

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

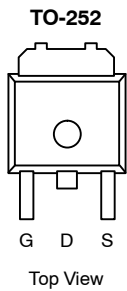
PRODUCT SUMMARY		
$V_{DS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A) <sup>a</sup>
30	0.016 @ $V_{GS} = 10$ V	15
	0.024 @ $V_{GS} = 4.5$ V	12

### FEATURES

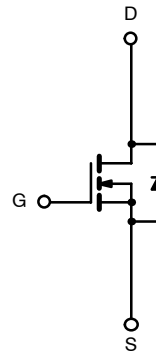
- TrenchFET® Power MOSFET
- PWM Optimized
- 100%  $R_g$  Tested

### APPLICATIONS

- High-Side DC/DC
  - Desktop
  - Server
- DDR DC/DC Converter



Drain Connected to Tab



N-Channel MOSFET

Ordering Information: SUD50N03-16P—E3 (Lead Free)

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		$V_{DS}$	30	V
Gate-Source Voltage		$V_{GS}$	$\pm 20$	
Continuous Drain Current <sup>a</sup>	$T_C = 25^\circ\text{C}$	$I_D$	37	A
	$T_A = 25^\circ\text{C}$		15	
	$T_A = 100^\circ\text{C}$		10.6	
Pulsed Drain Current		$I_{DM}$	40	
Continuous Source Current (Diode Conduction) <sup>a</sup>		$I_S$	5	
Avalanche Current	L = 0.1 mH	$I_{AS}$	25	mJ
Single Pulse Avalanche Energy		$E_{AS}$	31.25	
Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	$P_D$	40.8	W
	$T_A = 25^\circ\text{C}$		6.5 <sup>a</sup>	
Operating Junction and Storage Temperature Range		$T_J, T_{stg}$	-55 to 175	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>a</sup>	$t \leq 10$ sec	$R_{thJA}$	18	23	$^\circ\text{C}/\text{W}$
	Steady State		40	50	
Maximum Junction-to-Case		$R_{thJC}$	3.0	3.7	

Notes

a. Surface Mounted on FR4 Board,  $t \leq 10$  sec.

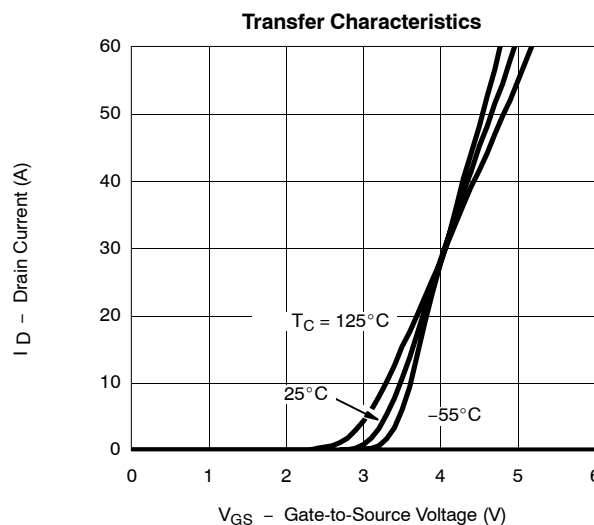
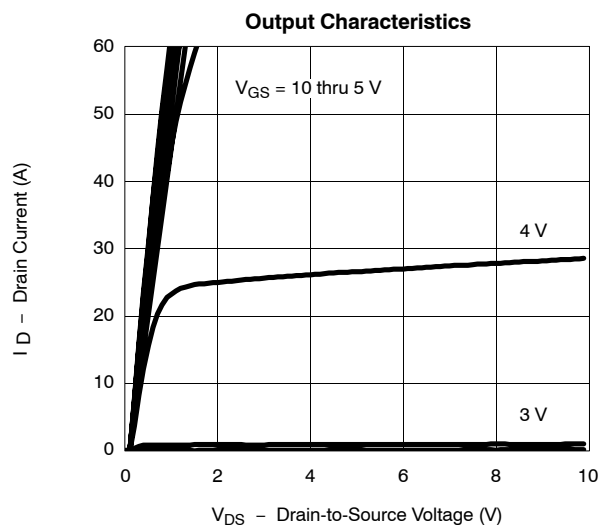
**SPECIFICATIONS (T<sub>J</sub> = 25°C UNLESS OTHERWISE NOTED)**

