Automotive N-Channel 20 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	20
$R_{DS(on)}$ (Ω) at V_{GS} = 4.5 V	0.030
$R_{DS(on)}$ (Ω) at V_{GS} = 2.5 V	0.034
$R_{DS(on)}$ (Ω) at V_{GS} = 1.8 V	0.038
I_D (A)	8
Configuration	Single

FEATURES

- **Halogen-free According to IEC 61249-2-21 Definition**
- TrenchFET® Power MOSFET
- AEC-Q101 Qualified[d]
- 100 % R_g and UIS Tested
- Compliant to RoHS Directive 2002/95/EC

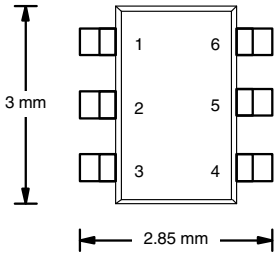
AUTOMOTIVE GRADE

Pb-free

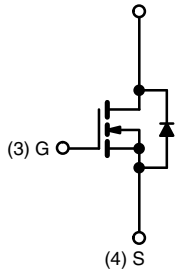
RoHS COMPLIANT

HALOGEN FREE

TSOP-6
Top View



Marking Code: 8Jxxx



N-Channel MOSFET

ORDERING INFORMATION	
Package	TSOP-6
Lead (Pb)-free and Halogen-free	SQ3460EV-T1-GE3

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise noted)

PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	± 8	
Continuous Drain Current	T_C = 25 °C[a]	I_D	8	A
	T_C = 125 °C		4.8	
Continuous Source Current (Diode Conduction)		I_S	4.6	
Pulsed Drain Current[b]		I_{DM}	32	
Single Pulse Avalanche Current	L = 0.1 mH	I_{AS}	10	
Single Pulse Avalanche Energy		E_{AS}	5	mJ
Maximum Power Dissipation[b]	T_C = 25 °C	P_D	3.6	W
	T_C = 125 °C		1.2	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to + 175	°C

THERMAL RESISTANCE RATINGS

PARAMETER		SYMBOL	LIMIT	UNIT
Junction-to-Ambient	PCB Mount[c]	R_{thJA}	110	°C/W
Junction-to-Foot (Drain)		R_{thJF}	41	

Notes

a. Package limited.
b. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
c. When mounted on 1" square PCB (FR-4 material).
d. Parametric verification ongoing.

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SPECIFICATIONS (T_C = 25 °C, unless otherwise noted)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNIT**
Static							
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0, I_D = 250 µA		20	-	-	V
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA		0.4	0.6	1.0	
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 8 V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V	V_{DS} = 20 V	-	-	1	µA
		V_{GS} = 0 V	V_{DS} = 20 V, T_J = 125 °C	-	-	50	
		V_{GS} = 0 V	V_{DS} = 20 V, T_J = 175 °C	-	-	150	
On-State Drain Current[a]	$I_{D(on)}$	V_{GS} = 4.5 V	V_{DS} ≥ 5 V	10	-	-	A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 4.5 V	I_D = 5.1 A	-	0.025	0.030	Ω
		V_{GS} = 4.5 V	I_D = 5.1 A, T_J = 125 °C	-	-	0.045	
		V_{GS} = 4.5 V	I_D = 5.1 A, T_J = 175 °C	-	-	0.053	
		V_{GS} = 2.5 V	I_D = 4.7 A	-	0.027	0.034	
		V_{GS} = 1.8 V	I_D = 2.5 A	-	0.031	0.038	
Forward Transconductance[b]	g_{fs}	V_{DS} = 15 V, I_D = 5.1 A		-	28	-	S
Dynamic[b]							
Input Capacitance	C_{iss}	V_{GS} = 0 V	V_{DS} = 10 V, f = 1 MHz	-	848	1060	pF
Output Capacitance	C_{oss}			-	117	146	
Reverse Transfer Capacitance	C_{rss}			-	68	85	
Total Gate Charge[c]	Q_g	V_{GS} = 4.5 V	V_{DS} = 10 V, I_D = 5.1 A	-	9.3	14	nC
Gate-Source Charge[c]	Q_{gs}			-	1.1	-	
Gate-Drain Charge[c]	Q_{gd}			-	1.4	-	
Gate Resistance	R_g	f = 1 MHz		6.2	12.4	18.6	Ω
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = 10 V, R_L = 10 Ω I_D ≅ 1 A, V_{GEN} = 4.5 V, R_g = 1 Ω		-	8	12	ns
Rise Time[c]	t_r			-	8	12	
Turn-Off Delay Time[c]	$t_{d(off)}$			-	21	32	
Fall Time[c]	t_f			-	8	12	
Source-Drain Diode Ratings and Characteristics[b]							
Pulsed Current[a]	I_{SM}			-	-	32	A
Forward Voltage	V_{SD}	I_F = 5 A, V_{GS} = 0		-	0.77	1.2	V

