

TF2333 P-Channel 20-V(D-S) MOSFET

$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D
-20V	0.022Ω@-4.5V	-6.0A
	0.027Ω@-2.5V	
	0.045Ω@-1.8V	

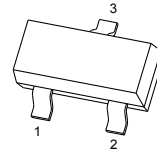
General FEATURE

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

APPLICATION

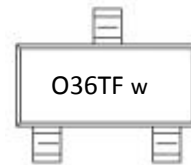
- Load Switch for Portable Devices
- DC/DC Converter

SOT-23



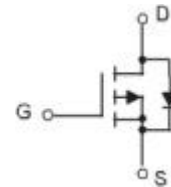
- 1.GATE
- 2.SOURCE
- 3.DRAIN

MARKING



*w: week code

Equivalent Circuit



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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	±12	
Continuous Drain Current	I_D	-6.0	A
Pulsed Drain Current	I_{DM}	-20	
Continuous Source-Drain Diode Current	I_S	-1.4	
Maximum Power Dissipation	P_D	1.4	W
Thermal Resistance from Junction to Ambient($t \leq 5s$)	$R_{\theta JA}$	69	$^{\circ}\text{C/W}$
Junction Temperature	T_J	150	$^{\circ}\text{C}$
Storage Temperature	T_{stg}	-55 ~+150	

MOSFET ELECTRICAL CHARACTERISTICS

T_a =25 °C unless otherwise specified

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Static						
Drain-source breakdown voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D =-250μA	-20			V
Gate-source threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-0.4	-0.7	-1	
Gate-source leakage	I _{GSS}	V _{DS} =0V, V _{GS} =±10 V			±100	nA
Zero gate voltage drain current	I _{DSS}	V _{DS} =-12V, V _{GS} =0V			-1	μA
Drain-source on-state resistance ^a	R _{DS(on)}	V _{GS} =-4.5V, I _D =-6.0A		0.022	0.026	Ω
		V _{GS} =-2.5V, I _D =-5.0A		0.027	0.035	
		V _{GS} =-1.8V, I _D =-3.0A		0.045	0.050	
Forward transconductance ^a	g _{fs}	V _{DS} =-5V, I _D =-5.0A		17.0	-	S
Dynamic ^b						
Input capacitance	C _{iSS}	V _{DS} =-6V, V _{GS} =0V, f =1MHz		1100		pF
Output capacitance	C _{oss}			390		
Reverse transfer capacitance	C _{rss}			300		
Total gate charge	Q _g	V _{DS} =-6V, V _{GS} =-4.5V, I _D =-5.0A		11.5		nC
Gate-source charge	Q _{gs}			1.5		
Gate-drain charge	Q _{gd}			3.2		
Gate resistance	R _g	f =1MHz	1.9		19	Ω
Turn-on delay time	t _{d(on)}	V _{DD} =-6V, I _D =-4.0A R _L =6Ω, V _{GEN} =-4.5V, R _g =6Ω		25.0		ns
Rise time	t _r			45.0		
Turn-off delay time	t _{d(off)}			72.0		
Fall time	t _f			60.0		
Drain-source body diode characteristics						
Continuous source-drain diode current	I _S	T _C =25°C			-1.0	A
Pulse diode forward current ^a	I _{SM}				-20	
Body diode voltage	V _{SD}	I _S =-1.0A		-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

