N-Channel 60 V (D-S) Super Junction Power MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)[a]
60	0.0021 at V_{GS} = 10 V	190
	0.0029 at V_{GS} = 4.5 V	150

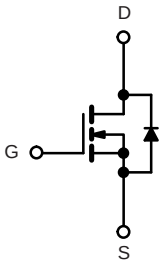
FEATURES

- 175 °C Junction Temperature
- DT-Trench Power MOSFET
- Material categorization:

RoHS COMPLIANT

TO-263

Top View



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise noted)				
Parameter		**Symbol**	**Limit**	**Unit**
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current (T_J = 175 °C)[b]	T_C = 25 °C	I_D	190	A
	T_C = 100 °C		150[a]	
Pulsed Drain Current		I_{DM}	660	
Continuous Source Current (Diode Conduction)		I_S	190[a]	
Avalanche Current		I_{AS}	189	
Single Avalanche Energy (Duty Cycle ≤ 1 %)	L = 0.1 mH	E_{AS}	750	mJ
Maximum Power Dissipation	T_C = 25 °C	P_D	235	W
	T_C = 75 °C		157	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS					
Parameter		**Symbol**	**Typical**	**Maximum**	**Unit**
Maximum Junction-to-Ambient[a]	t ≤ 10 sec	R_{thJA}	10	15	°C/W
	Steady State		30	40	
Maximum Junction-to-Case		R_{thJC}	0.55	1.0	

Notes:
a. Package limited.
b. Surface mounted on 1" x 1" FR4 board.
c. t ≤ 10 s.

SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.[a]**	**Max.**	**Unit**
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 µA	60			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	1		2.5	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 48 V, V_{GS} = 0 V			1	µA
		V_{DS} = 48 V, V_{GS} = 0 V, T_J = 125 °C			50	
		V_{DS} = 48 V, V_{GS} = 0 V, T_J = 175 °C			250	
On-State Drain Current[b]	$I_{D(on)}$	V_{DS} = 5 V, V_{GS} = 10 V	190			A
Drain-Source On-State Resistance[b]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 20 A		0.0021	0.0029	Ω
		V_{GS} = 10 V, I_D = 20 A, T_J = 125 °C		0.0027	0.0032	
		V_{GS} = 10 V, I_D = 10 A, T_J = 175 °C		0.0030	0.0036	
		V_{GS} = 4.5 V, I_D = 15 A		0.0029	0.0039	
Forward Transconductance[b]	g_{fs}	V_{DS} = 48 V, I_D = 20 A		45		S
Dynamic						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 48 V, f = 1 MHz		8510		pF
Output Capacitance	C_{oss}			1070		
Reverse Transfer Capacitance	C_{rss}			95		
Total Gate Charge[c]	Q_g	V_{DS} = 48 V, V_{GS} = 10 V, I_D = 20 A		65	77	nC
Gate-Source Charge[c]	Q_{gs}			10		
Gate-Drain Charge[c]	Q_{gd}			6.5		
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = 48 V, R_L = 0.6 Ω I_D ≅ 20 A, V_{GEN} = 10 V, R_g = 2.5 Ω		9		ns
Rise Time[c]	t_r			5		
Turn-Off Delay Time[c]	$t_{d(off)}$			52		
Fall Time[c]	t_f			11		
Source-Drain Diode Ratings and Characteristics (T_C = 25 °C)						
Pulsed Current	I_{SM}				660	A
Diode Forward Voltage	V_{SD}	I_F = 20 A, V_{GS} = 0 V		1	1.2	V
Reverse Recovery Time	t_{rr}	I_F = 20 A, di/dt = 100 A/µs		43	100	ns

Notes:

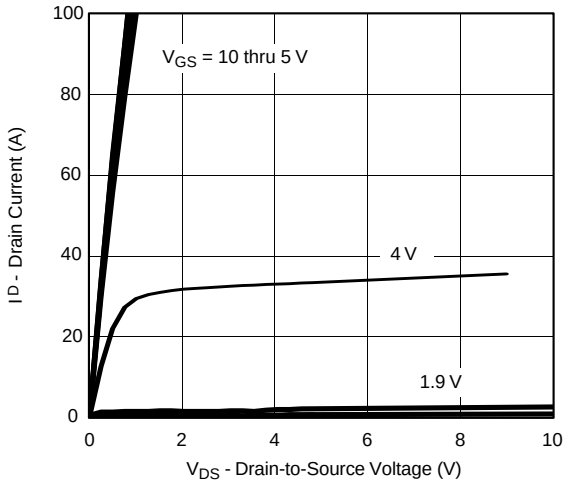
a. For design aid only; not subject to production testing.

b. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.

