GlobTek® (Suzhou) Co., Ltd

File No :

MTBF Prediction Report

Model Name: GTM91120-3024

Customer:

Stage: EDVT1

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

GTM91120-3024 CMTBF REPORT LIST
PART LIST REV: 0A

COMPONENT	FAILURE RATE	Q'TY
RESISTOR	0.15703108	23
CAPACITOR (except electrolytic)	0.658221999	11
CAPACITOR (electrolytic)	1.201343209	4
DIODE	0.21635627	7
Integrated Circuits	0.304010258	1
KA431	0.574138695	1
IC-Opto-couplers	0.254593066	1
Magnetic	0.017243743	3
Fuse	0.02	2
Transistor-Power MOSFET	0.603473087	1
TOTAL	4.00641141	54
MTBF	249,599.93	
MTBF SPEC.	200,000	
Conclusion	OK	

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

GlobTek (Suzhou) Co., Ltd

CMTBF TEST REPORT				Test Engineer:	Maichael
Model Name:	GTM91120-3024	Customer:		Test Date:	2013-12-30
Quantity:	1	Ser. No.:			

1. Purpose:

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

2. Conditions:

Input: 240V AC

Output: 24V/1.25A

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 240vac 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 - Fuse

Model:GTM91120-3024
Conditions:Vin=240VAC; Output Load:+24V/1.25A
Amb.: 25℃

Component description			Component specifications	Stress	Failure rate		
Ref. Design	Part No.	Type		I(RMS) A	λb	πE	λp
F1	160-27146315®	W-F-1814	3.15A/250V	0.23	0.01	1	0.01
F2	160-27146315®	W-F-1814	3.15A/251V	0.23	0.01	1	0.01
TOTAL							0.02

GlobTek (Suzhou) Co., Ltd

MTBF prediction worksheet - Magnetics

Model:GTM91120-3024
Conditions:Vin=240VAC; Output Load:+24V/1.25A
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	OSP-321-03331704®	C	130	51	0.000458703	4	1	1	0.001834811
LF2	OSP-320-03322002®	C	130	41.4	0.000421904	4	1	1	0.001687615
T1	320-02889002®	X	130	73.1	0.003430329	4	1	1	0.013721317
TOTAL									0.017243743

GlobTek® (Suzhou) Co., Ltd

MTBF prediction worksheet - KA431

Model:GTM91120-3024
Conditions:Vin=240VAC; Output Load:+24V/1.25A
Amb.: 25℃

Component description				Component specifications					Stress				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							
U3	270-05816001(R)	KA431	Fairchild	3	37	0.1	330	150	23.48	0.004	50.6	81.594	0.01	0.00118	5.68243	1	10	0.5	0.57414
TOTAL																			0.574139

GlobTek (Suzhou) Co., Ltd

MTBF prediction worksheet - Integrated Circuits

Model:GTM91120-3024
Conditions:Vin=240VAC; Output Load:+24V/1.25A
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							
U1	260-08080001(R)	PWM	ON-BRIGHT	6	30	0.01	200	150	18.52	0.002	63.4	70.808	0.01	0.0025	2.9155	1	10	0.5	0.304010258
TOTAL																			0.304010258

GlobTek (Suzhou) Co., Ltd

Component CMTBF analysis worksheet - IC-Opto-couplers

Model:GTM91120-3024
Conditions:Vin=240VAC; Output Load:+24V/1.25A
Amb.: 25℃

Component description				Component specifications					Worse case stress in application								Failure rate				
Ref. Design	Part No.	Type	Maker	P/Pc	VR/Vce(max)	IF/Ice(rms)	Rth	Tj	VR/Vce(max)		IF/Ice(rms)		P/Pc		Ta	Tj	πT	λb	πQ	πE	λp
				W	V	A	deg.C/W	deg.C	Vpeak(V)	Ratio	Irms(A)	Ratio	W	Ratio	deg.C	deg.C					
U2	260-00510001®	PHO	LITEON	0.07	6	0.05	400	100	1.84	0.307	0.002	0.04	0.004	0.05	62.4	63.87	2.9457	0.0055	8	1	0.1296098
				0.15	35	0.05	425	100	2.71	0.077	0.003	0.06	0.008	0.05	62.4	65.86	2.8405	0.0055	8	1	0.1249833
TOTAL																					0.254593

GlobTek® (Suzhou) Co., Ltd

MTBF prediction worksheet - Zener Diodes

Model:GTM91120-3024
Conditions:Vin=240VAC; Output Load:+24V/1.25A
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	211-01207008®	PANJIT	30	0.0085	1	667	150	24.07	0.002	47.1	79.209	0.002	1	5.5	2.70265	1	1	0.029729
TOTAL																		0.029729

