呈威電子(東莞)有限公司
SUNNY COMPUTER TECHNOLOGY CO., LTD.

QE Test Report

MTBF. Parts Stress Prediction

1. MODEL NO: SYS1357-1812

2. Test NO.:QC1491201009

3. DATE: 2012/1/18

4. CUSTOMER: Sercom

5. DOCUMENTATION: MIL-HDBK-217F(PARTS STRESS)

6. TEST CONDITION:

6.1AC INPUT: 90 Vac

6.2 DC OUTPUT: FULL LOAD

6.3AMBOENT TEMPERATURE:25 ℃

7. MTBF & STRESS TEST:

7.1 TOTAL= 5.318170

7.2 MTBF = 188,034.61 Hours

8. TEST DATA SHOW ON PAGE: 1~7

(Please refer to file "SYS1357-1812part stress")

9. REMARK:

PRESIDENT	R&D. MANAGER	Q.C. MANAGER	Q.E. REPORTER

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QE Test Report

MODEL:SYS1357-1812
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MTBF BY PARTS STRESS

1.Resistor
1.1Test Data： $\lambda_P = \lambda_b * \pi_T * \pi_S * \pi_Q * \pi_E$

Location	Parts Type	Top (℃)	Vop (Volts)	Pop (Watts)	Pmax (Watts)	R (Ω)		S	λ_b	π_T	π_S	π_Q	π_E	λ_P	MTBF (Hours)
R1	RM	57.8	44.9	0.001344	0.25	1500000	Ω	0.005376	0.0037	1.30	0.79	3.0	4.0	0.04560	21,930,402
R2	RM	59.5	45.1	0.001356	0.25	1500000	Ω	0.005424	0.0037	1.30	0.79	3.0	4.0	0.04560	21,930,402
R3	RM	65.5	92	0.005643	0.125	1500000	Ω	0.045141	0.0037	1.40	0.79	3.0	4.0	0.04911	20,363,944
R5	RM	61.8	0.001	0.000000	0.25	100	Ω	0.000000	0.0037	1.40	0.79	3.0	4.0	0.04911	20,363,944
R6	RM	64.9	0.03	0.000060	0.125	15	Ω	0.000480	0.0037	1.40	0.79	3.0	4.0	0.04911	20,363,944
R7	RM	63	74.1	0.024958	0.25	220000	Ω	0.099833	0.0037	1.40	0.79	3.0	4.0	0.04911	20,363,944
R8	RM	62.8	0.05	0.000000	0.25	3.3	Ω	0.000000	0.0037	1.40	0.79	3.0	4.0	0.04911	20,363,944
R9	RM	61.8	74.1	0.024958	0.25	220000	Ω	0.099833	0.0037	1.40	0.79	3.0	4.0	0.04911	20,363,944
R10	RM	67.5	0.1	0.027265	1	0.75	Ω	0.027265	0.0037	1.40	0.79	3.0	4.0	0.04911	20,363,944
R12	RM	55.1	2.49	0.001319	0.125	4700	Ω	0.010553	0.0037	1.30	0.79	3.0	4.0	0.04560	21,930,402
R15	RM	66.8	0.1	0.001000	0.25	10	Ω	0.004000	0.0037	1.40	0.79	3.0	4.0	0.04911	20,363,944
R16	RM	53.3	9.61	0.004965	0.125	18600	Ω	0.039721	0.0037	1.30	0.79	3.0	4.0	0.04560	21,930,402
R17	RM	50	0.21	0.000079	0.25	560	Ω	0.000315	0.0037	1.30	0.79	3.0	4.0	0.04560	21,930,402
R18	RM	50.8	0	0.000000	0.25	150	Ω	0.000000	0.0037	1.30	0.79	3.0	4.0	0.04560	21,930,402
RT	RM	62.5	1.1	0.000012	0.125	100000		0.000097	0.0037	1.40	0.79	3.0	4.0	0.04911	20,363,944
TOTAL														0.715550	1,397,526.4

1.2 Thermistors
1.3 Test Data： $\lambda_p = \lambda_b * \pi_T * \pi_S * \pi_O * \pi_e$

Location	Parts Type	Top (℃)	Vop (Volts)	Pop (Watts)	Amax (Amps)	R (Ω)	S	λ_b	π_T	π_S	π_Q	π_E	λ_P	MTBF (Hours)
							--			--				
TOTAL													0.00000	0.0

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MTBF BY PARTS STRESS

2. Capacitors

2.1Test Data： $\lambda_p = \lambda_b * \pi_T * \pi_C * \pi_V * \pi_{SR} * \pi_Q * \pi_E$

