GlobTek® (Suzhou) Co., Ltd

File No :

MTBF Prediction Report

Model Name: WR9X375LRPNKIT(RVB)

Customer:

Stage: MVT1

PCB Rev.: A

Part List Rev.: 2

Spec Rev.: E

Conclusion: ☑ **PASS** ☐ **FAIL**

Prepared By: Michael **Checked By:** JET **Approved By:** **JAYSON**

GlobTek® (Suzhou) Co., Ltd

WR9X375LRPNKIT(RVB) CMTBF REPORT LIST
PART LIST REV: 0A

COMPONENT	FAILURE RATE		Q'TY
RESISTOR	0.16976079		24
CAPACITOR (except electrolytic)	0.083892389		8
CAPACITOR (electrolytic)	0.876029476		4
DIODE	0.212932159		8
ZENER DIODE	0.083899334		3
Integrated Circuits	0.833309214		1
TL431	0.008480825		1
Transistor-Power MOSFET	0.714581134		1
IC-Opto-couplers	0.11985409		1
Magnetic	0.016380189		2
TOTAL	3.11911960		53
MTBF	320,603.29	Hours	
MTBF SPEC.	200,000	Hours	
Conclusion	OK		

GlobTek® (Suzhou) Co., Ltd **SUMMARY TEST REPORT**

Input Voltage	NO .	Test Item	Page
		Cover,Report,Part list,and summary	1~4
100V	1	Magnetics	5
	2	TL431s	6
	3	Integrated Circuits	7
	4	IC - Opto-couplers	8
	5	Zener Diodes	9
	6	Diode	10
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	8	Capacitors, electrolytic	12
	9	Transistor-Power MOSFET	13
	10	Resistor	14

GlobTek® (Suzhou) Co., Ltd

CMTBF TEST REPORT				Test Engineer:	Maichael
Model Name:	WR9X375LRPNKIT(RVB)	Customer:		Test Date:	2012-6-12
Quantity:	1	Ser. No.:			

1. Purpose:

Verify PSU whether or not to meet the customer CMTBF specification.

2. Conditions:

Input: 100V AC

Output: 48V/0.375A

Ambient: 25 degree C

3. Equipment:

Oscilloscope: Tek3054B, AC source: HP6813A, Electronic load:Chroma6310

Multimeter: Agilent34401A, Current Probe Amplifier:Tek TM502A

4. Criteria:

The life time of the power supply component shall exceed 200,000 hours when 100vac and maximun load at 25℃ .Calculated using the formula by the MIL-HDBK-217F.

5. REGISTER:

Details,please refer to the report content.

6. Result:

The MTBF value meets customer spec..

GlobTek® (Suzhou) Co., Ltd

MTBF prediction worksheet - Magnetics

Model WR9X375LRPNKIT(RVB)
Conditions:Vin=100VAC; Output Load:+48V/0.375A
Amb.: 25℃

Component description			Component specifications	Stress	Failure rate				
Ref. Design	Part No.	Type	Tcore	Tcore	λb	πQ	πE	πc	λp
			deg.C	deg.C					
LF1	703-01192004(R)	C	130	58	0.000494049	4	1	1	0.001976195
T1	320-01921403(R)	X	130	76	0.003600998	4	1	1	0.014403994
TOTAL									0.016380189

GlobTek® (Suzhou) Co., Ltd

MTBF prediction worksheet - TL431s

Model WR9X375LRPNKIT(RVB)
Conditions:Vin=100VAC; Output Load:+48V/0.375A
Amb.: 25℃

Component description				Component specifications					Sress				Failure rate						
Ref. Design	Part No.	Type	Maker	Pin NO.	VKA	IK(rms)	Rth	Tj	VKA	IK(rms)	Ta	Tj(c)	C1	C2	πT	πL	πQ	πE	λp
					V	A	degC/W	deg.C	V	A	deg.C	deg.C							
U2	270-05816001(R)	TL431C A	CT	3	36	0.1	330	150	9.98	0.003		9.8802	0.01	0.001179	0.025847	1	10	0.5	0.008481
TOTAL																			0.008481

GlobTek® (Suzhou) Co., Ltd

MTBF prediction worksheet - Integrated Circuits

Model WR9X375LRPNKIT(RVB)
Conditions:Vin=100VAC; Output Load:+48V/0.375A
Amb.: 25℃

