

N-Channel 30-V (D-S) MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^b
30	0.0095 at $V_{GS} = 10$ V	63 ^b
	0.014 at $V_{GS} = 4.5$ V	52 ^b

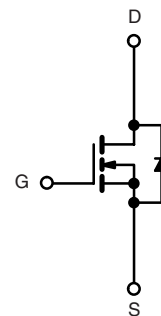
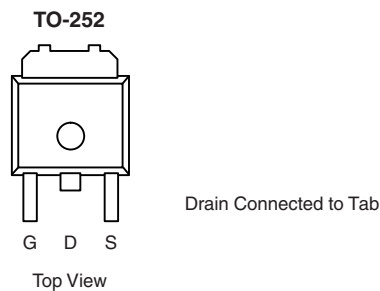
FEATURES

- TrenchFET[®] Power MOSFET
- Optimized for High- or Low-Side
- 100 % R_g Tested


 Available
RoHS*
 COMPLIANT

APPLICATIONS

- DC/DC Converters
- Synchronous Rectifiers



N-Channel MOSFET

Ordering Information: SUD50N03-09P
 SUD50N03-09P-E3 (Lead (Pb)-free)

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 ^a	I_D	$T_C = 25$ °C	63 ^b
		$T_C = 100$ °C	44.5 ^b
Pulsed Drain Current	I_{DM}	50	A
Continuous Source Current (Diode Conduction) ^a	I_S	5	
Avalanche Current	I_{AS}	L = 0.1 mH	
Single Pulse Avalanche Energy			E_{AS}
Maximum Power Dissipation	P_D	$T_C = 25$ °C	65.2
		$T_A = 25$ °C	7.5 ^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}	$t \leq 10$ s	16	20
		Steady State	40	50
Maximum Junction-to-Case	R_{thJC}	1.8	2.3	°C/W

Notes:

a. Surface Mounted on FR4 board, $t \leq 10$ s.

b. Based on maximum allowable Junction Temperature, package limitation current is 50 A.

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



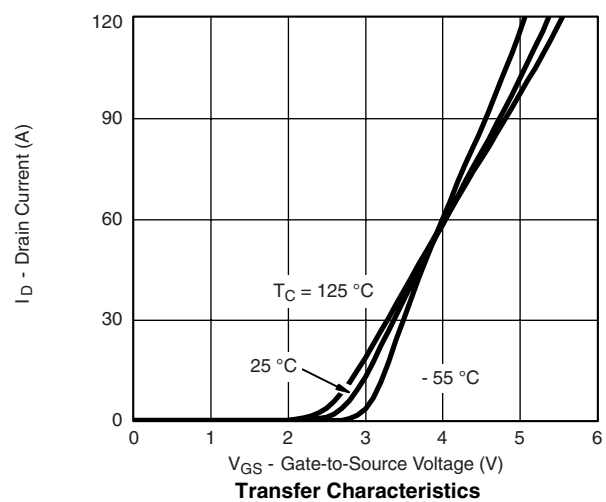
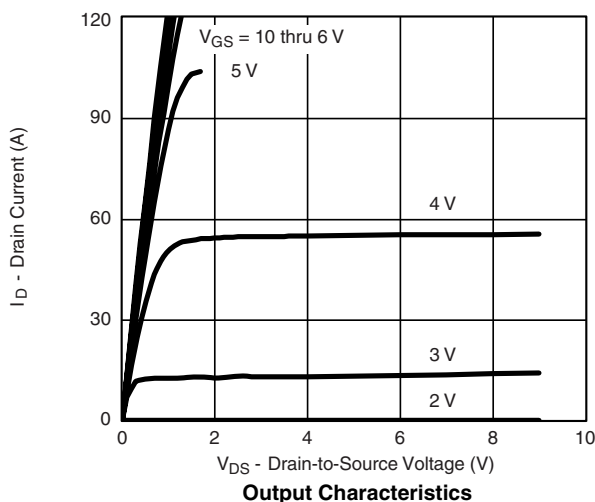
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ. ^a	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	30			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1.0		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}	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			50	
On-State Drain Current ^b	$I_{D(on)}$	$V_{DS} = 5\text{ V}, V_{GS} = 10\text{ V}$	50			A
Drain-Source On-State Resistance ^b	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$		0.0076	0.0095	Ω
		$V_{GS} = 10\text{ V}, I_D = 20\text{ A}, T_J = 125\text{ }^\circ\text{C}$			0.015	
		$V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$		0.0115	0.014	
Forward Transconductance ^b	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 20\text{ A}$	20			S
Dynamic^a						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		2200		μF
Output Capacitance	C_{oss}			410		
Reverse Transfer Capacitance	C_{rss}			180		
Total Gate Charge ^c	Q_g	$V_{DS} = 15\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 50\text{ A}$		11	16	nC
Gate-Source Charge ^c	Q_{gs}			7.5		
Gate-Drain Charge ^c	Q_{gd}			5.0		
Gate Resistance	R_g		0.5	1.5	2.1	
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 15\text{ V}, R_L = 0.3\text{ }\Omega$ $I_D \cong 50\text{ A}, V_{GEN} = 10\text{ V}, R_g = 2.5\text{ }\Omega$		9	15	ns
Rise Time ^c	t_r			15	25	
Turn-Off Delay Time ^c	$t_{d(off)}$			22	35	
Fall Time ^c	t_f			8	12	
Source-Drain Diode Ratings and Characteristic $T_C = 25\text{ }^\circ\text{C}$						
Pulsed Current	I_{SM}				100	A
Diode Forward Voltage ^b	V_{SD}	$I_F = 50\text{ A}, V_{GS} = 0\text{ V}$		1.2	1.5	V
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = 50\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		35	70	ns

