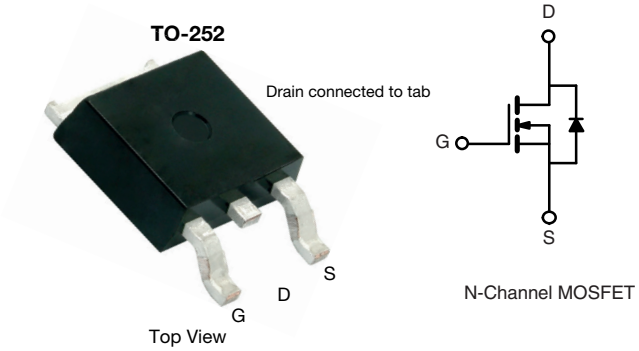
Automotive N-Channel 250 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	250
$R_{DS(on)}$ (Ω) at V_{GS} = 10 V	0.350
I_D (A)	7
Configuration	Single
Package	TO-252



FEATURES

- TrenchFET® power MOSFET
- Package with low thermal resistance
- AEC-Q101 qualified [d]
- 100 % R_g and UIS tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE GRADE

RoHS COMPLIANT

HALOGEN FREE

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise noted)				
PARAMETER		**SYMBOL**	**LIMIT**	**UNIT**
Drain-Source Voltage		V_{DS}	250	V
Gate-Source Voltage		V_{GS}	± 30	
Continuous Drain Current	T_C = 25 °C	I_D	7	A
	T_C = 125 °C		4	
Continuous Source Current (Diode Conduction) [a]		I_S	50	
Pulsed Drain Current [b]		I_{DM}	15	
Single Pulse Avalanche Current	L = 0.1 mH	I_{AS}	7	
Single Pulse Avalanche Energy		E_{AS}	2.4	mJ
Maximum Power Dissipation [b]	T_C = 25 °C	P_D	71	W
	T_C = 125 °C		23	
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}	50	°C/W
Junction-to-Case (Drain)		R_{thJC}	2.1	

Notes

a. Package limited.
b. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
c. When mounted on 1" square PCB (FR4 material).
d. Parametric verification ongoing.

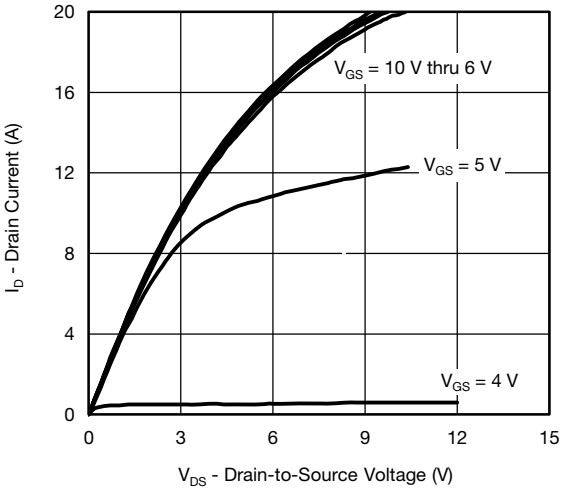
SPECIFICATIONS (T_C = 25 °C, unless otherwise noted)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNIT**
Static							
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 µA		250	-	-	V
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA		2.5	3.0	3.5	
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 30 V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V	V_{DS} = 250 V	-	-	1	µA
		V_{GS} = 0 V	V_{DS} = 250 V, T_J = 125 °C	-	-	50	
		V_{GS} = 0 V	V_{DS} = 250 V, T_J = 175 °C	-	-	250	
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 = 10 A	-	0.290	0.350	Ω
		V_{GS} = 10 V	I_D = 10 A, T_J = 125 °C	-	-	0.858	
		V_{GS} = 10 V	I_D = 10 A, T_J = 175 °C	-	-	1.250	
Forward Transconductance [b]	g_{fs}	V_{DS} = 15 V, I_D = 10 A		-	20	-	S
Dynamic [b]							
Input Capacitance	C_{iss}	V_{GS} = 0 V	V_{DS} = 25 V, f = 1 MHz	-	964	1205	pF
Output Capacitance	C_{oss}			-	88	110	
Reverse Transfer Capacitance	C_{rss}			-	32	40	
Total Gate Charge [c]	Q_g	V_{GS} = 10 V	V_{DS} = 125 V, I_D = 10 A	-	19	29	nC
Gate-Source Charge [c]	Q_{gs}			-	6.5	-	
Gate-Drain Charge [c]	Q_{gd}			-	5	-	
Gate Resistance	R_g	f = 1 MHz		0.35	1	3	Ω
Turn-On Delay Time [c]	$t_{d(on)}$	V_{DD} = 125 V, R_L = 12.5 Ω $I_D \cong$ 10 A, V_{GEN} = 10 V, R_g = 1 Ω		-	9	14	ns
Rise Time [c]	t_r			-	8	12	
Turn-Off Delay Time [c]	$t_{d(off)}$			-	15	23	
Fall Time [c]	t_f			-	4	6	
Source-Drain Diode Ratings and Characteristics [b]							
Pulsed Current [a]	I_{SM}			-	-	15	A
Forward Voltage	V_{SD}	I_F = 20 A, V_{GS} = 0 V		-	0.9	1.5	V

