

## N-Channel 150-V (D-S) 175 °C MOSFET

**PRODUCT SUMMARY**

$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
150	0.021 at $V_{GS} = 10$ V	85

**FEATURES**

- TrenchFET<sup>®</sup> Power MOSFET
- 175 °C Junction Temperature

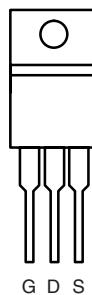


Available

**RoHS\***  
 COMPLIANT

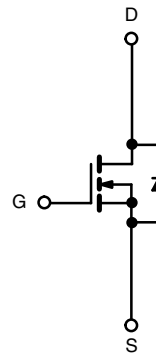
**APPLICATIONS**

- Primary Side Switch

**TO-220AB**


Top View

DRAIN connected to TAB



N-Channel MOSFET

**Ordering Information:** SUP85N15-21  
 SUP85N15-21-E3 (Lead (Pb)-free)

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	150	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current ( $T_J = 175$ °C)	$I_D$	$T_C = 25$ °C	85
		$T_C = 125$ °C	50
Pulsed Drain Current	$I_{DM}$	180	A
Avalanche Current	$I_{AS}$	50	
Single Pulse Avalanche Energy <sup>b</sup>	$E_{AS}$	125	mJ
Maximum Power Dissipation <sup>b</sup>	$P_D$	$T_C = 25$ °C	300 <sup>c</sup>
		$T_A = 25$ °C <sup>d</sup>	2.4
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 175	°C

**THERMAL RESISTANCE RATINGS**

Parameter	Symbol	Limit	Unit
Junction-to-Ambient-Free Air	$R_{thJA}$	62.5	°C/W
Junction-to-Case (Drain)	$R_{thJC}$	0.4	

Notes:

- Package limited.
- Duty cycle  $\leq 1$  %.
- See SOA curve for voltage derating.

\* Pb containing terminations are not RoHS compliant, exemptions may apply.



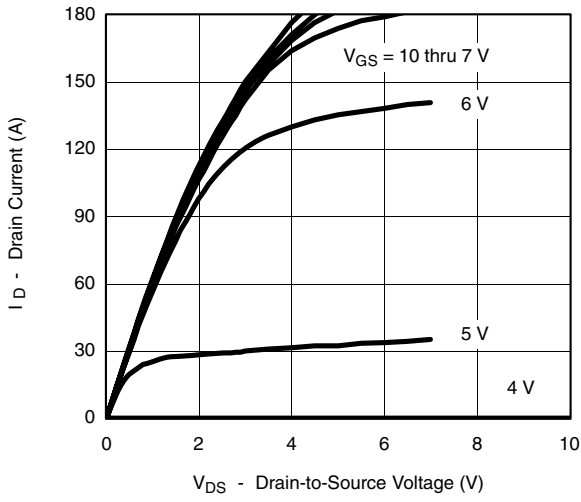
<b>SPECIFICATIONS</b> $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{DS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	150			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2		4	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 120\text{ V}, V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
		$V_{DS} = 120\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			50	
		$V_{DS} = 120\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$			250	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	120			A
Drain-Source On-State Resistance <sup>a</sup>	$r_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 30\text{ A}$		0.0175	0.021	$\Omega$
		$V_{GS} = 10\text{ V}, I_D = 30\text{ A}, T_J = 125\text{ }^\circ\text{C}$			0.042	
		$V_{GS} = 10\text{ V}, I_D = 30\text{ A}, T_J = 175\text{ }^\circ\text{C}$			0.055	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 15\text{ V}, I_D = 30\text{ A}$	25			S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		4750		$\text{pF}$
Output Capacitance	$C_{oss}$			530		
Reverse Transfer Capacitance	$C_{rss}$			220		
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{DS} = 75\text{ V}, V_{GS} = 10\text{ V}, I_D = 85\text{ A}$		76	110	$\text{nC}$
Gate-Source Charge <sup>c</sup>	$Q_{gs}$			21		
Gate-Drain Charge <sup>c</sup>	$Q_{gd}$			26		
Turn-On Delay Time <sup>c</sup>	$t_{d(on)}$	$V_{DD} = 75\text{ V}, R_L = 0.9\text{ }\Omega$ $I_D \cong 85\text{ A}, V_{GEN} = 10\text{ V}, R_G = 2.5\text{ }\Omega$		22	35	$\text{ns}$
Rise Time <sup>c</sup>	$t_r$			170	250	
Turn-Off Delay Time <sup>c</sup>	$t_{d(off)}$			40	60	
Fall Time <sup>c</sup>	$t_f$			170	250	
<b>Source-Drain Diode Ratings and Characteristics</b> ( $T_C = 25\text{ }^\circ\text{C}$ ) <sup>b</sup>						
Continuous Current	$I_S$				85	A
Pulsed Current	$I_{SM}$				180	
Forward Voltage <sup>a</sup>	$V_{SD}$	$I_F = 85\text{ A}, V_{GS} = 0\text{ V}$		1.0	1.5	V
Reverse Recovery Time	$t_{rr}$	$I_F = 50\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		130	200	ns
Peak Reverse Recovery Current	$I_{RM(REC)}$			8	12	A
Reverse Recovery Charge	$Q_{rr}$			0.52	1.2	$\mu\text{C}$

