

NCE40P40D-VB Datasheet

P-Channel 40 V (D-S) MOSFET

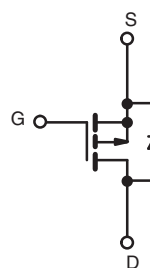
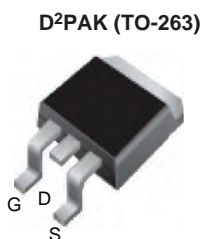
PRODUCT SUMMARY	
V_{DS} (V)	-40
$R_{DS(on)}$ (Ω) at $V_{GS} = -10$ V	0.012
$R_{DS(on)}$ (Ω) at $V_{GS} = -4.5$ V	0.015
I_D (A)	-60
Configuration	Single

FEATURES

- TrenchFET® power MOSFET
- Package with low thermal resistance
- 100 % R_g and UIS tested



RoHS
COMPLIANT
HALOGEN
FREE



P-Channel MOSFET

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	-60	
		$T_C = 125$ °C	-45	
Continuous Source Current (Diode Conduction) ^a	I_S	-60	A	
Pulsed Drain Current ^b	I_{DM}	-230		
Single Pulse Avalanche Current	I_{AS}	-45		
Single Pulse Avalanche Energy	E_{AS}	L = 0.1 mH	80	mJ
Maximum Power Dissipation ^b			P_D	$T_A = 25$ °C
	$T_C = 25$ °C	166		
	$T_C = 125$ °C	65		
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}	50	°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 (FR4 material).
- Parametric verification ongoing.

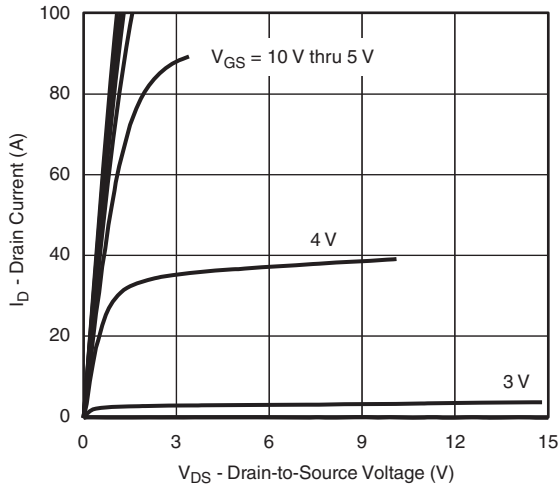
SPECIFICATIONS ($T_C = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-40	-	-	V
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-1.5	-	-2.5	
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	
		$V_{GS} = 0\text{ V}$ $V_{DS} = -40\text{ V}, T_J = 175\text{ }^\circ\text{C}$	-	-	-150	
On-State Drain Current ^a	$I_{D(on)}$	$V_{GS} = -10\text{ V}$ $V_{DS} \leq -5\text{ V}$	-60	-	-	A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -10\text{ V}$ $I_D = -17\text{ A}$	-	0.012	-	Ω
		$V_{GS} = -10\text{ V}$ $I_D = -50\text{ A}, T_J = 125\text{ }^\circ\text{C}$	-	0.017	-	
		$V_{GS} = -10\text{ V}$ $I_D = -50\text{ A}, T_J = 175\text{ }^\circ\text{C}$	-	0.020	-	
		$V_{GS} = -4.5\text{ V}$ $I_D = -14\text{ A}$	-	0.015	-	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -15\text{ V}, I_D = -17\text{ A}$	-	61	-	S
Dynamic ^b						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}$ $V_{DS} = -25\text{ V}, f = 1\text{ MHz}$	-	2872	3950	μF
Output Capacitance	C_{oss}		-	508	635	
Reverse Transfer Capacitance	C_{rss}		-	352	440	
Total Gate Charge ^c	Q_g	$V_{GS} = -10\text{ V}$ $V_{DS} = -30\text{ V}, I_D = -50\text{ A}$	-	60	80	nC
Gate-Source Charge ^c	Q_{gs}		-	5.7	8.6	
Gate-Drain Charge ^c	Q_{gd}		-	14.7	22	
Gate Resistance	R_g	$f = 1\text{ MHz}$	1.5	3	4.5	Ω
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = -20\text{ V}, R_L = 0.4\text{ }\Omega$ $I_D = -50\text{ A}, V_{GEN} = -10\text{ V}, R_g = 1\text{ }\Omega$	-	10	15	ns
Rise Time ^c	t_r		-	12	18	
Turn-Off Delay Time ^c	$t_{d(off)}$		-	40	60	
Fall Time ^c	t_f		-	16	24	
Source-Drain Diode Ratings and Characteristics ^b						
Pulsed Current ^a	I_{SM}		-	-	-200	A
Forward Voltage	V_{SD}	$I_F = -50\text{ A}, V_{GS} = 0\text{ V}$	-	-1	-1.5	V

