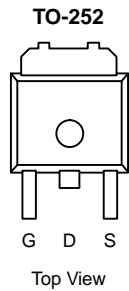




## N-Channel 40-V (D-S) 175°C MOSFET

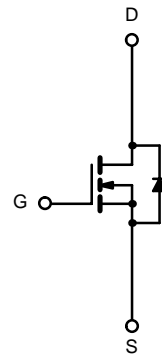
PRODUCT SUMMARY		
$V_{DS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
40	0.025 @ $V_{GS} = 10$ V	25
	0.040 @ $V_{GS} = 4.5$ V	20

**175°C Rated**  
Maximum Junction Temperature  
**TrenchFET®**  
Power MOSFETS



Order Number:  
SUD25N04-25

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		$V_{DS}$	40	V
Gate-Source Voltage		$V_{GS}$	$\pm 20$	
Continuous Drain Current ( $T_J = 175^\circ\text{C}$ ) <sup>b</sup>	$T_C = 25^\circ\text{C}$	$I_D$	25	A
	$T_C = 125^\circ\text{C}$		15	
Pulsed Drain Current		$I_{DM}$	50	
Continuous Source Current (Diode Conduction) <sup>b</sup>		$I_S$	50	
Avalanche Current		$I_{AR}$	25	mJ
Repetitive Avalanche Energy (Duty Cycle $\leq 1\%$ )	$L = 0.1$ mH	$E_{AR}$	31	
Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	$P_D$	33 <sup>b</sup>	W
	$T_A = 25^\circ\text{C}$		3 <sup>b</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
Junction-to-Ambient <sup>b</sup>	$t \leq 10$ sec	$R_{thJA}$	20	25	$^\circ\text{C/W}$
	Steady State		40	50	
Junction-to-Case		$R_{thJC}$	3.7	4.5	

Notes

- a. Surface Mounted on 1" x 1" FR4 Board.
- b. See SOA curve for voltage derating.

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	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	40			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	1.0	2.0	3.0	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
		$V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V}, T_J = 125^\circ\text{C}$			50	
		$V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V}, T_J = 175^\circ\text{C}$			150	
On-State Drain Current <sup>b</sup>	$I_{D(on)}$	$V_{DS} = 5\text{ V}, V_{GS} = 10\text{ V}$	50			A
Drain-Source On-State Resistance <sup>b</sup>	$r_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 25\text{ A}$		0.02	0.025	$\Omega$
		$V_{GS} = 10\text{ V}, I_D = 25\text{ A}, T_J = 125^\circ\text{C}$			0.040	
		$V_{GS} = 10\text{ V}, I_D = 25\text{ A}, T_J = 175^\circ\text{C}$			0.053	
		$V_{GS} = 4.5\text{ V}, I_D = 10\text{ A}$		0.031	0.040	
Forward Transconductance <sup>b</sup>	$g_{fs}$	$V_{DS} = 15\text{ V}, I_D = 25\text{ A}$		15		S
<b>Dynamic<sup>a</sup></b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, F = 1\text{ MHz}$		510		pF
Output Capacitance	$C_{oss}$			125		
Reverse Transfer Capacitance	$C_{rss}$			65		
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{DS} = 20\text{ V}, V_{GS} = 10\text{ V}, I_D = 25\text{ A}$		13	20	nC
Gate-Source Charge <sup>c</sup>	$Q_{gs}$			2.5		
Gate-Drain Charge <sup>c</sup>	$Q_{gd}$			3		
Turn-On Delay Time <sup>c</sup>	$t_{d(on)}$	$V_{DD} = 20\text{ V}, R_L = 0.8\ \Omega$ $I_D = 25\text{ A}, V_{GEN} = 10\text{ V}, R_G = 2.5\ \Omega$		5	10	ns
Rise Time <sup>c</sup>	$t_r$			47	70	
Turn-Off Delay Time <sup>c</sup>	$t_{d(off)}$			15	30	
Fall Time <sup>c</sup>	$t_f$			5	10	
<b>Source-Drain Diode Ratings and Characteristic (<math>T_C = 25^\circ\text{C}</math>)</b>						
Pulsed Current	$I_{SM}$				50	A
Diode Forward Voltage <sup>b</sup>	$V_{SD}$	$I_F = 25\text{ A}, V_{GS} = 0\text{ V}$		1.1	1.3	V
Source-Drain Reverse Recovery Time	$t_{rr}$	$I_F = 25\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		17	30	ns