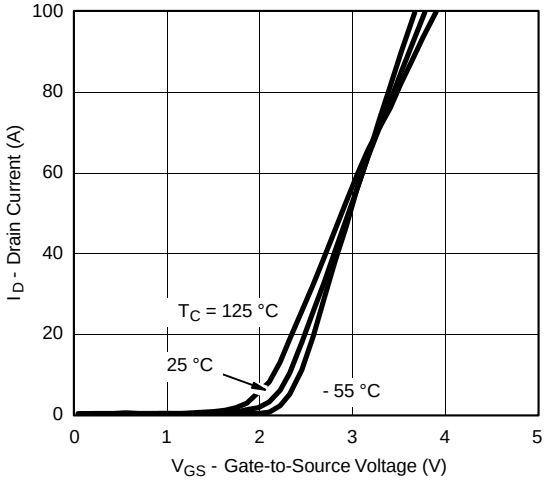
c. Independent of operating temperature.

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.

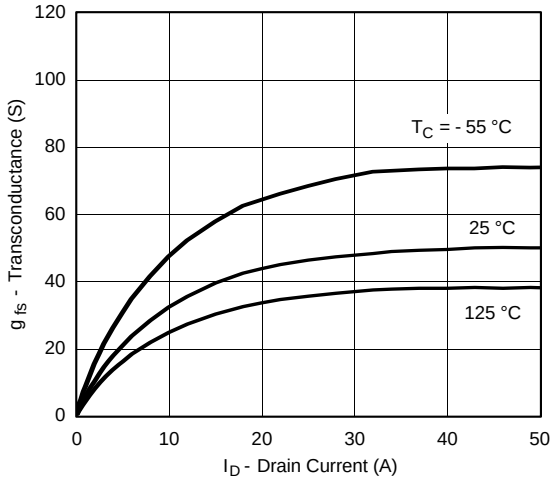
TYPICAL CHARACTERISTICS (25 °C unless noted)



