

APEX MICROTECHNOLOGY CORPORATION
RELIABILITY PREDICTION
PA12M/883

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	B
Environment is Gb	Ground, Benign
Case temperature is	40 C
Internal Power Dissipation =	50 W
Supply voltage is +/-	45 V
An AC signal is applied.	
Product introduction date:	01-Sep-81

The results of this prediction are:

0.2 failures per million hours; or,
MTBF=5021 thousand hours.

Monolithic Bipolar and MOS Linear Devices:

$L_p = C1 * PiT$

IC1		Watts = 3.14	Tj = 200	#/Qs = 56		
Usage:		Watts = 0.18		Max Tj = 50.032		
C1	PiT			Nc		
0.01	0.710994			1		0.00711

Transistors, Low Frequency, Bipolar:

$L_p = L_b * PiT * PiR * PiS$

Q3,5,7,8		Volts = 40	Watts = 1.2	Tj = 175	'K/W= 125	
Usage:	Vstress = 0.65	Vpwr = 0.65	Ic = 0.025	Vs = 0.0163	Power = 0.0163	
Lb	PiT	PiR	PiS	Nc	Tj = 42.031	
0.00074	1.467433	1.0698	0.0473	4		0.00022

Q4		Volts = 40	Watts = 1.2	Tj = 175	'K/W= 125	
Usage:	Vstress = 1.72	Vpwr = 1.72	Ic = 0.0064	Vs = 0.043	Power = 0.011	
Lb	PiT	PiR	PiS	Nc	Tj = 41.376	
0.00074	1.447051	1.0698	0.0514	4		0.000236

Q1		Volts = 120	Watts = 1.2	Tj = 200	'K/W= 145.83	
Usage:	Vstress = 86	Vpwr = 41	Ic = 0.0075	Vs = 0.7167	Power = 0.3075	
Lb	PiT	PiR	PiS	Nc	Tj = 84.844	
0.00074	3.275116	1.0698	0.415	1		0.001076

Q2,6		Volts = 120	Watts = 194	Tj = 200	'K/W= 0.9021	
Usage:	Vstress = 84	Fraction Output Pwr = 1/	1	Vs = 0.7	Power = 50	
Lb	PiT	PiR	PiS	Nc	Tj = 85.103	
0.00074	3.289159	7.0224	0.3941	2		0.013473

Capacitors, ceramic general purpose type CK:

$L_p = L_b * PiT * PiC * PiV$ $L_b = 0.00099$

C1		Volts = 100	pF = 1000			
Usage:	Vstress = 87			S = 0.87		
Lb	PiT	PiC	PiV	Nc		
0.00099	1.92167	0.288	4.0486	1		0.002221

C2		Volts = 100	pF = 2200			
Usage:	Vstress = 1.72			S = 0.0172		
Lb	PiT	PiC	PiV	Nc		
0.00099	1.92167	0.31	1	1		0.000589

C3 Volts = 200 pF = 2200
 Usage: Vstress = 87 S = 0.435
 Lb PiT PiC Pi V Nc
 0.00099 1.92167 0.31 1.3811 1 0.000813

Diodes, Low Frequency:
 Lp = Lb * PiT * PiS * PiC

Diodes, Zener, Lb = 0.002

D1,4 Volts = 3.1 Watts = 2.5 Tj = 175 'K/W= 60
 Usage: Ic = 0.0014 Power = 0.0045
 Lb PiT PiS PiC Nc Tj = 40.269
 0.002 1.370068 1 2 1 0.00548

Sum of all components 0.031219

Hybrid microcircuit:
 Lp=sumLc*(1+.2*PiE) * PiF * PiQ * PiL
 0.031219 1.1 5.8 1 1

Total failures per million hours = 0.1992
 Mean time between failures = 5E+06