



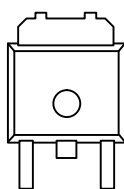
## N-Channel 40-V (D-S) 175°C MOSFET

## 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

TO-252

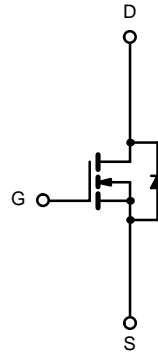


G D S

Top View

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	
Repetitive Avalanche Energy (Duty Cycle $\leq 1\%$ )	$L = 0.1$ mH	$E_{AR}$	31	mJ
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

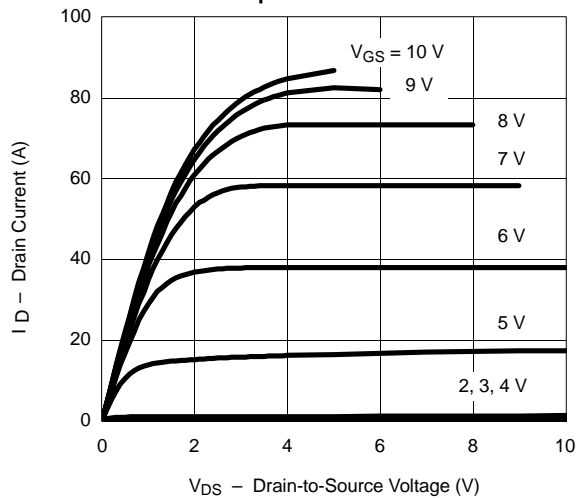
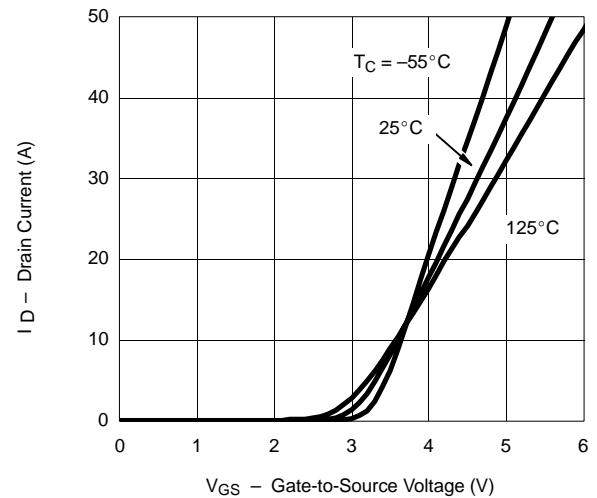
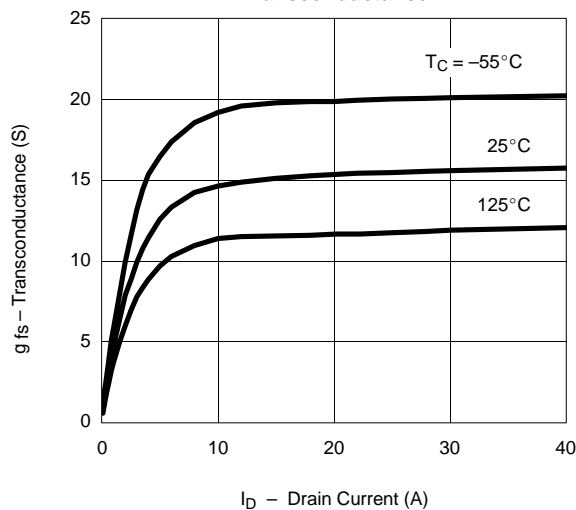
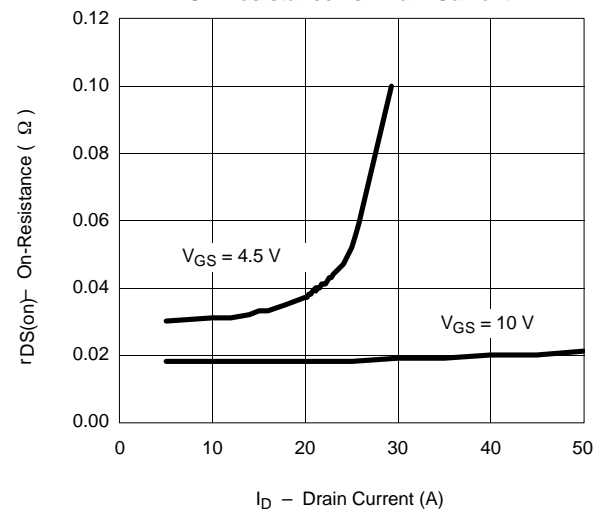
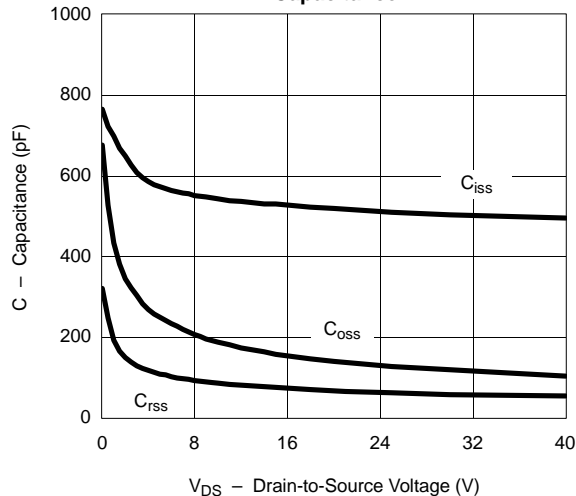
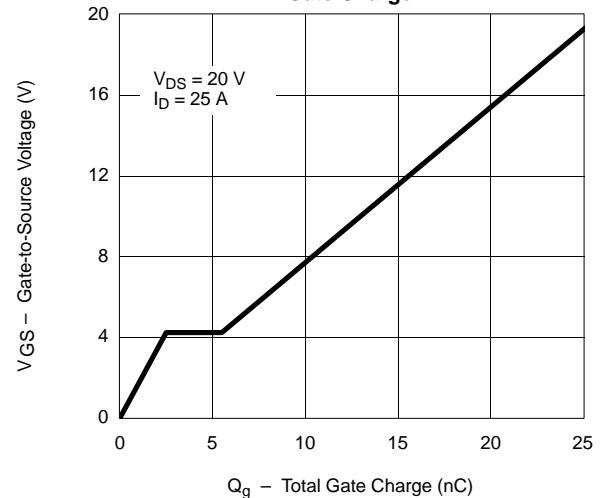
- a. Surface Mounted on 1" x 1" FR4 Board.  
b. See SOA curve for voltage derating.

