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

PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)[a]
60	0.0035 at V_{GS} = 10 V	130
	0.005 at V_{GS} = 4.5 V	110

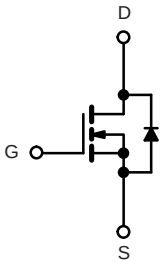
FEATURES

- 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	130	A
	T_C = 100 °C		110[a]	
Pulsed Drain Current		I_{DM}	480	
Continuous Source Current (Diode Conduction)		I_S	110[a]	
Avalanche Current		I_{AS}	110	
Single Avalanche Energy (Duty Cycle ≤ 1 %)	L = 0.1 mH	E_{AS}	500	mJ
Maximum Power Dissipation	T_C = 25 °C	P_D	180	W
	T_A = 25 °C		3[b], 8.5[b, c]	
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}	15	18	°C/W
	Steady State		40	50	
Maximum Junction-to-Case		R_{thJC}	0.85	1.1	

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	130			A
Drain-Source On-State Resistance[b]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 20 A		0.0035	0.0043	Ω
		V_{GS} = 10 V, I_D = 20 A, T_J = 125 °C		0.0040	0.0050	
		V_{GS} = 10 V, I_D = 10 A, T_J = 175 °C		0.0045	0.0055	
		V_{GS} = 4.5 V, I_D = 15 A		0.0050	0.0062	
Forward Transconductance[b]	g_{fs}	V_{DS} = 48 V, I_D = 20 A		50		S
Dynamic						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 48 V, f = 1 MHz		3950		pF
Output Capacitance	C_{oss}			670		
Reverse Transfer Capacitance	C_{rss}			23		
Total Gate Charge[c]	Q_g	V_{DS} = 48 V, V_{GS} = 10 V, I_D = 20 A		67	78	nC
Gate-Source Charge[c]	Q_{gs}			12		
Gate-Drain Charge[c]	Q_{gd}			8.5		
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		10	20	ns
Rise Time[c]	t_r			5	15	
Turn-Off Delay Time[c]	$t_{d(off)}$			55	70	
Fall Time[c]	t_f			12	20	
Source-Drain Diode Ratings and Characteristics (T_C = 25 °C)						
Pulsed Current	I_{SM}				130	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		45	100	ns

Notes:

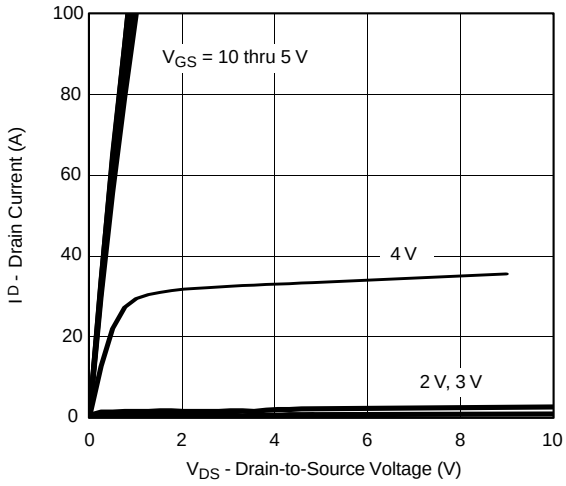
a. For design aid only; not subject to production testing.

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

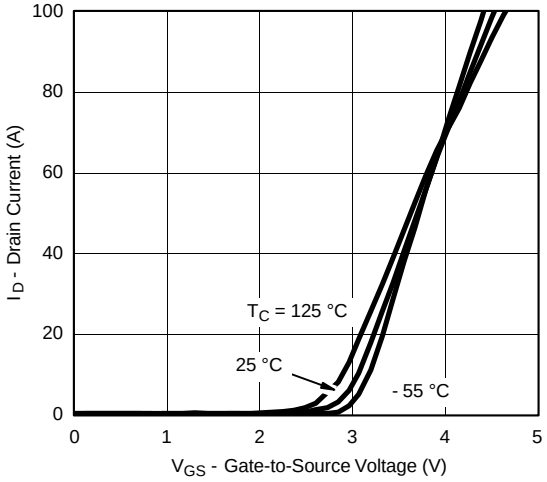
c. Independent of operating temperature.

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.

