

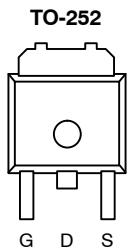


## N-Channel 20-V (D-S), 175°C MOSFET

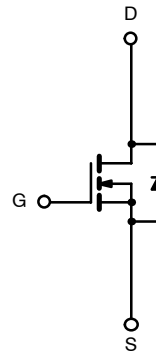
PRODUCT SUMMARY		
$V_{DS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A) <sup>a</sup>
20	0.0085 @ $V_{GS} = 4.5$ V	40
	0.014 @ $V_{GS} = 2.5$ V	40

### FEATURES

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



Order Number:  
SUD40N02-08



ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		$V_{DS}$	20	V
Gate-Source Voltage		$V_{GS}$	$\pm 12$	
Continuous Drain Current <sup>a</sup>	$T_C = 25^\circ\text{C}$	$I_D$	40	A
	$T_C = 100^\circ\text{C}$		40	
Pulsed Drain Current		$I_{DM}$	100	
Continuous Source Current (Diode Conduction) <sup>a</sup>		$I_S$	40	
Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	$P_D$	71	W
	$T_A = 25^\circ\text{C}$		8.3 <sup>b, c</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>b</sup>	$t \leq 10$ sec.	$R_{thJA}$	15	18	$^\circ\text{C}/\text{W}$
	Steady State		40	50	
Maximum Junction-to-Case		$R_{thJC}$	1.75	2.1	

Notes

- a. Package Limited
- b. Surface Mounted on 1" x 1" FR4 Board
- c.  $t \leq 10$  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	20			V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	0.6			
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±12 V			±100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 20 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> = 4.5 V	40			A
Drain-Source On-State Resistance <sup>b</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 20 A		0.0068	0.0085	Ω
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 20 A, T <sub>J</sub> = 125 °C		0.0104	0.013	
		V <sub>GS</sub> = 2.5 V, I <sub>D</sub> = 20 A		0.011	0.014	
Forward Transconductance <sup>b</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 5 V, I <sub>D</sub> = 40 A	20			S
<b>Dynamic<sup>a</sup></b>						
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 20 V, f = 1 MHz		2660		pF
Output Capacitance	C <sub>oss</sub>			730		
Reverse Transfer Capacitance	C <sub>rss</sub>			375		
Total Gate Charge <sup>c</sup>	Q <sub>g</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 40 A		26	35	nC
Gate-Source Charge <sup>c</sup>	Q <sub>gs</sub>			5		
Gate-Drain Charge <sup>c</sup>	Q <sub>gd</sub>			7		
Gate Resistance	R <sub>g</sub>		1		3.7	Ω
Turn-On Delay Time <sup>c</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> = 10 V, R <sub>L</sub> = 0.25 Ω I <sub>D</sub> ≅ 40 A, V <sub>GEN</sub> = 4.5 V, R <sub>G</sub> = 2.5 Ω		20	35	ns
Rise Time <sup>c</sup>	t <sub>r</sub>			120	190	
Turn-Off Delay Time <sup>c</sup>	t <sub>d(off)</sub>			45	70	
Fall Time <sup>c</sup>	t <sub>f</sub>			20	35	
<b>Source-Drain Diode Ratings and Characteristic (T<sub>C</sub> = 25 °C)</b>						
Pulsed Current	I <sub>SM</sub>				100	A
Diode Forward Voltage <sup>b</sup>	V <sub>SD</sub>	I <sub>F</sub> = 100 A, V <sub>GS</sub> = 0 V		1.2	1.5	V
Source-Drain Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 40 A, di/dt = 100 A/μs		35	70	ns

