

N-Channel 30 V (D-S) MOSFET

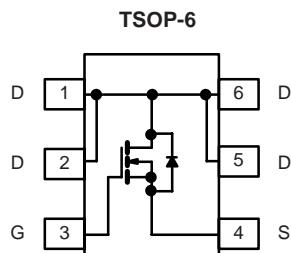
PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^{a, e}	Q_g (Typ.)
30	0.030 at $V_{GS} = 10$ V	6	4.2 nC
	0.040 at $V_{GS} = 4.5$ V	6	

FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- Low On-Resistance
- 100 % R_g Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE



Top View

APPLICATIONS

- DC/DC Converters, High Speed Switching

ABSOLUTE MAXIMUM RATINGS ($T_A = 25$ °C, unless otherwise noted)				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V_{DS}	30	V	
Gate-Source Voltage	V_{GS}	± 20		
Continuous Drain Current ($T_J = 150$ °C)	$I_C = 25$ °C	I_D	A	
	$T_C = 70$ °C			
	$T_A = 25$ °C			
	$T_A = 70$ °C			
Pulsed Drain Current ($t = 300$ μ s)	I_{DM}	25		
Continuous Source-Drain Diode Current	$I_C = 25$ °C	I_S		
	$T_A = 25$ °C			
Maximum Power Dissipation	$T_C = 25$ °C	P_D	W	
	$T_C = 70$ °C			
	$T_A = 25$ °C			
	$T_A = 70$ °C			
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	°C	
Soldering Recommendations (Peak Temperature)		260		

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, d}	$t \leq 5$ s	R_{thJA}	75	°C/W
Maximum Junction-to-Foot (Drain)	Steady State		40	

Notes:

- Based on $T_C = 25$ °C.
- Surface mounted on 1" x 1" FR4 board.
- $t = 5$ s.
- Maximum under steady state conditions is 166 °C/W.
- Package limited.

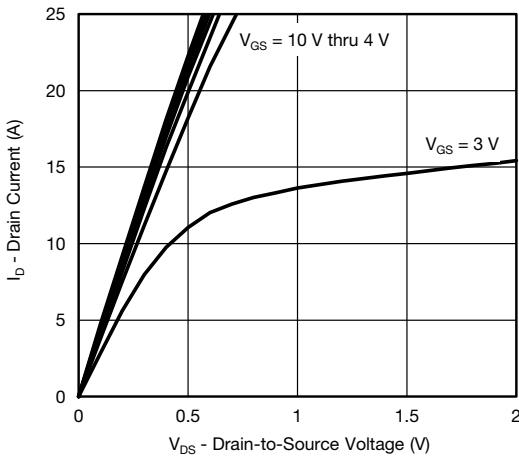
SPECIFICATIONS ($T_J = 25^\circ\text{C}$, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0 \text{ V}$, $I_D = 250 \mu\text{A}$	30			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250 \mu\text{A}$		30		mV/°C
$V_{GS(\text{th})}$ Temperature Coefficient	$\Delta V_{GS(\text{th})}/T_J$			- 4.8		
Gate-Source Threshold Voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}$, $I_D = 250 \mu\text{A}$	0.5		1.5	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0 \text{ V}$, $V_{GS} = \pm 20 \text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 30 \text{ V}$, $V_{GS} = 0 \text{ V}$		1		μA
		$V_{DS} = 30 \text{ V}$, $V_{GS} = 0 \text{ V}$, $T_J = 70^\circ\text{C}$			10	
On-State Drain Current ^a	$I_{D(\text{on})}$	$V_{DS} \leq 5 \text{ V}$, $V_{GS} = 10 \text{ V}$	20			A
Drain-Source On-State Resistance ^a	$R_{DS(\text{on})}$	$V_{GS} = 10 \text{ V}$, $I_D = 5.5 \text{ A}$		0.023	0.030	Ω
		$V_{GS} = 4.5 \text{ V}$, $I_D = 5 \text{ A}$		0.027	0.040	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15 \text{ V}$, $I_D = 5.5 \text{ A}$		24		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 15 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$		424		pF
Output Capacitance	C_{oss}			100		
Reverse Transfer Capacitance	C_{rss}			42		
Total Gate Charge	Q_g	$V_{DS} = 15 \text{ V}$, $V_{GS} = 10 \text{ V}$, $I_D = 5.5 \text{ A}$		8.2	13	nC
Gate-Source Charge	Q_{gs}	$V_{DS} = 15 \text{ V}$, $V_{GS} = 4.5 \text{ V}$, $I_D = 5.5 \text{ A}$		4.2	7	
Gate-Drain Charge	Q_{gd}			1.4		
Gate Resistance	R_g		$f = 1 \text{ MHz}$	2.5	12.6	25.2
Turn-On Delay Time	$t_{d(\text{on})}$	$V_{DD} = 15 \text{ V}$, $R_L = 3.4 \Omega$ $I_D \approx 4.4 \text{ A}$, $V_{GEN} = 4.5 \text{ V}$, $R_g = 1 \Omega$		6	12	ns
Rise Time	t_r			20	30	
Turn-Off Delay Time	$t_{d(\text{off})}$			14	21	
Fall Time	t_f			10	20	
Turn-On Delay Time	$t_{d(\text{on})}$			3	6	
Rise Time	t_r			11	20	
Turn-Off Delay Time	$t_{d(\text{off})}$			20	30	
Fall Time	t_f			7	14	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25^\circ\text{C}$			2.1	A
Pulse Diode Forward Current	I_{SM}				25	
Body Diode Voltage	V_{SD}	$I_S = 4.4 \text{ A}$, $V_{GS} = 0 \text{ V}$		0.82	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 4.4 \text{ A}$, $dl/dt = 100 \text{ A}/\mu\text{s}$, $T_J = 25^\circ\text{C}$		13	20	ns
Body Diode Reverse Recovery Charge	Q_{rr}			6	12	nC
Reverse Recovery Fall Time	t_a			8		ns
Reverse Recovery Rise Time	t_b			5		

