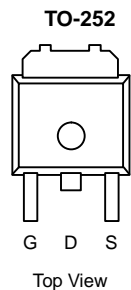




# N-Channel 40-V (D-S), 175°C MOSFET

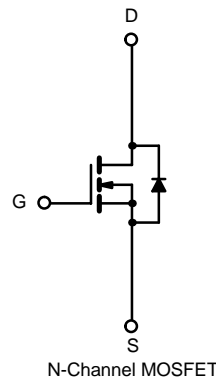
PRODUCT SUMMARY		
V <sub>(BR)DSS</sub> (V)	r <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A) <sup>a</sup>
40	0.010 @ V <sub>GS</sub> = 10 V	40
	0.014 @ V <sub>GS</sub> = 4.5 V	40

**175°C Rated**  
Maximum Junction Temperature



Drain Connected to Tab

Order Number:  
SUD40N04-10A



ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25°C UNLESS OTHERWISE NOTED)				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V <sub>DS</sub>	40	V	
Gate-Source Voltage	V <sub>GS</sub>	±20		
Continuous Drain Current (T <sub>J</sub> = 175°C)	I <sub>D</sub>	T <sub>C</sub> = 25°C	40 <sup>a</sup>	A
		T <sub>C</sub> = 100°C	40 <sup>a</sup>	
Pulsed Drain Current	I <sub>DM</sub>	100		
Avalanche Current	I <sub>AR</sub>	30		
Repetitive Avalanche Energy <sup>b</sup>	L = 0.1 mH	E <sub>AR</sub>	45	mJ
Power Dissipation	T <sub>C</sub> = 25°C	P <sub>D</sub>	71 <sup>c</sup>	W
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>		-55 to 175	°C

THERMAL RESISTANCE RATINGS					
Parameter	Symbol	Typical	Maximum	Unit	
Junction-to-Ambient <sup>d</sup>	R <sub>thJA</sub>	t ≤ 10 sec.	15	18	°C/W
		Steady State	40	50	
Junction-to-Case	R <sub>thJC</sub>	1.75	2.1		

- Notes:  
a. Package limited.  
b. Duty cycle ≤ 1%.  
c. See SOA curve for voltage derating.  
d. Surface mounted on 1" FR4 board.

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

Parameter	Symbol	Test Condition	Min	Typ	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	40			V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>DS</sub> = 250 μA	1		3	
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> = 32 V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 32 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125 °C			50	
		V <sub>DS</sub> = 32 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 175 °C			150	
On-State Drain Current <sup>a</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>a</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 40 A		0.0075	0.010	Ω
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 40 A, T <sub>J</sub> = 125 °C		0.012	0.016	
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 40 A, T <sub>J</sub> = 175 °C		0.015	0.020	
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 10 A		0.011	0.014	
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 10 A, T <sub>J</sub> = 125 °C		0.018	0.022	
V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 10 A, T <sub>J</sub> = 175 °C		0.022	0.028			
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 40 A	20	40		S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25 V, f = 1 MHz		1700		pF
Output Capacitance	C <sub>oss</sub>			370		
Reverse Transfer Capacitance	C <sub>rss</sub>			145		
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> = 40 A		35		nC
Gate-Source Charge <sup>c</sup>	Q <sub>gs</sub>			6		
Gate-Drain Charge <sup>c</sup>	Q <sub>gd</sub>			8		
Turn-On Delay Time <sup>c</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> = 20 V, R <sub>L</sub> = 0.5 Ω I <sub>D</sub> = 40 A, V <sub>GEN</sub> = 10 V, R <sub>G</sub> = 2.5 Ω		14	30	ns
Rise Time <sup>c</sup>	t <sub>r</sub>			7.5	15	
Turn-Off Delay Time <sup>c</sup>	t <sub>d(off)</sub>			30	60	
Fall Time <sup>c</sup>	t <sub>f</sub>			14	30	
<b>Source-Drain Diode Ratings and Characteristics (T<sub>C</sub> = 25 °C)<sup>b</sup></b>						
Continuous Current	I <sub>s</sub>				40	A
Pulsed Current	I <sub>SM</sub>				100	
Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>F</sub> = 40 A, V <sub>GS</sub> = 0 V		1.0	1.50	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 40 A, di/dt = 100 A/μs		30	60	ns

