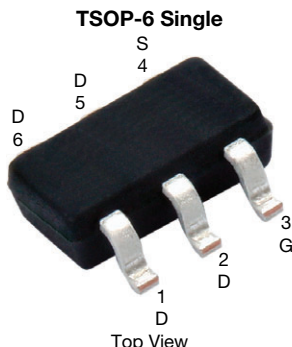


Automotive P-Channel 12 V (D-S) 175 °C MOSFET



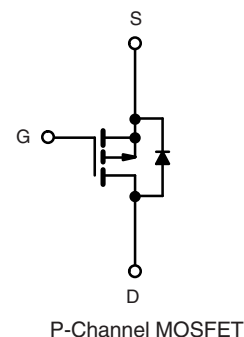
Marking Code: 9TY

FEATURES

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



RoHS
COMPLIANT
HALOGEN
FREE



PRODUCT SUMMARY	
V _{DS} (V)	-12
R _{DS(on)} (Ω) at V _{GS} = -4.5 V	0.025
R _{DS(on)} (Ω) at V _{GS} = -2.5 V	0.032
R _{DS(on)} (Ω) at V _{GS} = -1.8 V	0.043
I _D (A)	-8
Configuration	Single

ORDERING INFORMATION	
Package	TSOP-6
Lead (Pb)-free and halogen-free	SQ3461CEV (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}	-12	V
Gate-source voltage		V _{GS}	± 8	
Continuous drain current ^c	T _C = 25 °C	I _D	-8	A
	T _C = 125 °C		-6.6	
Continuous source current (diode conduction)		I _S	-6.3	
Pulsed drain current ^a		I _{DM}	-30	
Single pulse avalanche current	L = 0.1 mH	I _{AS}	-17	
Single pulse avalanche energy		E _{AS}	14	mJ
Maximum power dissipation	T _C = 25 °C	P _D	5	W
	T _C = 125 °C		1.67	
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 ^b	R _{thJA}	110	°C/W
Junction to case (drain)		R _{thJF}	30	

Notes

- Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %
- When mounted on 1" square PCB (FR4 material)
- Package limited



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		-12	-	-	V
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250 μA		-0.4	-0.6	-1	
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} = -12 V	-	-	-1	μA
		V _{GS} = 0 V	V _{DS} = -12 V, T _J = 125 °C	-	-	-50	
		V _{GS} = 0 V	V _{DS} = -12 V, T _J = 175 °C	-	-	-200	
On-State Drain Current ^a	I _{D(on)}	V _{GS} = -4.5 V	V _{DS} = -5 V	-11	-	-	A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = -4.5 V	I _D = -7.9 A	-	0.020	0.025	Ω
		V _{GS} = -4.5 V	I _D = -6.6 A, T _J = 125 °C	-	-	0.033	
		V _{GS} = -4.5 V	I _D = -3.5 A, T _J = 175 °C	-	-	0.037	
		V _{GS} = -2.5 V	I _D = -7 A	-	0.027	0.032	
		V _{GS} = -1.8 V	I _D = -3 A	-	0.036	0.043	
Forward Transconductance ^b	g _{fs}	V _{DS} = -5 V, I _D = -7.9 A		-	23	-	S
Dynamic ^b							
Input Capacitance	C _{iss}	V _{GS} = 0 V	V _{DS} = -6 V, f = 1 MHz	-	1818	2000	pF
Output Capacitance	C _{oss}			-	676	770	
Reverse Transfer Capacitance	C _{rss}			-	587	650	
Total Gate Charge ^c	Q _g	V _{GS} = -4.5 V	V _{DS} = -6 V, I _D = -7.9 A	-	24	28	nC
Gate-Source Charge ^c	Q _{gs}			-	3	-	
Gate-Drain Charge ^c	Q _{gd}			-	8	-	
Gate Resistance	R _g	f = 1 MHz		2.6	5.2	8.6	Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = -6 V, R _L = 1.6 Ω I _D ≅ -7.9 A, V _{GEN} = -4.5 V, R _g = 1 Ω		-	14	17	ns
Rise Time ^c	t _r			-	56	68	
Turn-Off Delay Time ^c	t _{d(off)}			-	55	120	
Fall Time ^c	t _f			-	72	93	
Source-Drain Diode Ratings and Characteristics ^b							
Pulsed Current ^a	I _{SM}			-	-	-20	A
Forward Voltage	V _{SD}	I _F = -2 A, V _{GS} = 0 V		-	-0.65	-1.2	V