Notes

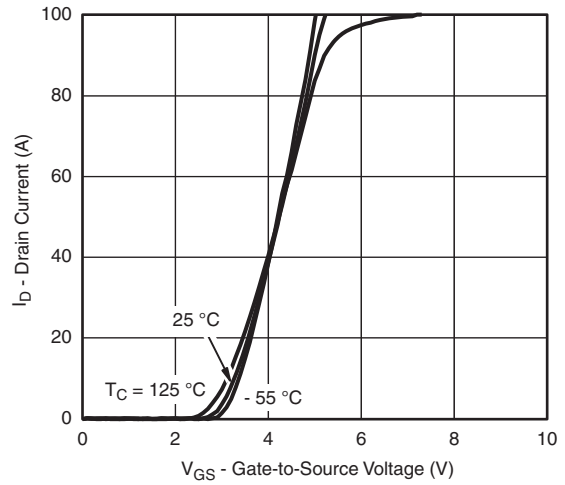
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- b. Guaranteed by design, not subject to production testing.
- c. Independent of operating temperature.

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.

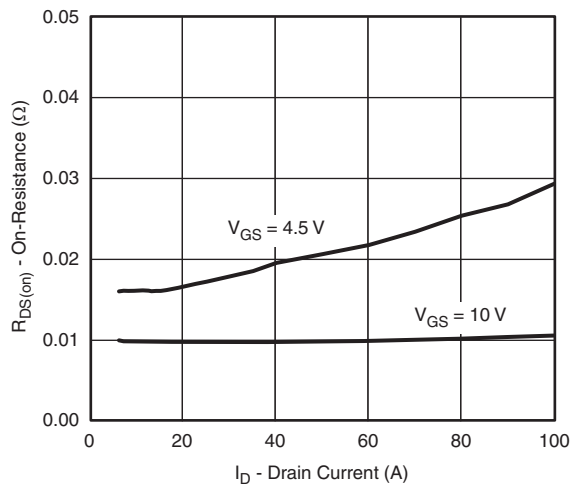
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



