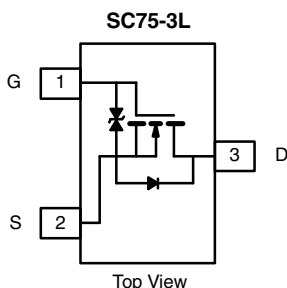


N-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY

V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^a	Q _g (Typ.)
20	0.420 at V _{GS} = 4.5 V	0.606	0.92
	0.501 at V _{GS} = 2.5 V	0.505	
	0.660 at V _{GS} = 1.8 V	0.150	



Ordering Information:

Si1046R-T1-GE3 (Lead (Pb)-free and Halogen-free)

FEATURES

- TrenchFET[®] Power MOSFET: 1.8 V Rated
- ESD Protected: 2000 V
- Material categorization:
For definitions of compliance please see
www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories
- Battery Operated Systems
- Power Supply Converter Circuits
- Load/Power Switching Cell Phones, Pagers

Marking Code: J

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V _{DS}	20	V
Gate-Source Voltage	V _{GS}	± 8	
Continuous Drain Current (T _J = 150 °C) ^a	I _D	0.606 ^{b, c}	A
		0.485 ^{b, c}	
Pulsed Drain Current	I _{DM}	2.5	
Continuous Source-Drain Diode Current	I _S	0.21 ^{b, c}	W
Maximum Power Dissipation ^a	P _D	0.25 ^{b, c}	
		0.16 ^{b, c}	
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 150	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, d}	R _{thJA}	440	530	°C/W
		540	650	

Notes:

- Based on T_C = 25 °C.
- Surface mounted on 1" x 1" FR4 board.
- t = 5 s.
- Maximum under steady state conditions is 650 °C/W.

SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	20			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA		20.5		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			- 2.12		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	0.35		0.95	V
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 8 V			± 30	mA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 20 V, V _{GS} = 0 V			1	μA
		V _{DS} = 20 V, V _{GS} = 0 V, T _J = 85 °C			10	
On-State Drain Current ^a	I _{D(on)}	V _{DS} = ≥ 5 V, V _{GS} = 4.5 V	2.5			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 4.5 V, I _D = 0.606 A		0.336	0.420	Ω
		V _{GS} = 2.5 V, I _D = 0.505 A		0.395	0.501	
		V _{GS} = 1.8 V, I _D = 0.150 A		0.438	0.660	
Forward Transconductance	g _{fs}	V _{DS} = 10 V, I _D = 0.606 A		2.1		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz		66		pF
Output Capacitance	C _{oss}			17		
Reverse Transfer Capacitance	C _{rss}			7		
Total Gate Charge	Q _g	V _{DS} = 10 V, V _{GS} = 5 V, I _D = 0.606 A		0.99	1.49	nC
		V _{DS} = 10 V, V _{GS} = 4.5 V, I _D = 0.606 A		0.92	1.38	
Gate-Source Charge	Q _{gs}			0.15		
Gate-Drain Charge	Q _{gd}			0.30		
Gate Resistance	R _g	f = 1 MHz		212		Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = 10 V, R _L = 20.8 Ω I _D ≅ 0.48 A, V _{GEN} = 4.5 V, R _g = 1 Ω		17	26	ns
Rise Time	t _r			19	28.5	
Turn-Off Delay Time	t _{d(off)}			76	114	
Fall Time	t _f			27	41	
Drain-Source Body Diode Characteristics						
Pulse Diode Forward Current ^a	I _{SM}				2.5	A
Body Diode Voltage	V _{SD}	I _S = 0.48 A		0.8	1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = 1 A, dI/dt = 100 A/μs		16	24	nC
Body Diode Reverse Recovery Charge	Q _{rr}			4.8	7.2	ns
Reverse Recovery Fall Time	t _a			12.3		
Reverse Recovery Rise Time	t _b			3.7		

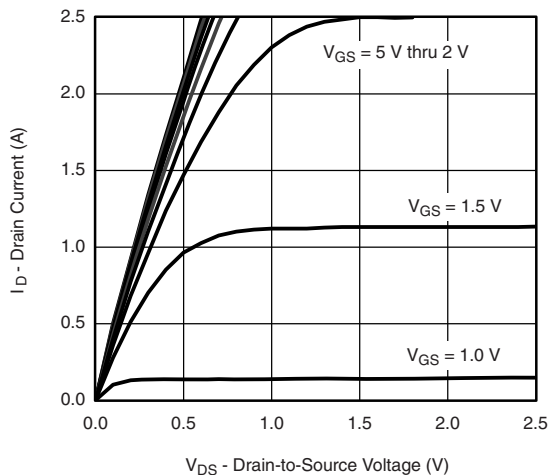
Notes:

a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

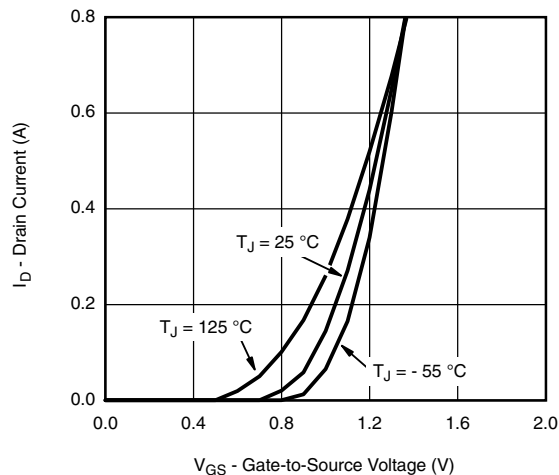
b. Guaranteed by design, not subject to production testing.

