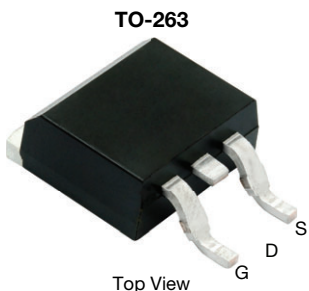


Automotive N-Channel 30 V (D-S) 175 °C MOSFET

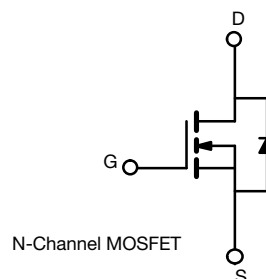


FEATURES

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



RoHS
COMPLIANT
HALOGEN
FREE



PRODUCT SUMMARY	
V_{DS} (V)	30
$R_{DS(on)}$ (Ω) at $V_{GS} = 10$ V	0.00135
$R_{DS(on)}$ (Ω) at $V_{GS} = 4.5$ V	0.00175
I_D (A)	120
Configuration	Single
Package	TO-263

ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-source voltage		V_{DS}	30	V
Gate-source voltage		V_{GS}	± 20	
Continuous drain current ^a	$T_C = 25$ °C	I_D	120	A
	$T_C = 125$ °C		120	
Continuous source current (diode conduction) ^a		I_S	120	
Pulsed drain current ^b		I_{DM}	360	
Single pulse avalanche current	$L = 0.1$ mH	I_{AS}	72	
Single pulse avalanche energy		E_{AS}	259	mJ
Maximum power dissipation ^b	$T_C = 25$ °C	P_D	375	W
	$T_C = 125$ °C		125	
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 ^c	R_{thJA}	40	°C/W
Junction-to-case (drain)		R_{thJC}	0.4	

