

Fujitsu Multichip Modules

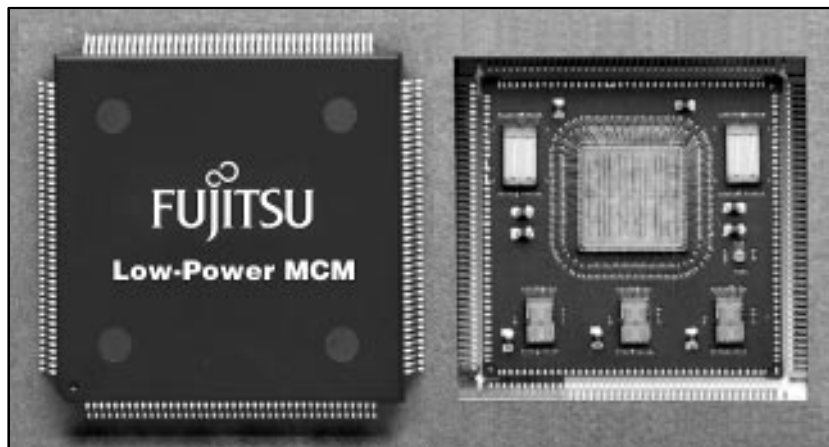
Low-Power MCMs

Description

Fujitsu's Low-Power Multichip Module (MCM) is the most cost effective advanced packaging solution to solve the speed and density barriers imposed by traditional packaging and interconnection approaches.

Our MCM family is built on a multilayer ceramic substrate with a semiconductor die mounted on both sides and housed in a surface mountable plastic quad flat package.

Some of the features and their benefits are listed below.



Features

- Highest component density possible with dual side mounting
- Excellent control of transmission line parameters
- 100% module testing
- Inclusion of both analog and digital functions
- I/O configuration options: 80, 104, 168, and 256 pins
- Package mount height options: 4.4 mm and 3.0 mm

Benefits

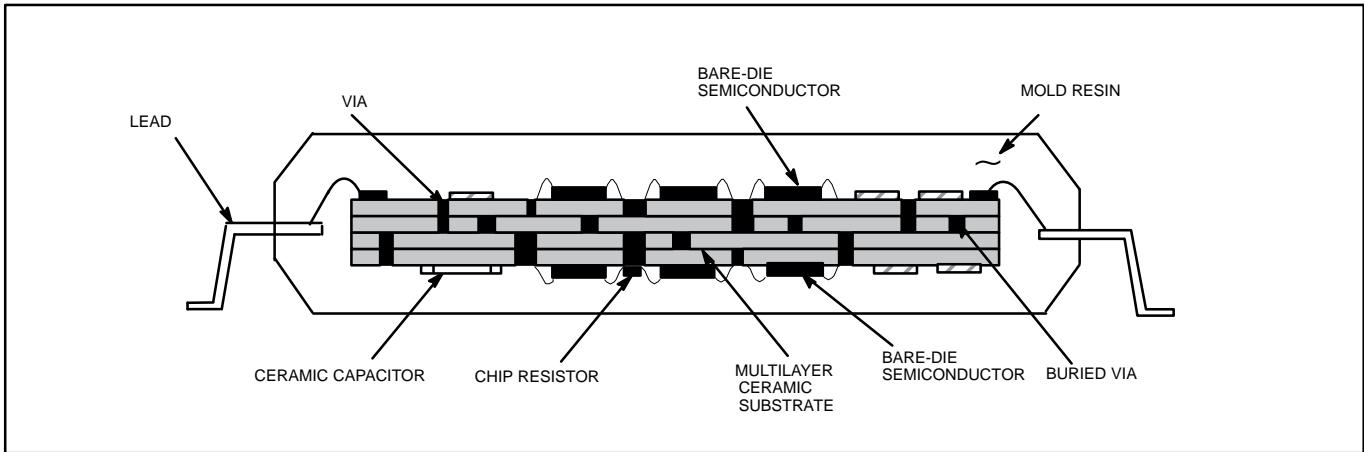
- Maximizes system performance and integration
- Reduces ringing and signal reflection
- High reliability
- Mixed signal
- Standard package sizes
- Low profile

Product Applications

- Telecommunications equipment
- Portable computers
- High speed workstations
- Industrial controls
- ATE/ instrumentation
- Hand-held POS terminals
- Computer peripherals
- Multimedia

Low-Power MCMs

STRUCTURE



Substrate Types

- Thick film ceramic (allows resistor trimming)
- Co-fired ceramic (best electrical characteristics)