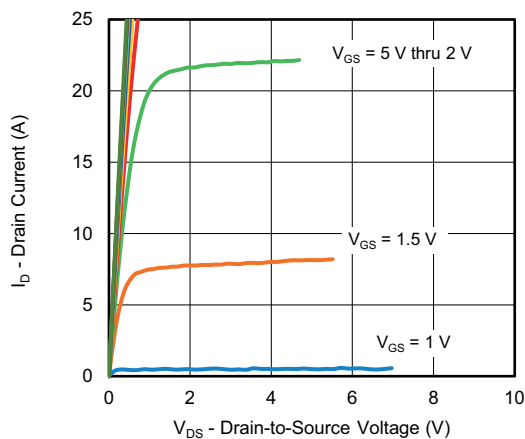
Notes

- 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.

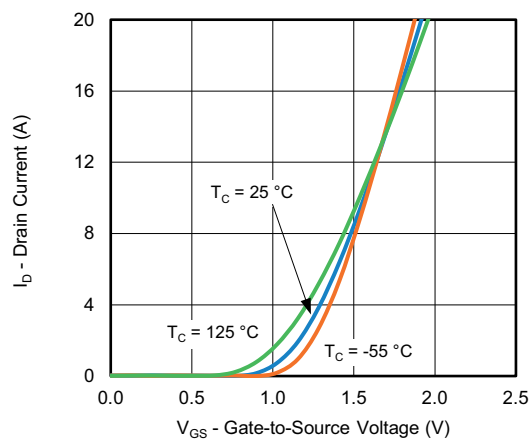
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



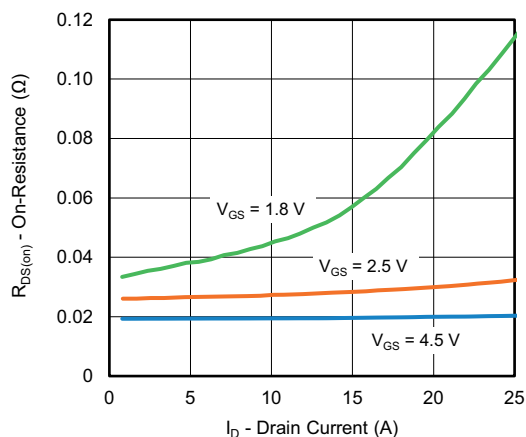
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



