

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

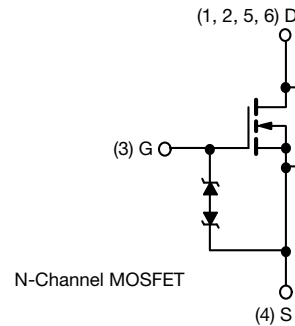
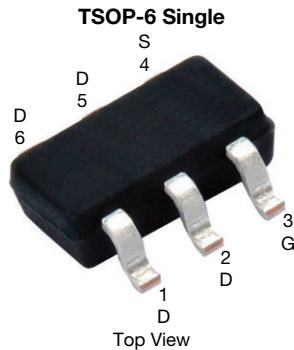
 AUTOMOTIVE
GRADE

RoHS
COMPLIANT
HALOGEN
FREE

PRODUCT SUMMARY	
V_{DS} (V)	40
$R_{DS(on)}$ (Ω) at $V_{GS} = 10$ V	0.032
$R_{DS(on)}$ (Ω) at $V_{GS} = 4.5$ V	0.042
I_D (A)	8
Configuration	Single
Package	TSOP-6

FEATURES

- TrenchFET® power MOSFET
- Typical ESD protection 800 V
- AEC-Q101 qualified ^d
- 100 % R_g and UIS tested
- Material categorization:
for definitions of compliance please see
www.vishay.com/doc?99912


Marking Code: 8M

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	8	A
	$T_C = 125$ °C		5	
Continuous Source Current (Diode Conduction)		I_S	4	
Pulsed Drain Current ^b		I_{DM}	32	
Single Pulse Avalanche Current	L = 0.1 mH	I_{AS}	11	
Single Pulse Avalanche Energy		E_{AS}	6	mJ
Maximum Power Dissipation ^b	$T_C = 25$ °C	P_D	5	W
	$T_C = 125$ °C		1.6	
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}	110	°C/W
Junction-to-Foot (Drain)		R_{thJF}	30	

Notes

- Package limited.
- 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	40	-	-	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} = ± 12 V	-	-	± 2	μA
		V _{DS} = 0 V, V _{GS} = ± 20 V	-	-	± 1	mA
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	-	-	150	
On-State Drain Current ^a	I _{D(on)}	V _{GS} = 10 V, V _{DS} ≥ 5 V	10	-	-	A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 5 A	-	0.026	0.032	Ω
		V _{GS} = 10 V, I _D = 5 A, T _J = 125 °C	-	-	0.050	
		V _{GS} = 10 V, I _D = 5 A, T _J = 175 °C	-	-	0.061	
		V _{GS} = 4.5 V, I _D = 4 A	-	0.032	0.042	
Forward Transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 4 A	-	13	-	S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 20 V, f = 1 MHz	-	450	675	pF
Output Capacitance	C _{oss}		-	80	120	
Reverse Transfer Capacitance	C _{rss}		-	41	62	
Total Gate Charge ^c	Q _g	V _{GS} = 10 V, V _{DS} = 20 V, I _D = 4 A	-	8.2	12.4	nC
Gate-Source Charge ^c	Q _{gs}		-	1.3	-	
Gate-Drain Charge ^c	Q _{gd}		-	1.9	-	
Gate Resistance	R _g	f = 1 MHz	0.9	1.8	2.7	Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 20 V, R _L = 4 Ω I _D ≅ 5 A, V _{GEN} = 10 V, R _g = 1 Ω	-	6	9	ns
Rise Time ^c	t _r		-	28	38	
Turn-Off Delay Time ^c	t _{d(off)}		-	12	16	
Fall Time ^c	t _f		-	37	49	
Source-Drain Diode Ratings and Characteristics T_C = 25 °C ^b						
Pulsed Current ^a	I _{SM}		-	-	32	A
Forward Voltage	V _{SD}	I _F = 3 A, V _{GS} = 0	-	0.8	1.2	V