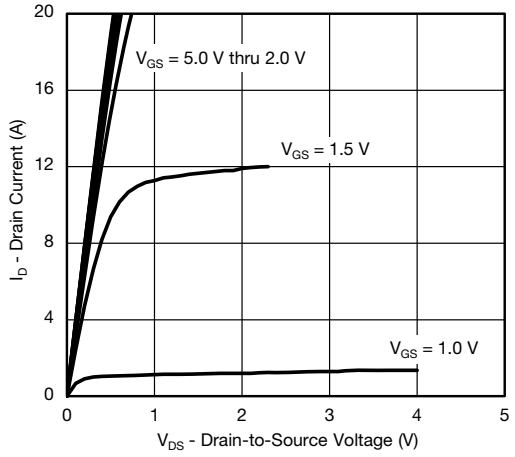
Notes

a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

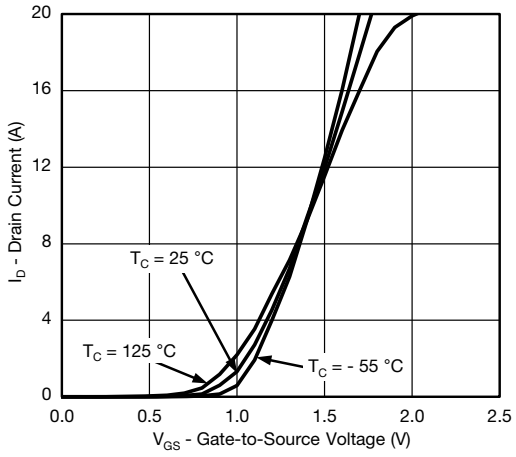
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

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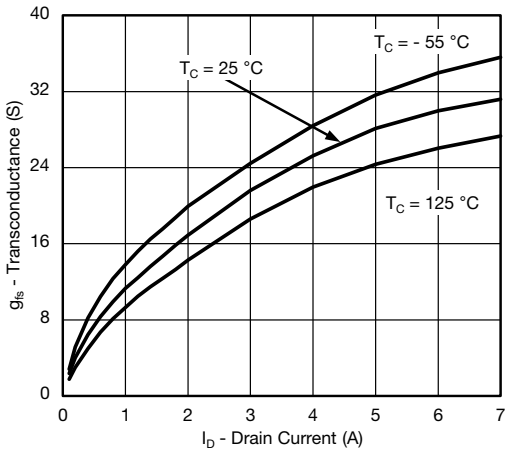
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