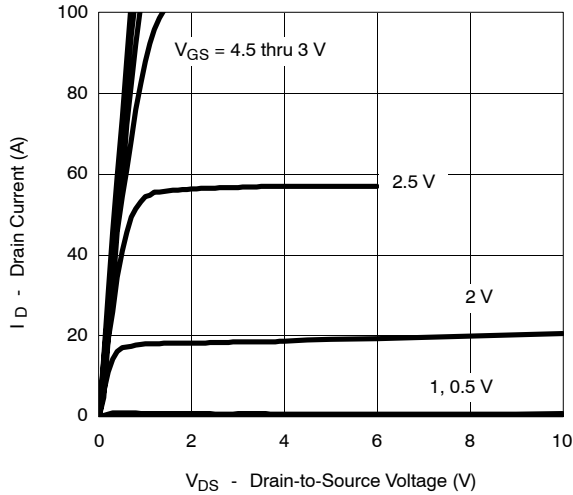
## Notes

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

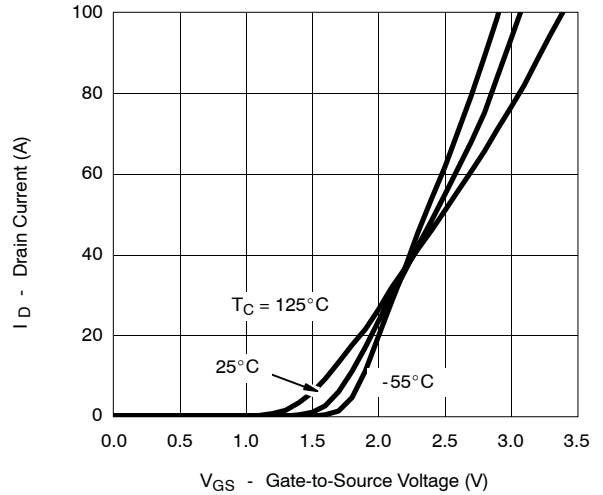


**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

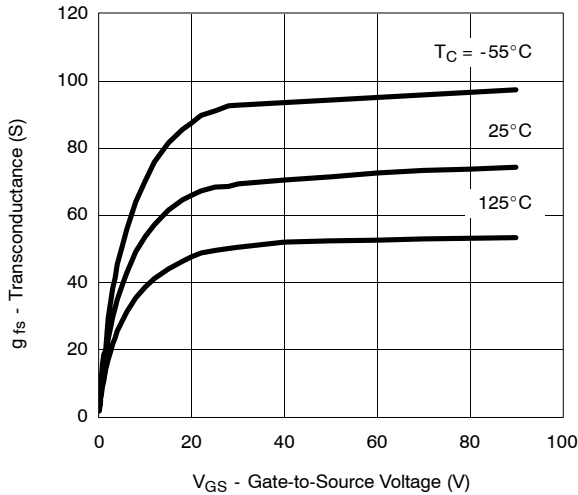
**Output Characteristics**



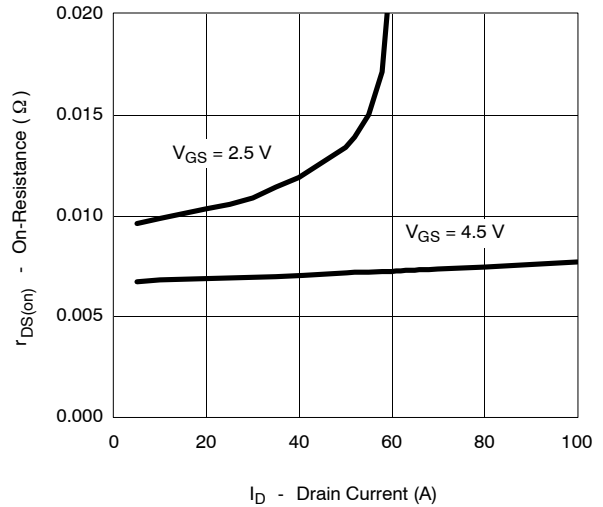
