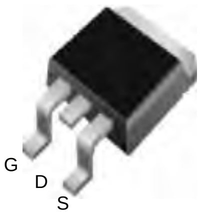
N-Channel 200-V (D-S) MOSFET

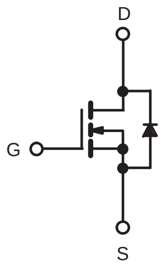
PRODUCT SUMMARY

$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)
200	0.122 at V_{GS} = 10 V	25

D²PAK
(TO-263)



Top View



N-Channel MOSFET

FEATURES

- DT-Trench Power MOSFET
- 175 °C Junction Temperature
- Low Thermal Resistance Package
- 100 % R_g and UIS tested

RoHS*
COMPLIANT

APPLICATIONS

- LCD/LED TV
- Consumer Appliances
- Lighting
- AC-DC Power Supply

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise noted)

PARAMETER			SYMBOL	LIMIT	UNIT
Drain-Source Voltage			V_{DS}	200	V
Gate-Source Voltage			V_{GS}	± 20	
Continuous Drain Current	V_{GS} at 10 V	T_C = 25 °C	I_D	25[a]	A
		T_C = 100 °C		18[a]	
Pulsed Drain Current			I_{DM}	100	
Single Pulse Avalanche Energy			E_{AS}	365	mJ
Avalanche Current			I_{AR}	25	A
Repetiitive Avalanche Energy			E_{AR}	14	mJ
Maximum Power Dissipation	T_C = 25 °C		P_D	3.1[c]	W
	T_A = 25 °C[b]			130	
Peak Diode Recovery dV/dt			dV/dt	5.0	V/ns
Operating Junction and Storage Temperature Range			T_J, T_{stg}	- 55 to + 175	°C
Soldering Recommendations (Peak Temperature)	for 10 s			300	

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient (PCB Mounted, Steady-State)	R_{thJA}	-	65	°C/W
Maximum Junction-to-Case (Drain)	R_{thJC}	-	4.98	

a. Package limited.
b. When Mounted on 1" square PCB (FR-4 material).
c. See SOA curve for voltage derating.

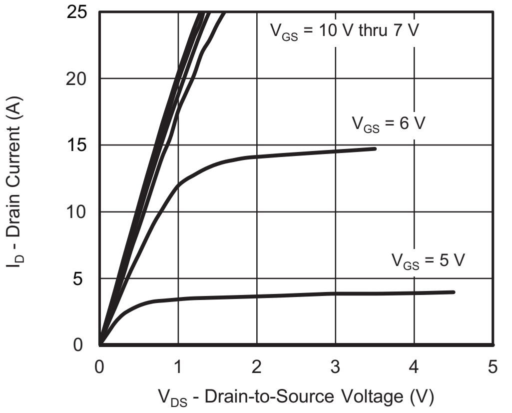
SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 µA	200	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	2	-	4	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V	-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 160 V, V_{GS} = 0 V	-	-	1	µA
		V_{DS} = 160 V, V_{GS} = 0 V, T_J = 125 °C	-	-	100	
		V_{DS} = 160 V, V_{GS} = 0 V, T_J = 175 °C	-	-	2	mA
On-State Drain Current [a]	$I_{D(on)}$	$V_{DS} \geq 10$ V, V_{GS} = 10 V	25	-	-	A
Drain-Source On-State Resistance [a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 10 A	-	0.122	0.145	Ω
		V_{GS} = 7.5 V, I_D = 8 A	-	0.135	0.158	
Forward Transconductance [a]	g_{fs}	V_{DS} = 20 V, I_D = 10 A	-	15	-	S
Dynamic [b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 160 V, f = 1 MHz	-	2450	-	pF
Output Capacitance	C_{oss}			350		
Reverse Transfer Capacitance	C_{rss}		-	90	-	
Total Gate Charge [c]	Q_g	V_{DS} = 160 V, V_{GS} = 10 V, I_D = 10 A	-	25	41	nC
Gate-Source Charge [c]	Q_{gs}			4.5		
Gate-Drain Charge [c]	Q_{gd}			13		
Gate Resistance	R_g	f = 1 MHz		3.9		Ω
Turn-On Delay Time [c]	$t_{d(on)}$	V_{DD} = 160 V, R_L = 1.67 Ω $I_D \cong$ 10 A, V_{GEN} = 10 V, R_g = 1 Ω		15	26	ns
Rise Time [c]	t_r			25	44	
Turn-Off Delay Time [c]	$t_{d(off)}$		-	27	54	
Fall Time [c]	t_f		-	9	20	
Drain-Source Body Diode Ratings and Characteristics [b] (T_C = 25 °C)						
Pulsed Current (t = 100 µs)	I_{SM}		-	-	100	A
Forward Voltage [a]	V_{SD}	I_F = 20 A, V_{GS} = 0 V		0.75	1.5	V
Reverse Recovery Time	t_{rr}	I_F = 20 A, d/dt = 100 A/µs	-	88	176	ns
Peak Reverse Recovery Charge	$I_{RM(REC)}$		-	5	10	A
Reverse Recovery Charge	Q_{rr}			0.22	0.44	µC