Location	Parts Type	Top (℃)	Tmax (℃)	Vop (Volts)	Vmax (Volts)	C (uF)		S	λ_b	π_T	π_C	π_V	π_{SR}	π_Q	π_E	λ_P	MTBF (Hours)
C2	CDR	58.7	105	3.4	50	0.01	uf	0.068000	0.002	2.90	0.66	1.00	1.0	3.0	10	0.1148	8,707,767
C4	CE	64.4	105	17.1	50	22	uf	0.342000	0.00012	4.20	1.90	1.00	1.0	3.0	10	0.0287	34,809,245
C5	CDR	61.8	125	0.143	50	0.00047	uf	0.002860	0.002	4.20	0.44	1.00	1.0	3.0	10	0.1109	9,018,759
C6	CC	63.3	125	74.10	630	0.001	uf	0.117619	0.00099	4.20	0.54	1.00	1.0	3.0	10	0.1361	7,348,618
C7	CE	61.7	105	109.2	400	33	uf	0.273000	0.00012	4.20	1.90	1.00	1.0	3.0	10	0.0287	34,809,245
C8	CC	64.2	105	18.8	1000	0.001	uf	0.018800	0.00099	4.20	0.54	1.00	1.0	3.0	10	0.0674	14,845,694
C9	CE	55.7	105	12.1	16	680	uf	0.756250	0.00012	2.90	3.40	3.20	1.0	3.0	10	0.1136	8,803,809
C10	CE	57.1	105	12.1	16	680	uf	0.756250	0.00012	2.90	3.40	3.20	1.0	3.0	10	0.1136	8,803,809
C12	CDR	54.1	125	8.3	50	0.1	uf	0.166000	0.002	2.90	0.81	1.00	1.0	3.0	10	0.1409	7,095,218
C13	CE	51.7	125	12.1	25	100	uf	0.484000	0.00012	2.90	2.30	1.10	1.0	3.0	10	0.0264	37,859,858
C16	CC	63.8	105	18.8	1000	0.001	uf	0.018800	0.00099	4.20	0.54	1.00	1.0	3.0	10	0.0674	14,845,694
C27	CC	51.5	125	109.2	1000	0.01	uf	0.109200	0.00099	2.90	0.66	1.00	1.0	3.0	10	0.0568	17,591,449
CY1	CZ	57.4	100	16.6	250	0.0022	uf	0.066400	0.00037	1.60	0.54	1.00	1.0	3.0	10	0.0096	104,270,938
CX1	CH	52.3	100	90.00	275	0.15	uf	0.327273	0.00037	1.60	0.81	1.00	1.0	3.0	10	0.0144	69,513,958
TOTAL																1.02932	971,515.2

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MTBF BY PARTS STRESS

3.Diode

3.1 Test Data： λ p=λ b*π T*π S*π C*π Q*π E

Location	Parts code	Parts Type	Top (℃)	Vop (Volts)	Vmax (Volts)	Iop (A)	Imax (A)	S	λ_b	π_T	π_S	Heat Sink	π_C	π_Q	π_E	λ_P	MTBF (Hours)
D1	RD	IN5397	65.1	49.6	600	0.240	1.50	0.160000	0.025	3.4	0.054	N	2.0	2.4	6.0	0.1322	7,564,754
D2	RD	IN5397	65.3	52.8	600	0.240	1.50	0.160000	0.025	3.4	0.054	N	2.0	2.4	6.0	0.1322	7,564,754
D3	RD	IN5397	64.8	54.8	600	0.240	1.50	0.160000	0.025	3.0	0.054	N	2.0	2.4	6.0	0.1166	8,573,388
D4	RD	IN5397	65.6	51.7	600	0.240	1.50	0.160000	0.025	3.4	0.054	N	2.0	2.4	6.0	0.1322	7,564,754
D5	RD	A7	60.1	25.2	1000	0.017	1.00	0.017000	0.025	3.0	0.054	N	2.0	2.4	6.0	0.1166	8,573,388
D7	RD	IN5397	68.5	70.3	600	0.001	1.50	0.000667	0.025	3.4	0.054	N	2.0	2.4	6.0	0.1322	7,564,754
D8	RD	SB10100F	67	12.1	100	1.500	10.00	0.150000	0.025	3.4	0.054	N	2.0	2.4	6.0	0.1322	7,564,754
TOTAL																0.8942	1,118,318.0

3.2 Zener Diode

3.3 Test Data： λ p=λ b*π T*π S*π C*π Q*π E

Location	Parts code	Parts Type	Top (℃)	Vop (Volts)	Vmax (Volts)	Iop (A)	Imax (A)		λ_b	π_T	π_S		π_C	π_Q	π_E	λ_P	MTBF (Hours)
ZD1	ZD	15	49.6	12.1	15				0.002	1.5	1.0		2.0	2.4	6.0	0.0864	11,574,074
TOTAL																0.0864	11,574,074

