N-Channel 80 V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω) Max.	I_D (A)	Q_g (Typ.)
80	0.0062 at V_{GS} = 10 V	80[a]	17.1 nC

FEATURES

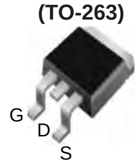
- DT-Trench Power MOSFET
- 100 % R_g and UIS Tested

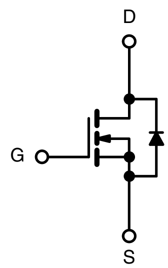
RoHS COMPLIANT

APPLICATIONS

- Primary Side Switching
- Synchronous Rectification
- DC/AC Inverters
- LED Backlighting

D^2PAK (TO-263)





N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise noted)				
Parameter		**Symbol**	**Limit**	**Unit**
Drain-Source Voltage		V_{DS}	80	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	80[a]	A
	T_C = 70 °C		72	
	T_A = 25 °C		35[b, c]	
	T_A = 70 °C		30[b, c]	
Pulsed Drain Current (t = 100 µs)		I_{DM}	320	
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	80[a]	
	T_A = 25 °C		9.5[b, c]	
Single Pulse Avalanche Current	L = 0.1 mH	I_{AS}	70	
Single Pulse Avalanche Energy		E_{AS}	450	mJ
Maximum Power Dissipation	T_C = 25 °C	P_D	295	W
	T_C = 70 °C		160	
	T_A = 25 °C		5[b, c]	
	T_A = 70 °C		3[b, c]	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150	°C
Soldering Recommendations (Peak Temperature)[d, e]			260	

THERMAL RESISTANCE RATINGS					
Parameter		**Symbol**	**Typical**	**Maximum**	**Unit**
Maximum Junction-to-Ambient[b, f]	t ≤ 10 s	R_{thJA}	12	16	°C/W
Maximum Junction-to-Case (Drain)	Steady State	R_{thJC}	0.39	0.54	

Notes

a. Package limited.
b. Surface mounted on 1" x 1" FR4 board.
c. t = 10 s.
d. The TO-263 is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.
e. Rework conditions: manual soldering with a soldering iron is not recommended for leadless components.
f. Maximum under steady state conditions is 70 °C/W.

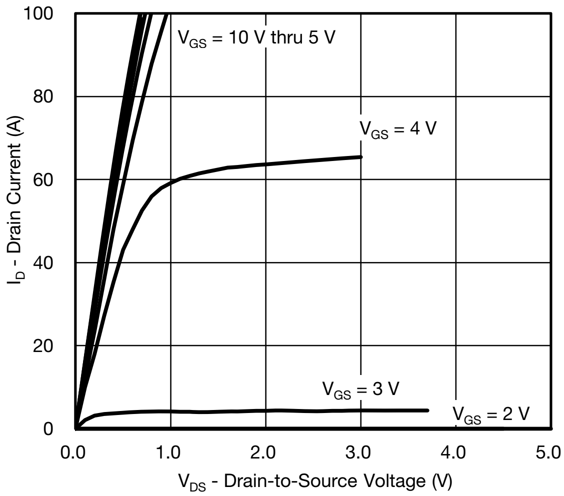
SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 μA	80			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = 250 μA		37		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 6		
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA	2		4	V
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 65 V, V_{GS} = 0 V			1	μA
		V_{DS} = 65 V, V_{GS} = 0 V, T_J = 55 °C			10	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \geq$ 5 V, V_{GS} = 10 V	320			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 20 A		0.0062	0.007	Ω
Forward Transconductance[a]	g_{fs}	V_{DS} = 10 V, I_D = 20 A		60		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = 50 V, V_{GS} = 0 V, f = 1 MHz		4255		pF
Output Capacitance	C_{oss}			750		
Reverse Transfer Capacitance	C_{rss}			66		
Total Gate Charge	Q_g	V_{DS} = 50 V, V_{GS} = 10 V, I_D = 10 A		55	84	nC
		V_{DS} = 50 V, V_{GS} = 6 V, I_D = 10 A		22	33	
		V_{DS} = 50 V, V_{GS} = 4.5 V, I_D = 10 A		20	26	
Gate-Source Charge	Q_{gs}			5.3		
Gate-Drain Charge	Q_{gd}			7.3		
Output Charge	Q_{oss}	V_{DS} = 50 V, V_{GS} = 0 V		61	88	
Gate Resistance	R_g	f = 1 MHz	0.5	1.4	2	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 40 V, R_L = 4 Ω, $I_D \cong$ 10 A, V_{GEN} = 10 V, R_g = 1 Ω		14		ns
Rise Time	t_r			10		
Turn-Off DelayTime	$t_{d(off)}$			33		
Fall Time	t_f			8		
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 40 V, R_L = 4 Ω, $I_D \cong$ 10 A, V_{GEN} = 6.0 V, R_g = 1 Ω		15		
Rise Time	t_r			13		
Turn-Off DelayTime	$t_{d(off)}$			34		
Fall Time	t_f			8		
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C			80	A
Pulse Diode Forward Current (t = 100 μs)	I_{SM}				320	
Body Diode Voltage	V_{SD}	I_S = 5 A		0.76	1.3	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 10 A, dI/dt = 100 A/μs, T_J = 25 °C		36		ns
Body Diode Reverse Recovery Charge	Q_{rr}			37		nC
Reverse Recovery Fall Time	t_a			20		ns
Reverse Recovery Rise Time	t_b			20		

