N-Channel Enhancement Mode MOSFET

2N5003

Features

HF

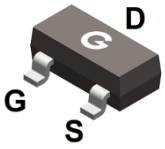
- Low on-resistance
- JESD22-A114-B ESD rating of class 2 per human body model
- High-speed switching
- Drive circuits can be simple
- Parallel use is easy

Typical Applications

- N-channel enhancement mode effect transistor
- Switching application

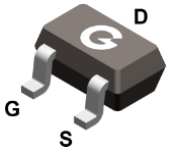
Mechanical Data

- Case: SOT-23, SOT-323, SOT-523, DFN1006-3,SOT-723
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208



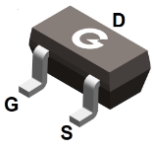
2N5003

SOT-23



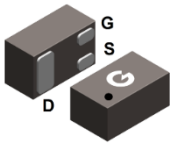
2N5003W

SOT-323



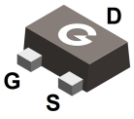
2N5003T

SOT-523



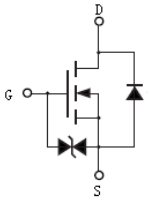
2N5003L

DFN1006-3



2N5003M

SOT-723



Ordering Information

Part Number	Package	Shipping	Marking Code
2N5003	SOT-23	3000pcs / Tape & Reel	5003
2N5003W	SOT-323	3000pcs / Tape & Reel	5003
2N5003T	SOT-523	3000pcs / Tape & Reel	53
2N5003L	DFN1006-3	10000pcs / Tape & Reel	53
2N5003M	SOT-723	10000pcs / Tape & Reel	5003

Maximum Ratings (@ T_A = 25°C unless otherwise specified)

Parameter		Symbol	Value	Units
Drain-Source Voltage		V_{DSS}	50	V
Gate -Source Voltage		V_{GSS}	±20	V
Continuous Drain Current *1		I_D	300	mA
Pulsed Drain Current (t_p = 10μs) *1		I_{DM}	2000	mA
Power Dissipation *1	SOT-23	P_D	0.35	W
	SOT-323		0.25	
	SOT-523		0.15	
	DFN1006-3		0.15	
	SOT-723		0.15	

Thermal Characteristics

Parameter		Symbol	Limits	Unit
Thermal Resistance Junction to Ambient Air *1	SOT-23	$R_{\theta JA}$	357	°C/W
	SOT-323		500	
	SOT-523		833	
	DFN1006-3		833	
	SOT-723		833	
Thermal Resistance Junction to Lead *1	SOT-23	$R_{\theta JL}$	234	°C/W
	SOT-323		313	
	SOT-523		521	
	DFN1006-3		521	
	SOT-723		521	
Thermal Resistance Junction to Case *1	SOT-23	$R_{\theta JC}$	195	°C/W
	SOT-323		261	
	SOT-523		434	
	DFN1006-3		434	
	SOT-723		434	
Operating Junction Temperature Range		T_J	-55 to +150	°C
Storage Temperature Range		T_{STG}	-55 to +150	°C

Electrical Characteristics (@ T_A = 25°C unless otherwise specified)

