	73%
	12V	3A	0.5A	2.3A	3A	3.3A	120mVp-p	±6.0%	±2.0%	±3.0%	
	15V	0.6A	0A	0.4A	0.6A	1A	80mVp-p	±8.0%	±2.0%	±3.0%	
	24V	0.6A	0A	0.4A	0.6A	1A	80mVp-p	±5.0%	±0.5%	±1.0%	

- Notes :
1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25°C of ambient temperature.
 2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1μf & 47μf parallel capacitor.
 3. Tolerance : includes set up tolerance, line regulation and load regulation.
 4. 33% Duty cycle maximum within every 30 seconds. Average output power should not exceed the rated power.
 5. The power supply is considered a component which will be installed into a final equipment. The final equipment must be re-confirmed that it still meets EMC directives.

Mechanical Specification

Unit:mm



Pin Assignment

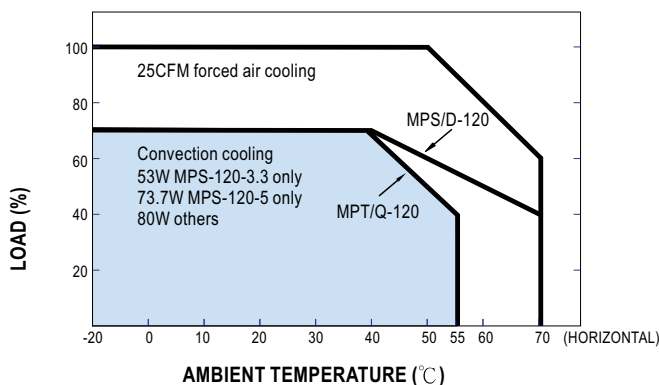
AC Input Connector (CN1) : Molex 5273-05 or equivalent

Pin No.	MPS-120	MPD-120	MPT-120	MPQ-120	Mating Housing	Terminal
1	FG	FG	FG	FG	Molex 5195 or equivalent	Molex 5194 or equivalent
2,4	No Pin	No Pin	No Pin	No Pin		
3	AC/N	AC/N	AC/N	AC/N		
5	AC/L	AC/L	AC/L	AC/L		

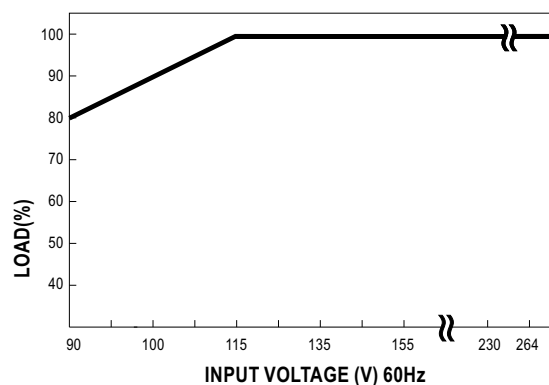
DC Output Connector (CN2) : Molex 5273-13 or equivalent

Pin No.	MPS-120	MPD-120	MPT-120	MPQ-120	Mating Housing	Terminal
1	+V	V1	V1	V1	Molex 5195 or equivalent	Molex 5194 or equivalent
2	+V	V1	V1	V1		
3	+V	V1	V1	V1		
4	-V	COM	COM	COM		
5	-V	COM	COM	COM		
6	-V	COM	COM	COM		
7	-V	COM	COM	COM		
8	+V	V2	V2	V2		
9	+V	V2	V2	V2		
10	P.F.D.	P.F.D.	P.F.D.	P.F.D.		
11	NC	NC	V3	V3		
12	No Pin	No Pin	No Pin	No Pin		
13	NC	NC	NC	V4		