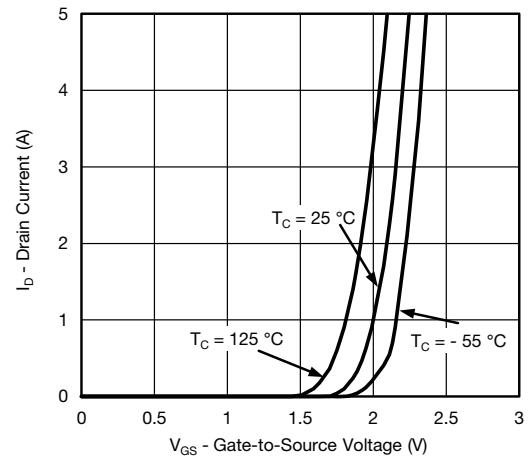
Notes:

a. Pulse test; pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.

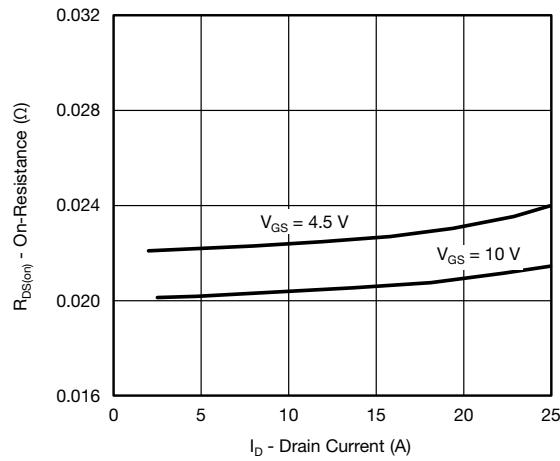
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)


