



YOUSHANG SEMICONDUCTOR

**设计研发新型功率器件**

**各类小信号开关**

**中低压及高压大电流等场效应管**

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## Product Summary

$BV_{DSS}$	$R_{DS(ON)}$	$I_D$ $T_A = +25^\circ\text{C}$
30V	25m $\Omega$ @ $V_{GS} = 10V$	6.2A
	28m $\Omega$ @ $V_{GS} = 4.5V$	5.8A

## Features and Benefits

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- ESD Protected Gate

## Description and Applications

This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- Load Switch
- DC-DC Converters
- Power Management Functions

## Mechanical Data

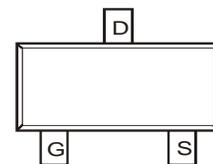
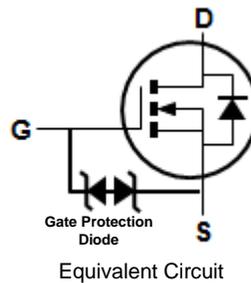
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208③
- Terminal Connections: See Diagram
- Weight: 0.009 grams (Approximate)



SOT23



Top View



Top View

**Maximum Ratings** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			$V_{DSS}$	30	V
Gate-Source Voltage			$V_{GSS}$	$\pm 20$	V
Continuous Drain Current (Note 6) $V_{GS} = 10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$	$I_D$	6.2	A
		$T_A = +70^\circ\text{C}$		4.9	
Pulsed Drain Current (380 $\mu\text{s}$ Pulse, Duty Cycle = 1%)			$I_{DM}$	40	A
Maximum Body Diode Forward Current (Note 6)			$I_S$	2	A

**Thermal Characteristics**

Characteristic			Symbol	Value	Unit
Total Power Dissipation (Note 5)	$T_A = +25^\circ\text{C}$		$P_D$	0.86	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State		$R_{\theta JA}$	146	$^\circ\text{C/W}$
Total Power Dissipation (Note 6)	$T_A = +25^\circ\text{C}$		$P_D$	1.4	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State		$R_{\theta JA}$	88	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case (Note 6)			$R_{\theta JC}$	13	
Operating and Storage Temperature Range			$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

**Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 7)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	30	—	—	V	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current	$I_{BSS}$	—	—	1	$\mu\text{A}$	$V_{DS} = 24\text{V}, V_{GS} = 0\text{V}$
Gate-Body Leakage	$I_{GSS}$	—	—	$\pm 10$	$\mu\text{A}$	$V_{GS} = \pm 16\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	0.8	—	1.8	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	16	25	m $\Omega$	$V_{GS} = 10\text{V}, I_D = 4.0\text{A}$
		—	19	28		$V_{GS} = 4.5\text{V}, I_D = 3.5\text{A}$
		—	47	68		$V_{GS} = 2.5\text{V}, I_D = 2.5\text{A}$
Source-Drain Diode Forward Voltage	$V_{SD}$	—	0.7	1.2	V	$V_{GS} = 0\text{V}, I_S = 1\text{A}$
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	$C_{iss}$	—	680	—	pF	$V_{DS} = 15\text{V}, V_{GS} = 0\text{V}$ $f = 1.0\text{MHz}$
Output Capacitance	$C_{oss}$	—	96	—	pF	
Reverse Transfer Capacitance	$C_{rss}$	—	74	—	pF	
Gate Resistance	$R_g$	—	1.7	—	$\Omega$	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Total Gate Charge ( $V_{GS} = 10\text{V}$ )	$Q_g$	—	10.9	—	nC	$V_{DS} = 15\text{V}, I_D = 4\text{A}$
Total Gate Charge ( $V_{GS} = 4.5\text{V}$ )	$Q_g$	—	7.8	—	nC	
Gate-Source Charge	$Q_{gs}$	—	1.6	—	nC	
Gate-Drain Charge	$Q_{gd}$	—	4.8	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	6.7	—	ns	$V_{DD} = 15\text{V}, V_{GS} = 10\text{V},$ $R_L = 15\Omega, R_G = 6\Omega$
Turn-On Rise Time	$t_r$	—	1.5	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	17.5	—	ns	
Turn-Off Fall Time	$t_f$	—	10.4	—	ns	