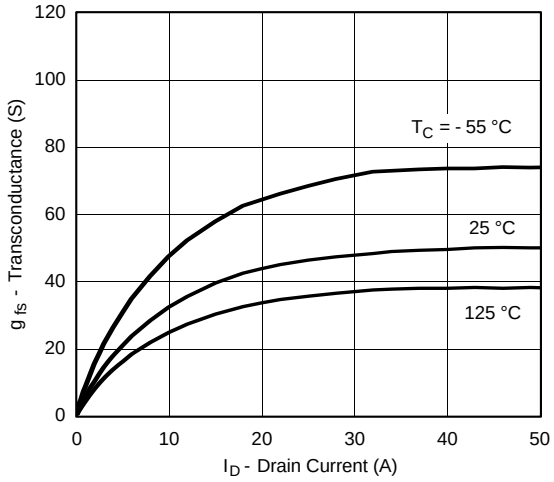
TYPICAL CHARACTERISTICS (25 °C unless noted)



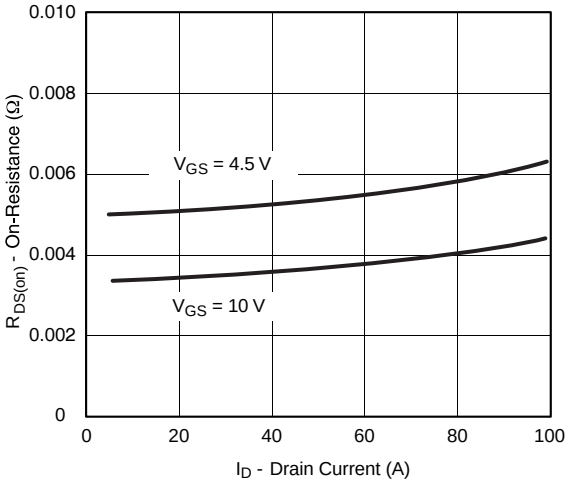
Output Characteristics



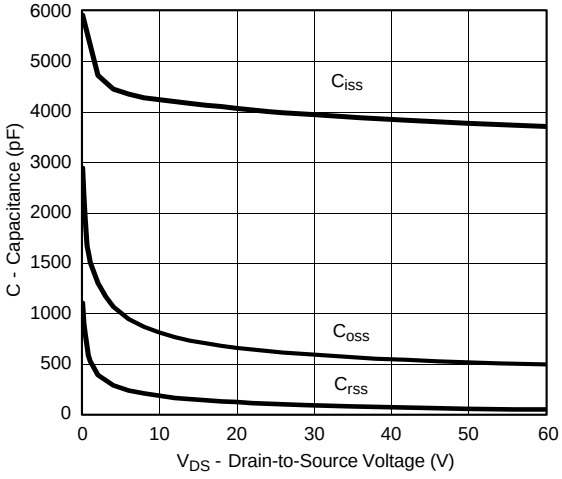
Transfer Characteristics



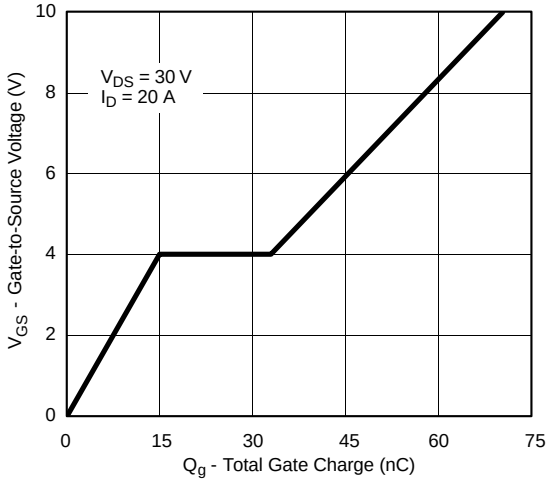
Transconductance



On-Resistance vs. Drain Current

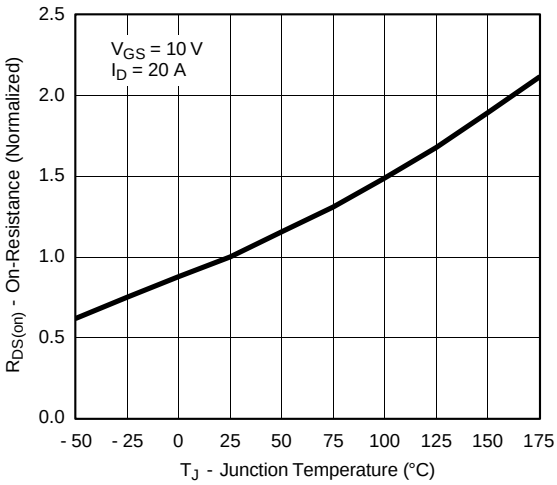


Capacitance

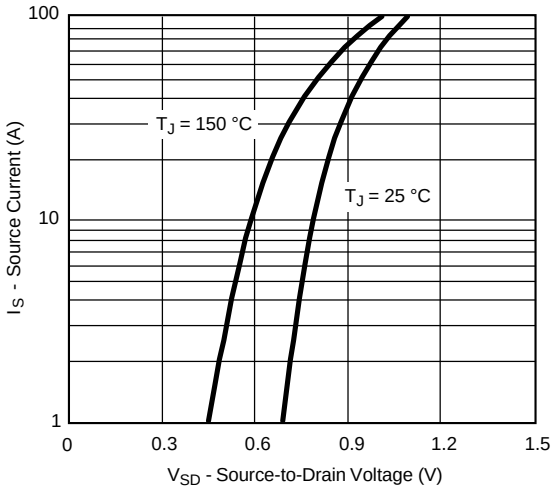


Gate Charge

TYPICAL CHARACTERISTICS (25 °C unless noted)