Notes

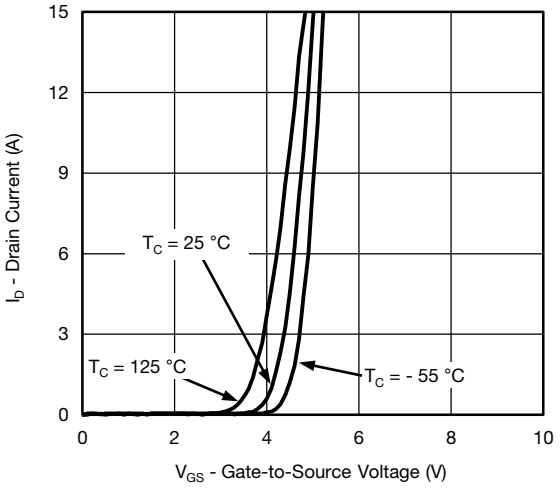
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

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.

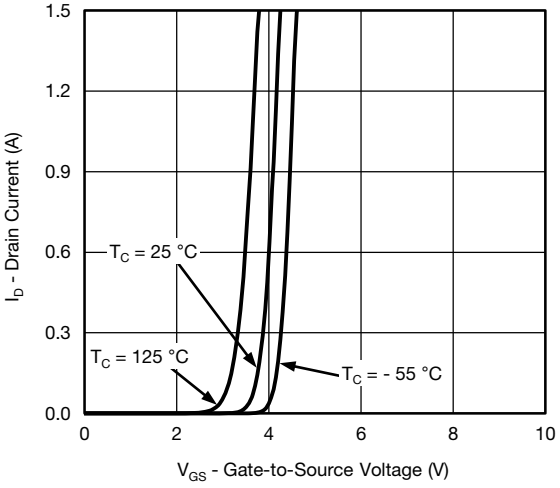
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



