

Automotive N-Channel 100 V (D-S) 175 °C MOSFET

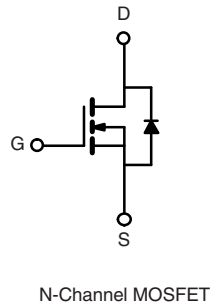
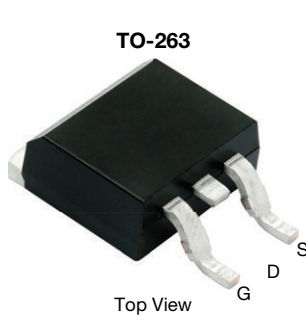
 AUTOMOTIVE
GRADE

RoHS
COMPLIANT
HALOGEN
FREE

PRODUCT SUMMARY	
V_{DS} (V)	100
$R_{DS(on)}$ (Ω) at $V_{GS} = 10$ V	0.024
$R_{DS(on)}$ (Ω) at $V_{GS} = 4.5$ V	0.027
I_D (A)	47
Configuration	Single
Package	TO-263

FEATURES

- TrenchFET® power MOSFET
- Package with low thermal resistance
- AEC-Q101 qualified ^c
- 100 % R_g and UIS tested
- Material categorization for definitions of compliance please see www.vishay.com/doc?99912



ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current	$T_C = 25$ °C	I_D	47	A
	$T_C = 125$ °C		27	
Continuous Source Current (Diode Conduction)		I_S	47	
Pulsed Drain Current ^a		I_{DM}	189	
Single Pulse Avalanche Current	L = 0.1 mH	I_{AS}	43	
Single Pulse Avalanche Energy		E_{AS}	92	
Maximum Power Dissipation ^a	$T_C = 25$ °C	P_D	136	W
	$T_C = 125$ °C		45	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to +175	°C

THERMAL RESISTANCE RATINGS				
PARAMETER		SYMBOL	LIMIT	UNIT
Junction-to-Ambient	PCB Mount ^b	R_{thJA}	40	°C/W
Junction-to-Case (Drain)		R_{thJC}	1.1	

Notes

- Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %.
- When mounted on 1" square PCB (FR4 material).
- Parametric verification ongoing.



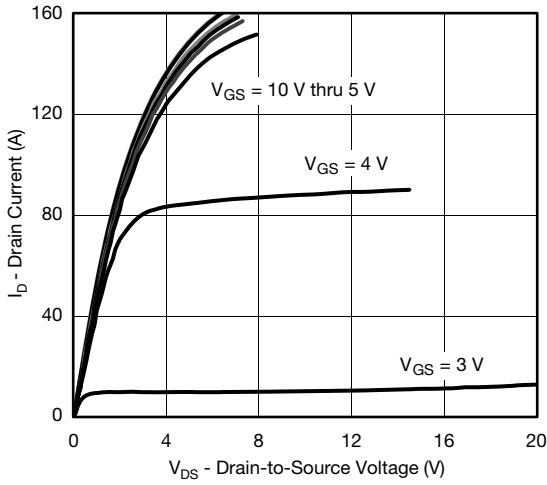
SPECIFICATIONS (T _C = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0, I _D = 250 μA		100	-	-	V
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		1.5	2.0	2.5	
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V	V _{DS} = 100 V	-	-	1	μA
		V _{GS} = 0 V	V _{DS} = 100 V, T _J = 125 °C	-	-	50	
		V _{GS} = 0 V	V _{DS} = 100 V, T _J = 175 °C	-	-	250	
On-State Drain Current ^a	I _{D(on)}	V _{GS} = 10 V	V _{DS} ≥ 5 V	120	-	-	A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V	I _D = 40 A	-	0.017	0.024	Ω
		V _{GS} = 10 V	I _D = 40 A, T _J = 125 °C	-	-	0.048	
		V _{GS} = 10 V	I _D = 40 A, T _J = 175 °C	-	-	0.061	
		V _{GS} = 4.5 V	I _D = 20 A	-	0.020	0.027	
Forward Transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 40 A		-	85	-	S
Dynamic ^b							
Input Capacitance	C _{iss}	V _{GS} = 0 V	V _{DS} = 25 V, f = 1 MHz	-	2893	3620	pF
Output Capacitance	C _{oss}			-	321	400	
Reverse Transfer Capacitance	C _{rss}			-	126	160	
Total Gate Charge ^c	Q _g	V _{GS} = 10 V	V _{DS} = 50 V, I _D = 40 A	-	48	72	nC
Gate-Source Charge ^c	Q _{gs}			-	10	-	
Gate-Drain Charge ^c	Q _{gd}			-	10	-	
Gate Resistance	R _g	f = 1 MHz		0.4	1	3.5	Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 50 V, R _L = 1.06 Ω I _D ≅ 47 A, V _{GEN} = 10 V, R _g = 1 Ω		-	10	15	ns
Rise Time ^c	t _r			-	6	9	
Turn-Off Delay Time ^c	t _{d(off)}			-	32	48	
Fall Time ^c	t _f			-	6	9	
Source-Drain Diode Ratings and Characteristics ^b							
Pulsed Current ^a	I _{SM}			-	-	189	A
Forward Voltage	V _{SD}	I _F = 40 A, V _{GS} = 0		-	0.85	1.5	V