Electrical and Mechanical Properties Comparison

Parameters	High Temp Co-fired	Thick Film
Metalization	Tungsten	Silver palladium
Conductivity	15 mΩ/□	(Ag) 3.5 mΩ/□
Dielectric constant (at 1 MHz)	K = 10.0	K = 9.10
Volume resistivity (Ω x cm)	>10 ¹²	>10 ¹²
Dielectric strength (volts/mil)	> 1000	>1000
Dissipation factor (DF)	0.03%	< 0.2%
Firing temperature	1600°C	850°C
Surface finish microinches	15	14.5
Camber	4 mil/in	3 mil/in
Layer count	Unlimited	5 to 7
TCE (10 ⁻⁶ /C ⁰)	7.0	7.0
Thermal conductivity (W/m K)	20	20
Shrinkage	20% x & y	na

COMPONENTS

- Almost any type of component can all be mounted on the Fujitsu Low-Power MCMs as long as maximum height requirements are not exceeded.
- Fujitsu ICs are preferred.

Capacitors

Capacitors use laminated ceramic chips.

Type	Type	Capacitance	Temperature Characteristics	Dielectric Strength	Initial Deviation
Temperature compensation	NPO	1000 pF max.	0 ± 60 ppm/ °C	50 V	J (+5%)
High dielectric constant (1)	X7R	0.1 μ F max.	$\pm 15\%$	25 V	K ($\pm 10\%$) M ($\pm 20\%$)
High dielectric constant (2)	Z5U	0.01 μ F 0.1 μ F, 1 μ F	+ 22% -82%	25 V	Z (+80%) (-20%)

FILM CHARACTERISTICS

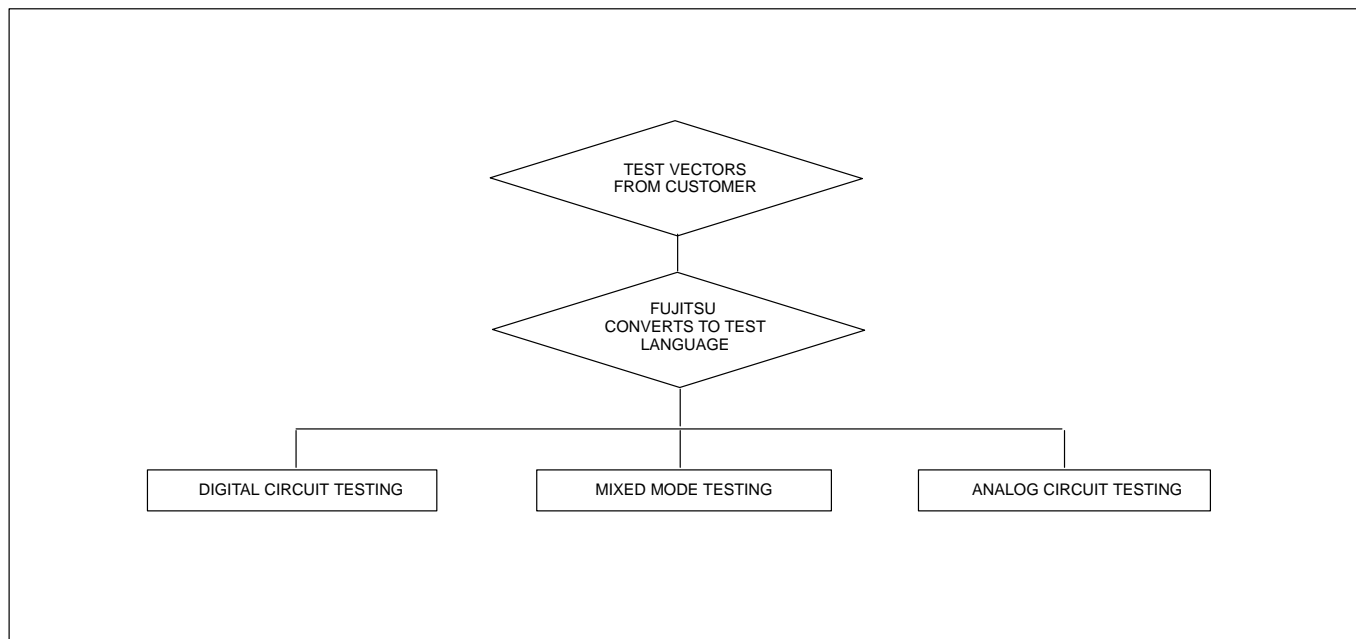
Resistor Characteristics

Items		Thick-Film Characteristics
Resistance range		10 to 10 M Ω
Sheet resistivity		5 to 1 M Ω /sq
Temperature coefficient resistance*		± 100 , ± 300 ppm/°C
Resistance tolerance*		± 1 , $\pm 5\%$
Stability	85°C, 100 hr	$\pm 0.5\%$
	150°C, 100 hr	$\pm 1.0\%$
	40°C, 95%: 100 hr	$\pm 0.5\%$

*Contact Fujitsu about resistors with a temperature coefficient of ± 100 ppm/°C or a resistance tolerance of $\pm 1\%$.