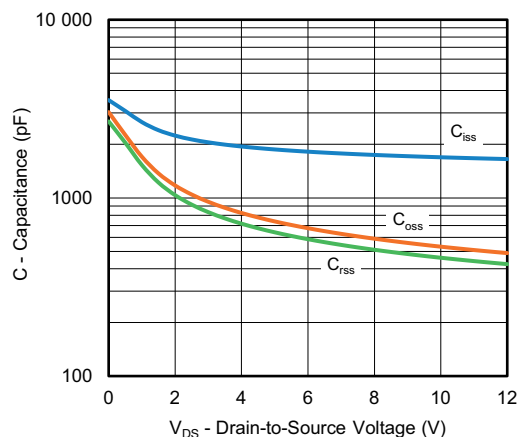
Output Characteristics



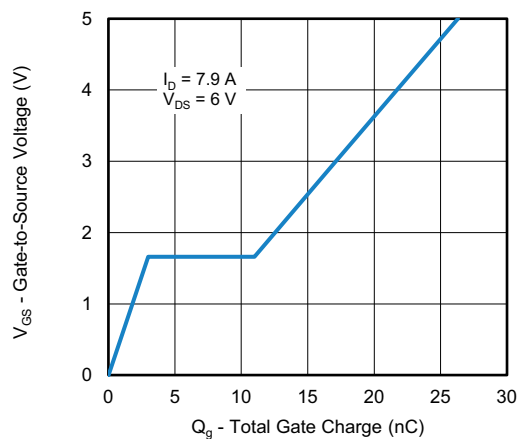
Transfer Characteristics



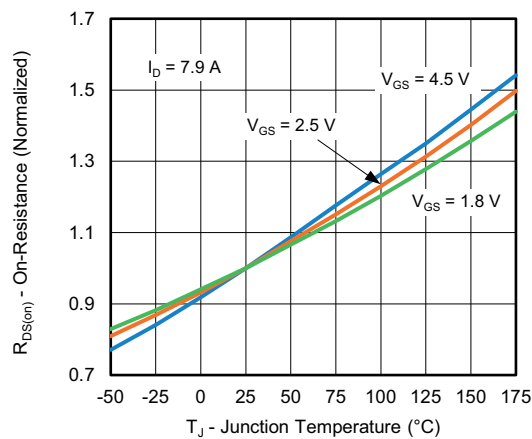
On-Resistance vs. Drain Current



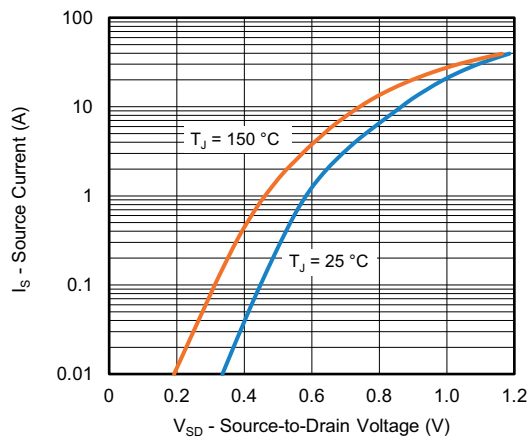
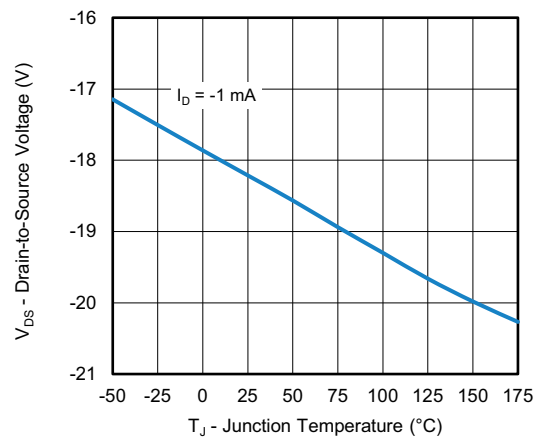
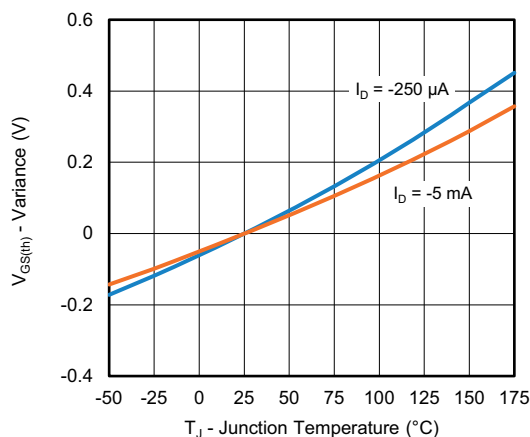
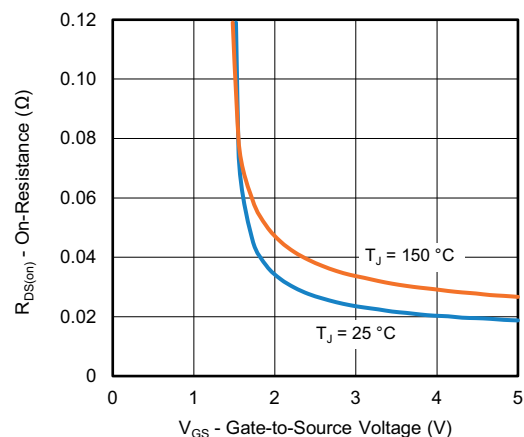
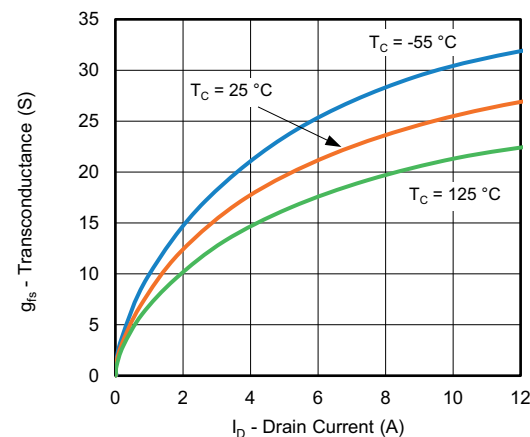
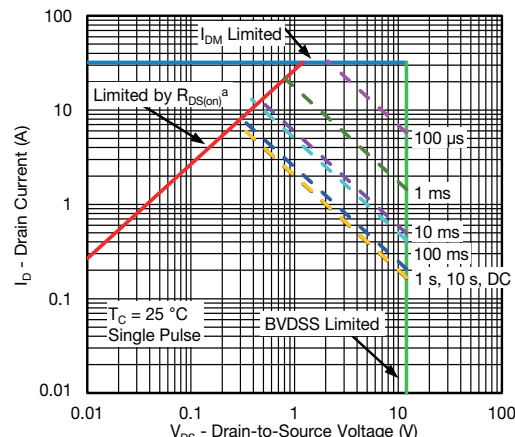
Capacitance