Notes

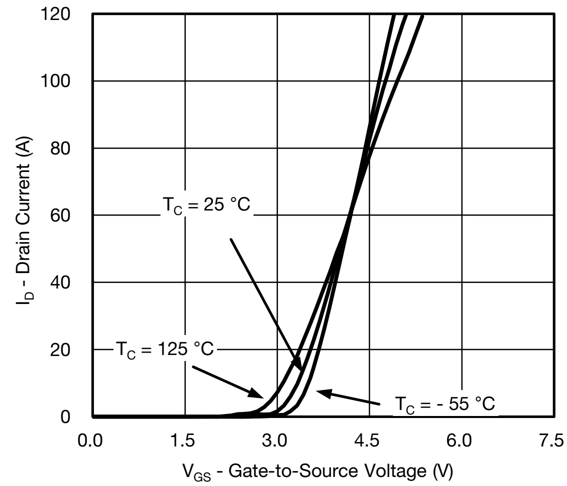
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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.

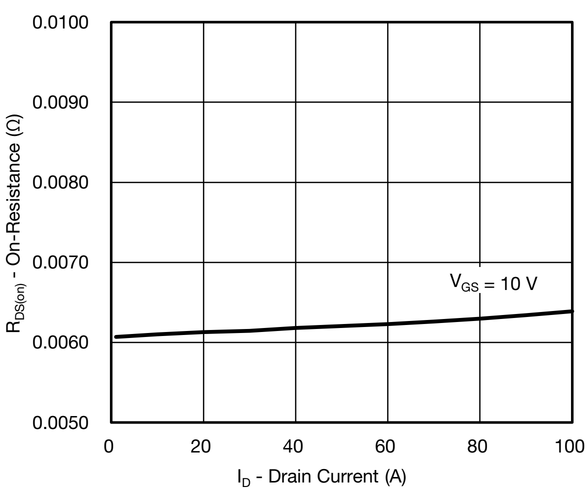
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



