MODEL: ETSA120150U-P13P-SZ-C1 | **DESCRIPTION:** 240 V MTBF TEST REPORT

TYPE : *MTBF* ***REV : 01***

TEST CONDITION

AC INPUT : 240V ***ROOM TEMPERATURE : 25 ^{0} C***

DC OUTPUT : 12V 1.5A

TYPE	***π p***
RESISTOR	0.191505773
CERAMIC	0.052357691
PLASTIC CAPACITOR	0.015023838
CAPACITOR(ALUMINUM)	4.686622189
DIODE	9.343302346
ZENER	0.030780469
MOSFET	0.779447764
IC	0.174058316
CHOKE	0.061517769
TRANSFORMER	0.670288435
FUSE NTC	0.02
PCB	0.32
LED PHOTO	0.075061196
CONNECTOR	0.002625568
TOTAL π p =	**16.42259135**
MTBF =	**60892 Hours**

TYPE : Resister ***SPECIFICATION:***

TEST CONDITION

AC INPUT : 240V ***ROOM TEMPERATURE : 25 ^{0}C***

DC OUTPUT : 12V 1.5A

P / N	Item	ohm	(W)	Vm	π m	S	T	π b	π R	π Q	π E	π P	
	R1	1500000	0.25	112	0.0084	0.033450667	45.8	0.000335217	1.6	5	2	0.005363478	
	R2	1500000	0.25	112	0.0084	0.033450667	48.2	0.000364758	1.6	5	2	0.005836129	
	R4	1000000	0.125	152	0.0231	0.184832	77.8	0.001429459	1.1	5	2	0.015724049	
	R5	1000000	0.125	151	0.0228	0.182408	72	0.001153419	1.1	5	2	0.012687606	
	R6	200000	0.25	106	0.0562	0.22472	81.3	0.001768218	1.1	5	2	0.019450399	
	R7	200000	0.25	106	0.0562	0.22472	77.4	0.00153446	1.1	5	2	0.016879062	
	R8	2.2	0.25	0.172	0.0134	0.053789091	71.9	0.000876602	1	5	2	0.008766025	
	R9	100000	0.125	1.25	0.0000	0.000125	63.1	0.000575465	1.1	5	2	0.00633012	
	R10	1.2	1	0.168	0.0235	0.02352	78.8	0.001048073	1	3	2	0.006288439	
	R11	100	0.125	0.73	0.0053	0.042632	63.4	0.000634586	1	5	2	0.006345859	
	R12	1000	0.125	0.076	0.0000	0.000046208	68	0.000682968	1	5	2	0.006829676	
	R13	33	0.25	2.4	0.1745	0.698181818	82.7	0.005201874	1	5	2	0.052018738	
	R14	510	0.125	0.56	0.0006	0.004919216	59.4	0.000510535	1	5	2	0.00510535	
	R15	10000	0.125	1.05	0.0001	0.000882	56.2	0.00045273	1	5	2	0.0045273	
	R16	1000	0.125	8	0.0640	0.512	50.4	0.001013819	1	5	2	0.01013819	
	R17	8250	0.125	9.5	0.0109	0.087515152	54	0.000498331	1	5	2	0.004983313	
	R18	2150	0.125	2.5	0.0029	0.023255814	53	0.000423204	1	5	2	0.00423204	

Total π P ***0.191505773***

π m :Operating Power

S : Ratio of Operating Power to Rated Power

(S=Pm/P)

T : Component Temperature

π b : Base Failure Rate

(π b = $4.5 \times 10^{-9} \exp(12((T+273)/343)) \exp(S/0.6((T+273)/273)$)

π R : Resistance Factor

π Q : Quality Factor

π E : Environment Factor

π p = AbPRPQPE Failures / 10^{6} Hours

TYPE : Ceramic
TEST CONDITION
AC INPUT : 240V
DC OUTPUT : 12V 1.5A

SPECIFICATION:

ROOM TEMPERATURE : 25 ^{0} C

P / N	Item	(pF)	(V)	Vp	S	T	Ab	π CV	π Q	π E	π P	
	C3	2200	1000	166	0.166	74.8	0.000927	0.955983	3	1	0.002658	
	C5	33	1000	514	0.514	75.2	0.004784	0.60231	3	1	0.008645	
	C6	100	50	2.6	0.052	65.4	0.000776	0.680431	3	1	0.001584	
	C7	4700	50	8.5	0.17	55.5	0.000888	1.039237	3	1	0.002767	
	C10	100000	25	12.2	0.488	54.2	0.003969	1.454735	3	1	0.017321	
	C11	100	50	0.8	0.016	71.3	0.000785	0.680431	3	1	0.001602	
	C12	1000	100	59.2	0.592	77.7	0.006939	0.876564	3	1	0.018247	
	CY1	1000	400	48	0.12	70.4	0.000833	0.876564	3	1	0.002191	
Total π P =					0.052357691							

Vp :Peak Voltage
S : Ratio of Peak to rated Voltage
(S=Vp/V)
T : Component Temperature
Ab : Base Failure Rate
Ab = $(0.0003((S/0.3)^{3}\exp((T+273)/358)$
π cv : Capacitance Factor
π E : Environment Factor
π p = AbPcvPQPE Failures / 10^{6} Hours
π Q : Quality Factor

TYPE : Plastic Capacitor
TEST CONDITION
AC INPUT : 240V
DC OUTPUT : 12V 1.5A

SPECIFICATION:

ROOM TEMPERATURE : 25 ^{0}C

P / N	Item	(uF)	(V)	V_P	S	T	A_b	π CV	π Q	π E	π P	
	CX1	0.22	300	240	0.8	47.2	0.014648	0.341881	3	1	0.015024	
Total π **P =**	0.015023838											

Vp :Peak Voltage
S : Ratio of Peak to rated Voltage
(S=Vp/V)
T : Component Temperature
Ab : Base Failure Rate
Ab = $(0.0003((S/0.3)^3 \exp((T+273)/358)$
π cv : Capacitance Factor

π Q : Quality Factor
π E : Environment Factor
π p = AbPcvPQPE Failures / 10^6 Hours

TYPE : Aluminum Capacitor ***SPECIFICATION:***

TEST CONDITION

AC INPUT : 240V ***ROOM TEMPERATURE : 25 ^{0}C***

DC OUTPUT : 12V 1.5A

P / N	Item	(uF)	(V)	Vrip	V_p	S	T	π b	π CV	π Q	π E	π P	
	C1	33	400	14.7	341	0.90447	63.8	0.306392	0.637986	3	2	1.1728	*105 ^{0}C*
	C4	10	50	0.39	17.2	0.35503	75.5	0.102386	0.514611	3	2	0.3161	*105 ^{0}C*
	C8	1500	16	0.38	12.2	0.79609	69.5	0.286401	1.268164	3	2	2.1792	*105 ^{0}C*
	C9	680	16	0.085	12.2	0.77001	56.7	0.154329	1.099843	3	2	1.0184	*105 ^{0}C*

Total π_P = 4.686622189

VP :Peak Voltage

S : Ratio of Peak to rated Voltage

T : Component Temperature

π b : Base Failure Rate (85 °C)

π b = $(0.00254((S/0.5)^3+1)\exp(5.09((T+273)/378)^5$

π cv : Capacitance Factor

π Q : Quality Factor

π E : Environment Factor

π p = π bPcvPQPE Failures / 10^6 Hours

π b : Base Failure Rate (105 °C)