GlobTek (Suzhou) Co., Ltd

MTBF prediction worksheet - Diodes

Model:GTM91120-3024
Conditions:Vin=240VAC; Output Load:+24V/1.25A
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	206-00706999(R)	BRG	PANJIT	1000	2	1.3	50	150	1	346	0.346	0.02	53.6	54.9	0.005	1	5.5	2.5749	0.08	1	0.0054
D2	206-00707000(R)	BRG	PANJIT	1000	2	1.3	50	150	1	346	0.346	0.02	54.6	55.9	0.005	1	5.5	2.6498	0.08	1	0.0055
D3	206-00707001(R)	BRG	PANJIT	1000	2	1.3	50	150	1	346	0.346	0.02	53.8	55.1	0.005	1	5.5	2.5898	0.08	1	0.0054
D4	206-00707002(R)	BRG	PANJIT	1000	2	1.3	50	150	1	346	0.346	0.02	54.2	55.5	0.005	1	5.5	2.6197	0.08	1	0.0055
D5	206-00707002(R)	GENERAL	PANJIT	1000	1	1.1	50	150	1	422	0.422	0.003	70.1	70.27	0.004	1	5.5	3.9266	0.12	1	0.0101
D6	206-01470001(R)	GENERAL	PANJIT	1000	1	1.1	50	150	1	98.7	0.099	0.003	69.1	69.27	0.004	1	5.5	3.8247	0.05	1	0.0043
D7	204-04270002(R)	GENERAL	PANJIT	150	10	0.92	30	150	1	145	0.967	1.24	72.7	106.9	0.004	1	5.5	9.3619	0.92	1	0.1802
TOTAL																					0.2164

GlobTek (Suzhou) Co., Ltd

MTBF prediction worksheet - Capacitors, except electrolytic

Model:GTM91120-3024
Conditions:Vin=240VAC; Output Load:+24V/1.25A
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	125-08045475(R)	MEF	DAIN	0.47	275	100	43.7	241	0.87636	1.031623	0.058127	10	1	0.599648
CY1/CY2	122-11044103(R)	DIS	TDK	0.001	250	85	53.2	130	0.52	0.876564	0.004632	3	1	0.0121808
C3	122-39131103(R)	DIS	TDK	0.001	1000	125	56.2	115	0.115	0.876564	0.000795	3	1	0.0020902
C9	122-39131103(R)	MON	TDK	0.001	1000	125	54.3	134.81	0.13481	0.876564	0.000816	3	1	0.0021468
C4	122-38141225(R)	MON	TDK	0.01	1000	125	57.2	350	0.35	1.129234	0.001953	3	1	0.0066154
C4A	122-05031474(R)	MON	TDK	0.047	1000	125	53.8	350	0.35	1.338797	0.001934	3	1	0.0077689
C6	120-26091002(R)	MON	TDK	0.0001	50	125	62.5	1.32	0.0264	0.680431	0.000766	3	1	0.0015643
C5	120-26091004(R)	MON	TDK	0.01	50	125	62.4	1.69	0.0338	1.129234	0.000767	3	1	0.0025973
C14	120-26091005(R)	MON	TDK	0.1	50	125	49.6	20.57	0.4114	1.454735	0.002644	3	1	0.0115378
C15	120-26091005(R)	MON	TDK	0.1	50	125	50.42	20.98	0.4196	1.454735	0.002766	3	1	0.0120725
TOTAL														0.658222

GlobTek (Suzhou) Co., Ltd

MTBF prediction worksheet - Capacitors, electrolytic

Model:GTM91120-3024
Conditions:Vin=240VAC; Output Load:+24V/1.25A
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
				(uF)	V	A			deg.C	deg.C	V						
C2	123-63431687®	ELE	SAMXON	68	400	0.391	1 1.4	2.2	105	59	350	0.875	0.7267	0.231	3	1	0.50362
C11	123-51091478(R)	ELE	SAMXON	470	35	1.05	1	2.44	105	53.4	24.9	0.711	1.0291	0.1135	3	1	0.350351
C12	123-51211278(R)	ELE	SAMXON	270	35	0.84	1	2.44	105	48	24.9	0.711	0.9314	0.0933	3	1	0.260763
C7	123-59047104R)	ELE	CHEN	10	50	0.1	1	2.44	105	61.3	18.5	0.37	0.5146	0.0561	3	1	0.08661
TOTAL																	1.201343

GlobTek (Suzhou) Co., Ltd

MTBF prediction worksheet - Transistor-Power MOSFET

Model:GTM91120-3024
Conditions:Vin=240VAC; Output Load:+24V/1.25A
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	0.26	0.08	68.4	68.74	2.286	0.012	4	5.5	1	0.603473
TOTAL																				0.603473