Symbol	Parameter	Test conditions	MIN	TYP	MAX	UNIT
OFF Characteristics						
V_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0V,I_D = 250μA	50	-	-	V
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	I_D = 250μA	-	66	-	mV/°C
I_{DSS}	Drain to Source Leakage Current	V_{DS} = 50V, V_{GS} = 0V	-	-	1	μA
I_{GSS}	Gate-body Leakage	V_{GS} = ±20V, V_{DS} = 0V	-	-	±10	μA
ON Characteristics						
$R_{DS(ON)}$	Drain-Source On-resistance *2	V_{GS} = 10V, I_D = 0.5A	-	1.2	1.5	Ω
		V_{GS} = 4.5V, I_D = 0.2A	-	1.5	2.5	
		V_{GS} = 2.5V, I_D = 0.2A	-	1.6	2.9	
		V_{GS} = 1.8V, I_D = 0.05A	-	2.8	3.2	
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250uA	0.5	0.8	1.0	V
R_G	Gate Resistance	V_{GS} = 0V, f = 1MHz	-	34	-	Ω
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{GS} = 0V V_{DS} = 20V f = 1.0MHz	-	41	-	pF
C_{OSS}	Output Capacitance		-	15	-	
C_{RSS}	Reverse Transfer Capacitance		-	4	-	
g_{fs}	Forward Transconductance	V_{DS} = 10V, I_D = 0.2A	-	0.5	-	S
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time *3	V_{DD} = 30V,I_D = 0.2A V_{GS} = 10V,R_G = 25Ω R_L = 150Ω	-	6	-	nS
t_r	Turn-on Rise Time *3		-	5	-	
$t_{d(off)}$	Turn-Off Delay Time *3		-	25	-	
t_f	Turn-Off Fall Time *3		-	15	-	
Q_G	Total Gate-Charge	V_{DD} = 25V V_{GS} = 10V I_D = 0.2A	-	4	-	nC
Q_{GS}	Gate to Source Charge		-	0.6	-	
Q_{GD}	Gate to Drain (Miller) Charge		-	0.46	-	
Source-Drain Diode Characteristics						
V_{SD}	Diode Forward Voltage *2	I_S = 0.3A, V_{GS} = 0V	-	0.85	1.2	V
I_S	Diode Continuous Forward Current	T_C = 25°C	-	-	0.3	A

Notes:

1. The data tested by surface mounted on a FR-4 board
2. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%
3. Guaranteed by design, not subject to production

Ratings and Characteristics Curves (@ T_A = 25°C unless otherwise specified)