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.

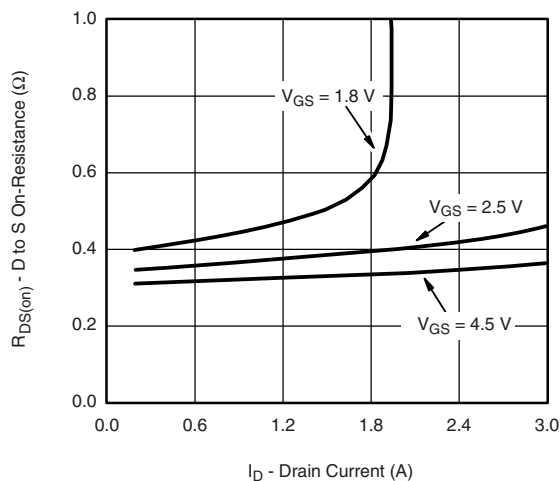
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise noted)



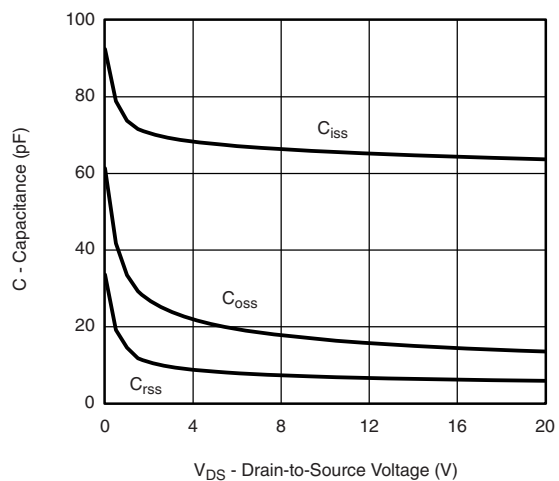
Output Characteristics



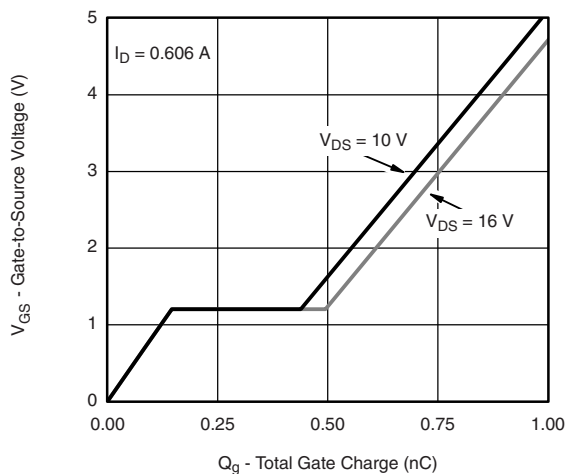
Transfer Characteristics



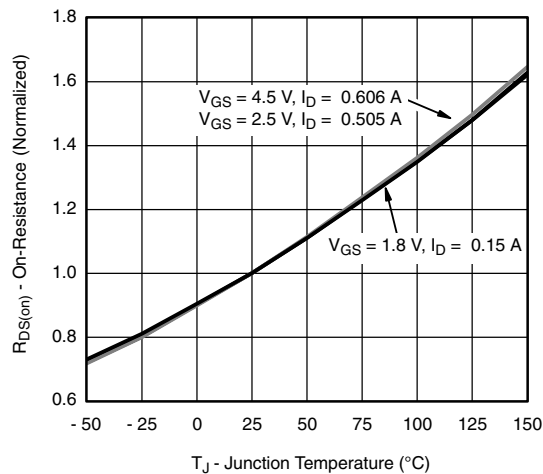
On-Resistance vs. Drain Current



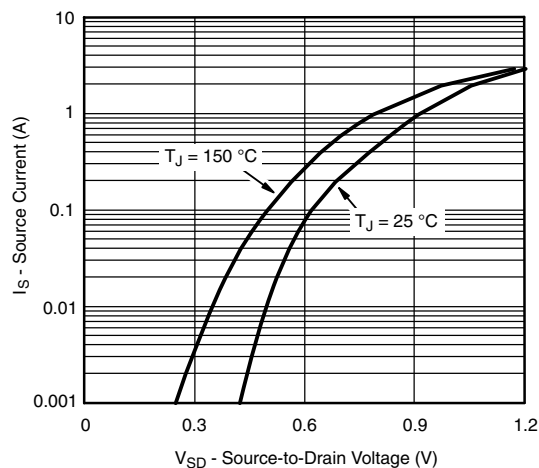
Capacitance



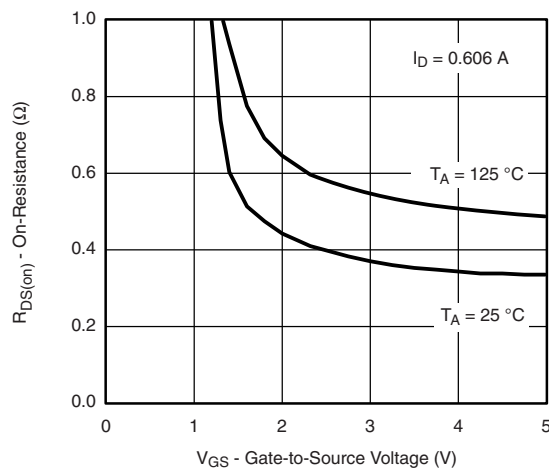
