



N-Channel 40-V (D-S), 175°C MOSFET

PRODUCT SUMMARY

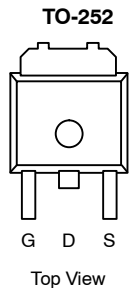
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A) ^c
40	0.0054 @ $V_{GS} = 10$ V	115
	0.0069 @ $V_{GS} = 4.5$ V	102

FEATURES

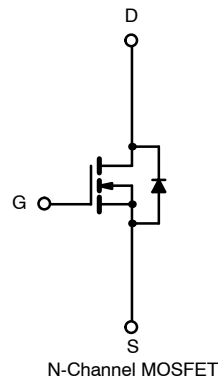
- TrenchFET® Power MOSFETS
- 175°C Junction Temperature

APPLICATIONS

- Automotive Such As:
 - High-Side Switch
 - Motor Drives
 - Valve Drives



Ordering Information: SUD50N04-05L—E3

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}	± 20	
Continuous Drain Current ($T_J = 175^\circ\text{C}$)	$T_C = 25^\circ\text{C}$	I_D	115 ^c	A
	$T_C = 100^\circ\text{C}$		81 ^c	
Pulsed Drain Current		I_{DM}	100	
Single Pulse Avalanche Current	$L = 0.1$ mH	I_{AS}	50	
Single Pulse Repetitive Avalanche Energy ^a		E_{AS}	125	mJ
Power Dissipation	$T_C = 25^\circ\text{C}$	P_D	136	W
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 ^b	$t \leq 10$ sec	R_{thJA}	15	18	$^\circ\text{C/W}$
	Steady State		40	50	
Junction-to-Case		R_{thJC}	0.85	1.1	

Notes:

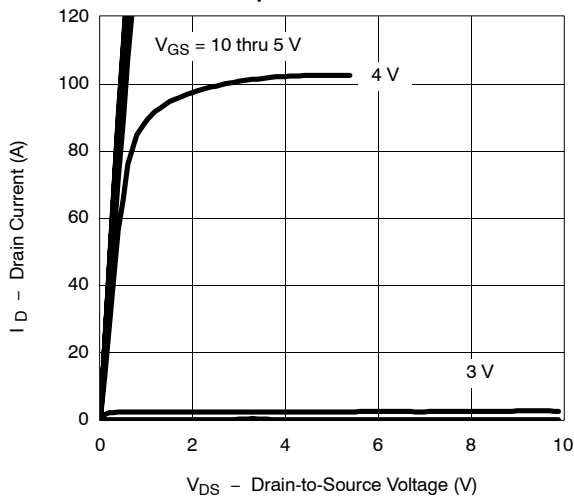
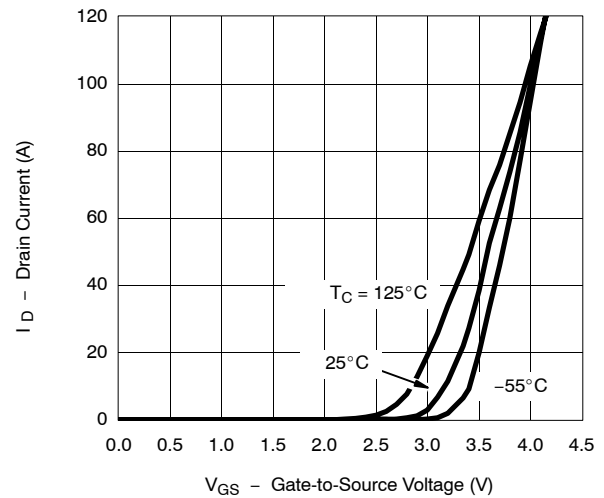
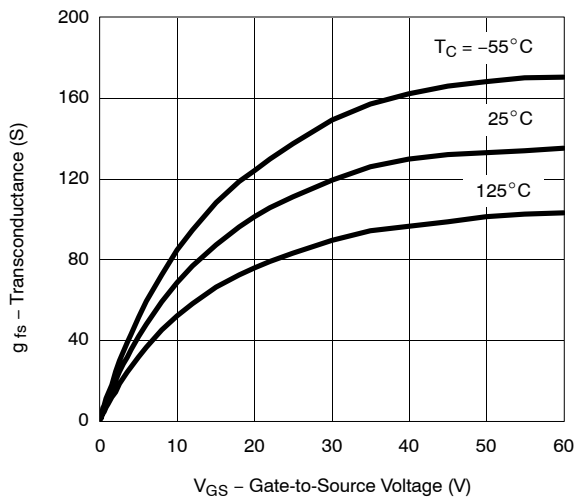
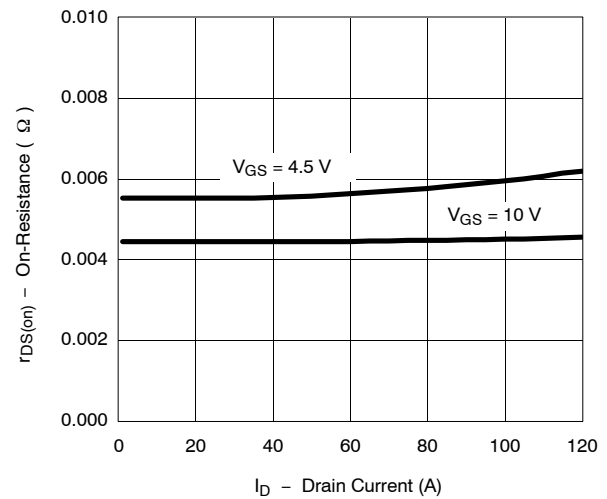
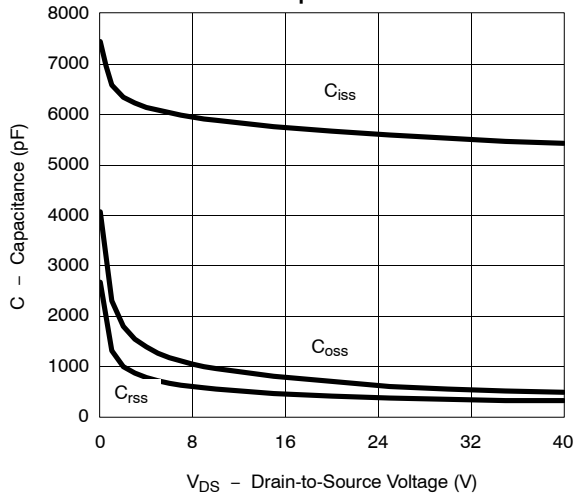
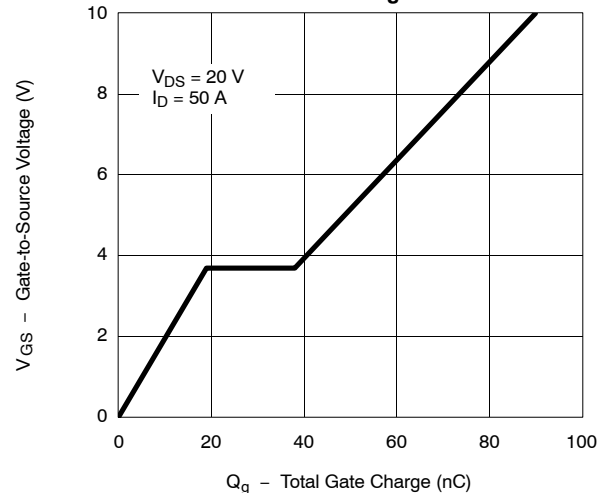
- Duty cycle $\leq 1\%$.
- Surface mounted on 1" FR4 board.
- Based on maximum allowable Junction Temperature. Package limitation current is 50 A.