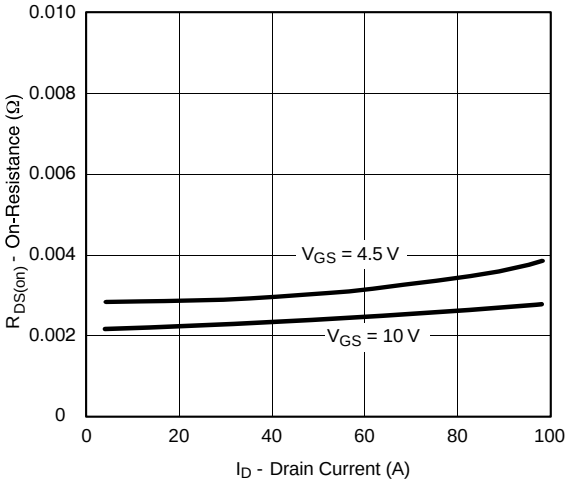
Output Characteristics



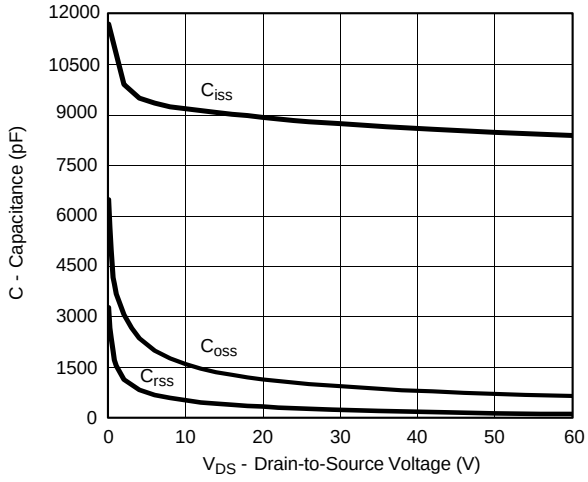
Transfer Characteristics



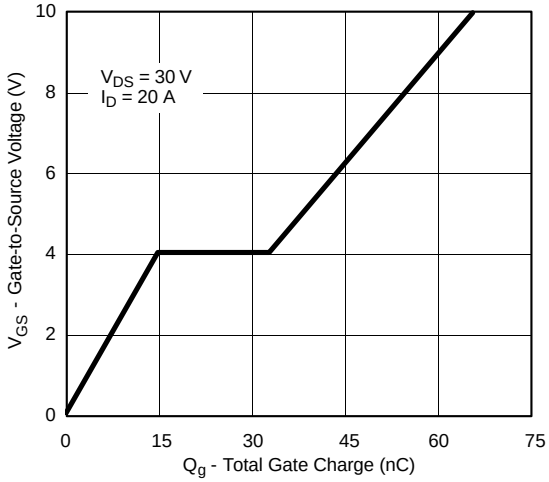
Transconductance



On-Resistance vs. Drain Current

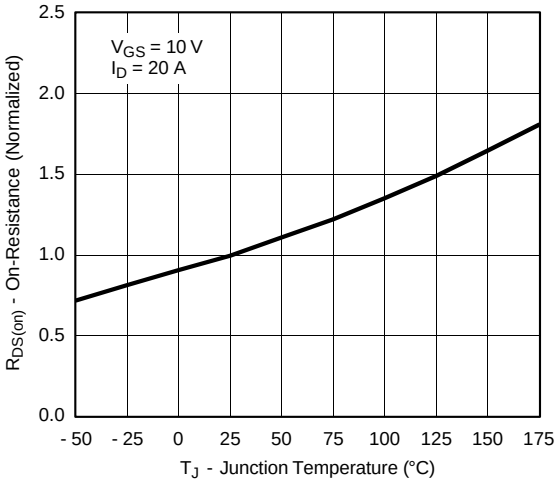


Capacitance

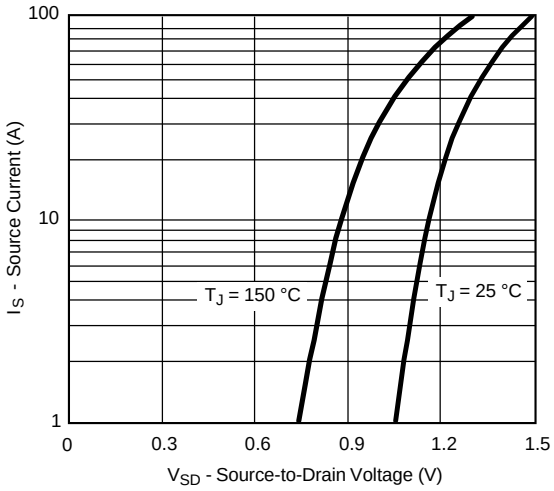


Gate Charge

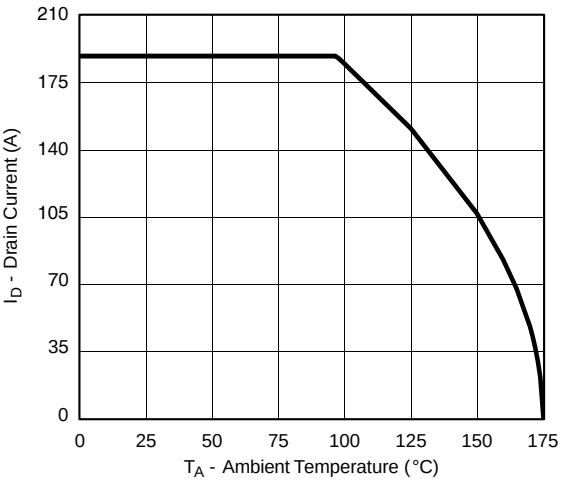
TYPICAL CHARACTERISTICS (25 °C unless noted)



