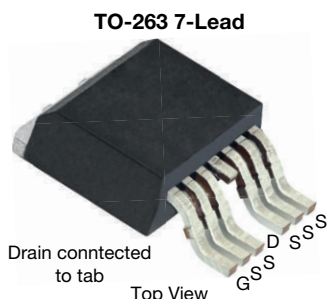


Automotive N-Channel 40 V (D-S) 175 °C MOSFET

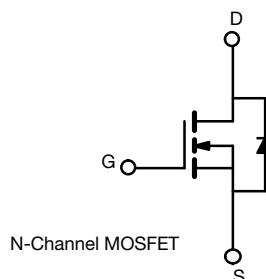


FEATURES

- 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)	40
R _{DS(on)} (Ω) at V _{GS} = 10 V	0.00100
I _D (A)	250
Configuration	Single
Package	TO-263-7L

ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-source voltage		V _{DS}	40	V
Gate-source voltage		V _{GS}	± 20	
Continuous drain current	T _C = 25 °C ^a	I _D	250	A
	T _C = 125 °C		229	
Continuous source current (diode conduction) ^a		I _S	250	
Pulsed drain current ^b		I _{DM}	420	
Single pulse avalanche current		I _{AS}	78	
Single pulse avalanche energy		E _{AS}	304	mJ
Maximum power dissipation ^b	T _C = 25 °C	P _D	300	W
	T _C = 125 °C		100	
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}	0.5	

Notes

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

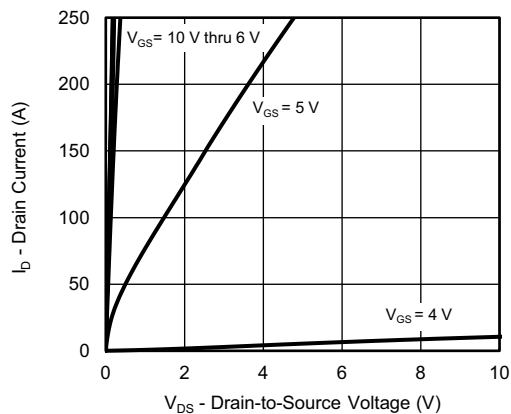
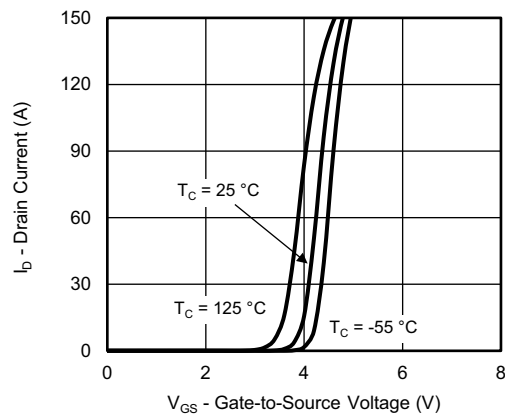
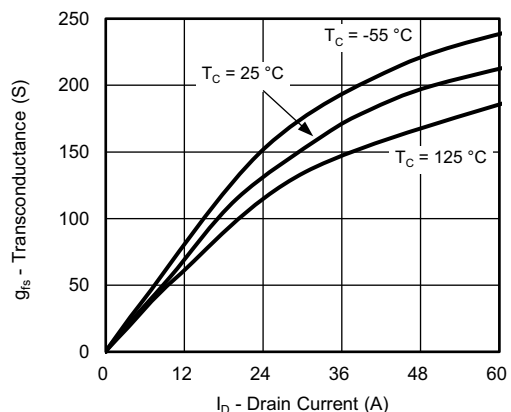
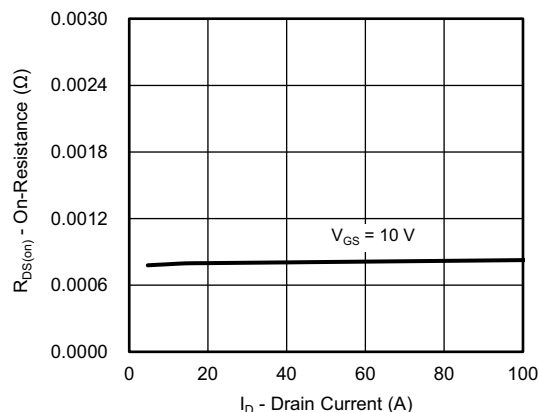
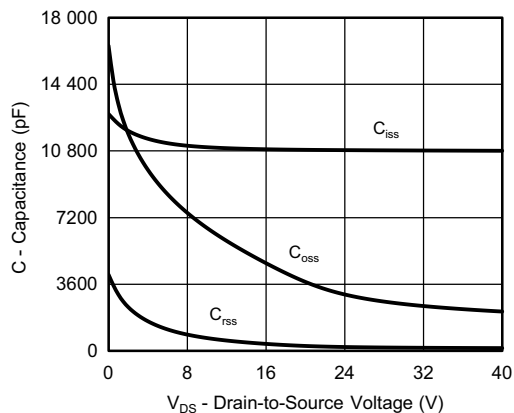
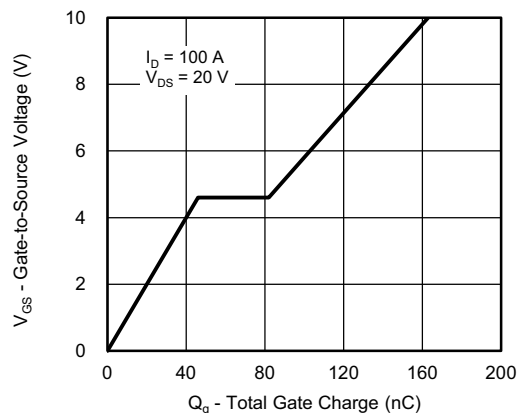