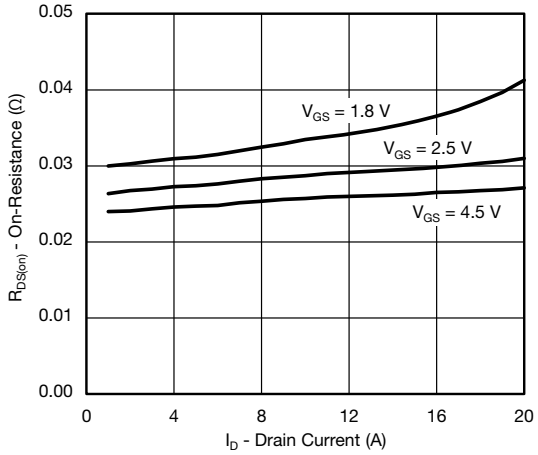
Output Characteristics



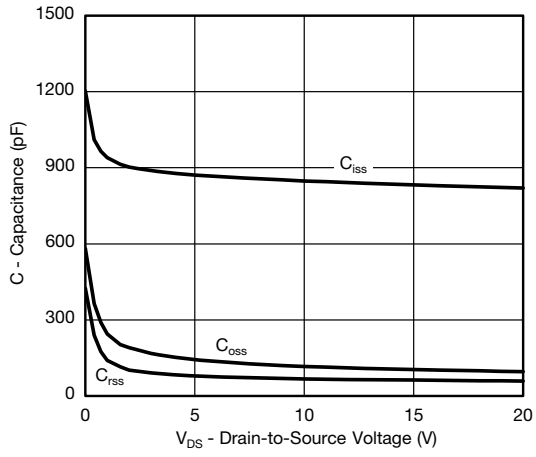
Transfer Characteristics



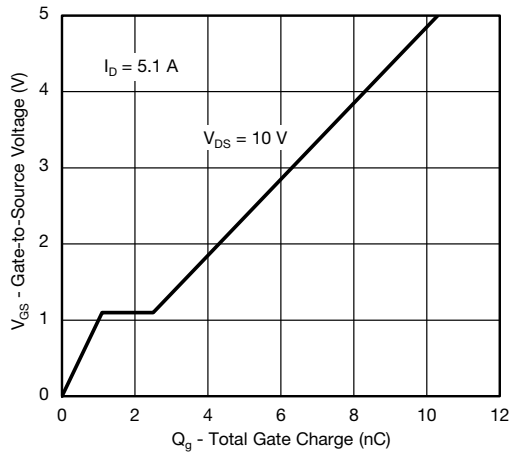
Transconductance



On-Resistance vs. Drain Current



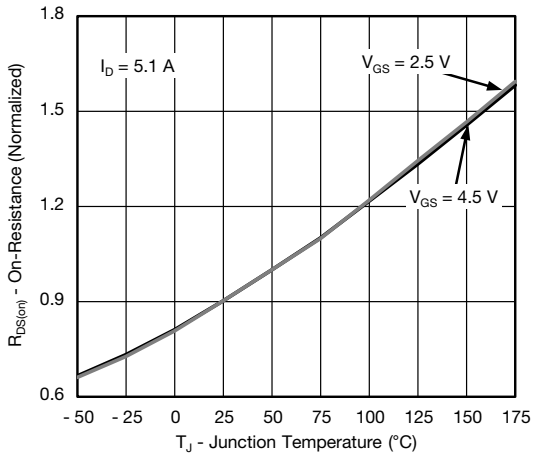
Capacitance



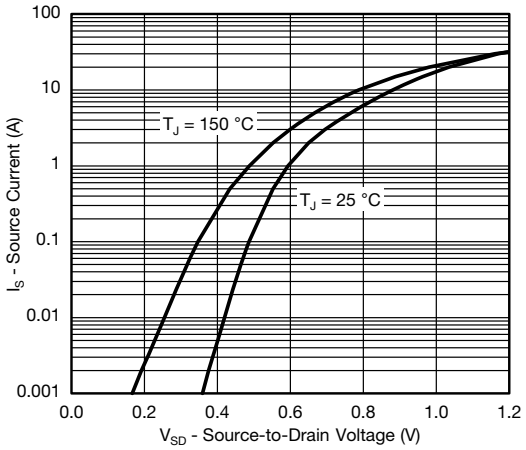
Gate Charge

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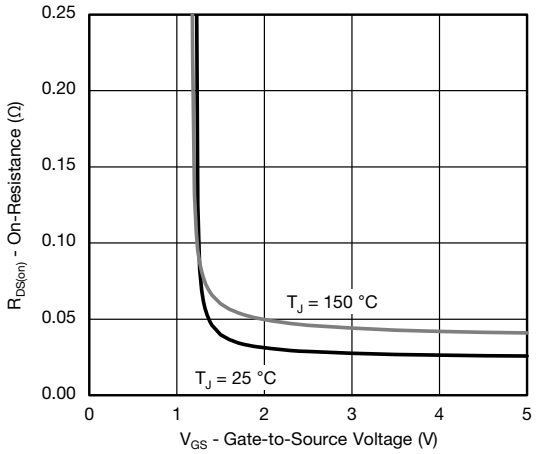
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



