

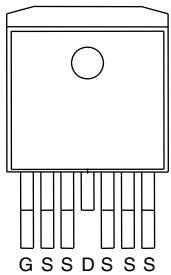
Automotive N-Channel 40 V (D-S) 175 °C MOSFET



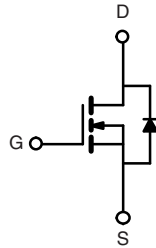
PRODUCT SUMMARY	
V_{DS} (V)	40
$R_{DS(on)}$ (Ω) at $V_{GS} = 10$ V	0.0017
$R_{DS(on)}$ (Ω) at $V_{GS} = 4.5$ V	0.0020
I_D (A)	200
Configuration	Single

FEATURES

- TrenchFET® Power MOSFET
- Package with Low Thermal Resistance
- 100 % R_g and UIS Tested
- AEC-Q101 Qualified^d
- Material categorization:
For definitions of compliance please see www.vishay.com/doc?99912

TO-263-7L


Drain connected to Tab



N-Channel MOSFET

ORDERING INFORMATION

Package	TO-263-7L
Lead (Pb)-free and Halogen-free	SQM200N04-1m7L-GE3

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}	± 20		
Continuous Drain Current	I_D	$T_C = 25$ °C ^a	200	
		$T_C = 125$ °C	193	
Continuous Source Current (Diode Conduction) ^a	I_S	200	A	
Pulsed Drain Current ^b	I_{DM}	600		
Single Pulse Avalanche Current	I_{AS}	95		
Single Pulse Avalanche Energy	E_{AS}	L = 0.1 mH	451	mJ
Maximum Power Dissipation ^b			P_D	
		$T_C = 125$ °C		125
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to + 175	°C	

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-Ambient	R_{thJA}	40	°C/W
Junction-to-Case (Drain)			

Notes

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



SPECIFICATIONS ($T_C = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$	40	-	-	V
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	1.5	2.0	2.5	
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}	$V_{GS} = 0\text{ V}$, $V_{DS} = 40\text{ V}$	-	-	1	μA
		$V_{GS} = 0\text{ V}$, $V_{DS} = 40\text{ V}$, $T_J = 125\text{ }^\circ\text{C}$	-	-	50	
		$V_{GS} = 0\text{ V}$, $V_{DS} = 40\text{ V}$, $T_J = 175\text{ }^\circ\text{C}$	-	-	250	
On-State Drain Current ^a	$I_{D(on)}$	$V_{GS} = 10\text{ V}$, $V_{DS} \geq 5\text{ V}$	200	-	-	A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$, $I_D = 30\text{ A}$	-	0.0012	0.0017	Ω
		$V_{GS} = 10\text{ V}$, $I_D = 30\text{ A}$, $T_J = 125\text{ }^\circ\text{C}$	-	-	0.0028	
		$V_{GS} = 10\text{ V}$, $I_D = 30\text{ A}$, $T_J = 175\text{ }^\circ\text{C}$	-	-	0.0034	
		$V_{GS} = 4.5\text{ V}$, $I_D = 20\text{ A}$	-	0.0014	0.0020	
Forward Transconductance ^b	g_{fs}	$V_{DS} = 15\text{ V}$, $I_D = 30\text{ A}$	-	181	-	S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}$, $V_{DS} = 20\text{ V}$, $f = 1\text{ MHz}$	-	8934	11 168	μF
Output Capacitance	C_{oss}		-	1592	1990	
Reverse Transfer Capacitance	C_{rss}		-	928	1160	
Total Gate Charge ^c	Q_g	$V_{GS} = 10\text{ V}$, $V_{DS} = 20\text{ V}$, $I_D = 20\text{ A}$	-	194	291	nC
Gate-Source Charge ^c	Q_{gs}		-	25	-	
Gate-Drain Charge ^c	Q_{gd}		-	40	-	
Gate Resistance	R_g	$f = 1\text{ MHz}$	0.4	0.8	1.2	Ω
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 20\text{ V}$, $R_L = 1\text{ }\Omega$ $I_D \cong 20\text{ A}$, $V_{GEN} = 10\text{ V}$, $R_g = 1\text{ }\Omega$	-	22	33	ns
Rise Time ^c	t_r		-	17	26	
Turn-Off Delay Time ^c	$t_{d(off)}$		-	70	105	
Fall Time ^c	t_f		-	16	24	
Source-Drain Diode Ratings and Characteristics^b						
Pulsed Current ^a	I_{SM}		-	-	600	A
Forward Voltage	V_{SD}	$I_F = 60\text{ A}$, $V_{GS} = 0\text{ V}$	-	0.8	1.5	V