π b = $(0.00254((S/0.5)^3+1)\exp(5.09((T+273)/378)^5$

TYPE : Diode
TEST CONDITION
AC INPUT : 240V
DC OUTPUT : 12V 1.5A

ROOM TEMPERATURE : 25 ^{0}C

P / N	Item	(V)	(A)	VP	S	T_j	π_b	π_T	π_S	π_C	π_Q	π_E	π_P	
1N4007	D1	1000	1	341	0.341	70.6	0.069	3.96124	0.0732	2	5.5	6	1.32074	
1N4007	D2	1000	1	341	0.341	72.9	0.069	4.20542	0.0732	2	5.5	6	1.40215	
1N4007	D3	1000	1	341	0.341	62.8	0.069	3.21427	0.0732	2	5.5	6	1.07169	
1N4007	D4	1000	1	341	0.341	66.2	0.069	3.52495	0.0732	2	5.5	6	1.17527	
PS1010R	D5	1000	1	454	0.454	84.7	0.069	5.64722	0.1468	2	5.5	6	3.77462	
GS1006FL	D6	600	1	106	0.176667	75	0.069	4.43842	0.0148	2	5.5	6	0.29937	
IN4148	D7	75	0.15	5.72	0.076267	70.5	0.069	3.95088	0.0019	2	5.5	6	0.03461	
SB5100	D8	100	5	67	0.67	97.5	0.003	3.53973	0.3779	2	5.5	6	0.26485	

Total π_P = 9.343302346

Vm : Voltage Applied
S : Stress = Vm/V
T : Component Temperature
π b : Base Failure Rate
π T : Temperature Factor
=exp(-1925((1/(T+273))-(1/298)))
SCR PT : Temperature Factor
=exp(-3082((1/(T+273))-(1/298)))

π S : Electrical Stress Factor
π c : Contact Construction Factor
π Q : Quality Factor
π E : Environment Factor
π p = AbPTPSPCPQPE Failures / 10^6 Hours

SCR PR(Pc) : Current Rating Factor
= (Irms)^0.40

TYPE : Zener Diode
TEST CONDITION
AC INPUT : 240V
DC OUTPUT : 12V 1.5A

ROOM TEMPERATURE : 25 ^{0} C

P / N	Item	(V)	(A)	VP	S	T_j	π_b	π_T	π_S	π_C	π_Q	π_E	π_P	
MMSZ5244B	ZD2	14	0.005	12.2	0.871429	59.5	0.002	1.95474	0.71575	2	5.5	1	0.03078	

Total π_P = 0.030780469

Vm : Voltage Applied
S : Stress = Vm/V
T : Component Temperature
π b : Base Failure Rate
π T : Temperature Factor
=exp(-1925((1/(T+273))-(1/298)))
SCR PT : Temperature Factor
=exp(-3082((1/(T+273))-(1/298)))

π S : Electrical Stress Factor
π c : Contact Construction Factor
π Q : Quality Factor
π E : Environment Factor
π p = AbPTPSPCPQPE Failures / 10^6 Hours

SCR PR(Pc) : Current Rating Factor
= (Irms)^0.40

TYPE : MOSFET ***SPECIFICATION:***

TEST CONDITION

AC INPUT : 240V ***ROOM TEMPERATURE : 25 ^{0}C***

DC OUTPUT : 12V 1.5A

P / N	Item	V	Vop	S	T	π b	π T	π A	π Q	π E	π P	
STP4N60ZFP	Q1	600	514	0.856667	85	0.012	2.95245	4	5.5	1	0.779448	DIP

Total π P = ***0.779447764***

Vm :Max Voltage

T : Component Temperature

π b : Base Failure Rate

π T : Temperature Facto

=exp(-1925((1/(T+273))-(1/298)))

π A : Application Factor

π Q : Quality Factor

π E : Environment Factor

π p = AbPTPAPQPE Failures / 10^{6} Hours

TYPE : IC ***SPECIFICATION:***

TEST CONDITION

AC INPUT : 240V ***ROOM TEMPERATURE : 25 ^{0} C***

DC OUTPUT : 12V 1.5A

P / N	Item	Part type	pin	S	T	C1	C2	π T	π E	π Q	π L	π P	
GR8835	U1		6		68.8	0.02	0.0030	2.563	2	2	1	0.115	
KA431	IC1		3		57.3	0.02	0.0030	1.189	2	2	1	0.06	