**Notes:**

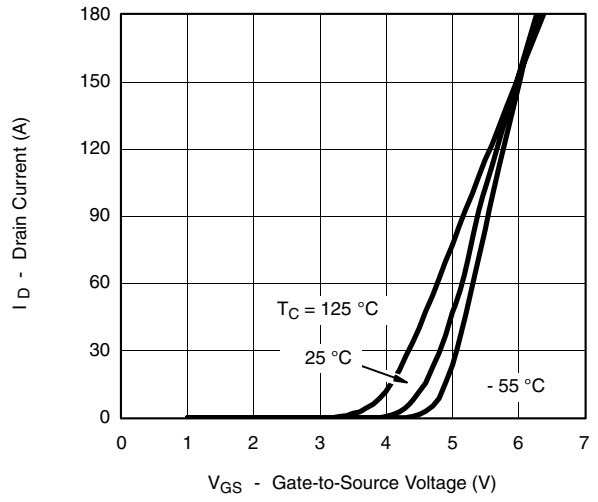
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- b. Guaranteed by design, not subject to production testing.
- c. Independent of operating temperature.

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.

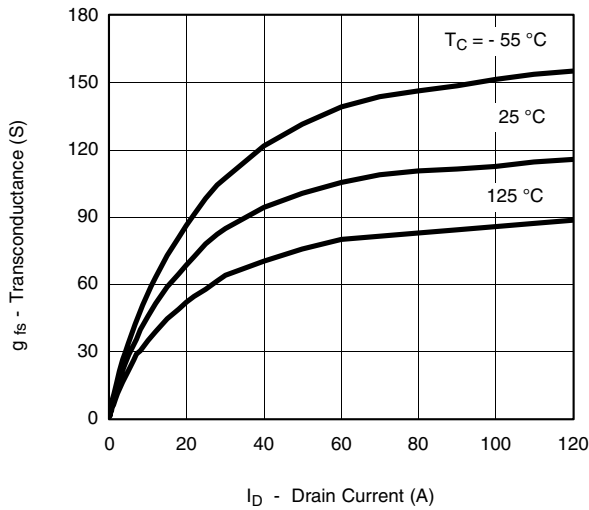
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