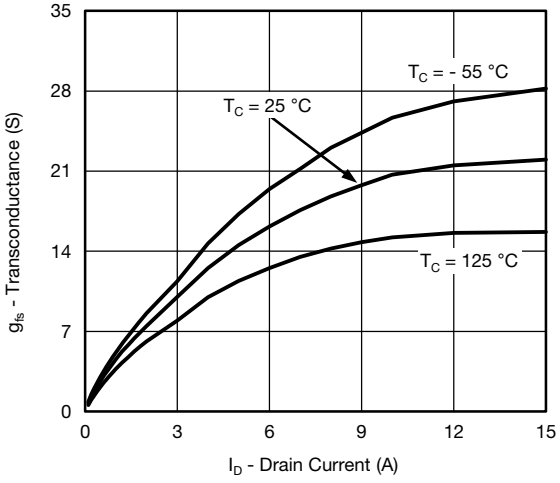
Output Characteristics



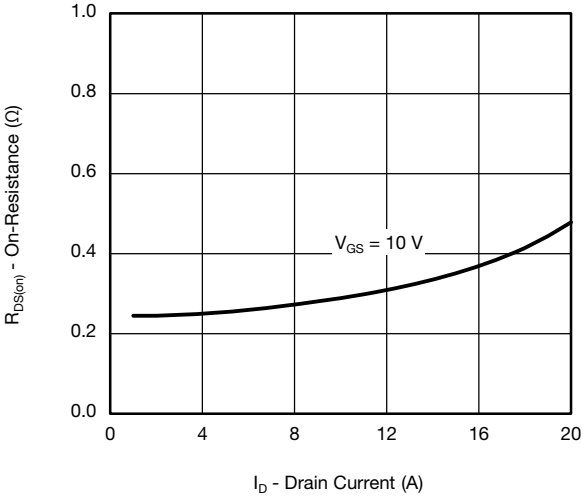
Transfer Characteristics



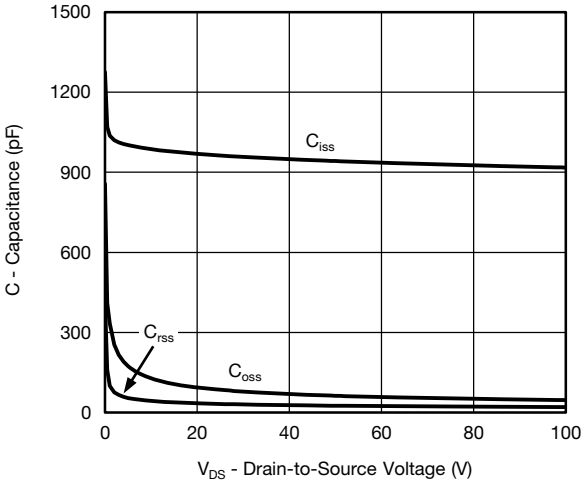
Transfer Characteristics



Transconductance

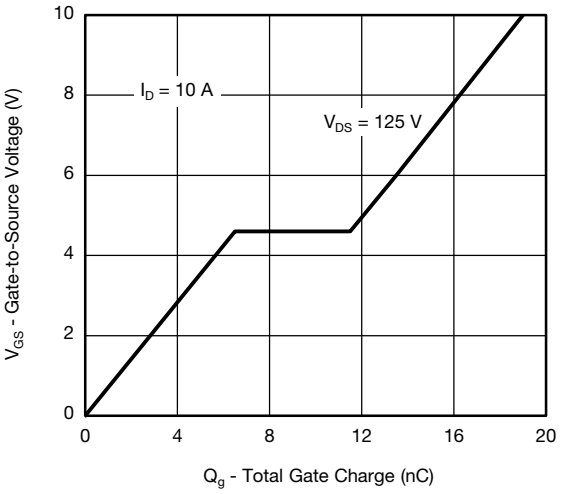


On-Resistance vs. Drain Current

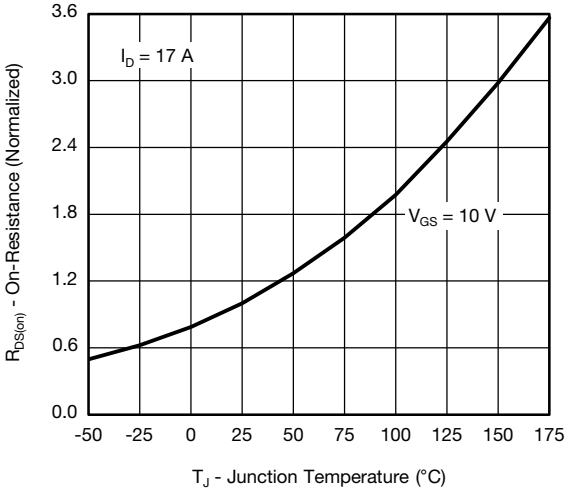


Capacitance

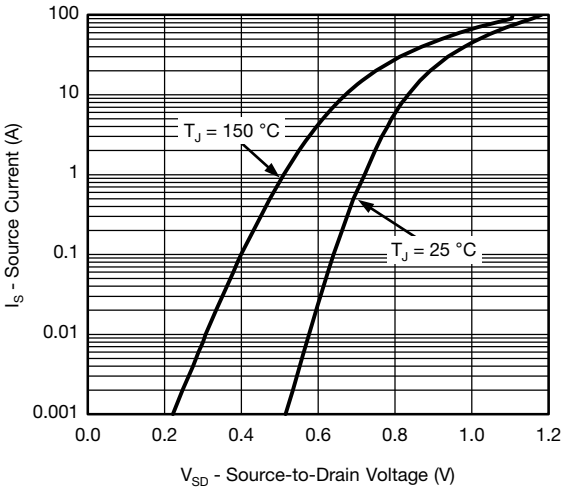
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