Notes

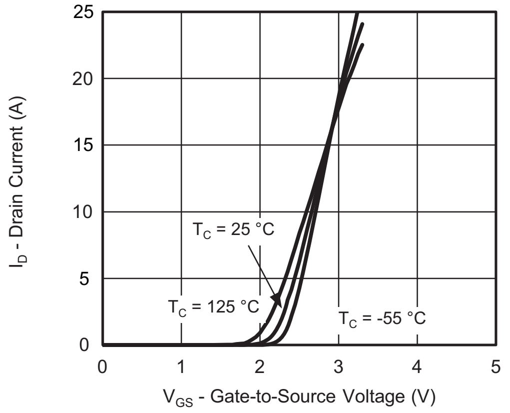
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

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.

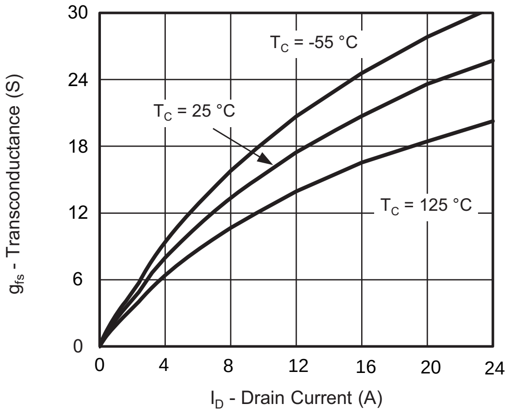
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