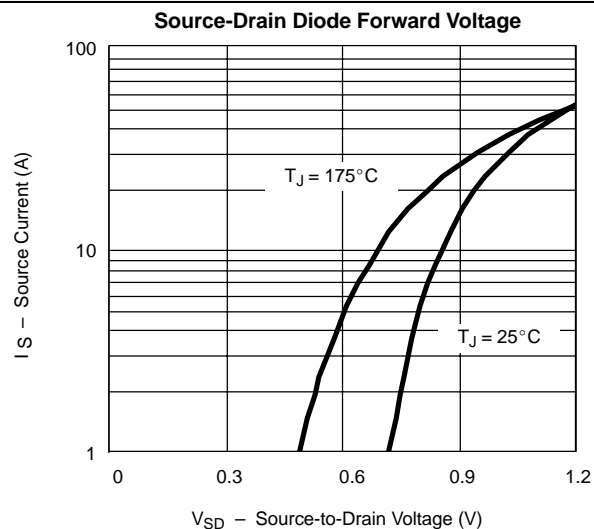
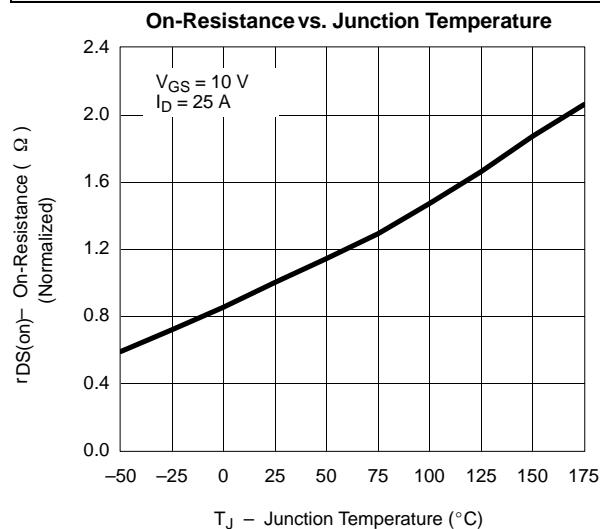


SPECIFICATIONS (T <sub>J</sub> = 25 °C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ <sup>a</sup>	Max	Unit
Static						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	40			V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	1.0	2.0	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> = 40 V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 40 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125 °C			50	
		V <sub>DS</sub> = 40 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 175 °C			150	
On-State Drain Current <sup>b</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> = 5 V, V <sub>GS</sub> = 10 V	50			A
Drain-Source On-State Resistance <sup>b</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 25 A		0.02	0.025	Ω
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 25 A, T <sub>J</sub> = 125 °C			0.040	
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 25 A, T <sub>J</sub> = 175 °C			0.053	
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 10 A		0.031	0.040	
Forward Transconductance <sup>b</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 25 A		15		S
Dynamic <sup>a</sup>						
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25 V, F = 1 MHz		510		pF
Output Capacitance	C <sub>oss</sub>			125		
Reverse Transfer Capacitance	C <sub>rss</sub>			65		
Total Gate Charge <sup>c</sup>	Q <sub>g</sub>	V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 25 A		13	20	nC
Gate-Source Charge <sup>c</sup>	Q <sub>gs</sub>			2.5		
Gate-Drain Charge <sup>c</sup>	Q <sub>gd</sub>			3		
Turn-On Delay Time <sup>c</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> = 20 V, R <sub>L</sub> = 0.8 Ω I <sub>D</sub> ≅ 25 A, V <sub>GEN</sub> = 10 V, R <sub>G</sub> = 2.5 Ω		5	10	ns
Rise Time <sup>c</sup>	t <sub>r</sub>			47	70	
Turn-Off Delay Time <sup>c</sup>	t <sub>d(off)</sub>			15	30	
Fall Time <sup>c</sup>	t <sub>f</sub>			5	10	
Source-Drain Diode Ratings and Characteristic (T <sub>C</sub> = 25 °C)						
Pulsed Current	I <sub>SM</sub>				50	A
Diode Forward Voltage <sup>b</sup>	V <sub>SD</sub>	I <sub>F</sub> = 25 A, V <sub>GS</sub> = 0 V		1.1	1.3	V
Source-Drain Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 25 A, di/dt = 100 A/μs		17	30	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.

**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**