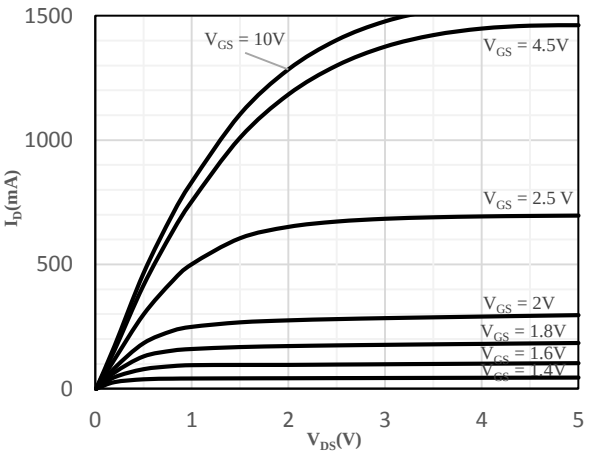


Fig 1 Typical Output Characteristics

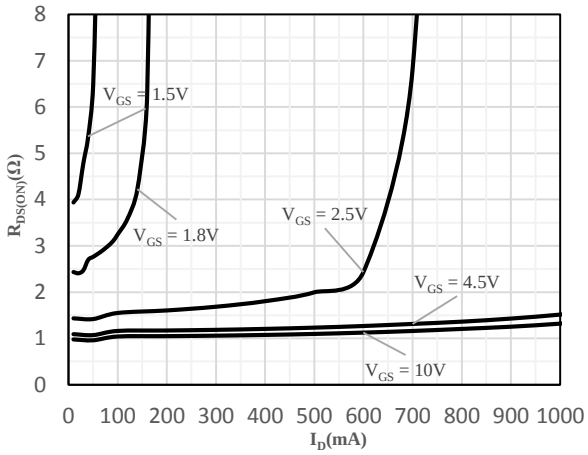


Fig 2 On-Resistance vs. Drain Current and Gate Voltage

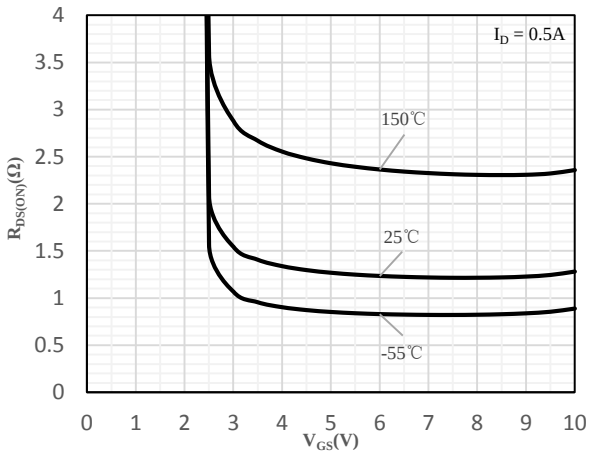


Fig 3 On-Resistance vs. Gate-Source Voltage

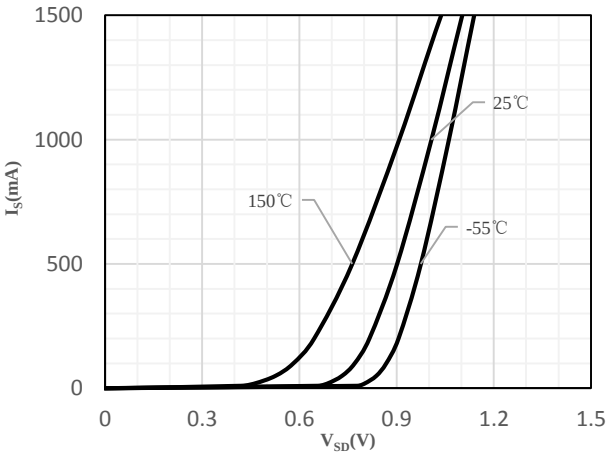


Fig 4 Body-Diode Characteristics

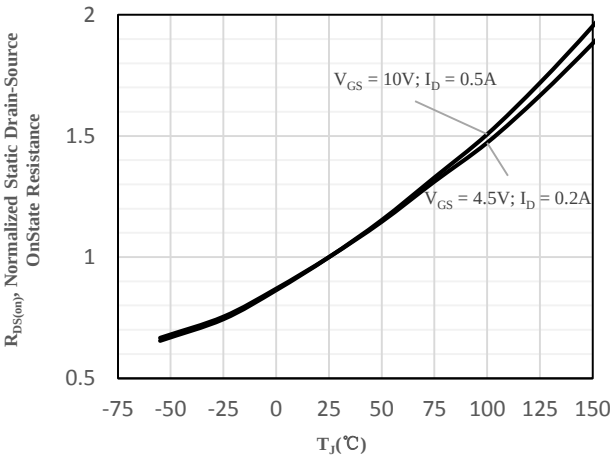