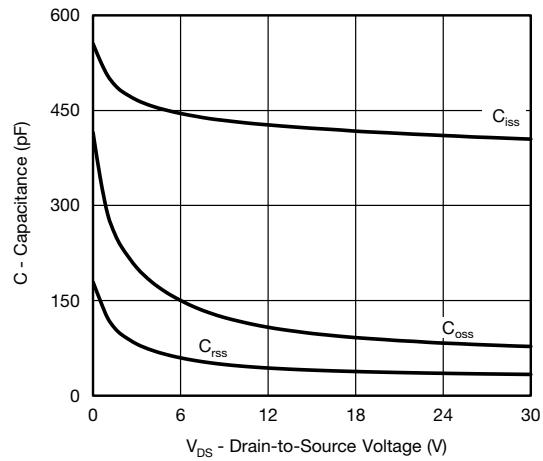
Output Characteristics



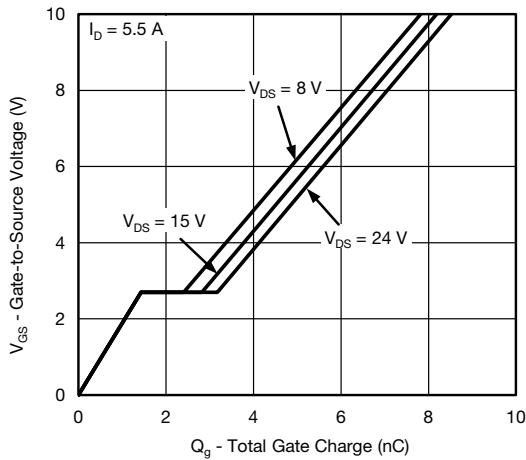
Transfer Characteristics



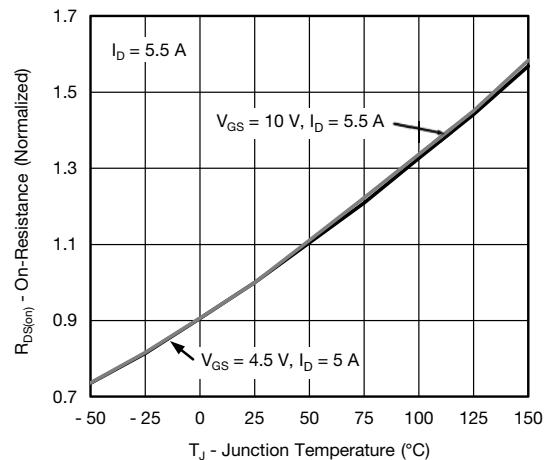
On-Resistance vs. Drain Current and Gate Voltage



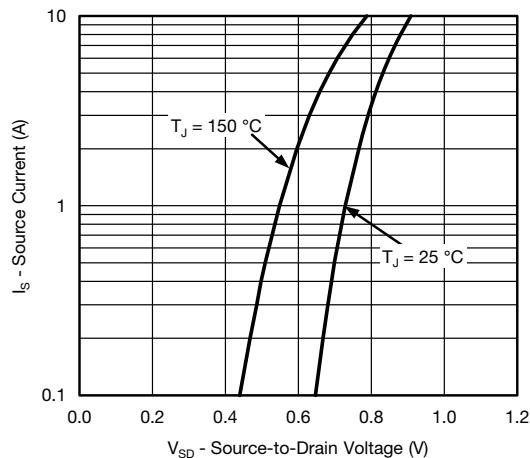
Capacitance



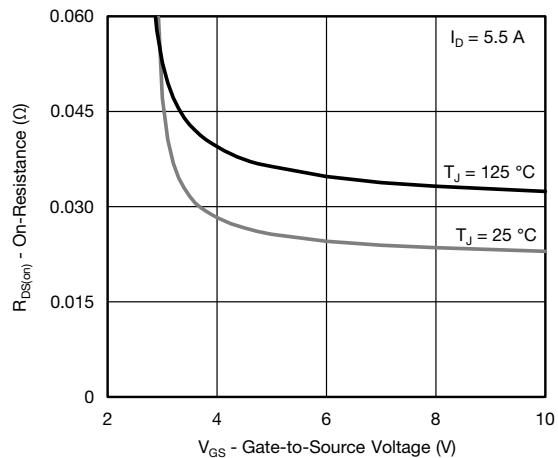
Gate Charge



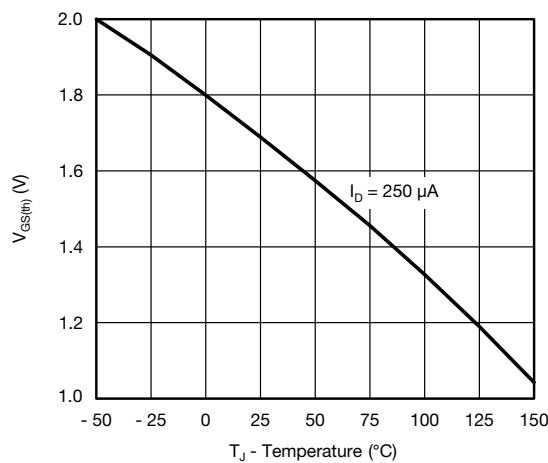
On-Resistance vs. Junction Temperature

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)


