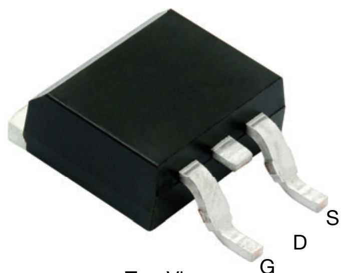
N-Channel 60 V (D-S) MOSFET

TO-263



Top View

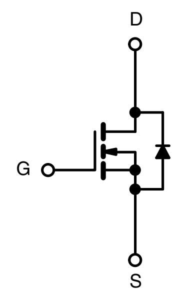
FEATURES

- TrenchFET® power MOSFET
- Maximum 175 °C junction temperature
- Very low Q_{gd} reduces power loss from passing through $V_{plateau}$
- 100 % R_g and UIS tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT
HALOGEN FREE

APPLICATIONS

- Power supply
  - Secondary synchronous rectification
- DC/DC converter
- Power tools
- Motor drive switch
- DC/AC inverter
- Battery management
- OR-ing / e-fuse



N-Channel MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	60
$R_{DS(on)}$ max. (Ω) at V_{GS} = 10 V	0.00175
$R_{DS(on)}$ max. (Ω) at V_{GS} = 7.5 V	0.00220
Q_g typ. (nC)	141
I_D (A)	150 [d]
Configuration	Single

ORDERING INFORMATION	
Package	TO-263
Lead (Pb)-free and halogen-free	SUM50010E-GE3

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise noted)

PARAMETER		SYMBOL	LIMIT	UNIT
Drain-source voltage		V_{DS}	60	V
Gate-source voltage		V_{GS}	± 20	
Continuous drain current (T_J = 150 °C)	T_C = 25 °C	I_D	150 [d]	A
	T_C = 70 °C		150 [d]	
Pulsed drain current (t = 100 μs)		I_{DM}	500	
Avalanche current		I_{AS}	60	
Single avalanche energy [a]	L = 0.1 mH	E_{AS}	180	mJ
Maximum power dissipation [a]	T_C = 25 °C	P_D	375 [b]	W
	T_C = 125 °C		125 [b]	
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

a. Duty cycle ≤ 1 %
b. See SOA curve for voltage derating
c. When mounted on 1" square PCB (FR4 material)
d. Package limited

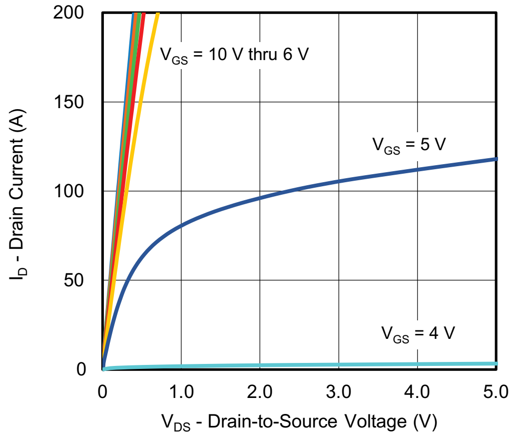
SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Static						
Drain-source breakdown voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 µA	60	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	2	-	4	
Gate-body leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V	-	-	± 250	nA
Zero gate voltage drain current	I_{DSS}	V_{DS} = 60 V, V_{GS} = 0 V	-	-	1	µA
		V_{DS} = 60 V, V_{GS} = 0 V, T_J = 125 °C	-	-	150	
		V_{DS} = 60 V, V_{GS} = 0 V, T_J = 175 °C	-	-	5	mA
On-state drain current [a]	$I_{D(on)}$	V_{DS} ≥ 10 V, V_{GS} = 10 V	120	-	-	A
Drain-source on-state resistance [a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 30 A	-	0.00145	0.00175	Ω
		V_{GS} = 7.5 V, I_D = 20 A	-	0.00183	0.00220	
Forward transconductance [a]	g_{fs}	V_{DS} = 15 V, I_D = 30 A	-	120	-	S
Dynamic [b]						
Input capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 30 V, f = 1 MHz	-	10 895	-	pF
Output capacitance	C_{oss}		-	2420	-	
Reverse transfer capacitance	C_{rss}		-	85	-	
Total gate charge [c]	Q_g	V_{DS} = 30 V, V_{GS} = 10 V, I_D = 20 A	-	141	212	nC
Gate-source charge [c]	Q_{gs}		-	43.6	-	
Gate-drain charge [c]	Q_{gd}		-	19.1	-	
Output charge	Q_{oss}	V_{DS} = 50 V, V_{GS} = 0 V	-	143	215	
Gate resistance	R_g	f = 1 MHz	0.24	1.2	2.4	Ω
Turn-on delay time [c]	$t_{d(on)}$	V_{DD} = 30 V, R_L = 3 Ω I_D ≅ 10 A, V_{GEN} = 10 V, R_g = 1 Ω	-	28	56	ns
Rise time [c]	t_r		-	12	24	
Turn-off delay time [c]	$t_{d(off)}$		-	50	100	
Fall time [c]	t_f		-	13	26	
Drain-Source Body Diode Ratings and Characteristics [b] (T_C = 25 °C)						
Pulsed current (t = 100 µs)	I_{SM}		-	-	250	A
Forward voltage [a]	V_{SD}	I_F = 10 A, V_{GS} = 0 V	-	0.8	1.5	V
Reverse recovery time	t_{rr}	I_F = 34 A, di/dt = 100 A/µs	-	75	150	ns
Peak reverse recovery charge	$I_{RM(REC)}$		-	2.8	5.6	A
Reverse recovery charge	Q_{rr}		-	0.12	0.24	µC
Reverse recovery fall time	t_a		-	38	-	ns
Reverse recovery rise time	t_b		-	37	-	