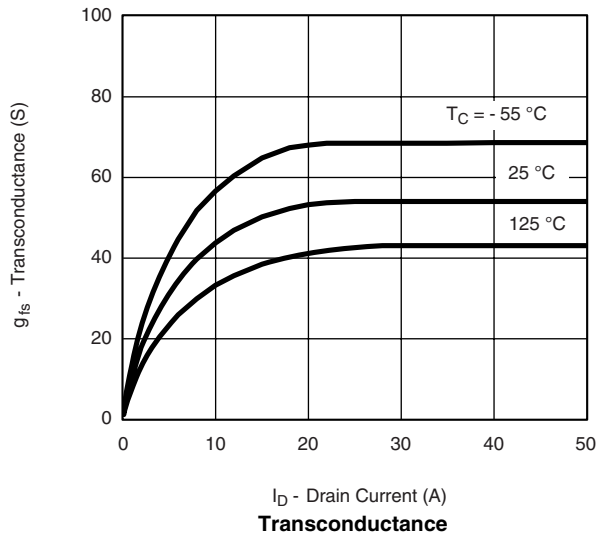
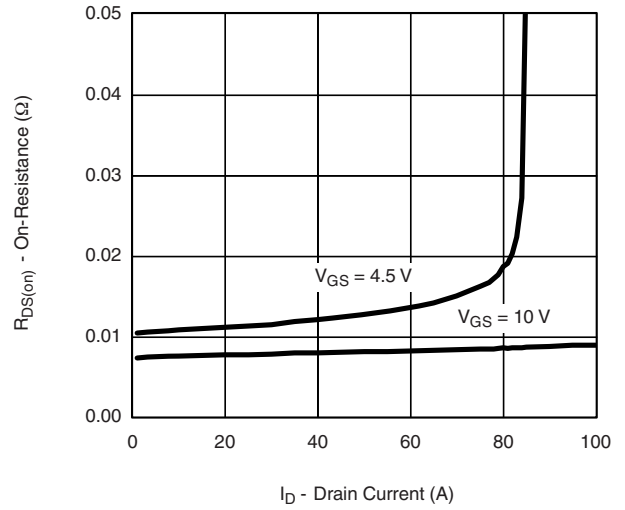
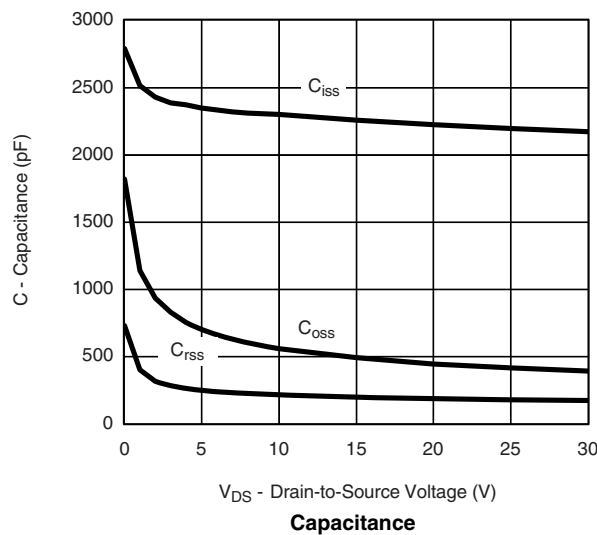
