

# SOT-23 Plastic-Encapsulate MOSFETS

TF3415

## TF3415 P-Channel 15-V(D-S) MOSFET

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	$I_D$
-15V	0.039Ω@-4.5V	-4.3A
	0.052Ω@-2.5V	
	0.063Ω@-1.8V	

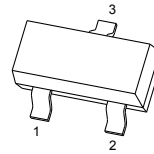
### General FEATURE

- TrenchFET Power MOSFET
- Lead free product is acquired
- Surface mount package

### APPLICATION

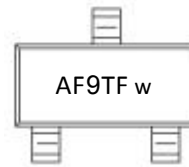
- Load Switch for Portable Devices
- DC/DC Converter

### SOT-23 / SOT-23-3L



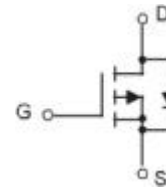
- 1.GATE
- 2.SOURCE
- 3.DRAIN

### MARKING



\*w: week code

### Equivalent Circuit



### Maximum ratings ( $T_a=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	-15	V
Gate-Source Voltage	$V_{GS}$	±10	
Continuous Drain Current	$I_D$	-4.3	A
Pulsed Drain Current	$I_{DM}$	-15	
Continuous Source-Drain Diode Current	$I_S$	-1.25	
Maximum Power Dissipation	$P_D$	1	W
Thermal Resistance from Junction to Ambient( $t \leq 5s$ )	$R_{\theta JA}$	74	$^{\circ}C/W$
Junction Temperature	$T_J$	150	$^{\circ}C$
Storage Temperature	$T_{stg}$	-55 ~+150	



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**MOSFET ELECTRICAL CHARACTERISTICS**

**T<sub>a</sub> =25 °C unless otherwise specified**

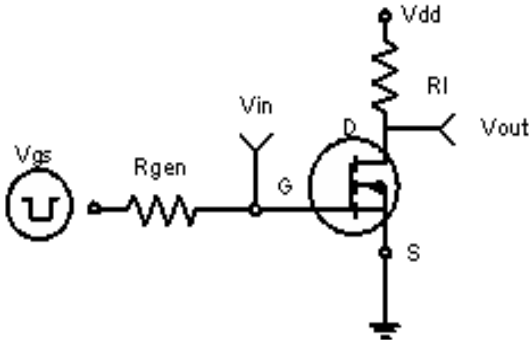
Parameter	Symbol	Test Condition	Min	Typ	Max	Units
<b>Static</b>						
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA	-15			V
Gate-source threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA	-0.4	-0.7	-1	
Gate-source leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±8V			±100	nA
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> = -12V, V <sub>GS</sub> = 0V			-100	nA
Drain-source on-state resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -4.3A		0.035	0.039	Ω
		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -4.1A		0.047	0.052	
		V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -2.0A		0.060	0.063	
Forward transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = -5V, I <sub>D</sub> = -2.0A		5.0	-	S
<b>Dynamic<sup>b</sup></b>						
Input capacitance	C <sub>iSS</sub>	V <sub>DS</sub> = -4V, V <sub>GS</sub> = 0V, F = 1.0MHz		740		pF
Output capacitance	C <sub>oss</sub>			290		
Reverse transfer capacitance	C <sub>rss</sub>			190		
Total gate charge	Q <sub>g</sub>	V <sub>DS</sub> = -4V, I <sub>D</sub> = -4.1A, V <sub>GS</sub> = -4.5V		7.8		nC
Gate-source charge	Q <sub>gs</sub>			1.2		
Gate-drain charge	Q <sub>gd</sub>			1.6		
Gate resistance	R <sub>g</sub>	f = 1MHz	1.9		19	Ω
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> = -4V, I <sub>D</sub> = -3.3A , R <sub>L</sub> = -1.2Ω, V <sub>GEN</sub> = -4.5V, R <sub>g</sub> = 1Ω		12.0		ns
Rise time	t <sub>r</sub>			35.0		
Turn-off delay time	t <sub>d(off)</sub>			30.0		
Fall time	t <sub>f</sub>			10.0		
<b>Drain-source body diode characteristics</b>						
Continuous source-drain diode current	I <sub>s</sub>	T <sub>C</sub> = 25°C			-1.6	A
Body diode voltage	V <sub>SD</sub>	I <sub>s</sub> = -1.6A		-0.8	-1.2	V

