

P-Channel 60-V (D-S) MOSFET

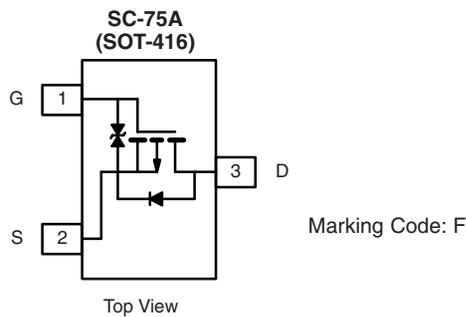
PRODUCT SUMMARY			
$V_{DS(min.)}$ (V)	$R_{DS(on)}$ (Ω)	$V_{GS(th)}$ (V)	I_D (mA)
- 60	4.0 at $V_{GS} = - 10$ V	- 1 to 3.0	- 190

FEATURES

- Halogen-free Option Available
- TrenchFET[®] Power MOSFETs
- High-Side Switching
- Low On-Resistance: 4 Ω
- Low Threshold: - 2 V (typ.)
- Fast Switching Speed: 20 ns (typ.)
- Low Input Capacitance: 20 pF (typ.)
- Miniature Package
- ESD Protected: 2000 V



RoHS
COMPLIANT



Ordering Information: Si1021R-T1-E3 (Lead (Pb)-free)
Si1021R-T1-GE3 (Lead (Pb)-free and Halogen-free)

APPLICATIONS

- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.
- Battery Operated Systems
- Power Supply Converter Circuits
- Solid-State Relays

BENEFITS

- Ease in Driving Switches
- Low Offset Voltage
- Low-Voltage Operation
- High-Speed Circuits
- Easily Driven without Buffer
- Small Board Area

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted			
Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	- 60	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 150$ °C) ^a	I_D	$T_A = 25$ °C	- 190
		$T_A = 85$ °C	- 135
Pulsed Drain Current ^b	I_{DM}	- 650	mA
Power Dissipation ^a	P_D	$T_A = 25$ °C	250
		$T_A = 85$ °C	130
Maximum Junction-to-Ambient ^a	R_{thJA}	500	°C/W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	°C

Notes:

- a. Surface mounted on FR4 board.
b. Pulse width limited by maximum junction temperature.

SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = -10\text{ }\mu\text{A}$	- 60			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -0.25\text{ mA}$	- 1		- 3.0	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 10	μA
		$V_{DS} = 0\text{ V}, V_{GS} = \pm 10\text{ V}$			± 200	
		$V_{DS} = 0\text{ V}, V_{GS} = \pm 10\text{ V}, T_J = 85\text{ }^\circ\text{C}$			± 500	
		$V_{DS} = 0\text{ V}, V_{GS} = \pm 5\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -50\text{ V}, V_{GS} = 0\text{ V}$			- 25	
		$V_{DS} = -50\text{ V}, V_{GS} = 0\text{ V}, T_J = 85\text{ }^\circ\text{C}$			- 250	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} = -10\text{ V}, V_{GS} = -4.5\text{ V}$	- 50			mA
		$V_{DS} = -10\text{ V}, V_{GS} = -10\text{ V}$	- 600			
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -25\text{ mA}$			8	
		$V_{GS} = -10\text{ V}, I_D = -500\text{ mA}$			4	Ω
		$V_{GS} = -10\text{ V}, I_D = -500\text{ mA}, T_J = 125\text{ }^\circ\text{C}$			6	
Forward Transconductance	g_{fs}	$V_{DS} = -10\text{ V}, I_D = -100\text{ mA}$	80			mS
Diode Forward Voltage ^a	V_{SD}	$V_{DS} = -200\text{ mA}, V_{GS} = 0\text{ V}$	80			V
Dynamic						
Total Gate Charge	Q_g	$V_{DS} = -30\text{ V}, V_{GS} = -15\text{ V}, I_D \cong -500\text{ mA}$		1.7		nC
Gate-Source Charge	Q_{gs}		0.26			
Gate-Drain Charge	Q_{gd}		0.46			
Input Capacitance	C_{iss}	$V_{DS} = -25\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		23		pF
Output Capacitance	C_{oss}		10			
Reverse Transfer Capacitance	C_{rss}		5			
Switching^b						
Turn-On Time	t_{ON}	$V_{DD} = -25\text{ V}, R_L = 150\text{ }\Omega,$ $I_D \cong -200\text{ mA}, V_{GEN} = -10\text{ V}, R_G = 10\text{ }\Omega$		20		ns
Turn-Off Time	t_{OFF}		35			