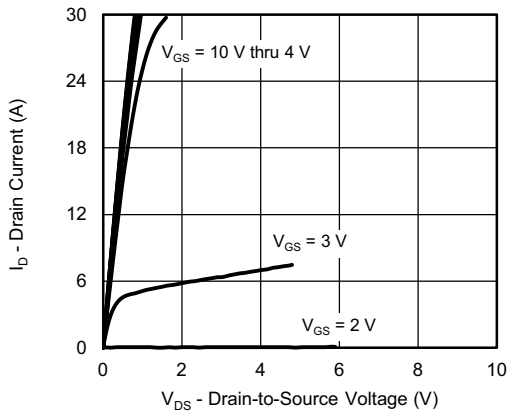
Notes

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

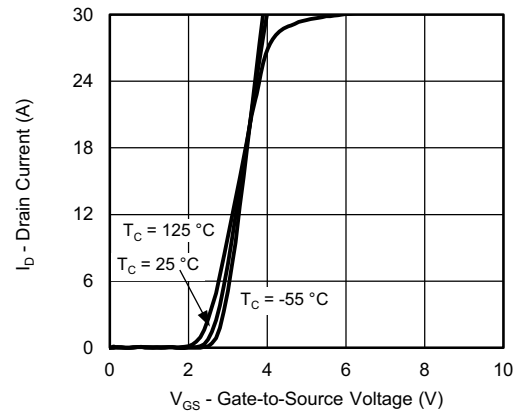
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



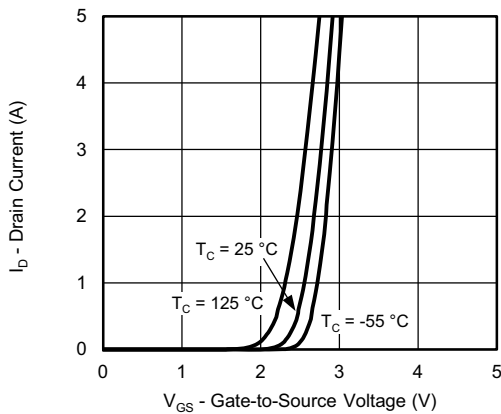
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