Parameter	Symbol	Test Condition	Min	Typ <sup>a</sup>	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	30			V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	1.0		3.0	
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±20 V			±100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125°C			50	
On-State Drain Current <sup>b</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> = 5 V, V <sub>GS</sub> = 10 V	40			A
Drain-Source On-State Resistance <sup>b</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 15 A		0.0128	0.016	Ω
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A, T <sub>J</sub> = 125°C			0.025	
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 10 A		0.019	0.024	
Forward Transconductance <sup>b</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 20 A	10			S
<b>Dynamic<sup>a</sup></b>						
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25 V, f = 1 MHz		1150		pF
Output Capacitance	C <sub>oss</sub>			215		
Reverse Transfer Capacitance	C <sub>rss</sub>			70		
Total Gate Charge <sup>c</sup>	Q <sub>g</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 50 A		8.5	13	nC
Gate-Source Charge <sup>c</sup>	Q <sub>gs</sub>			5		
Gate-Drain Charge <sup>c</sup>	Q <sub>gd</sub>			2.5		
Gate Resistance	R <sub>g</sub>			2.7	5.5	
Turn-On Delay Time <sup>c</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> = 15 V, R <sub>L</sub> = 0.3 Ω I <sub>D</sub> ≅ 50 A, V <sub>GEN</sub> = 10 V, R <sub>g</sub> = 2.5 Ω		7	15	ns
Rise Time <sup>c</sup>	t <sub>r</sub>			20	30	
Turn-Off Delay Time <sup>c</sup>	t <sub>d(off)</sub>			25	40	
Fall Time <sup>c</sup>	t <sub>f</sub>			12	20	
<b>Source-Drain Diode Ratings and Characteristic (T<sub>C</sub> = 25°C)</b>						
Pulsed Current	I <sub>SM</sub>				40	A
Diode Forward Voltage <sup>b</sup>	V <sub>SD</sub>	I <sub>F</sub> = 20 A, V <sub>GS</sub> = 0 V		1.0	1.5	V
Source-Drain Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 40 A, di/dt = 100 A/μs		25	70	ns

Notes

- a. Guaranteed by design, not subject to production testing.
- b. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
- c. Independent of operating temperature.

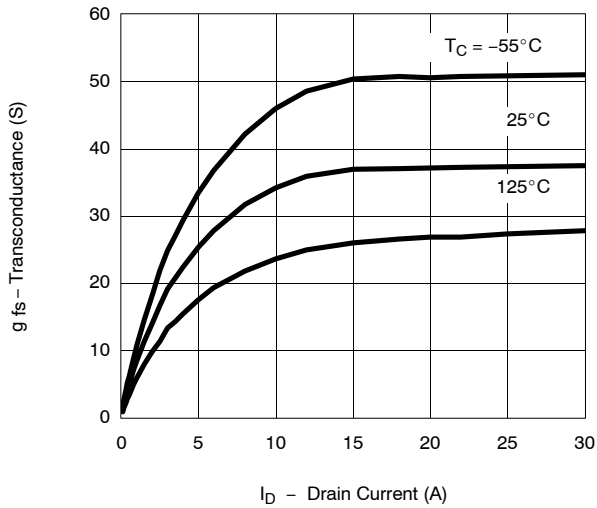
**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**



