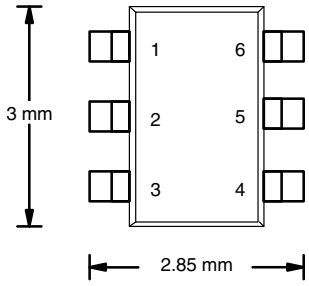
P-Channel 20-V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
- 20	0.0240 at V_{GS} = - 4.5 V	- 8[a]	21 nC
	0.0372 at V_{GS} = - 2.5 V	- 8[a]	

TSOP-6
Top View



Ordering Information:
Si3407DV-T1-E3 (Lead (Pb)-free)
Si3407DV-T1-GE3 (Lead (Pb)-free and Halogen-free)

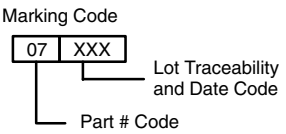
FEATURES

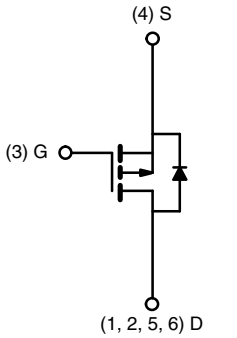
- **Halogen-free According to IEC 61249-2-21 Definition**
- TrenchFET® Power MOSFET
- PWM Optimized
- 100 % R_g Tested
- 100 % UIS Tested
- Compliant to RoHS Directive 2002/95/EC

Pb-free
RoHS COMPLIANT
HALOGEN FREE Available

APPLICATIONS

- Load Switch
  - Notebook PC





P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise noted)				
Parameter		**Symbol**	**Limit**	**Unit**
Drain-Source Voltage		V_{DS}	- 20	V
Gate-Source Voltage		V_{GS}	± 12	
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	- 8[a]	A
	T_C = 70 °C		- 8[a]	
	T_A = 25 °C		- 7.5[b, c]	
	T_A = 70 °C		- 6[b, c]	
Pulsed Drain Current		I_{DM}	- 25	
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	- 3.5	
	T_A = 25 °C		- 1.7[b, c]	
Avalanche Current	L = 0.1 mH	I_{AS}	- 8	
Single Pulse Avalanche Energy		E_{AS}	3.2	mJ
Maximum Power Dissipation	T_C = 25 °C	P_D	4.2	W
	T_C = 70 °C		2.7	
	T_A = 25 °C		2[b, c]	
	T_A = 70 °C		1.3[b, c]	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150	°C

THERMAL RESISTANCE RATINGS					
Parameter		**Symbol**	**Typical**	**Maximum**	**Unit**
Maximum Junction-to-Ambient[b, d]	t ≤ 5 s	R_{thJA}	45	62.5	°C/W
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJF}	25	30	

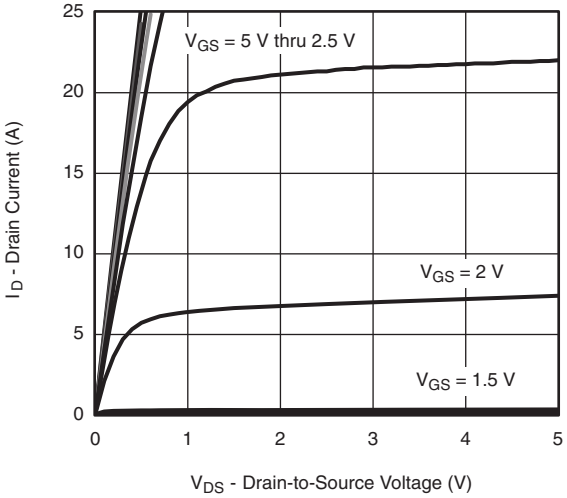
Notes:
a. Package limited.
b. Surface mounted on 1" x 1" FR4 board.
c. t = 5 s.
d. Maximum under steady state conditions is 110 °C/W.

SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = - 250 µA	- 20			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = - 250 µA		-18.7		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			3.7		
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS} , I_D = - 250 µA	- 0.65		- 1.5	V
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 12 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = - 20 V, V_{GS} = 0 V			- 1	µA
		V_{DS} = - 20 V, V_{GS} = 0 V, T_J = 55 °C			- 10	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \leq$ - 5 V, V_{GS} = - 4.5 V	- 25			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = - 4.5 V, I_D = - 7.5 A		0.0200	0.0240	Ω
		V_{GS} = - 2.5 V, I_D = - 6.4 A		0.0310	0.0327	
Forward Transconductance[a]	g_{fs}	V_{DS} = - 10 V, I_D = - 7.5 A		25		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = - 10 V, V_{GS} = 0 V, f = 1 MHz		1670		pF
Output Capacitance	C_{oss}			335		
Reverse Transfer Capacitance	C_{rss}			284		
Total Gate Charge	Q_g	V_{DS} = - 10 V, V_{GS} = - 10 V, I_D = - 7.5 A		42	63	nC
		V_{DS} = - 10 V, V_{GS} = - 4.5 V, I_D = - 7.5 A		21	32	
Gate-Source Charge	Q_{gs}			6		
Gate-Drain Charge	Q_{gd}			5		
Gate Resistance	R_g	f = 1 MHz	1.3	6.5	13	Ω
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = - 10 V, R_L = 1.7 Ω $I_D \cong$ - 6 A, V_{GEN} = - 10 V, R_g = 1 Ω		8	16	ns
Rise Time	t_r			11	17	
Turn-Off Delay Time	$t_{d(off)}$			65	98	
Fall Time	t_f			39	59	
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = - 10 V, R_L = 1.7 Ω $I_D \cong$ - 6 A, V_{GEN} = - 4.5 V, R_g = 1 Ω		32	48	
Rise Time	t_r			62	93	
Turn-Off Delay Time	$t_{d(off)}$			53	80	
Fall Time	t_f			38	57	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C			- 3.5	A
Pulse Diode Forward Current[a]	I_{SM}				- 25	
Body Diode Voltage	V_{SD}	I_S = - 6 A		- 0.8	- 1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 6 A, dI/dt = 100 A/µs, T_J = 25 °C		37	56	ns
Body Diode Reverse Recovery Charge	Q_{rr}			22	33	nC
Reverse Recovery Fall Time	t_a			12		ns
Reverse Recovery Rise Time	t_b			25		

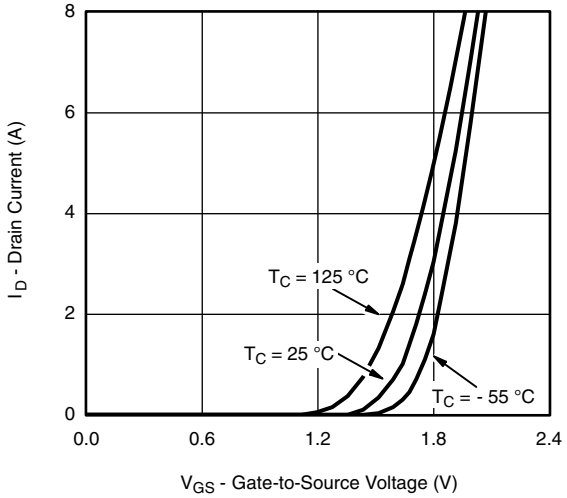
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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.

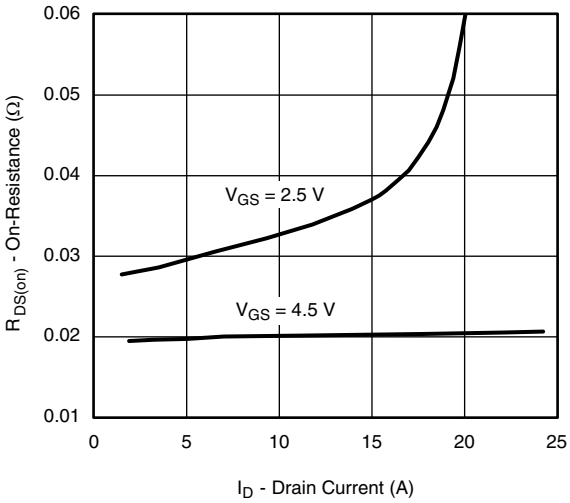
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