Notes

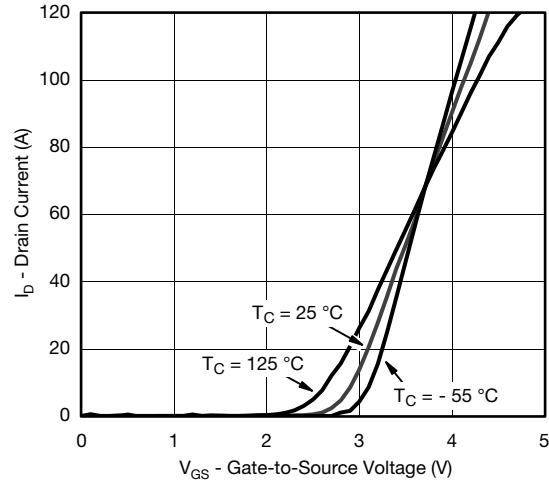
- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.
- b. Guaranteed by design, not subject to production testing.
- c. Independent of operating temperature.

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.

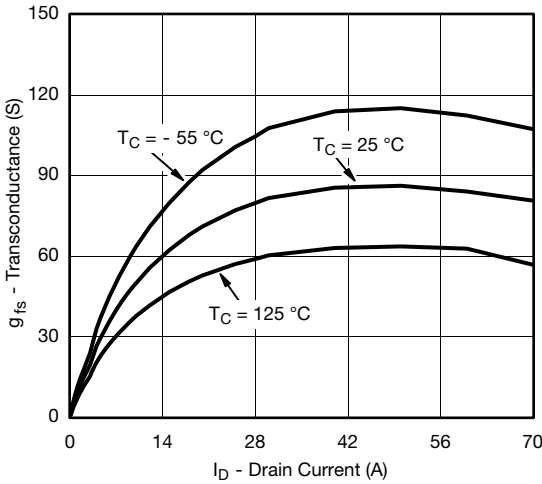
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