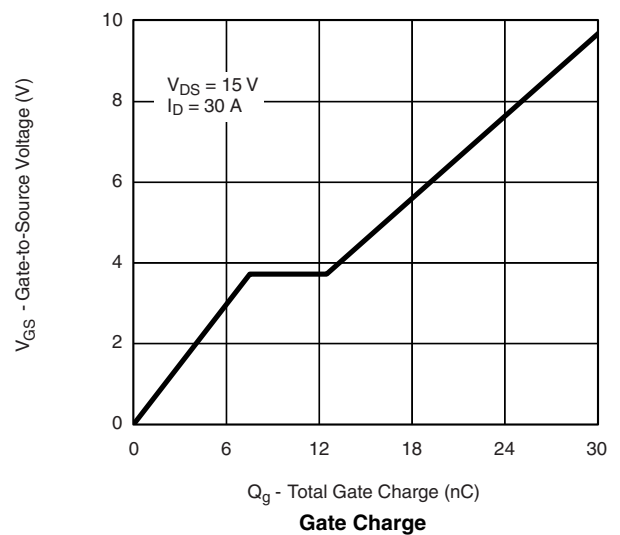
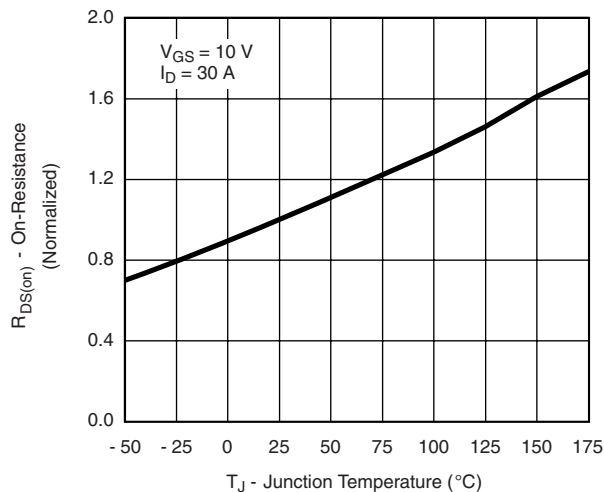
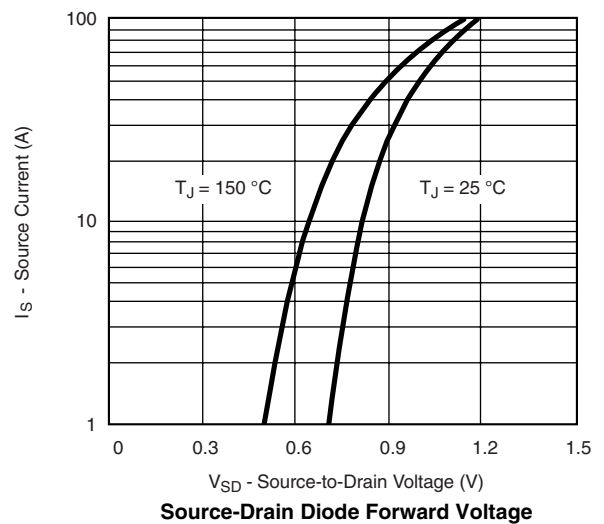
Notes:

