

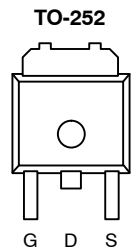


## N-Channel 20-V (D-S), 175 °C MOSFET

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

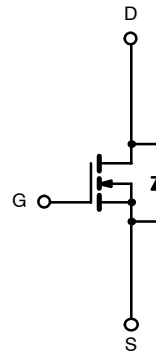
- TrenchFET® Power MOSFET
- 175 °C Maximum Junction Temperature
- 100%  $R_g$  Tested



Top View

Order Number:  
SUD40N02-08

Drain Connected to Tab



N-Channel MOSFET

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

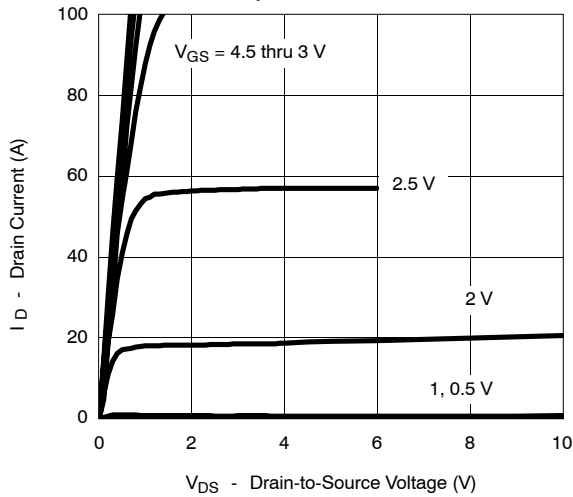
SPECIFICATIONS ( $T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ <sup>a</sup>	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	20			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	0.6			
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 12\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
		$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}, T_J = 125^\circ\text{C}$			50	
On-State Drain Current <sup>b</sup>	$I_{D(on)}$	$V_{DS} = 5\text{ V}, V_{GS} = 4.5\text{ V}$	40			A
Drain-Source On-State Resistance <sup>b</sup>	$r_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$		0.0068	0.0085	$\Omega$
		$V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}, T_J = 125^\circ\text{C}$		0.0104	0.013	
		$V_{GS} = 2.5\text{ V}, I_D = 20\text{ A}$		0.011	0.014	
Forward Transconductance <sup>b</sup>	$g_{fs}$	$V_{DS} = 5\text{ V}, I_D = 40\text{ A}$	20			S
<b>Dynamic<sup>a</sup></b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 20\text{ V}, f = 1\text{ MHz}$		2660		pF
Output Capacitance	$C_{oss}$			730		
Reverse Transfer Capacitance	$C_{rss}$			375		
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 40\text{ A}$		26	35	nC
Gate-Source Charge <sup>c</sup>	$Q_{gs}$			5		
Gate-Drain Charge <sup>c</sup>	$Q_{gd}$			7		
Gate Resistance	$R_g$		1		3.7	$\Omega$
Turn-On Delay Time <sup>c</sup>	$t_{d(on)}$	$V_{DD} = 10\text{ V}, R_L = 0.25\ \Omega$ $I_D \cong 40\text{ A}, V_{GEN} = 4.5\text{ V}, R_G = 2.5\ \Omega$		20	35	ns
Rise Time <sup>c</sup>	$t_r$			120	190	
Turn-Off Delay Time <sup>c</sup>	$t_{d(off)}$			45	70	
Fall Time <sup>c</sup>	$t_f$			20	35	
<b>Source-Drain Diode Ratings and Characteristic (<math>T_C = 25^\circ\text{C}</math>)</b>						
Pulsed Current	$I_{SM}$				100	A
Diode Forward Voltage <sup>b</sup>	$V_{SD}$	$I_F = 100\text{ A}, V_{GS} = 0\text{ V}$		1.2	1.5	V
Source-Drain Reverse Recovery Time	$t_{rr}$	$I_F = 40\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		35	70	ns