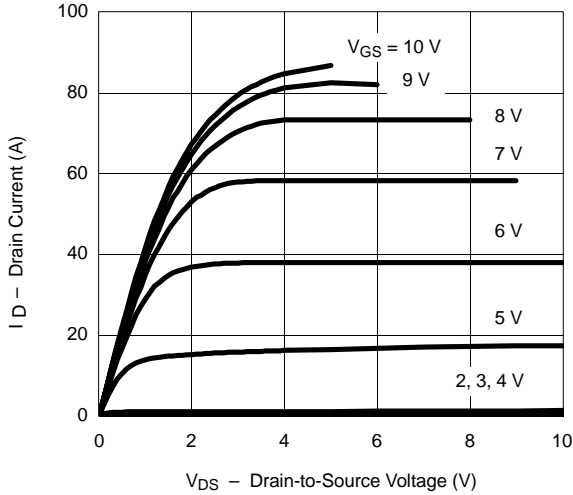
## Notes

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

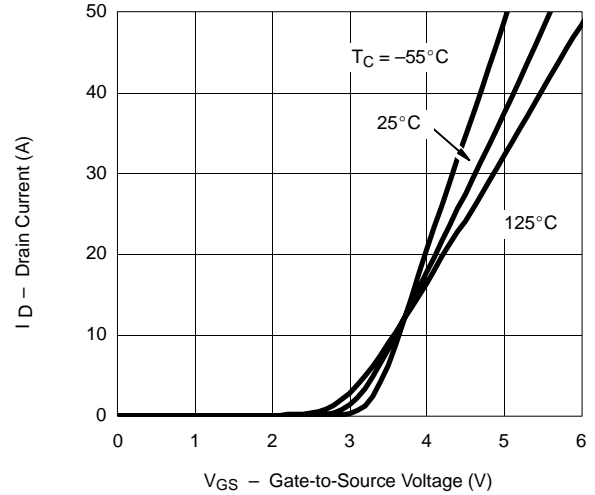


**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

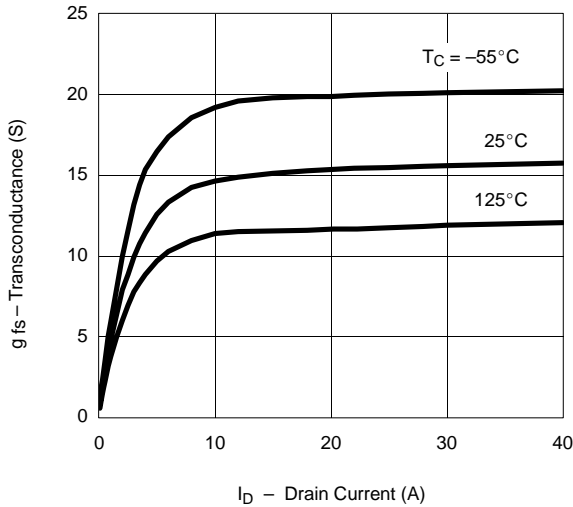
**Output Characteristics**



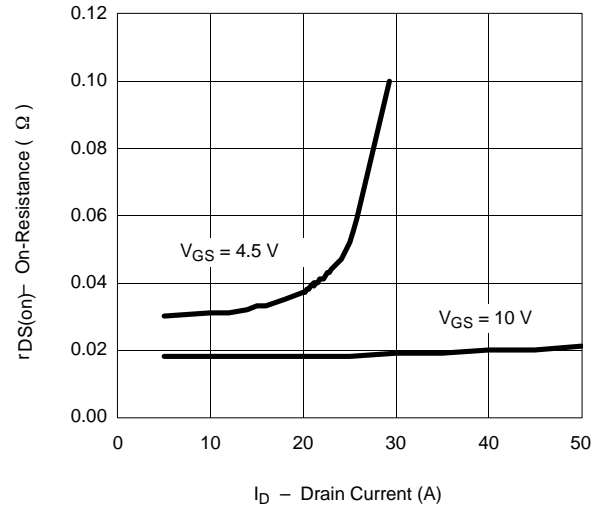