Low-Power MCMs

TEST FLOW

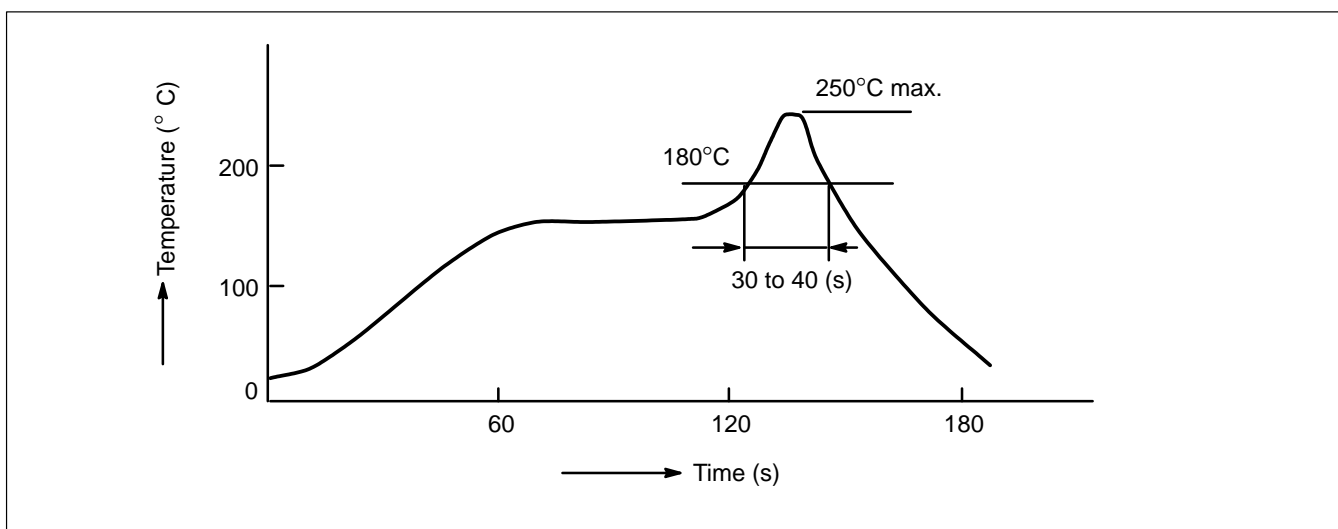


NOTES ON USE

Mounting

If the MCM is left as is for a long time, absorbed moisture may lower package reliability when reflowing is performed. In this case, dehumidify the chip before mounting.

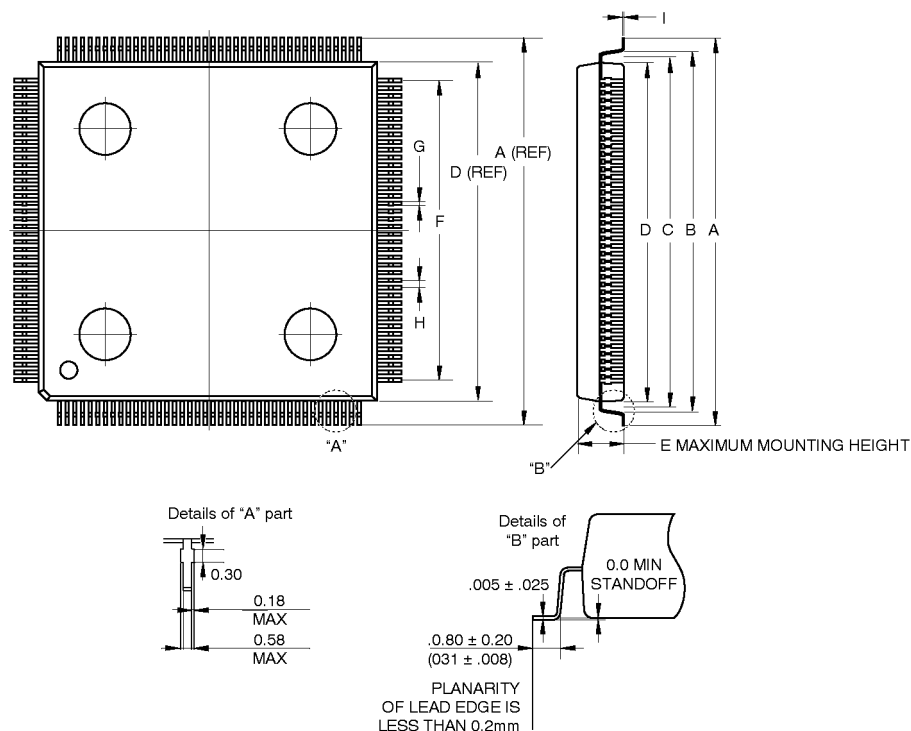
The following graph shows a typical reflow profile.



