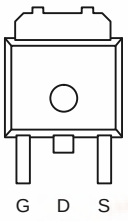
N-Channel 40-V (D-S) 175°C MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	$r_{DS(on)}$ (Ω)	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

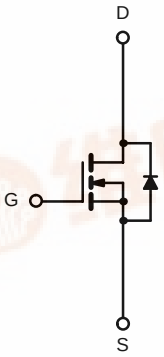
TO-252



Top View

Order Number:
SUD25N04-25

Drain Connected to Tab



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C UNLESS OTHERWISE NOTED)				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current (T_J = 175°C)[b]	T_C = 25°C	I_D	25	A
	T_C = 125°C		15	
Pulsed Drain Current		I_{DM}	50	
Continuous Source Current (Diode Conduction)[b]		I_S	50	
Avalanche Current		I_{AR}	25	
Repetitive Avalanche Energy (Duty Cycle ≤ 1%)	L = 0.1 mH	E_{AR}	31	mJ
Maximum Power Dissipation	T_C = 25°C	P_D	33[b]	W
	T_A = 25°C		3[b]	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	–55 to 175	°C

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Junction-to-Ambient[b]	t ≤ 10 sec	R_{thJA}	20	25	°C/W
	Steady State		40	50	
Junction-to-Case		R_{thJC}	3.7	4.5	

Notes
a. Surface Mounted on 1" x1" FR4 Board.
b. See SOA curve for voltage derating.

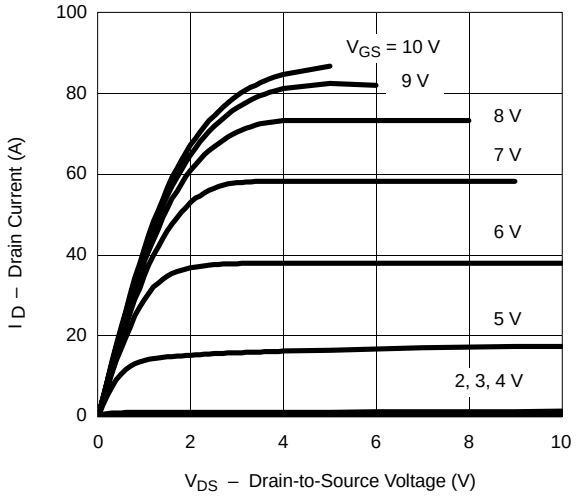
SPECIFICATIONS (T_J = 25°C UNLESS OTHERWISE NOTED)

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

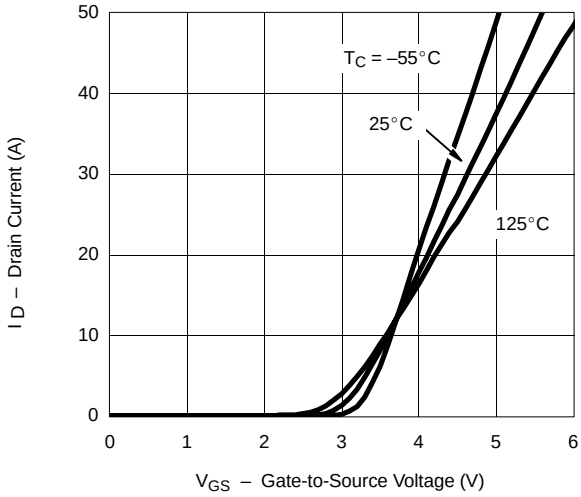
Notes
a. Guaranteed by design, not subject to production testing.
b. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2%.
c. Independent of operating temperature.