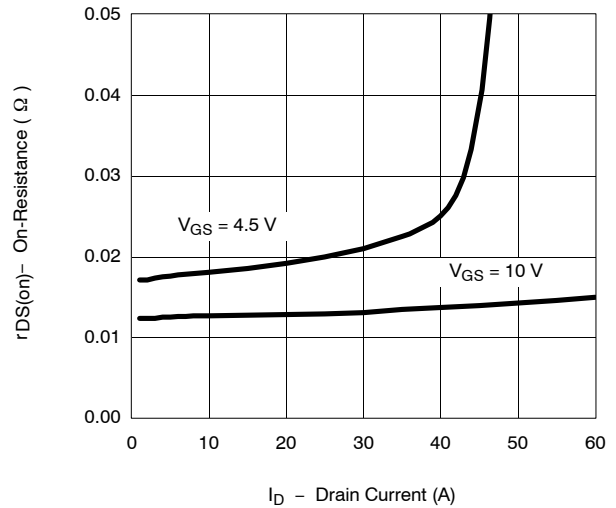


**TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)**

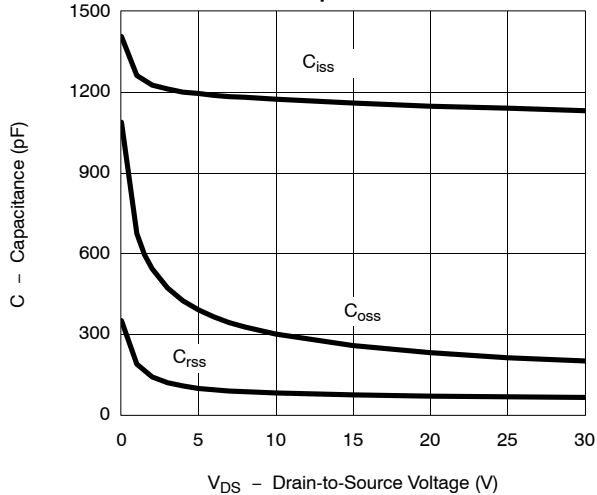
**Transconductance**



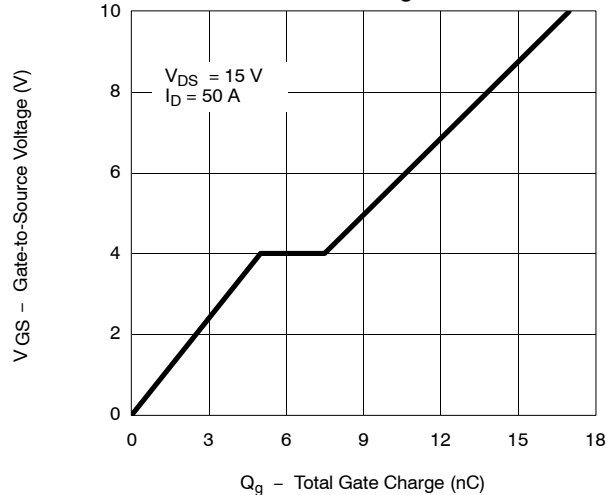
**On-Resistance vs. Drain Current**



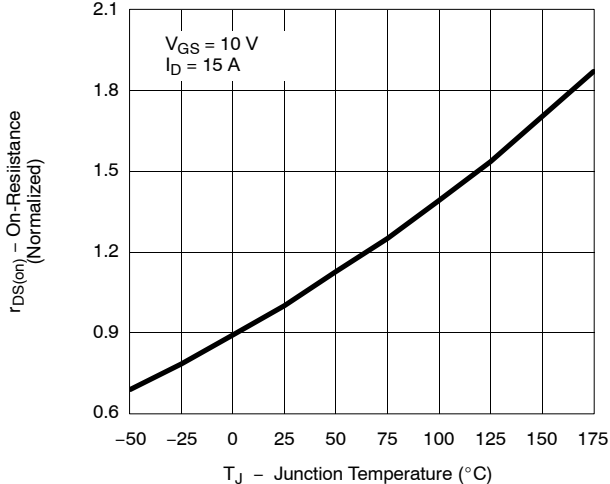
**Capacitance**



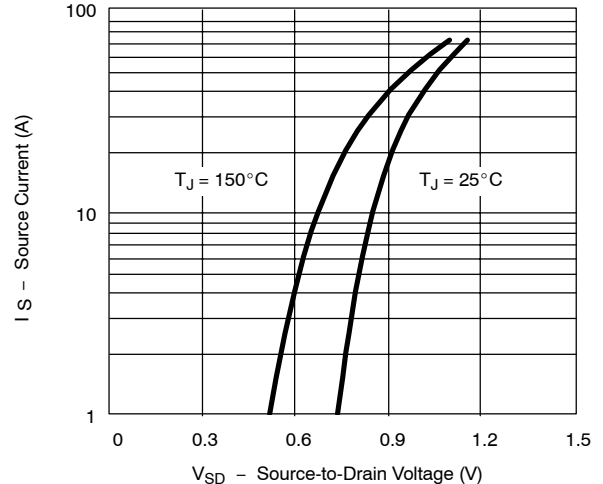
**Gate Charge**



**On-Resistance vs. Junction Temperature**

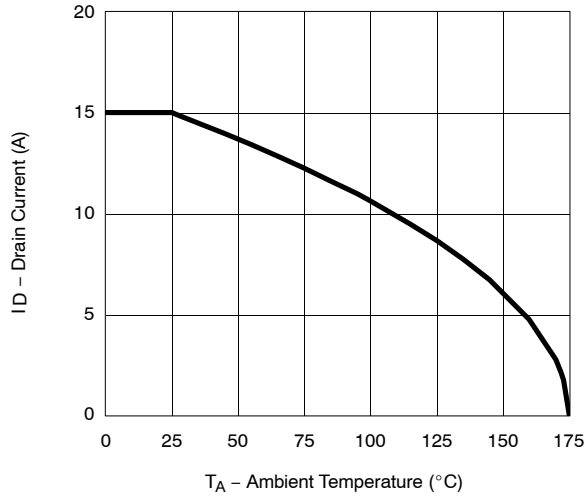