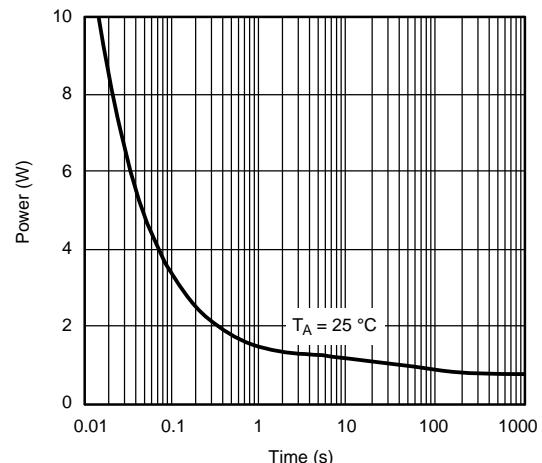
Source-Drain Diode Forward Voltage



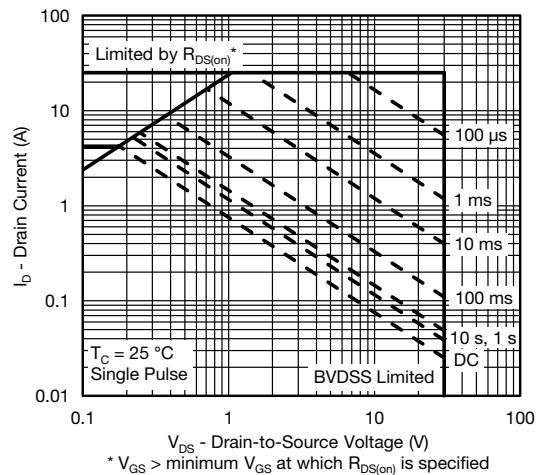
On-Resistance vs. Gate-to-Source Voltage



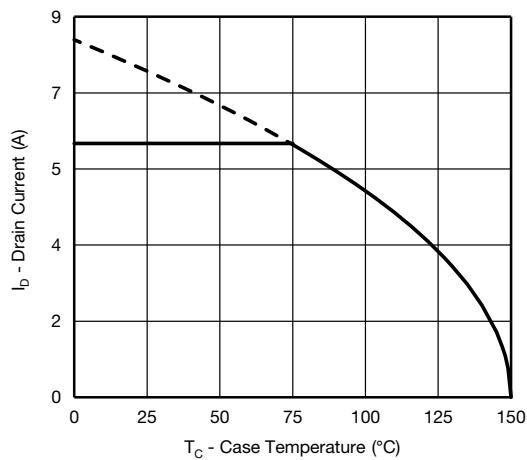
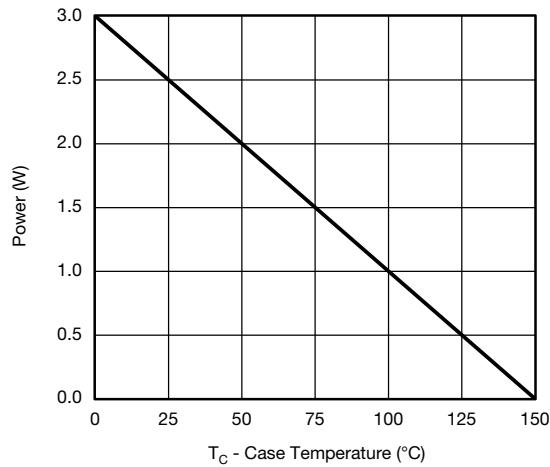
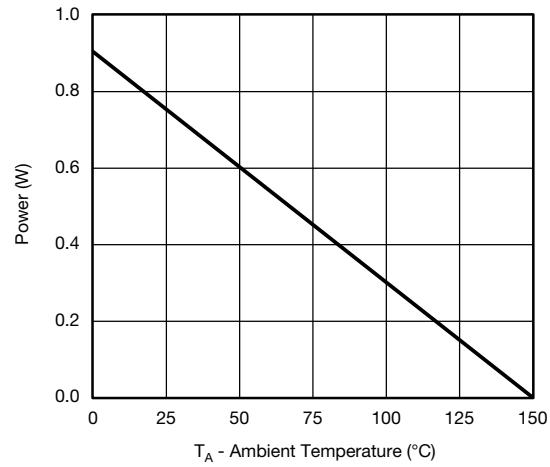
Threshold Voltage



