

N-Channel 30-V (D-S) 175 °C MOSFET

PRODUCT SUMMARY

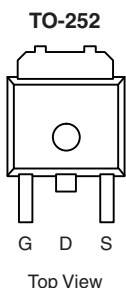
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^a
30	0.011 at $V_{GS} = 10$ V	50
	0.017 at $V_{GS} = 4.5$ V	43

FEATURES

- TrenchFET® Power MOSFET
- 175 °C Maximum Junction Temperature
- 100 % R_g Tested

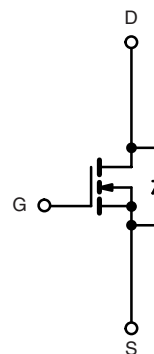


RoHS
COMPLIANT



Drain Connected to Tab

Ordering Information: SUD50N03-11-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}	30	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 175$ °C) ^b	I_D	$T_C = 25$ °C	A
		$T_C = 100$ °C	
Pulsed Drain Current	I_{DM}	100	
Continuous Source Current (Diode Conduction) ^a	I_S	50	
Maximum Power Dissipation	P_D	$T_C = 25$ °C	W
		$T_A = 25$ °C	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Junction-to-Ambient ^b	R_{thJA}	$t \leq 10$ s	17	°C/W
		Steady State	50	
Junction-to-Case	R_{thJC}	2	2.4	
Junction-to-Lead	R_{thJL}	4	4.8	

Notes:

a. Package limited.

b. Surface Mounted on 1" x 1" FR4 board, $t \leq 10$ s.

c. See SOA curve for voltage derating.