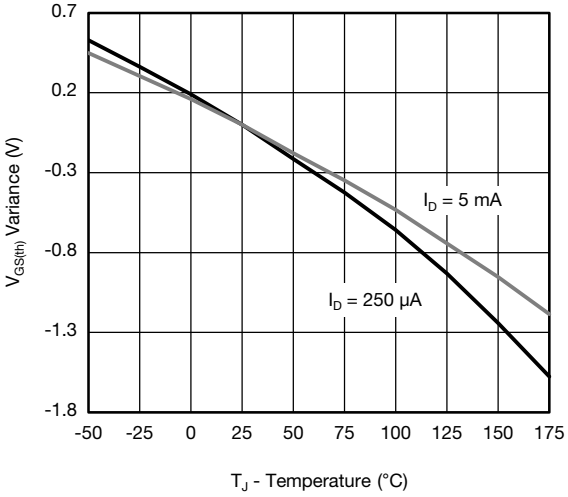
Gate Charge



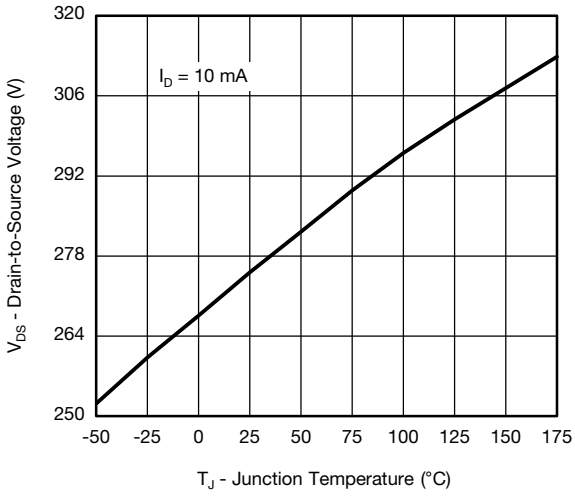
On-Resistance vs. Junction Temperature



Source Drain Diode Forward Voltage

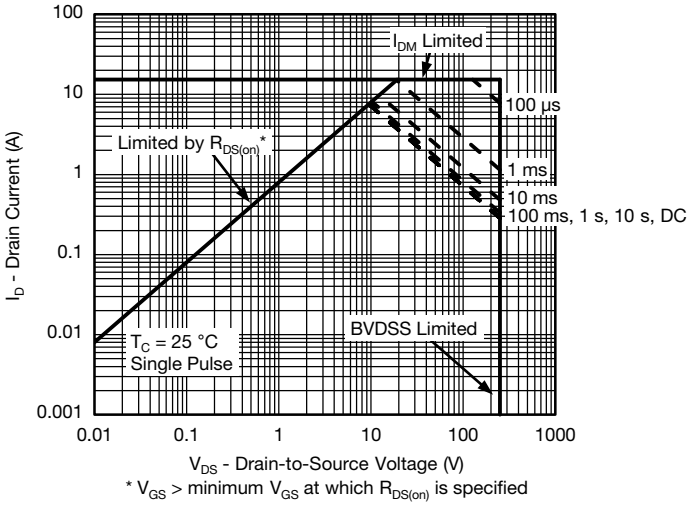


Threshold Voltage

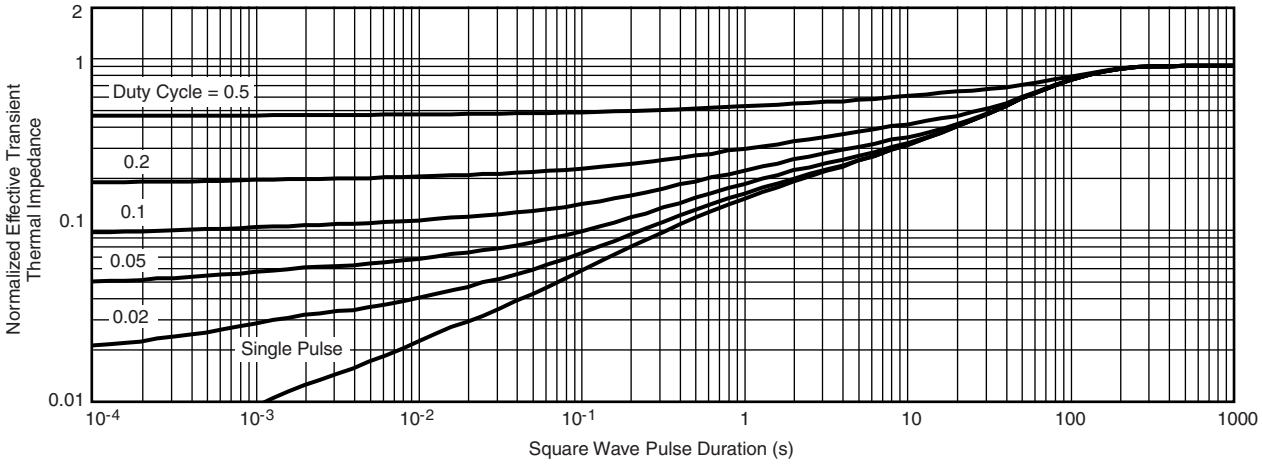