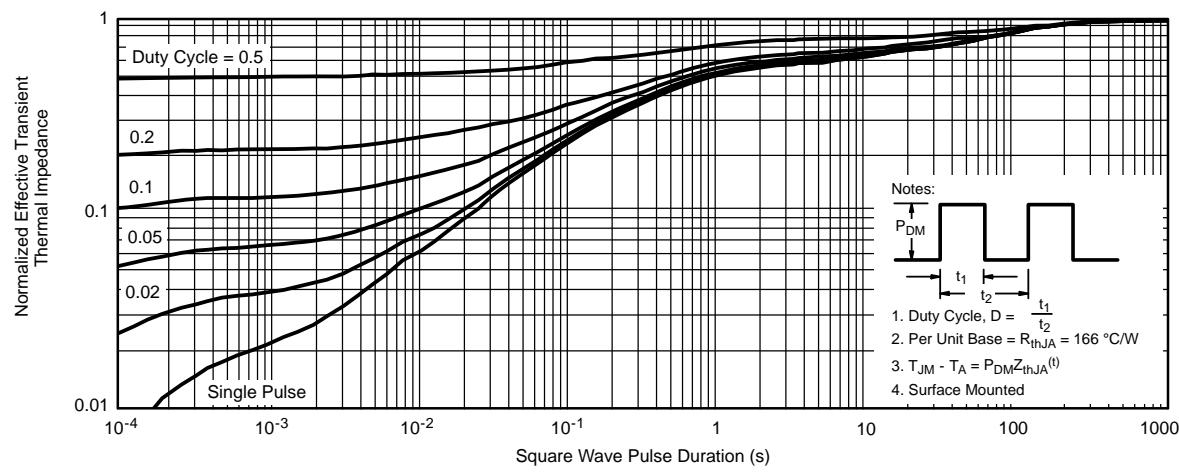
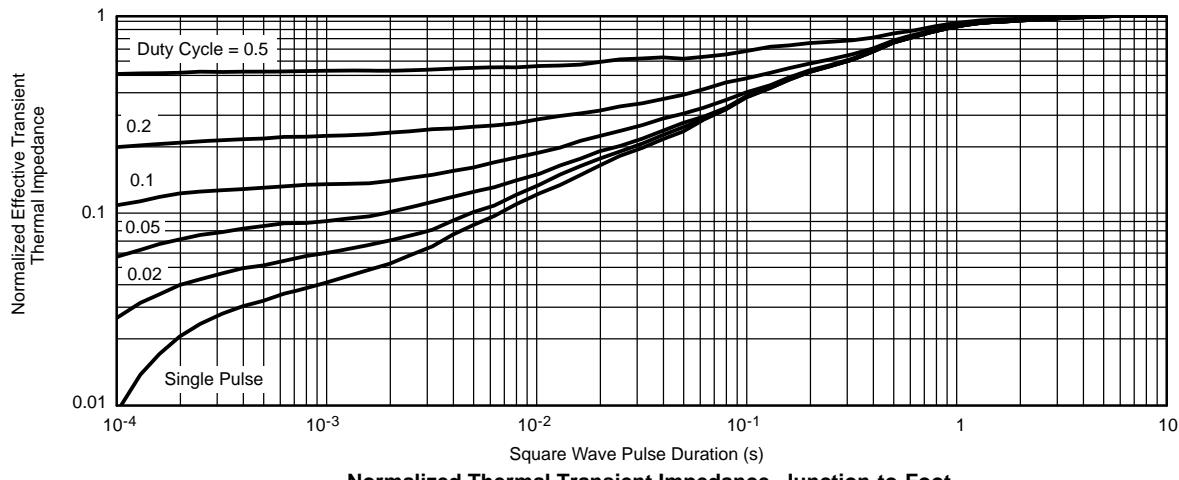
Single Pulse Power (Junction-to-Ambient)



Safe Operating Area, Junction-to-Ambient

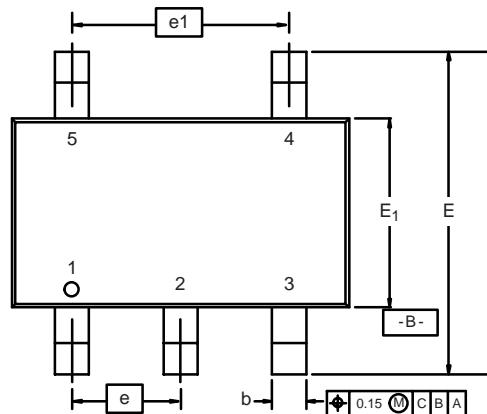
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Current Derating*

Power Derating, Junction-to-Foot

Power Derating, Junction-to-Ambient

* The power dissipation P_D is based on $T_{J(\max.)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

