

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

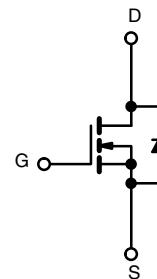
- ThunderFET® power MOSFET
- Q_{gd} / Q_{gs} ratio < 1 optimizes switching characteristics
- 100 % R_g and UIS tested
- Material categorization:
for definitions of compliance please see www.vishay.com/doc?99912



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)	I_D	42.8	A
		34.2	
Pulsed Drain Current ($t = 100$ μ s)	I_{DM}	120	
Avalanche Current	I_{AS}	40	
Single Avalanche Energy ^a	E_{AS}	80	mJ
Maximum Power Dissipation ^a	P_D	35.7	W
		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

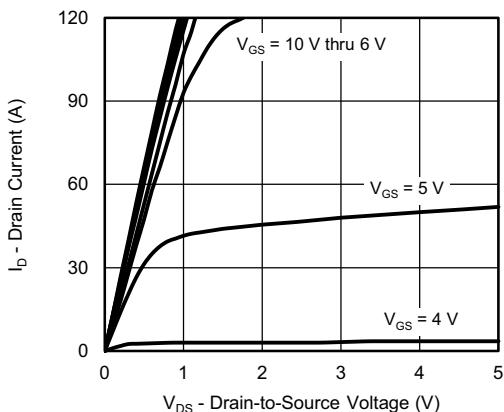
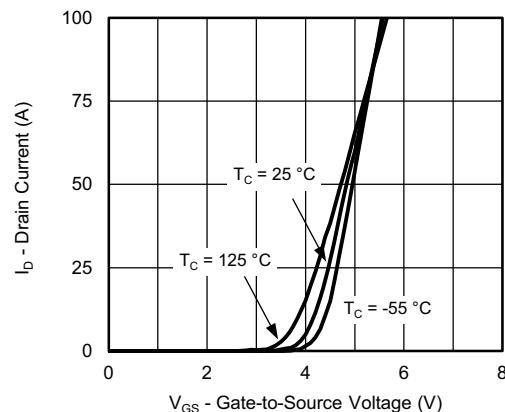
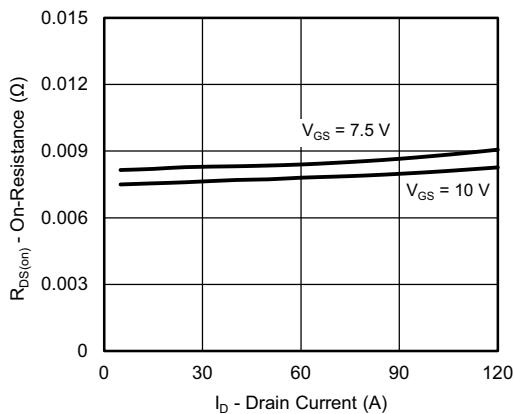
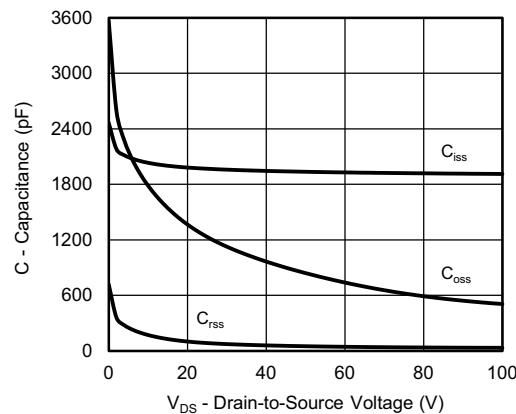
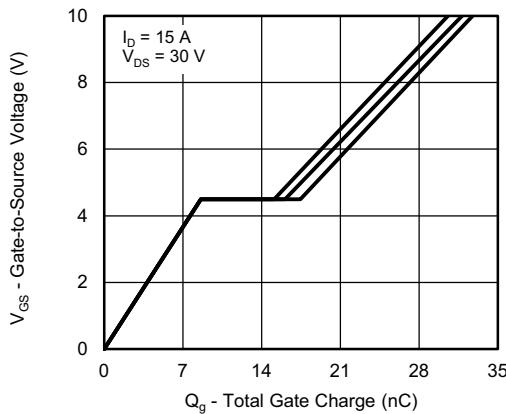
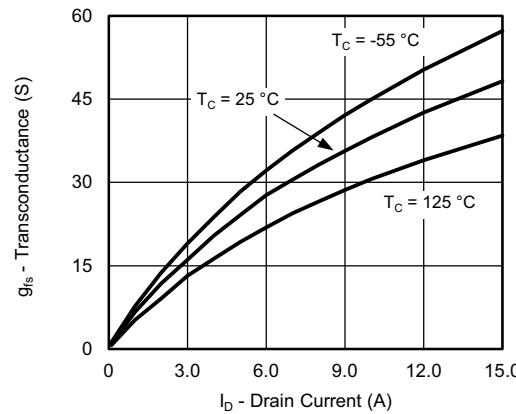
- Duty cycle ≤ 1 %.
- When mounted on 1" square PCB (FR4 material).