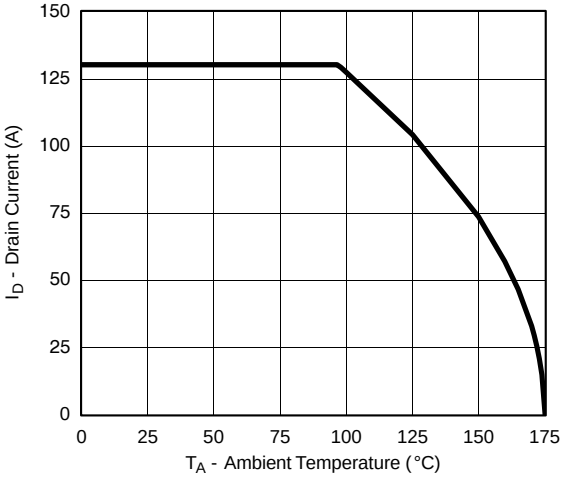


On-Resistance vs. Junction Temperature

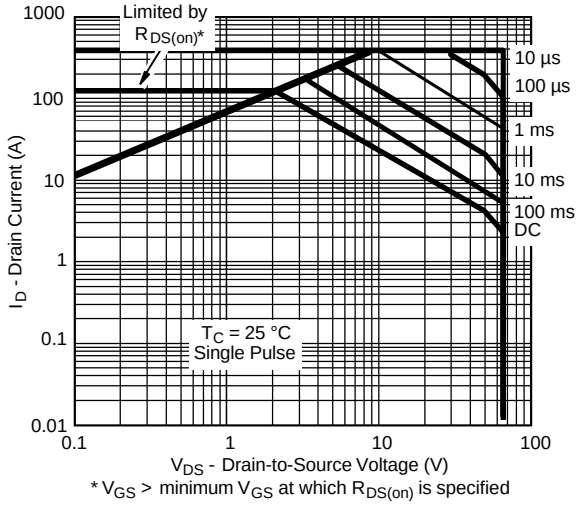


Source-Drain Diode Forward Voltage

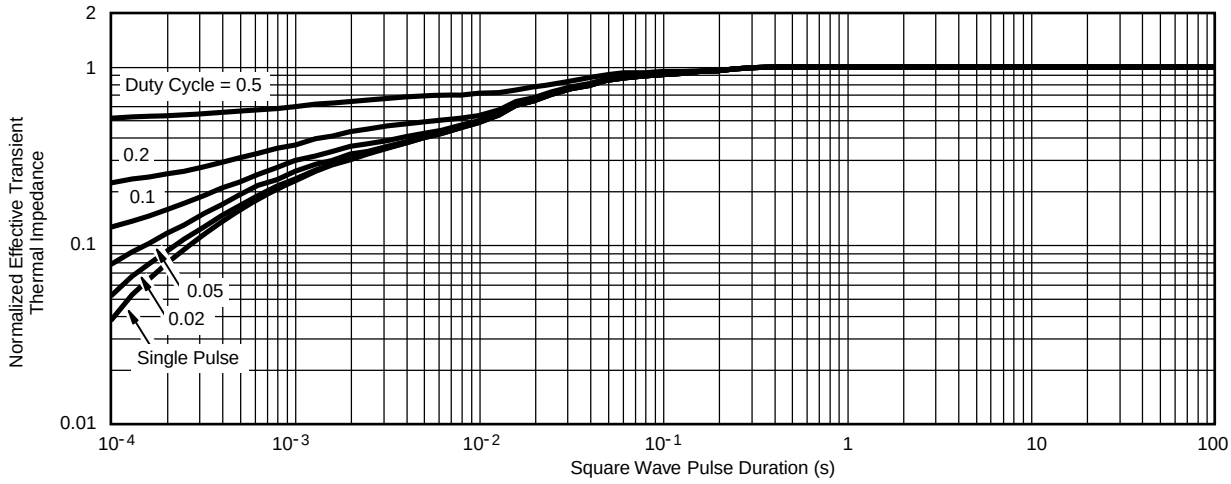
THERMAL RATINGS



Maximum Drain Current vs. Ambient Temperature

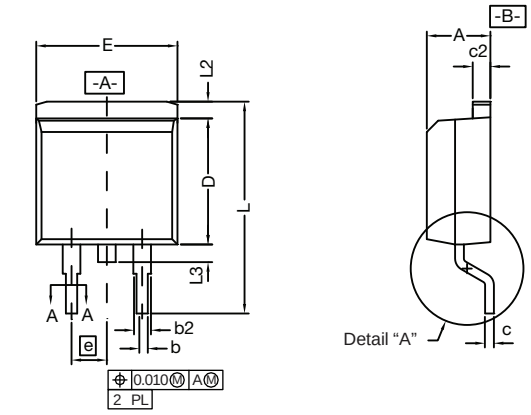


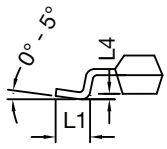
Safe Operating Area



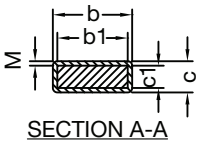
Normalized Thermal Transient Impedance, Junction-to-Case

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





DETAIL A (ROTATED 90°)