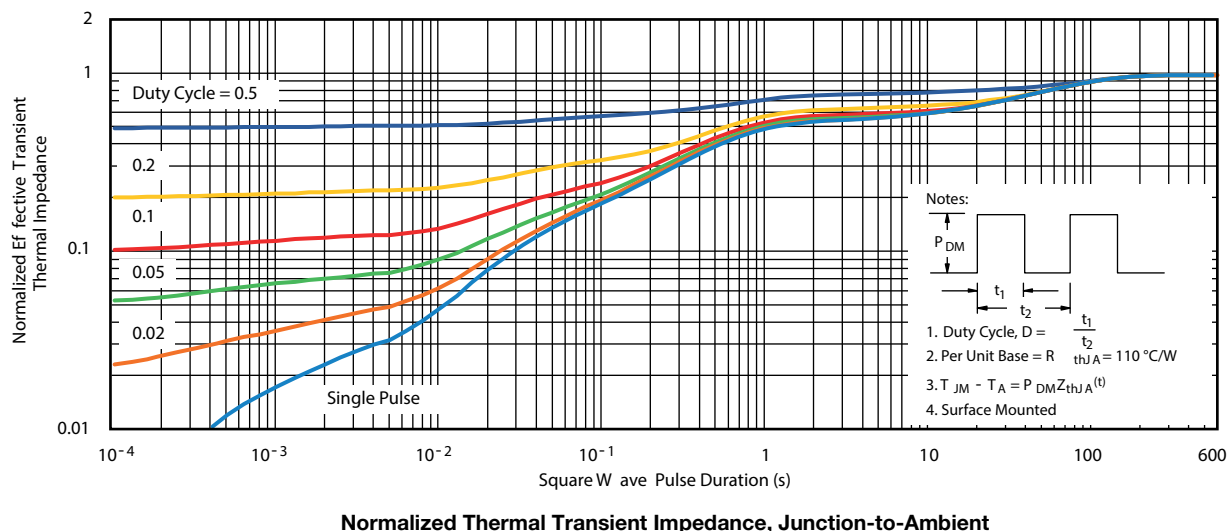
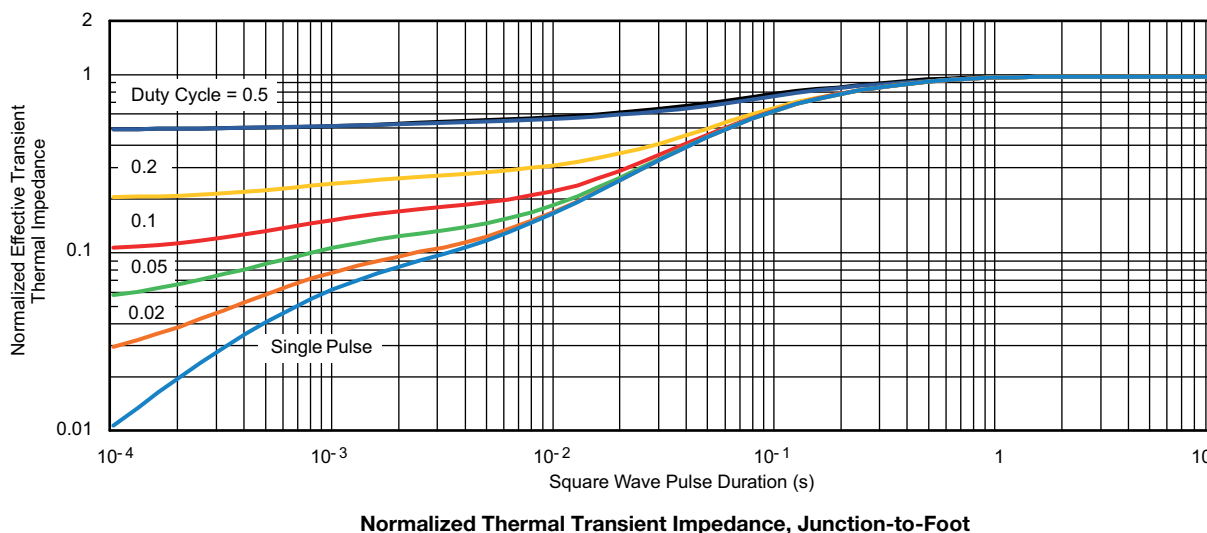
Gate Charge