Component description				Component specifications					Sress				Failure rate						
Ref. Design	Part No.	Type	Maker	Pin NO.	VCC(max)	Ic (rms)	Rth	Tj	VCC(peak)	Ic(rms)	Ta	Tj(c)	C1	C2	πT	πL	πQ	πE	λp
					V	A	deg.C/W	deg.C	V	A	deg.C	deg.C							
US1	260-08080001(R)	PWM	ON-BRIGHT	6	30	0.01	200	150	15.6	0.0086	61	87.832	0.01	0.0025	8.2084	1	10	0.5	0.833309214
TOTAL																			0.833309214

GlobTek® (Suzhou) Co., Ltd

Component stress analysis worksheet - IC-Opto-couplers

Model WR9X375LRPNKIT(RVB)

Conditions:Vin=100VAC; Output Load:+48V/0.375A

Amb.: 25℃

				W	V	A	deg.C/W	deg.C	Vpeak(V)	Ratio	Irms(A)	Ratio	W	Ratio	deg.C	deg.C	π T	λ b	π Q	π E	λp
U1	250-00500001®	PHO	LITEON	0.07	6	0.05	400	100	1.19	0.19833	0.003	0.06	0.0036	0.05	60	61.43	2.772677	0.0055	8	1	0.121998
				0.15	35	0.05	425	100	2.63	0.07514	0.004	0.08	0.0105	0.07	60	64.47	2.675236	0.0055	8	1	0.11771
TOTAL																					0.119854

GlobTek® (Suzhou) Co., Ltd

MTBF prediction worksheet - Zener Diodes

Model WR9X375LRPNKIT(RVB)
Conditions:Vin=100VAC; Output Load:+48V/0.375A
Amb.: 25℃

Component description			Component specifications					Stress				Failure rate						
Ref. Desig.	Part No.	Maker	Vz	Iz	Pd	Rth	Tj	Vz	Iz(rms)	Ta	Tj(c)	λb	πE	πQ	πt	πs	πc	λp
			V	I	W	deg.C/W	deg. C	V	A	deg.C	deg.C							
ZD1	211-02470002(R)	PANJIT	16	0.031	0.5	300	175	15.7	0.002	58	67.42	0.002	1	5.5	2.23659	1	1	0.024602
ZD2	211-01770008(R)	PANJIT	27	0.019	0.5	300	175	15.6	0.001	66	70.68	0.002	1	5.5	2.35983	1	1	0.025958
ZD3	211-02470005(R)	PANJIT	62	0.019	0.5	300	175	47.92	0.002	58	86.752	0.002	1	5.5	3.03079	1	1	0.033339
TOTAL																		0.083899

GlobTek® (Suzhou) Co., Ltd

MTBF prediction worksheet - Diodes

Model WR9X375LRPNKIT(RVB)
Conditions:Vin=100VAC; Output Load:+48V/0.375A
Amb.: 25℃

Component description				Component specifications						Stress					Failure Rate						
Ref.Design	Part No.	Type	Maker	Vr	If, ave.	Vf	Rth	Tj rated	K	Vr.peak	Vr,ratio	If.ave	Ta	Tj(c)	λb	πE	πQ	πt	πs	πc	λp
				V	A	V	deg.C/W	deg.C		V		A	deg.C	deg.C							
D1	206-01470001(R)	BRG	PANJIT	1000	1	1	50	175	1	144	0.144	0.083	73	77.15	0.005	1	5.5	4.6872	0.05	1	0.00696
D2	206-01470001(R)	BRG	PANJIT	1000	1	1	50	175	1	141	0.141	0.078	73	76.9	0.005	1	5.5	4.6577	0.05	1	0.00692
D3	206-01470001(R)	BRG	PANJIT	1000	1	1	50	175	1	147	0.147	0.083	72	76.15	0.005	1	5.5	4.5702	0.05	1	0.00679
D4	206-01470001(R)	BRG	PANJIT	1000	1	1	50	175	1	150	0.15	0.078	72	75.9	0.005	1	5.5	4.5413	0.05	1	0.00674
D5	206-01407005(R)	FR	PANJIT	1000	1	1.3	25	175	1	275	0.275	0.002	85	85.07	0.069	1	5.5	5.6972	0.05	1	0.11675
D6	206-01407004(R)	FR	PANJIT	200	1	1.3	25	175	1	35.6	0.178	0.003	60	60.1	0.069	1	5.5	2.983	0.05	1	0.06113
D7	208-00807001(R)	GENERAL	PANJIT	600	4	1.28	28	175	1	100	0.167	0.358	77	89.83	0.004	1	5.5	6.3812	0.05	1	0.0072
DS1	207-02110001(R)	GENERAL	PANJIT	75	0.15	1	50	125	1	10.8	0.144	0.004		0.2	0.004	1	5.5	0.39	0.05	1	0.00044
TOTAL																					0.21293