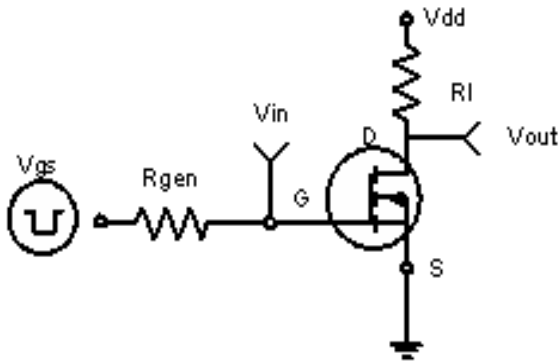


Figure 1: Switching Test Circuit

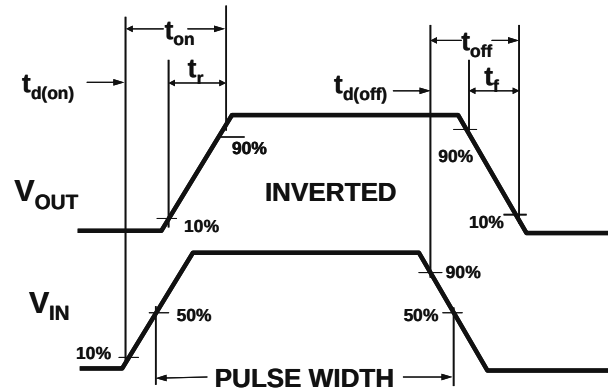
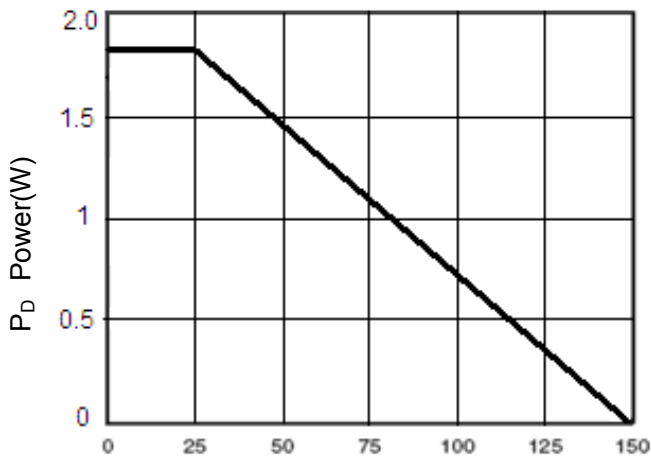
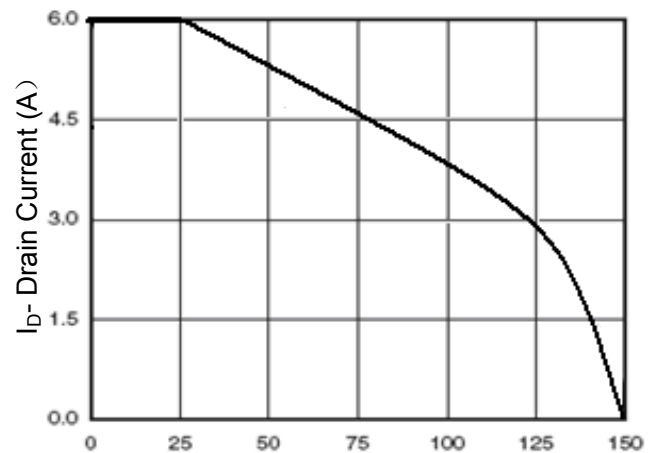