**Transfer Characteristics**



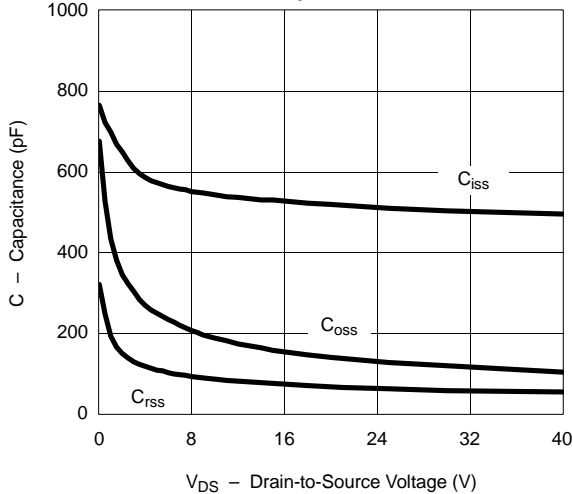
**Transconductance**



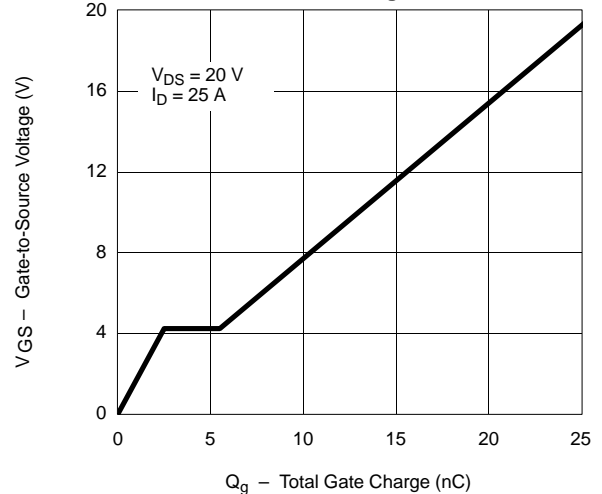
**On-Resistance vs. Drain Current**



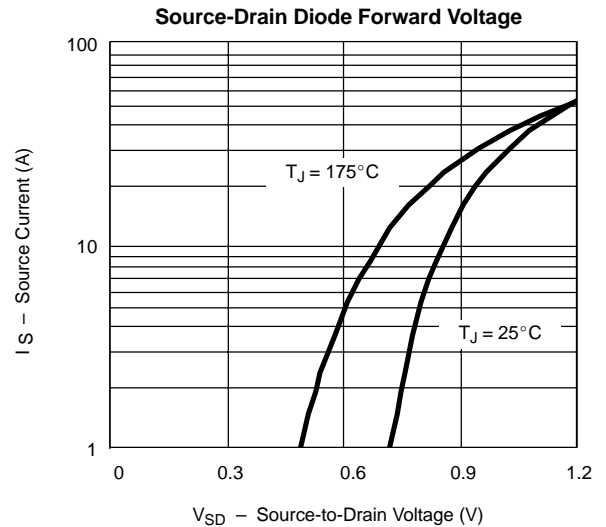
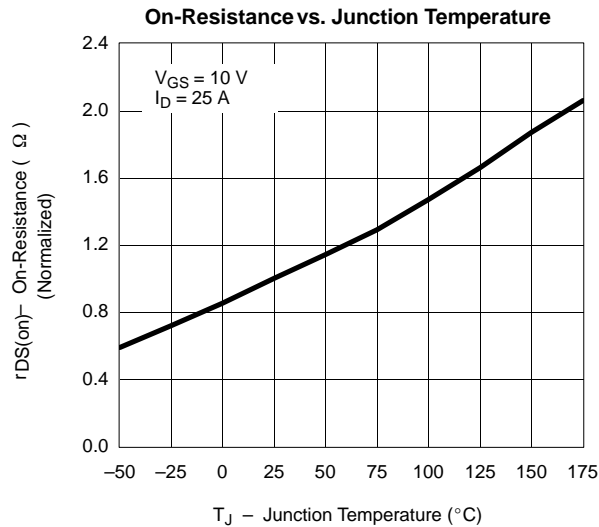
**Capacitance**