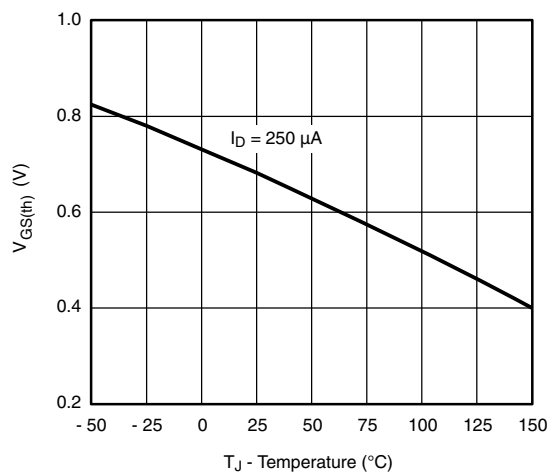
Gate Charge



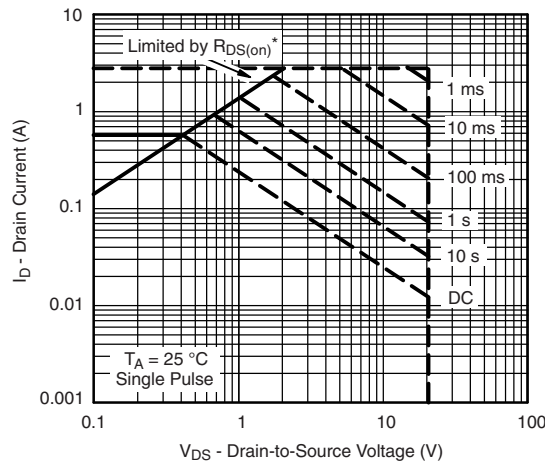
On-Resistance vs. Junction Temperature

TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)


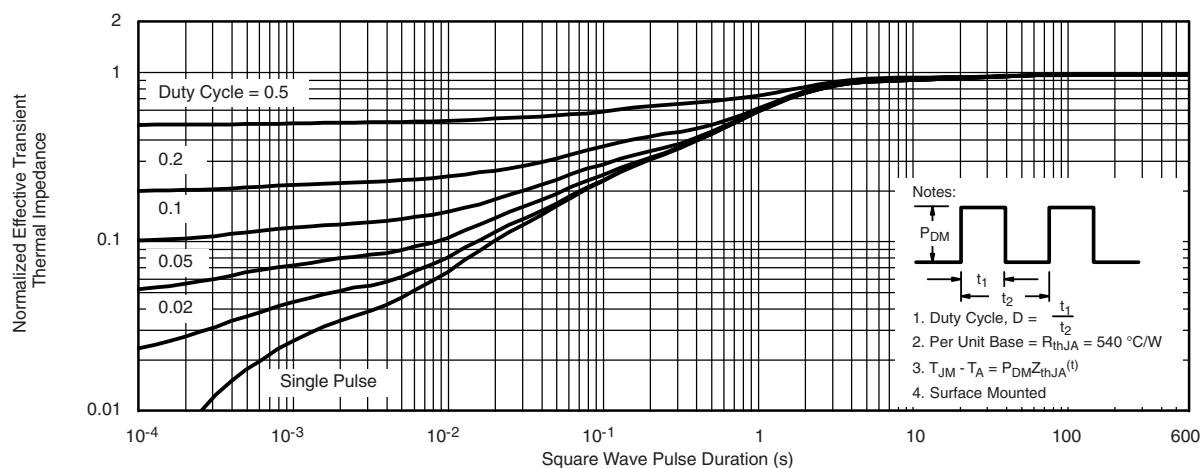
Source-Drain Diode Forward Voltage

 $R_{DS(on)}$ vs. V_{GS} vs Temperature

Threshold Voltage



Safe Operating Area, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Ambient

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