## Notes

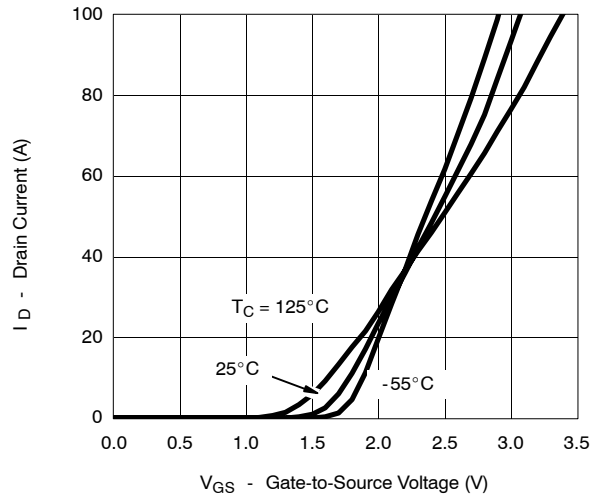
- a. Guaranteed by design, not subject to production testing.  
 b. Pulse test; pulse width  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 2\%$ .  
 c. Independent of operating temperature.

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

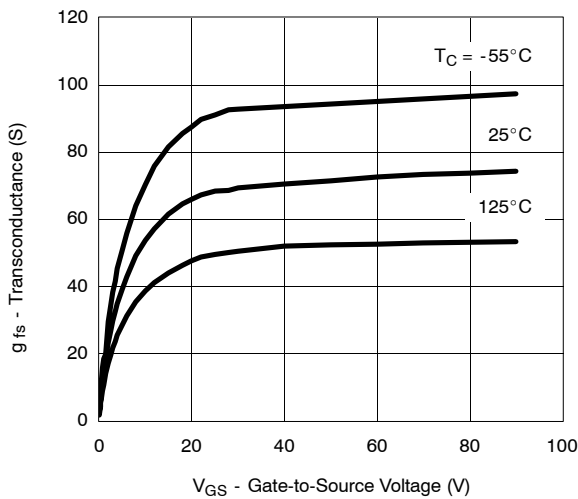