**Transfer Characteristics**



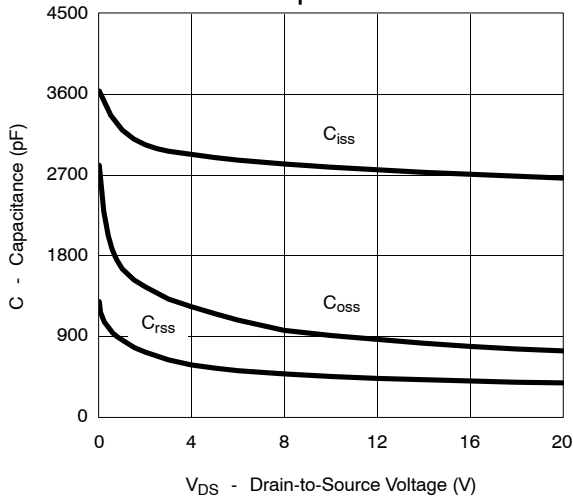
**Transconductance**



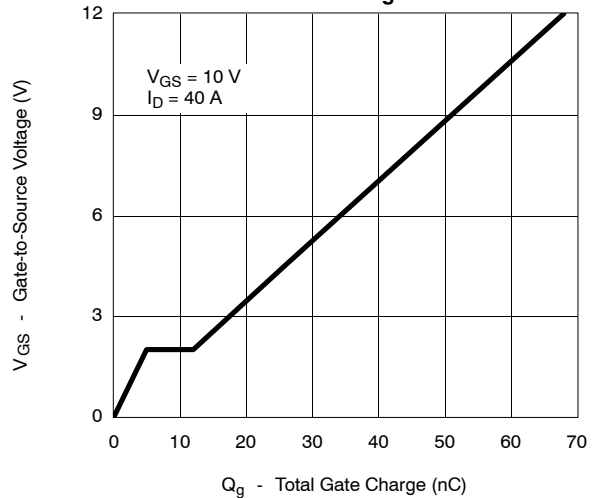
**On-Resistance vs. Drain Current**



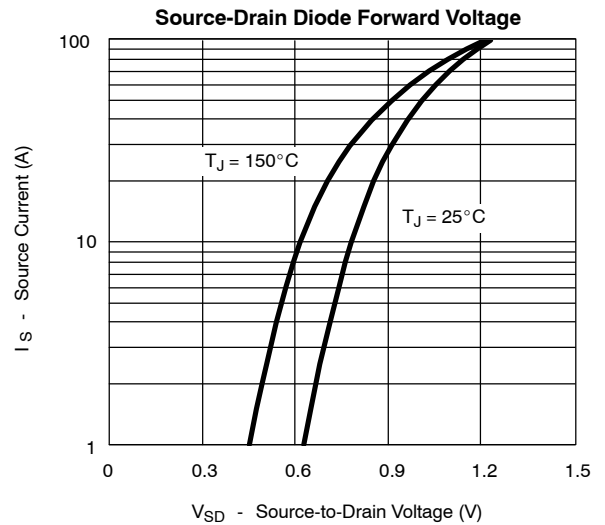
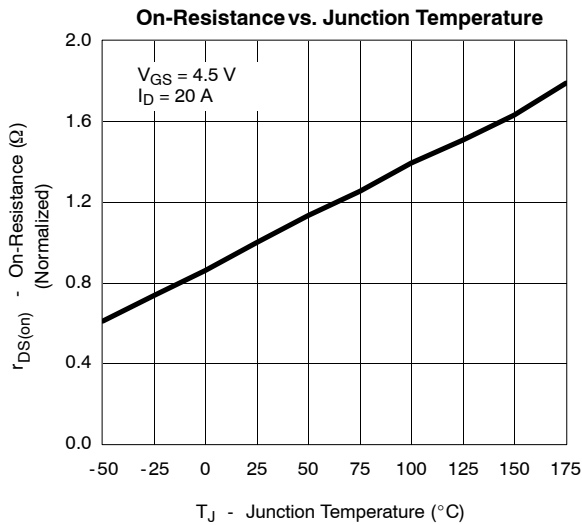
**Capacitance**