Derating Curve



Static Characteristics



MODEL: MPS-120-15

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	V1: 100 mVp-p (Max)	I/P: 230VAC O/P:FULL LOAD Ta:25°C	V1: 10 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1: 14.25 V- 16.5 V	I/P: 230 VAC I/P: 115 VAC O/P:MIN LOAD Ta:25°C	14.11 V- 17.2 V/ 230 VAC 14.11 V- 17.2 V/ 115 VAC	P
3	OUTPUT VOLTAGE TOLERANCE	V1: 2 %- -2 % (Max)	I/P: 115 VAC / 264 VAC O/P:FULL/ MIN LOAD Ta:25°C	V1: 0.04 %- -0.04 %	P
4	LINE REGULATION	V1: 1 %- -1 % (Max)	I/P: 115 VAC ~ 264 VAC O/P:FULL LOAD Ta:25°C	V1: 0.04 %- -0.04 %	P
5	LOAD REGULATION	V1: 2 %- -2 % (Max)	I/P: 230 VAC O/P:FULL -MIN LOAD Ta:25°C	V1: 0.04 %- -0.04 %	P
6	SET UP TIME	230VAC: 800 ms (Max) 115 VAC: 2000 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 532 ms 115VAC/ 924 ms	P
7	RISE TIME	230VAC: 20 ms (Max) 115VAC: 50 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 14 ms 115VAC/ 14 ms	P
8	HOLD UP TIME	230VAC: 80 ms (TYP) 115VAC: 14 ms (TYP)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 89 ms 115VAC/ 17 ms	P
9	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	TEST: <5 %	P
10	DYNAMIC LOAD	V1: 1500 mVp-p	I/P: 230 VAC O/P:FULL /Min LOAD 90%DUTY/1KHZ Ta:25°C	208 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°C	74 V~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 ~440 HZ NO DAMAGE OSC	I/P: 90 VAC ~ 264 VAC O/P:FULL-MIN LOAD Ta:25°C	TEST: OK	P
3	EFFICIENCY	79 % (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	79 %	P
4	INPUT CURRENT	230V/ 1.7 A (TYP) 115V/ 2.9 A (TYP)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	I = 1.4 A/ 230 VAC I = 2.3 A/ 115 VAC	P
5	INRUSH CURRENT	230V/ 45 A (TYP) 115V/ 22 A (TYP) COLD START	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	I = 45 A/ 230 VAC I = 20 A/ 115 VAC	P
6	LEAKAGE CURRENT	< 180 uA / 264 VAC	I/P: 264 VAC O/P:Min LOAD Ta:25°C	L-FG: 145 uA N-FG: 145 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°C	132 %/ 230 VAC 125 %/ 115 VAC Hiccup Mode	P
2	OVER VOLTAGE PROTECTION	CH1: 18 V~ 21 V	I/P: 230 VAC I/P: 115 VAC O/P:MIN LOAD Ta:25°C	19V/ 230 VAC 19 / 115 VAC Shunt down Re- power ON	P
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264 VAC O/P:FULL LOAD Ta:25°C	NO DAMAGE Hiccup Mode	P

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	TEMPERATURE RISE TEST	MODEL : MPS-120-24 with FAN 1. ROOM AMBIENT BURN-IN : 1 HRS I/P: 230VAC O/P: FULL LOAD Ta= 29 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P: 230VAC O/P: FULL LOAD Ta= 51.6 °C			P
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P: 230 VAC O/P: 125 % LOAD Ta:25°C	TEST : OK	P
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P: 230 VAC O/P: 100 % LOAD Ta= -20 °C	TEST : OK	P
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C NO DAMAGE	I/P: 272 VAC O/P:FULL LOAD Ta= 50 °C HUMIDITY= 95 %R.H	TEST : OK	P
5	TEMPERATURE COEFFICIENT	± 0.04 %(0-50°C)	I/P: 230 VAC O/P:FULL LOAD	± 0.02 %(0-50°C)	P
6	VIBRATION TEST	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°C		TEST : OK	P

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: 0.5 KVAC/min	I/P-O/P: 4.2 KVAC/min I/P-FG: 1.8 KVAC/min O/P-FG: 0.6 KVAC/min Ta:25°C	I/P-O/P: 4.77 mA I/P-FG: 2.42 mA O/P-FG: 2.37 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°C	I/P-O/P: 30 GΩ I/P-FG: 30 GΩ O/P-FG: 30 GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta:25°C	10 mΩ	P
4	APPROVAL	TUV: Certificate NO : TA50053140 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°C	PASS	P
2	CONDUCTION	EN55022 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL/50% LOAD Ta:25°C	PASS Test by certified Lab	P
3	RADIATION	EN55022 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL LOAD Ta:25°C	PASS Test by certified Lab	P
4	E.S.D	EN61000-4-2 INDUSTRY AIR:8KV / Contact:4KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
5	E.F.T	EN61000-4-4 INDUSTRY INPUT: 2KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	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°C	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 62 IS THE MOST CRITICAL COMPONENT I/P: 230VAC O/P:FULL LOAD Ta= 25 °C LIFE TIME= 1761554 HRS I/P: 230VAC O/P:FULL LOAD Ta= 50 °C LIFE TIME= 322410 HRS			P
2	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE: 262.1K HRS			P



COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated 2SK2082 : 900 V 9 A	I/P:High-Line +3V = 267 V O/P: (1)Full Load Turn on (2) Full Load (3)Output Short Ta:25°C	(1) 534 V (2) 598 V (3) 660 V	P
2	Diode Peak Voltage	D60 Rated BYQ28X-200 : 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°C	(1) 78 V (2) 96.8 V (3) 72.4 V 564	P
3	Clamp Diode Peak Voltage	D1 Rated SF5408 : 1KV 3 A	I/P:High-Line +3V = 267 V O/P: (1)Full Load (2) Dynamic Load 90%Duty/1KHz Ta:25°C	(1) 562 V (2) 384 V	P
4	Input Capacitor Voltage	C 5 Rated : 150u / 400V/ 105°C	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°C	(1) 384 V (2) 384 V (3) 384 V	P
5	Control IC Voltage Test	U1 Rated TL3842 : 30 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°C	(1) 16.5 V (2) 16.5 V (3) 15.8 V	P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2004/8/16	RD SAMPLE	PASS	VINCENT TSENG	MAX LIN
2004/11/22	PRODUCT SAMPLE W0409B05	PASS	VINCENT TSENG	MAX LIN
2005/3/8	PRODUCT SAMPLE W0501D05	PASS	VINCENT TSENG	MAX LIN

2003/12/12 A50-F023