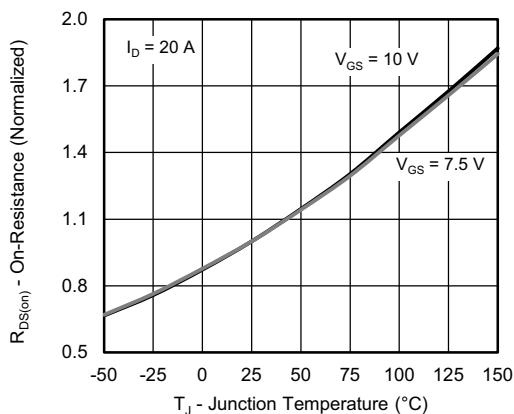
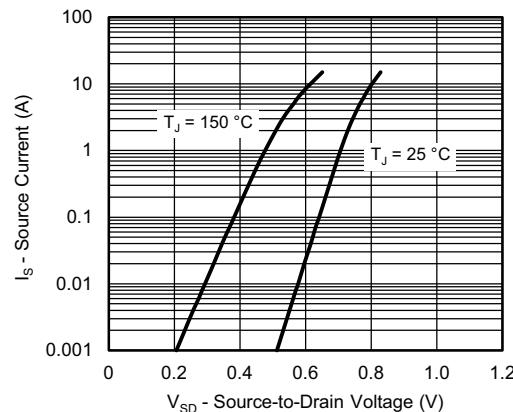
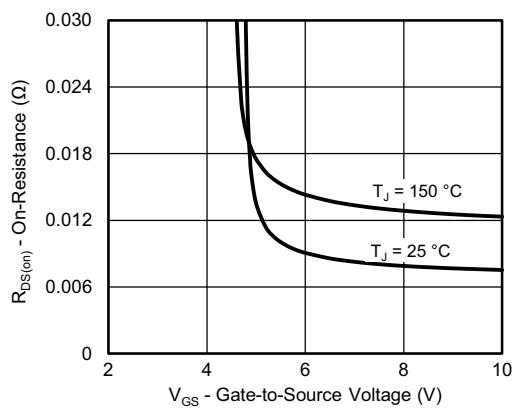
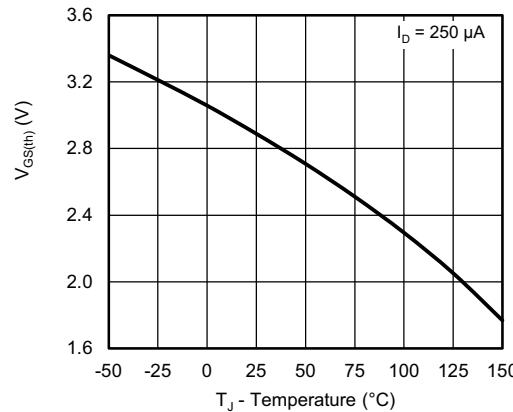
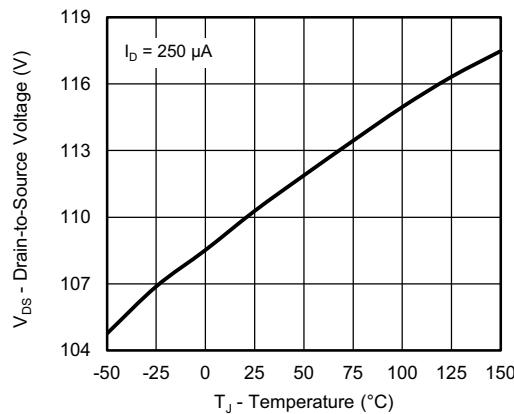
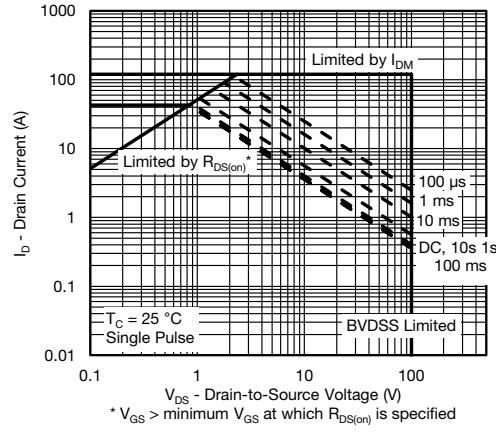
SPECIFICATIONS ($T_J = 25^\circ\text{C}$, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0 \text{ V}$, $I_D = 250 \mu\text{A}$	100	-	-	V
Gate Threshold Voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}$, $I_D = 250 \mu\text{A}$	2	-	4	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0 \text{ V}$, $V_{GS} = \pm 20 \text{ V}$	-	-	± 250	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 100 \text{ V}$, $V_{GS} = 0 \text{ V}$	-	-	1	μA
		$V_{DS} = 100 \text{ V}$, $V_{GS} = 0 \text{ V}$, $T_J = 125^\circ\text{C}$	-	-	150	
		$V_{DS} = 100 \text{ V}$, $V_{GS} = 0 \text{ V}$, $T_J = 175^\circ\text{C}$	-	-	5	mA
On-State Drain Current ^a	$I_{D(\text{on})}$	$V_{DS} \geq 10 \text{ V}$, $V_{GS} = 10 \text{ V}$	50	-	-	A
Drain-Source On-State Resistance ^a	$R_{DS(\text{on})}$	$V_{GS} = 10 \text{ V}$, $I_D = 20 \text{ A}$	-	0.0077	0.0093	Ω
		$V_{GS} = 7.5 \text{ V}$, $I_D = 15 \text{ A}$	-	0.0083	0.0100	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15 \text{ V}$, $I_D = 10 \text{ A}$	-	38	-	S
Dynamic ^b						
Input Capacitance	C_{iss}	$V_{GS} = 0 \text{ V}$, $V_{DS} = 50 \text{ V}$, $f = 1 \text{ MHz}$	-	1950	-	pF
Output Capacitance	C_{oss}		-	845	-	
Reverse Transfer Capacitance	C_{rss}		-	54	-	
Total Gate Charge ^c	Q_g	$V_{DS} = 50 \text{ V}$, $V_{GS} = 10 \text{ V}$, $I_D = 20 \text{ A}$	-	33	50	nC
Gate-Source Charge ^c	Q_{gs}		-	8.8	-	
Gate-Drain Charge ^c	Q_{gd}		-	7.5	-	
Gate Resistance	R_g	$f = 1 \text{ MHz}$	0.7	3.5	7	Ω
Turn-On Delay Time ^c	$t_{d(\text{on})}$	$V_{DD} = 50 \text{ V}$, $R_L = 5 \Omega$ $I_D \equiv 10 \text{ A}$, $V_{GEN} = 10 \text{ V}$, $R_g = 1 \Omega$	-	15	30	ns
Rise Time ^c	t_r		-	27	54	
Turn-Off Delay Time ^c	$t_{d(\text{off})}$		-	36	72	
Fall Time ^c	t_f		-	45	90	
Drain-Source Body Diode Ratings and Characteristics ^b ($T_C = 25^\circ\text{C}$)						
Pulsed Current ($t = 100 \mu\text{s}$)	I_{SM}		-	-	120	A
Forward Voltage ^a	V_{SD}	$I_F = 10 \text{ A}$, $V_{GS} = 0 \text{ V}$	-	0.8	1.5	V
Reverse Recovery Time	t_{rr}	$I_F = -10 \text{ A}$, $dI/dt = 100 \text{ A}/\mu\text{s}$	-	77	116	ns
Peak Reverse Recovery Charge	$I_{RM(\text{REC})}$		-	4.2	6.3	A
Reverse Recovery Charge	Q_{rr}		-	145	365	nC