Fig 5 Normalized On-Resistance vs. Junction Temperature

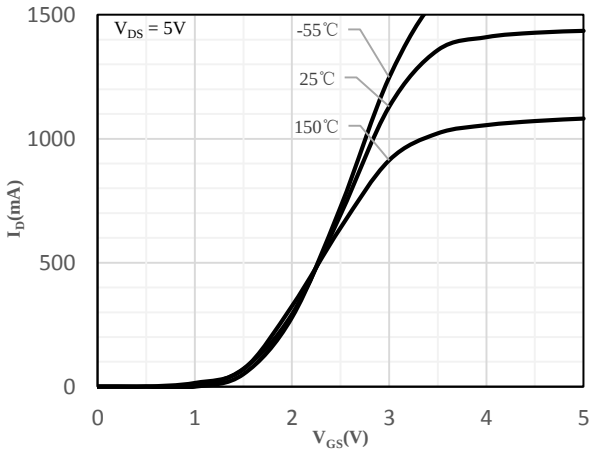


Fig 6 Transfer Characteristics

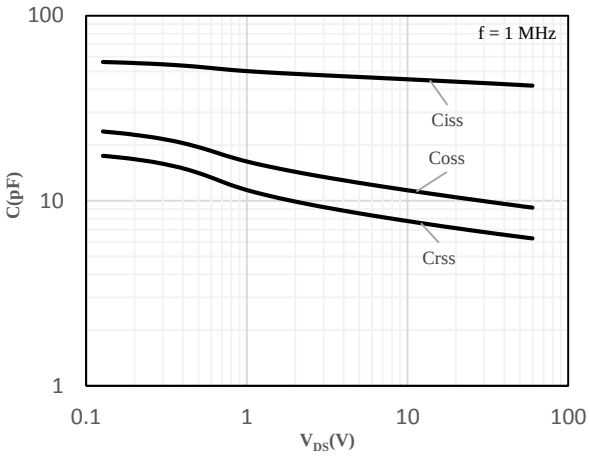


Fig 7 Capacitance Characteristics

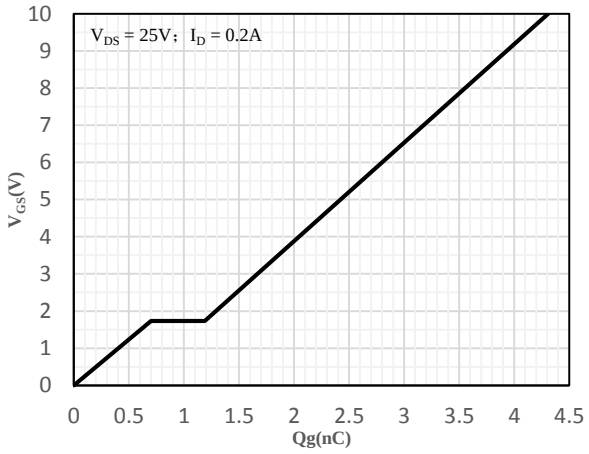


Fig 8 Gate-Charge Characteristics

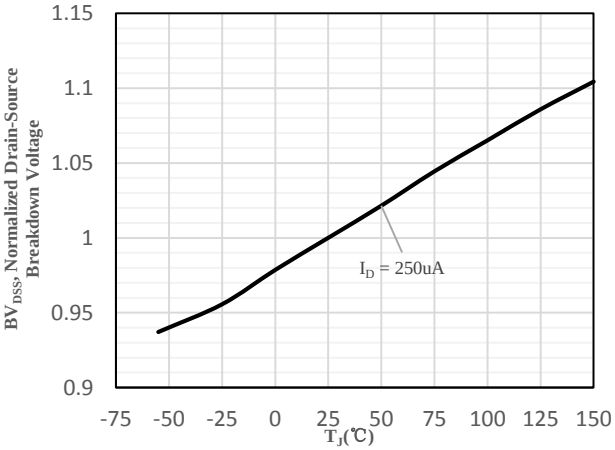


Fig 9 Normalized Breakdown Voltage vs. Junction Temperature

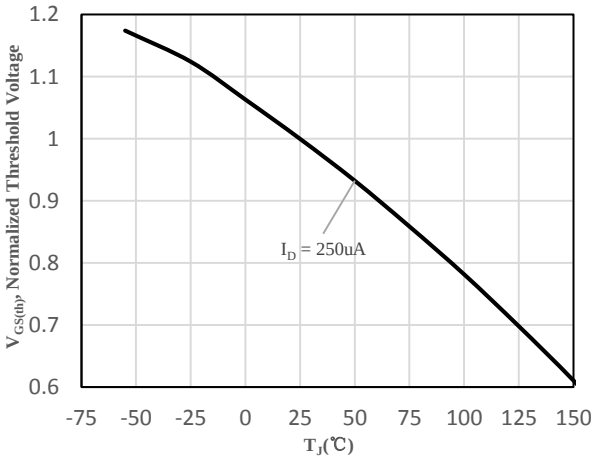