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

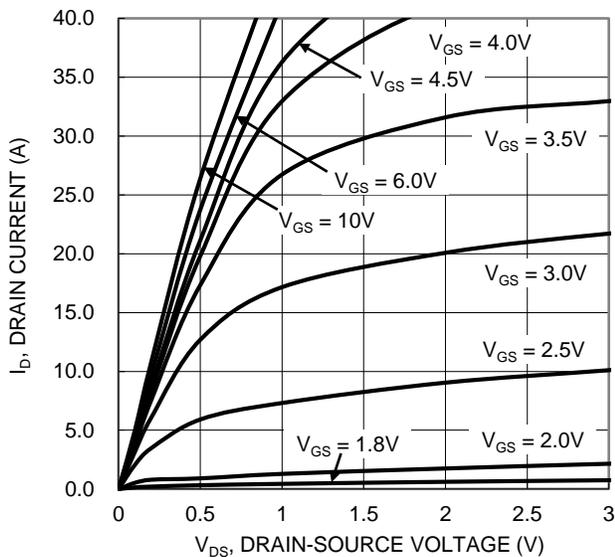


Figure 1. Typical Output Characteristic

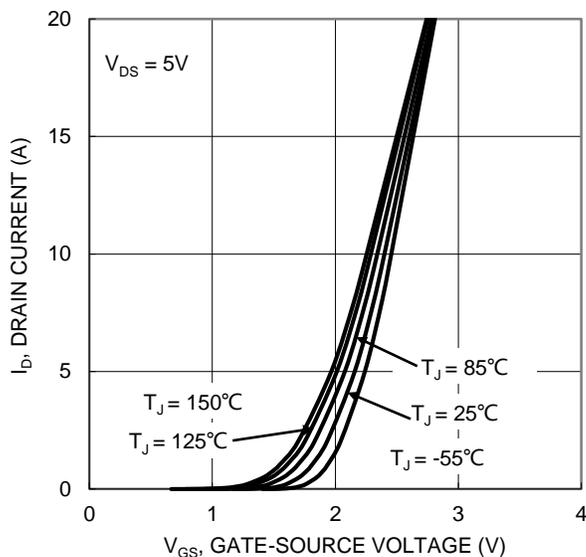


Figure 2. Typical Transfer Characteristic

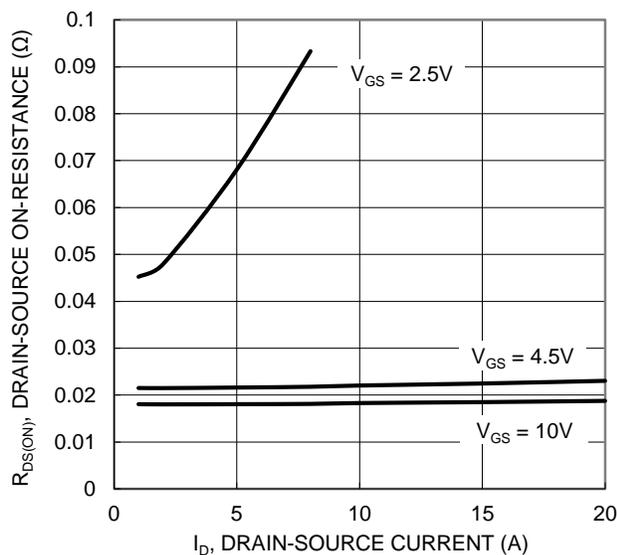


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

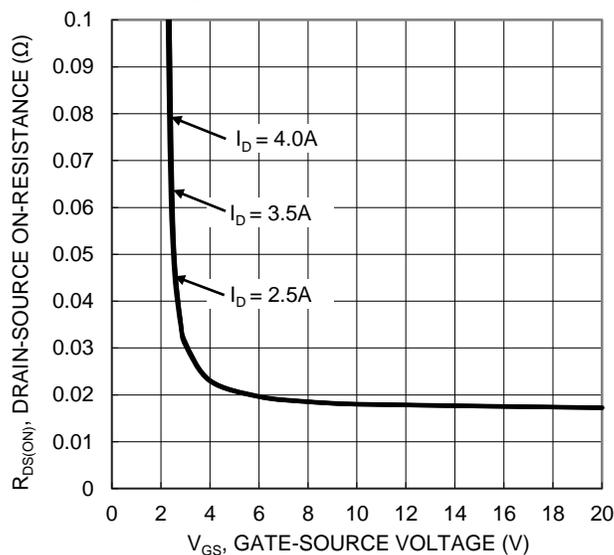