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MTBF BY PARTS STRESS

4.MOS-FET

4.1Test Data： $\lambda p=\lambda b*\pi T*\pi A*\pi Q*\pi E$

Location	Parts Type	Top (℃)	Vop (Volts)	Vmax (Volts)	Iop (A)	Imax (A)	Power (Watts)	λ_b	π_T	π_A	N\A	N\A	π_Q	π_E	λ_P	MTBF (Hours)
Q1	DG4N60	63.5	278	600	--	--	18	0.012	2.00	4.0	N\A	N\A	2.4	6.0	1	723,380
TOTAL															1	1,000,000.0

4.2 Microelectronic Devices

4.3 Test Data: $\lambda p=(C1\pi T + C2\pi E)\pi Q\pi L$

Location	Parts Type	Tc (℃)	θ jc (℃/W)	P_D (W)	T j (℃)	No. Pins	IC內電晶體數	C_2	π_T	C_1	π_L	N\A	π_Q	π_E	λ_P	MTBF (Hours)
IC1	RT7731	63.4	N/A	N/A	150	6	100	0.0025	1.4	0.01	1.0	N\A	2.0	2.0	0.0380	26,315,789
U2	AZ431	55.30	N/A	N/A	150	3	100	0.0012	1	0.01	1.0		2.0	2.0	0.0248	40,322,581
TOTAL															0.0628	15,923,566.9

4.3 Photocoupler & LED

4.4 Test Data: $\lambda p=\lambda b*\pi T*\pi Q*\pi E$

Location	Parts Type	Top (℃)	Vop (℃)	Vmax (Volts)	Iop (A)	Imax (A)	Photo or LED	λ_b	π_T	N\A	N\A	N\A	π_Q	π_E	λ_P	MTBF (Hours)
U1	LTV817C	56.50	150	N/A	N/A	N/A	Photo	0.0055	2.60	N\A	N\A	N\A	2.4	2.0	0.0686	14,568,765
TOTAL															0.0686	14,577,259.5

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MTBF BY PARTS STRESS

5. P.C.B.

5.1 Test Data： $\lambda_P = \lambda_b * (N_1 \pi_C + N_2 (\pi_C + 13)) \pi_Q \pi_E$

Location	Parts Type	銅箔層數	過錫爐焊點數	手焊焊點數量					λ_b		π_C	N_1	N_2	π_Q	π_E	λ_P	MTBF (Hours)
PCB	CEM-1	1	110	4					0.000017		1.0	110	4	2.0	2.0	0.0113	88,589,653
TOTAL																0.0113	88,495,575

5.2 Transformers & Coils

5.3 Test Data： $\lambda_P = \lambda_b * \pi_T * \pi_Q * \pi_E$

Location	Parts Type	Insulation Class	Top (℃)	Tmax (℃)	屬性 T or L	T: Transformer L: Coil			λ_b	π_T				π_Q	π_E	λ_P	MTBF (Hours)
T1	EE-25/19	B	65.60	130	T				0.049	1.60				3.0	6.0	1.4112	708,617
LF1	30mH 04A0073	B	64.80	130	L				0.00003	1.60				3.0	6.0	0.0009	1,157,407,407
LF2	9*5*3mm 0.6∮ 200uH	B	51.00	130	L				0.00003	1.40				3.0	6.0	0.0008	1,322,751,323
L1	0.65φ x6Ts	B	51.00	130	L				0.00003	1.40				3.0	6.0	0.0008	1,322,751,323
TOTAL																1.4136	707,413.7

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MTBF BY PARTS STRESS

6. Connector

6.1 Test Data： λ p=λ b*π P *π Q*π E

Location	Parts Type	No. Pins	Top (℃)						λ b		π P			π Q	π E	λ P	MTBF (Hours)
I/P	PLUG	2							0.00064		1.5			3.0	3.0	0.0086	115,740,741
TOTAL																0.0086	116,279,070

6.2 Fuse

6.3 Test Data： λ p=λ b*π E

Location	Parts Type								λ b						π E	λ P	MTBF
F1	T1A 250V								0.01						2.0	0.02	50,000,000
TOTAL																0.02	50,000,000.0

6.4 Connetion

6.5 Test Data： λ p=λ b*π E

Location	Parts Type								λ b查表						π E	λ P	MTBF (Hours)
Output	2468#20*2C								0.0013						2.0	0.0026	384,615,385
Input L	20A WG								0.0013						2.0	0.0026	384,615,385
Input N	20A WG								0.0013						2.0	0.0026	384,615,385
TOTAL																0.0078	128,205,128