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

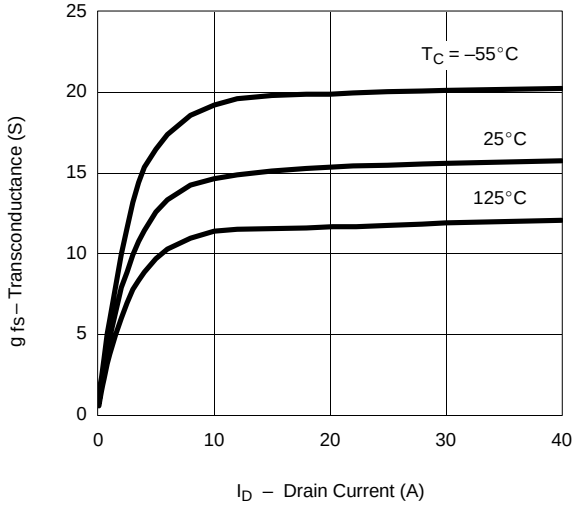
Output Characteristics



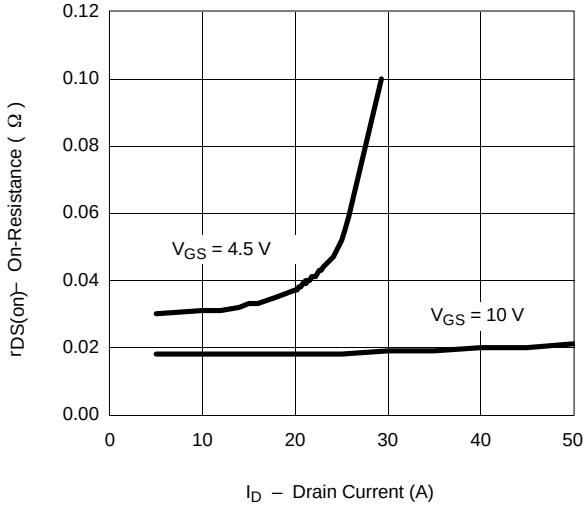
Transfer Characteristics



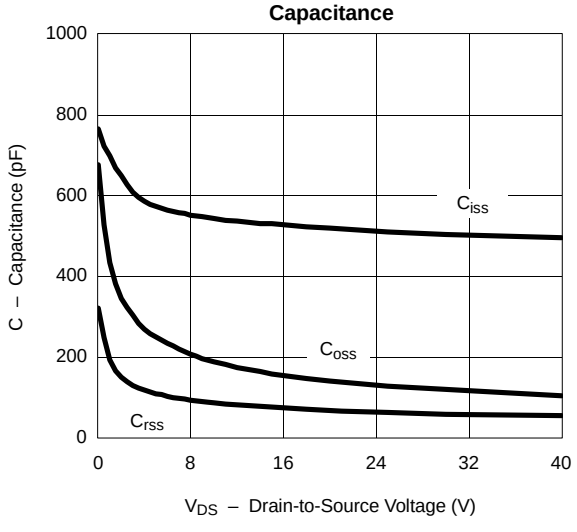
Transconductance



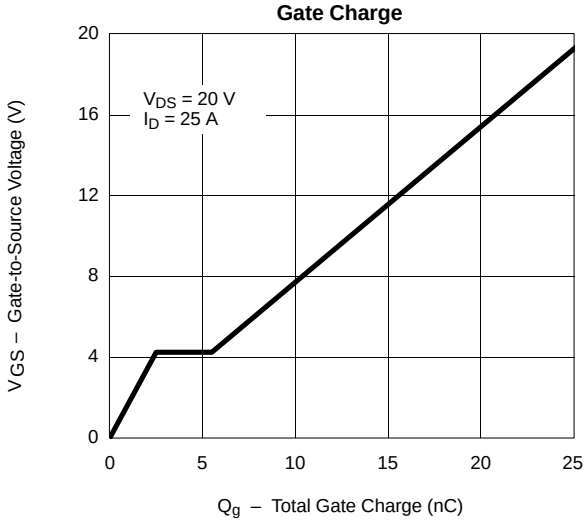
On-Resistance vs. Drain Current



Capacitance

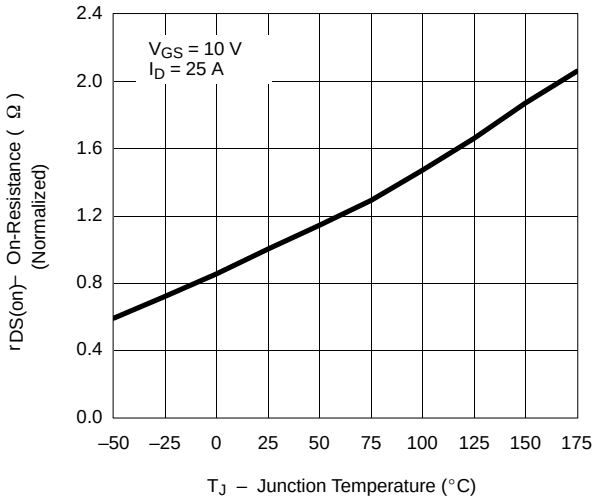