Figure 4. Typical Transfer Characteristic

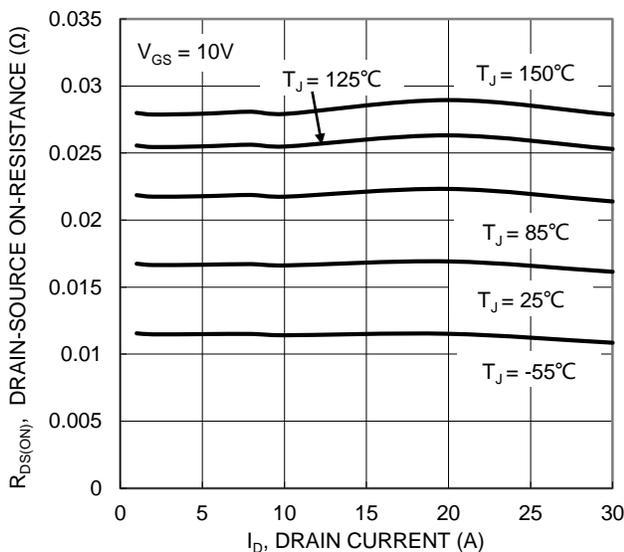


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

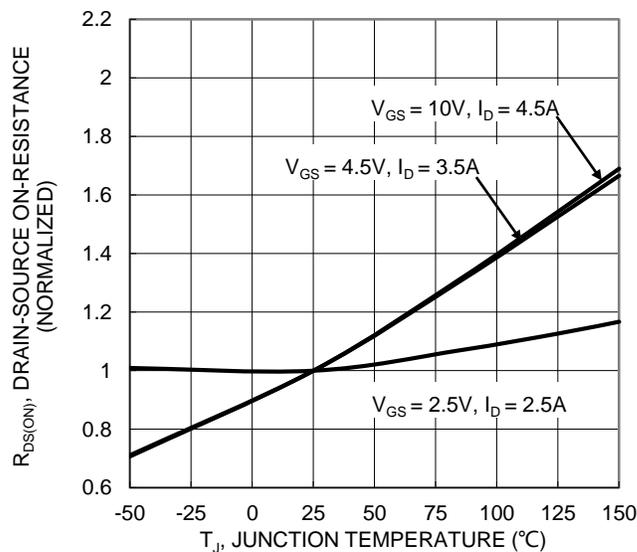


Figure 6. On-Resistance Variation with Junction Temperature

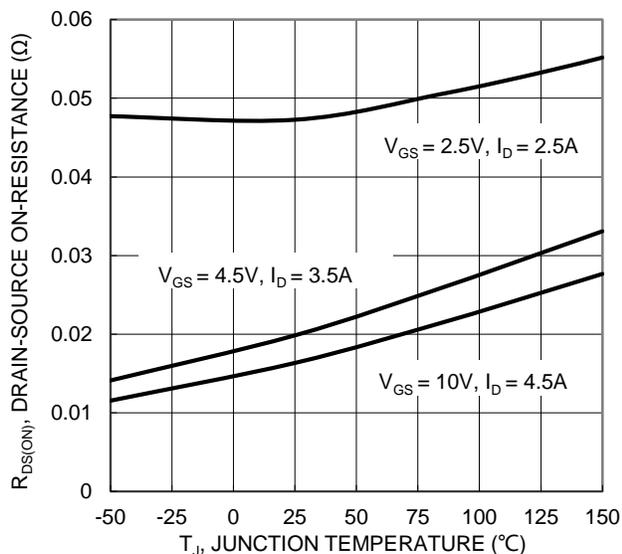


Figure 7. On-Resistance Variation with Junction Temperature

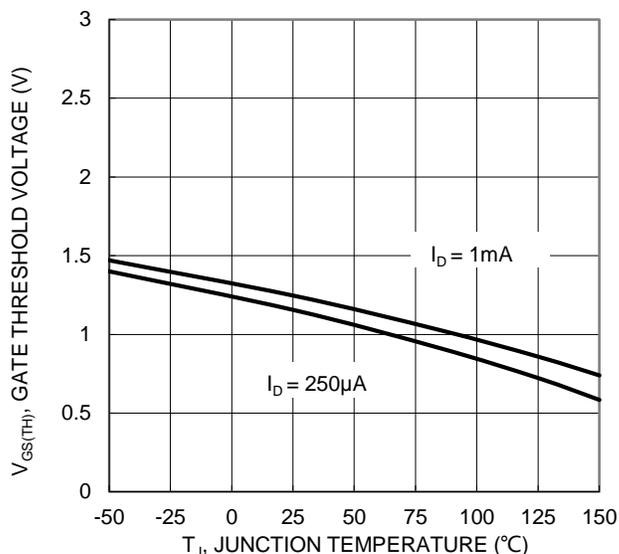