**Notes :**

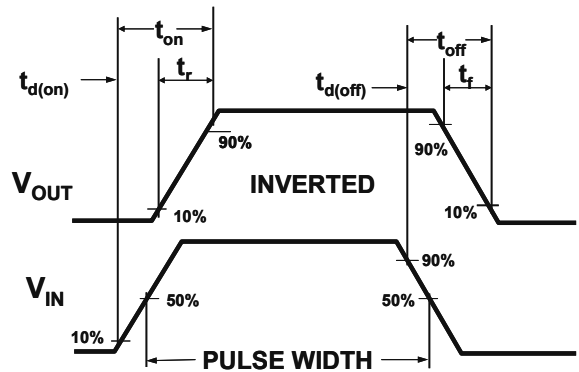
a. Pulse Test : Pulse Width < 300μs, Duty Cycle ≤2%.

b. Guaranteed by design, not subject to production testing.

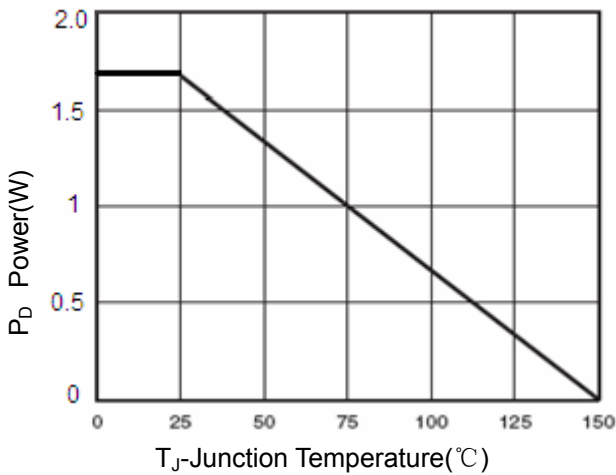
**Typical Electrical and Thermal Characteristics**