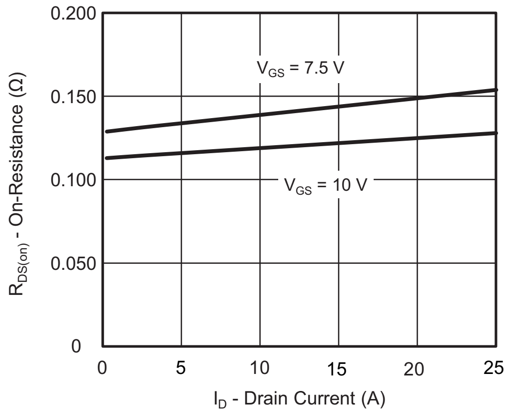
Output Characteristics



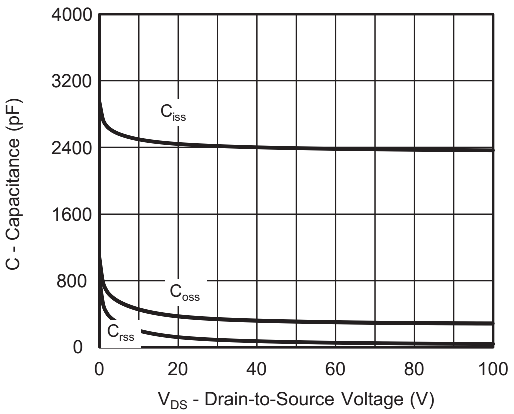
Transfer Characteristics



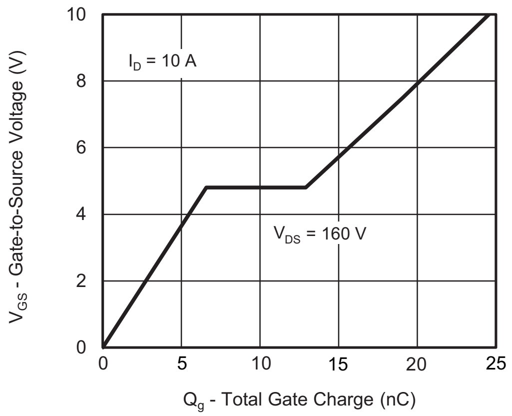
Transconductance



On-Resistance vs. Drain Current

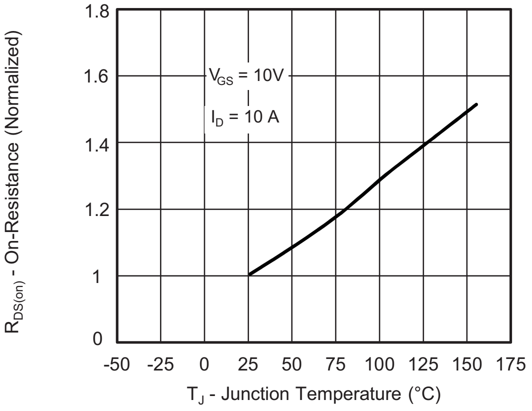


Capacitance

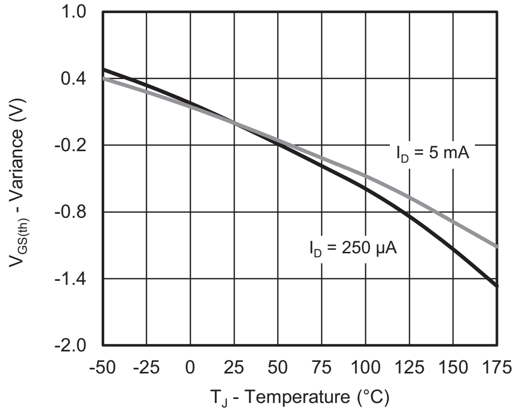


Gate Charge

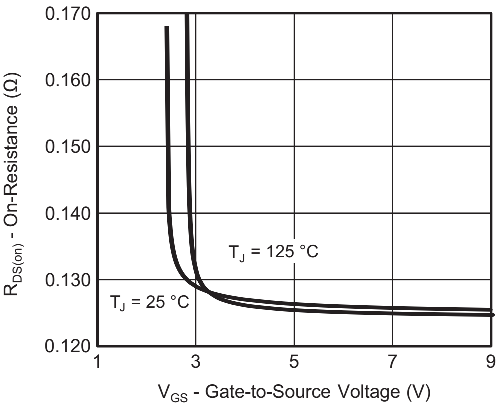
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



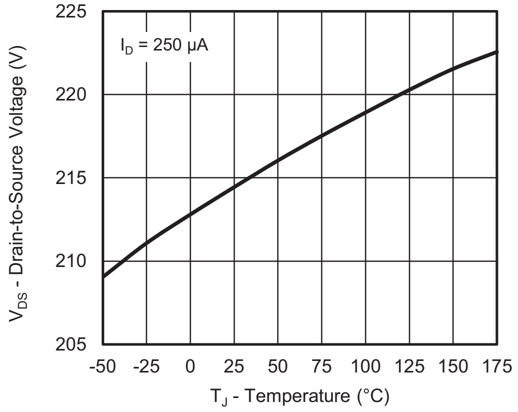
On-Resistance vs. Junction Temperature



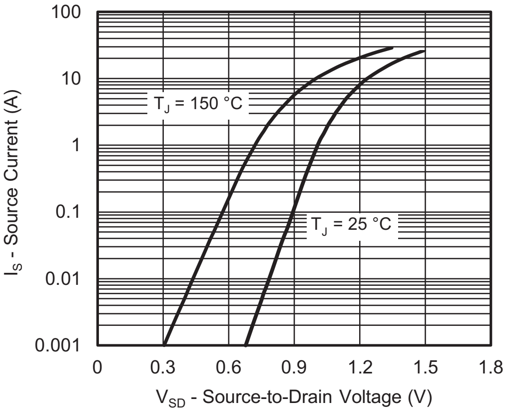
Threshold Voltage



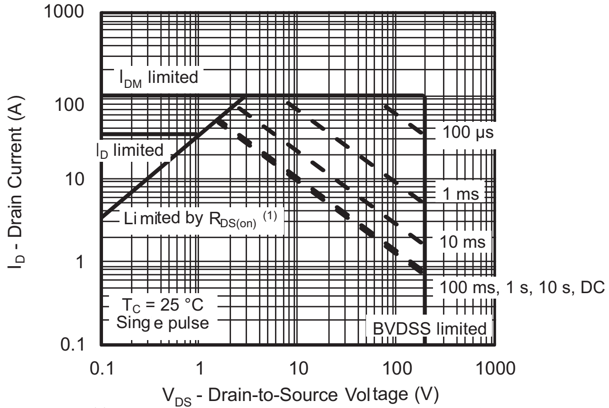
On-Resistance vs. Gate-to-Source Voltage