Notes

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

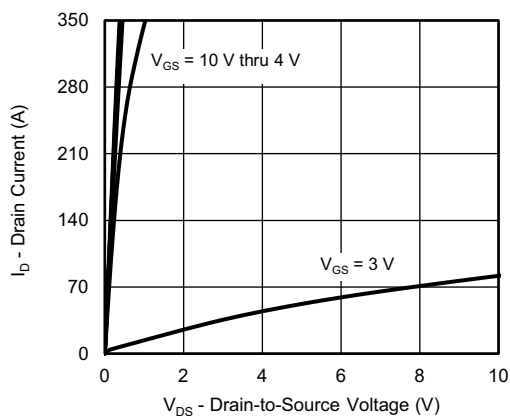
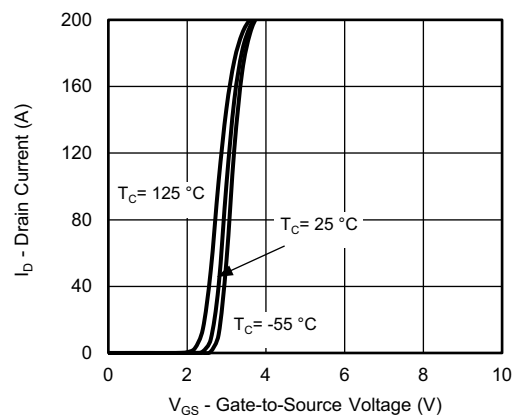
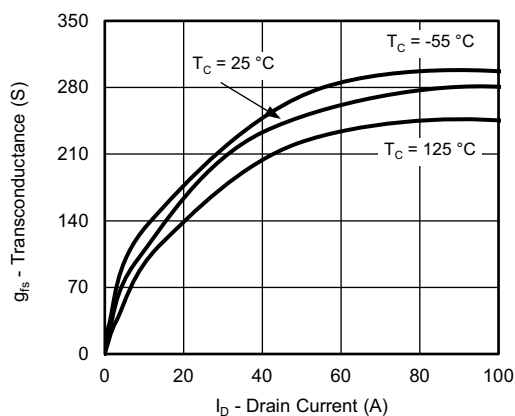
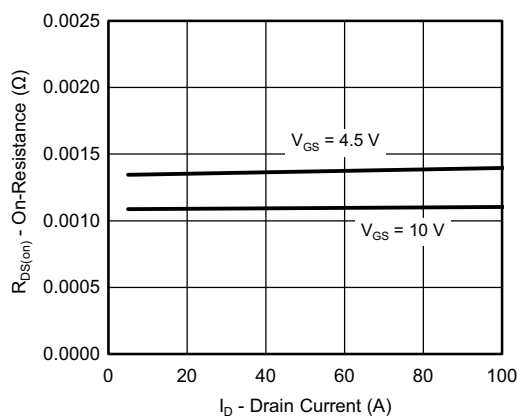
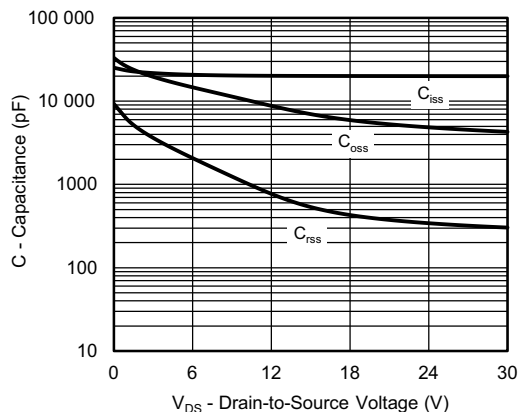
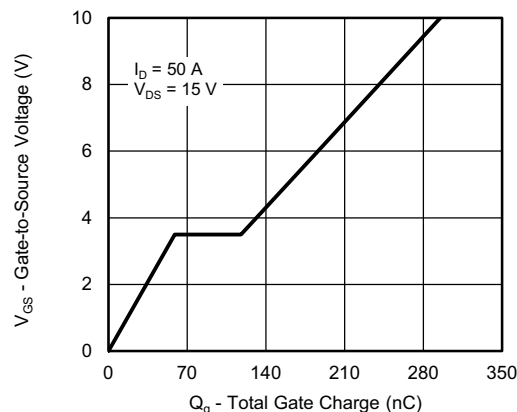