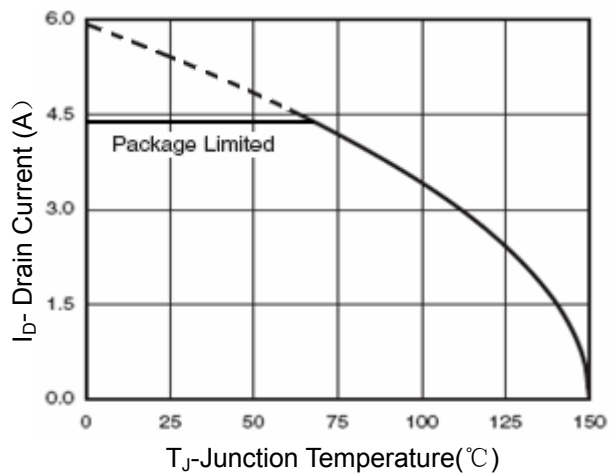
**Figure 1: Switching Test Circuit**



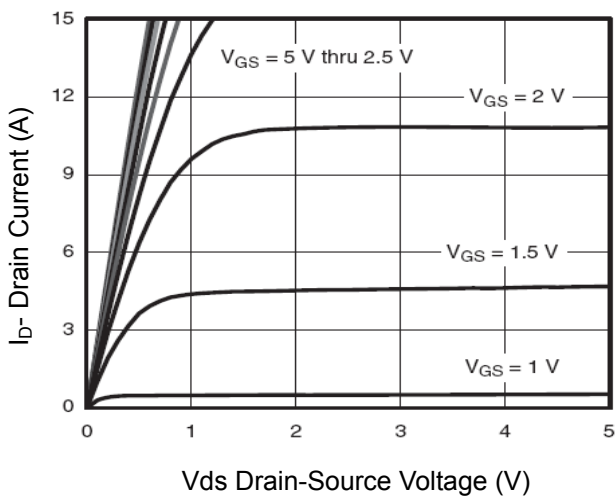
**Figure 2: Switching Waveforms**



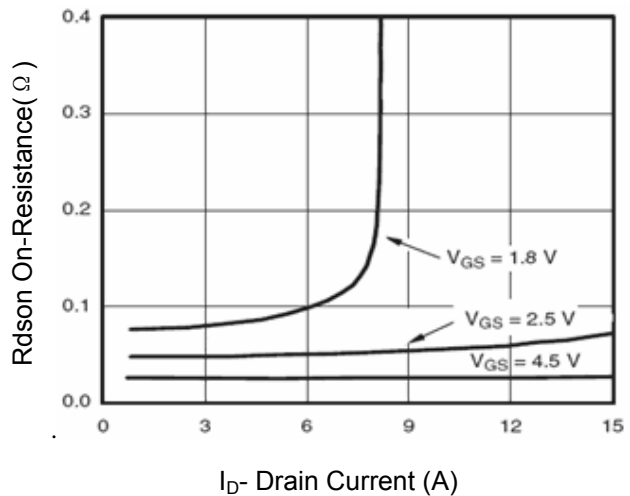
**Figure 3 Power Dissipation**



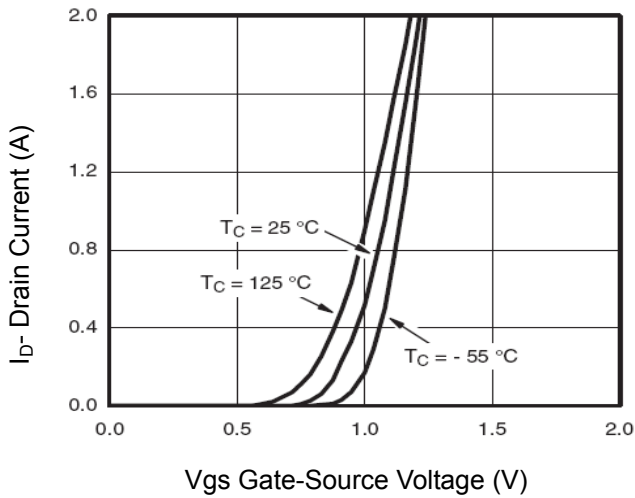
**Figure 4 Drain Current**



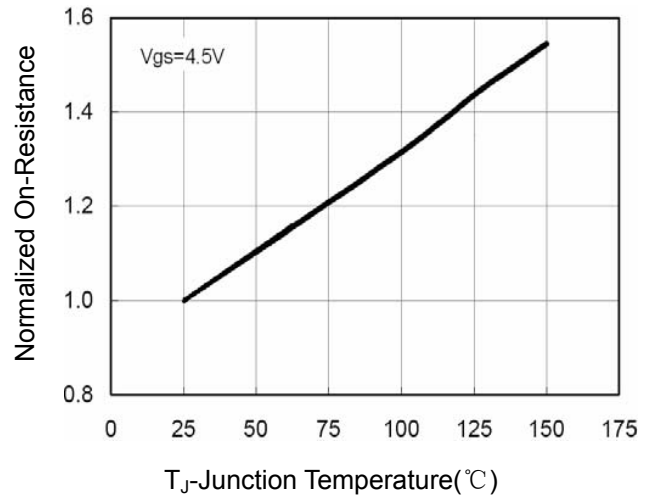