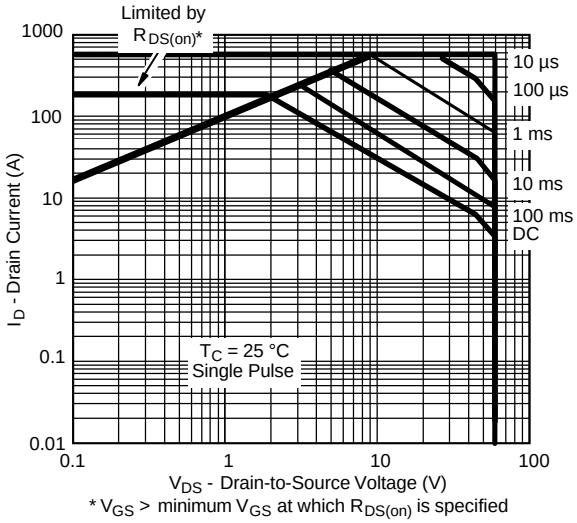
On-Resistance vs. Junction Temperature



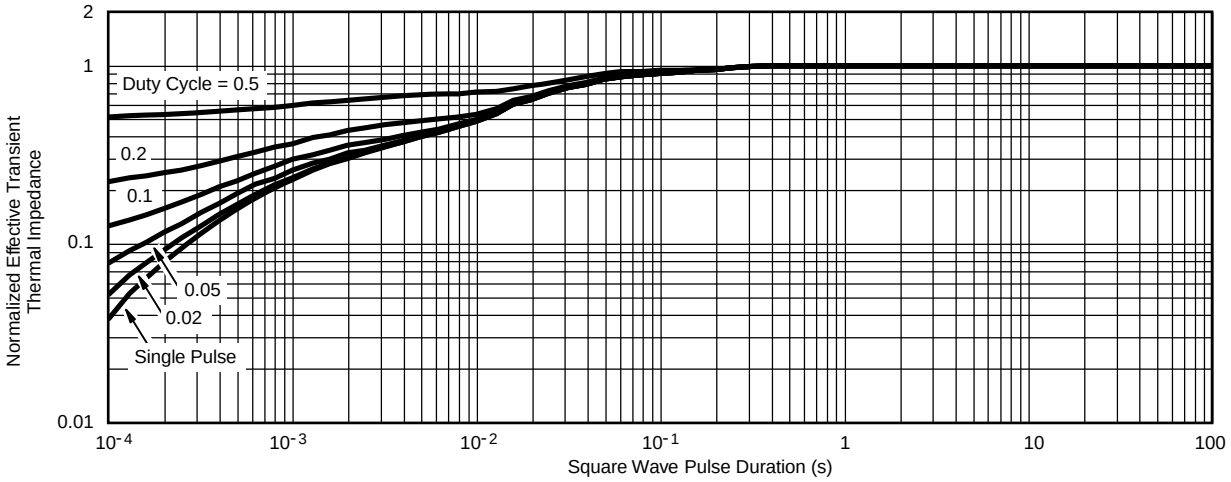
Source-Drain Diode Forward Voltage



Maximum Drain Current vs. Ambient Temperature

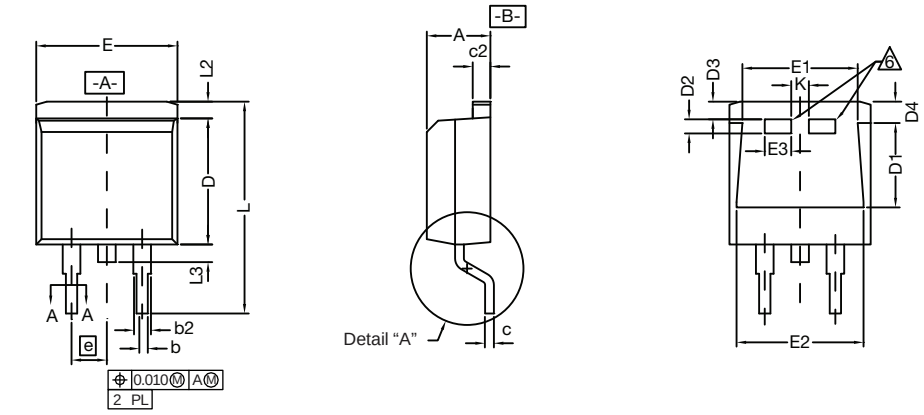


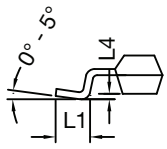
Safe Operating Area



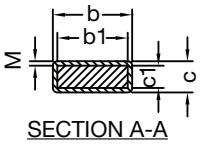
Normalized Thermal Transient Impedance, Junction-to-Case

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





DETAIL A (ROTATED 90°)



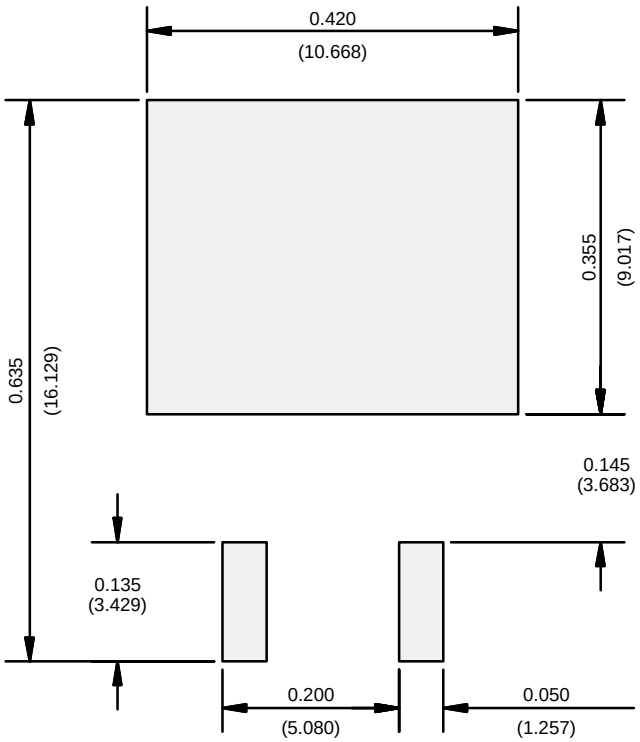
SECTION A-A

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 D²PAK: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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