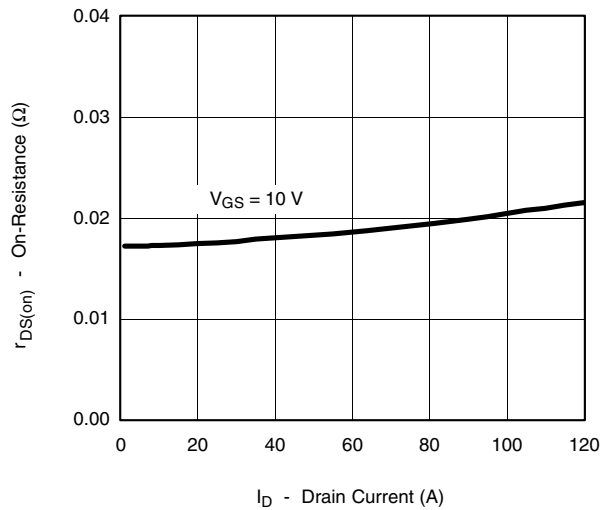
**Output Characteristics**



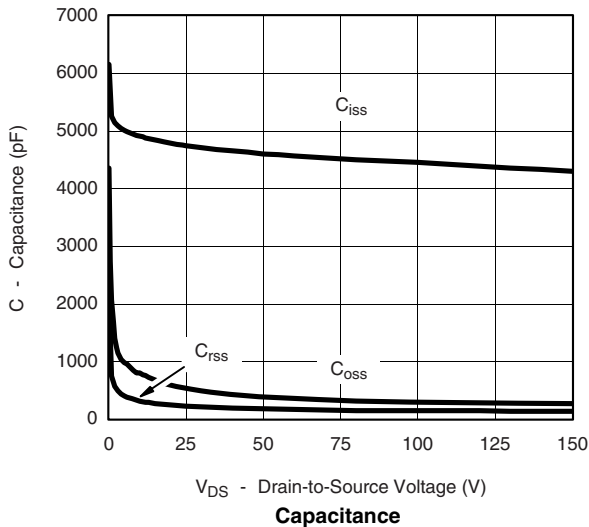
**Transfer Characteristics**



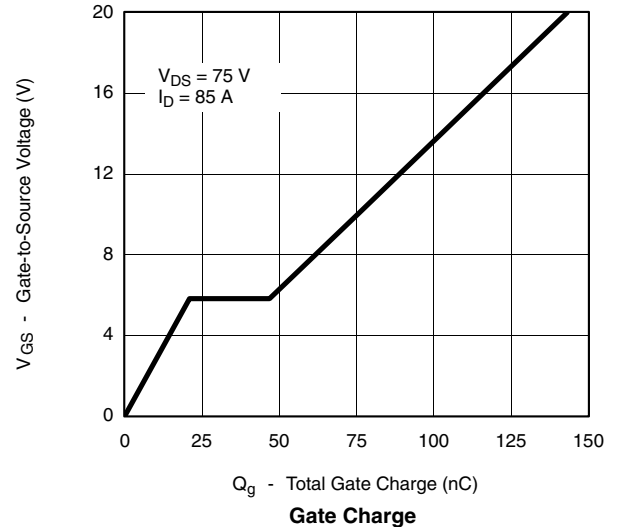
**Transconductance**



**On-Resistance vs. Drain Current**

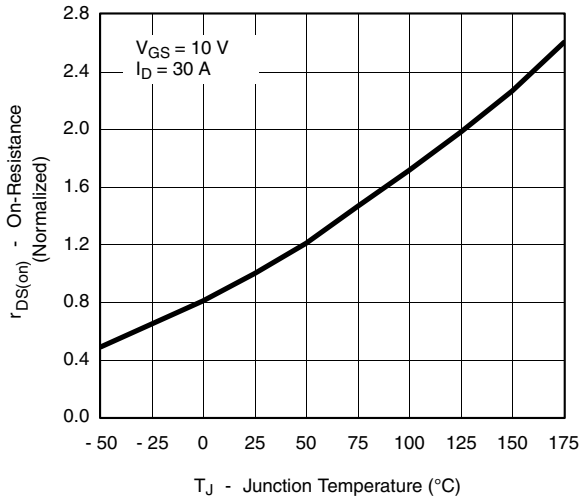


**Capacitance**

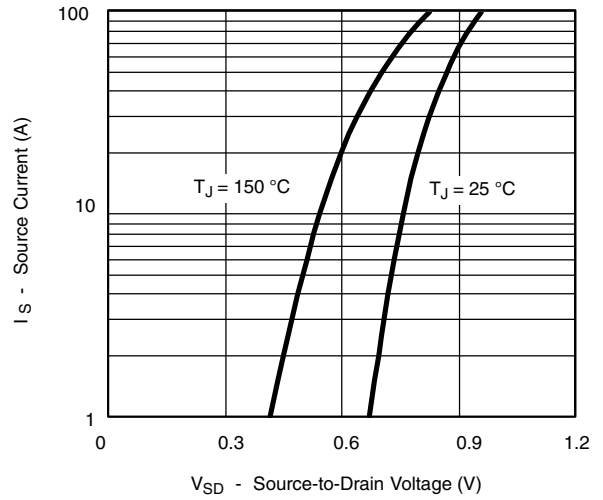


**Gate Charge**

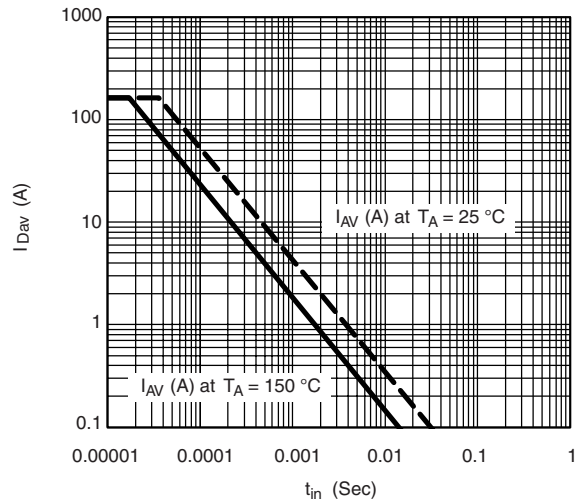
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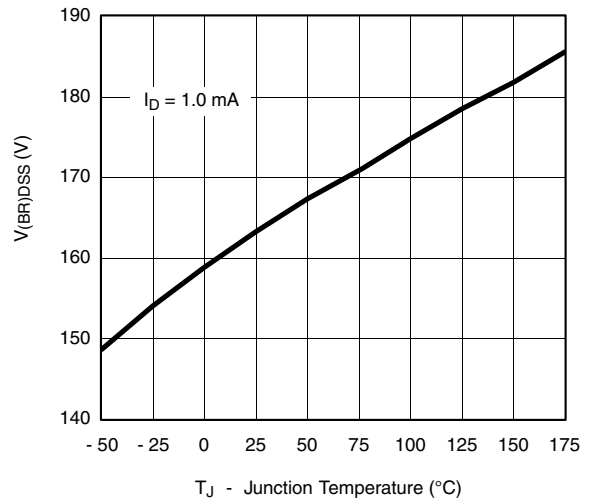
**On-Resistance vs. Junction Temperature**



