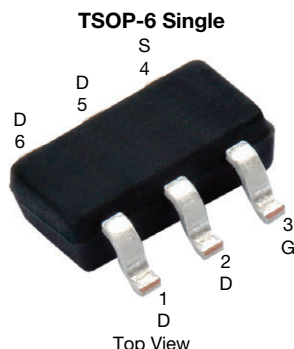


Automotive P-Channel 40 V (D-S) 175 °C MOSFET



Marking Code: 8W

PRODUCT SUMMARY	
V_{DS} (V)	-40
$R_{DS(on)}$ (Ω) at $V_{GS} = -10$ V	0.061
$R_{DS(on)}$ (Ω) at $V_{GS} = -4.5$ V	0.093
I_D (A)	-6.9
Configuration	Single

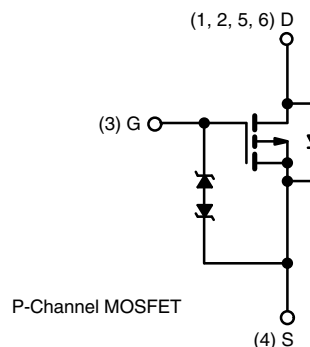
FEATURES

- TrenchFET® power MOSFET
- AEC-Q101 qualified °
- 100 % R_g and UIS tested
- Typical ESD protection 800 V
- Material categorization:
for definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE
GRADE



RoHS
COMPLIANT
HALOGEN
FREE



ORDERING INFORMATION	
Package	TSOP-6
Lead (Pb)-free and halogen-free	SQ3419AEEV (for detailed order number please see www.vishay.com/doc?79771)

ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-source voltage		V _{DS}	-40	V
Gate-source voltage		V _{GS}	± 12	
Continuous drain current	T _C = 25 °C	I _D	-6.9	A
	T _C = 125 °C		-4	
Continuous source current (diode conduction)		I _S	-6.3	
Pulsed drain current		I _{DM}	-27	
Single pulse avalanche current	L = 0.1 mH	I _{AS}	-18	
Single pulse avalanche energy		E _{AS}	16.7	mJ
Maximum power dissipation ^a	T _C = 25 °C	P _D	5	W
	T _C = 125 °C		1.6	
Operating junction and storage temperature range		T _J , T _{sta}	-55 to +175	°C

THERMAL RESISTANCE RATINGS				
PARAMETER		SYMBOL	LIMIT	UNIT
Junction to ambient	PCB mount ^b	R_{thJA}	110	°C/W
Junction to case (drain)		R_{thJF}	30	

Notes

- Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %.
- When mounted on 1" square PCB (FR4 material).
- Parametric verification ongoing.



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 V, I _D = -250 μA		-40	-	-	V
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250 μA		-1.5	-2.0	-2.5	
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 12 V		-	-	± 2	μA
		V _{DS} = 0 V, V _{GS} = ± 20 V		-	-	± 30	mA
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V	V _{DS} = -40 V	-	-	-1	μA
		V _{GS} = 0 V	V _{DS} = -40 V, T _J = 125 °C	-	-	-50	
		V _{GS} = 0 V	V _{DS} = -40 V, T _J = 175 °C	-	-	-150	
On-State Drain Current ^a	I _{D(on)}	V _{GS} = -10 V	V _{DS} = -5 V	-10	-	-	A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = -10 V	I _D = -2.5 A	-	0.048	0.061	Ω
		V _{GS} = -10 V	I _D = -2.5 A, T _J = 125 °C	-	0.070	-	
		V _{GS} = -10 V	I _D = -2.5 A, T _J = 175 °C	-	0.081	-	
		V _{GS} = -4.5 V	I _D = -2 A	-	0.077	0.093	
Forward Transconductance ^b	g _{fs}	V _{DS} = -15 V, I _D = -4 A		-	10	-	S
Dynamic ^b							
Input Capacitance	C _{iss}	V _{GS} = 0 V	V _{DS} = -20 V, f = 1 MHz	-	733	975	pF
Output Capacitance	C _{oss}			-	130	175	
Reverse Transfer Capacitance	C _{rss}			-	84	115	
Total Gate Charge ^c	Q _g	V _{GS} = -4.5 V	V _{DS} = -20 V, I _D = -4 A	-	8.4	12.5	nC
Gate-Source Charge ^c	Q _{gs}			-	2.4	-	
Gate-Drain Charge ^c	Q _{gd}			-	4.1	-	
Gate Resistance	R _g	f = 1 MHz		2.6	5.3	7.9	Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = -20 V, R _L = 5 Ω I _D ≅ -4 A, V _{GEN} = -10 V, R _g = 1 Ω		-	9	12	ns
Rise Time ^c	t _r			-	24	32	
Turn-Off Delay Time ^c	t _{d(off)}			-	26	34	
Fall Time ^c	t _f			-	31	41	
Source-Drain Diode Ratings and Characteristics ^b							
Pulsed Current ^a	I _{SM}			-	-	-27	A
Forward Voltage	V _{SD}	I _F = -1.6 A, V _{GS} = 0 V		-	-0.75	-1.1	V