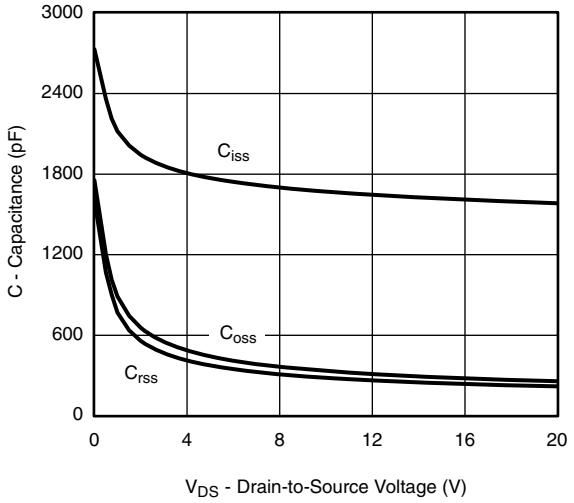
Output Characteristics



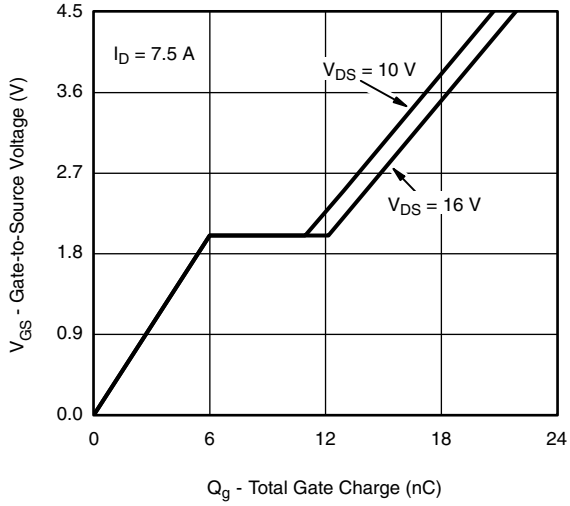
Transfer Characteristics



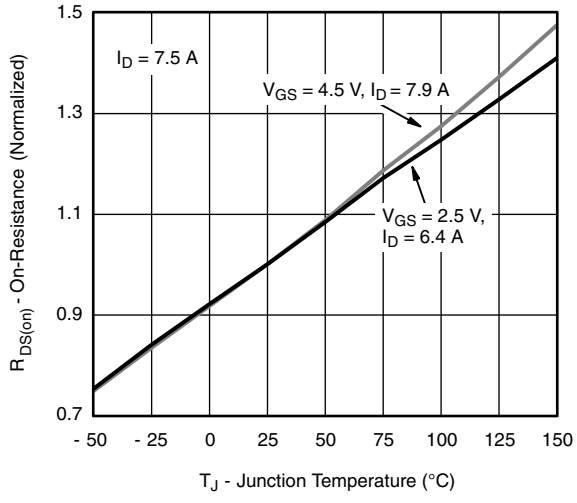
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