SPECIFICATIONS (T _C = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-source breakdown voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA		40	-	-	V
Gate-source threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		2.5	3.0	3.5	
Gate-source 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} = 40 V	-	-	1	μA
		V _{GS} = 0 V	V _{DS} = 40 V, T _J = 125 °C	-	-	50	
		V _{GS} = 0 V	V _{DS} = 40 V, T _J = 175 °C	-	-	500	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	-	0.00081	0.00100	Ω
		V _{GS} = 10 V	I _D = 40 A, T _J = 125 °C	-	-	0.00152	
		V _{GS} = 10 V	I _D = 40 A, T _J = 175 °C	-	-	0.00184	
Forward transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 40 A		-	181	-	S
Dynamic ^b							
Input capacitance	C _{iss}	V _{GS} = 0 V	V _{DS} = 25 V, f = 1 MHz	-	10 841	15 000	pF
Output capacitance	C _{oss}			-	2928	4000	
Reverse transfer capacitance	C _{rss}			-	198	270	
Total gate charge ^c	Q _g	V _{GS} = 10 V	V _{DS} = 20 V, I _D = 100 A	-	163	245	nC
Gate-source charge ^c	Q _{gs}			-	46	-	
Gate-drain charge ^c	Q _{gd}			-	36	-	
Gate resistance	R _g	f = 1 MHz		1	2.2	3.4	Ω
Turn-on delay time ^c	t _{d(on)}	V _{DD} = 20 V, R _L = 0.2 Ω I _D ≅ 100 A, V _{GEN} = 10 V, R _g = 1 Ω		-	24	40	ns
Rise time ^c	t _r			-	215	330	
Turn-off delay time ^c	t _{d(off)}			-	59	90	
Fall time ^c	t _f			-	35	55	
Source-Drain Diode Ratings and Characteristics ^b							
Pulsed current ^a	I _{SM}			-	-	420	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 = 40 A, di/dt = 100 A/μs		-	92	185	ns
Body diode reverse recovery charge	Q _{rr}			-	198	400	nC
Reverse recovery fall time	t _a			-	47	-	ns
Reverse recovery rise time	t _b			-	45	-	
Body diode peak reverse recovery current	I _{RM(REC)}			-	-4.4	-	A

