

N-Channel 150-V (D-S) 175 °C MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
150	0.052 at $V_{GS} = 10$ V	28
	0.060 at $V_{GS} = 6$ V	26

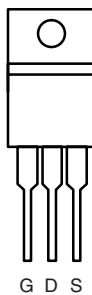
FEATURES

- TrenchFET® Power MOSFET
- 175 °C Junction Temperature
- PWM Optimized
- Compliant to RoHS Directive 2002/95/EC


RoHS
COMPLIANT

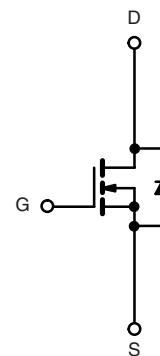
APPLICATIONS

- Primary Side Switch

TO-220AB


Top View

DRAIN connected to TAB

Ordering Information: SUP28N15-52 E3 (Lead (Pb)-free)


N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	150	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 175$ °C) ^b	I_D	$T_C = 25$ °C	A
		$T_C = 125$ °C	
Pulsed Drain Current	I_{DM}	50	A
Continuous Source Current (Diode Conduction)	I_S	28	
Avalanche Current	I_{AR}	25	
Repetitive Avalanche Energy (Duty Cycle ≤ 1 %)	$L = 0.1$ mH E_{AR}	31	mJ
Maximum Power Dissipation	P_D	$T_C = 25$ °C	120 ^b
		$T_A = 25$ °C (mounted) ^a	3.75 ^a
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Unit
Junction-to-Ambient ^a	R_{thJA}	PCB Mount ^a	40
		Free Air	62.5
Junction-to-Case (Drain)	R_{thJC}	1.25	°C/W

Notes:

a. Surface Mounted on 1" x 1" FR4 board.

b. See SOA curve for voltage derating.

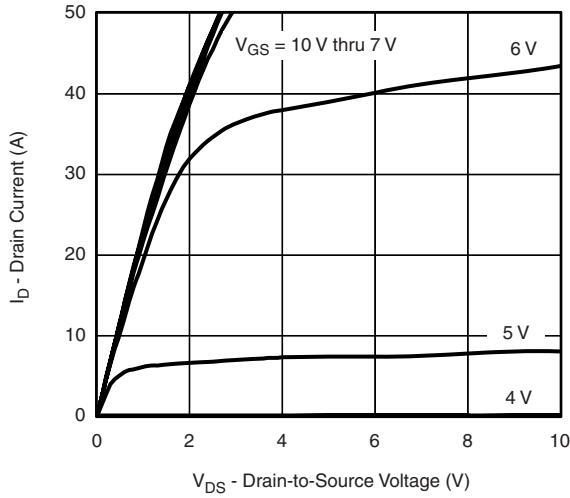
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ. ^a	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	150			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2		4.5	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 120\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 120\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			50	
		$V_{DS} = 120\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$			250	
On-State Drain Current ^b	$I_{D(on)}$	$V_{DS} = 5\text{ V}, V_{GS} = 10\text{ V}$	50			A
Drain-Source On-State Resistance ^b	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 5\text{ A}$		0.042	0.052	Ω
		$V_{GS} = 10\text{ V}, I_D = 5\text{ A}, T_J = 125\text{ }^\circ\text{C}$			0.109	
		$V_{GS} = 10\text{ V}, I_D = 5\text{ A}, T_J = 175\text{ }^\circ\text{C}$			0.145	
		$V_{GS} = 6\text{ V}, I_D = 5\text{ A}$		0.047	0.060	
Forward Transconductance ^b	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 25\text{ A}$		40		S
Dynamic^a						
Input Capacitance	C_{ISS}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		1725		pF
Output Capacitance	C_{OSS}			216		
Reverse Transfer Capacitance	C_{RSS}			100		
Total Gate Charge ^c	Q_g	$V_{DS} = 75\text{ V}, V_{GS} = 10\text{ V}, I_D = 28\text{ A}$		33	40	nC
Gate-Source Charge ^c	Q_{gs}			9		
Gate-Drain Charge ^c	Q_{gd}			12		
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 50\text{ V}, R_L = 3\text{ }\Omega$ $I_D \cong 28\text{ A}, V_{GEN} = 10\text{ V}, R_g = 2.5\text{ }\Omega$		15	25	ns
Rise Time ^c	t_r			70	100	
Turn-Off Delay Time ^c	$t_{d(off)}$			25	40	
Fall Time ^c	t_f			60	90	
Source-Drain Diode Ratings and Characteristics $T_C = 25\text{ }^\circ\text{C}$						
Pulsed Current	I_{SM}				50	A
Diode Forward Voltage ^b	V_{SD}	$I_F = 25\text{ A}, V_{GS} = 0\text{ V}$		0.9	1.5	V
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = 28\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		95	140	ns

