

N-Channel 60 V (D-S), 175 °C MOSFET, Logic Level

PRODUCT SUMMARY

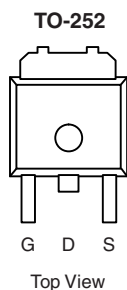
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A) ^a
60	0.031 at $V_{GS} = 10$ V	23
	0.045 at $V_{GS} = 4.5$ V	19.5

FEATURES

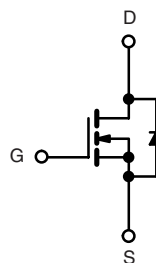
- TrenchFET® Power MOSFET
- 175 °C Junction Temperature



Available
RoHS*
COMPLIANT



Drain Connected to Tab



N-Channel MOSFET

Ordering Information: SUD23N06-31L
SUD23N06-31L-E3 (Lead (Pb)-free)

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

Parameter	Symbol	Limit	Unit
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ($T_J = 175$ °C) ^b	I_D	$T_C = 25$ °C	23
		$T_C = 100$ °C	16.5
Pulsed Drain Current	I_{DM}	50	A
Continuous Source Current (Diode Conduction)	I_S	23	
Avalanche Current	I_{AS}	20	
Single Avalanche Energy (Duty Cycle ≤ 1 %)	E_{AS}	20	mJ
Maximum Power Dissipation	P_D	$T_C = 25$ °C	100
		$T_A = 25$ °C	3 ^a
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^a	R_{thJA}	$t \leq 10$ sec	18	°C/W
		Steady State	40	
Maximum Junction-to-Case	R_{thJC}	3.2	4	

Notes:

a. Surface Mounted on 1" x 1" FR4 board, $t \leq 10$ sec.