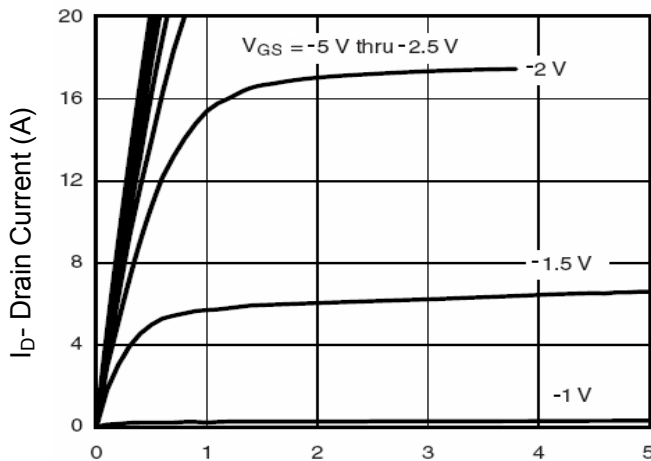
Figure 2: Switching Waveforms



T_J-Junction Temperature(°C)
Figure 3 Power Dissipation



T_J-Junction Temperature(°C)
Figure 4 Drain Current



V_{GS} = -5 V thru -2.5 V
Figure 5 Output Characteristics

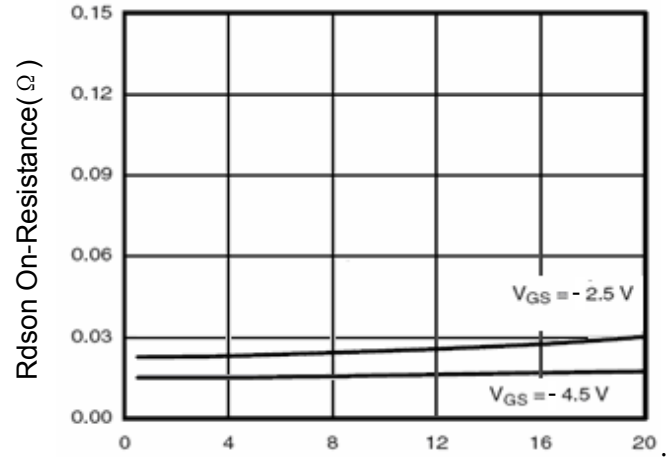


Figure 6 Drain-Source On-Resistance

