N-Channel 100 V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω) MAX.	I_D (A)	Q_g (TYP.)
100	0.0093 at V_{GS} = 10 V	42.8	33 nC
	0.0100 at V_{GS} = 7.5 V	33	

Thin-Lead TO-220 FULLPAK



Ordering Information:
SUA70090E-E3 (lead (Pb)-free and halogen-free)

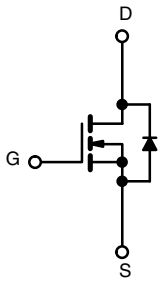
FEATURES

- ThunderFET® power MOSFET
- Q_{gd} / Q_{gs} ratio < 1 optimizes switching characteristics
- 100 % R_g and UIS tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

APPLICATIONS

- Power supply
  - Secondary synchronous rectification
- DC/DC converter
- Power tools
- Motor drive switch
- DC/AC inverter



N-Channel MOSFET

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_J = 150 °C)	T_C = 25 °C	I_D	42.8	A
	T_C = 70 °C		34.2	
Pulsed Drain Current (t = 100 µs)		I_{DM}	120	
Avalanche Current		I_{AS}	40	
Single Avalanche Energy [a]	L = 0.1 mH	E_{AS}	80	mJ
Maximum Power Dissipation [a]	T_C = 25 °C	P_D	35.7	W
	T_C = 70 °C		22.9	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to +150	°C

THERMAL RESISTANCE RATINGS			
PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-Ambient (PCB Mount) [b]	R_{thJA}	60	°C/W
Junction-to-Case (Drain)	R_{thJC}	3.5	

Notes

a. Duty cycle ≤ 1 %.

b. When mounted on 1" square PCB (FR4 material).

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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	100	-	-	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} = 100 V, V_{GS} = 0 V	-	-	1	µA
		V_{DS} = 100 V, V_{GS} = 0 V, T_J = 125 °C	-	-	150	
		V_{DS} = 100 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	50	-	-	A
Drain-Source On-State Resistance [a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 20 A	-	0.0077	0.0093	Ω
		V_{GS} = 7.5 V, I_D = 15 A	-	0.0083	0.0100	
Forward Transconductance [a]	g_{fs}	V_{DS} = 15 V, I_D = 10 A	-	38	-	S
Dynamic [b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 50 V, f = 1 MHz	-	1950	-	pF
Output Capacitance	C_{oss}		-	845	-	
Reverse Transfer Capacitance	C_{rss}		-	54	-	
Total Gate Charge [c]	Q_g	V_{DS} = 50 V, V_{GS} = 10 V, I_D = 20 A	-	33	50	nC
Gate-Source Charge [c]	Q_{gs}		-	8.8	-	
Gate-Drain Charge [c]	Q_{gd}		-	7.5	-	
Gate Resistance	R_g	f = 1 MHz	0.7	3.5	7	Ω
Turn-On Delay Time [c]	$t_{d(on)}$	V_{DD} = 50 V, R_L = 5 Ω I_D ≅ 10 A, V_{GEN} = 10 V, R_g = 1 Ω	-	15	30	ns
Rise Time [c]	t_r		-	27	54	
Turn-Off Delay Time [c]	$t_{d(off)}$		-	36	72	
Fall Time [c]	t_f		-	45	90	
Drain-Source Body Diode Ratings and Characteristics [b] (T_C = 25 °C)						
Pulsed Current (t = 100 µs)	I_{SM}		-	-	120	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 = -10 A, dI/dt = 100 A/µs	-	77	116	ns
Peak Reverse Recovery Charge	$I_{RM(REC)}$		-	4.2	6.3	A
Reverse Recovery Charge	Q_{rr}		-	145	365	nC

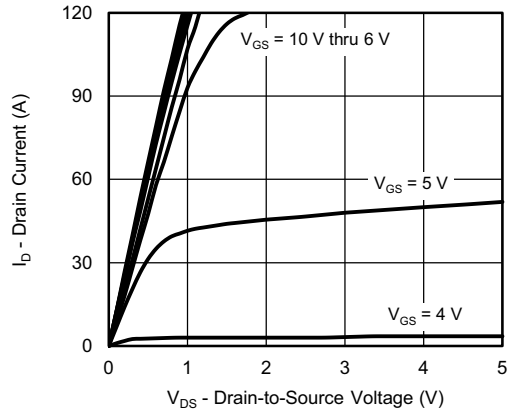
Notes

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

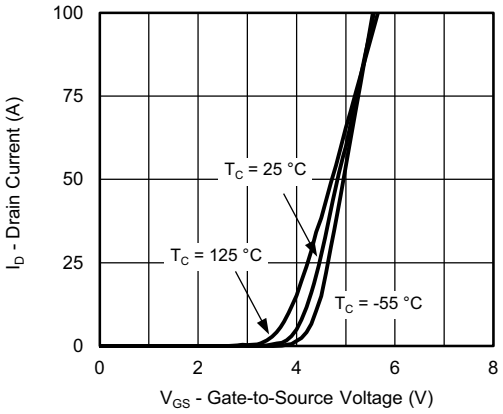
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