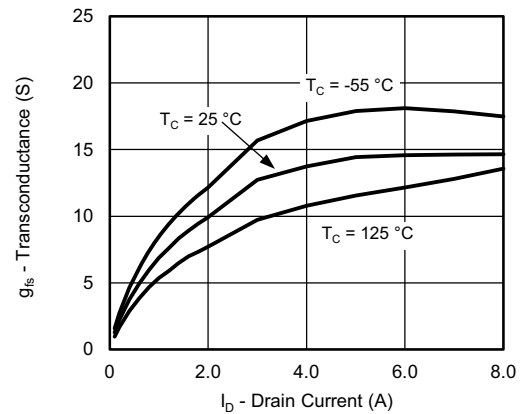
Output Characteristics



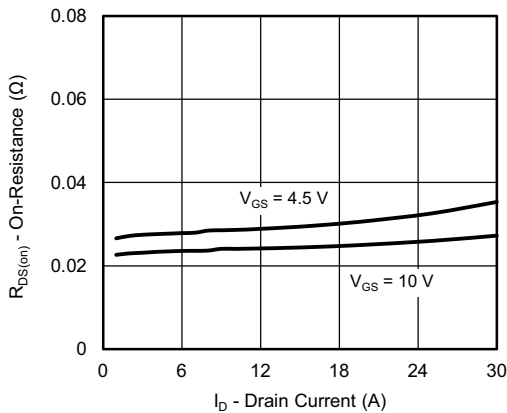
Transfer Characteristics



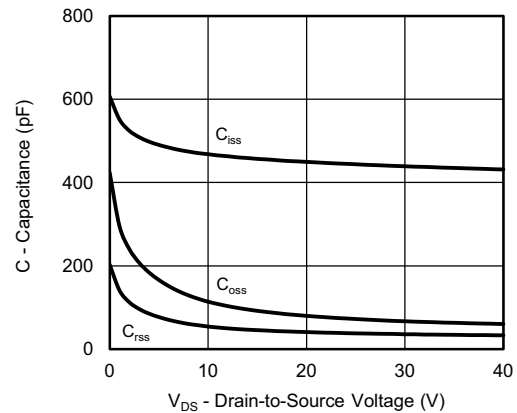
Transfer Characteristics



Transconductance

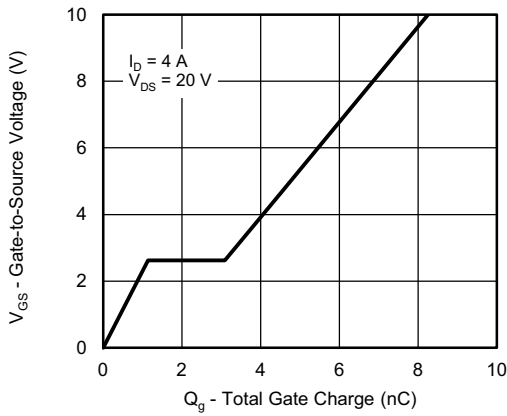


On-Resistance vs. Drain Current

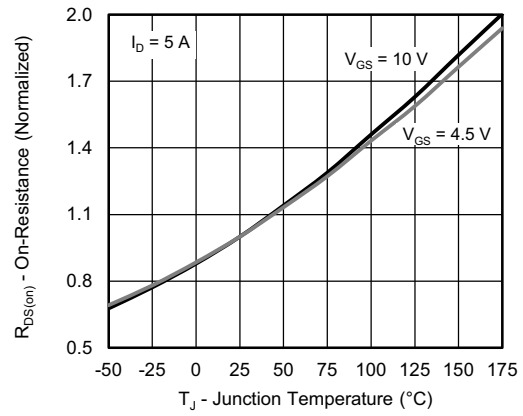


Capacitance

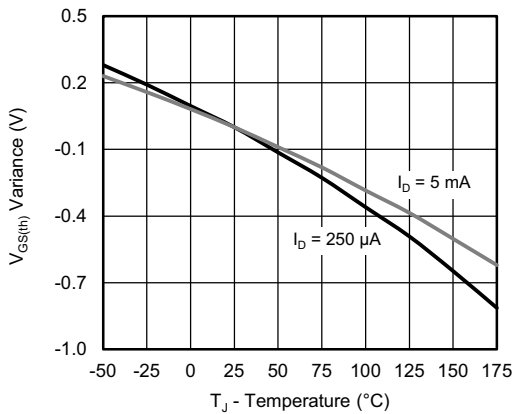
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