- 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.

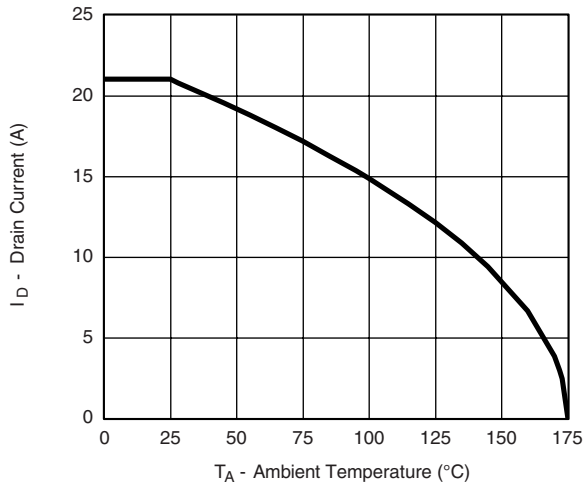
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS $25\text{ }^\circ\text{C}$, unless otherwise noted

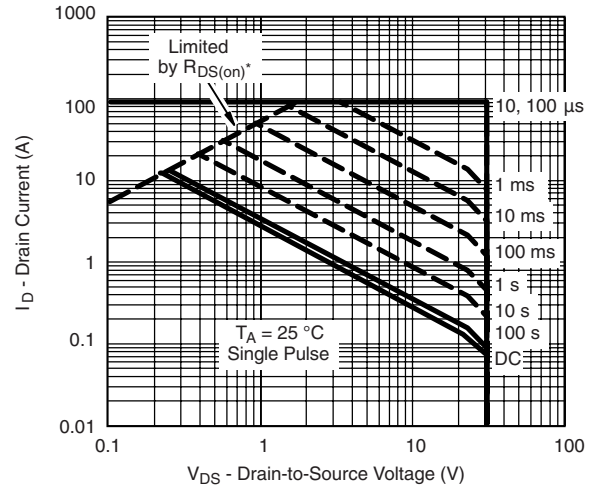


TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

Transconductance

On-Resistance vs. Drain Current

Capacitance

Gate Charge

On-Resistance vs. Junction Temperature

Source-Drain Diode Forward Voltage

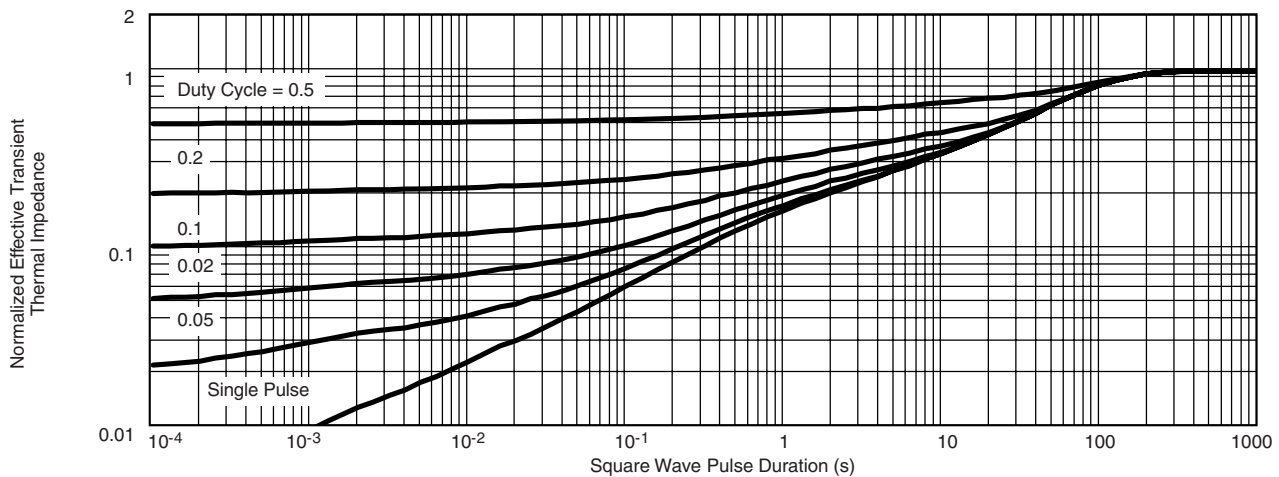
THERMAL RATINGS



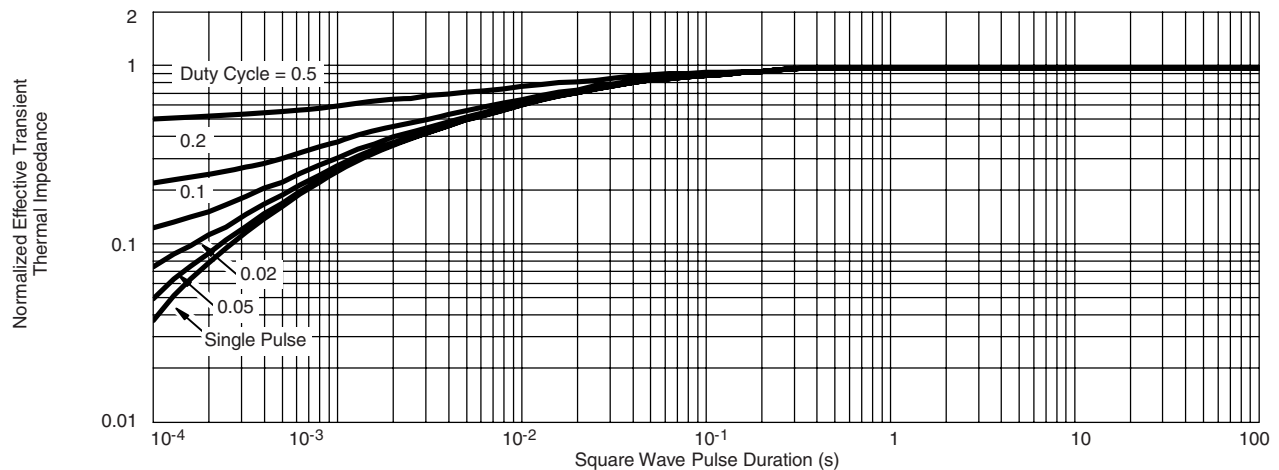
Maximum Drain Current vs. Ambient Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

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TO-252AA Case Outline