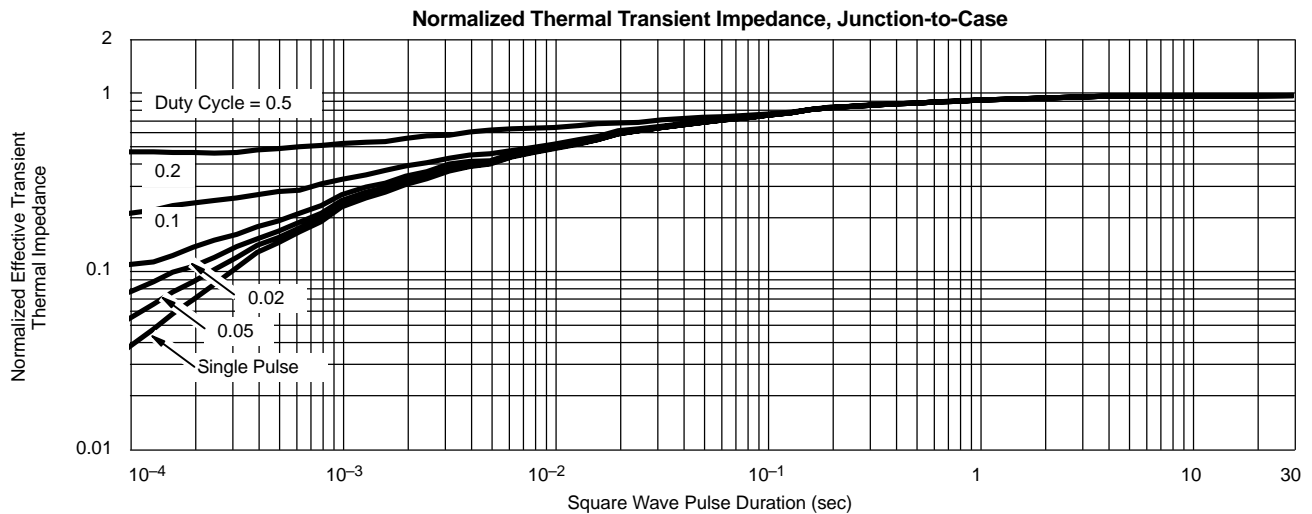
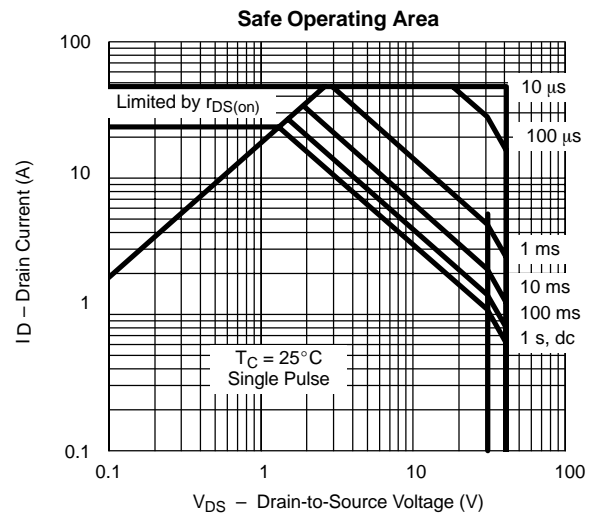
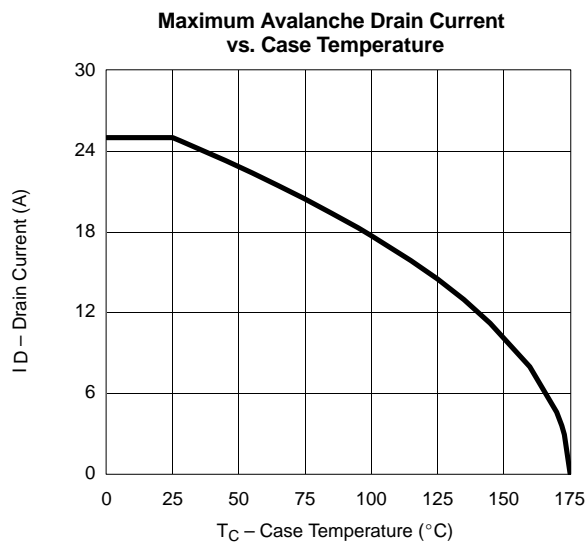
**Gate Charge**



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



### THERMAL RATINGS





## Disclaimer

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