Figure 8. Gate Threshold Variation vs. Junction Temperature

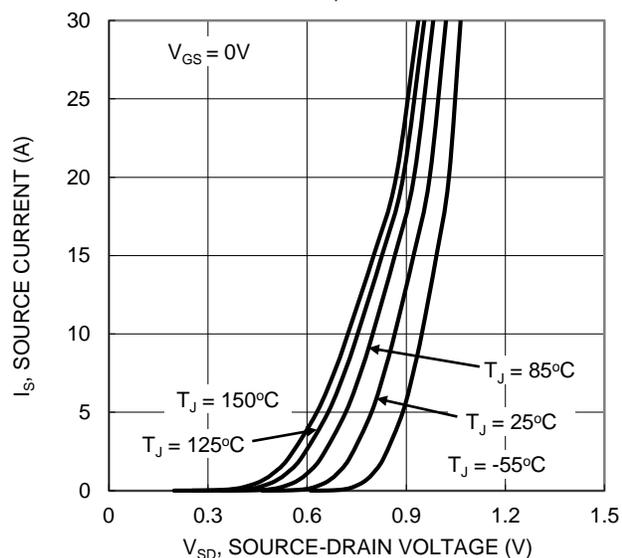


Figure 9. Diode Forward Voltage vs. Current

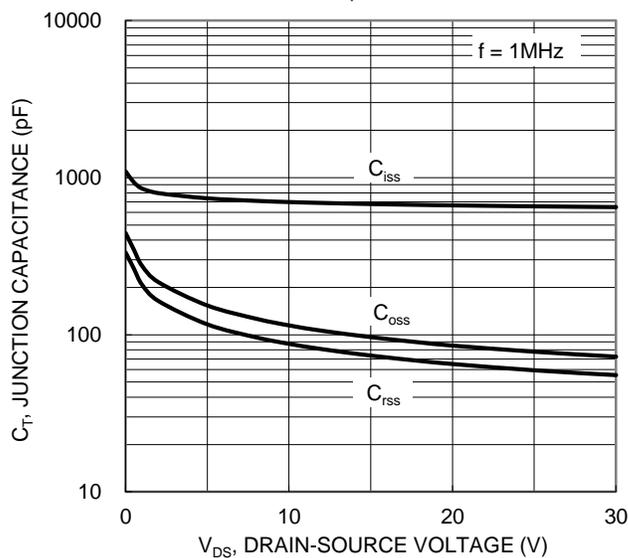


Figure 10. Typical Junction Capacitance

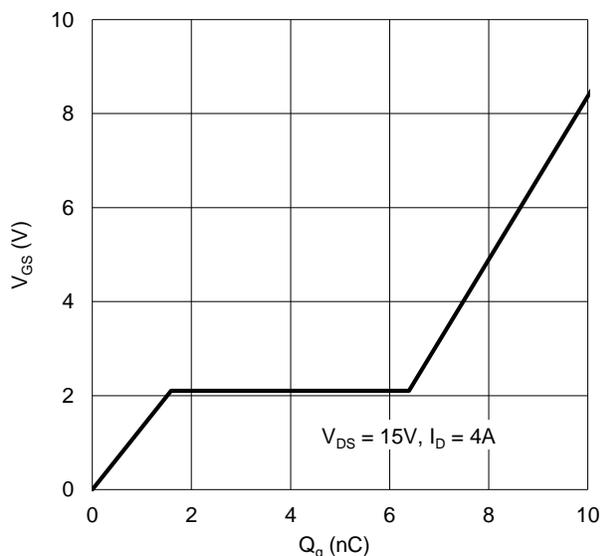


Figure 11. Gate Charge

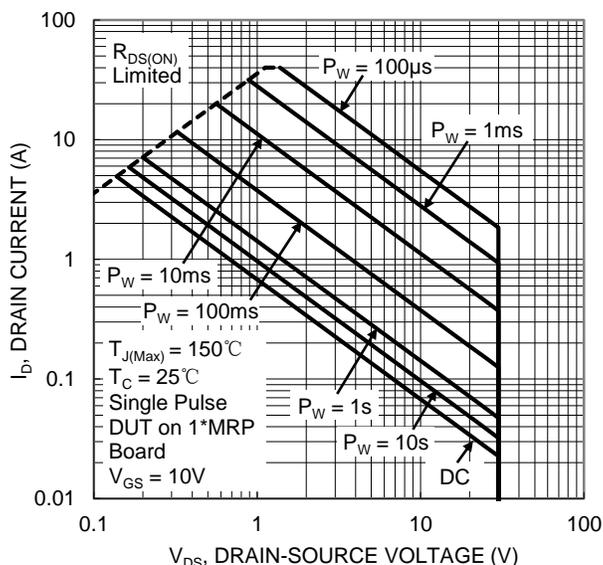


Figure 12. SOA, Safe Operation Area