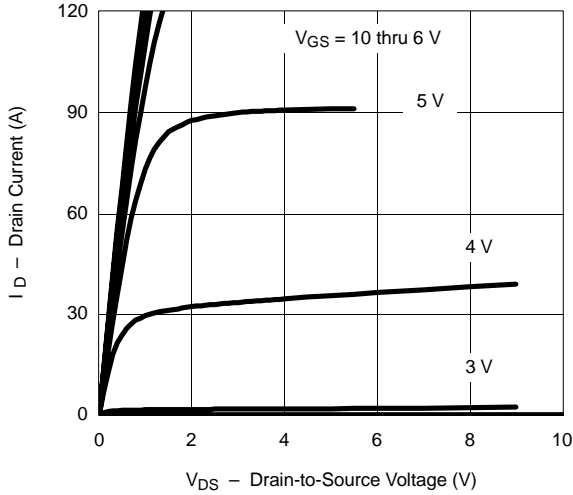
## Notes:

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

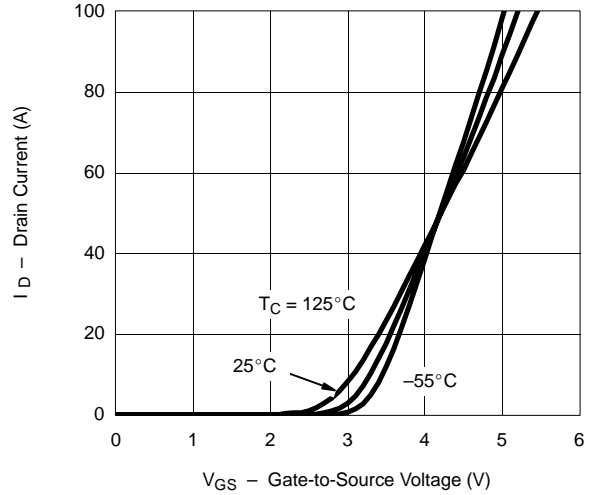


**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

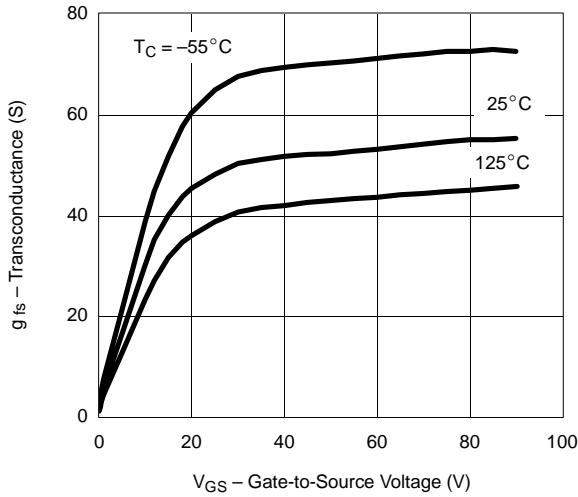
**Output Characteristics**



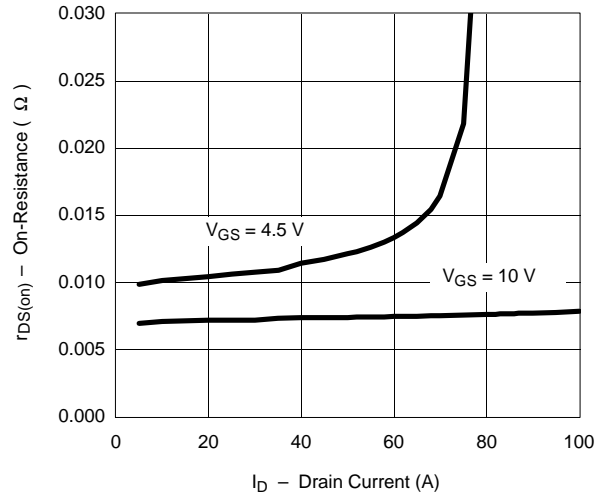