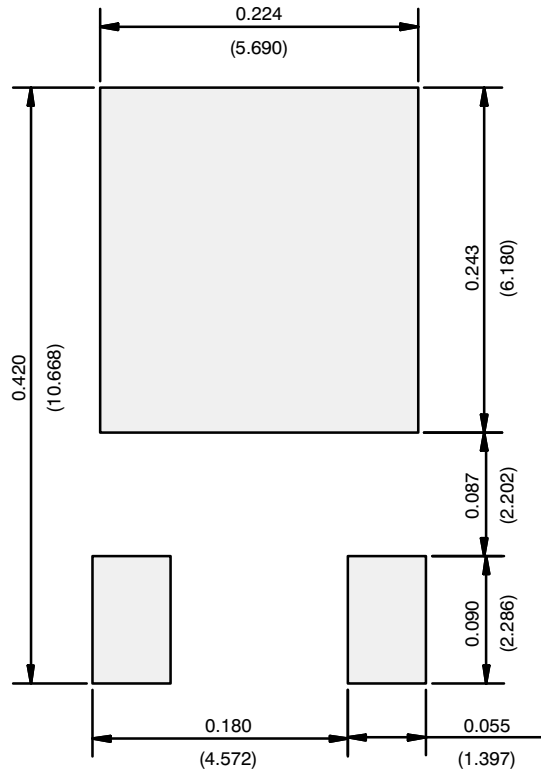


DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.18	2.38	0.086	0.094
A1	-	0.127	-	0.005
b	0.64	0.88	0.025	0.035
b2	0.76	1.14	0.030	0.045
b3	4.95	5.46	0.195	0.215
C	0.46	0.61	0.018	0.024
C2	0.46	0.89	0.018	0.035
D	5.97	6.22	0.235	0.245
D1	4.10	-	0.161	-
E	6.35	6.73	0.250	0.265
E1	4.32	-	0.170	-
H	9.40	10.41	0.370	0.410
e	2.28 BSC		0.090 BSC	
e1	4.56 BSC		0.180 BSC	
L	1.40	1.78	0.055	0.070
L3	0.89	1.27	0.035	0.050
L4	-	1.02	-	0.040
L5	1.01	1.52	0.040	0.060
ECN: T16-0236-Rev. P, 16-May-16 DWG: 5347				

Notes

- Dimension L3 is for reference only.

RECOMMENDED MINIMUM PADS FOR DPAK (TO-252)



Recommended Minimum Pads
Dimensions in Inches/(mm)

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