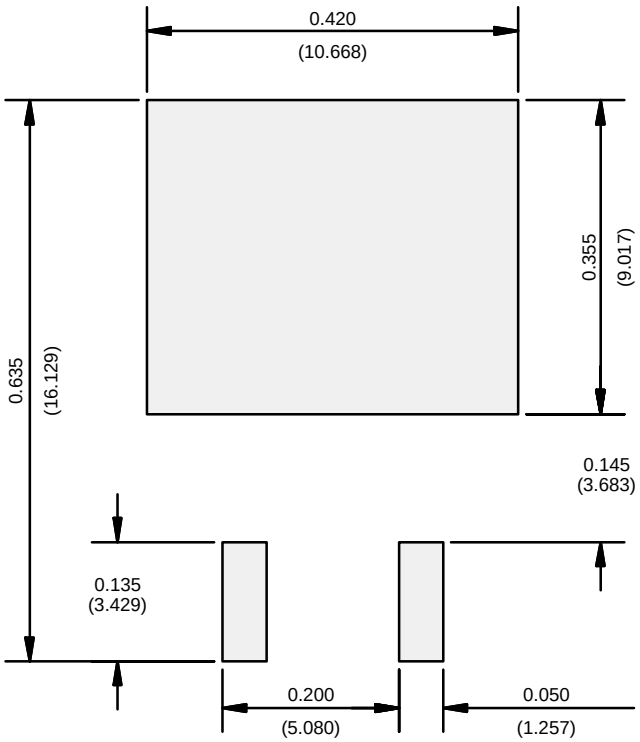
SECTION A-A

DIM.		INCHES		MILLIMETERS	
		MIN.	MAX.	MIN.	MAX.
A		0.150	0.190	3.810	4.826
b		0.014	0.031	0.358	0.790
b1		0.020	0.035	0.508	0.889
b2		0.045	0.055	1.143	1.397
c*	Thin lead	0.013	0.022	0.330	0.557
	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	0.410	8.636	10.414
E		0.380	0.440	9.652	11.176
e		0.100 BSC		2.54 BSC	
L		0.575	0.669	14.605	16.993
L1		0.090	0.110	2.286	2.794
L2		0.040	0.061	1.016	1.537
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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