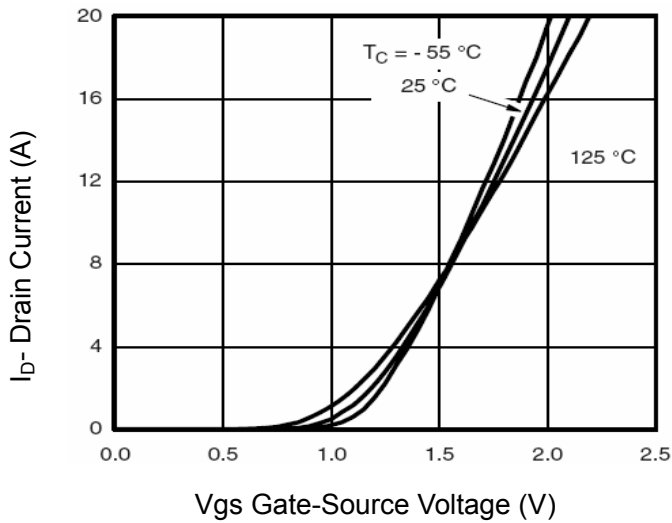


Figure 7 Transfer Characteristics

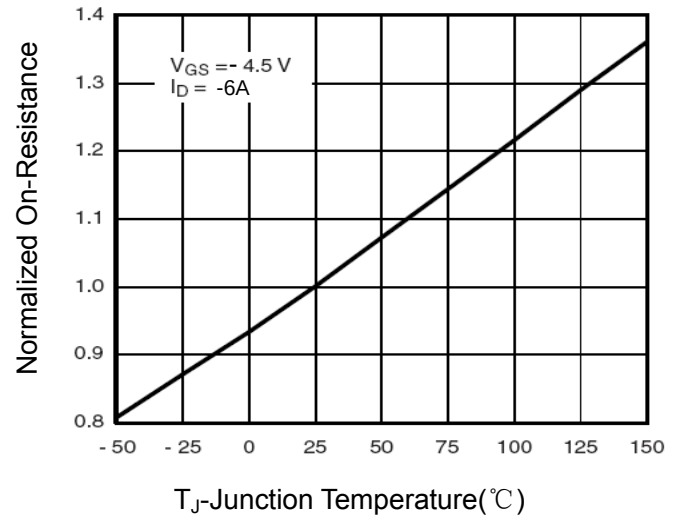


Figure 8 Drain-Source On-Resistance

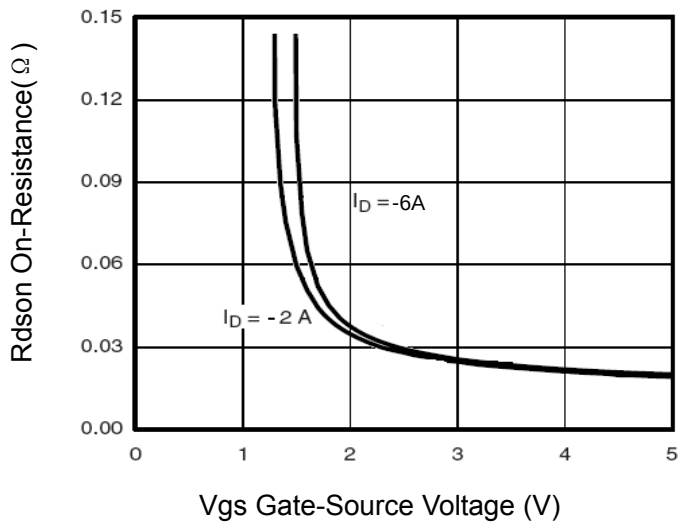


Figure 9 Rdson vs VGS

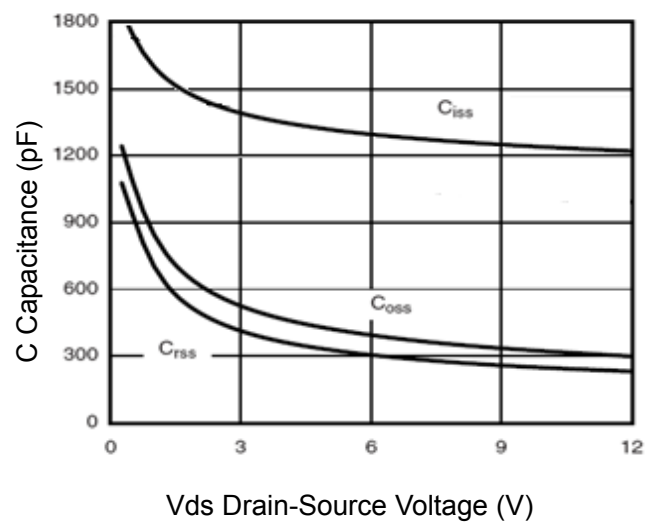


Figure 10 Capacitance vs Vds