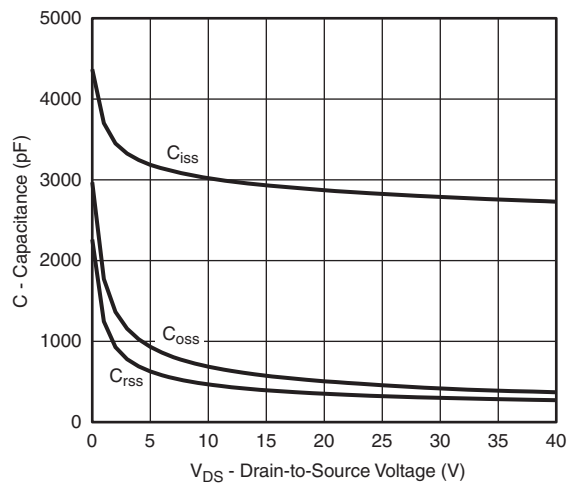
Output Characteristics



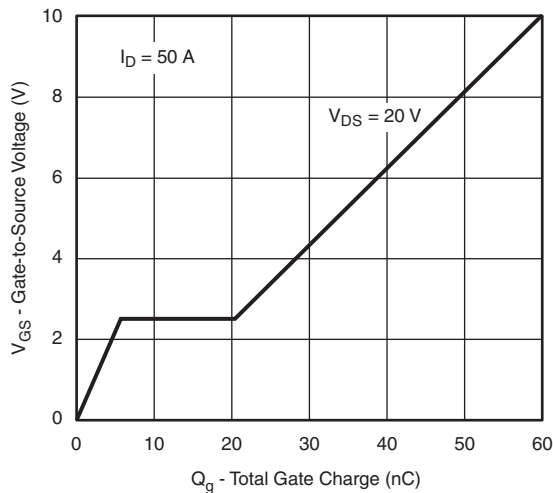
Transfer Characteristics



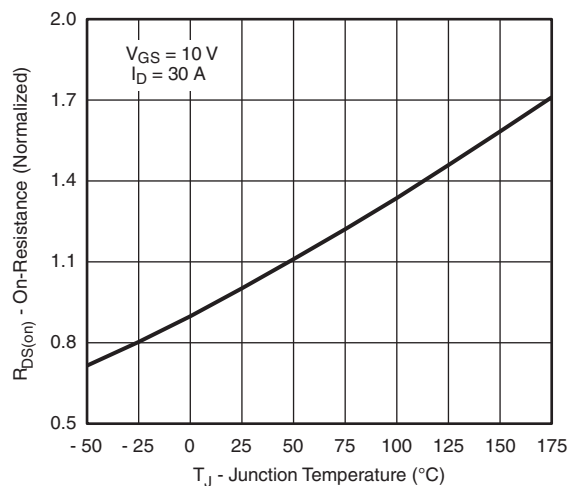
On-Resistance vs. Drain Current



Capacitance

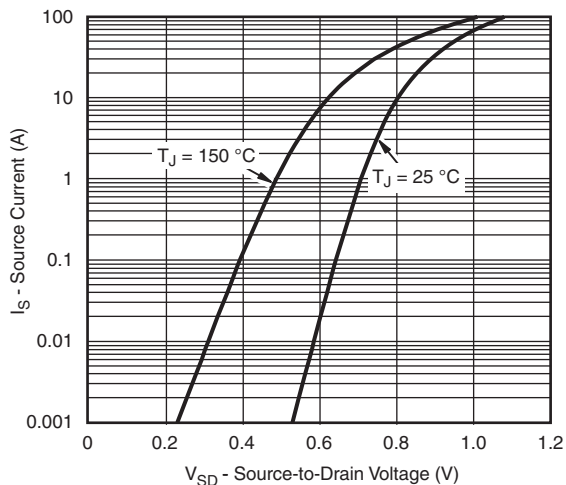