Cleaning

Use alcohol to clean the package. Check thoroughly before using any other solvent.

Do not attempt to clean the package ultrasonically or components in the package may be damaged. If ultrasonic cleaning is unavoidable, check the package carefully before cleaning to ascertain its condition.

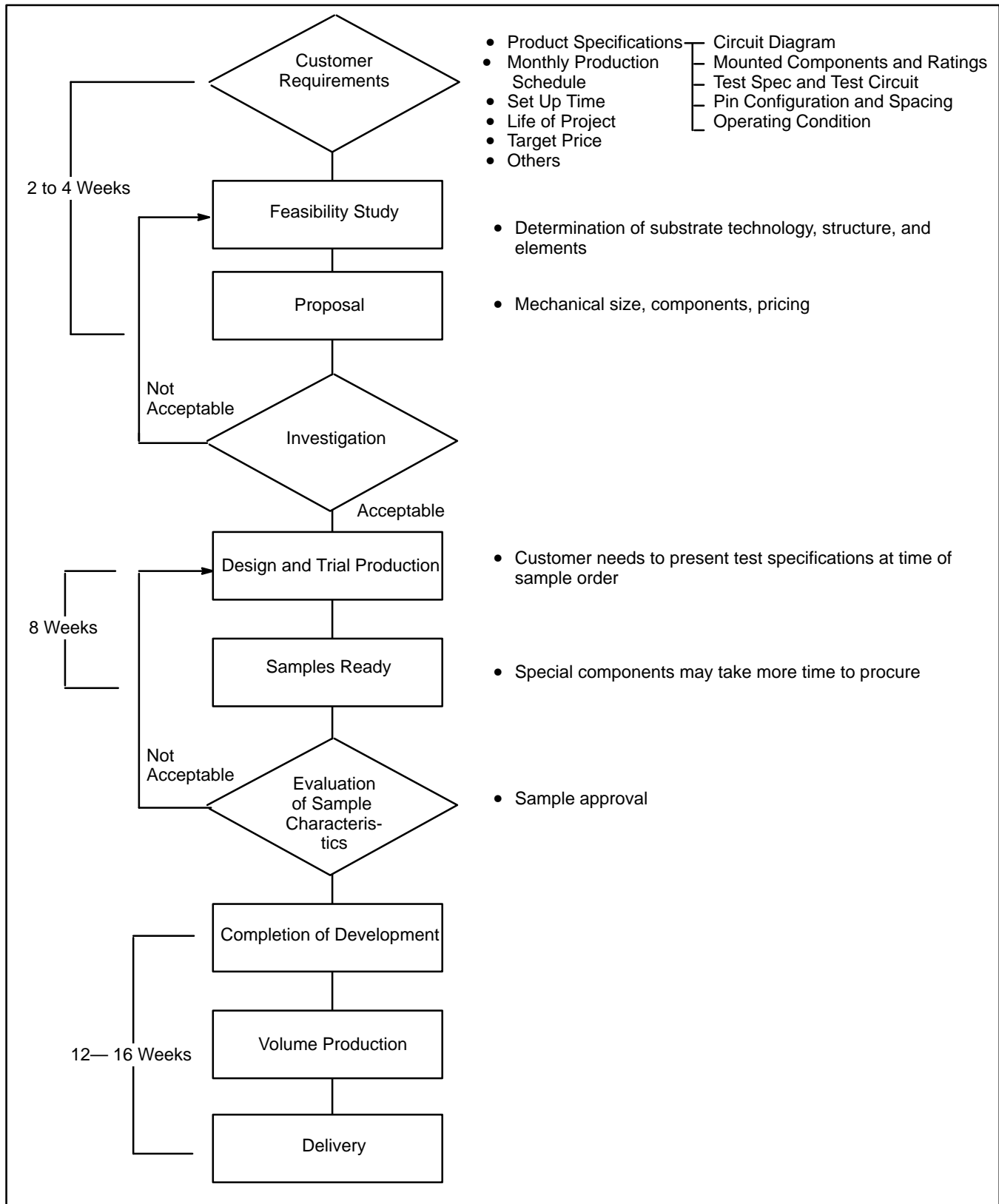


Item	Package Dimensions					
0.80 mm pitch	168 Pins		104 Pins		80 Pins	
[0.50 mm pitch]	[256 Pins]					
Substrate	35x35	(1.379x1.379)	23x23	0.906	(19x19)	(0.798x0.798)
Unit	mm	Inch	mm	Inch	mm	Inch
A	44.0 ± 0.4	(1.732)	32.0 ± 0.4	(1.260)	28.0 ± 0.4	(1.02)
B	42.4 ± 0.4	(1.669)	30.4 ± 0.4	(1.197)	26.4 ± 0.4	(1.039)
C	41.6	(1.638)	29.6		25.6	
D	40.0	(1.575)	28.0	(1.102)	24.0	(0.095)
E (Standard)	4.4	(0.173)	4.4	(0.173)	4.4	(0.173)
E (Low profile)	—	—	3.0	(0.118)	—	—
F	32.8	(1.291)	20.0	(0.787)	15.2	(0.598)
G	0.35 [0.20]	(0.014) [.008]	0.35	(0.014)	0.35	(0.014)
H	0.80 [0.50]	(0.031) [.019]	0.80	(0.031)	0.80	(0.031)
I	0.25	(0.009)	0.25	(0.009)	0.25	(0.009)

Note: Use the metric measurements for PCB layouts. Inch measurements are only approximations
 [] refers to the 256 pin package only.

Low-Power MCMs

Development Flowchart

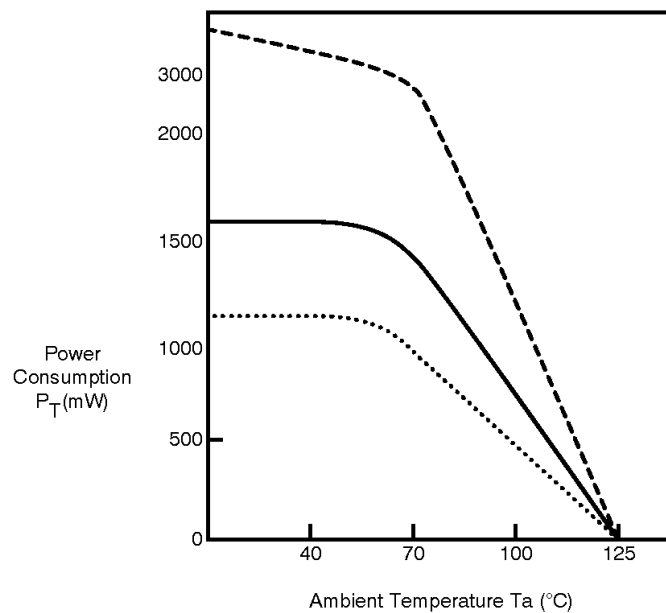


RELIABILITY CRITERIA

Test Items		Test Condition	Number of Test Samples	Evaluation Standard (Accept/Reject)