**Figure 5 Output Characteristics**



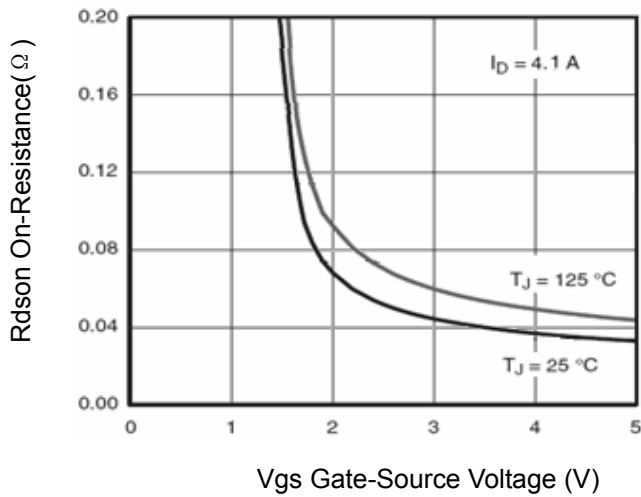
**Figure 6 Drain-Source On-Resistance**



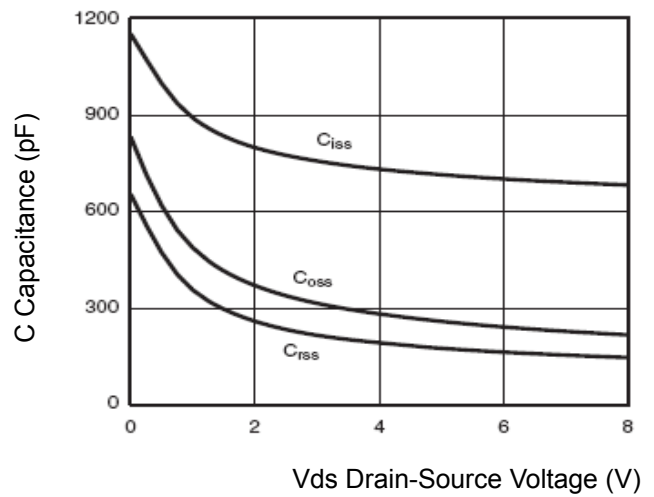
**Figure 7 Transfer Characteristics**



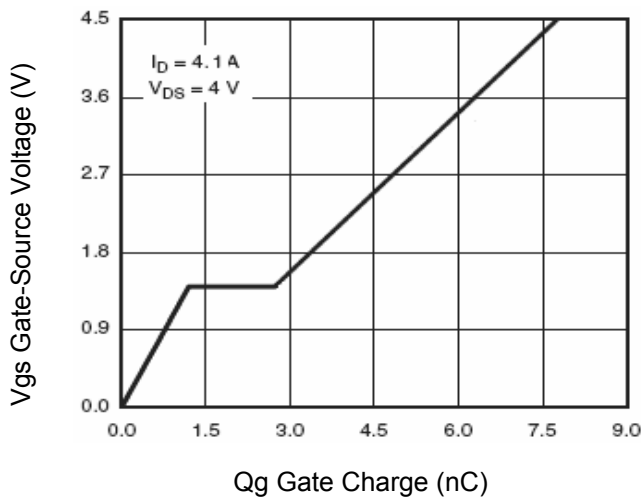
**Figure 8 Drain-Source On-Resistance**



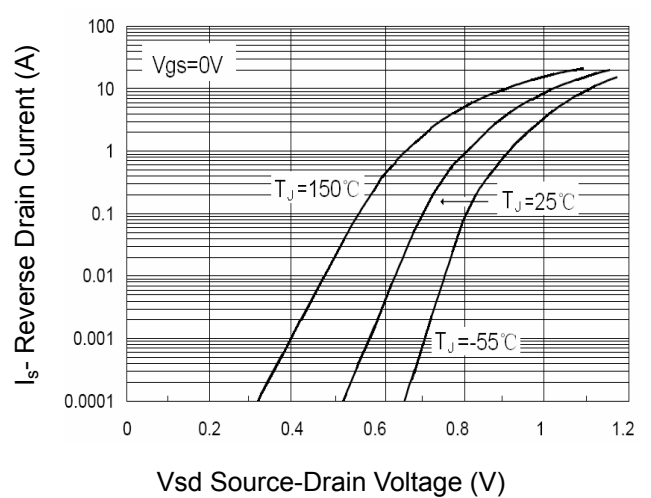