Notes:

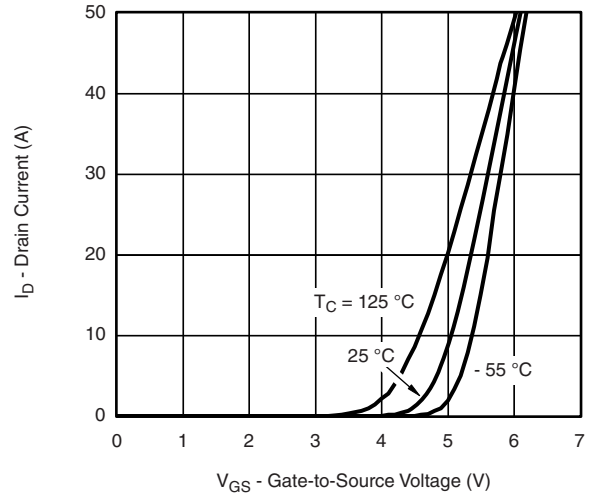
- a. Guaranteed by design, not subject to production testing.
- b. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- c. Independent of operating temperature.

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.

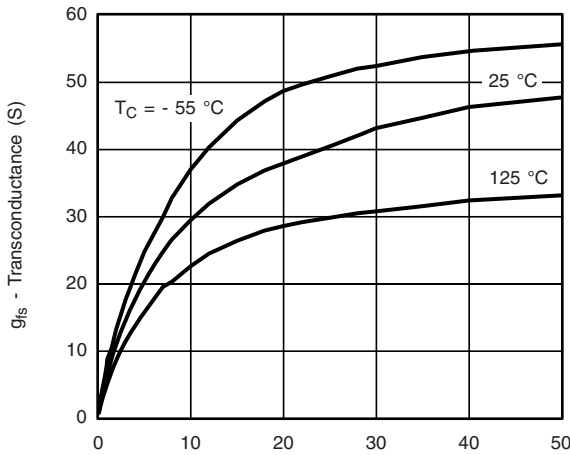
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



