

APEX MICROTECHNOLOGY CORPORATION
RELIABILITY PREDICTION
PA83

by

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Date of prediction: 15-Mar-01

This reliability prediction is based on MIL-HDBK-217F,
December 2, 1991 including Notice 2, February 28, 1995.

Conditions of this prediction are as follows:

Hybrid quality level is	Commercial
Environment is Gf	Ground, Fixed
Case temperature is	40 C
Internal Power Dissipation =	5 W
Supply voltage is +/-	120 V
An AC signal is applied.	
Product introduction date:	01-May-81

The results of this prediction are:

4.43 failures per million hours; or,
MTBF=225.5 thousand hours.

Transistors, Low Frequency, Bipolar:

$$L_p = L_b * P_{iT} * P_{iR} * P_{iS}$$

Q7		Volts = 40	Watts = 1.2	Tj = 175	'K/W= 125		
Usage:	Vstress = 1.3	Vpwr = 1.3	Ic = 1E-06	Vs = 0.0325	Power = 1E-06		
Lb	PiT	PiR	PiS	Nc	Tj = 40		
0.00074	1.404905	1.0698	0.04977	1			5.54E-05
Q11		Volts = 40	Watts = 1.2	Tj = 175	'K/W= 125		
Usage:	Vstress = 1.13	Vpwr = 1.13	Ic = 0.003	Vs = 0.0283	Power = 0.0034		
Lb	PiT	PiR	PiS	Nc	Tj = 40.424		
0.00074	1.417787	1.0698	0.049119	1			5.51E-05
Q6,17		Volts = 300	Watts = 26	Tj = 150	'K/W= 4.8077		
Usage:	Vstress = 235	Fraction Output Pwr = 1/	1	Vs = 0.7833	Power = 5		
Lb	PiT	PiR	PiS	Nc	Tj = 64.038		
0.00074	2.274314	3.3384	0.510298	2			0.005734
Q8,9		Volts = 300	Watts = 1.15	Tj = 150	'K/W= 108.7		
Usage:	Vstress = 110.3	Vpwr = 110.3	Ic = 0.0005	Vs = 0.3677	Power = 0.0552		
Lb	PiT	PiR	PiS	Nc	Tj = 45.995		
0.00074	1.595022	1.0531	0.140672	1			0.000175
Q15		Volts = 300	Watts = 1.15	Tj = 150	'K/W= 108.7		
Usage:	Vstress = 111.6	Vpwr = 111.6	Ic = 0.0012	Vs = 0.372	Power = 0.1295		
Lb	PiT	PiR	PiS	Nc	Tj = 54.071		
0.00074	1.87862	1.0531	0.142574	1			0.000209
Q3,16		Volts = 300	Watts = 1.15	Tj = 150	'K/W= 108.7		
Usage:	Vstress = 232.9	Vpwr = 118.3	Ic = 4E-09	Vs = 0.7763	Power = 5E-07		
Lb	PiT	PiR	PiS	Nc	Tj = 40		
0.00074	1.404902	1.0531	0.499344	2			0.001093
Q5		Volts = 300	Watts = 1.15	Tj = 150	'K/W= 108.7		
Usage:	Vstress = 110.2	Vpwr = 110.2	Ic = 0.0002	Vs = 0.3673	Power = 0.0176		
Lb	PiT	PiR	PiS	Nc	Tj = 41.917		
0.00074	1.46385	1.0531	0.140526	1			0.00016
Q1		Volts = 20	Watts = 0.38	Tj = 150	'K/W= 328.95		
Usage:	Vstress = 0.65	Vpwr = 0.65	Ic = 0.0005	Vs = 0.0325	Power = 0.0003		
Lb	PiT	PiR	PiS	Nc	Tj = 40.107		
0.00074	1.408144	0.6991	0.04977	1			3.63E-05

Q2,4 Volts = 20 Watts = 0.38 Tj = 150 'K/W= 328.95
Usage: Vstress = 3 Vpwr = 1.55 Ic = 0.0005 Vs = 0.15 Power = 0.0008
Lb PiT PiR PiS Nc Tj = 40.255
0.00074 1.412643 0.6991 0.071641 2 0.000105

Transistors, Low Frequency, Si JFET: Lb = 0.0045
Lp = Lb * PiT

Q12 Volts = 50 Watts = 4 Tj = 150 'K/W= 31.25
Usage: Vpwr = 5.4 Id = 0.0005 Power = 0.0027
Lb PiT Nc Tj = 40.084
0.0045 1.365102 2 0.012286

Q13,14 Volts = 30 Watts = 0.8 Tj = 150 'K/W= 156.25
Usage: Vpwr = 5.03 Id = 2E-09 Power = 1E-08
Lb PiT Nc Tj = 40
0.0045 1.362841 2 0.012266

Q10 Volts = 300 Watts = 3 Tj = 150 'K/W= 41.667
Usage: Vpwr = 231.6 Id = 0.0014 Power = 0.3312
Lb PiT Nc Tj = 53.8
0.0045 1.766976 1 0.007951

Capacitors, ceramic general purpose type CK:
Lp = Lb * PiT * PiC * PiV Lb = 0.00099

C2 Volts = 100 pF = 1000
Usage: Vstress = 1 S = 0.01
Lb PiT PiC Pi V Nc
0.00099 1.92167 0.288 1 1 0.000549

C5,6 Volts = 200 pF = 100
Usage: Vstress = 1 S = 0.005
Lb PiT PiC Pi V Nc
0.00099 1.92167 0.234 1 2 0.000892

C4 Volts = 200 pF = 150
Usage: Vstress = 6.4 S = 0.032
Lb PiT PiC Pi V Nc
0.00099 1.92167 0.243 1.0002 1 0.000463

C3 Volts = 300 pF = 18
Usage: Vstress = 232.7 S = 0.7757
Lb PiT PiC Pi V Nc
0.00099 1.92167 0.201 3.1606 1 0.001208