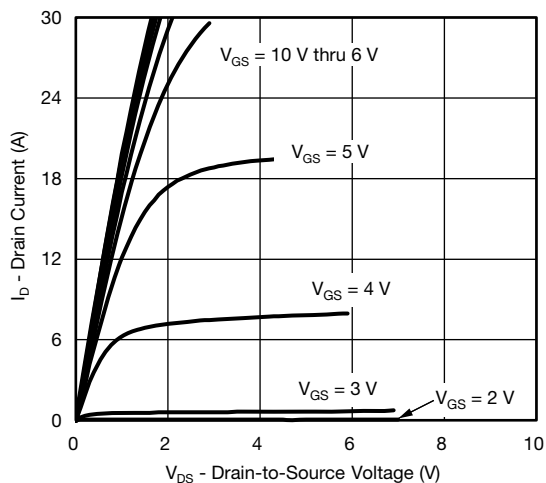
Notes

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

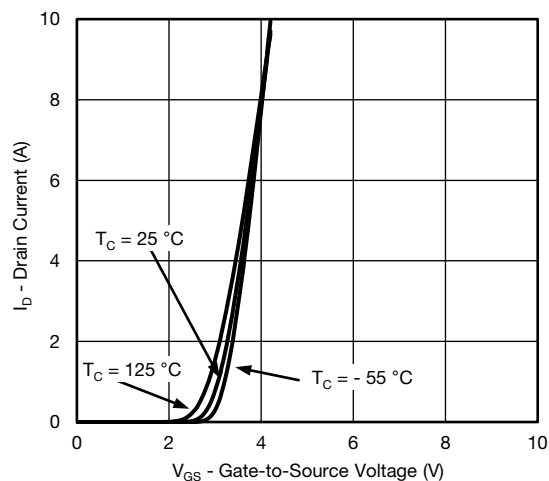
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



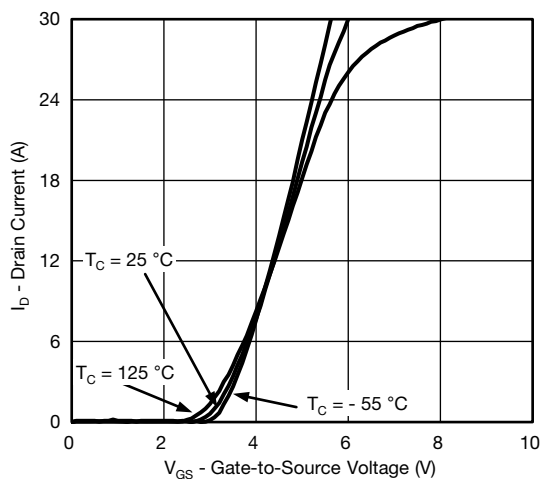
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise noted)