On-Resistance vs. Junction Temperature

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

Source-Drain Diode Forward Voltage

Drain-to-Source Voltage vs. Junction Temperature

Threshold Voltage

On-Resistance vs. Gate-to-Source Voltage

Transconductance

Safe Operating Area
Note

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

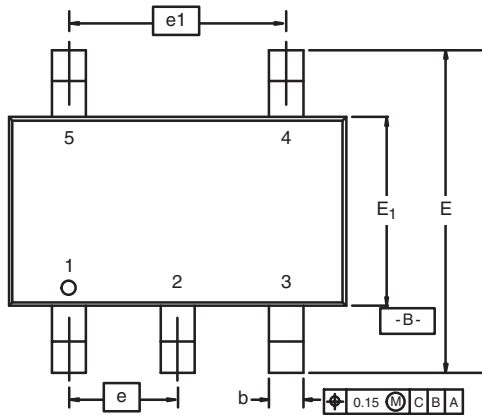
**TYPICAL CHARACTERISTICS** ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)**THERMAL RATINGS** ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)**Note**

- 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-Foot ($25\text{ }^{\circ}\text{C}$)
- 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.

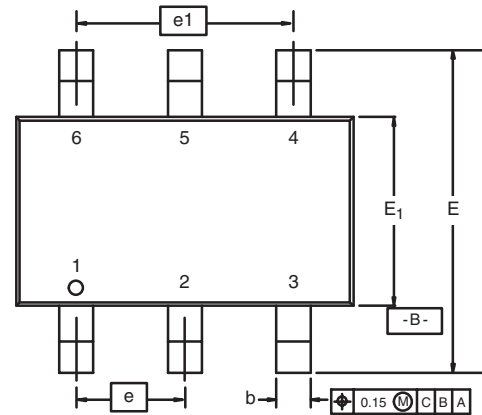
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TSOP: 5/6-LEAD

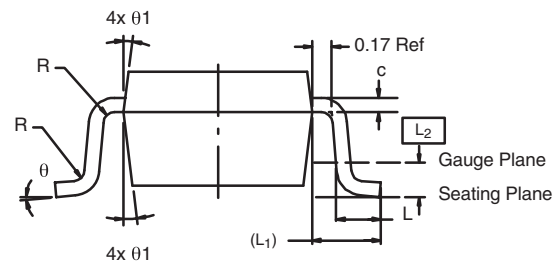
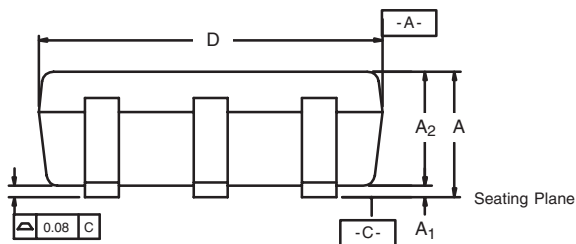
JEDEC Part Number: MO-193C



5-LEAD TSOP

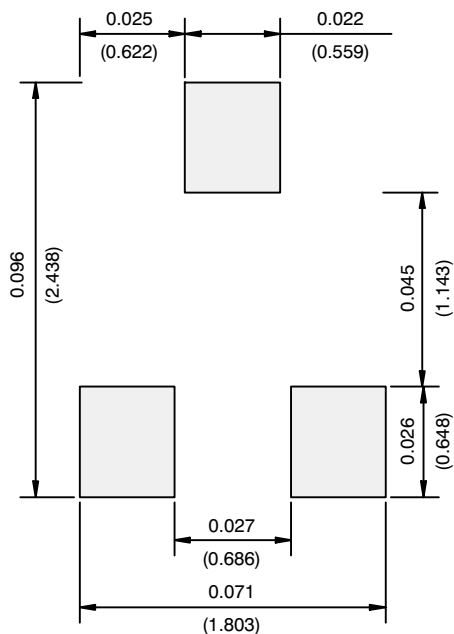


6-LEAD TSOP



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 MINIMUM PADS FOR SC-70: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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