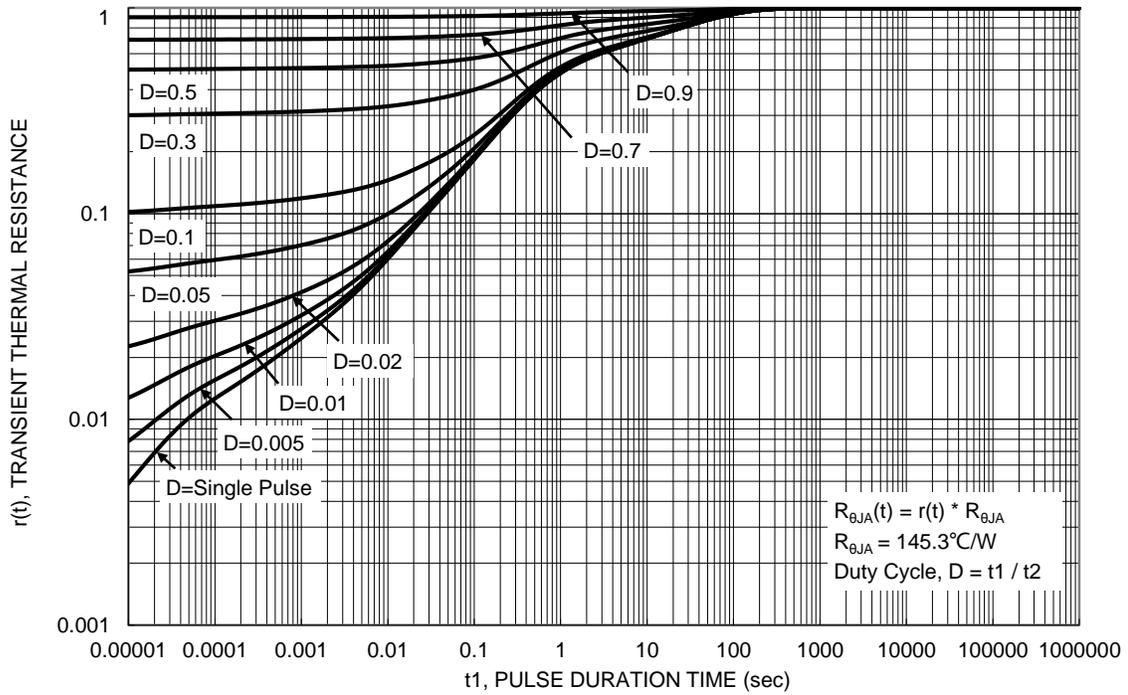
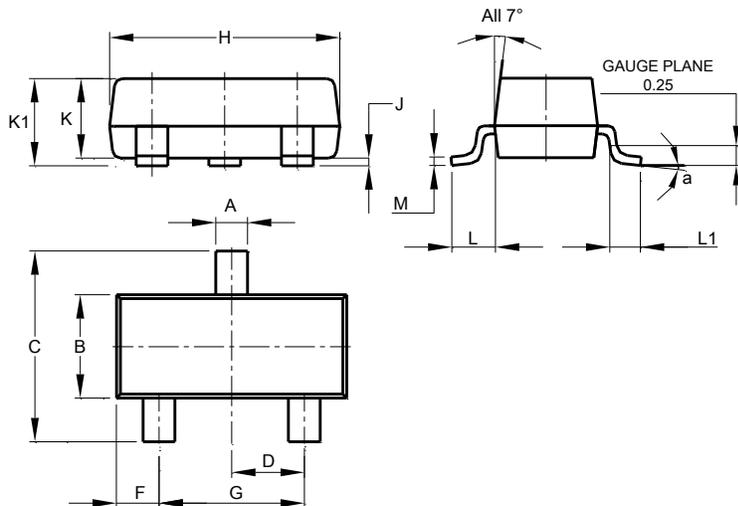


Figure 13. Transient Thermal Resistance

## Package Outline Dimensions

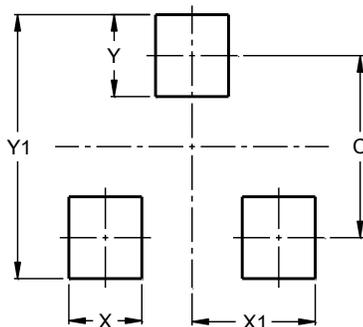
### SOT23



SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

## Suggested Pad Layout

### SOT23



Dimensions	Value (in mm)
C	2.0
X	0.8
X1	1.35
Y	0.9
Y1	2.9