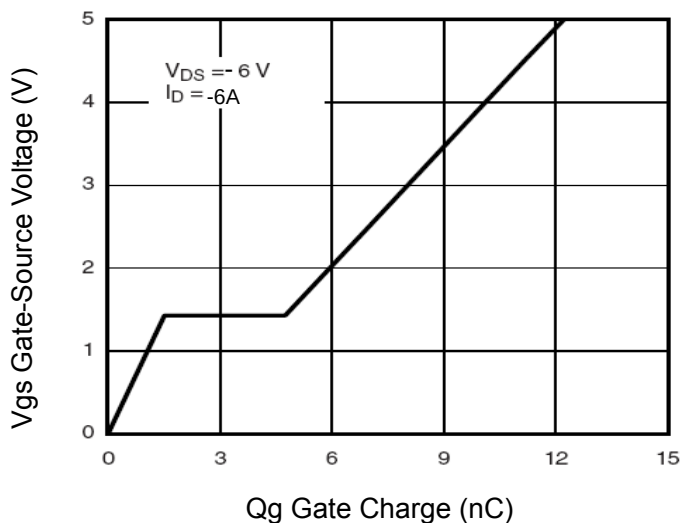


Figure 11 Gate Charge

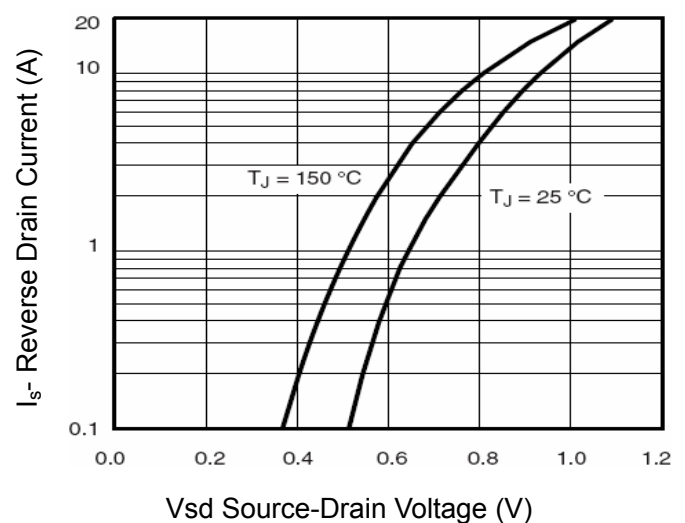


Figure 12 Source- Drain Diode Forward

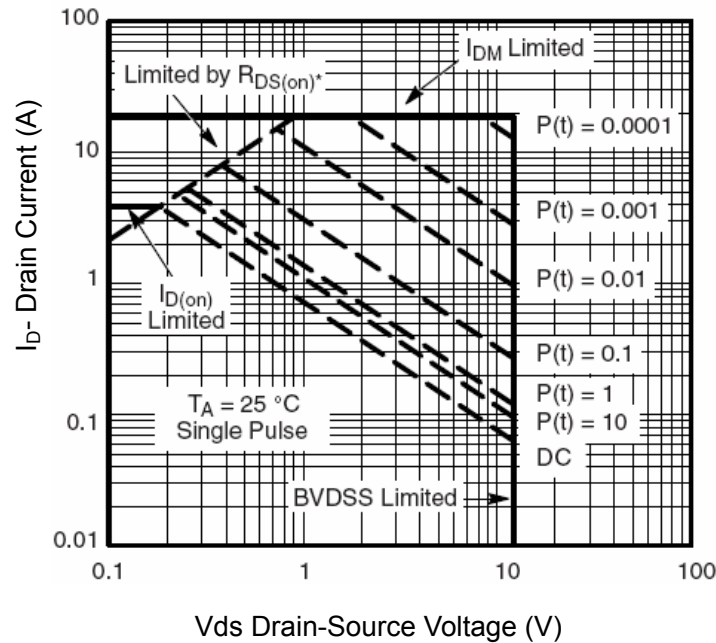


Figure 13 Safe Operation Area

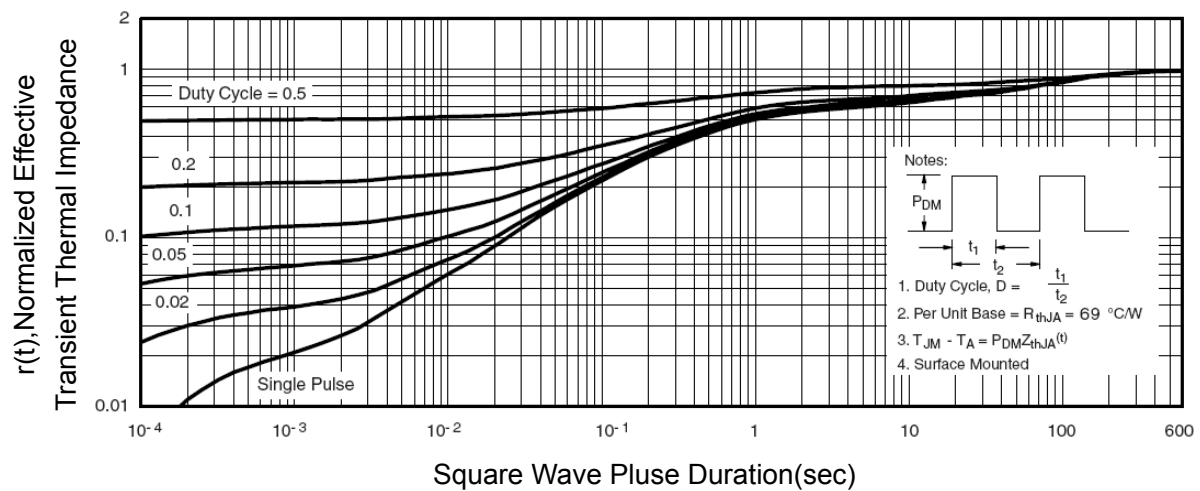
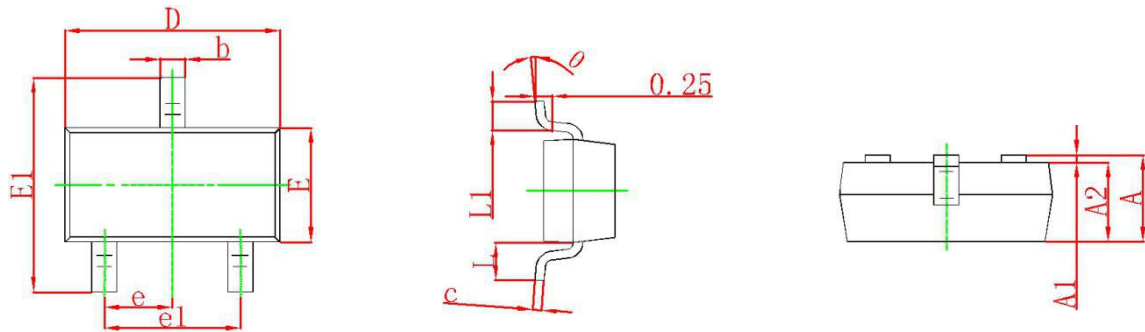