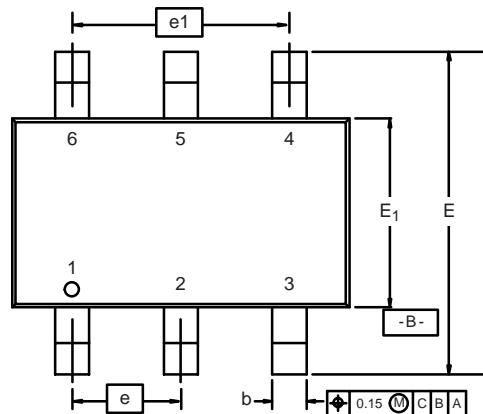
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Normalized Thermal Transient Impedance, Junction-to-Ambient

Normalized Thermal Transient Impedance, Junction-to-Foot

TSOP: 5/6-LEAD

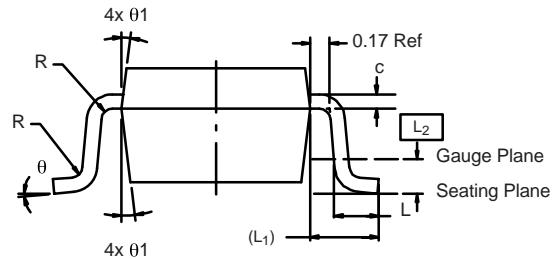
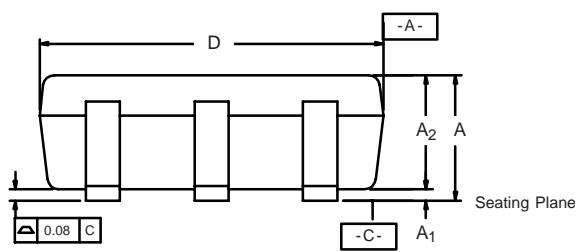
JEDEC Part Number: MO-193C



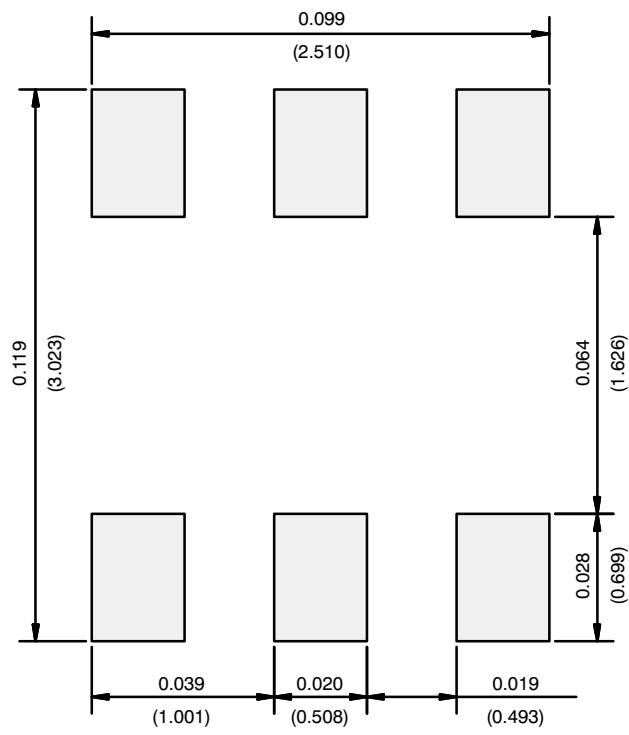
5-LEAD TSOP



6-LEAD TSOP



Dim	MILLIMETERS			INCHES								
	Min	Nom	Max	Min	Nom	Max						
A	0.91	-	1.10	0.036	-	0.043						
A₁	0.01	-	0.10	0.0004	-	0.004						
A₂	0.90	-	1.00	0.035	0.038	0.039						
b	0.30	0.32	0.45	0.012	0.013	0.018						
c	0.10	0.15	0.20	0.004	0.006	0.008						
D	2.95	3.05	3.10	0.116	0.120	0.122						
E	2.70	2.85	2.98	0.106	0.112	0.117						
E₁	1.55	1.65	1.70	0.061	0.065	0.067						
e	0.95 BSC			0.0374 BSC								
e₁	1.80	1.90	2.00	0.071	0.075	0.079						
L	0.32	-	0.50	0.012	-	0.020						
L₁	0.60 Ref			0.024 Ref								
L₂	0.25 BSC			0.010 BSC								
R	0.10	-	-	0.004	-	-						
θ	0°	4°	8°	0°	4°	8°						
θ₁	7° Nom			7° Nom								
ECN: C-06593-Rev. I, 18-Dec-06												
DWG: 5540												

RECOMMENDED MINIMUM PADS FOR TSOP-6

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