Gate Charge

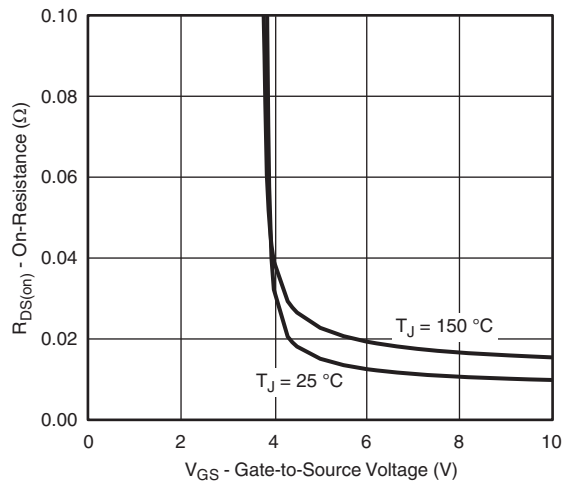


On-Resistance vs. Junction Temperature

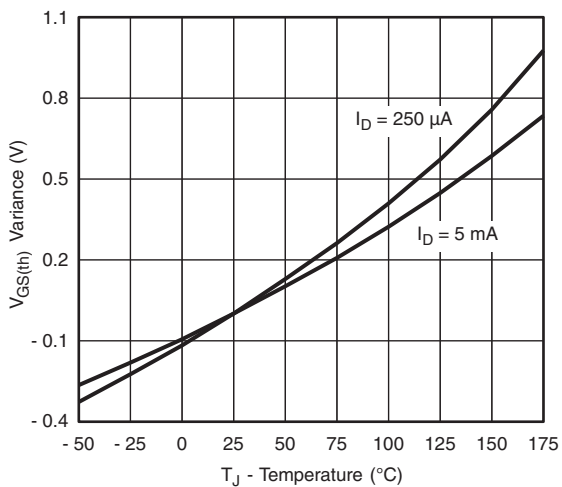
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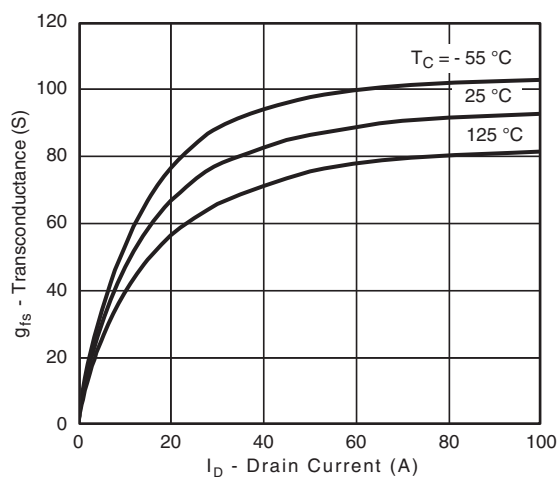
Source Drain Diode Forward Voltage