Storage (High temperature)		Ta = +125 °C, 1000 hr	10	0/1
Storage (Low temperature)		Ta = -40 °C, 1000 hr	10	0/1
Life (Bias)		Ta = +125 °C, WV x 1.1, 1000 hr	20	0/1
Life (T.H.B.)		Ta = +85 °C, RH = 85%, WV x 1.1, 1000 hr	25	0/1
Temperature cycling		-40 to +125 °C for 30 minutes at each temperature for 100 cycles	25	0/1
Thermal shock		0 to 100°C (water) for 5 minutes at each temperature for 100 cycles	20	0/1
Pin strength	Tension	Load of 500g (axis direction) 10 sec. or more	10	0/1
	Bending	Load of 250 g, bending by 90°, 3 times or more	10	0/1
Vibration		20 to 2000 Hz, 20 G, 4 times each for X, Y, and Z	10	0/1
Shock		1500 G for 5 ms, 5 times each for X, Y, and Z	10	0/1
Solderability		Lead dipping at 230°C for 5 sec.	10	0/1
Resistance to soldering heat		260°C, 10 sec.	10	0/1
Resistance to solvent		Immersing into CH ₃ CCl for 10 minutes, brushing 10 times, 5 cycles	10	0/1
Pressure curing test		121°C, 2 ATMS, 96 hours	20	0/1

THERMAL CHARACTERISTICS

The IC's maximum power consumption varies with the circuit configuration, mounted components, and package. The following graph illustrates typical $P_T - T_A$ characteristics.



Maximum power consumption: 3W at 70°C (with no air flow)

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