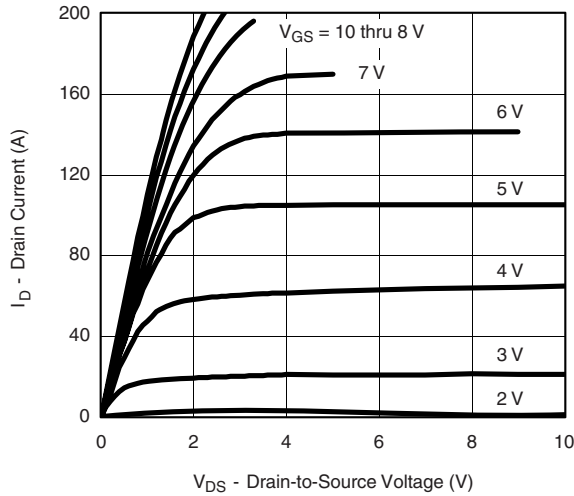
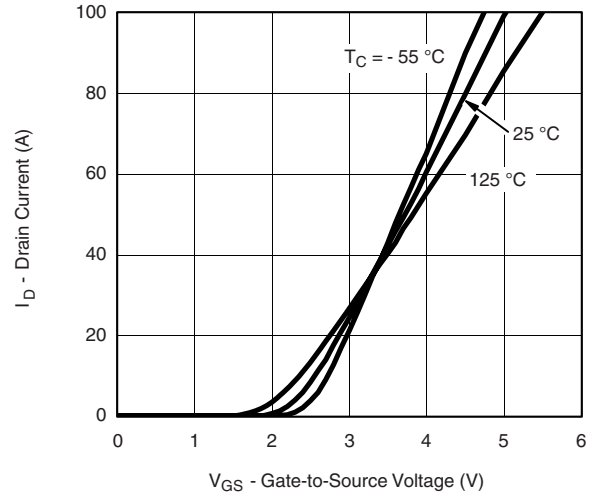
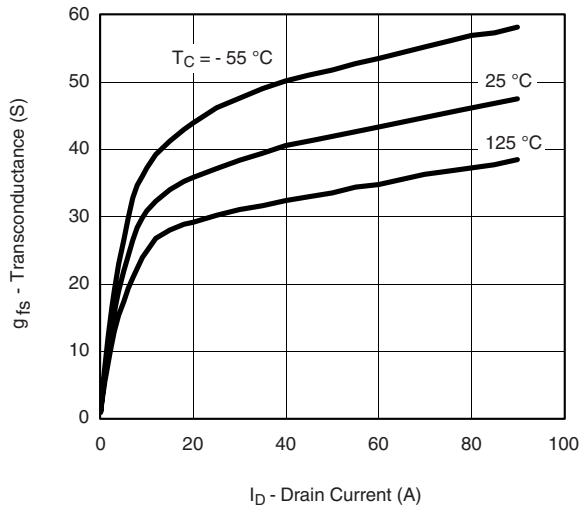
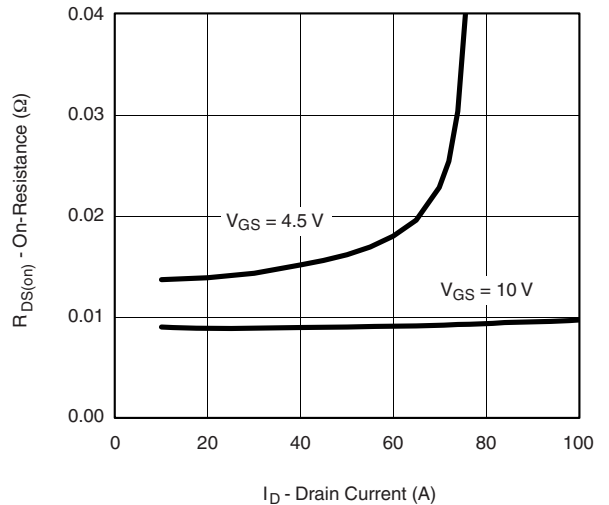
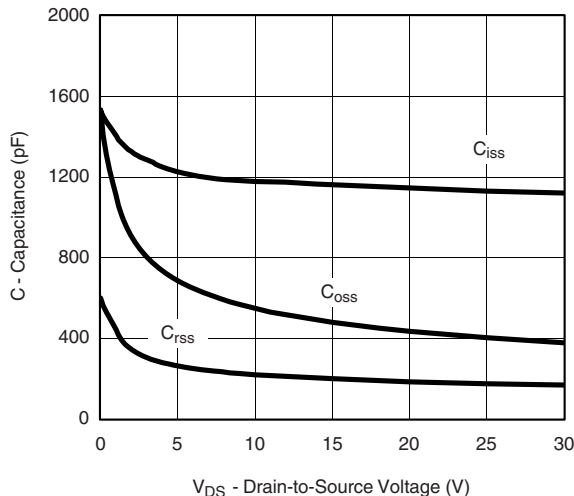
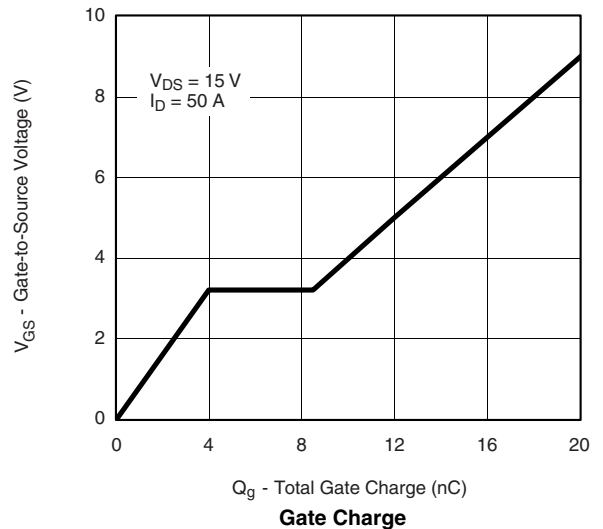
* Pb containing terminations are not RoHS compliant, exemptions may apply.