Notes

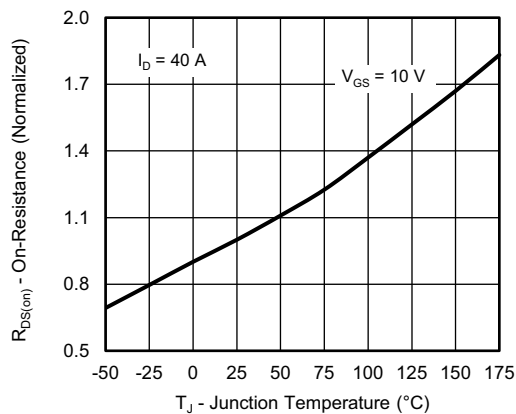
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$
b. Guaranteed by design, not subject to production testing
c. Independent of operating temperature

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.

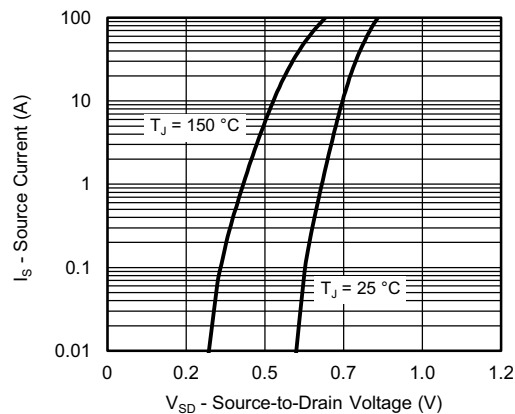
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

Output Characteristics

Transfer Characteristics

Transconductance

On-Resistance vs. Drain Current

Capacitance

Gate Charge



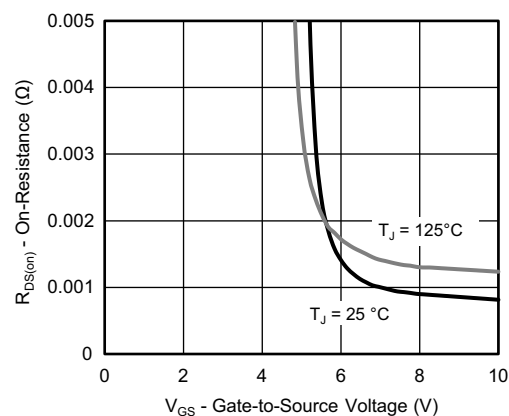
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



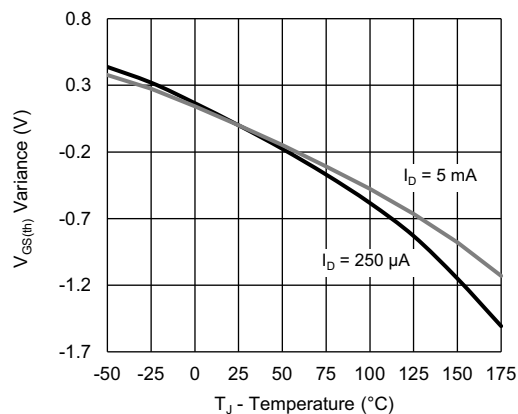
On-Resistance vs. Junction Temperature



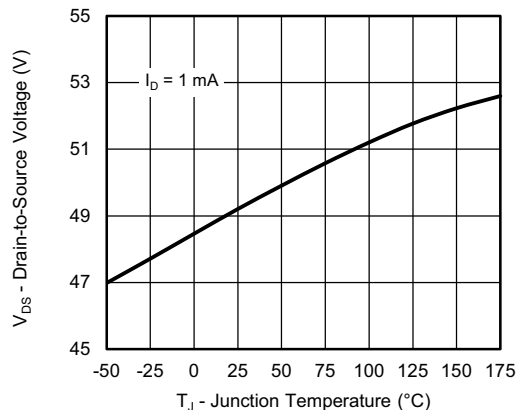
Source Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