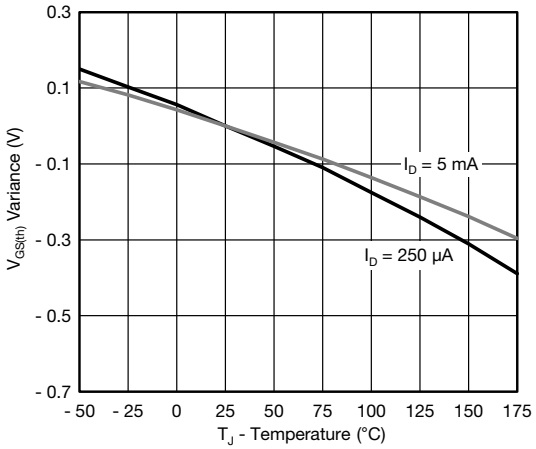
On-Resistance vs. Junction Temperature



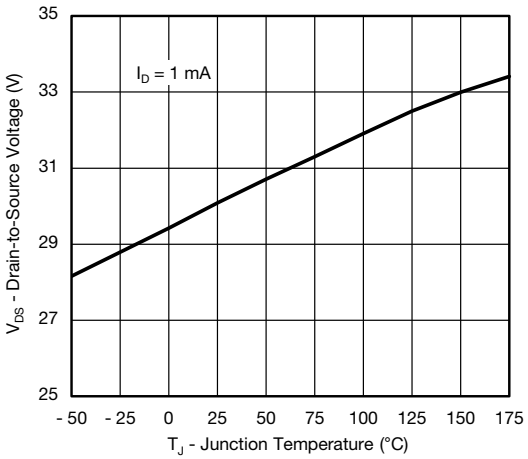
Source Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



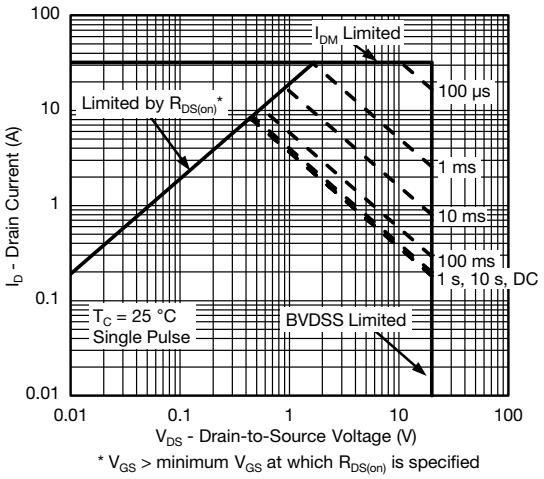
Threshold Voltage



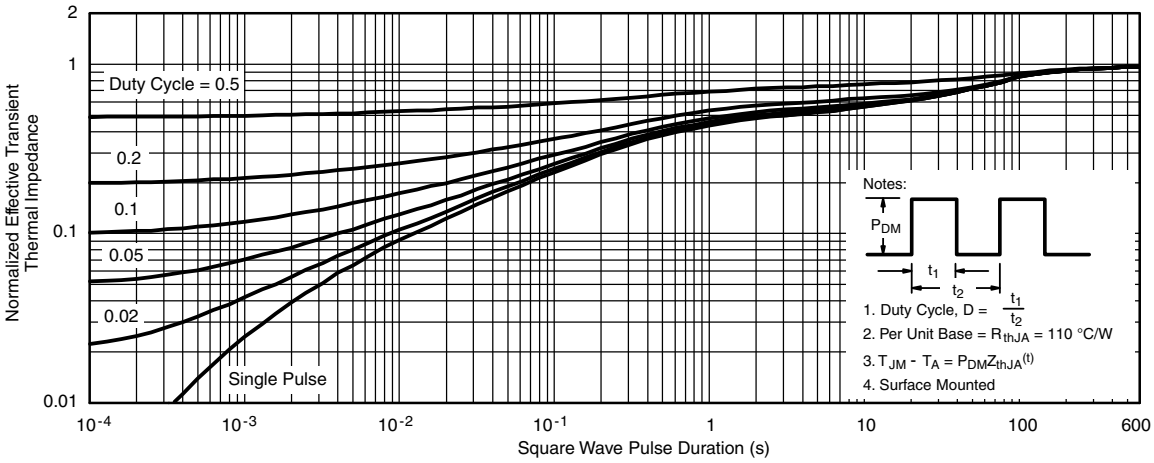
Drain Source Breakdown vs. Junction Temperature