Total π P = 0.174058316

T : Component Temperature

C1 : Die Complexity Failure Rates

C2 : Package Failure Rate for all Microcircuits

π T : Temperature Factor

π E : Environment Factor

π Q : Quality Factor

π L : Learning Factor

π p =(C1PT + C2PE)PLPQ Failures / 10^{6} Hours

TYPE : Choke ***SPECIFICATION:***

TEST CONDITION

AC INPUT : 240V ***ROOM TEMPERATURE : 25 ^{0}C***

DC OUTPUT : 12V 1.5A

P / N	Item	Spec	P_m	S	T	π_b	π_C	π_Q	π_E	π_P	
NF00030	NF1				61.1	0.0005	1	30	4	0.0615	DIP
Total π_P =						***0.061517769***					

T : Component Temperature

π b : Base Failure Rate

(Ab = 0.000319exp(((T+273)/364)^8.7)

π c : Construction Factor

π Q : Quality Factor

π E : Environment Factor

π p : AbPCPQPE Failures / 10^6 Hours

TYPE : Transformer *SPECIFICATION:*
TEST CONDITION
AC INPUT : 240V ***ROOM TEMPERATURE : 25 ^{0} C***
DC OUTPUT : 12V 1.5A

P / N	Item	Spec	π_m	S	T	π_b	π_Q	π_E	π_P	
XF00578	T1				77.9	0.003724	30	6	0.6702884	DIP

Total π_P = 0.670288435

T : Component Temperature
π b : Base Failure Rate
π Q : Quality Factor
π E : Environment Factor
π p : AbPQPE Failures / 10^6 Hours

TYPE : Fuse *SPECIFICATION:*

TEST CONDITION

AC INPUT : 240V ***ROOM TEMPERATURE : 25 ^{0} C***

DC OUTPUT : 12V 1.5A

P / N	Item	V	A	π_m	S	π Q	π_b	π_E	π_P	
MST	F1	250	1				0.01	2	0.02	DIP

Total π_P = 0.02

T : Component Temperature

π b : Base Failure Rate

π E : Environment Factor

π p : AbPE Failures / 10^6 Hours

TYPE : PCB *SPECIFICATION:*

TEST CONDITION

AC INPUT : 240V ***ROOM TEMPERATURE : 25 ^{0} C***

DC OUTPUT : 12V 1.5A

P / N	Item	Spec	T	π b	N1	N2	π C	π Q	π E	π P	
181806	PCB	94-V0	75	0.0008	200	0	1	2	1	0.32	

Total π P = ***0.32***

π b : Base Failure Rate

N1,N2 : Number of PTHS Factor

π c : Complexity Factor

π Q : Quality Factor

π E : Environment Factor

π p = π b((N1XPC+N2(PC+13))PQPE Failures / 10^{6} Hours

TYPE : LED PHOTO ***SPECIFICATION:***

TEST CONDITION

AC INPUT : 240V ***ROOM TEMPERATURE : 25 ^{0} C***

DC OUTPUT: 12V 1.5A

P / N	Item	Spec	T	π b	π T	π Q	π E	π P		
EL817-B	PC1		60.8	0.0025	2.7295	5.5	2	0.0751	DIP	

Total π P = ***0.075061196***

π b : Base Failure Rate

π T: Complexity Factor

π Q : Quality Factor

π E : Environment Factor

π p = π b* π T* π Q* π E* π P Failures / 10^{6} Hours

TYPE : CONNECTOR ***SPECIFICATION:***

TEST CONDITION

AC INPUT : 240V ***ROOM TEMPERATURE : 25 ^{0} C***

DC OUTPUT : 12V 1.5A

P / N	Item	parts type	PIN	π b	N1	N2	π k	π p	π E	π P	
	AC Inlet	3 PIN	3	0.0001352			2	1.1075	3	0.0009	
	AC PIN	3	3	0.0001352			2	1.1075	3	0.0009	
	DC Outlet	2 wire	2	0.0001313			2	1.0524	3	0.0008	

Total π P = ***0.002625568***

π b : Base Failure Rate

N1,N2 : Number of PTHS Factor

π c : Complexity Factor

π Q : Quality Factor

π E : Environment Factor

π p = π b((N1XPC+N2(PC+13))PQPE Failures / 10^{6} Hours

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