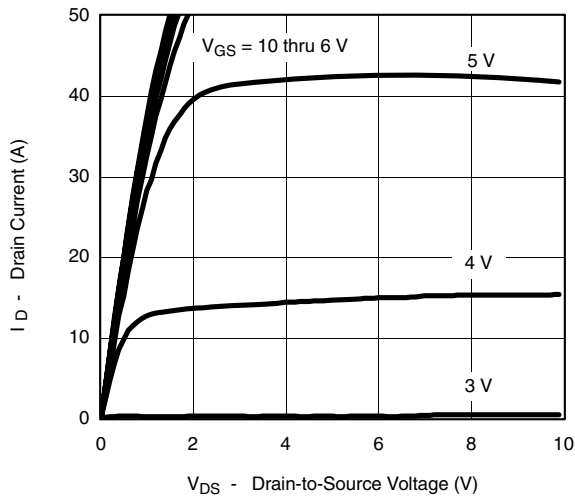
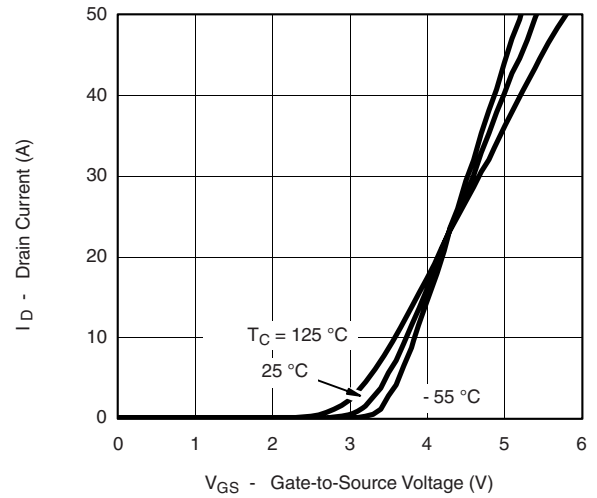
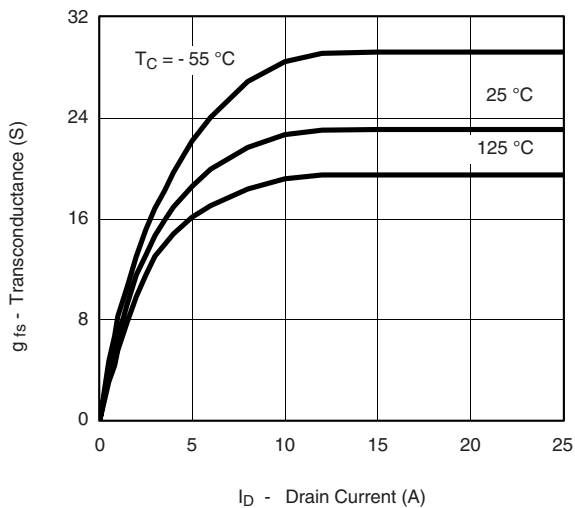
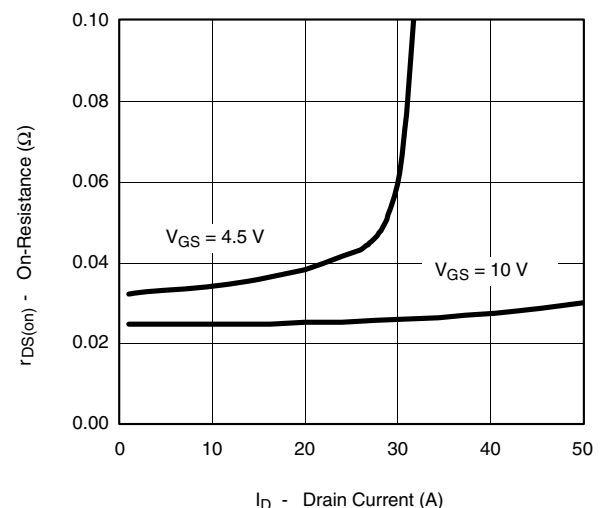
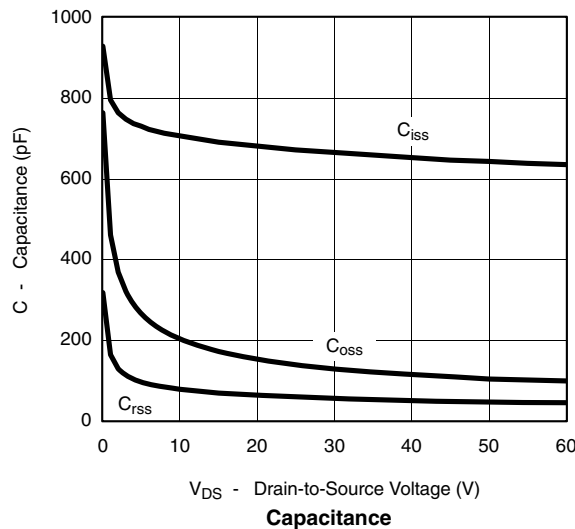
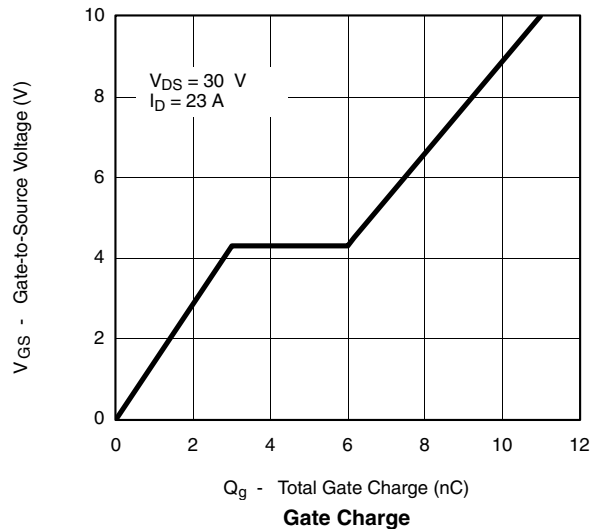
* Pb containing terminations are not RoHS compliant, exemptions may apply.