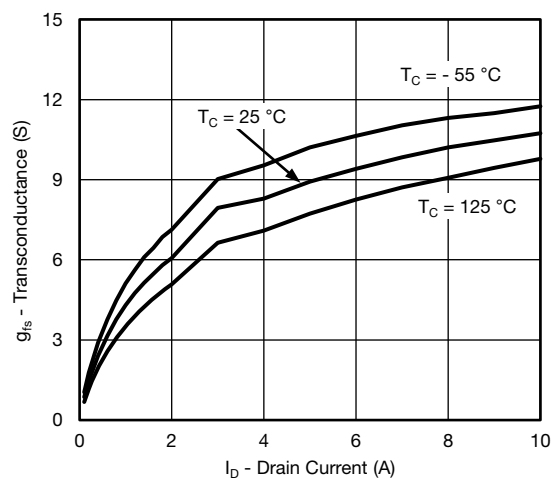
Output Characteristics



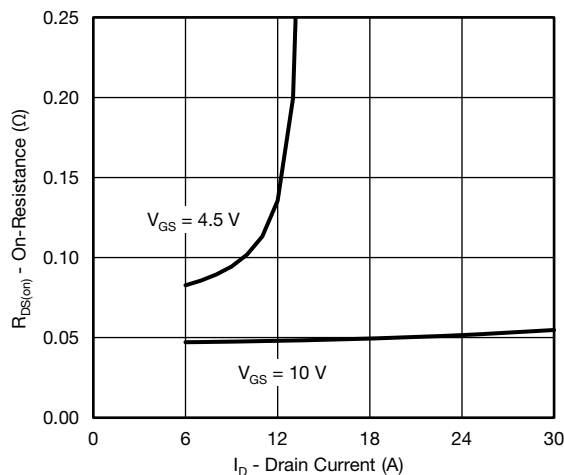
Transfer Characteristics



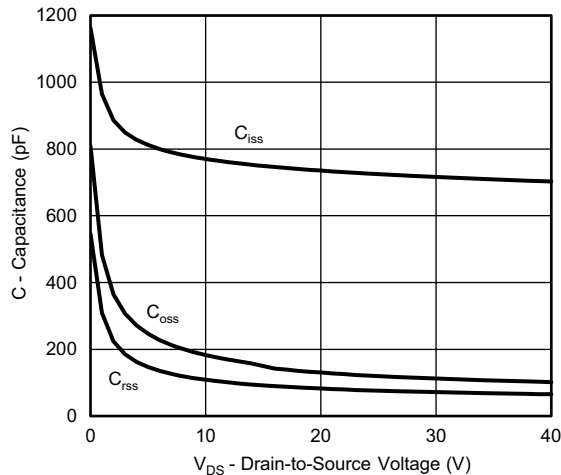
Transfer Characteristics



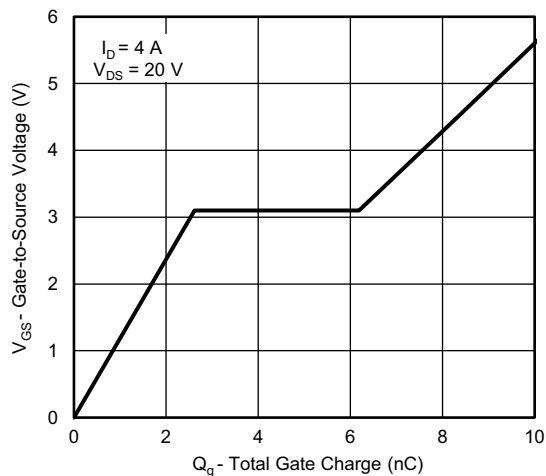