Notes

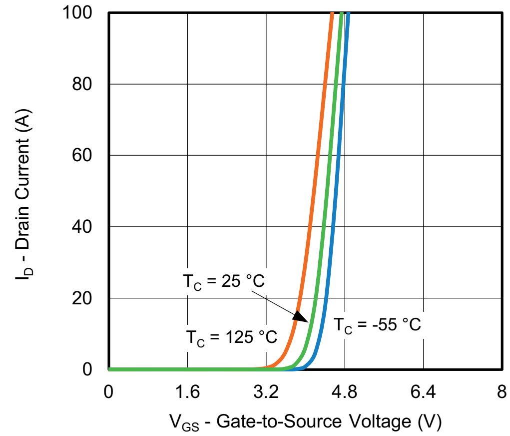
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %
b. Guaranteed by design, not subject to production testing
c. Independent of operating temperature

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.

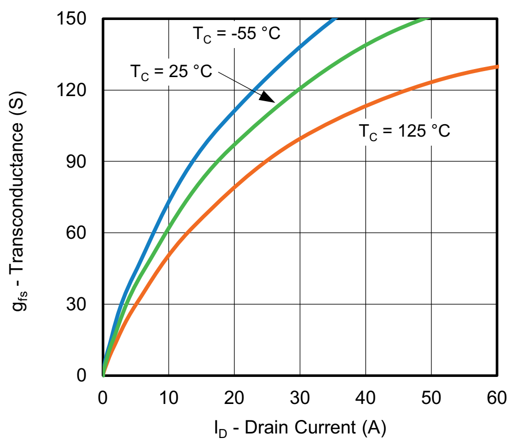
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