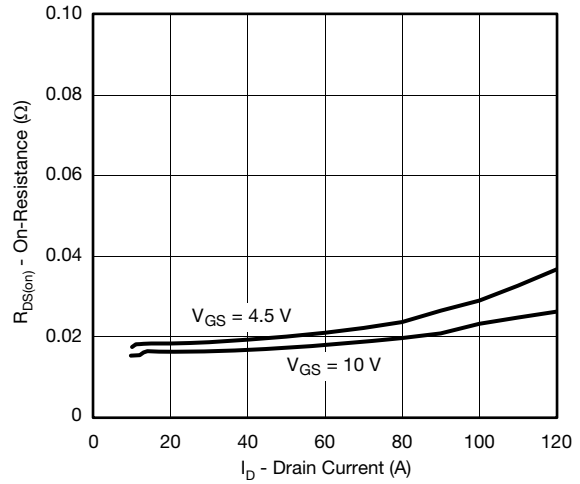
Output Characteristics



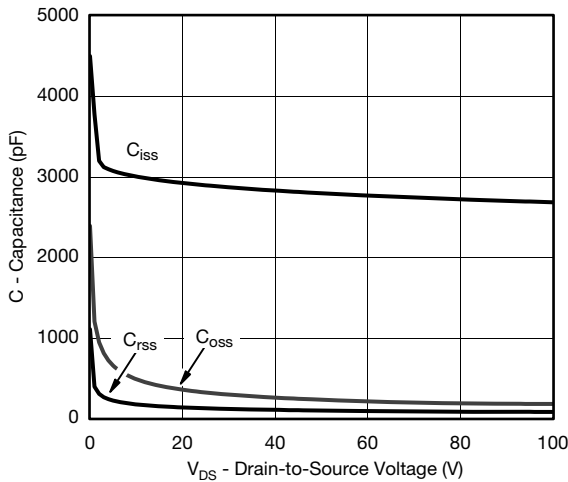
Transfer Characteristics



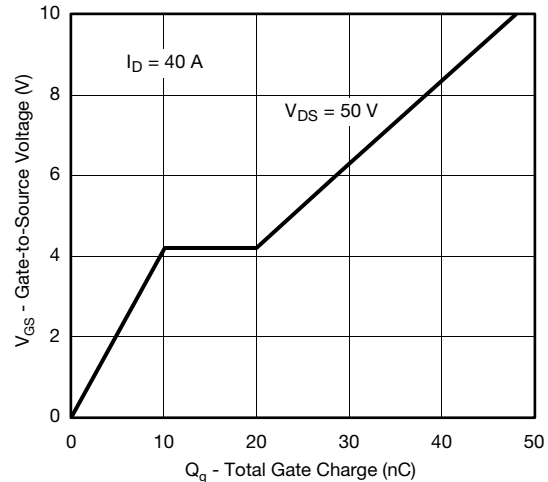
Transconductance



On-Resistance vs. Drain Current



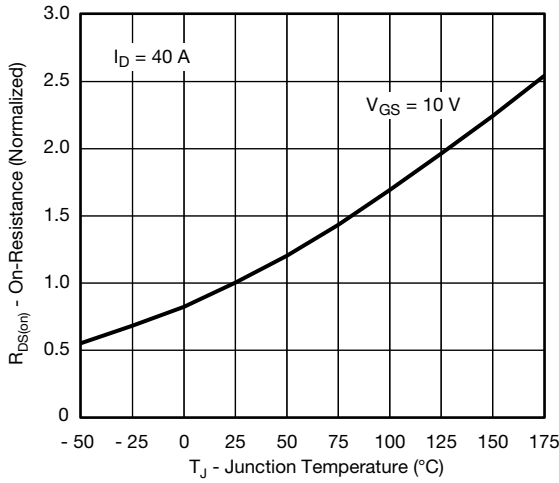
Capacitance



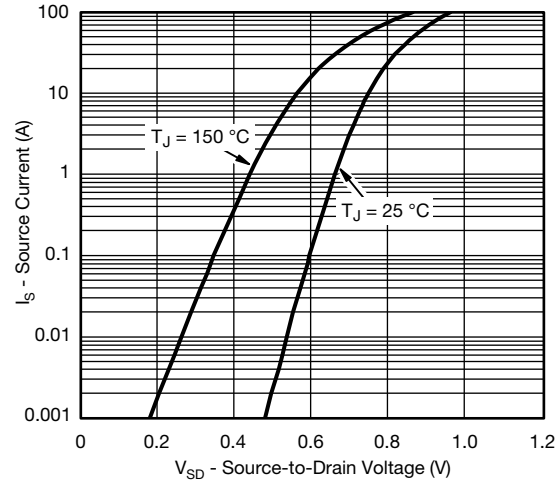