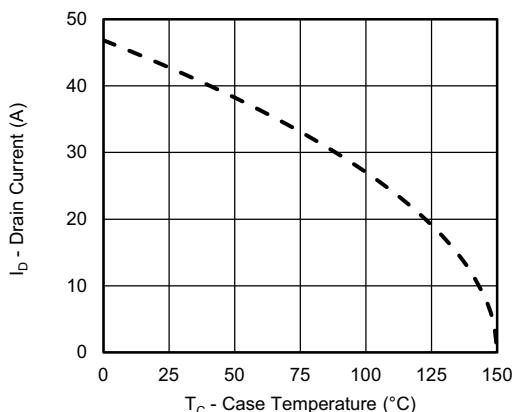
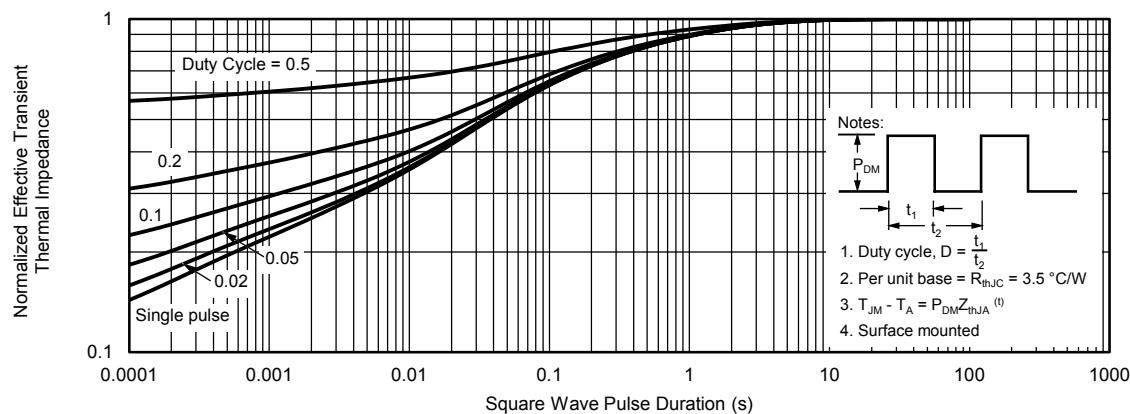
Notes