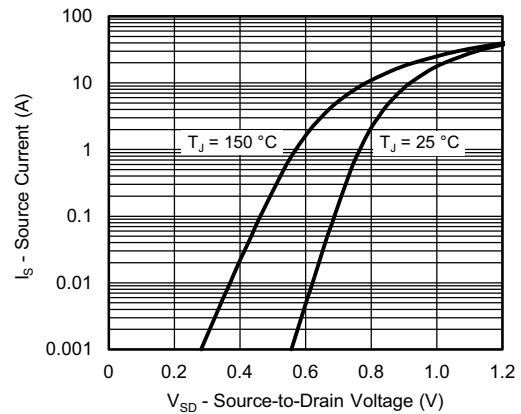
Gate Charge



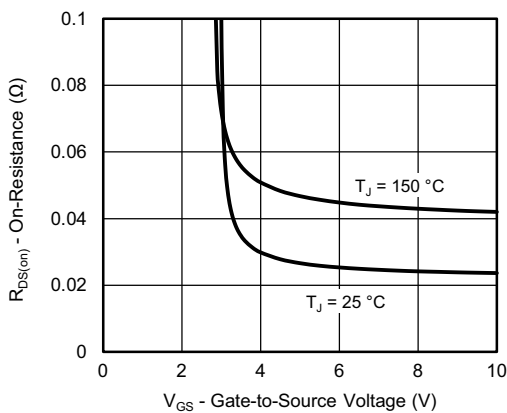
On-Resistance vs. Junction Temperature



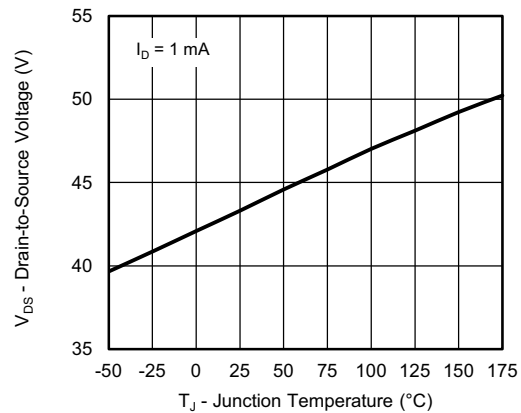
Threshold Voltage



Source Drain Diode Forward Voltage

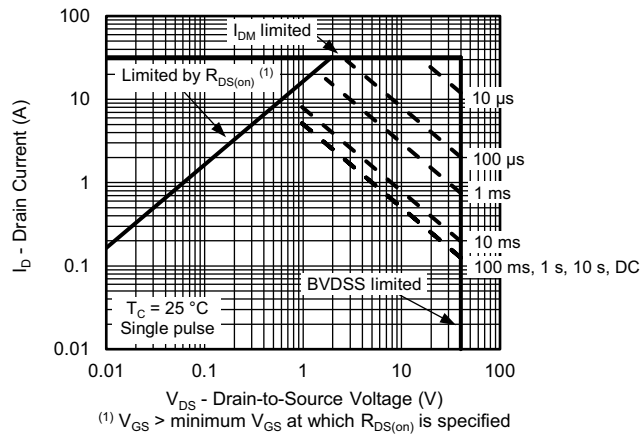


On-Resistance vs. Gate-to-Source Voltage

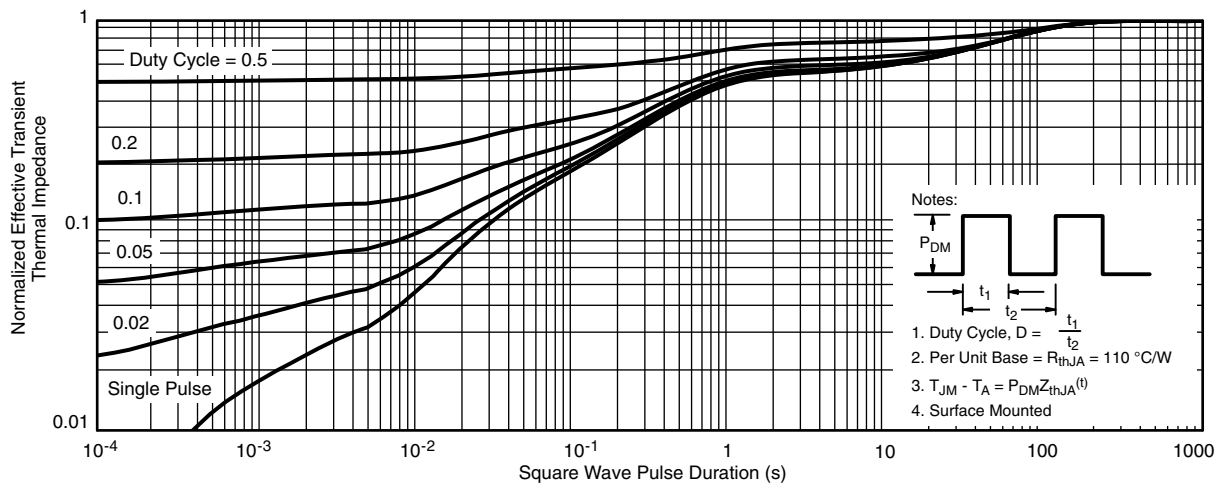


Drain Source Breakdown vs. Junction Temperature

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



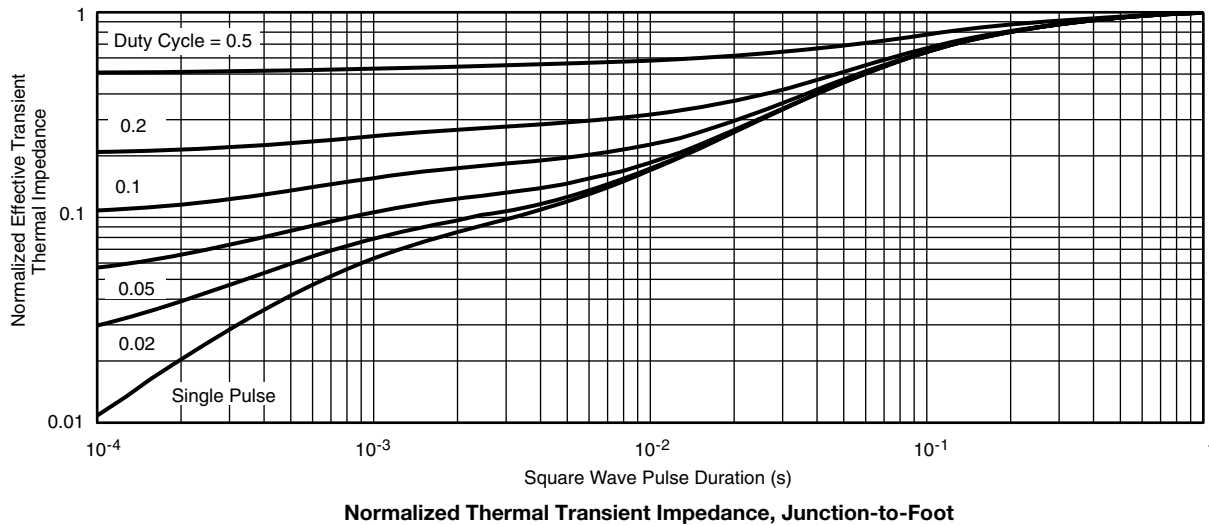
Safe Operating Area



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-Foot

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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