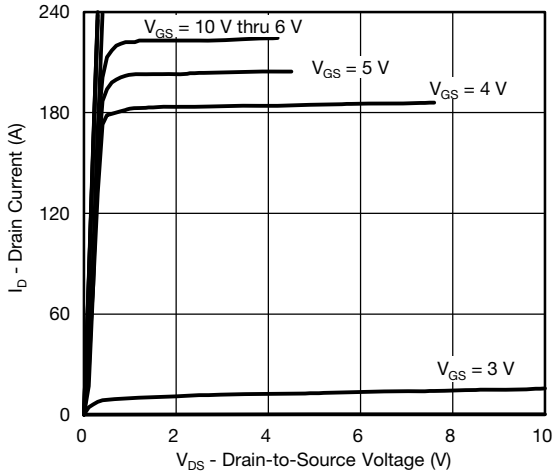
Notes

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

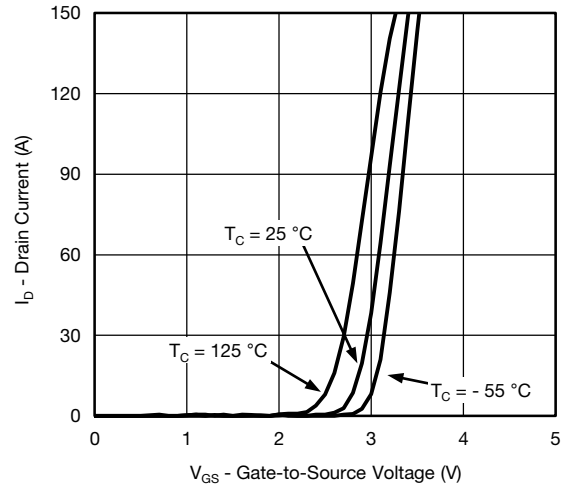
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



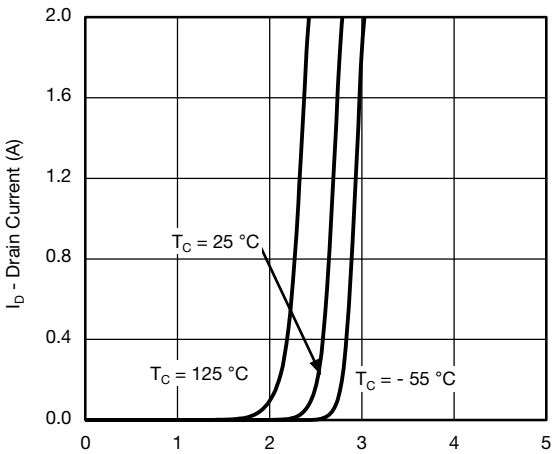
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