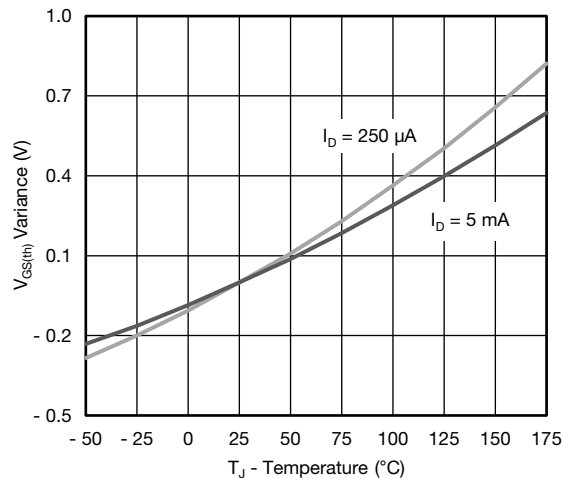
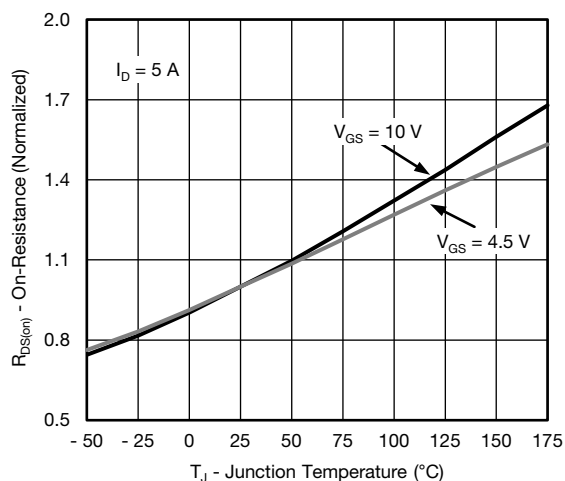
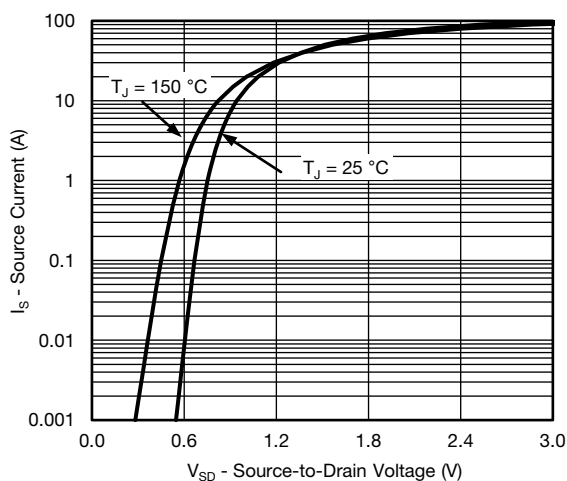
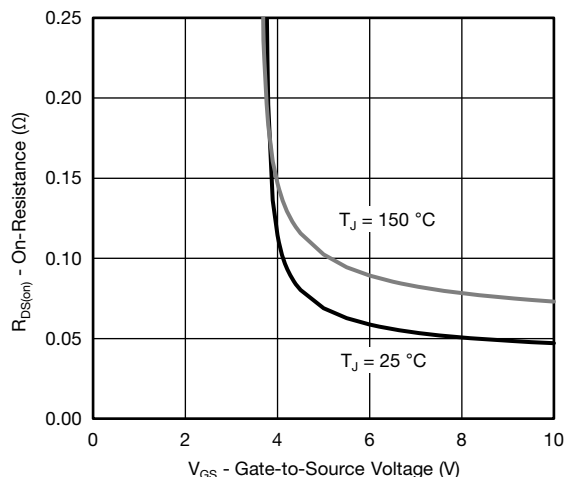
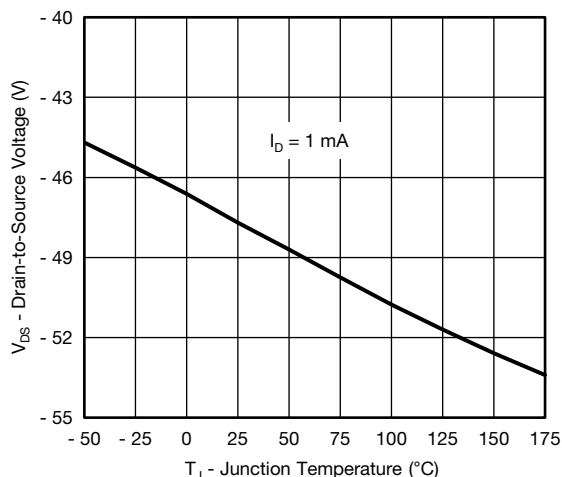
Transconductance