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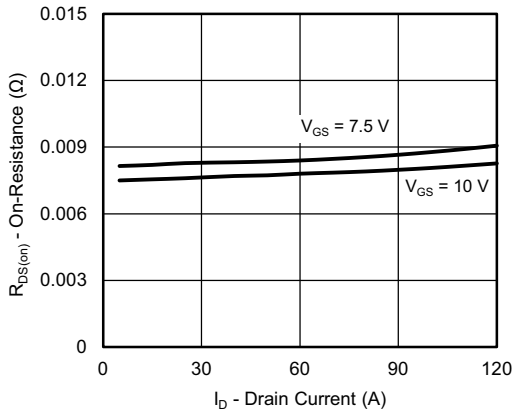
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



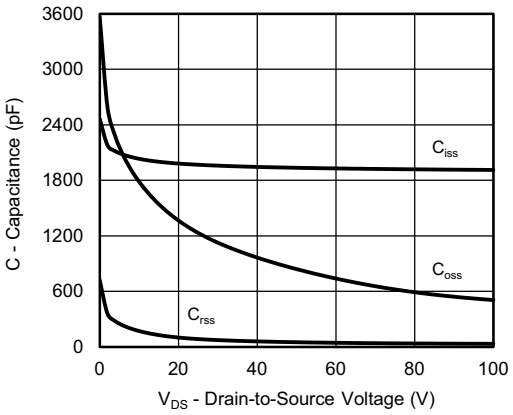
Output Characteristics



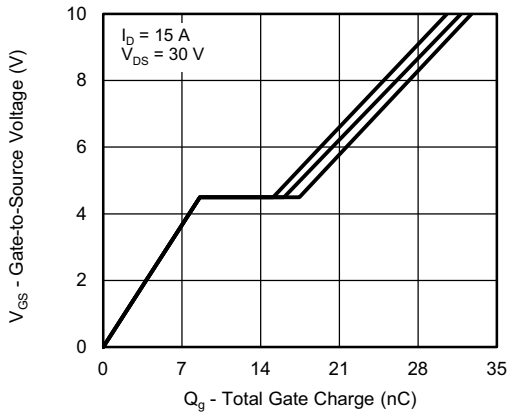
Transfer Characteristics



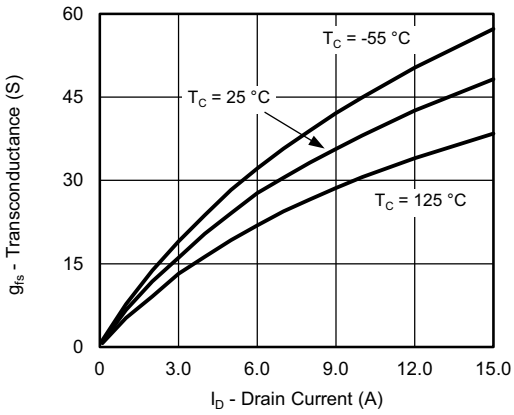
On-Resistance vs. Drain Current



Capacitance



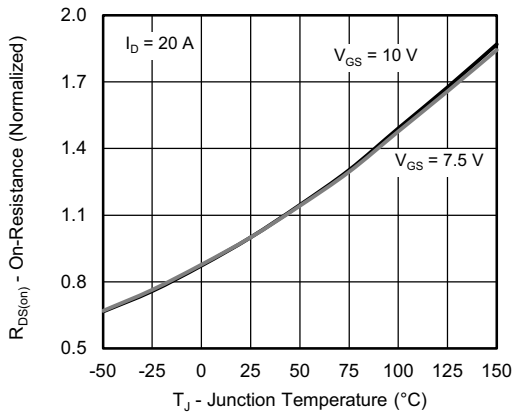
Gate Charge



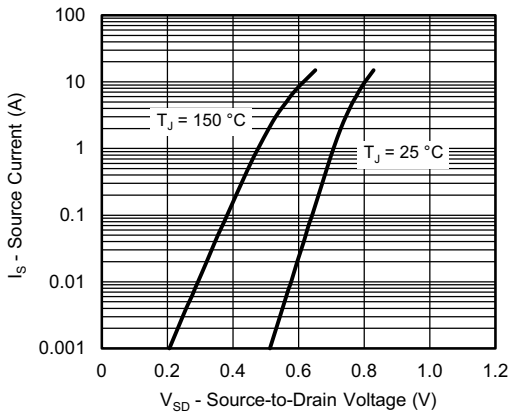