- a. Pulse test; pulse width $\leq 300 \mu\text{s}$, 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 ($T_A = 25^\circ\text{C}$, unless otherwise noted)

Output Characteristics

Transfer Characteristics

On-Resistance vs. Drain Current

Capacitance

Gate Charge

Transconductance

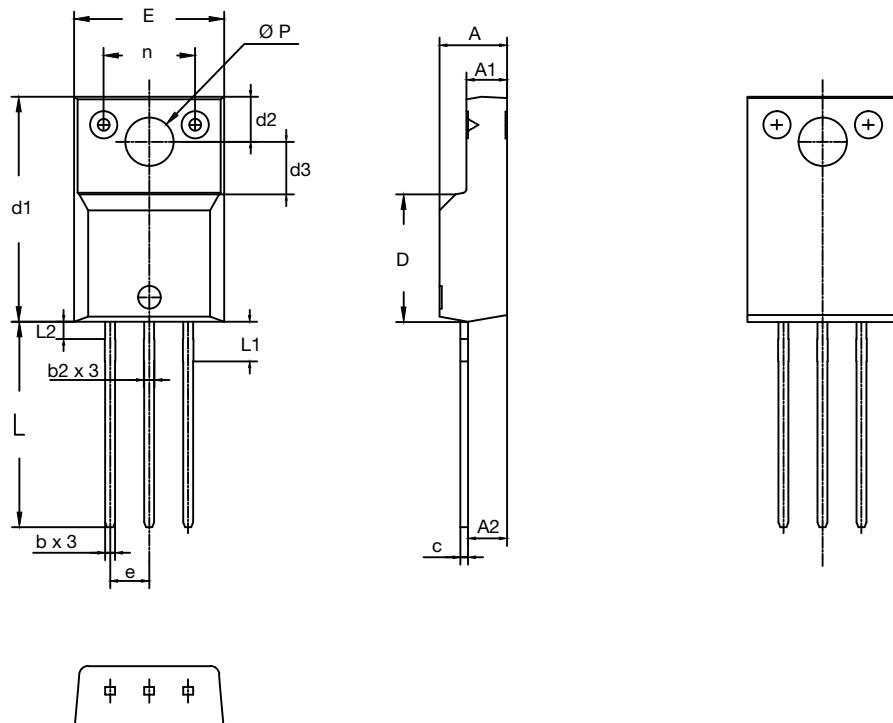
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise noted)

On-Resistance vs. Junction Temperature

Source Drain Diode Forward Voltage

On-Resistance vs. Gate-to-Source Voltage

Threshold Voltage

Drain Source Voltage vs. Junction Temperature

Safe Operating Area

THERMAL RATINGS ($T_A = 25^\circ\text{C}$, 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.

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	2.50	2.70	0.098	0.106
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	3.40	3.60	0.134	0.142
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	2.50	2.80	0.098	0.110
L2	-	1.20	-	0.047
n	6.05	6.15	0.238	0.242
Ø P	3.00	3.40	0.118	0.134

ECN: T16-0549-Rev. C, 12-Sep-16
DWG: 6021

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