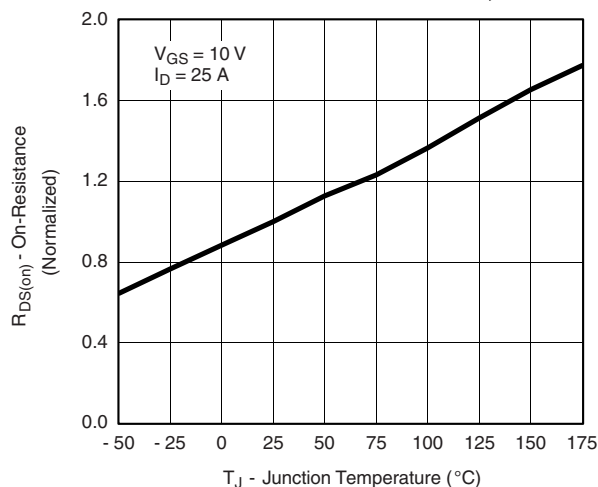
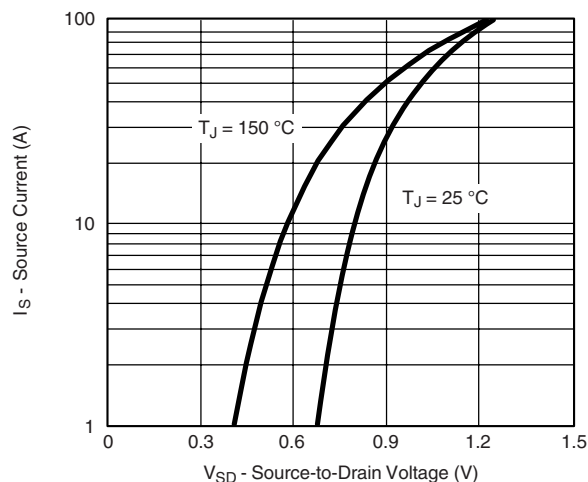
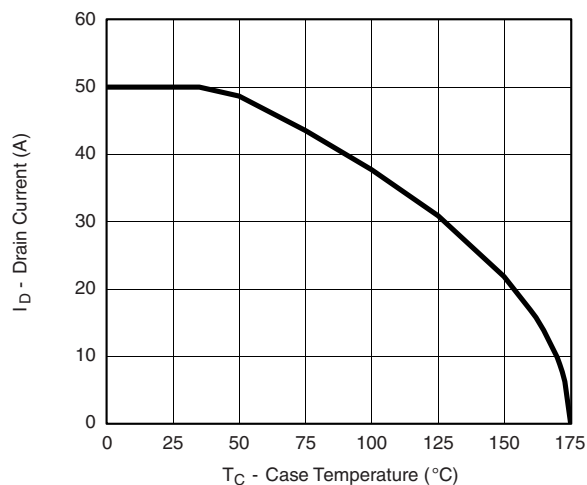
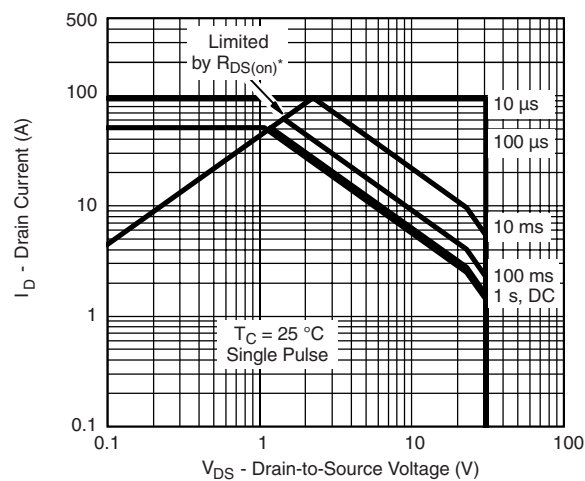
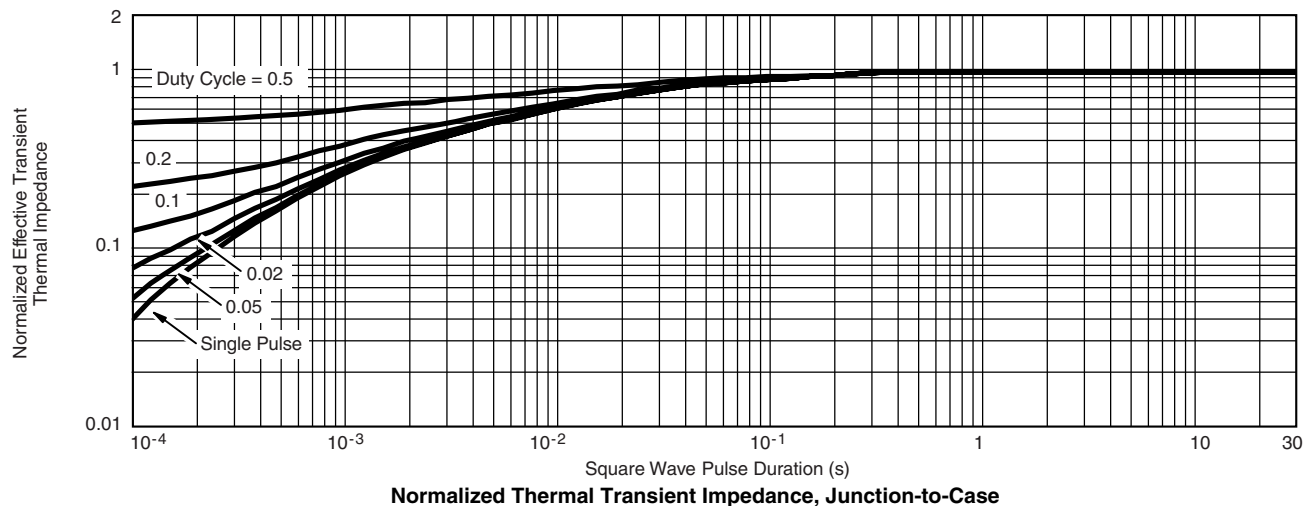
SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ. ^a	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$	30			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	0.8			
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}	$V_{DS} = 24\text{ V}$, $V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 24\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 125\text{ }^{\circ}\text{C}$			50	
On-State Drain Current ^b	$I_{D(on)}$	$V_{DS} = 5\text{ V}$, $V_{GS} = 5\text{ V}$	50			A
Drain-Source On-State Resistance ^b	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$, $I_D = 25\text{ A}$		0.009	0.011	Ω
		$V_{GS} = 5\text{ V}$, $I_D = 20\text{ A}$, $T_J = 125\text{ }^{\circ}\text{C}$			0.018	
		$V_{GS} = 4.5\text{ V}$, $I_D = 15\text{ A}$		0.014	0.017	
Forward Transconductance ^b	g_{fs}	$V_{DS} = 15\text{ V}$, $I_D = 20\text{ A}$	10			S