On-Resistance vs. Drain Current

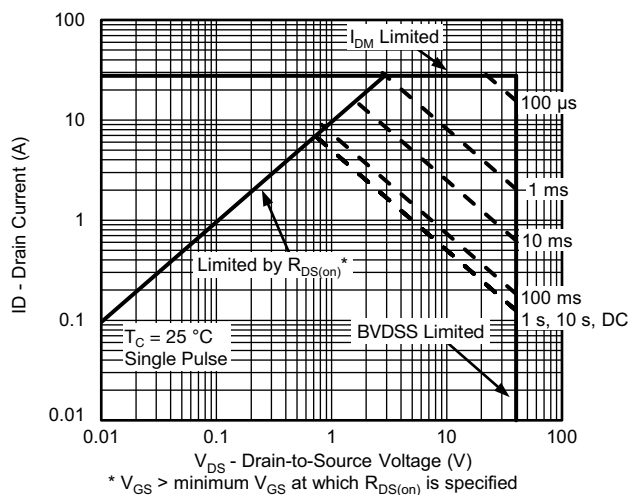


Capacitance

TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

Gate Charge

Threshold Voltage

On-Resistance vs. Junction Temperature

Source Drain Diode Forward Voltage

On-Resistance vs. Gate-to-Source Voltage

Drain Source Breakdown vs. Junction Temperature

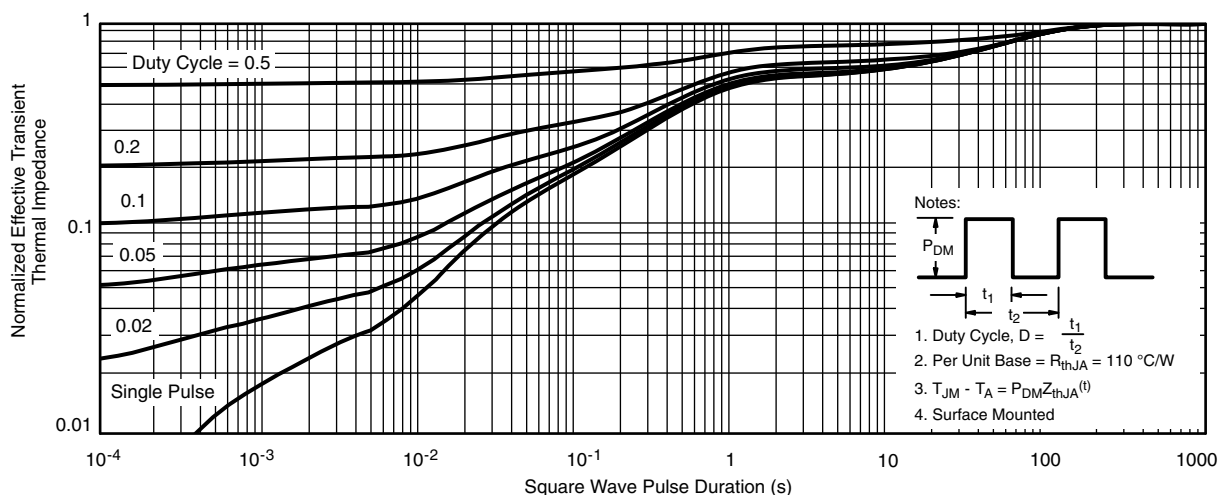


THERMAL RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

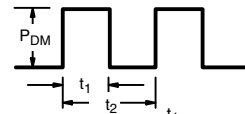


* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area



Notes:

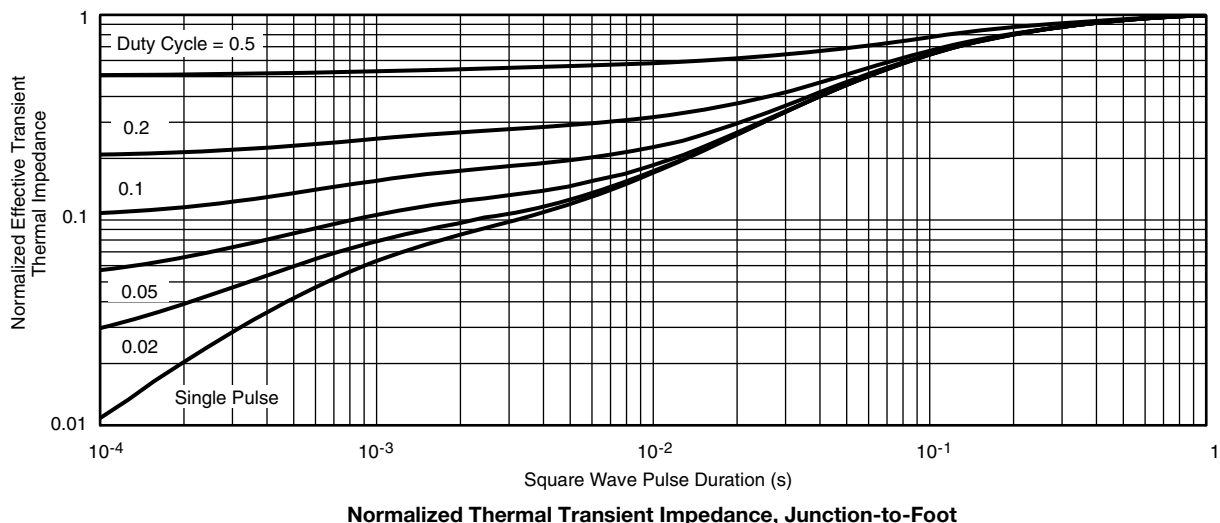


1. Duty Cycle, $D = \frac{t_1}{t_2}$
2. Per Unit Base = $R_{thJA} = 110\text{ }^{\circ}\text{C/W}$
3. $T_{JM} - T_A = P_{DM}Z_{thJA}(t)$
4. Surface Mounted

Normalized Thermal Transient Impedance, Junction-to-Ambient



THERMAL RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



Note

- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction-to-Ambient ($25\text{ }^{\circ}\text{C}$)
 - Normalized Transient Thermal Impedance Junction-to-Case ($25\text{ }^{\circ}\text{C}$)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



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