**Output Characteristics**



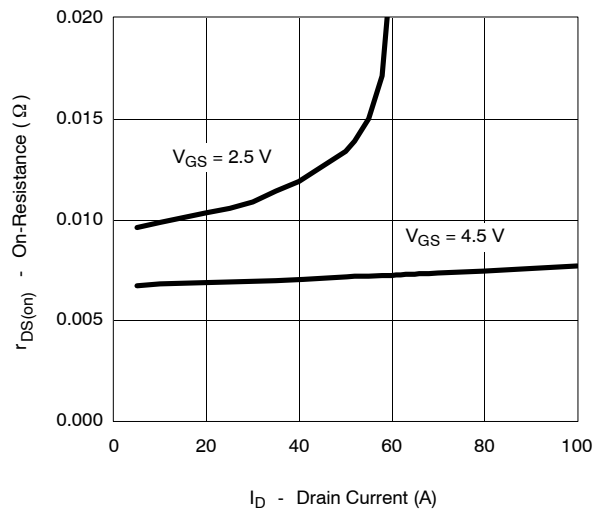
**Transfer Characteristics**



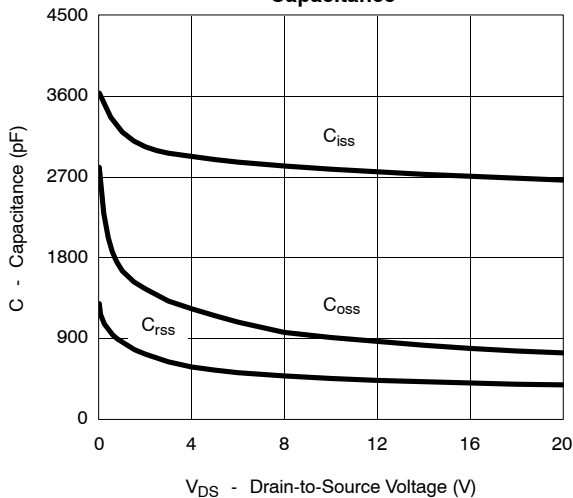
**Transconductance**



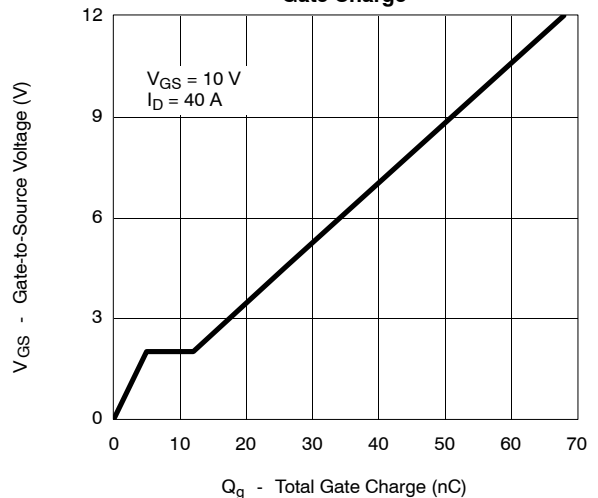
**On-Resistance vs. Drain Current**



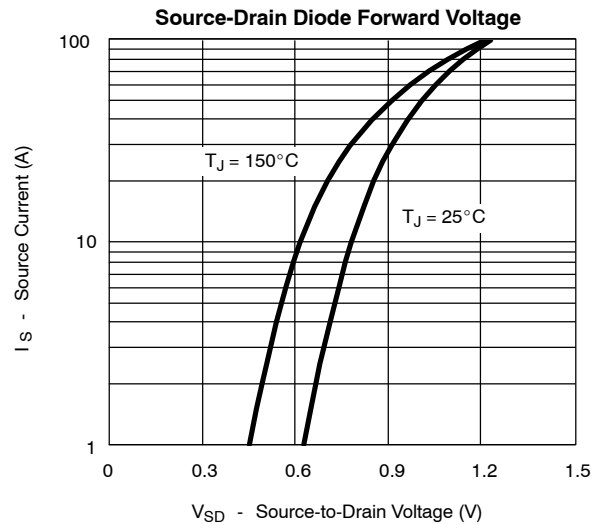
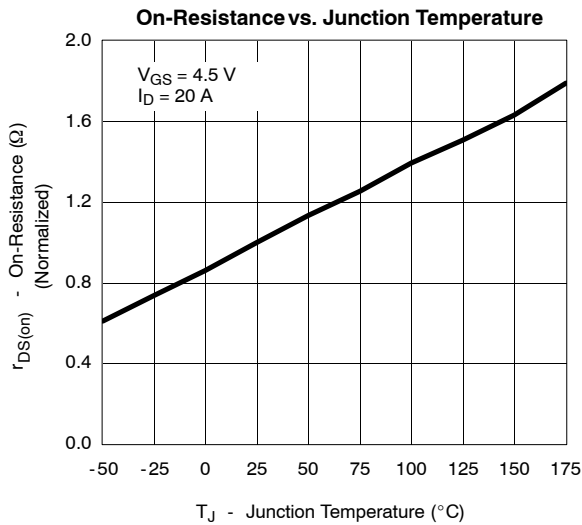
**Capacitance**