**Source-Drain Diode Forward Voltage**



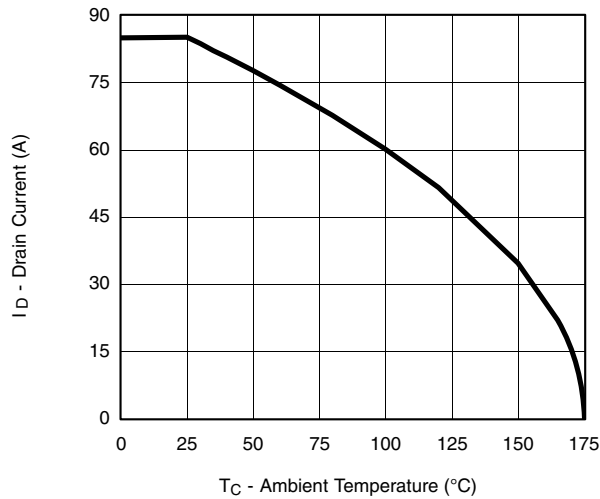
**Avalanche Current vs. Time**



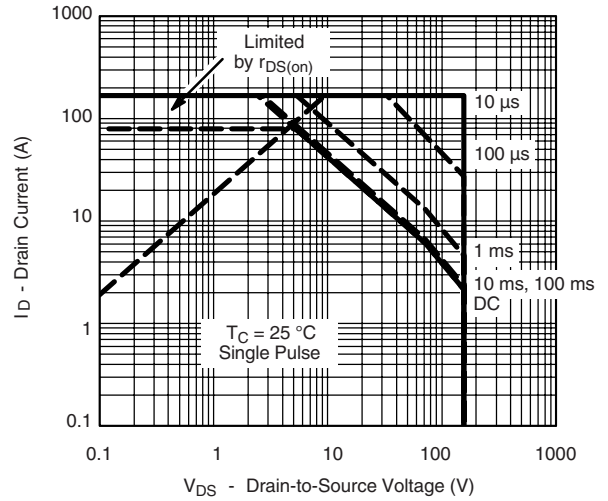
**Drain Source Breakdown vs. Junction Temperature**



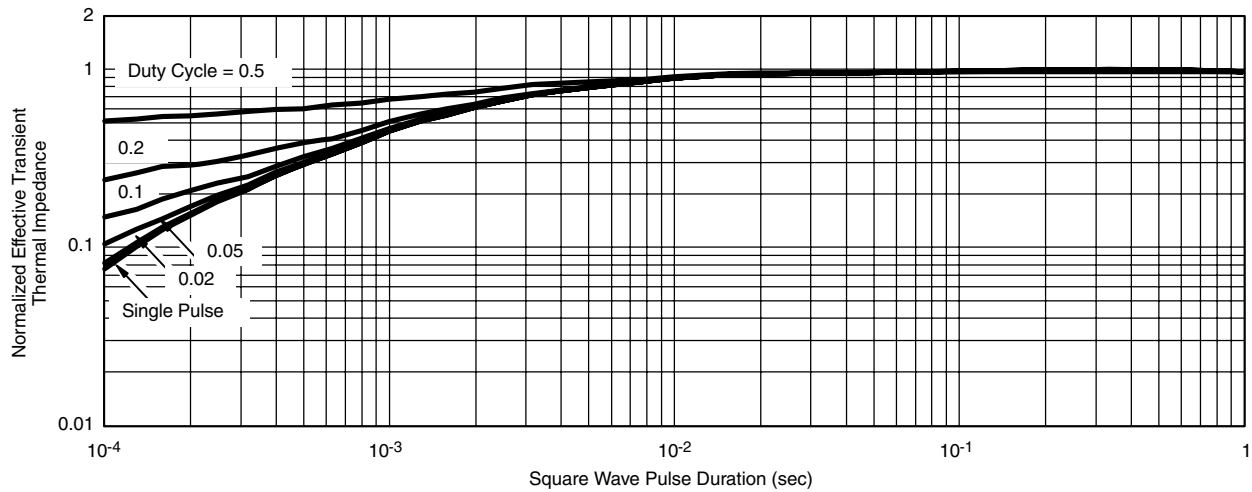
### THERMAL RATINGS



**Maximum Avalanche and Drain Current vs. Case Temperature**



**Safe Operating Area**



**Normalized Thermal Transient Impedance, Junction-to-Case**

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