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THERMAL RATINGS (T_A = 25 °C, unless otherwise noted)



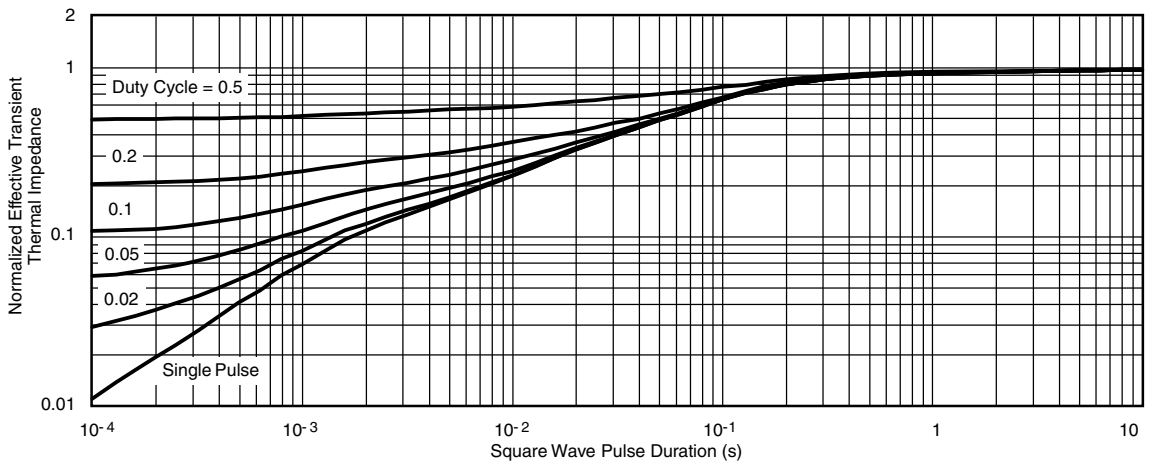
Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

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THERMAL RATINGS (T_A = 25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Foot

Note

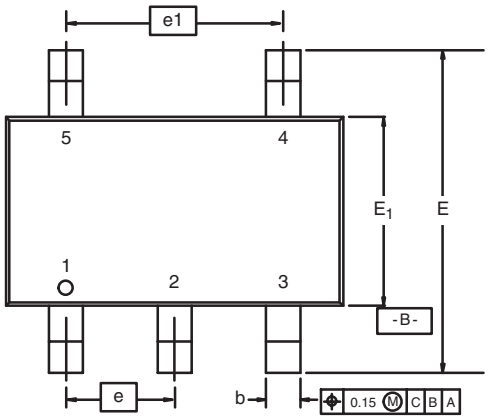
- The characteristics shown in the two graphs
  - Normalized Transient Thermal Impedance Junction-to-Ambient (25 °C)
  - Normalized Transient Thermal Impedance Junction-to-Foot (25 °C)

  are given for general guidelines only to enable the user to get a “ball park” indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

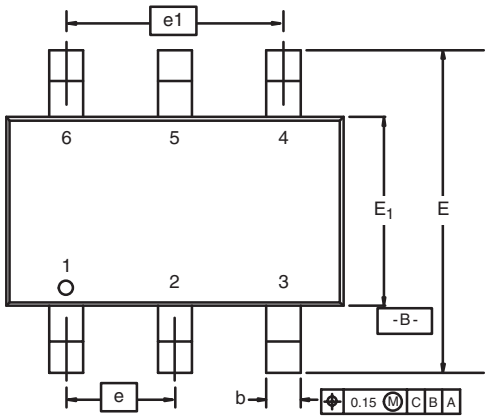
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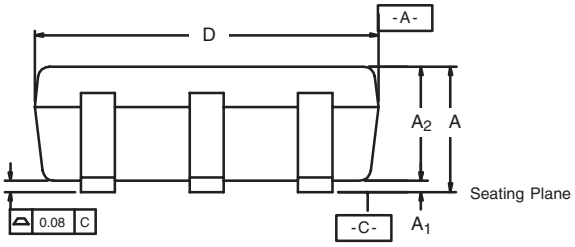
TSOP: 5/6–LEAD
JEDEC Part Number: MO-193C

