SUD50N04-05L

Vishay Siliconix

N-Channel 40-V (D-S), 175 °C MOSFET
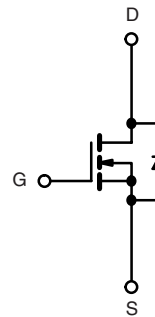
PRODUCT SUMMARY

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

FEATURES

- TrenchFET® Power MOSFETS
- 175 °C Junction Temperature

RoHS
COMPLIANT

TO-252

G D S

Top View
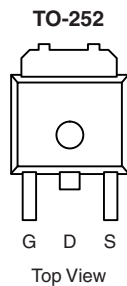
Drain Connected to Tab

Ordering Information: SUD50N04-05L-E3 (Lead (Pb)-free)

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)	T_C = 25 °C	I_D	115[c]	A
	T_C = 100 °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 °C	P_D	136	W
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}	15	18	°C/W
	Steady State		40	50	
Junction-to-Case		R_{thJC}	0.85	1.1	

Notes:
a. Duty cycle ≤ 1 %.
b. Surface Mounted on 1" FR4 board.
c. Based on maximum allowable Junction Temperature. Package limitation current is 50 A.

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SPECIFICATIONS $T_J = 25\ °C$, unless otherwise noted

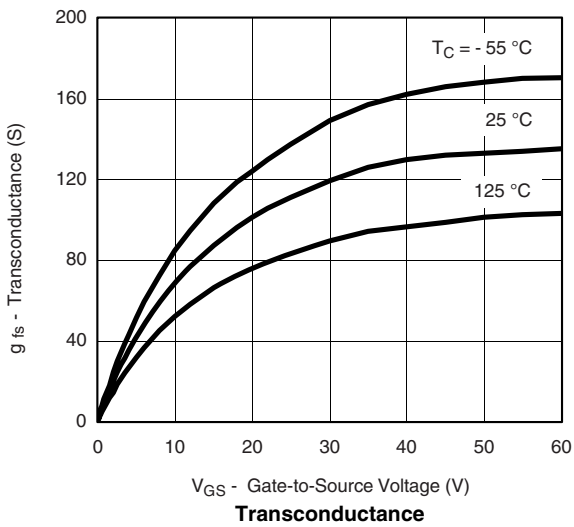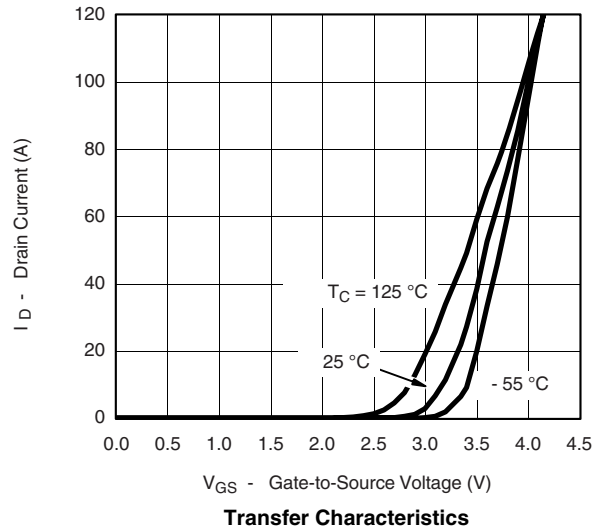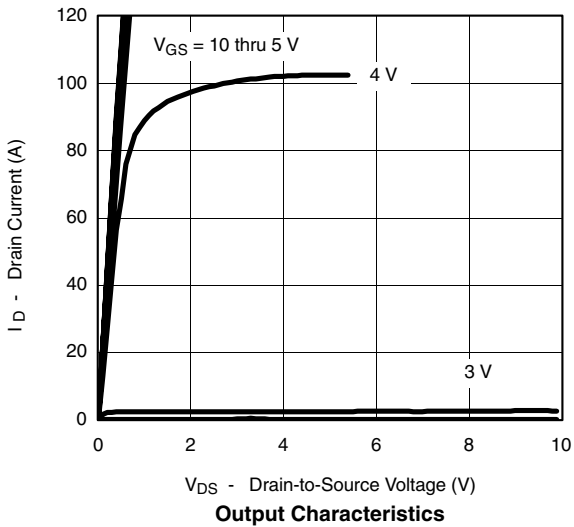| Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\ V$, $I_D = 250\ \mu A$	40			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\ \mu A$	1		3	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\ V$, $V_{GS} = \pm 20\ V$			± 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]	$t_{d(on)}$	$V_{DD} = 20\ V$, $R_L = 0.4\ \Omega$ $I_D \cong 50\ A$, $V_{GEN} = 10\ V$, $R_g = 2.5\ \Omega$		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 Diode 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}	$I_F = 30\ A$, $di/dt = 100\ A/\mu s$		30	45	ns