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	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$	60			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	1.0	2.0	3.0	
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}	$V_{DS} = 60\text{ V}$, $V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 60\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 125\text{ }^{\circ}\text{C}$			50	
		$V_{DS} = 60\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 175\text{ }^{\circ}\text{C}$			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	$r_{DS(on)}$	$V_{GS} = 10\text{ V}$, $I_D = 15\text{ A}$		0.025	0.031	Ω
		$V_{GS} = 10\text{ V}$, $I_D = 15\text{ A}$, $T_J = 125\text{ }^{\circ}\text{C}$			0.055	
		$V_{GS} = 10\text{ V}$, $I_D = 15\text{ A}$, $T_J = 175\text{ }^{\circ}\text{C}$			0.069	
		$V_{GS} = 4.5\text{ V}$, $I_D = 10\text{ A}$		0.037	0.045	
Forward Transconductance ^b	g_{fs}	$V_{DS} = 15\text{ V}$, $I_D = 15\text{ A}$		20		S
Dynamic ^a						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$		670		pF
Output Capacitance	C_{oss}			140		
Reverse Transfer Capacitance	C_{rss}			60		
Total Gate Charge ^c	Q_g	$V_{DS} = 30\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 23\text{ A}$		11	17	nC
Gate-Source Charge ^c	Q_{gs}			3		
Gate-Drain Charge ^c	Q_{gd}			3		
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 30\text{ V}$, $R_L = 1.3\text{ }\Omega$ $I_D \cong 23\text{ A}$, $V_{GEN} = 10\text{ V}$, $R_g = 2.5\text{ }\Omega$		8	15	ns
Rise Time ^c	t_r			15	25	
Turn-Off Delay Time ^c	$t_{d(off)}$			30	45	
Fall Time ^c	t_f			25	40	
Source-Drain Diode Ratings and Characteristics ($T_C = 25\text{ }^{\circ}\text{C}$)						
Pulsed Current	I_{SM}				50	A
Diode Forward Voltage	V_{SD}	$I_F = 15\text{ A}$, $V_{GS} = 0\text{ V}$		1.0	1.5	V
Reverse Recovery Time	t_{rr}	$I_F = 15\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$		30	60	ns

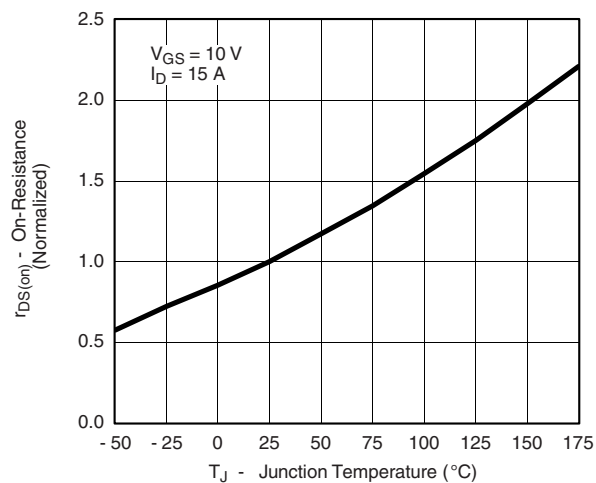
Notes:

- a. For design aid only; 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.

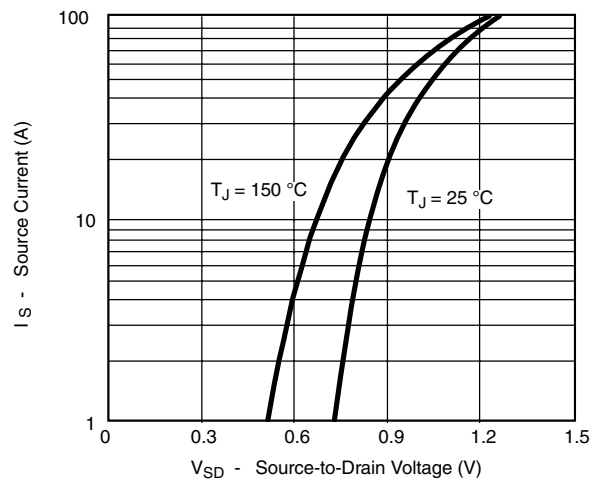
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS 25 °C unless noted