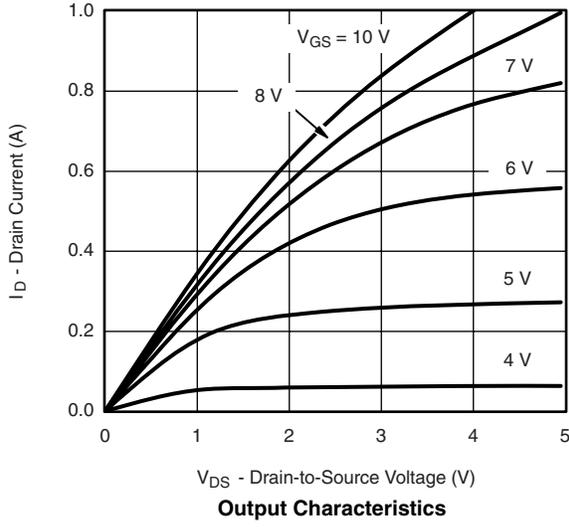
Notes:

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

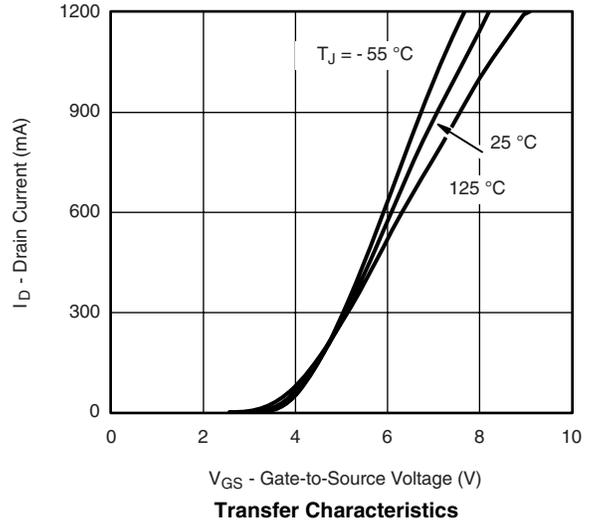
b. Switching time is essentially independent of operating temperature.

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.

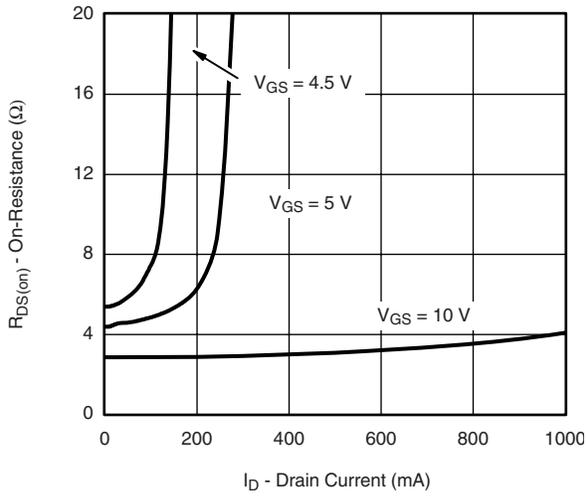
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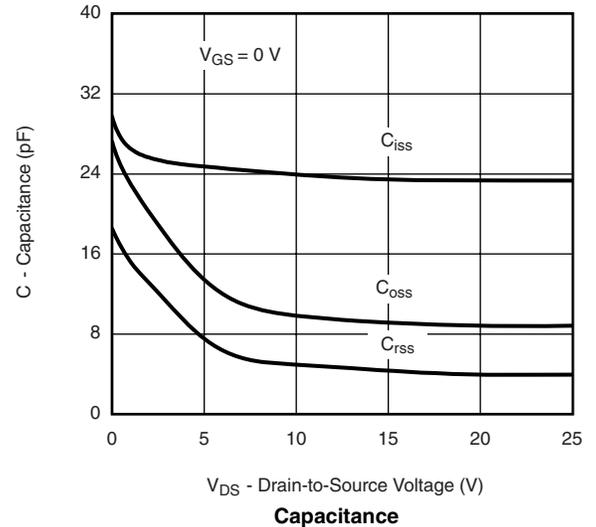
Output Characteristics