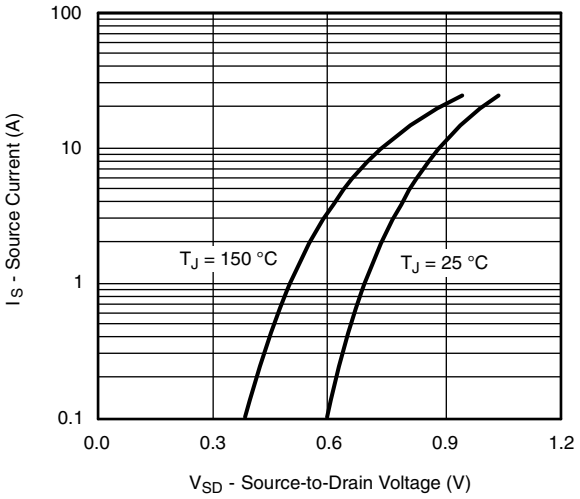


Gate Charge

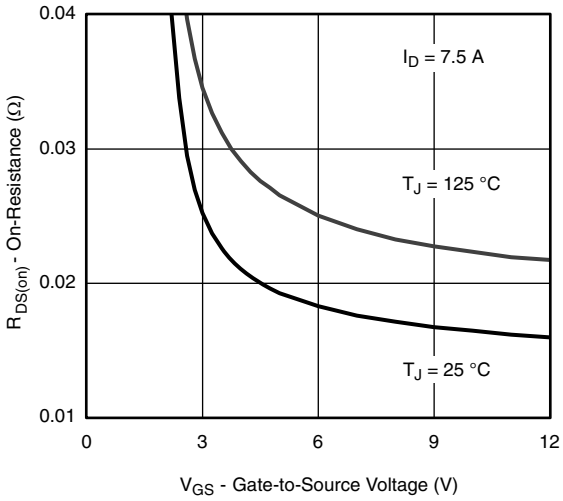


On-Resistance vs. Junction Temperature

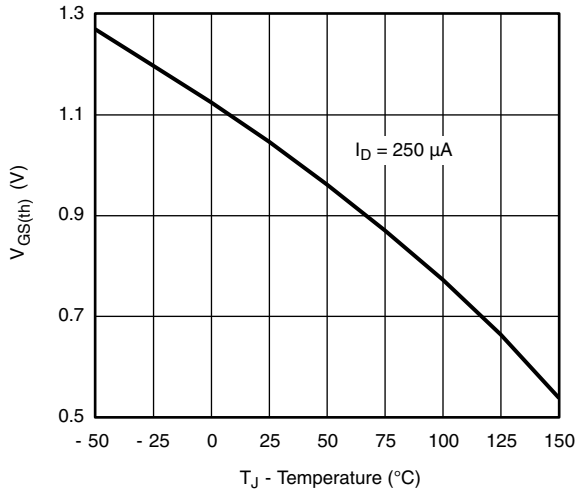
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



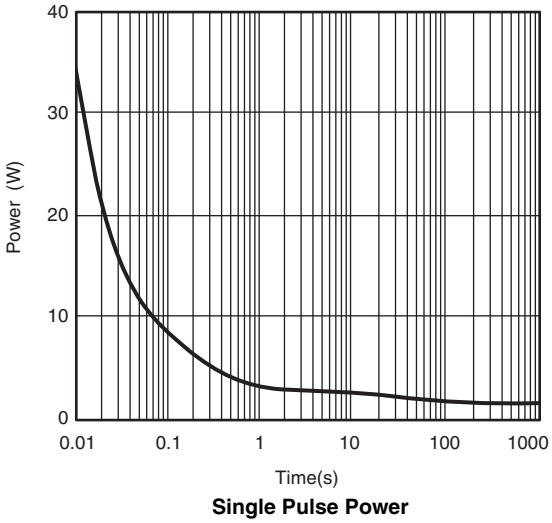
Source-Drain Diode Forward Voltage



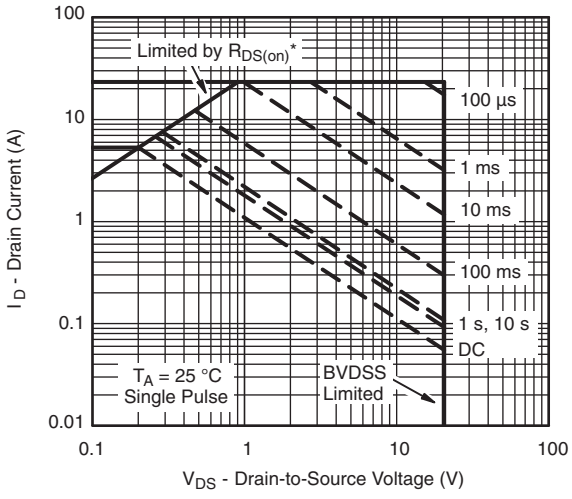
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