Drain Source Breakdown vs. Junction Temperature



Source Drain Diode Forward Voltage



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

Safe Operating Area

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

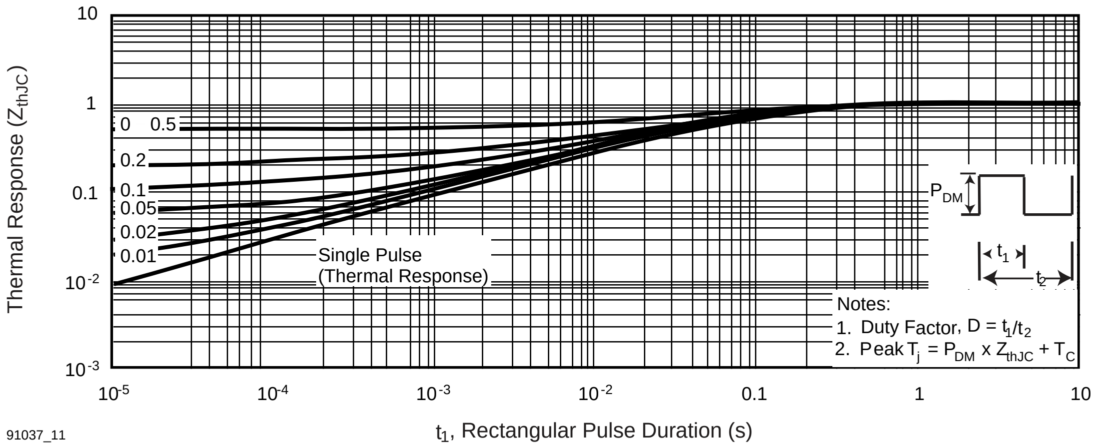
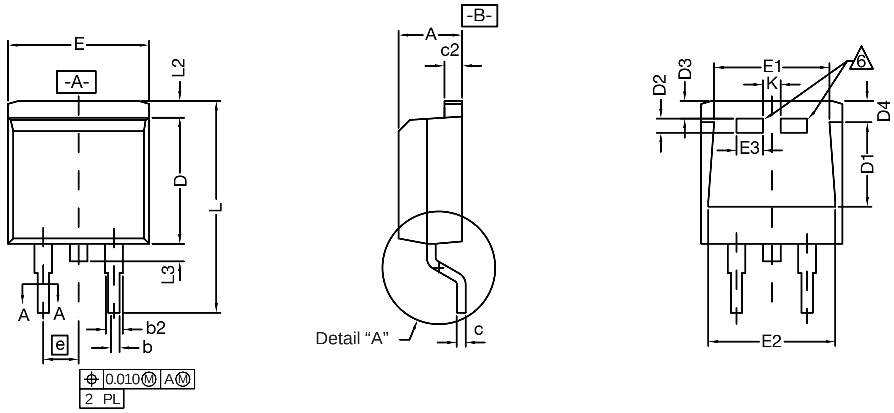
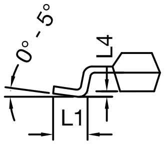


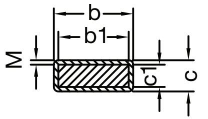
Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

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





DETAIL A (ROTATED 90°)



SECTION A-A

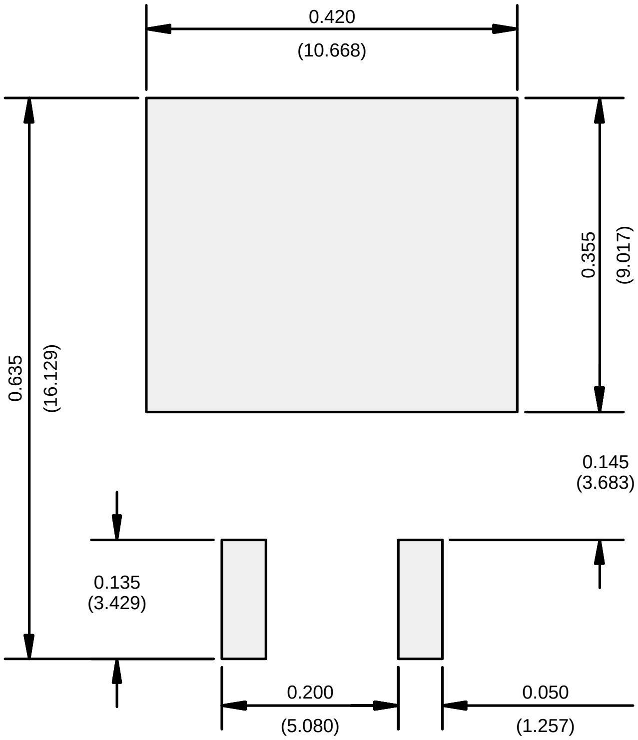
DIM.		INCHES		MILLIMETERS	
		MIN.	MAX.	MIN.	MAX.
A		0.160	0.190	4.064	4.826
b		0.020	0.039	0.508	0.990
b1		0.020	0.035	0.508	0.889
b2		0.045	0.055	1.143	1.397
c*	Thin lead	0.013	0.018	0.330	0.457
	Thick lead	0.023	0.028	0.584	0.711
c1	Thin lead	0.013	0.017	0.330	0.431
	Thick lead	0.023	0.027	0.584	0.685
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
$\boxed{\text{E3}}$		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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