Fig 10 Normalized $V_{GS(th)}$ vs. Junction Temperature

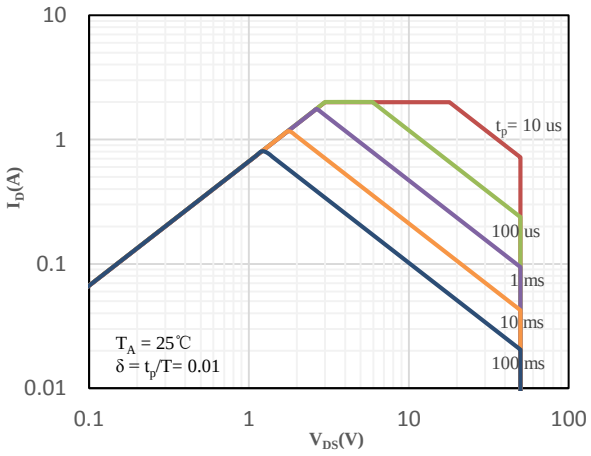


Fig 11 Safe Operation Area

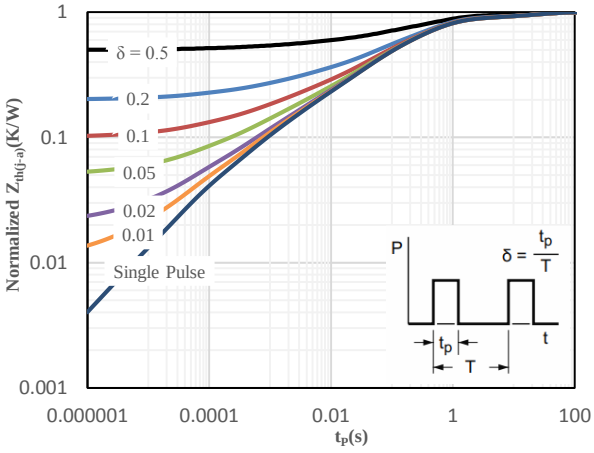
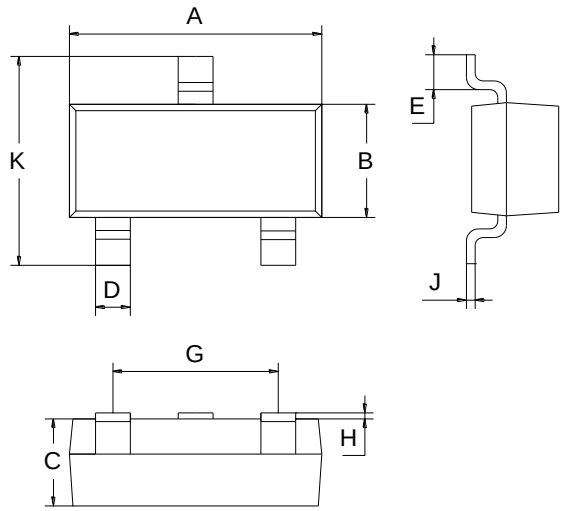
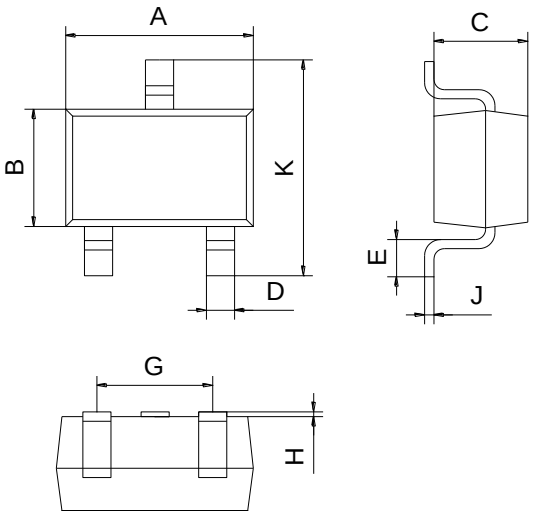


Fig 12 Normalized Maximum transient thermal impedance

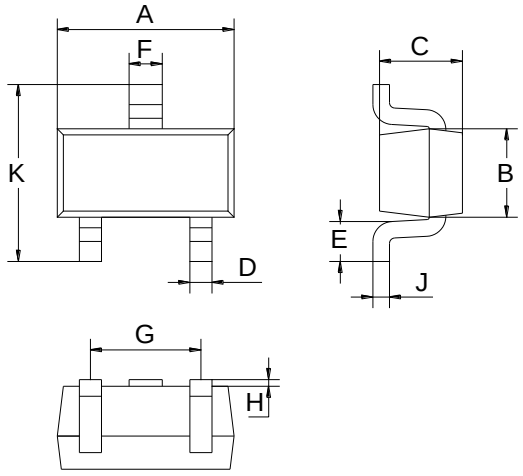
Package Outline Dimensions (Unit: mm)



