

APEX MICROTECHNOLOGY CORPORATION
RELIABILITY PREDICTION
SA60

by

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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 +	28	V
An AC signal is applied.		
Product introduction date:		
	24-Nov-98	

The results of this prediction are:

11.7 failures per million hours; or,
MTBF= 85.5 thousand hours.

Monolithic Bipolar and MOS Linear Devices:

$L_p = C_1 * PiT$

IC2		Watts = 1.325	Tj = 125	#/Qs = 56	
Usage:		Watts = 0.432		Max Tj = 72.604	
C1	PiT			Nc	
0.01	3.26747			1	0.032675

IC1		Watts = 0.22	Tj = 135	#/Qs = 30	
Usage:		Watts = 0.0011		Max Tj = 40.54	
C1	PiT			Nc	
0.01	0.350636			1	0.003506

Transistors, Low Frequency, Si MOSFET: Lb = 0.012

$L_p = L_b * PiT$

Q10,13		Volts = 100	Watts = 80	Tj = 150	'K/W= 1.5625
Usage:		Fraction Output Pwr = 1/	2		Power = 2.5
Lb	PiT			Nc	Tj = 43.906
0.012	1.470173			2	0.035284

Q11,12		Volts = 100	Watts = 80	Tj = 150	'K/W= 1.5625
Usage:		Fraction Output Pwr = 1/	20		Power = 0.25
Lb	PiT			Nc	Tj = 40.391
0.012	1.373329			2	0.03296

Capacitors, ceramic general purpose type CK:

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

C1		Volts = 50	pF = 10000		
Usage:	Vstress = 12			S = 0.24	
Lb	PiT	PiC	Pi V	Nc	
0.00099	1.92167	0.355	1.064	1	0.000718

C2,3		Volts = 25	pF = 47000		
Usage:	Vstress = 11.35			S = 0.454	
Lb	PiT	PiC	Pi V	Nc	
0.00099	1.92167	0.408	1.4332	2	0.002224

Diodes, Low Frequency:

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

Diodes, Switching, $L_b = 0.001$

D5,6
 Usage: Volts = 100 Watts = 0.38 Tj = 175 'K/W= 394.74
 Volts = 11 Ic = 1E-05 Vs = 0.11 Power = 7E-06
 Lb PiT PiS PiC Nc Tj = 40.003
 0.001 1.644053 0.054 2 2 0.000355

D7-10
 Usage: Volts = 100 Watts = 0.38 Tj = 175 'K/W= 394.74
 Volts = 2 Ic = 1E-05 Vs = 0.02 Power = 7E-06
 Lb PiT PiS PiC Nc Tj = 40.003
 0.001 1.644053 0.054 2 4 0.00071

Diodes, Power Rectifier, Fast Recovery, $L_b = 0.025$

D1,4
 Usage: Volts = 150 Watts = 4.29 Tj = 175 'K/W= 34.965
 Volts = 28 Ic = 0.001 Vs = 0.1867 Power = 0.0007
 Lb PiT PiS PiC Nc Tj = 40.023
 0.025 1.6451 0.054 1 2 0.004442

D2,3
 Usage: Volts = 150 Watts = 4.29 Tj = 175 'K/W= 34.965
 Volts = 17 Ic = 0.001 Vs = 0.1133 Power = 0.0007
 Lb PiT PiS PiC Nc Tj = 40.023
 0.025 1.6451 0.054 1 2 0.004442

Sum of all components 0.117316

Hybrid microcircuit:

$L_p = \sum L_c * (1 + 2 * P_{iE}) * P_{iF} * P_{iQ} * P_{iL}$
 0.117316 1.4 5.8 10 1.2271

Total failures per million hours = 11.689

Mean time between failures = 85550