Transconductance

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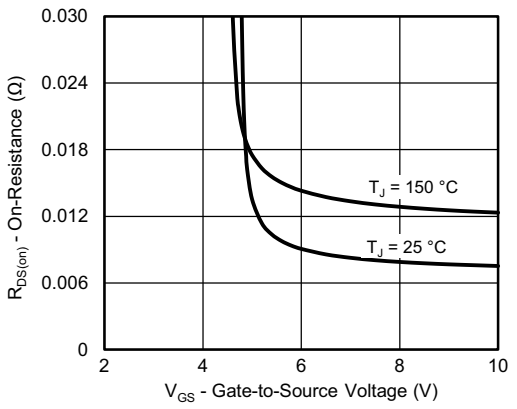
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



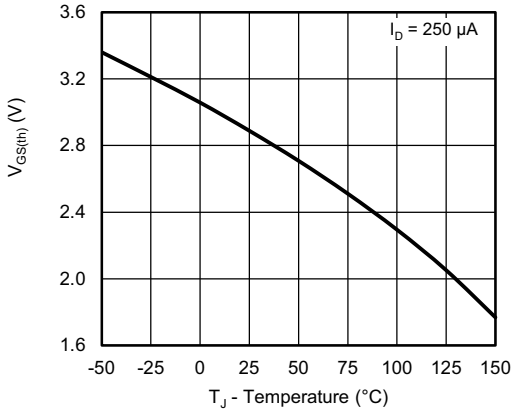
On-Resistance vs. Junction Temperature



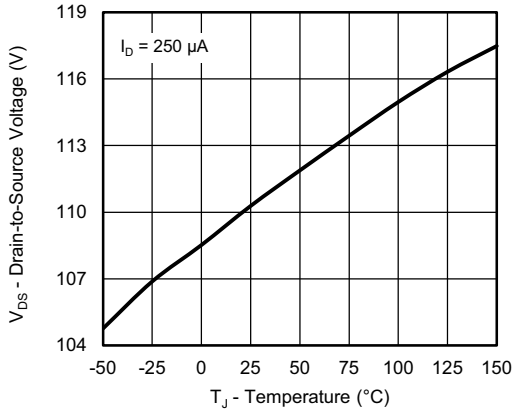
Source Drain Diode Forward Voltage



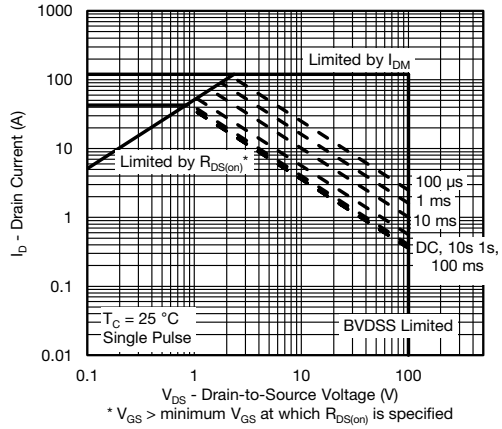
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Drain Source Voltage vs. Junction Temperature