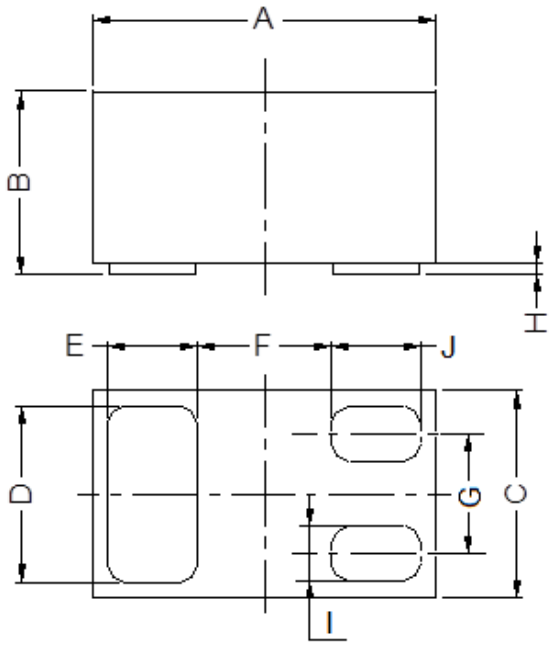
SOT-23		
Dimension	**Min.**	**Max.**
A	2.70	3.10
B	1.10	1.50
C	0.90	1.10
D	0.30	0.50
E	0.35	0.48
G	1.80	2.00
H	0.02	0.10
J	0.05	0.15
K	2.20	2.60



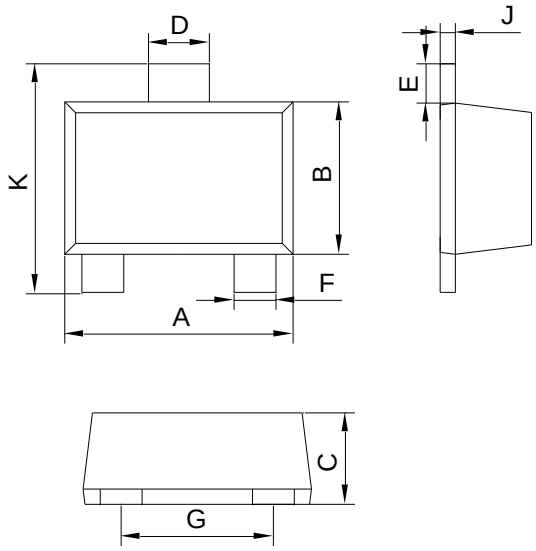
SOT-323		
Dimension	**Min.**	**Max.**
A	2.00	2.20
B	1.15	1.35
C	0.90	1.10
D	0.15	0.35
E	0.25	0.40
G	1.20	1.40
H	0.02	0.10
J	0.05	0.15
K	2.20	2.40



SOT-523		
Dimension	**Min.**	**Max.**
A	1.50	1.70
B	0.75	0.85
C	0.60	0.80
D	0.15	0.30
E	0.30	0.40
F	0.25	0.40
G	0.90	1.10
H	0.02	0.10
J	0.08	0.18
K	1.45	1.75



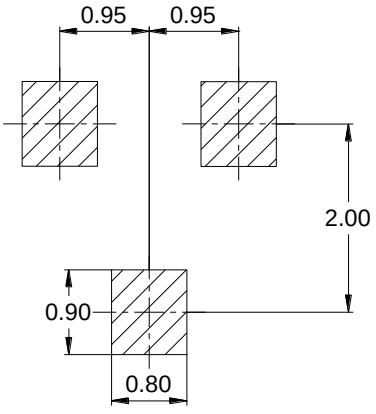
DFN1006-3			
Dimension	**Min.**	**Typ.**	**Max.**
A	0.95	1.00	1.075
B	0.47	0.50	0.53
C	0.55	0.60	0.675
D	0.45	0.50	0.55
E/J	0.20	0.25	0.30
F	-	0.40	-
G	-	0.35	-
H	0	0.03	0.05
I	0.10	0.15	0.20