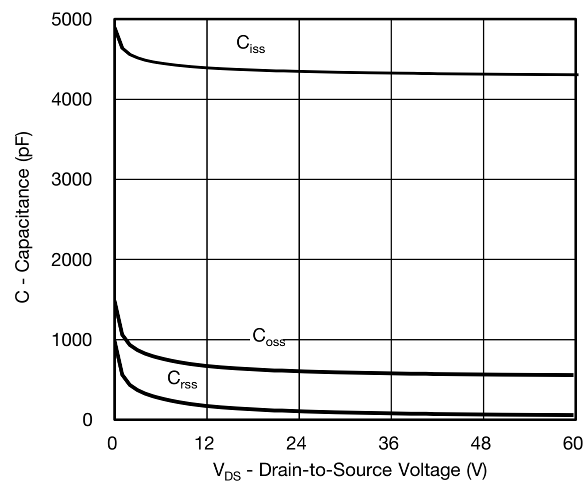
Output Characteristics



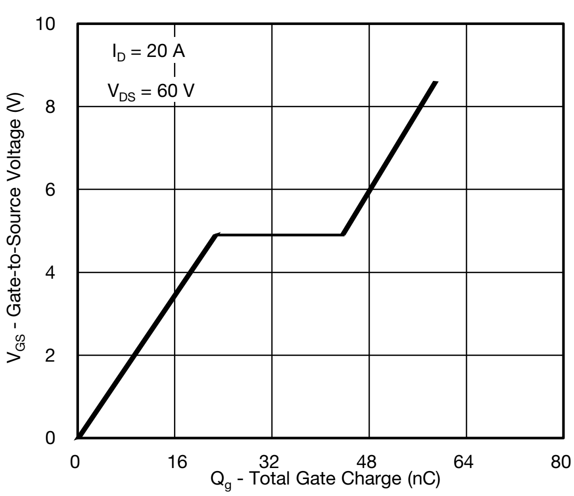
Transfer Characteristics



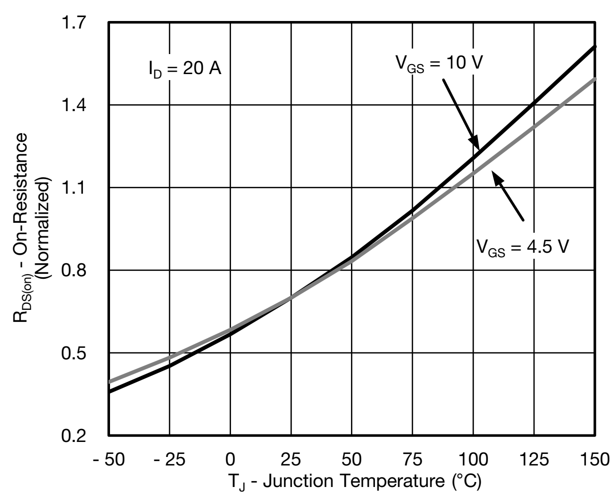
On-Resistance vs. Drain Current



Capacitance

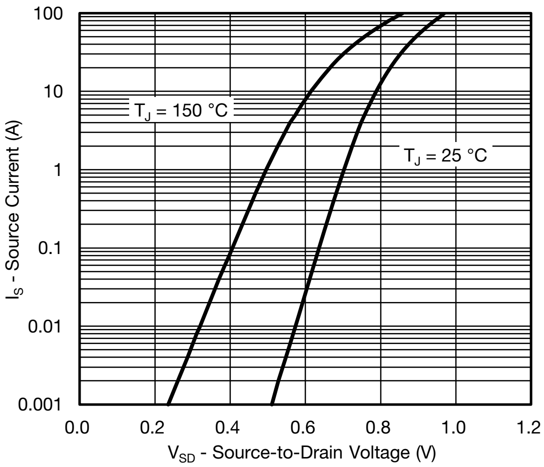


Gate Charge

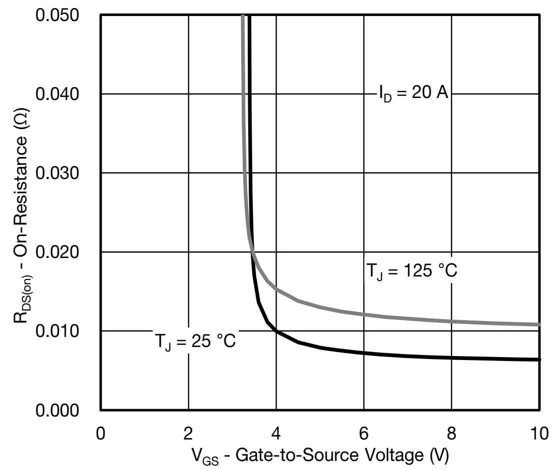


On-Resistance vs. Junction Temperature

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