Gate Charge



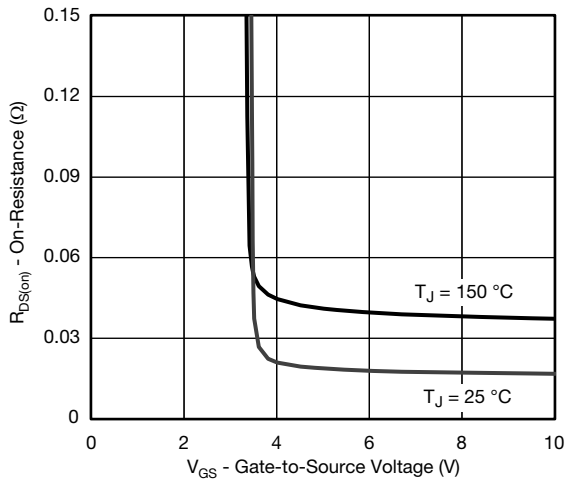
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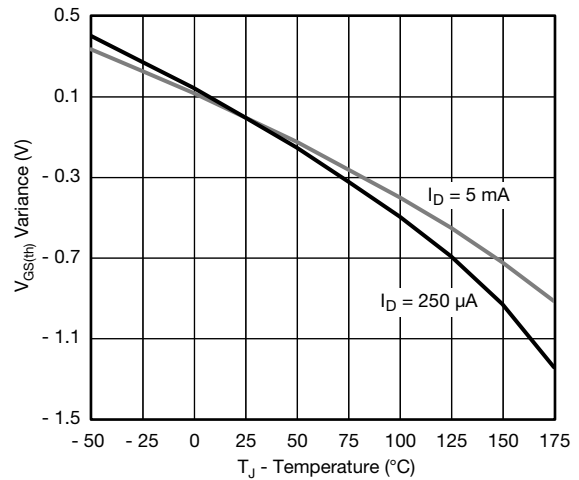
On-Resistance vs. Junction Temperature



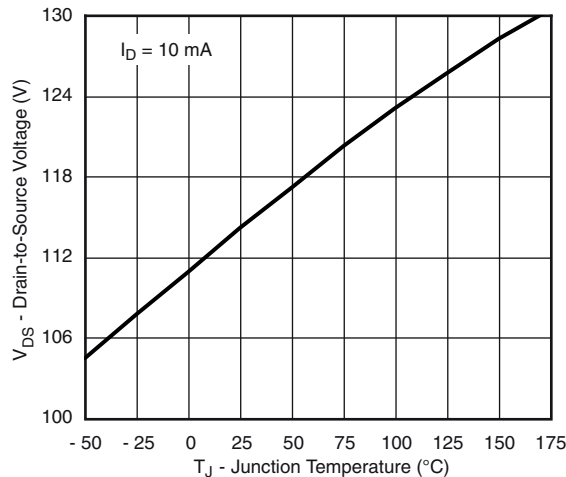
Source Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