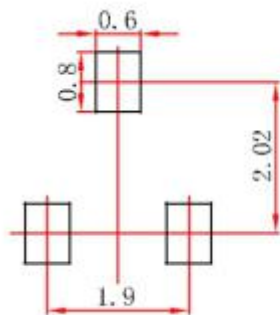
Figure 14 Normalized Maximum Transient Thermal Impedance

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°

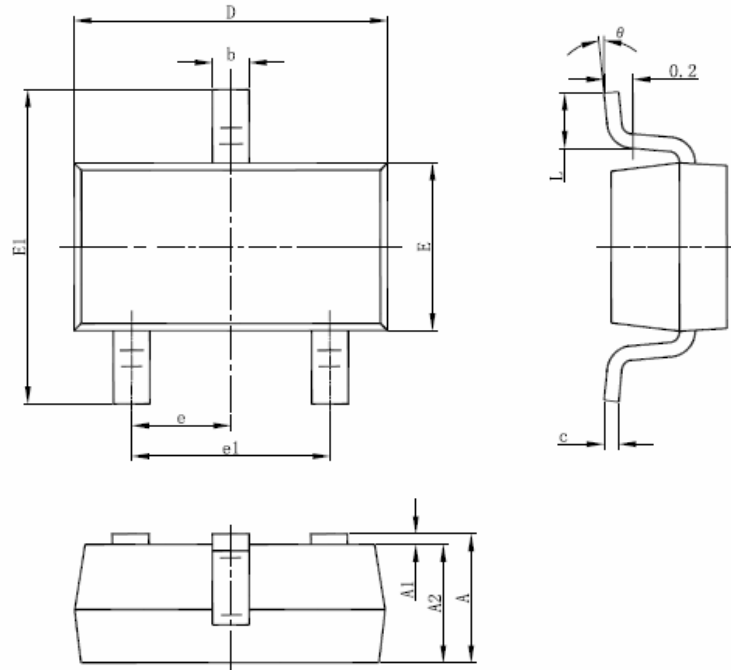
SOT-23 Suggested Pad Layout



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 Information



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
E	1.500	1.700	0.059	0.067
E1	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°

Notes

1. All dimensions are in millimeters.
2. Tolerance $\pm 0.10\text{mm}$ (4 mil) unless otherwise specified
3. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 5 mils.
4. Dimension L is measured in gauge plane.
5. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.