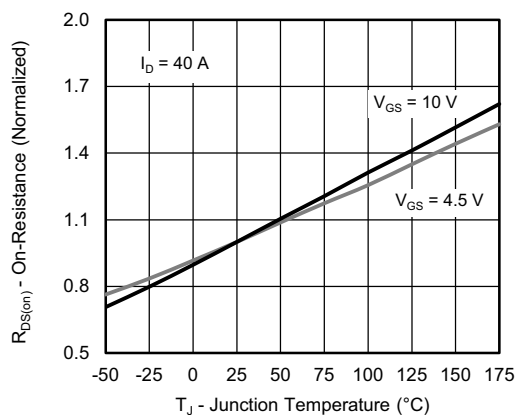
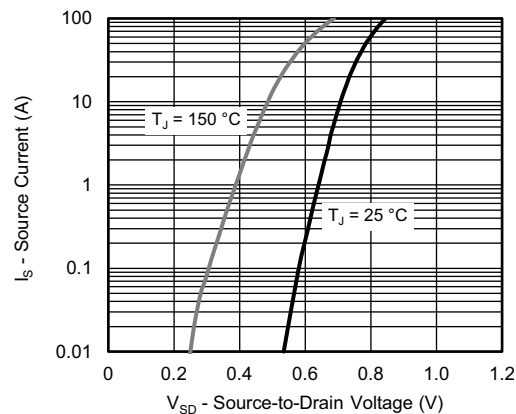
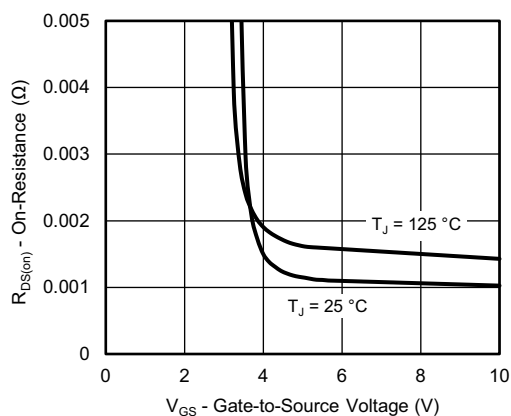
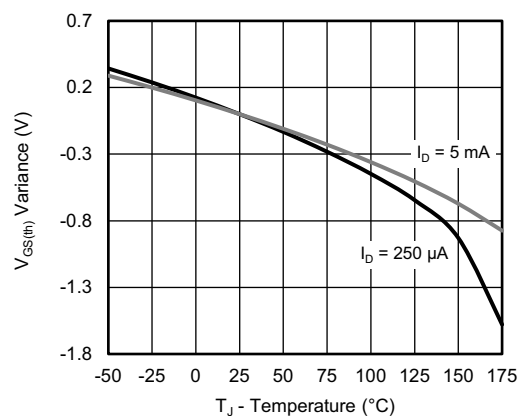
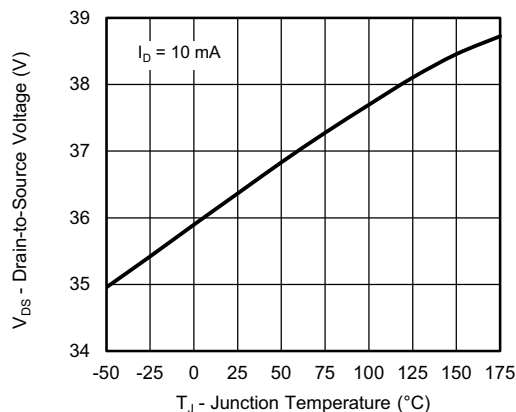
SPECIFICATIONS (T _C = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-source breakdown voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA		30	-	-	V
Gate-source threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		1.5	2.0	2.5	
Gate-source leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V		-	-	± 100	
Zero gate voltage drain current	I _{DSS}	V _{GS} = 0 V	V _{DS} = 30 V	-	-	1	μA
		V _{GS} = 0 V	V _{DS} = 30 V, T _J = 125 °C	-	-	50	
		V _{GS} = 0 V	V _{DS} = 30 V, T _J = 175 °C	-	-	800	μA
On-state drain current ^a	I _{D(on)}	V _{GS} = 10 V	V _{DS} ≥ 5 V	100	-	-	A
Drain-source on-state resistance ^a	R _{DS(on)}	V _{GS} = 10 V	I _D = 40 A	-	0.00110	0.00135	Ω
		V _{GS} = 10 V	I _D = 40 A, T _J = 125 °C	-	-	0.00191	
		V _{GS} = 10 V	I _D = 40 A, T _J = 175 °C	-	-	0.00220	
		V _{GS} = 4.5 V	I _D = 35 A	-	0.00143	0.00175	Ω
Forward transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 40 A		-	233	-	S
Dynamic ^b							
Input capacitance	C _{iss}	V _{GS} = 0 V	V _{DS} = 15 V, f = 1 MHz	-	20 090	28 000	pF
Output capacitance	C _{oss}			-	7000	9500	
Reverse transfer capacitance	C _{rss}			-	540	750	
Total gate charge ^c	Q _g	V _{GS} = 10 V	V _{DS} = 15 V, I _D = 50 A	-	295	450	nC
Gate-source charge ^c	Q _{gs}			-	59	-	
Gate-drain charge ^c	Q _{gd}			-	59	-	
Gate resistance	R _g	f = 1 MHz		0.5	1.11	1.7	Ω
Turn-on delay time ^c	t _{d(on)}	V _{DD} = 15 V, R _L = 0.2 Ω I _D ≅ 50 A, V _{GEN} = 10 V, R _g = 1 Ω		-	30	45	ns
Rise time ^c	t _r			-	240	360	
Turn-off delay time ^c	t _{d(off)}			-	98	150	
Fall time ^c	t _f			-	44	70	
Source-Drain Diode Ratings and Characteristics ^b							
Pulsed current ^a	I _{SM}			-	-	360	A
Forward voltage	V _{SD}	I _F = 60 A, V _{GS} = 0 V		-	0.8	1.5	V
Body diode reverse recovery time	t _{rr}	I _F = 35 A, di/dt = 100 A/μs		-	96	195	ns
Body diode reverse recovery charge	Q _{rr}			-	185	370	nC
Reverse recovery fall time	t _a			-	48	-	ns
Reverse recovery rise time	t _b			-	48	-	
Body diode peak reverse recovery current	I _{RM(REC)}			-	-3.4	-	A