GlobTek (Suzhou) Co., Ltd

MTBF prediction worksheet - Capacitors, except electrolytic

Model WR9X375LRPNKIT(RVB)
Conditions:Vin=100VAC; Output Load:+48V/0.375A
Amb.: 25℃

Component description				Component specifications			Stress			Failure rate				
Ref. Design	Part No.	Type	Maker	Cap.	Vmax rated	temp. rated	Tc	V	V ratio	πcv	λb	πQ	πE	λp
				uF	V	deg C	deg.C	V						
CX1	123-08048225(R)	MPF	UTX	0.22	275	125	43	104.8	0.38109	1.586538	0.002024	3	1	0.0096336
CY1	122-13031103(R)	DIS	SUCCESS	0.001	250	125	61	206	0.824	0.876564	0.016565	3	1	0.0435605
CS1	120-31132203(R)	MON	TDK	0.0022	1000	125	70	164	0.164	0.955983	0.00091	3	1	0.0026092
CS2	120-26094702(R)	MON	TDK	0.00047	50	125	59	0.813	0.01626	0.806705	0.000758	3	1	0.0018356
CS3	120-06081005(R)	MON	TDK	0.1	50	125	58	15.6	0.312	1.454735	0.001607	3	1	0.0070129
CS7	120-06081005(R)	MON	TDK	0.1	50	125	55	7.06	0.1412	1.454735	0.000828	3	1	0.0036141
CS4	120-26091003(R)	MON	TDK	0.001	50	125	58	2.81	0.0562	0.876564	0.000761	3	1	0.0020018
CS8	120-27091003(R)	MON	TDK	0.001	200	125	59	108	0.54	0.876564	0.005181	3	1	0.0136247
TOTAL														0.0838924

GlobTek® (Suzhou) Co., Ltd

MTBF prediction worksheet - Capacitors, electrolytic

Model WR9X375LRPNKIT(RVB)
Conditions:Vin=100VAC; Output Load:+48V/0.375A
Amb.: 25℃

Component description				Component specifications						Stress			Failure rate				
Ref.Design	Part No.	Type	Maker	Cap. (uF)	Vmax	Ripple current	F	T	Temp.	Tc	V	Vratio	πcv	λb	πQ	πE	λp
										deg.C	Vmax						
C1	123-03111337(R)	ELE	SAMXON	33	400	0.193	1 1.4	2.2	105	62	147	0.368	0.638	0.0574	3	1	0.109784
C2	123-59047104(R)	ELE	YOU CHEN	10	50	0.148	1	2.44	105	58	15.6	0.312	0.5146	0.0434	3	1	0.066989
C3	123-55061108(R)	ELE	SAMXON	100	63	0.3	1	2.44	105	61	49.1	0.779	0.7789	0.1886	3	1	0.440694
C4	123-55061108(R)	ELE	SAMXON	100	63	0.3	1	2.44	105	47	49	0.778	0.7789	0.1107	3	1	0.258562
TOTAL																	0.876029

GlobTek® (Suzhou) Co., Ltd

MTBF prediction worksheet - Transistor-Power MOSFET

Model WR9X375LRPNKIT(RVB)
Conditions:Vin=100VAC; Output Load:+48V/0.375A
Amb.: 25℃

Component description				Component specifications							Stress				Failure rate					
Ref. Design	Part No.	Type	Maker	Pd rated	Vds rated	Id rated	Vgs rated	Rth	Rdc(on)	Tj rated	Id(rms)	Pd	Tc	Tj(c)	πT	λb	πA	πQ	πE	λp
				W	V	A	V	deg.C/W	Ohm	deg,C	A	W	deg.C	deg.C						
Q1	226-08311001(R)	M	AUK	30	600	7	30	4.16	1.2	150	0.248	0.07	79	79.31	2.707	0.012	4	5.5	1	0.714581
TOTAL																				0.714581

GlobTek® (Suzhou) Co., Ltd

MTBF prediction worksheet - Resistors

Model WR9X375LRPNKIT(RVB)
Conditions:Vin=100VAC; Output Load:+48V/0.375A
Amb.: 25℃