**Transfer Characteristics**



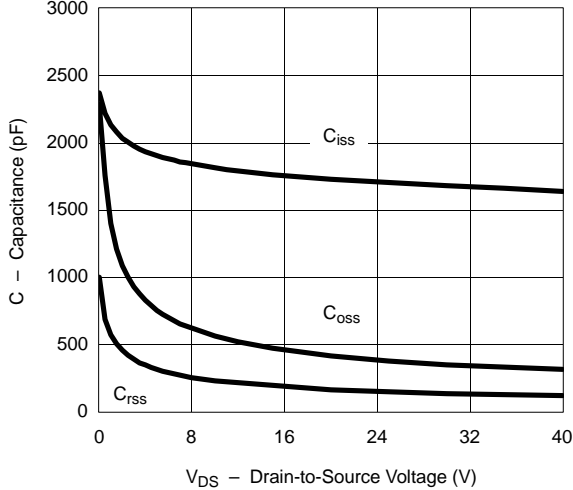
**Transconductance**



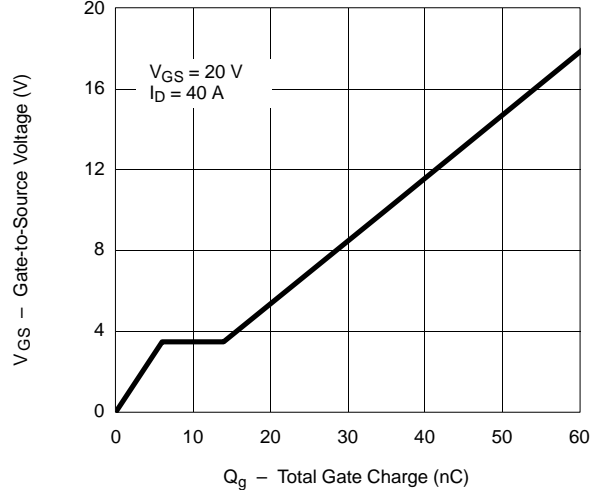
**On-Resistance vs. Drain Current**



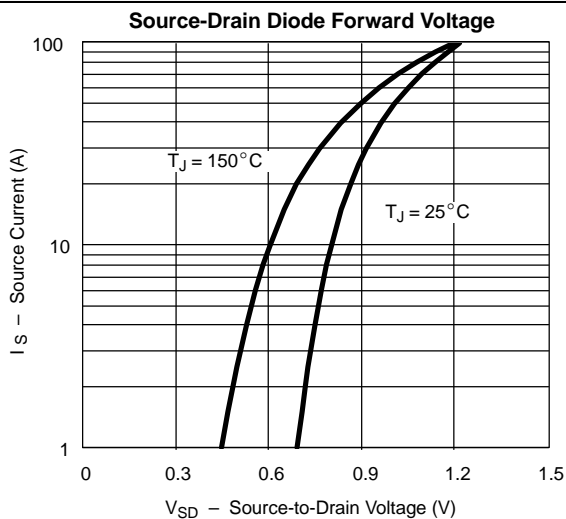
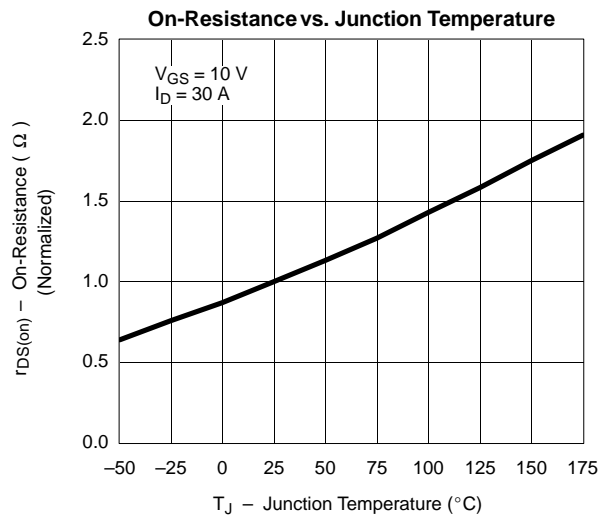
**Capacitance**



**Gate Charge**



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



### THERMAL RATINGS