Output Characteristics

Transfer Characteristics

Transconductance

On-Resistance vs. Drain Current

Capacitance

Gate Charge

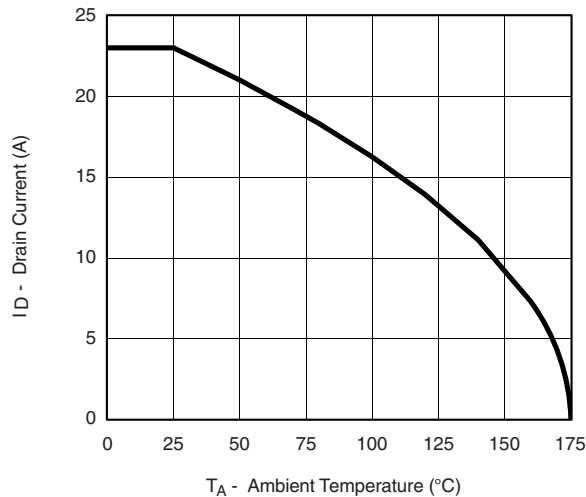
TYPICAL CHARACTERISTICS 25 °C unless noted



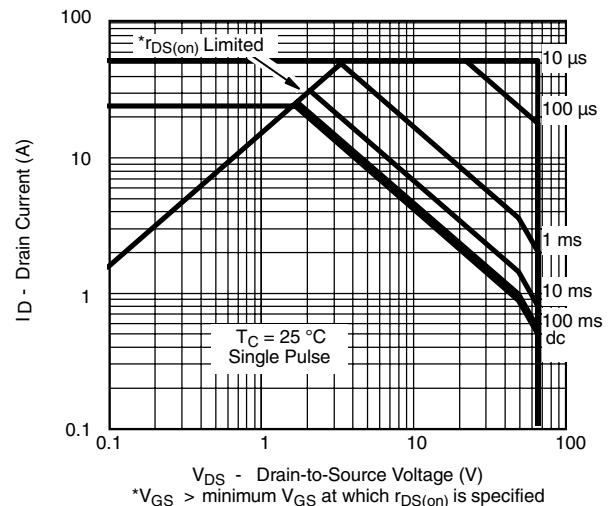
On-Resistance vs. Junction Temperature



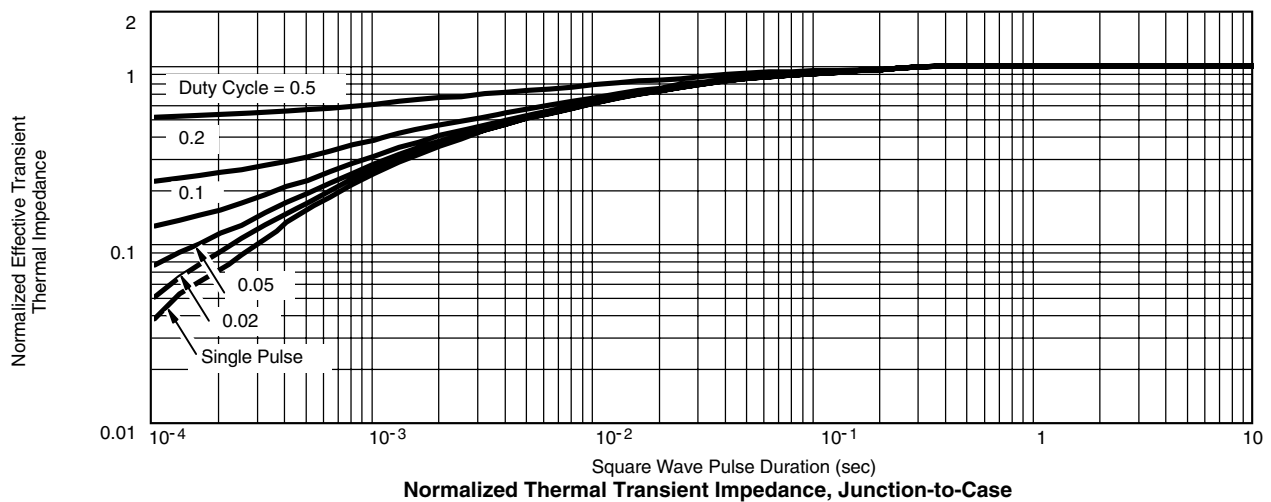
Source-Drain Diode Forward Voltage

**THERMAL RATINGS**

**Maximum Drain Current
vs. Ambient Temperature**



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

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