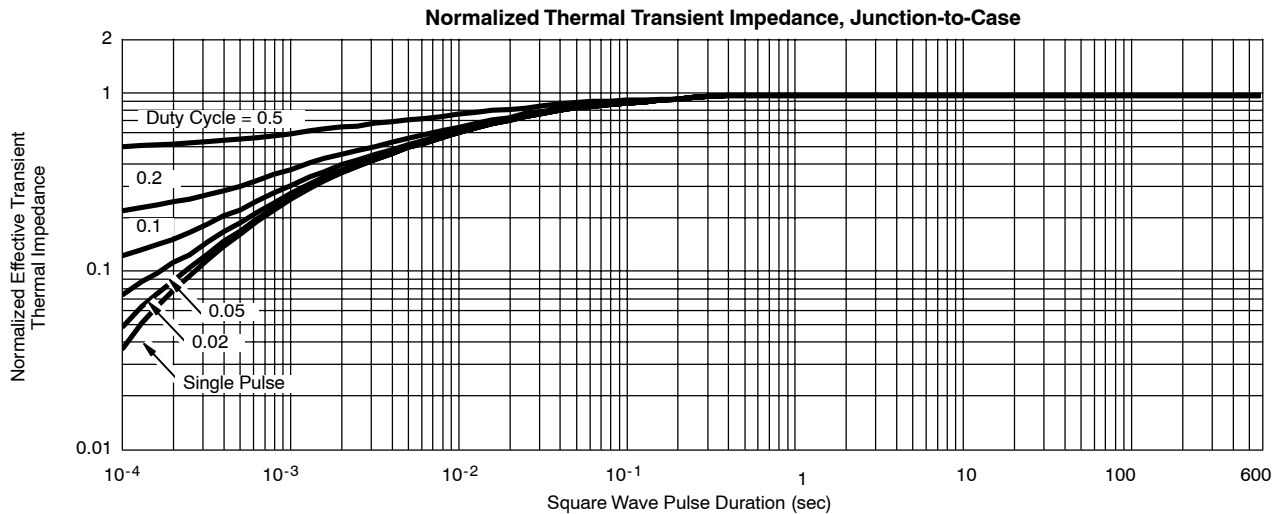
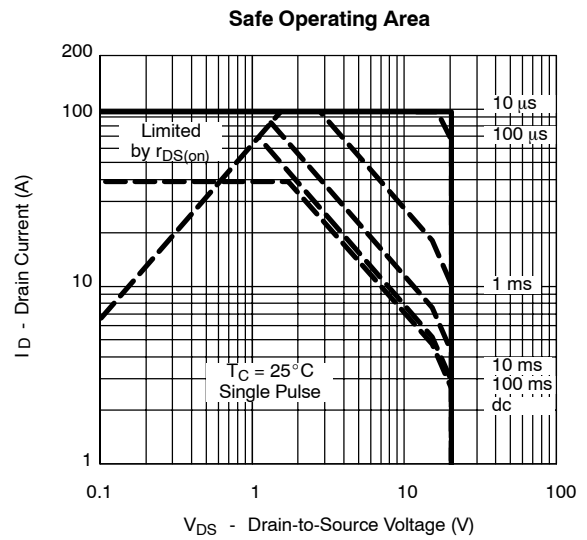
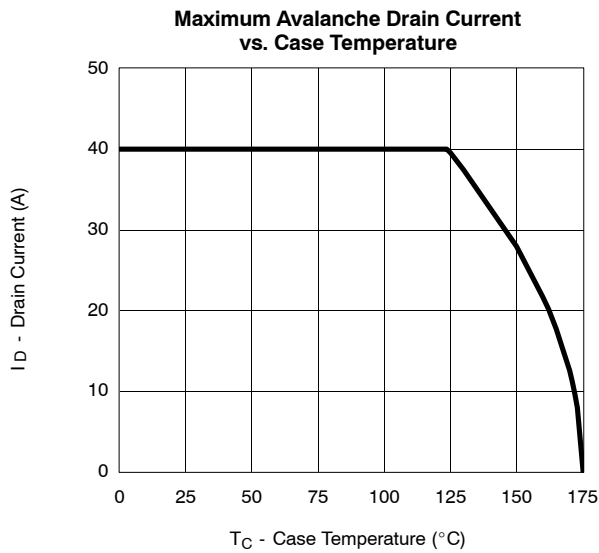
**Gate Charge**



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



**THERMAL RATINGS**





## Disclaimer

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