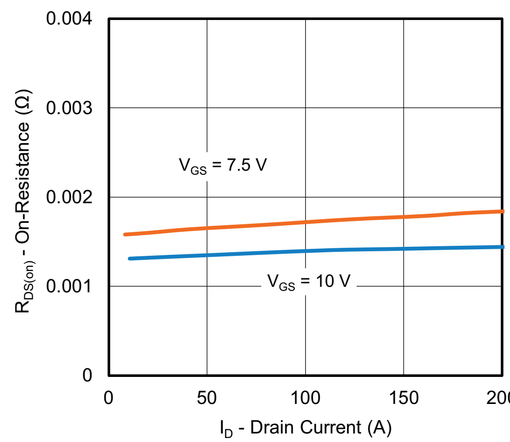
Output Characteristics



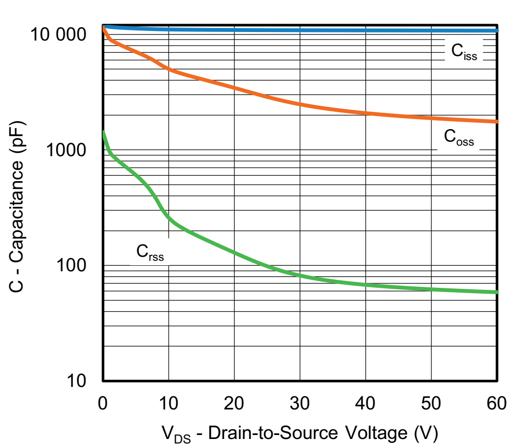
Transfer Characteristics



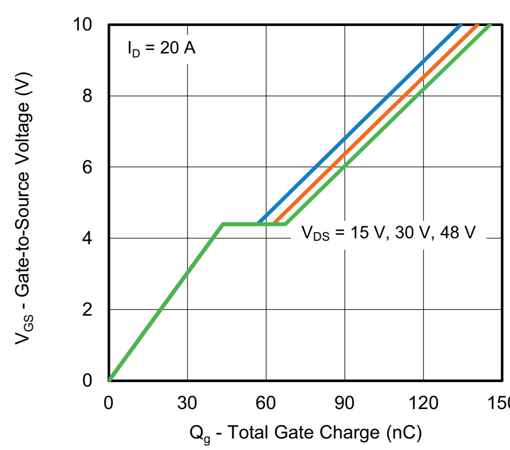
Transconductance



On-Resistance vs. Drain Current

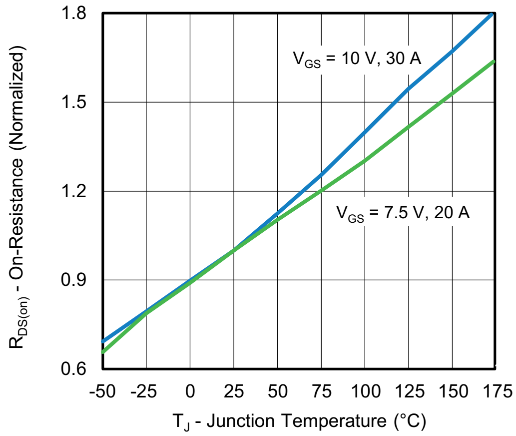


Capacitance

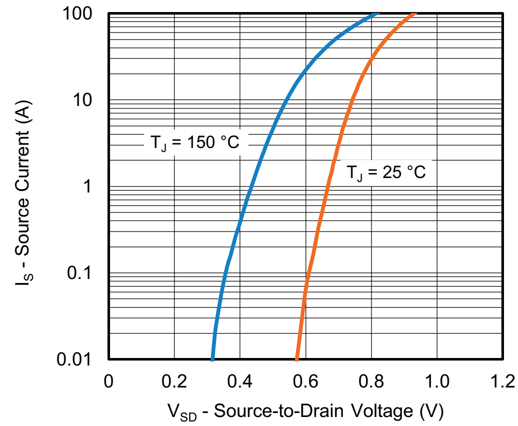


Gate Charge

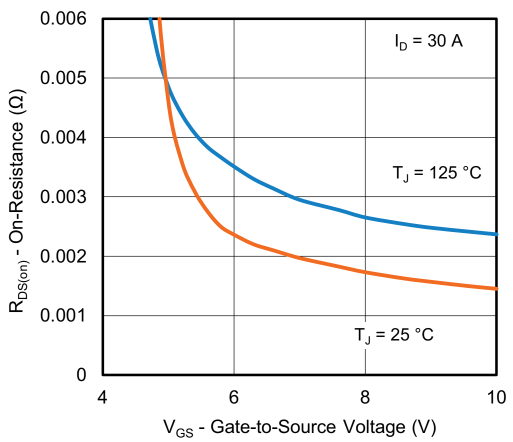
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