**Figure 9 Rdson vs Vgs**



**Figure 10 Capacitance vs Vds**



**Figure 11 Gate Charge**



**Figure 12 Source- Drain Diode Forward**

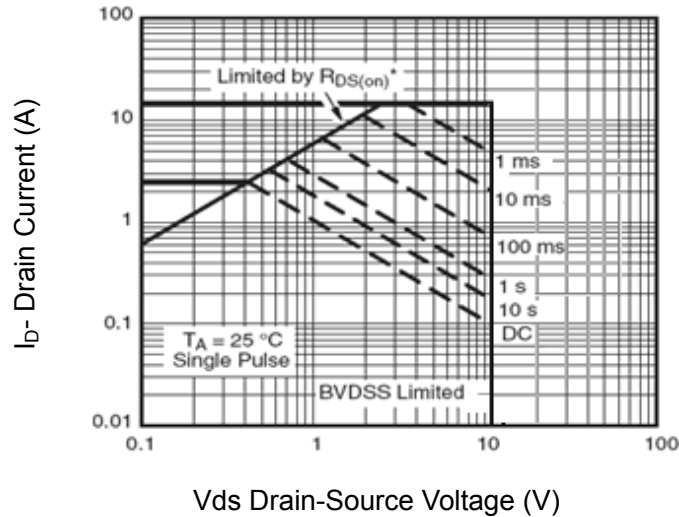


Figure 13 Safe Operation Area

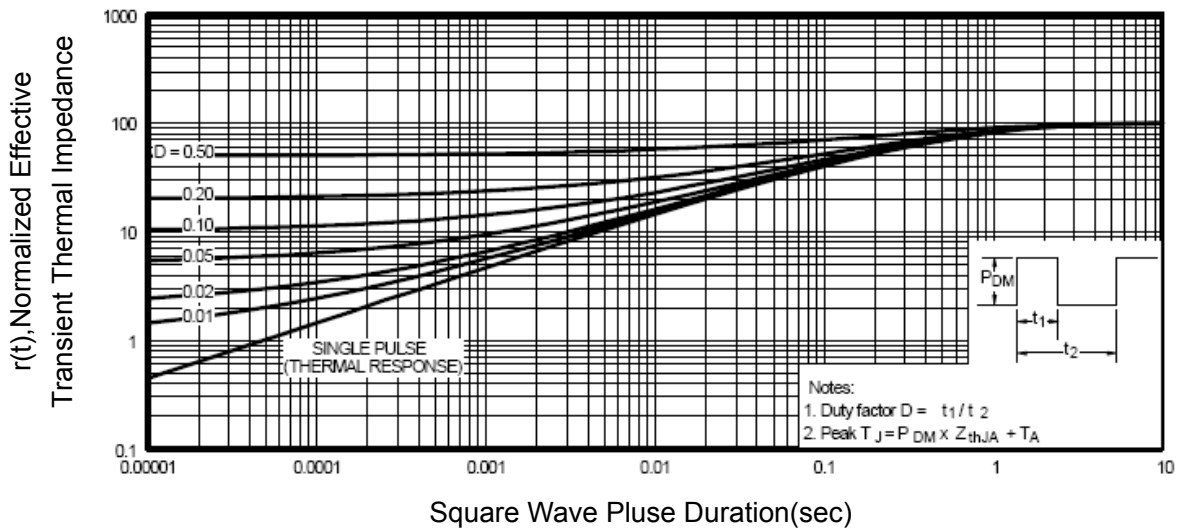
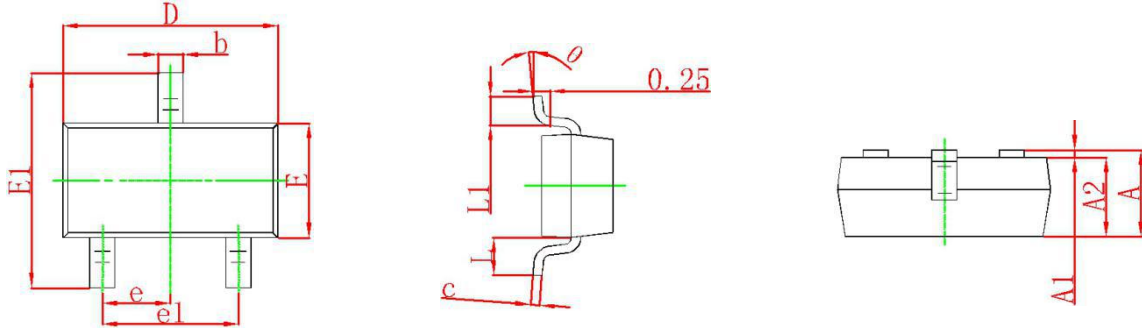