GlobTek (Suzhou) Co., Ltd

MTBF prediction worksheet - Resistors

Model:GTM91120-3024
Conditions:Vin=240VAC; Output Load:+24V/1.25A
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						
R1	100-12011006(R)	R.CF	YAGEO	1000000	0.25	200	155	1.00	62.8	150.2	0.023	0.09	1.10	0.001071	5.00	1.00	0.005888667
R2	100-12011007(R)	R.CF	YAGEO	1000000	0.25	200	155	1.00	62.7	151.8	0.023	0.09	1.10	0.001072	5.00	1.00	0.005897295
R1A	100-12014995(R)	R.CF	YAGEO	499000	0.25	200	155	1.00	62.9	122.7	0.030	0.12	1.10	0.001113	5.00	1.00	0.006119007
R1B	100-12014995(R)	R.CF	YAGEO	499000	0.25	200	155	1.00	63.1	122.7	0.030	0.12	1.10	0.001115	5.00	1.00	0.006130321
R3	100-12052005(R)	R.CF	YAGEO	200000	0.25	200	155	1.00	63.5	82.92	0.034	0.14	1.10	0.001142	5.00	1.00	0.006281992
R4	100-12052005(R)	R.CF	YAGEO	200000	0.25	200	155	1.00	63.9	82.92	0.034	0.14	1.10	0.001146	5.00	1.00	0.006305399
R5	100-12051002(R)	R.CF	YAGEO	100	0.25	200	155	1.00	62.1	2.71	0.073	0.29	1.00	0.001366	5.00	1.00	0.006828822
R6	100-12051001(R)	R.CF	YAGEO	10	0.25	200	155	1.00	63.2	0.505	0.026	0.10	1.00	0.001090	5.00	1.00	0.005451353
R8	100-08019104(R)	MOF	YAGEO	91000	0.125	150	155	1.00	63.4	1.59	0.000	0.00	1.00	0.000964	5.00	1.00	0.004817576
R14A	100-12053301(R)	R.CF	YAGEO	33	0.25	200	155	1.00	47.6	3.63	0.399	1.60	1.00	0.005470	5.00	1.00	0.027350602
R11	100-12053000(R)	R.CF	YAGEO	3	0.25	200	155	1.00	62.9	0.428	0.061	0.24	1.00	0.001295	5.00	1.00	0.006476112
R12	100-12053000(R)	R.CF	YAGEO	3	0.25	200	155	1.00	62.7	0.428	0.061	0.24	1.00	0.001293	5.00	1.00	0.006463575
R13	100-12053000(R)	R.CF	YAGEO	3	0.25	200	155	1.00	62.5	0.428	0.061	0.24	1.00	0.001290	5.00	1.00	0.006451062
R14	100-12052700(R)	R.CF	YAGEO	2.7	0.25	200	155	1.00	62.2	0.428	0.068	0.27	1.00	0.001330	5.00	1.00	0.006650285
R9	100-08056801(R)	R.CF	YAGEO	68	0.125	150	155	1.00	63.1	1.47	0.032	0.25	1.00	0.001314	5.00	1.00	0.006568875
R17	100-12015102(R)	R.CF	YAGEO	510	0.25	200	155	1.00	47.2	0.181	0.000	0.00	1.00	0.000836	5.00	1.00	0.004178015
R17A	100-08011503(R)	R.CF	YAGEO	1500	0.125	150	155	1.00	45.9	2.021	0.003	0.02	1.00	0.000847	5.00	1.00	0.004235701
R21	100-08011203(R)	R.CF	YAGEO	1200	0.125	150	155	1.00	46.9	0.32	0.000	0.00	1.00	0.000834	5.00	1.00	0.004169085
R22	100-08053901(R)	R.CF	YAGEO	39	0.125	150	155	1.00	62.1	0.027	0.000	0.00	1.00	0.000952	5.00	1.00	0.004762385
R10	100-08018202(R)	R.CF	YAGEO	820	0.125	150	155	1.00	63.5	0.532	0.000	0.00	1.00	0.000967	5.00	1.00	0.004836929
R19	100-08014434(R)	R.CF	YAGEO	44200	0.125	150	155	1.00	47.1	20.54	0.010	0.08	1.00	0.000913	5.00	1.00	0.004563958
R20	100-08055103(R)	R.CF	YAGEO	5100	0.125	150	155	1.00	47.3	2.14	0.001	0.01	1.00	0.000843	5.00	1.00	0.004215813
R23	100-08013903(R)	R.CF	YAGEO	3900	0.125	150	155	1.00	47.6	21.21	0.115	0.92	1.00	0.002478	5.00	1.00	0.012388253
TOTAL																	0.157031080