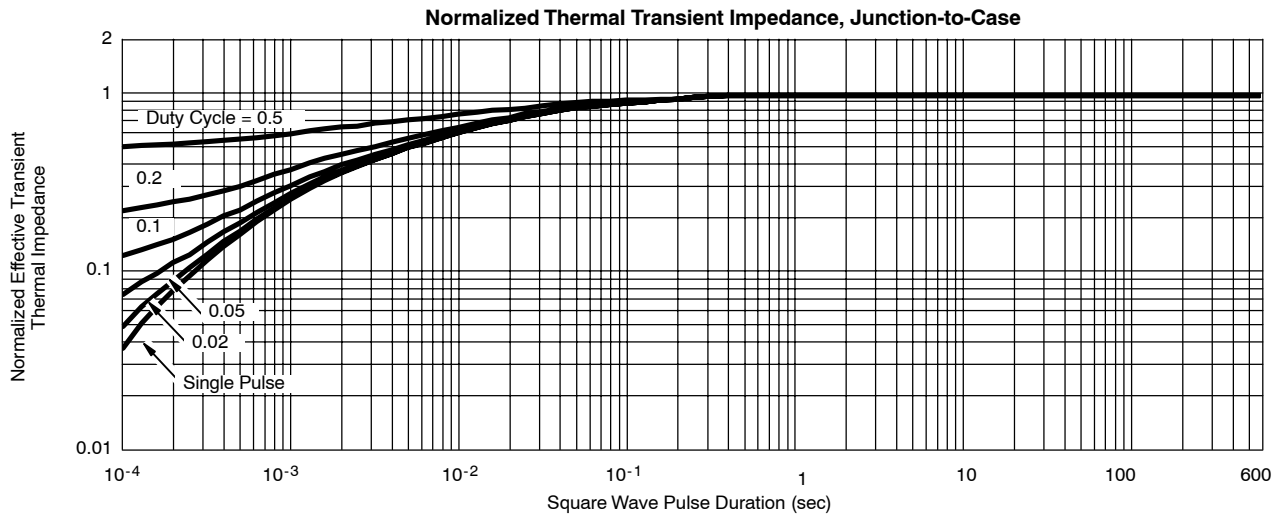
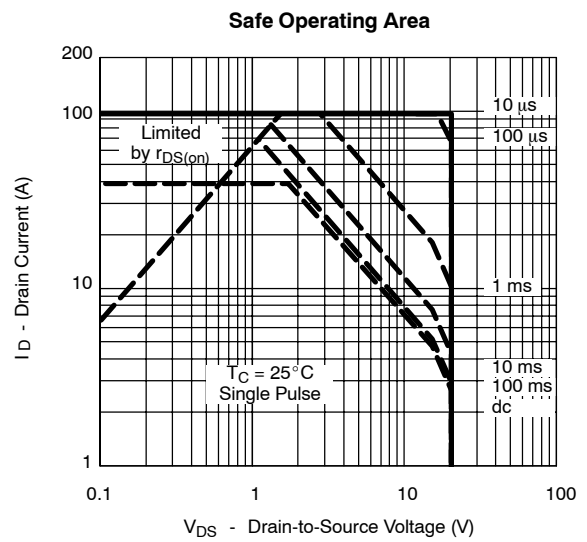
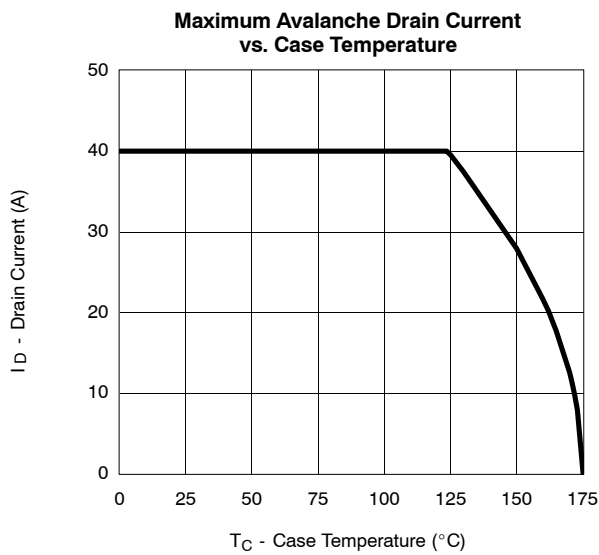
**Gate Charge**



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



**THERMAL RATINGS**





## Disclaimer

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