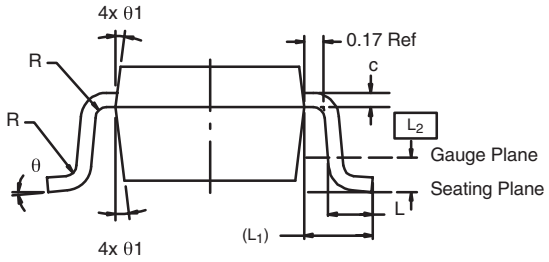


5-LEAD TSOP



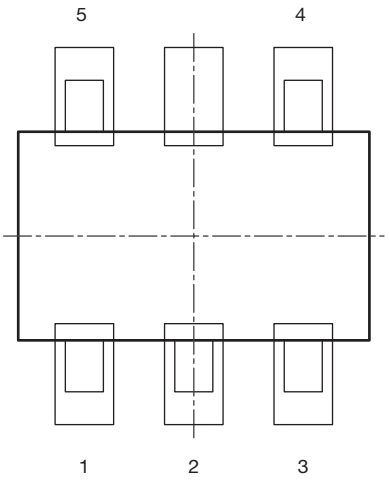
6-LEAD TSOP



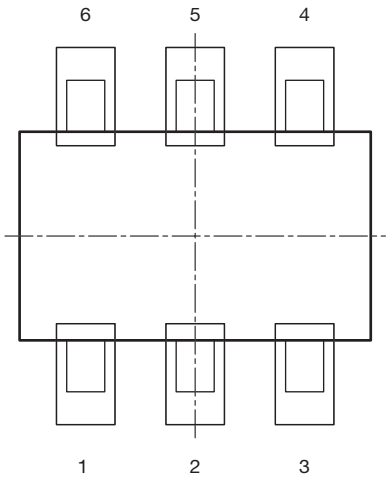


Dim	MILLIMETERS			INCHES		
	Min	Nom	Max	Min	Nom	Max
A	0.91	-	1.10	0.036	-	0.043
A_1	0.01	-	0.10	0.0004	-	0.004
A_2	0.90	-	1.00	0.035	0.038	0.039
b	0.30	0.32	0.45	0.012	0.013	0.018
c	0.10	0.15	0.20	0.004	0.006	0.008
D	2.95	3.05	3.10	0.116	0.120	0.122
E	2.70	2.85	2.98	0.106	0.112	0.117
E_1	1.55	1.65	1.70	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						

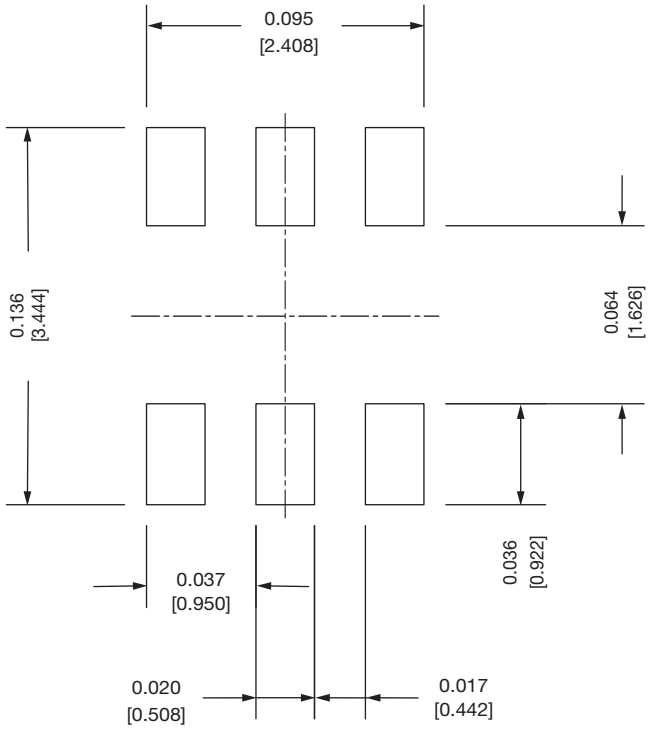
Recommended Land Pattern For TSOP-5L / TSOP-6L



TSOP 5L



TSOP 6L



Note

- All dimensions are in inches (millimeter)

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

For technical questions, contact: pmostechsupport@vishay.com

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