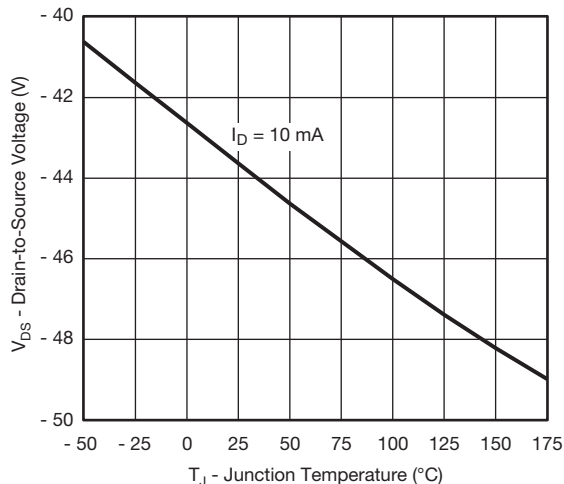
On-Resistance vs. Gate-to Source Voltage



Threshold Voltage

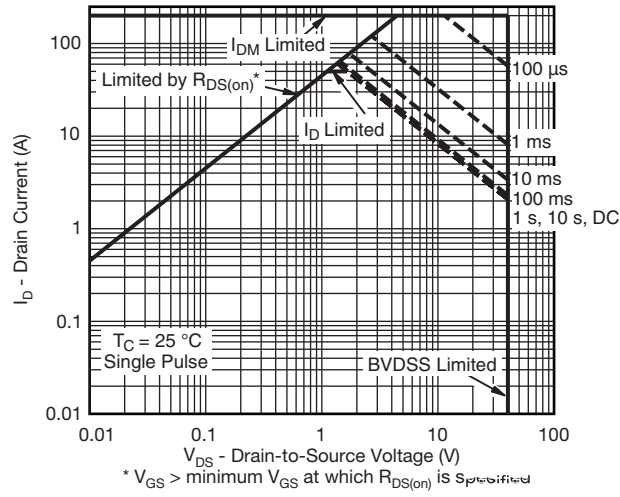


Transconductance

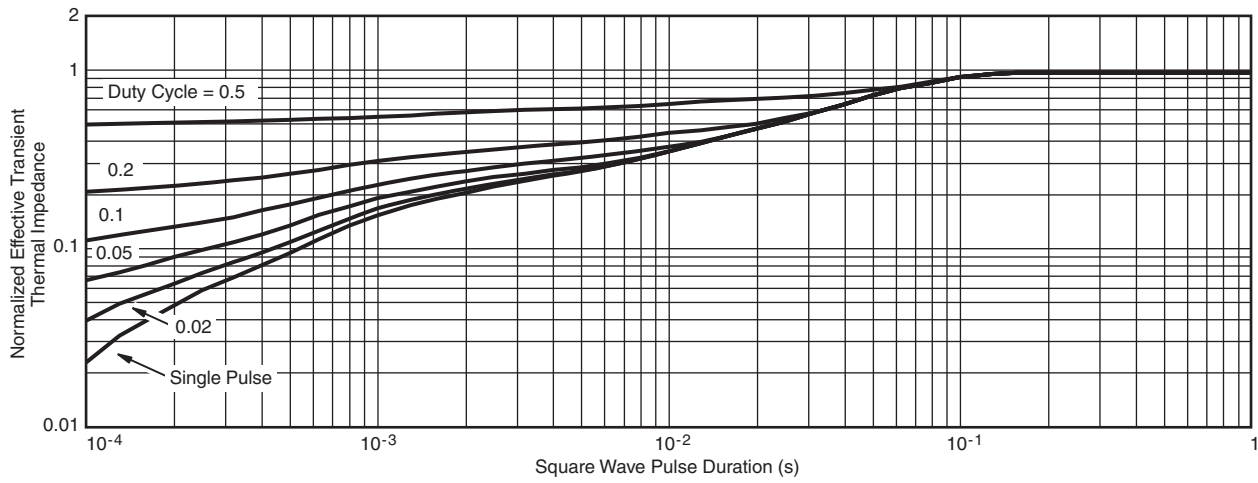


Drain Source Breakdown vs. Junction Temperature

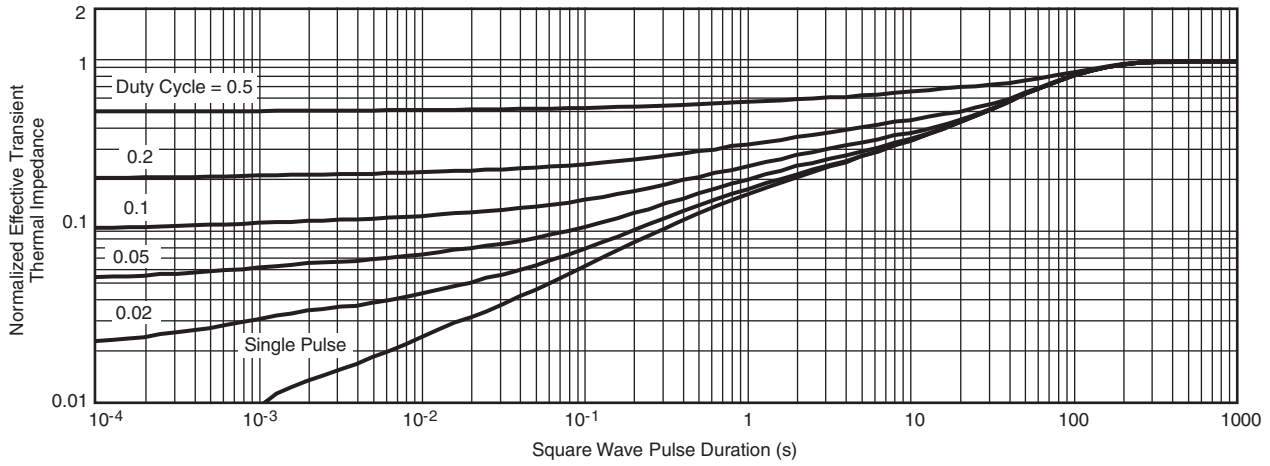
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