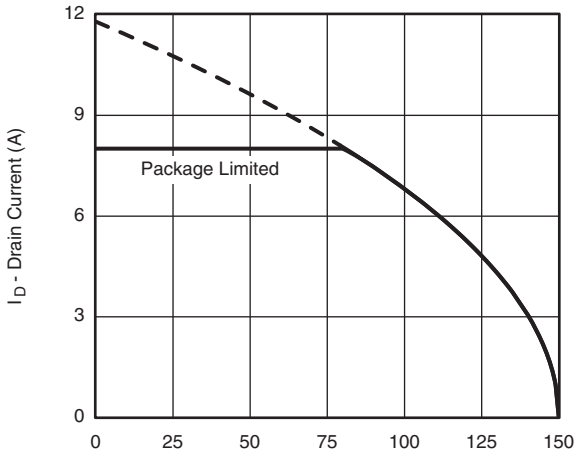
Single Pulse Power



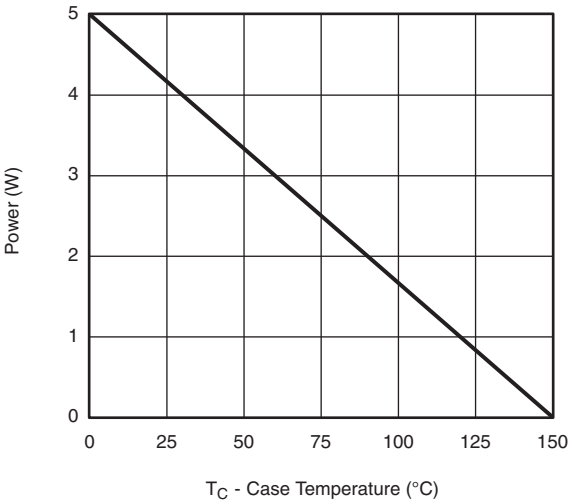
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

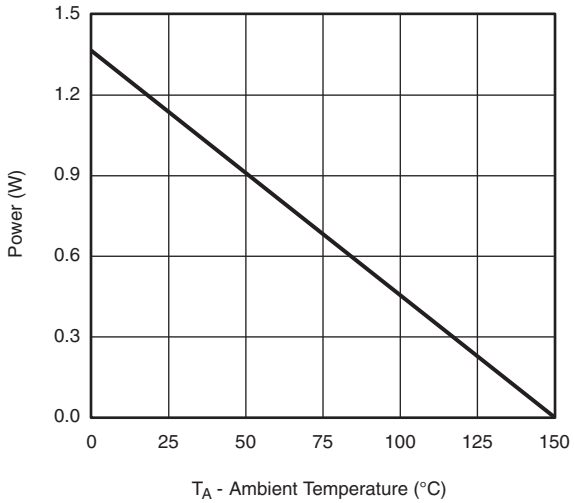
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating*