Dynamic ^a						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$		1130		pF
Output Capacitance	C_{oss}			400		
Reverse Transfer Capacitance	C_{rss}			175		
Total Gate Charge ^c	Q_g	$V_{DS} = 15\text{ V}$, $V_{GS} = 5\text{ V}$, $I_D = 50\text{ A}$		12	20	nC
Gate-Source Charge ^c	Q_{gs}			4		
Gate-Drain Charge ^c	Q_{gd}			4.5		
Gate Resistance	R_g		0.5		3.4	Ω
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 15\text{ V}$, $R_L = 0.3\text{ }\Omega$ $I_D \cong 50\text{ A}$, $V_{GEN} = 10\text{ V}$, $R_G = 2.5\text{ }\Omega$		8	12	ns
Rise Time ^c	t_r			10	15	
Turn-Off Delay Time ^c	$t_{d(off)}$			18	30	
Fall Time ^c	t_f			6	9	
Source-Drain Diode Ratings and Characteristics $T_C = 25\text{ }^{\circ}\text{C}$						
Continuous Current	I_S				50	A
Pulsed Current	I_{SM}				80	
Diode Forward Voltage ^b	V_{SD}	$I_F = 100\text{ A}$, $V_{GS} = 0\text{ V}$			1.5	V
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = 50\text{ A}$, $dI/dt = 100\text{ A}/\mu\text{s}$		30	50	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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