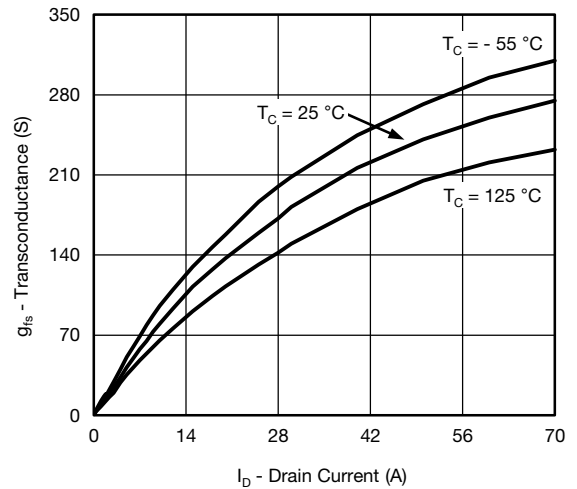
Output Characteristics



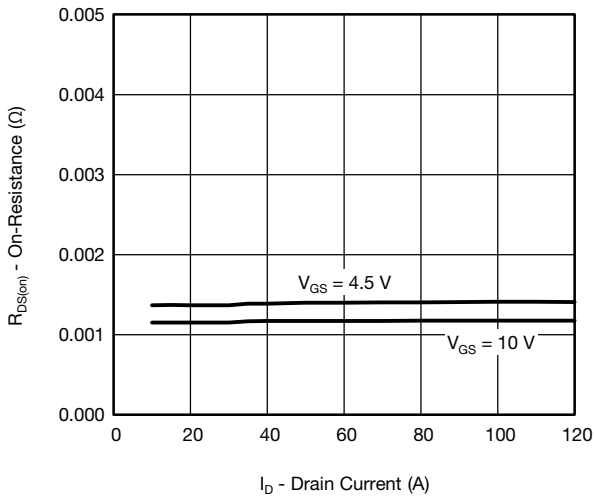
Transfer Characteristics



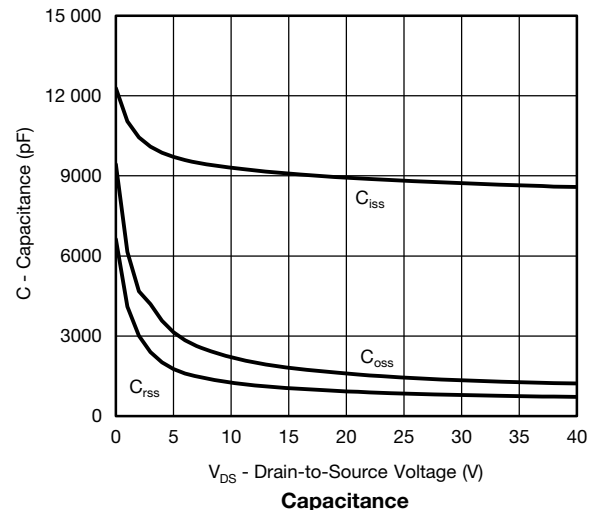
Transfer Characteristics



Transconductance



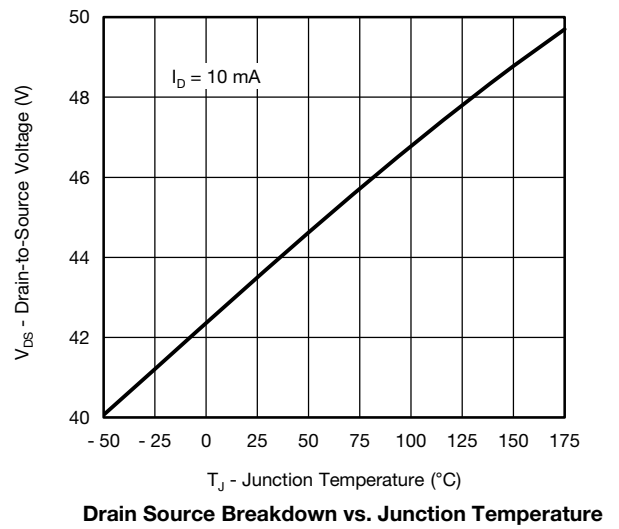
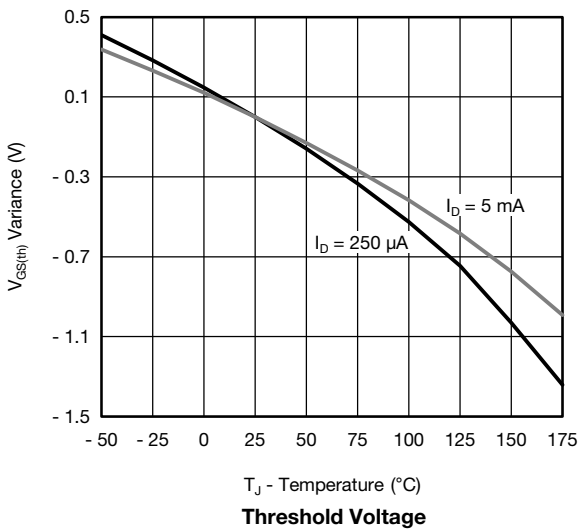