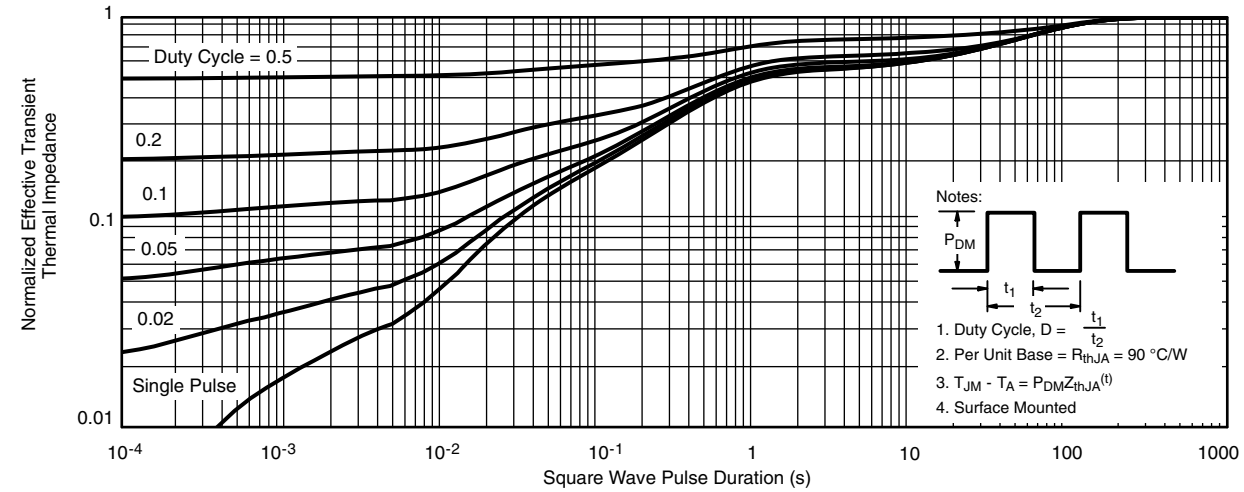
Power Derating, Junction-to-Foot



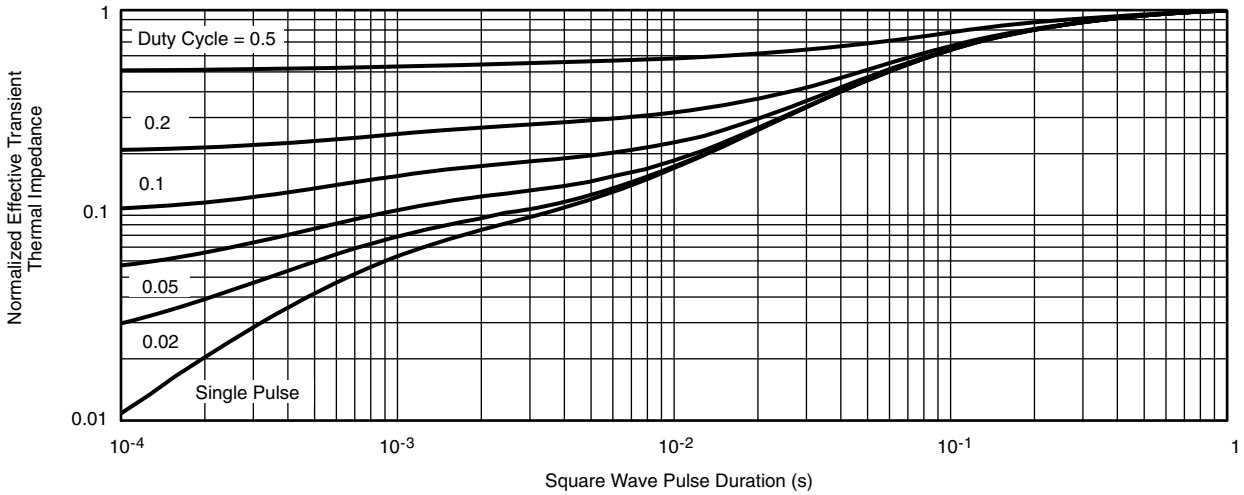
Power Derating, Junction-to-Ambient

* 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

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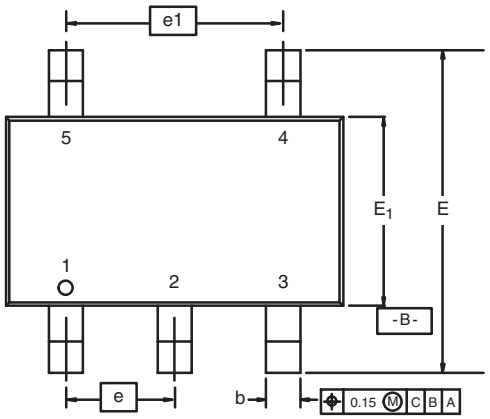
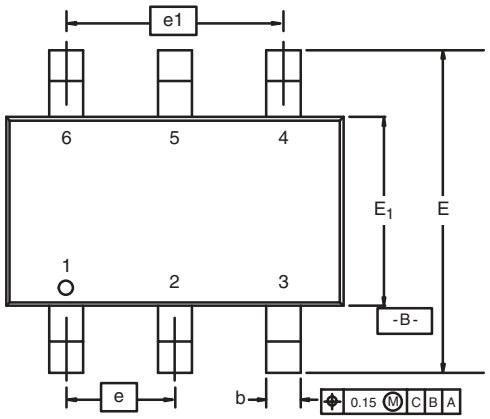
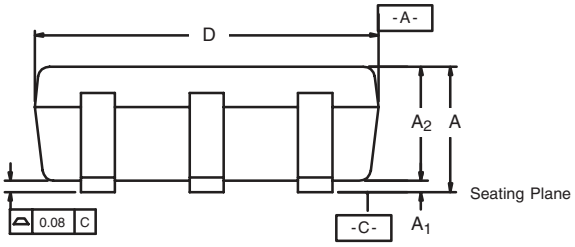
TSOP: 5/6–LEAD
JEDEC Part Number: MO-193C