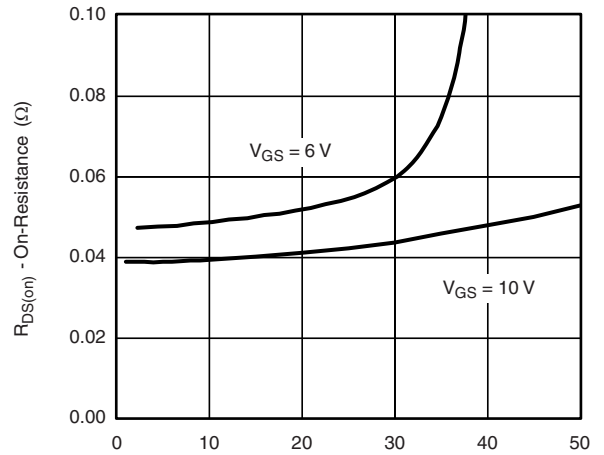
Output Characteristics



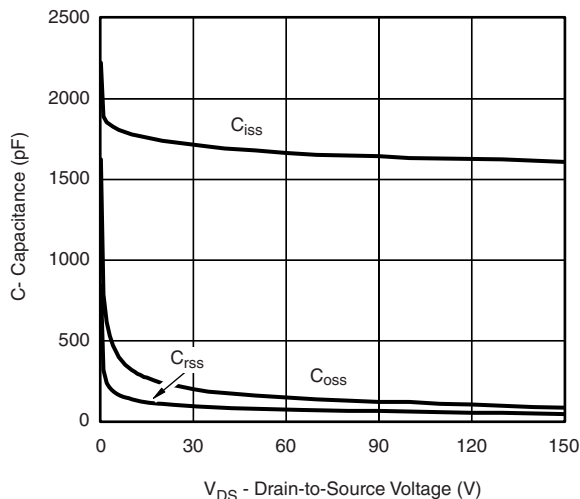
Transfer Characteristics



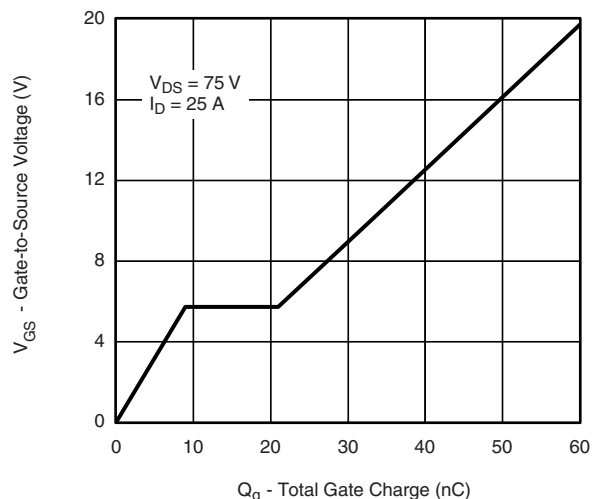
Transconductance



On-Resistance vs. Drain Current

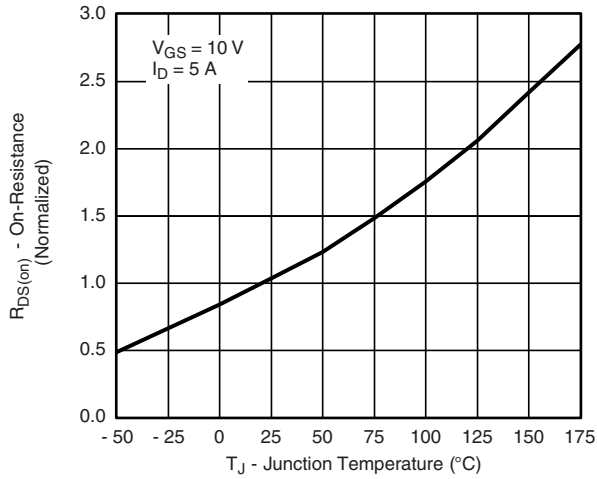


Capacitance

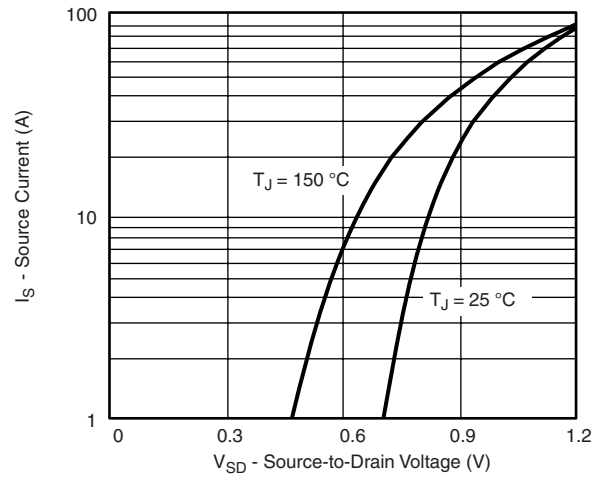


Gate Charge

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

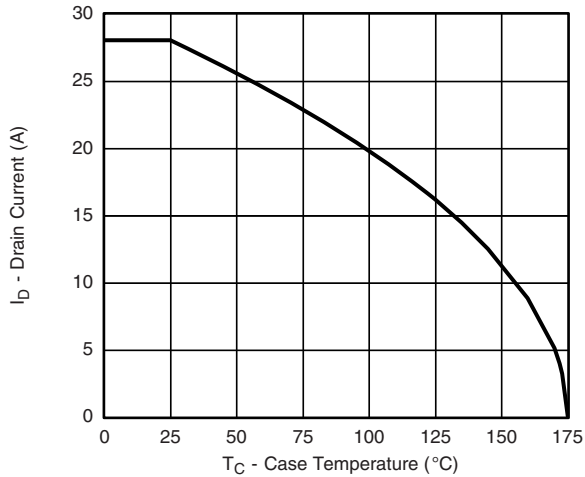


On-Resistance vs. Junction Temperature

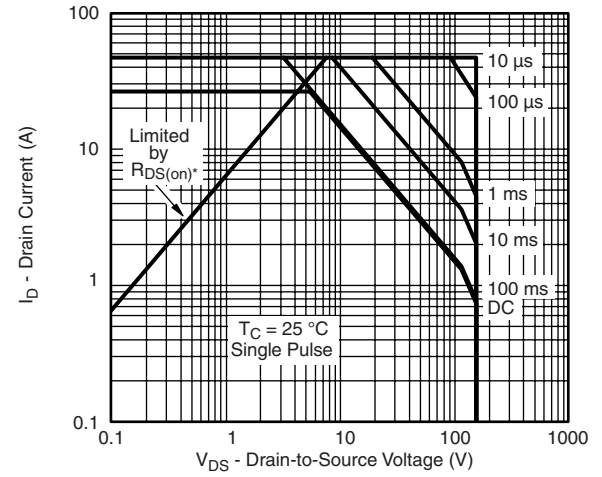


Source-Drain Diode Forward Voltage

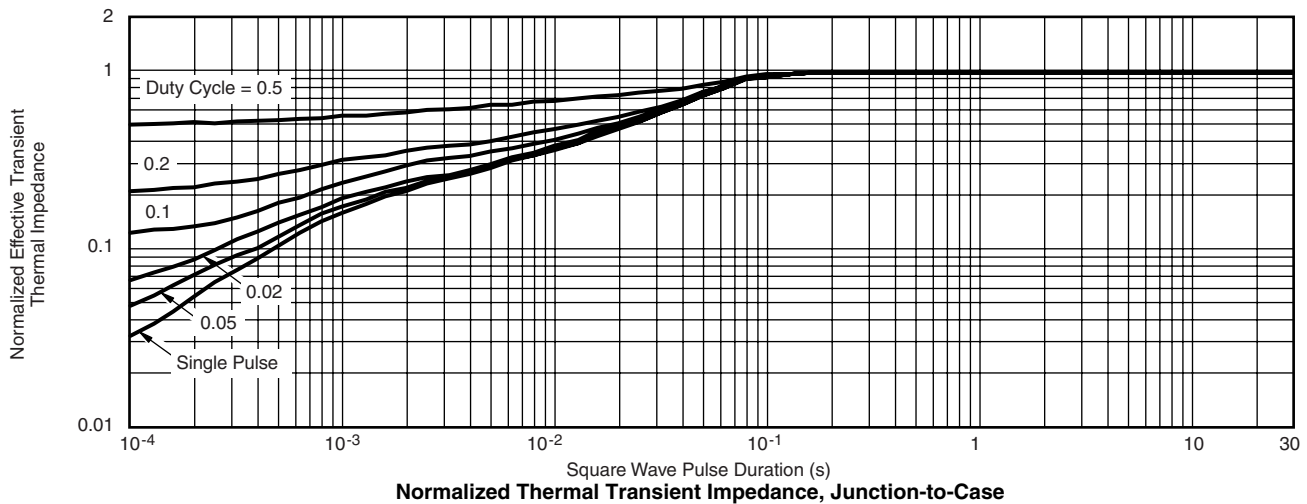
THERMAL RATINGS



Maximum Avalanche Drain Current vs. Case Temperature



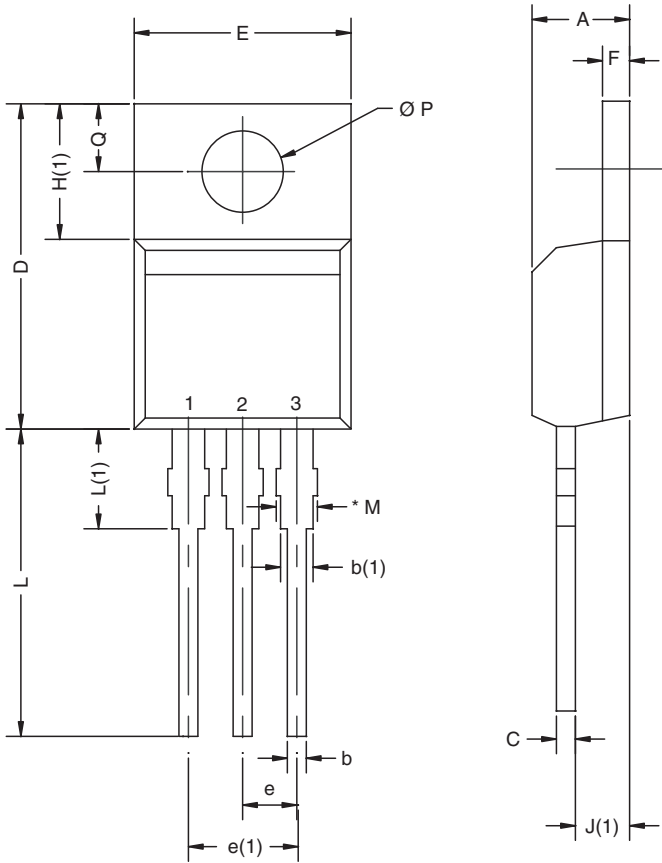
Safe Operating Area
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified



Normalized Thermal Transient Impedance, Junction-to-Case

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TO-220AB



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.25	4.65	0.167	0.183
b	0.69	1.01	0.027	0.040
b(1)	1.20	1.73	0.047	0.068
c	0.36	0.61	0.014	0.024
D	14.85	15.49	0.585	0.610
E	10.04	10.51	0.395	0.414
e	2.41	2.67	0.095	0.105
e(1)	4.88	5.28	0.192	0.208
F	1.14	1.40	0.045	0.055
H(1)	6.09	6.48	0.240	0.255
J(1)	2.41	2.92	0.095	0.115
L	13.35	14.02	0.526	0.552
L(1)	3.32	3.82	0.131	0.150
Ø P	3.54	3.94	0.139	0.155
Q	2.60	3.00	0.102	0.118

ECN: X10-0416-Rev. M, 01-Nov-10
DWG: 5471

Note

* M = 1.32 mm to 1.62 mm (dimension including protrusion)
Heatsink hole for HVM



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