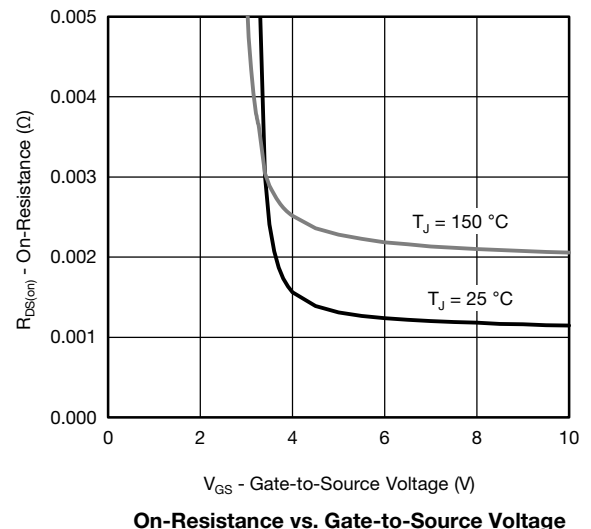
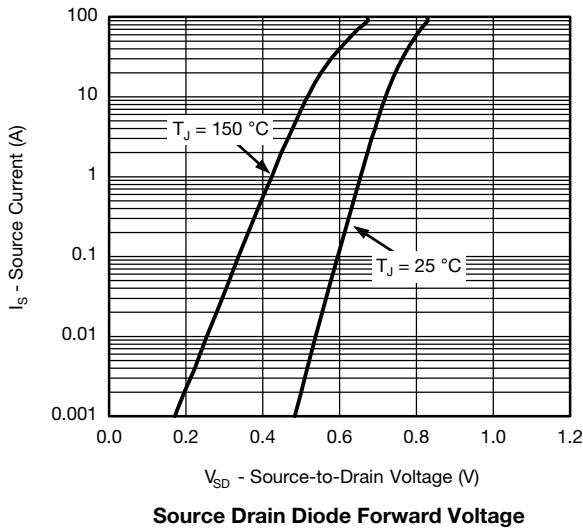
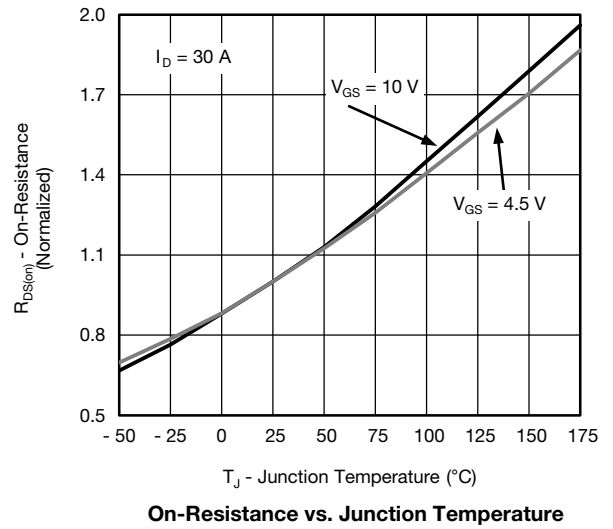
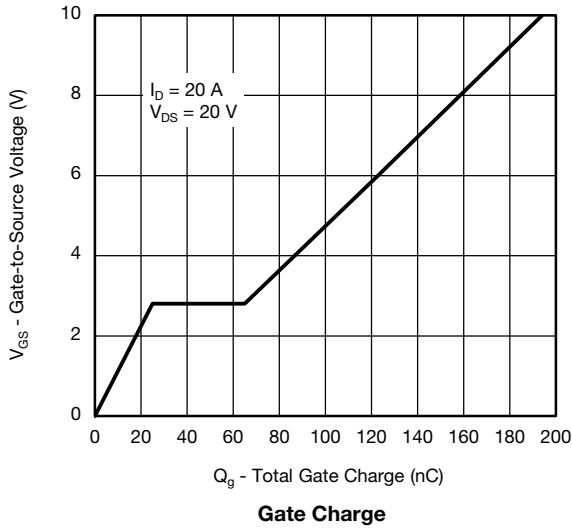
On-Resistance vs. Drain Current



Capacitance

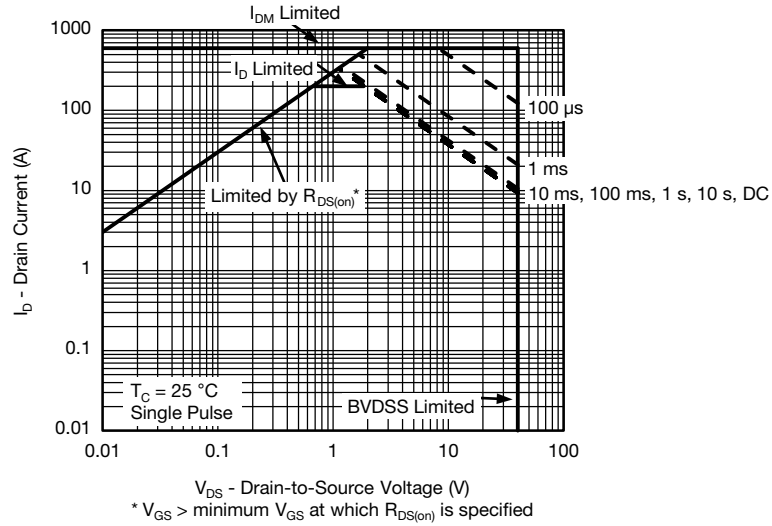


TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)