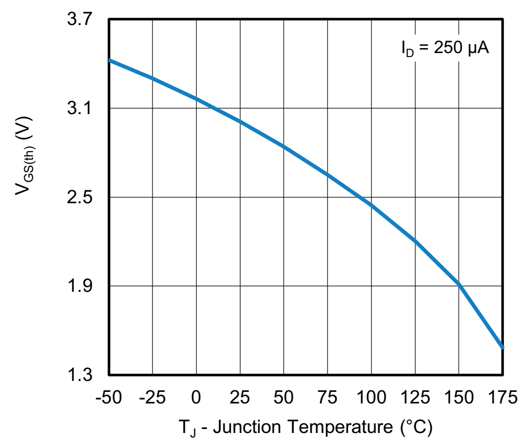
On-Resistance vs. Junction Temperature



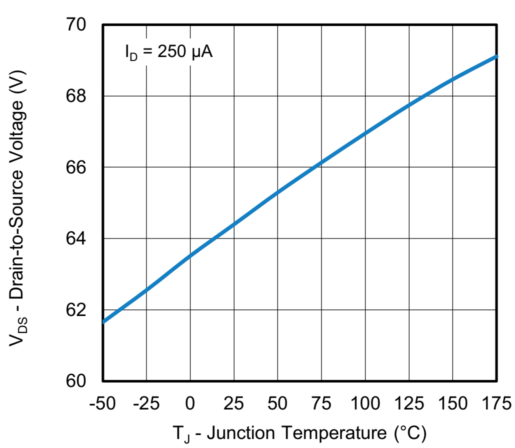
Source Drain Diode Forward Voltage



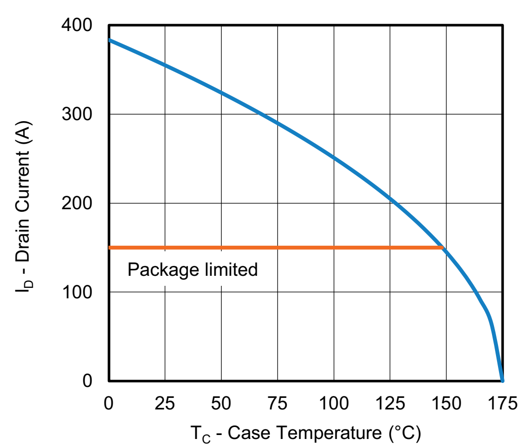
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

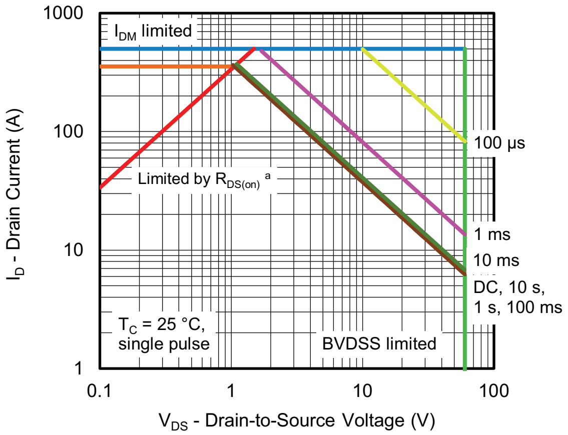


Drain Source Breakdown vs. Junction Temperature

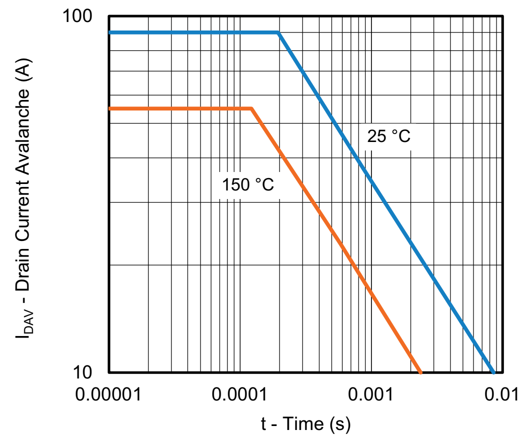


Current De-rating

THERMAL RATINGS (T_A = 25 °C, unless otherwise noted)



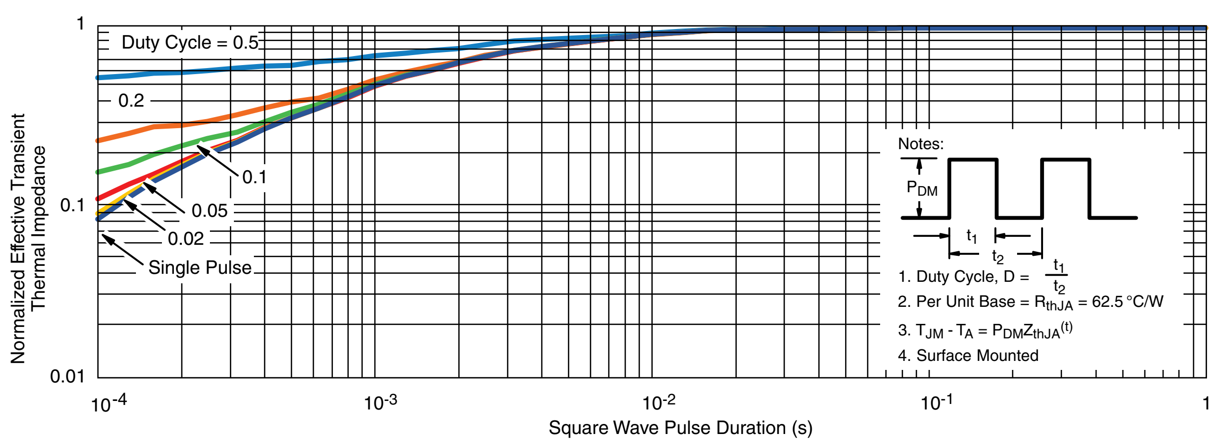
Safe Operating Area



Single Pulse Avalanche Current Capability vs. Time

Note

a. V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified



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 pplication parameters and operating conditions

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- Техническая поддержка проекта;
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