Notes:
a. Pulse test; pulse width $\leq 300\ \mu s$, duty cycle $\leq 2\ \%$.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.
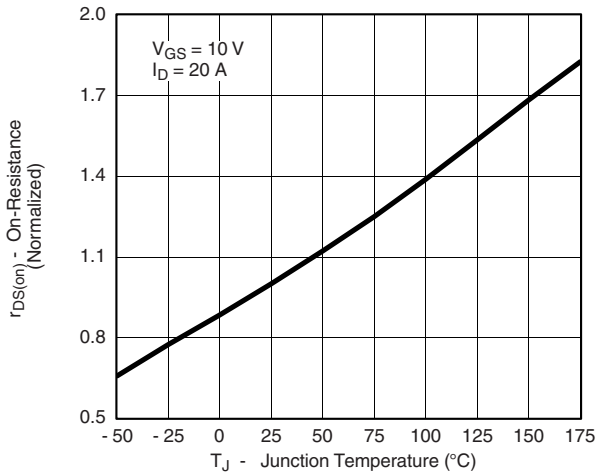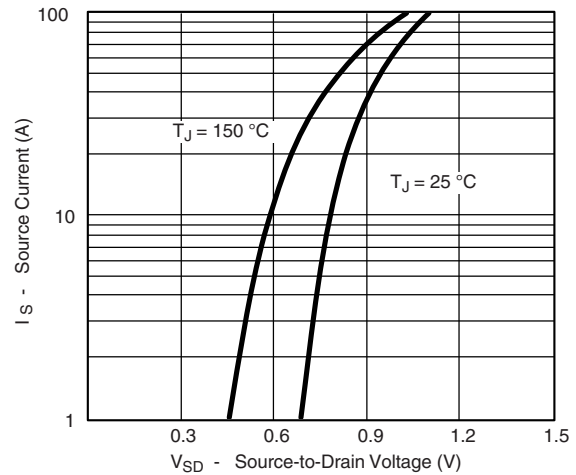
TYPICAL CHARACTERISTICS 25 °C unless noted

Output Characteristics

Transfer Characteristics

Transconductance

On-Resistance vs. Drain Current

Capacitance

Gate Charge

SUD50N04-05L

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![VISHAY logo]
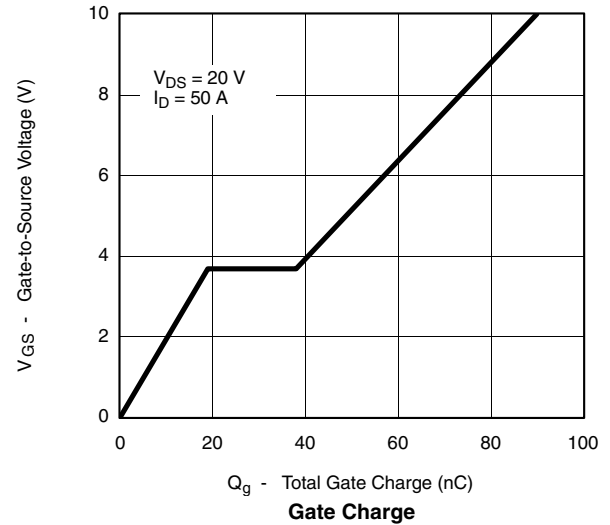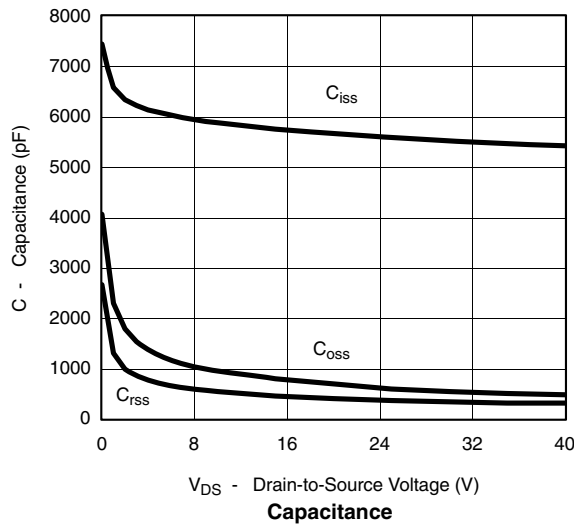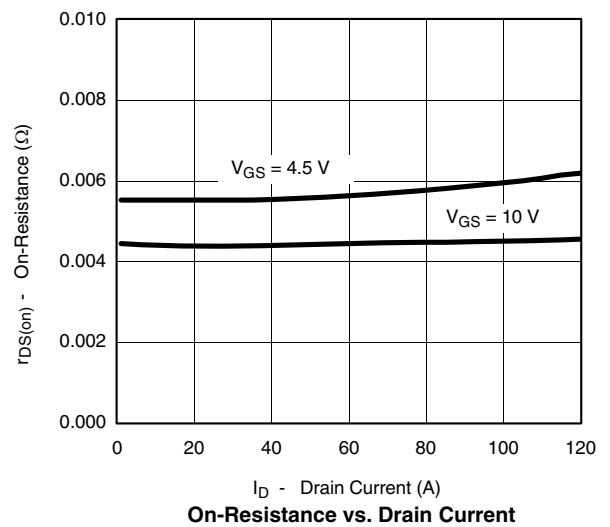
TYPICAL CHARACTERISTICS   25 °C unless noted
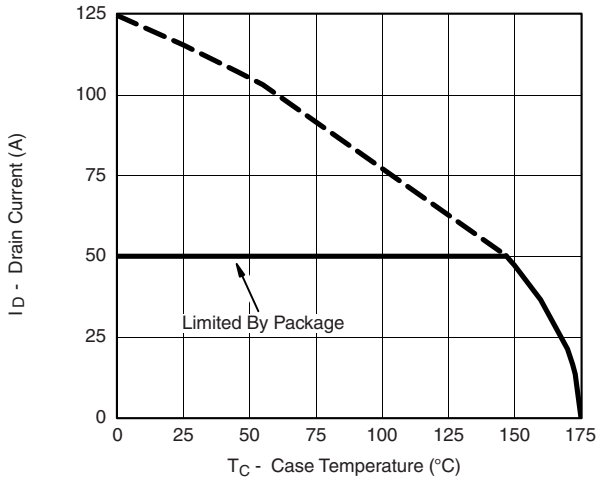