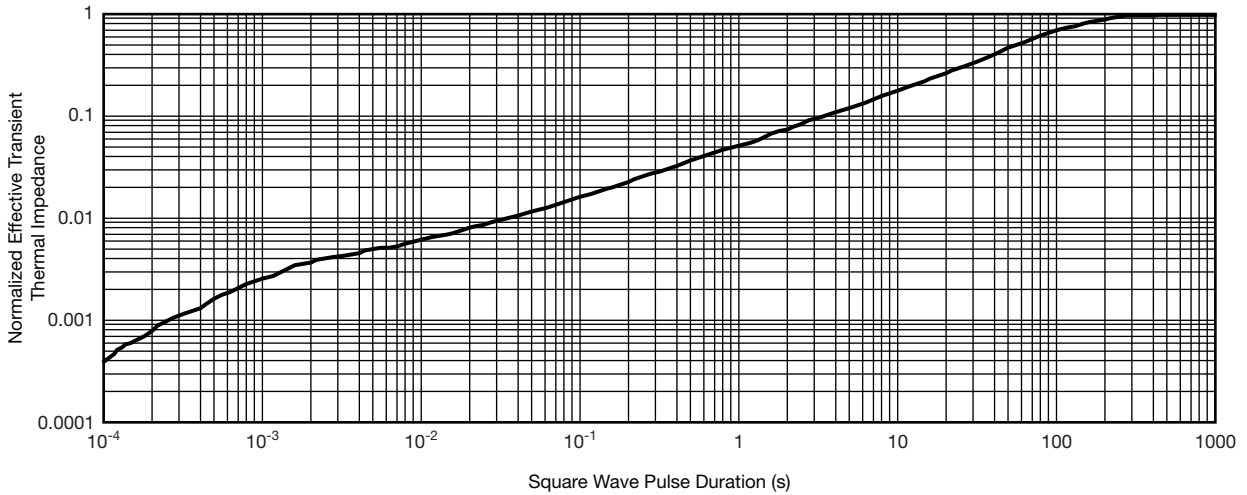




THERMAL RATINGS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



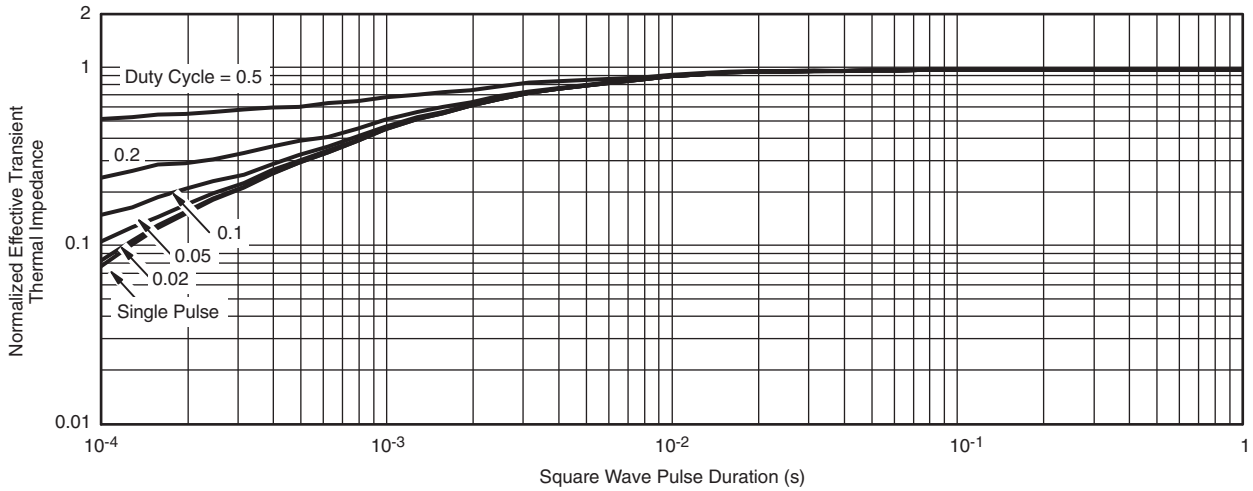
Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient