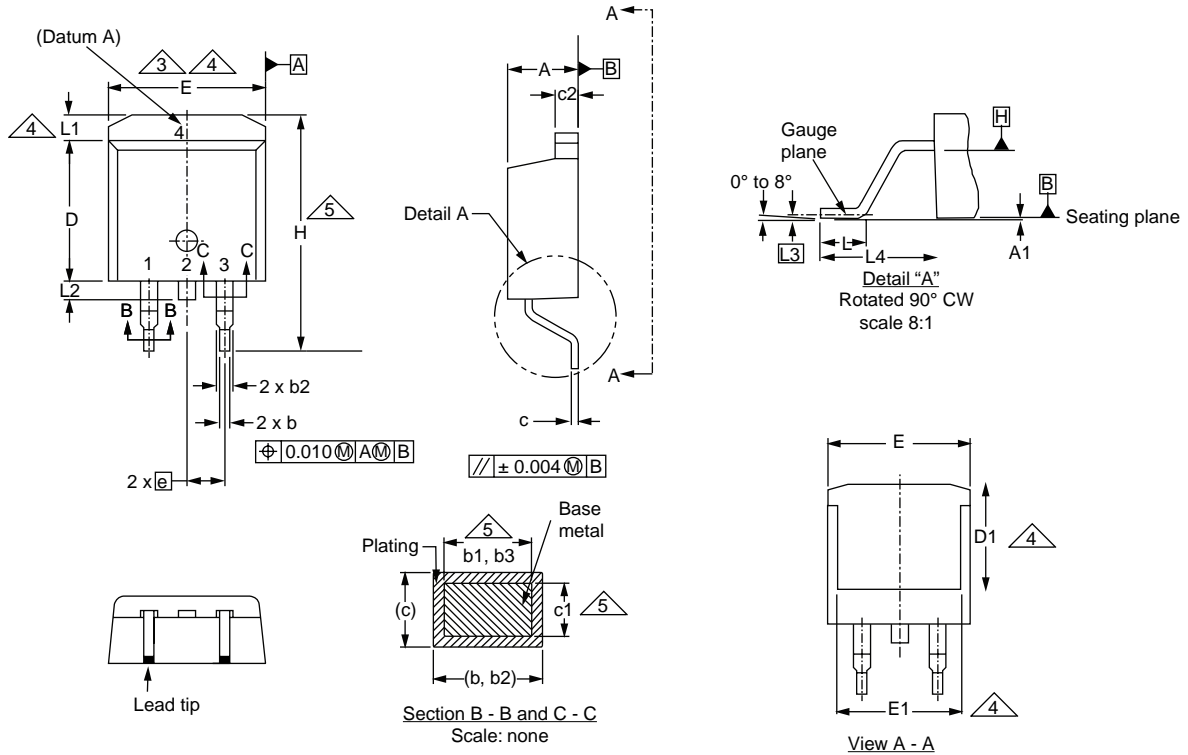


Normalized Thermal Transient Impedance, Junction-to-Ambient

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.

TO-263AB (HIGH VOLTAGE)



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.06	4.83	0.160	0.190
A1	0.00	0.25	0.000	0.010
b	0.51	0.99	0.020	0.039
b1	0.51	0.89	0.020	0.035
b2	1.14	1.78	0.045	0.070
b3	1.14	1.73	0.045	0.068
c	0.38	0.74	0.015	0.029
c1	0.38	0.58	0.015	0.023
c2	1.14	1.65	0.045	0.065
D	8.38	9.65	0.330	0.380

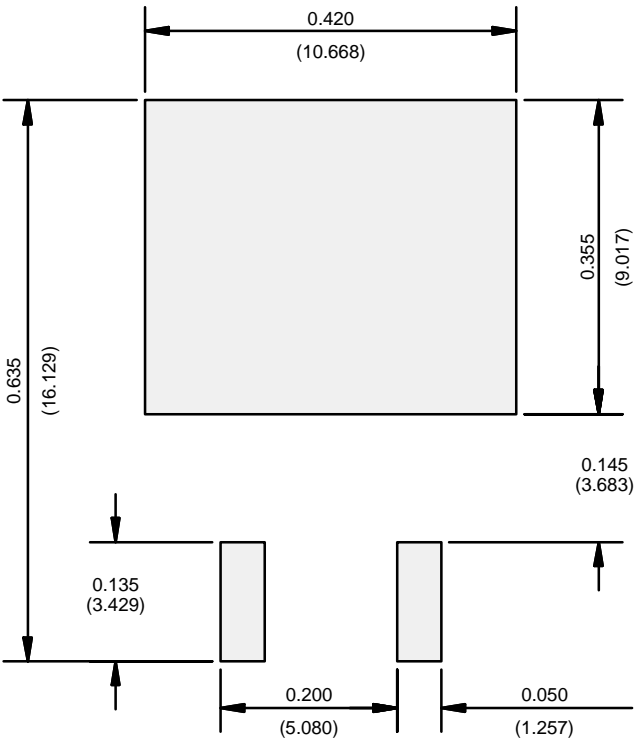
DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
D1	6.86	-	0.270	-
E	9.65	10.67	0.380	0.420
E1	6.22	-	0.245	-
e	2.54 BSC		0.100 BSC	
H	14.61	15.88	0.575	0.625
L	1.78	2.79	0.070	0.110
L1	-	1.65	-	0.066
L2	-	1.78	-	0.070
L3	0.25 BSC		0.010 BSC	
L4	4.78	5.28	0.188	0.208

ECN: S-82110-Rev. A, 15-Sep-08
DWG: 5970

Notes

1. Dimensioning and tolerancing per ASME Y14.5M-1994.
2. Dimensions are shown in millimeters (inches).
3. Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outmost extremes of the plastic body at datum A.
4. Thermal PAD contour optional within dimension E, L1, D1 and E1.
5. Dimension b1 and c1 apply to base metal only.
6. Datum A and B to be determined at datum plane H.
7. Outline conforms to JEDEC outline to TO-263AB.

RECOMMENDED MINIMUM PADS FOR D²PAK: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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