Notes

- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$
b. Guaranteed by design, not subject to production testing
c. Independent of operating temperature

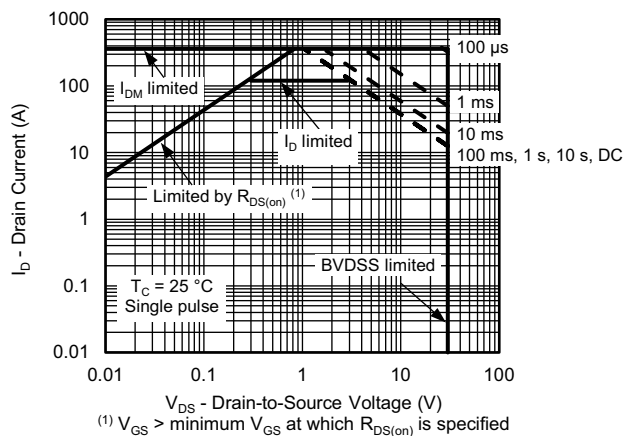
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure 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

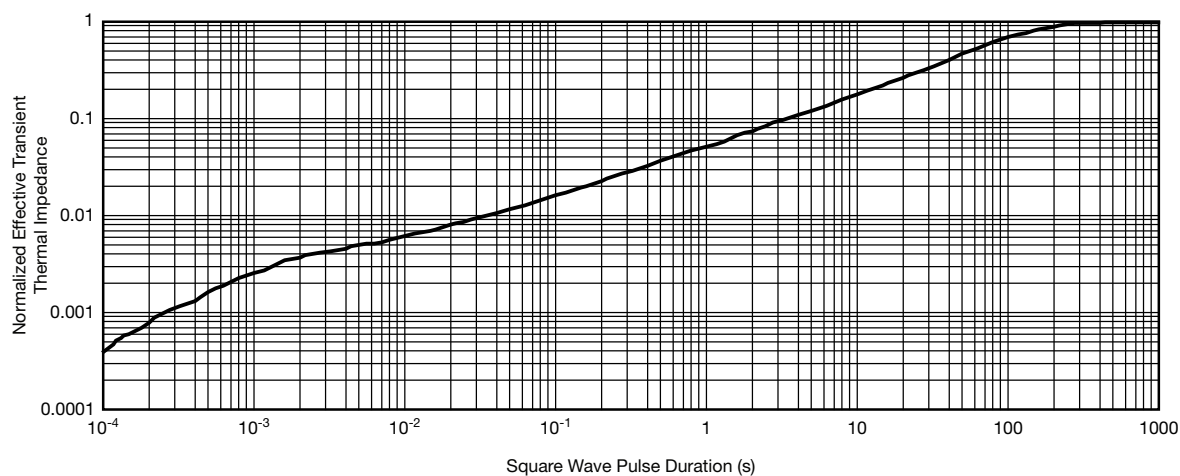
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