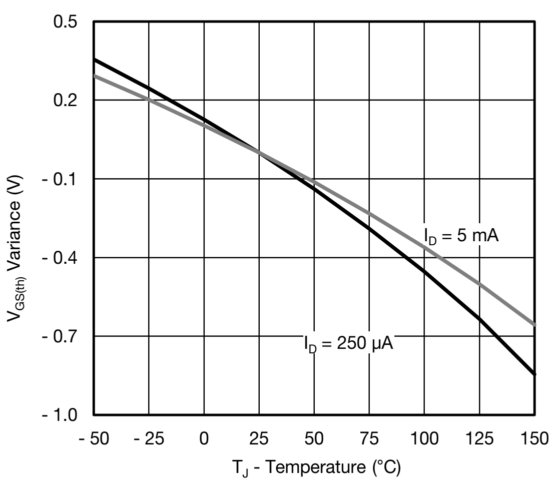


Source-Drain Diode Forward Voltage

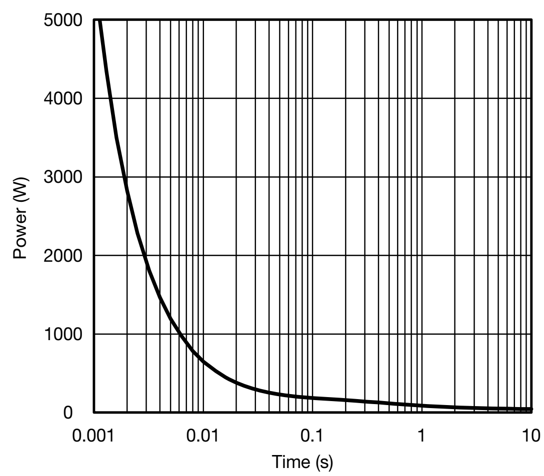


On-Resistance vs. Gate-to-Source Voltage

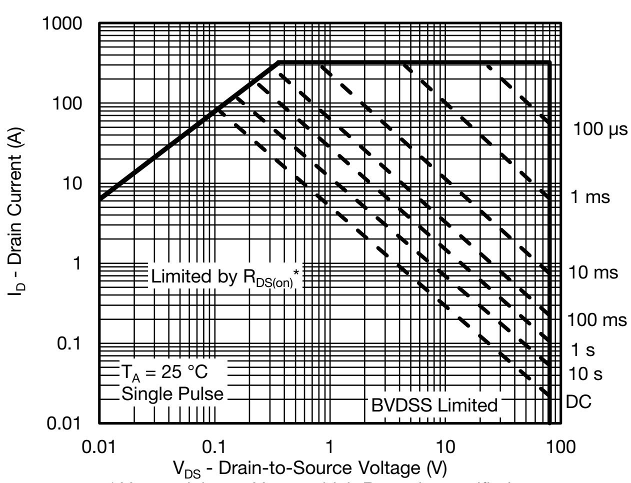
3



Threshold Voltage



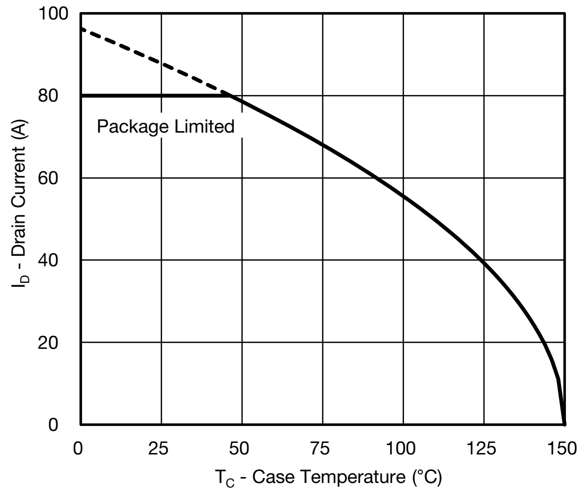
Single Pulse Power, Junction-to-Ambient



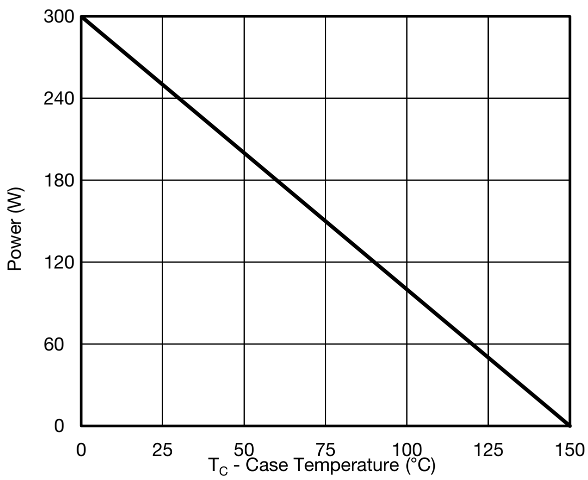
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