**Source-Drain Diode Forward Voltage**

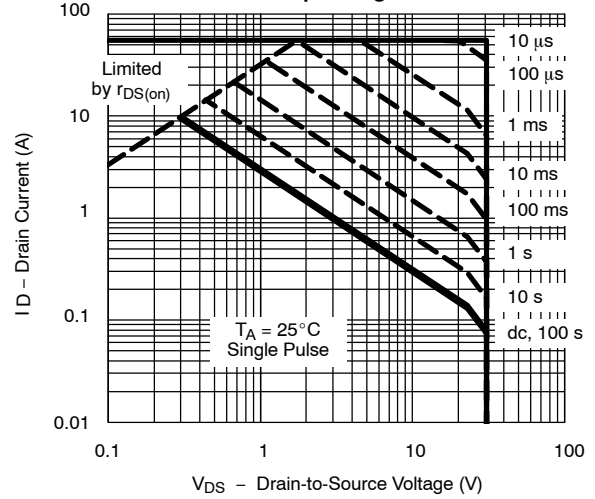


### THERMAL RATINGS

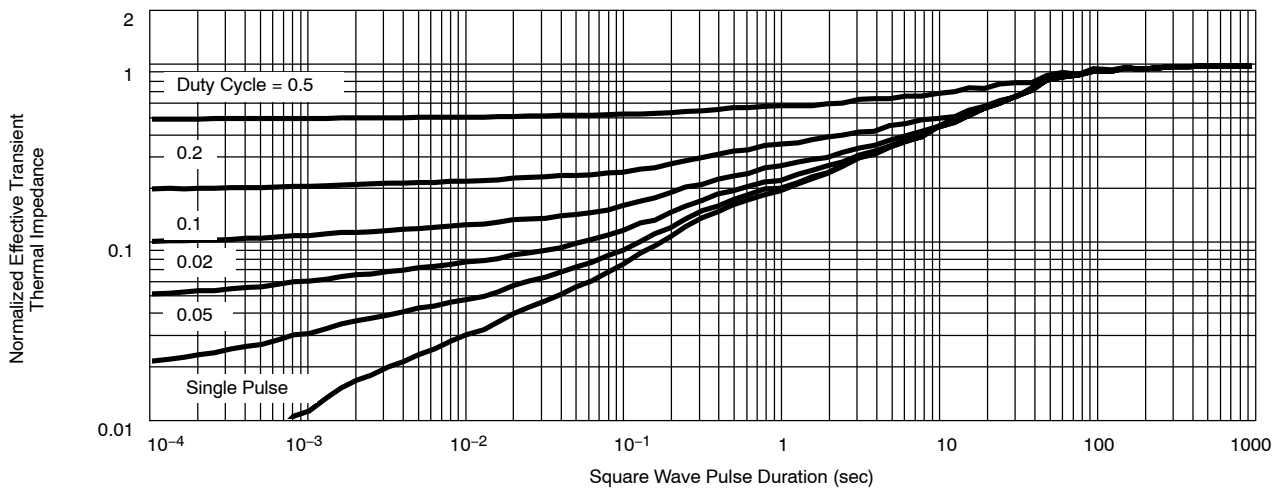
Maximum Drain Current vs. Ambient Temperature



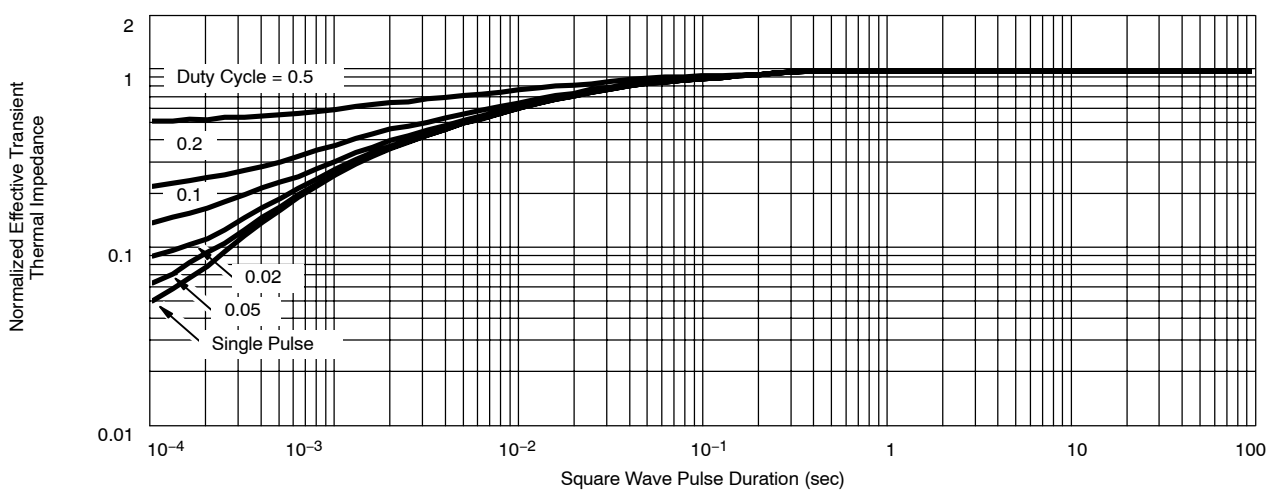
Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case





## Disclaimer

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