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



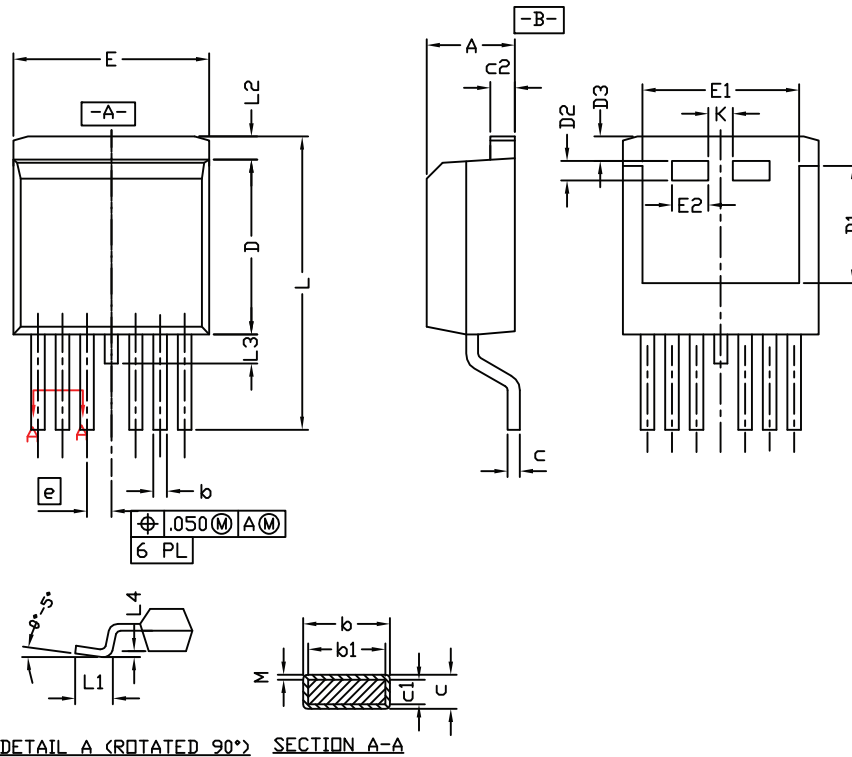
Normalized Thermal Transient Impedance, Junction-to-Case

Note

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

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see www.vishay.com/ppg?67058.

D²PAK (TO-263-7L) Case Outline



DETAIL A (ROTATED 90°) SECTION A-A

Notes

1. Plane B includes maximum features of heat sink tab and plastic.
2. No more than 25 % of L1 can fall above seating plane by max. 8 mils.
3. Pin to pin coplanarity max. 4 mils.
4. Lead thickness 25 mils.
5. For SUM part numbers lead thickness is 24 mils to 29 mils.
6. For reference only.
7. Use inches as the primary measurement.
8. This feature is only for SUM.

DIM.	INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.
A	0.160	0.190	4.064	4.826
b	0.020	0.039	0.508	0.990
b1	0.020	0.035	0.508	0.889
b2	0.045	0.055	1.143	1.397
c* SUB	0.012	0.018	0.305	0.457
c* SUM	0.022	0.028	0.559	0.711
c1	0.018	0.025	0.457	0.635
c2	0.045	0.055	1.143	1.397
D	0.340	0.380	8.636	9.652
D1	0.220	0.240	5.588	6.096
D2	0.038	0.042	0.965	1.067
D3	0.045	0.055	1.143	1.397
E	0.380	0.410	9.652	10.414
E1	0.245	-	6.223	-
E2	0.072	0.078	1.829	1.981
e	0.050 BSC		1.27 BSC	
K	0.045	0.055	1.143	1.397
L	0.575	0.625	14.605	15.875
L1	0.090	0.110	2.286	2.794
L2	0.040	0.055	1.016	1.397
L3	0.050	0.070	1.270	1.778
L4	0.010 BSC		0.254 BSC	
M	-	0.002	-	0.050
ECN: T13-0709-Rev. B, 30-Sep-13				
DWG: 6006				



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