Component description				Component specifications					Stress				Failure Rate				
Ref. Design	Part No.	Type	Maker	Resistance	Power	V rms rated	temp.	K	Tc	Vrms	Power actual	Watt ratio	πR	λb	πQ	πE	λp
				Ohm	W	V	deg.C		deg.C	V	W						
RS1	100-12051506(R)	R.CF	VIKMG	1500000	0.25	200	155	1.00	50	44.48	0.001	0.01	1.60	0.000862	5.00	1.00	0.006892292
RS2	100-12051506(R)	R.CF	VIKMG	1500000	0.25	200	155	1.00	50	43.7	0.001	0.01	1.60	0.000861	5.00	1.00	0.006890797
RS3	100-12051005(R)	R.CF	VIKMG	100000	0.25	200	155	1.00	79	60.8	0.037	0.15	1.10	0.001337	5.00	1.00	0.007353289
RS4	100-12051005(R)	R.CF	VIKMG	100000	0.25	200	155	1.00	79	60.8	0.037	0.15	1.10	0.001337	5.00	1.00	0.007353289
RS5	100-12051005(R)	R.CF	VIKMG	100000	0.25	200	155	1.00	75	61.6	0.038	0.15	1.10	0.001294	5.00	1.00	0.007119220
RS6	100-12051005(R)	R.CF	VIKMG	100000	0.25	200	155	1.00	75	61.6	0.038	0.15	1.10	0.001294	5.00	1.00	0.007119220
RS22A	100-12053300(R)	R.CF	VIKMG	3.3	0.25	200	155	1.00	71	0.293	0.026	0.10	1.00	0.001174	5.00	1.00	0.005870582
RS22B	100-12053300(R)	R.CF	VIKMG	3.3	0.25	200	155	1.00	71	0.293	0.026	0.10	1.00	0.001174	5.00	1.00	0.005870582
RS22C	100-12053300(R)	R.CF	VIKMG	3.3	0.25	200	155	1.00	71	0.293	0.026	0.10	1.00	0.001174	5.00	1.00	0.005870582
RS15	100-12054701(R)	R.CF	VIKMG	47	0.25	200	155	1.00	78	1.28	0.035	0.14	1.00	0.001310	5.00	1.00	0.006551322
RS7	100-12051002(R)	R.CF	VIKMG	100	0.25	200	155	1.00	67	2.42	0.059	0.23	1.00	0.001331	5.00	1.00	0.006655229
RS20	100-08051005(R)	R.CF	VIKMG	100000	0.125	200	155	1.00	55	2.047	0.000	0.00	1.10	0.000895	5.00	1.00	0.004922619
RS12	100-08051002(R)	R.CF	VIKMG	100	0.125	150	155	1.00	66	0.046	0.000	0.00	1.00	0.000986	5.00	1.00	0.004928682
RS11	100-08051001(R)	R.CF	VIKMG	10	0.125	150	155	1.00	66	0.198	0.004	0.03	1.00	0.001025	5.00	1.00	0.005123342
RS8	100-08055105(R)	R.CF	VIKMG	510000	0.125	150	155	1.00	73	53.6	0.006	0.05	1.10	0.001110	5.00	1.00	0.006103400
RS9	100-08055105(R)	R.CF	VIKMG	510000	0.125	150	155	1.00	73	39.24	0.003	0.02	1.10	0.001081	5.00	1.00	0.005943757
RS10	100-08055105(R)	R.CF	VIKMG	510000	0.125	150	155	1.00	71	34.7	0.002	0.02	1.10	0.001055	5.00	1.00	0.005800484
RS13	100-08051004(R)	R.CF	VIKMG	10000	0.125	150	155	1.00	62	7.47	0.006	0.04	1.00	0.001005	5.00	1.00	0.005025196
RS19	100-08052701(R)	R.MF	VIKMG	27	0.125	150	155	1.00	67	2.29	0.194	1.55	1.00	0.006885	5.00	1.00	0.034425589
RS14	100-08054703(R)	R.MF	VIKMG	4700	0.125	150	155	1.00	59	1.047	0.000	0.00	1.00	0.000929	5.00	1.00	0.004643985
RS16	100-08054703(R)	R.MF	VIKMG	4700	0.125	150	155	1.00	58	0.971	0.000	0.00	1.00	0.000920	5.00	1.00	0.004601836
RS21	100-08051003(R)	R.MF	VIKMG	1000	0.125	150	155	1.00	59	1.062	0.001	0.01	1.00	0.000937	5.00	1.00	0.004684580
RS17	100-08053305(R)	R.MF	VIKMG	330000	0.125	150	155	1.00	59	41.6	0.005	0.04	1.10	0.000975	5.00	1.00	0.005363590
RS18	100-08011804(R)	R.MF	VIKMG	18000	0.125	150	155	1.00	59	2.351	0.000	0.00	1.00	0.000929	5.00	1.00	0.004647322
TOTAL																	0.169760785