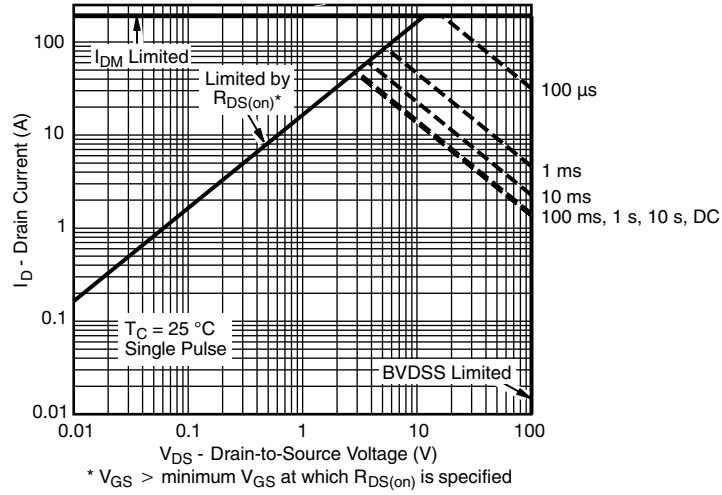
Threshold Voltage



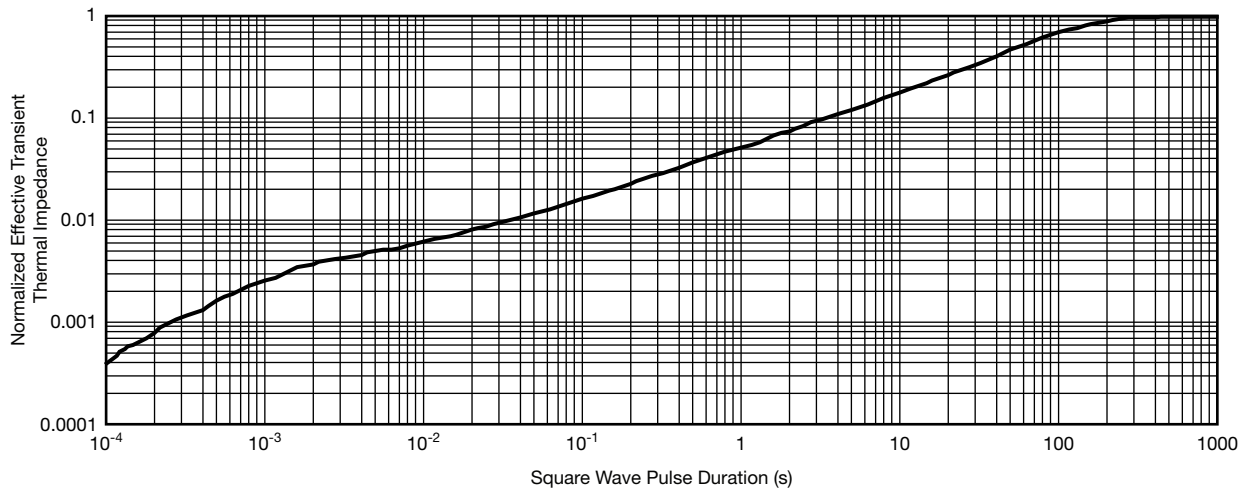
Drain Source Breakdown vs. Junction Temperature



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



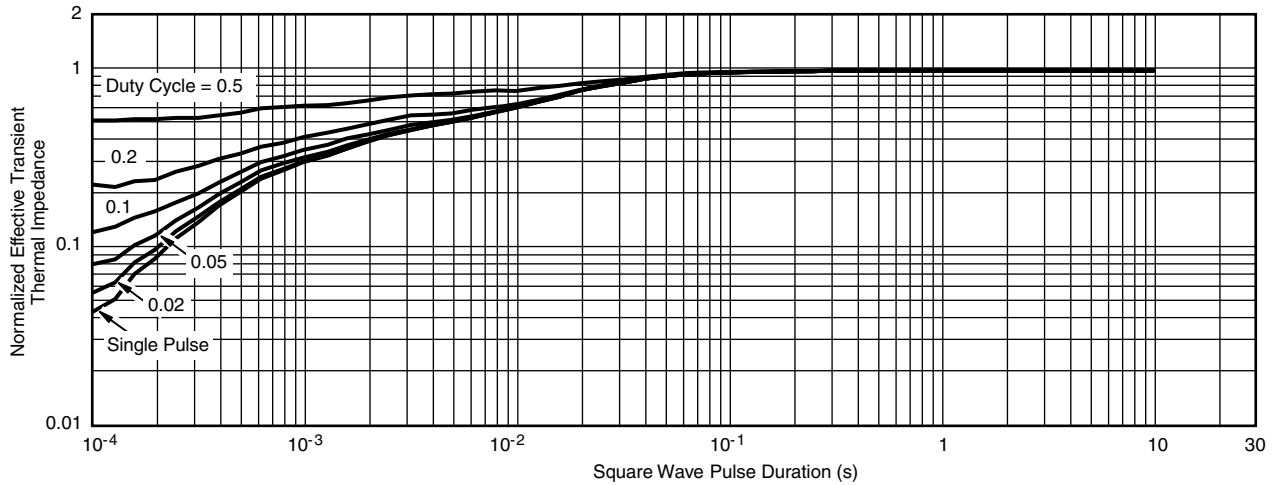
Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient



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



Normalized Thermal Transient Impedance, Junction-to-Case

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.

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REVISION HISTORY ^a		
REVISION	DATE	DESCRIPTION OF CHANGE
D	04-Aug-15	• Revised R _g minimum limit

Note

a. As of April 2014

TO-263 (D²PAK): 3-LEAD



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

- Plane B includes maximum features of heat sink tab and plastic.
- No more than 25 % of L1 can fall above seating plane by max. 8 mils.
- Pin-to-pin coplanarity max. 4 mils.
- *: Thin lead is for SUB, SYB.
Thick lead is for SUM, SYM, SQM.
- Use inches as the primary measurement.
- This feature is for thick lead.

RECOMMENDED MINIMUM PADS FOR D²PAK: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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