Drain Source Breakdown vs. Junction Temperature

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

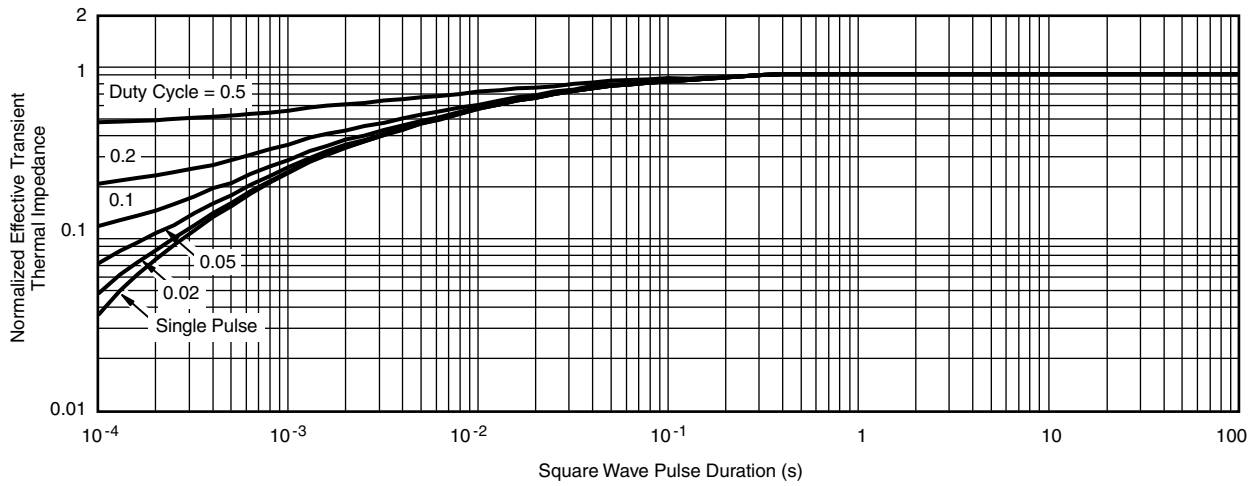


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

THERMAL RATINGS (T_A = 25 °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.