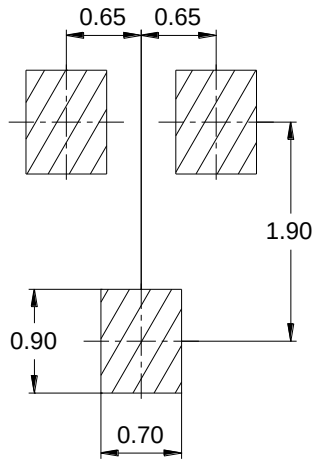
SOT-723		
Dim	Min	Max
A	1.10	1.30
B	0.70	0.90
C	0.40	0.54
D	0.22	0.42
E	0.10	0.30
F	0.12	0.32
G	0.70	0.90
J	0.08	0.15
K	1.10	1.30

Mounting Pad Layout (Unit: mm)

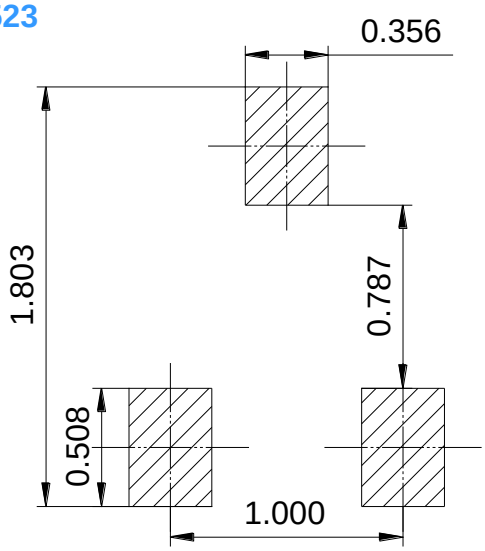
SOT-23



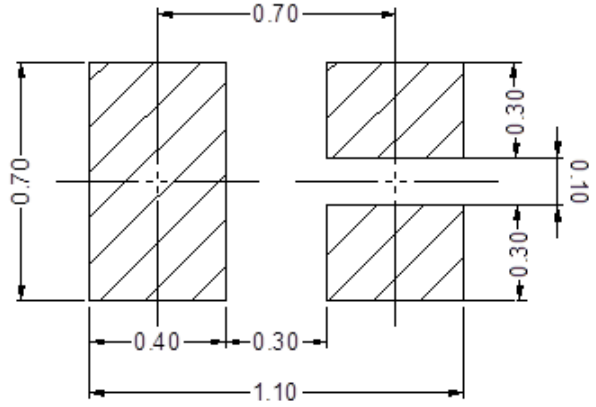
SOT-323



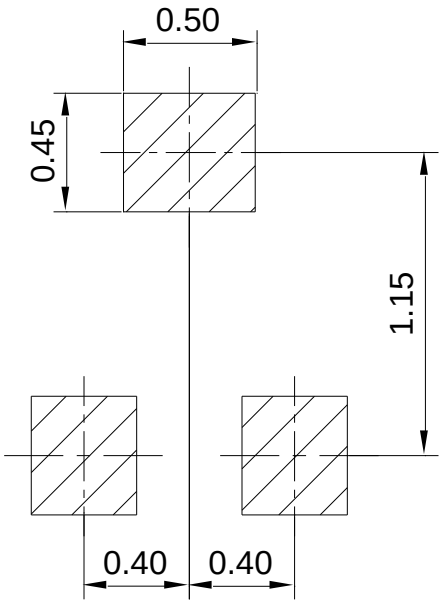
SOT-523



DFN1006-3



SOT-723



IMPORTANT NOTICE

Galaxy Microelectronics (GME) reserves the right to make changes without further notice to any product herein to make corrections, modifications , improvements , or other changes. GME does not assume any liability arising out of the application or use of any product described herein; neither does it convey any license under its patent rights ,nor the rights of others .