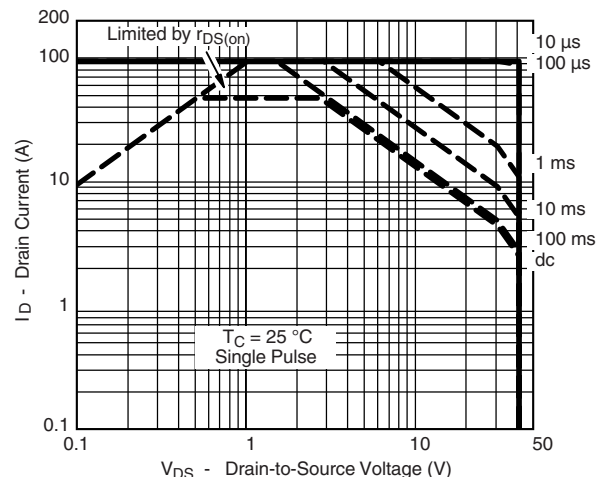**On-Resistance vs. Junction Temperature**
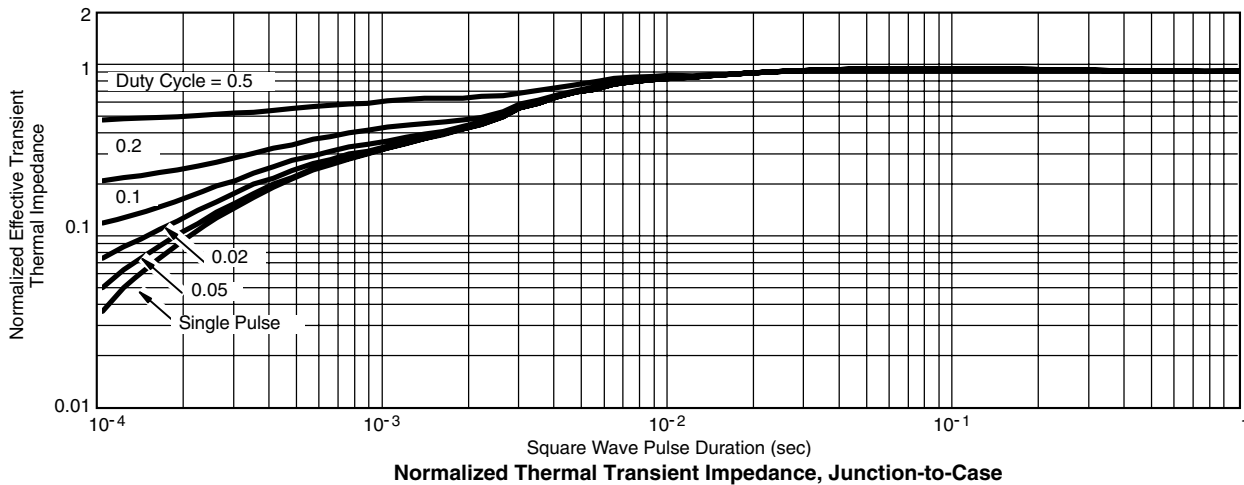

Source-Drain Diode Forward Voltage

THERMAL RATINGS

**Maximum Avalanche and Drain Current
vs. Case Temperature**

Safe Operating Area

Normalized Thermal Transient Impedance, Junction-to-Case

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