Figure 14 Normalized Maximum Transient Thermal Impedance

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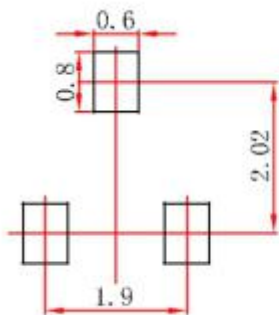
TF3415

## SOT-23 Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

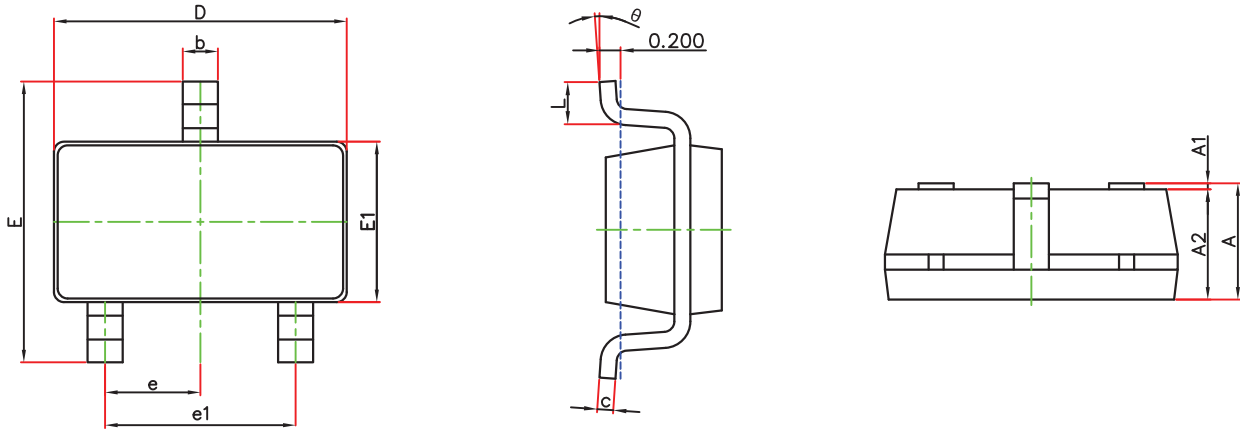
## SOT-23 Suggested Pad Layout



Note:

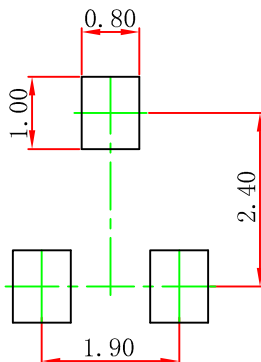
1. Controlling dimension: in millimeters.
2. General tolerance:  $\pm 0.05\text{mm}$ .
3. The pad layout is for reference purposes only.

**SOT-23-3L Package Outline Dimensions**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E1	1.500	1.700	0.059	0.067
E	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

**SOT-23-3L Suggested Pad Layout**



Note:

1. Controlling dimension: in millimeters.
2. General tolerance:  $\pm 0.05\text{mm}$ .
3. The pad layout is for reference purposes only.