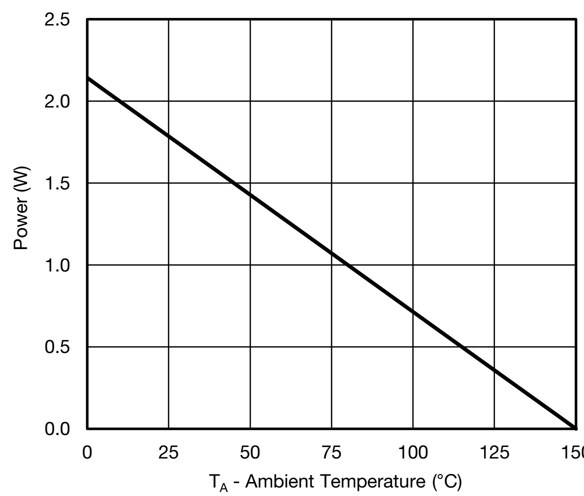
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating*



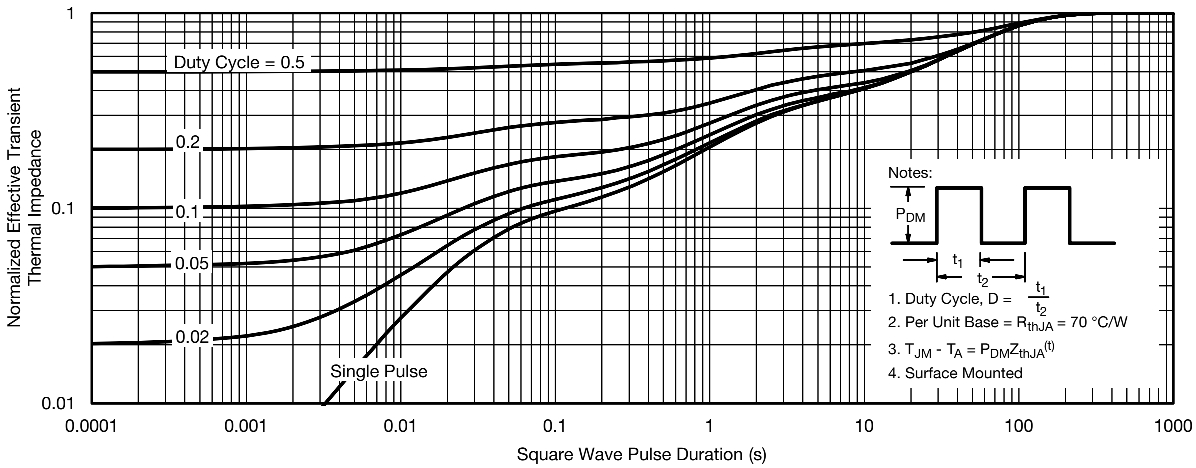
Power, Junction-to-Case



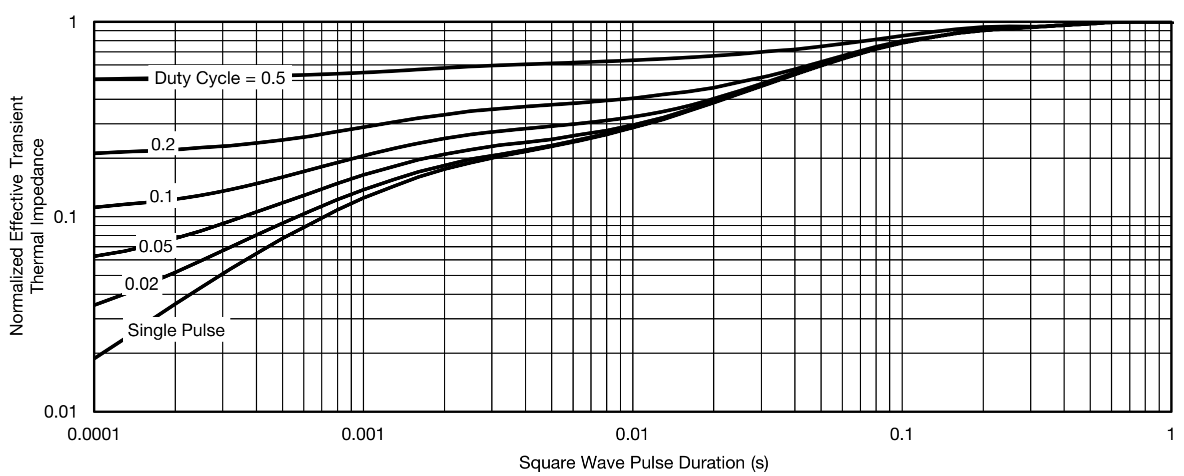
Power, Junction-to-Ambient

** The power dissipation P_D is based on $T_{J(max.)}$ = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.*

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

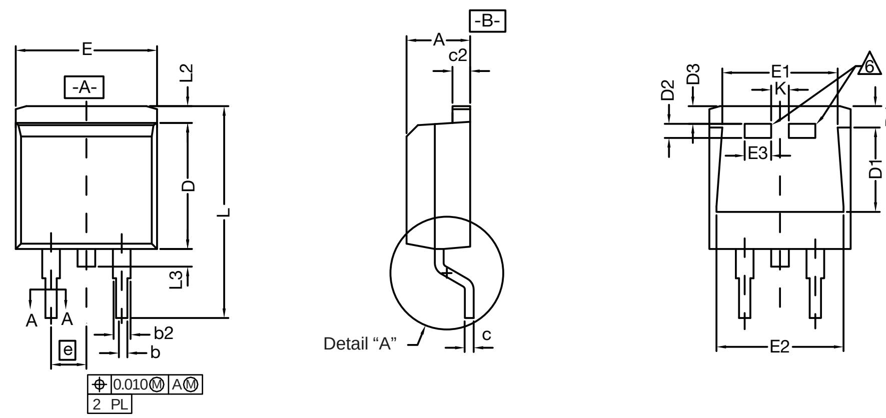


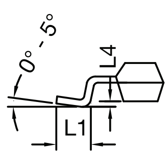
Normalized Thermal Transient Impedance, Junction-to-Ambient



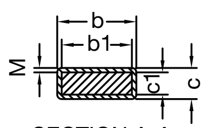
Normalized Thermal Transient Impedance, Junction-to-Case

TO-263 (D^2PAK): 3-LEAD





DETAIL A (ROTATED 90°)



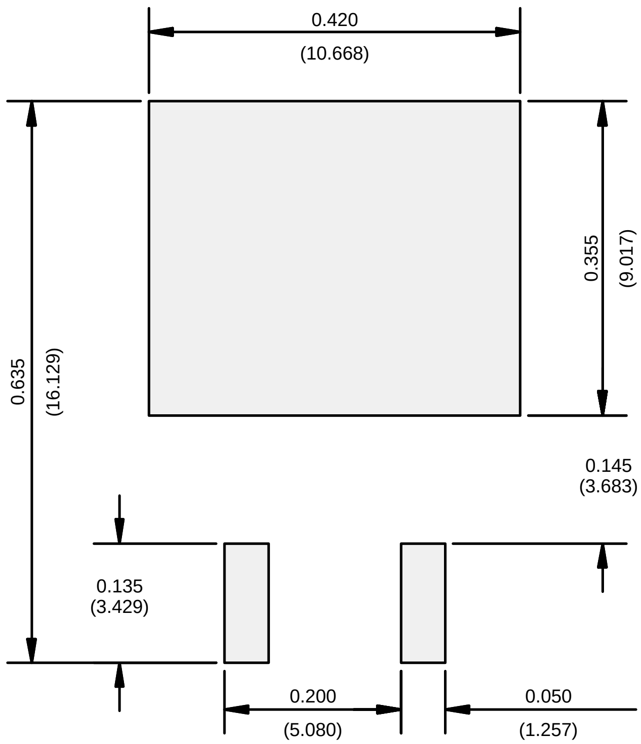
SECTION A-A

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*	Thin lead	0.013	0.018	0.330	0.457
	Thick lead	0.023	0.028	0.584	0.711
c1	Thin lead	0.013	0.017	0.330	0.431
	Thick lead	0.023	0.027	0.584	0.685
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
D4		0.044	0.052	1.118	1.321
E		0.380	0.410	9.652	10.414
E1		0.245	-	6.223	-
E2		0.355	0.375	9.017	9.525
E3		0.072	0.078	1.829	1.981
e		0.100 BSC		2.54 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: T13-0707-Rev. K, 30-Sep-13 DWG: 5843					

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. *: Thin lead is for SUB, SYB.
   Thick lead is for SUM, SYM, SQM.
5. Use inches as the primary measurement.
6. This feature is for thick lead.

RECOMMENDED MINIMUM PADS FOR D^{2}PAK: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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