SPECIFICATIONS ($T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

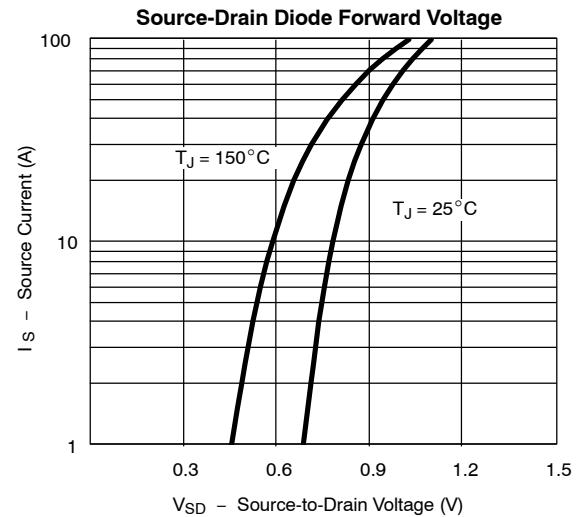
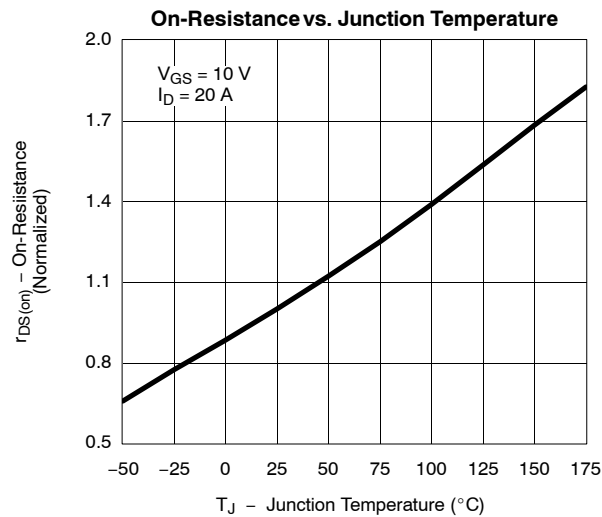
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = 250 μA	40			V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _{DS} = 250 μA	1		3	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±20 V			± 100	nA
Zero Gate Voltage 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 ^a	I _{D(on)}	V _{DS} = 5 V, V _{GS} = 10 V	50			A
Drain-Source On-State Resistance ^a	r _{DS(on)}	V _{GS} = 10 V, I _D = 20 A		0.0044	0.0054	Ω
		V _{GS} = 10 V, I _D = 20 A, T _J = 125°C			0.0083	
		V _{GS} = 10 V, I _D = 20 A, T _J = 175°C			0.0130	
		V _{GS} = 4.5 V, I _D = 20 A		0.0055	0.0069	
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 15 A	20	80		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz		5600		pF
Output Capacitance	C _{oss}			590		
Reversen Transfer Capacitance	C _{rss}			365		
Total Gate Charge ^c	Q _g	V _{DS} = 20 V, V _{GS} = 10 V, I _D = 50 A		90	135	nC
Gate-Source Charge ^c	Q _{gs}			19		
Gate-Drain Charge ^c	Q _{gd}			19		
Gate Resistance	R _g			1.6		Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 20 V, R _L = 0.4 Ω I _D ≈ 50 A, V _{GEN} = 10 V, R _g = 2.5 Ω		15	25	ns
Rise Time ^c	t _r			20	30	
Turn-Off Delay Time ^c	t _{d(off)}			65	100	
Fall Time ^c	t _f			11	20	
Source-Drain Ciode Ratings and Characteristics (T _C = 25°C) ^b						
Continuous Current	I _s				50	A
Pulsed Current	I _{SM}				100	
Forward Voltage ^a	V _{SD}	I _F = 30 A, V _{GS} = 0 V		0.90	1.50	V
Reverse Recovery Time	t _{rr}	I _F = 30 A, di/dt = 100 A/μs		30	45	ns

Notes:

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

