## APEX MICROTECHNOLOGY CORPORATION RELIABILITY PREDICTION PA97

by

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Date of prediction: 06-Dec-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 = 2 W
Supply voltage is +/- 400 V
An AC signal is applied.

Product introduction date: 25-May-00

The results of this prediction are:
31.1 failures per million hours; or,
MTBF=32.1 thousand hours.

## Transistors, Low Frequency, Bipolar:

Lp = Lb \* PiT \* PiR \* PiS

Q1 Usage: Lb 0.00074	Vstress = 0.65 PiT 1.411392	Volts = 20 Vpwr = 0.6 PiR PiS 0.6991 0.0		0.38 0.001	Tj = Vs =	150 0.0325 Nc 1	'K/W= Power = Tj =	328.95 0.0007 40.214	3.63E-05
Q2 Usage: Lb 0.00074	Vstress = 3 PiT 1.435041	Volts = 20 Vpwr = 3 PiR PiS 0.6991 0.0	Watts = Ic = S	0.38 0.001	Tj = Vs =	150 0.15 Nc 1	'K/W= Power = Tj =	328.95 0.003 40.987	5.32E-05
Transistor	rs, Low Frequency, S PiT	Si JFET: Lb	= 0.0045						
Q10A,B Usage: Lb 0.0045	PiT 1.387333	Volts = 25 Vpwr = 4	Watts = Id =	0.55 0.001	Tj =	150 Nc 2	'K/W= Power = Tj =	227.27 0.004 40.909	0.012486
Q6 Usage: Lb	PiT	Volts = 450 Vpwr = 0.7		0.38 1E-07	Tj =	150 Nc	'K/W= Power = Tj =	328.95 7E-08 40	
0.0045								0.006133	
Q15 Usage: Lb 0.012	PiT 3.793289	Volts = 450 Vpwr = 200		4 0.01	Tj =	150 Nc 1	'K/W= Power = Tj =	31.25 2 102.5	0.045519
Q7,8 Usage: Lb 0.012	PiT 1.722969	Volts = 450 Vpwr = 397		4 0.001	Tj =	150 Nc 2	'K/W= Power = Tj =	31.25 0.397 52.406	0.041351

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Q14		Volts =	450	Watts =	4	Tj =	150	'K/W=	31.25	
Usage:		Vpwr =	397	ld =	0.0002			Power =	0.0794	
Lb	PiT						Nc	Tj =	42.481	
0.012	1.430384						1			0.017165
Q4,11,12,16		Volts =	450	Watts =	3.125	Tj =	150	'K/W=	40	
Usage:		Fraction	Output Pv	wr = 1/	2			Power =	1	
Lb	PiT						Nc	Tj =	80	
0.012	2.735936						4			0.131325
Q3,6,13		Volts =	450	Watts =	3.125	Tj =	150	'K/W=	40	
Usage:		Vpwr =	200	ld =	0.0003			Power =	0.06	
Lb	PiT						Nc	Tj =	42.4	
0.012	1.428137						3			0.051413

Capacitors, ceramic general purpose type CK:

Lp = Lb \* PiT \* PiC \* PiV Lb = 0.00099

C1 Volts = 50 pF = 470

 Usage:
 Vstress =
 1.5
 S =
 0.03

 Lb
 PiT
 PiC
 Pi V
 Nc

 0.00099
 1.92167
 0.269
 1.0001
 1
 0.000513

Diodes, Low Frequency:

Lp = Lb \* PiT \* PiS \* PiC

Diodes, Zener, Lb = 0.002

D1 Volts = 8.7Watts = 1.35 Tj = 175 'K/W= 111.11 1E-06 Power = 9E-06Usage: lc = Lb PiT PiS PiC Nc Tj = 40.001 0.002 1.362867 1 2 1 0.005451

Sum of all components 0.311446

Hybrid microcircuit:

Lp=sumLc\*(1+.2\*PiE) \* PiF \* PiQ \* PiL 0.311446 1.4 5.8 10 1.2307

Total failures per million hours = 31.123 Mean time between failures = 32130