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)



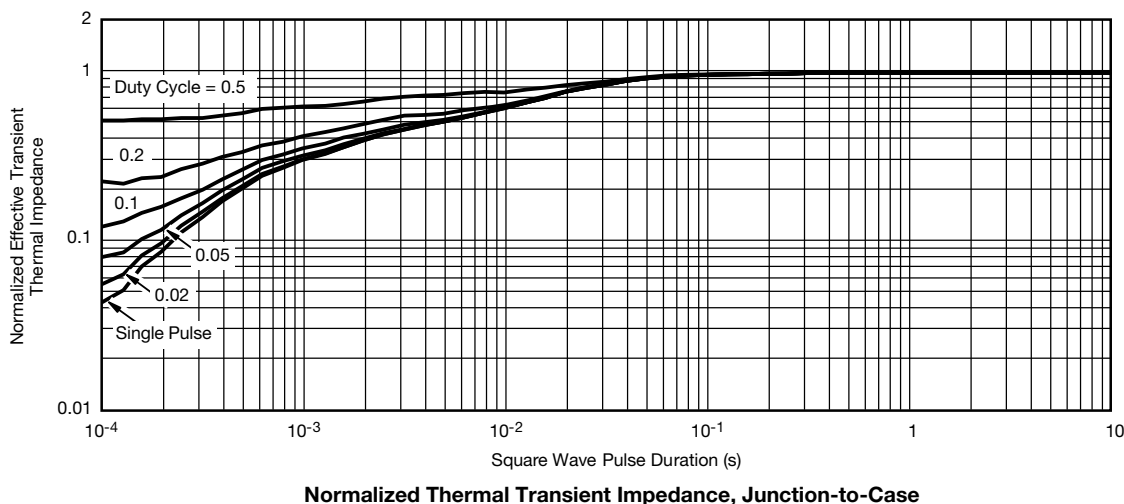
Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient



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

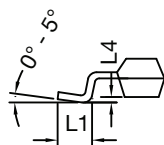
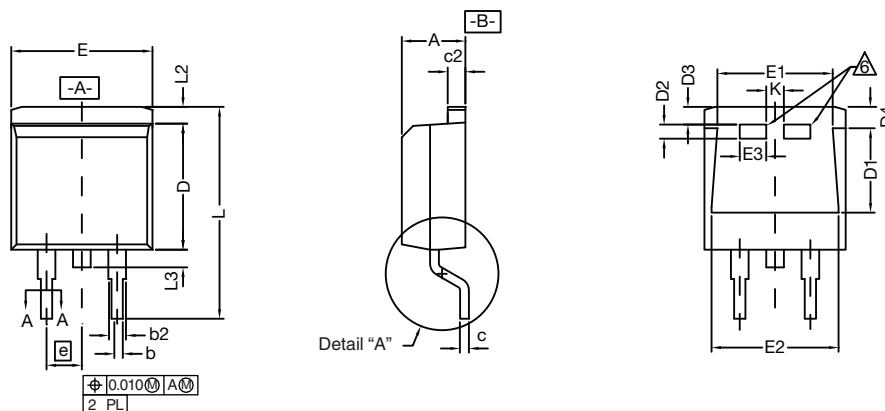


Note

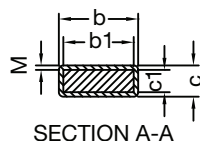
- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction-to-Ambient ($25\text{ }^{\circ}\text{C}$)
 - Normalized Transient Thermal Impedance Junction-to-Case ($25\text{ }^{\circ}\text{C}$)are given for general guidelines only to enable the user to get a “ball park” 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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TO-263 (D²PAK): 3-LEAD



DETAIL A (ROTATED 90°)



SECTION A-A

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.

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
		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					

RECOMMENDED MINIMUM PADS FOR D²PAK: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

[Return to Index](#)



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