Gate Charge

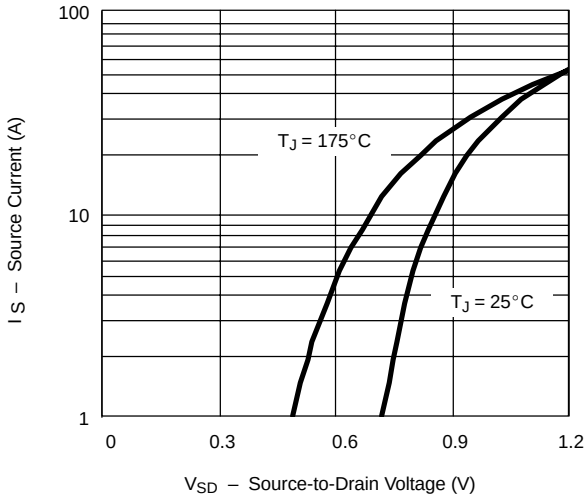


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

On-Resistance vs. Junction Temperature

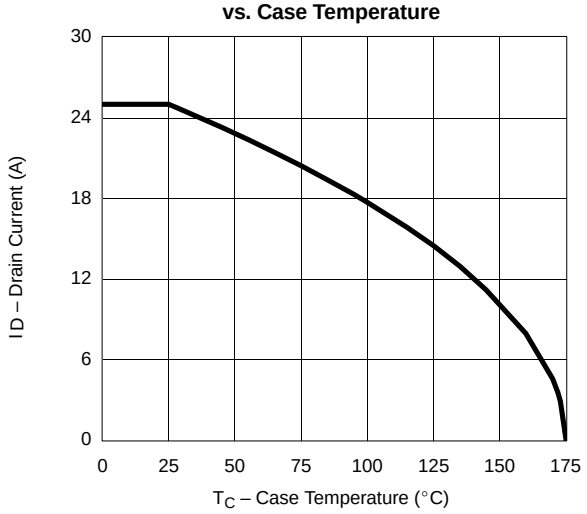


Source-Drain Diode Forward Voltage

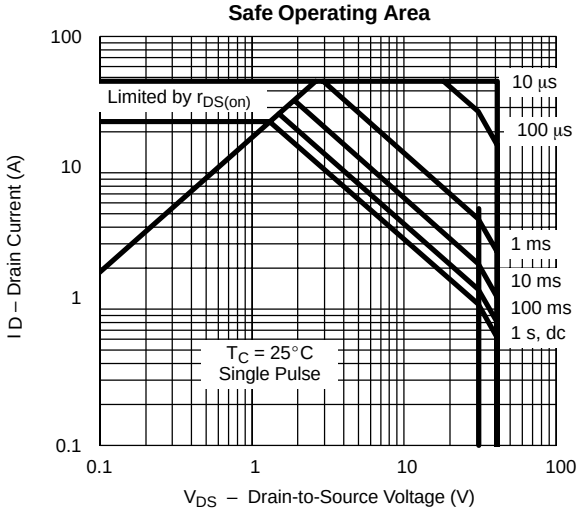


THERMAL RATINGS

Maximum Avalanche Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case