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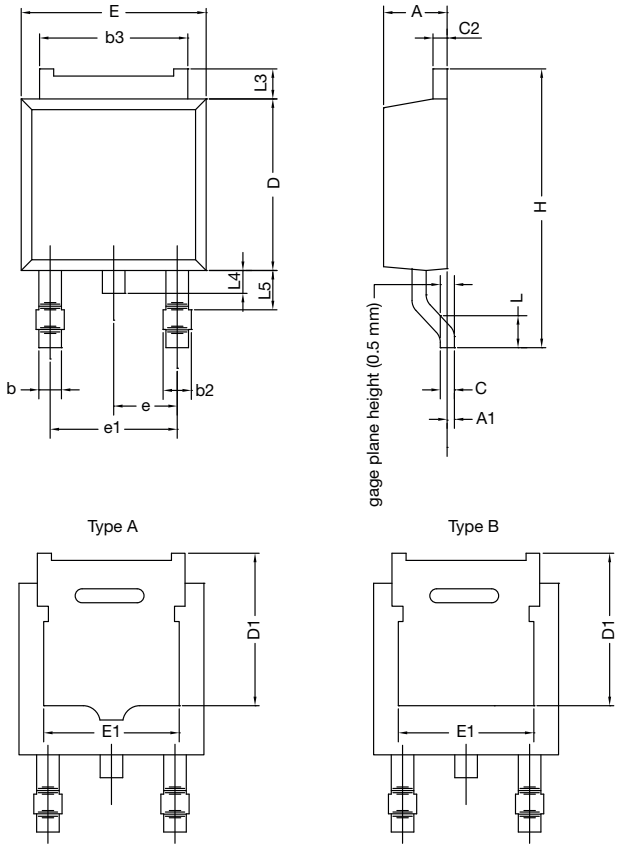
REVISION HISTORY [a]		
REVISION	DATE	DESCRIPTION OF CHANGE
C	04-Aug-15	• Revised R_g minimum limit

Note

a. As of April 2014

TO-252AA Case Outline

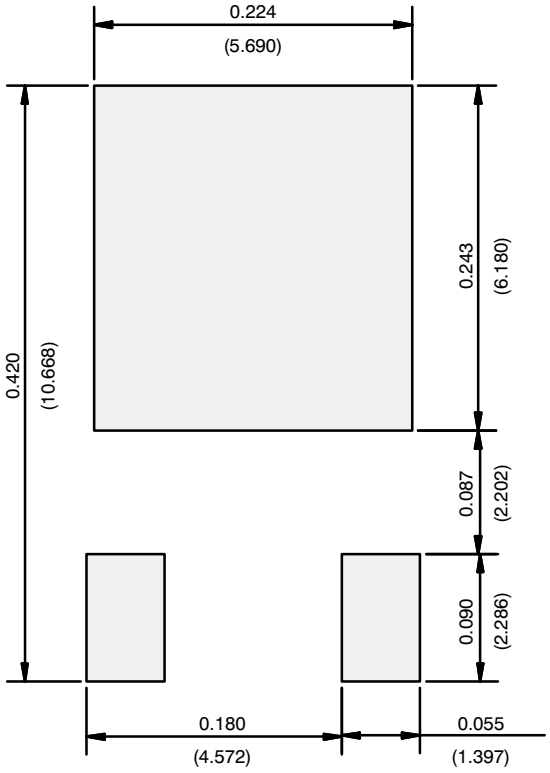


DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.18	2.38	0.086	0.094
A1	-	0.127	-	0.005
b	0.64	0.88	0.025	0.035
b2	0.76	1.14	0.030	0.045
b3	4.95	5.46	0.195	0.215
C	0.46	0.61	0.018	0.024
C2	0.46	0.89	0.018	0.035
D	5.97	6.22	0.235	0.245
D1	4.10	-	0.161	-
E	6.35	6.73	0.250	0.265
E1	4.32	-	0.170	-
H	9.40	10.41	0.370	0.410
e	2.28 BSC		0.090 BSC	
e1	4.56 BSC		0.180 BSC	
L	1.40	1.78	0.055	0.070
L3	0.89	1.27	0.035	0.050
L4	-	1.02	-	0.040
L5	1.01	1.52	0.040	0.060
ECN: T24-0298-Rev. B, 29-Jul-2024 DWG: 6019				

Notes

- Dimension L3 is for reference only
- Dimension D1 and E1 on type A and B is the same

RECOMMENDED MINIMUM PADS FOR DPAK (TO-252)



Recommended Minimum Pads
Dimensions in Inches/(mm)

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