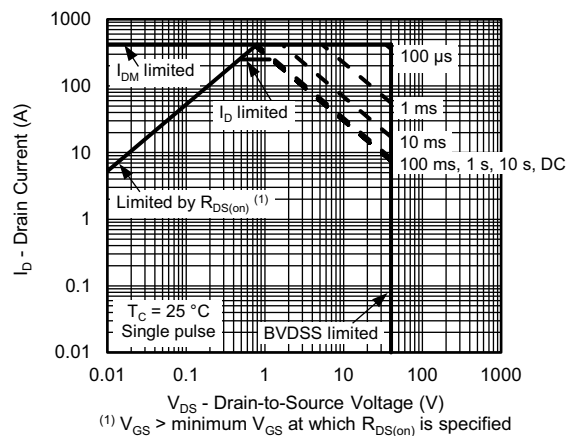
Threshold Voltage



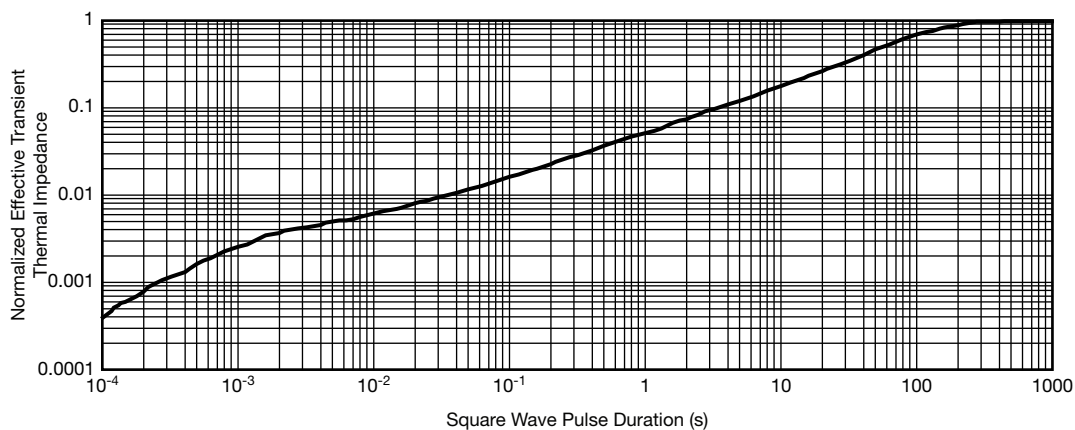
Drain Source Breakdown vs. Junction Temperature



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



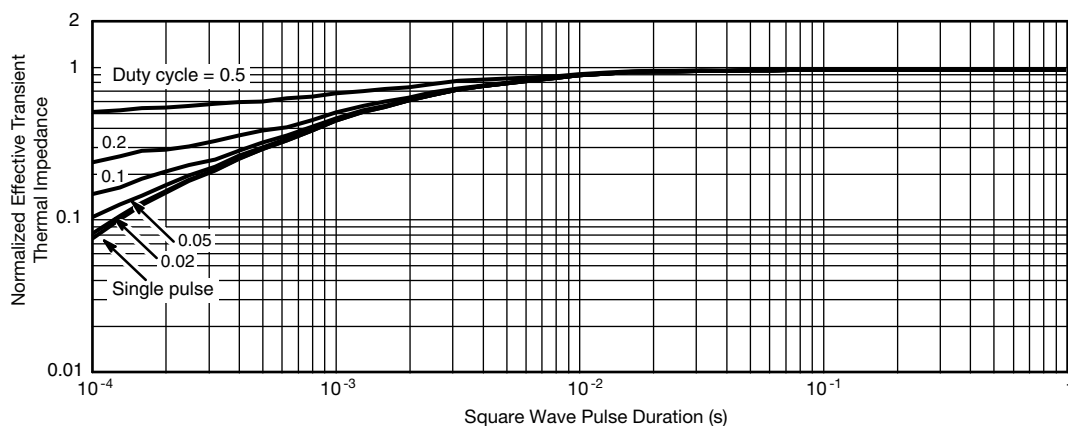
Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient



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



Normalized Thermal Transient Impedance, Junction-to-Case

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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