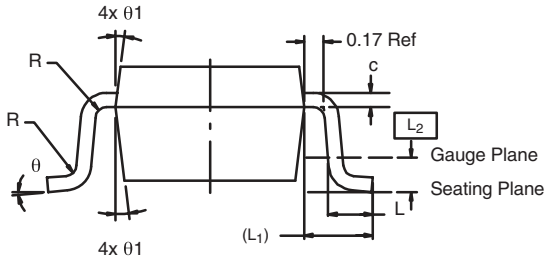


5-LEAD TSOP



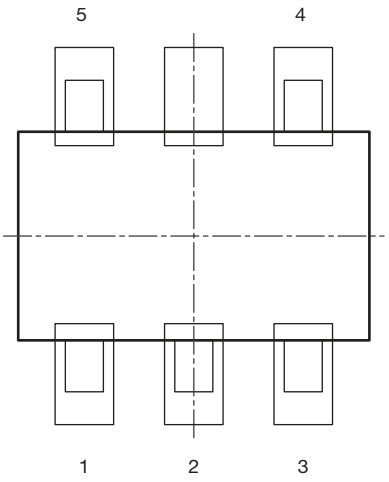
6-LEAD TSOP



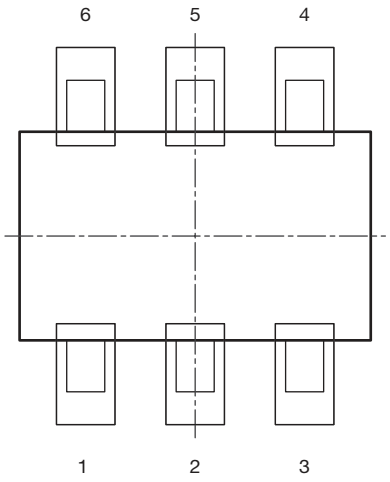


Dim	MILLIMETERS			INCHES		
	Min	Nom	Max	Min	Nom	Max
A	0.91	-	1.10	0.036	-	0.043
A_1	0.01	-	0.10	0.0004	-	0.004
A_2	0.90	-	1.00	0.035	0.038	0.039
b	0.30	0.32	0.45	0.012	0.013	0.018
c	0.10	0.15	0.20	0.004	0.006	0.008
D	2.95	3.05	3.10	0.116	0.120	0.122
E	2.70	2.85	2.98	0.106	0.112	0.117
E_1	1.55	1.65	1.70	0.061	0.065	0.067
e	0.95 BSC			0.0374 BSC		
e_1	1.80	1.90	2.00	0.071	0.075	0.079
L	0.32	-	0.50	0.012	-	0.020
L_1	0.60 Ref			0.024 Ref		
L_2	0.25 BSC			0.010 BSC		
R	0.10	-	-	0.004	-	-
θ	0°	4°	8°	0°	4°	8°
θ_1	7° Nom			7° Nom		
ECN: C-06593-Rev. I, 18-Dec-06 DWG: 5540						

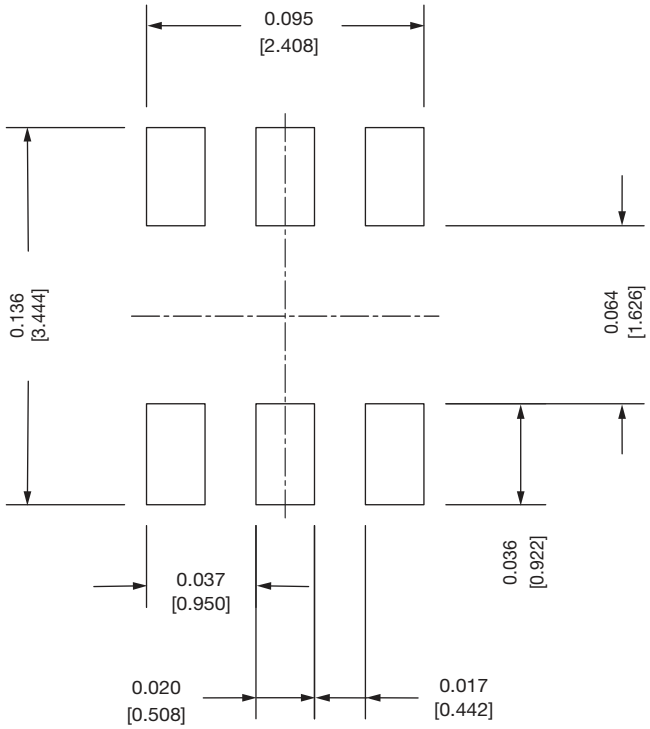
Recommended Land Pattern For TSOP-5L / TSOP-6L



TSOP 5L



TSOP 6L



Note

- All dimensions are in inches (millimeter)

ECN: C22-0860-Rev. B, 24-Oct-2022 DWG: 3010

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