## APEX MICROTECHNOLOGY CORPORATION RELIABILITY PREDICTION SA50

by

## Granger Scofield

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 28 V
An AC signal is applied.

Product introduction date: 01-Jun-94

The results of this prediction are:
9.33 failures per million hours; or,
MTBF=107 thousand hours.

## Monolithic MOS Digital Devices:

Lp = C1 \* PiT

Monolithic Bipolar and MOS Linear Devices:

Lp = C1 \* PiT

IC1 Usage: C1 0.01	PiT 3.26747	Watts = 1.325 Watts = 0.432	Tj =	125	#/Qs = Max Tj =	56 72.604 Nc 1	0.032675		
IC1 Usage: C1 0.01	PiT 0.350636	Watts = 0.22 Watts = 0.0011	Tj =	135	#/Qs = Max Tj =	30 40.54 Nc 1	0.003506		
Transistors, Low Frequency, Si MOSFET: Lb = 0.012									

Lp = Lb \* PiT

Q10,13 Usage:		Volts = 100 Fraction Out			60 2	Tj =	175	'K/W= Power =	2.5	
Lb	PiT	Traction Out	puti wi –	17	_		Nc	Tj =	46.25	
0.012	1.537218						2			0.036893
Q11,12		Volts = 100	0 Wa	atts =	60	Tj =	175	'K/W=	2.5	
Usage:		Fraction Out	put Pwr =	1/	20			Power =	0.25	
Lb	PiT						Nc	Tj =	40.625	
0.012	1.379647						2			0.033112

Capacitors, ceramic general purpose type CK:

Lb =

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

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 =	100000			
Usage:	Vstress =	11.4					S =	0.456	
Lb	PiT	PiC	Pi V					Nc	
0.00099	1.92167	0.437	1.439					2	0.00239

0.00099

C4	Volts = 50	pF =	270					
Usage: Vstress = 8				S =	0.16			
Lb PiT PiC	Pi V				Nc			
0.00099 1.92167 0.256	1.019				1			0.000497
Diodes, Low Frequency:								
Lp = Lb * PiT * PiS * PiC								
Diodes, Switching, Lb =		0.001						
D3-6	Volts = 100	Watts =	0.38	Tj =	175	'K/W=	394.74	
Usage:	Volts = 11	Ic =	0.001	Vs =	0.11	Power =	0.0007	
Lb PiT PiS	PiC				Nc	Tj =	40.257	
0.001 1.657271 0.054	2				4			0.000716
Diodes, Power Rectifier, Fast	Recovery, Lb =	0.025						
	•							
D1,2	Volts = 100	Watts =	4.29	Tj =	175	'K/W=	34.965	
Usage:	Volts = 28	Ic =	0.001	Vs =	0.28	Power =	0.0007	
Lb PiT PiS	PiC				Nc	Tj =	40.023	
0.025 1.6451 0.054	1				2	•		0.004442
		Sum of a	II compon	ents				0.114949
			•					

Hybrid microcircuit:

Lp=sumLc\*(1+.2\*PiE) \* PiF \* PiQ \* PiL 0.114949 1.4 5.8 10 1

Total failures per million hours = 9.3338 Mean time between failures = 107137