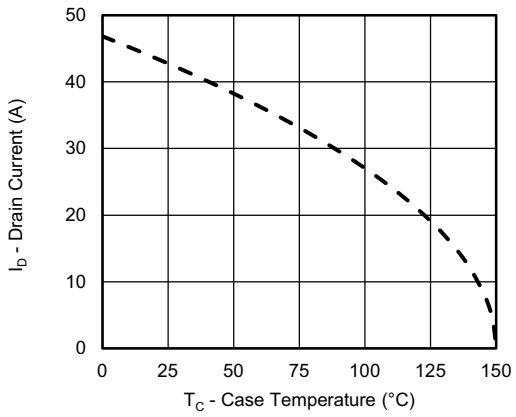


Safe Operating Area

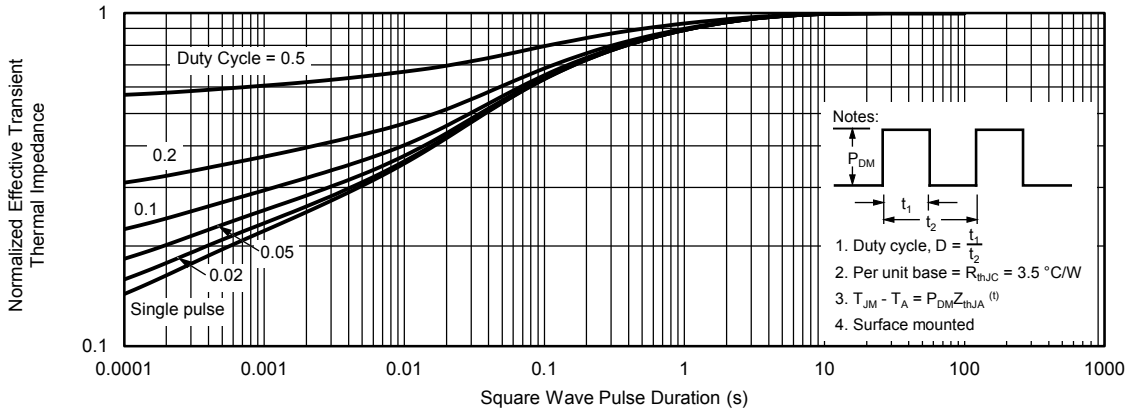
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THERMAL RATINGS (T_A = 25 °C, unless otherwise noted)



Current De-Rating



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)

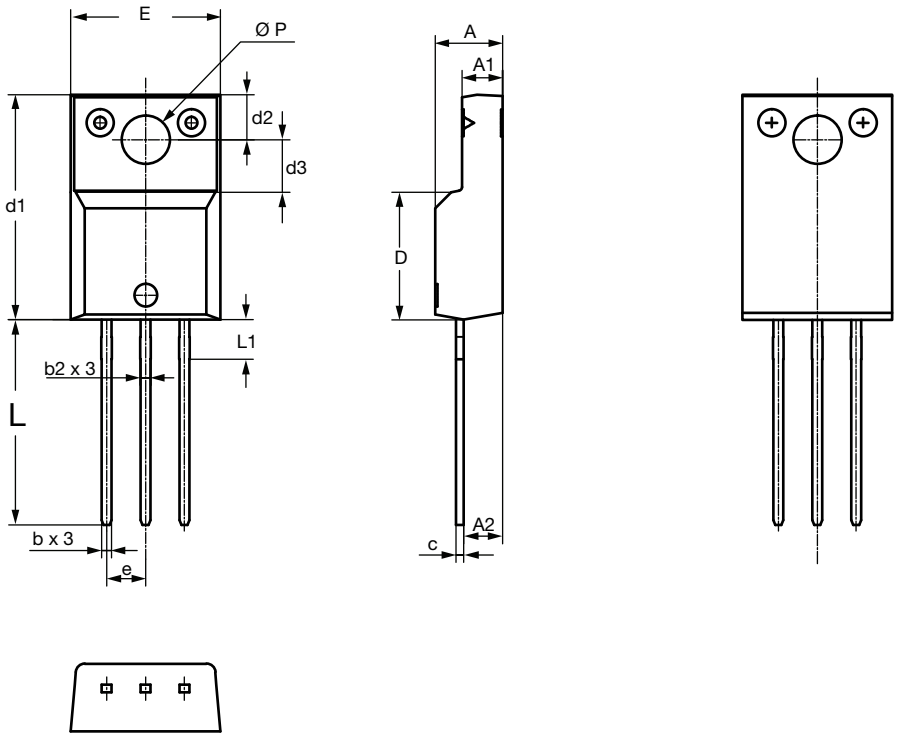
  are given for general guidelines only to enable the user to get a “ball park” indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit 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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TO-220 FULLPAK Thin Lead



SYMBOL	DIMENSIONS			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.30	4.70	0.169	0.185
A1	2.50	2.90	0.098	0.114
A2	2.40	2.80	0.094	0.110
b	0.60	0.80	0.024	0.031
b2	0.60	0.90	0.024	0.035
c	-	0.60	-	0.024
D	8.30	8.70	0.327	0.342
d1	14.70	15.30	0.579	0.602
d2	2.90	3.10	0.114	0.122
d3	3.30	3.70	0.130	0.146
E	9.70	10.30	0.382	0.406
e	2.50	2.70	0.098	0.106
L	13.40	13.80	0.528	0.543
L1	1.00	2.80	0.039	0.110
Ø P	3.00	3.40	0.118	0.134

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DWG: 6021

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