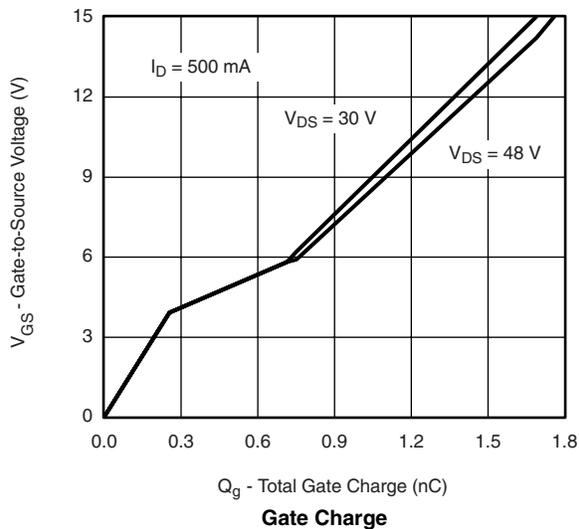
Transfer Characteristics



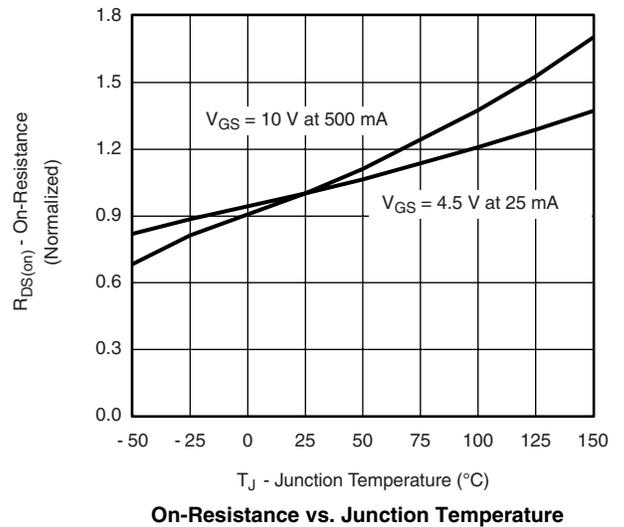
On-Resistance vs. Drain Current



Capacitance

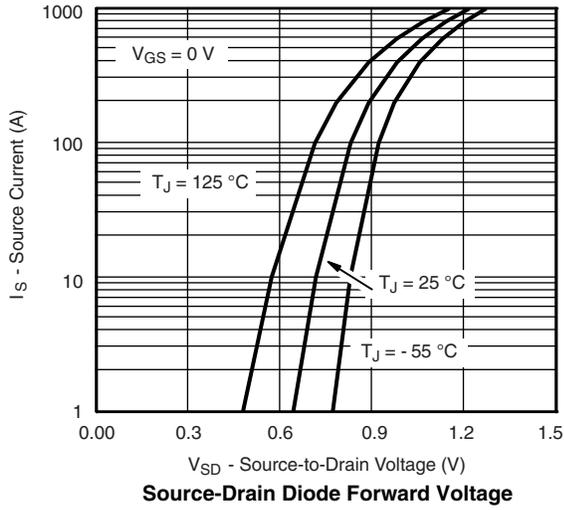


Gate Charge

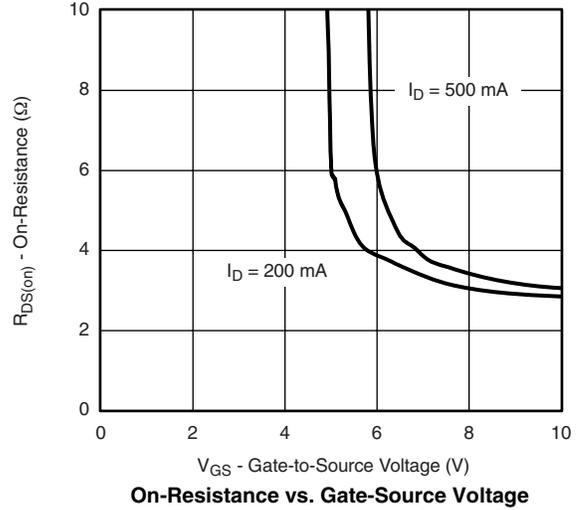


On-Resistance vs. Junction Temperature

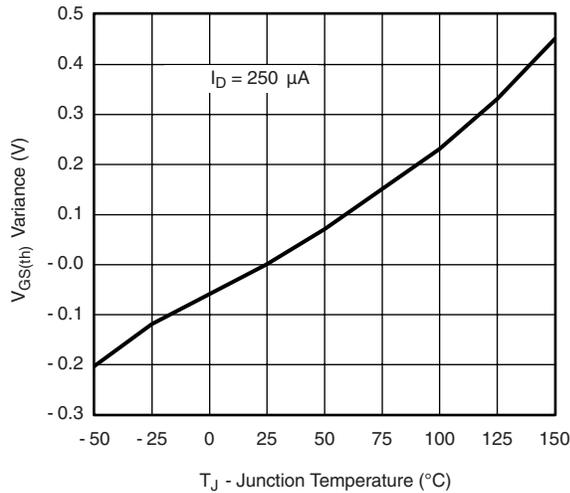
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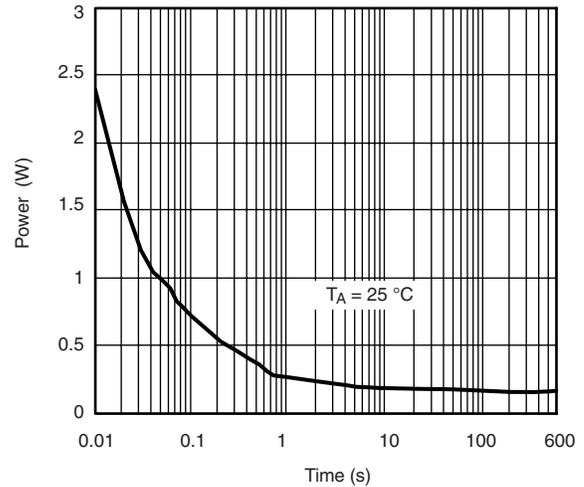
Source-Drain Diode Forward Voltage



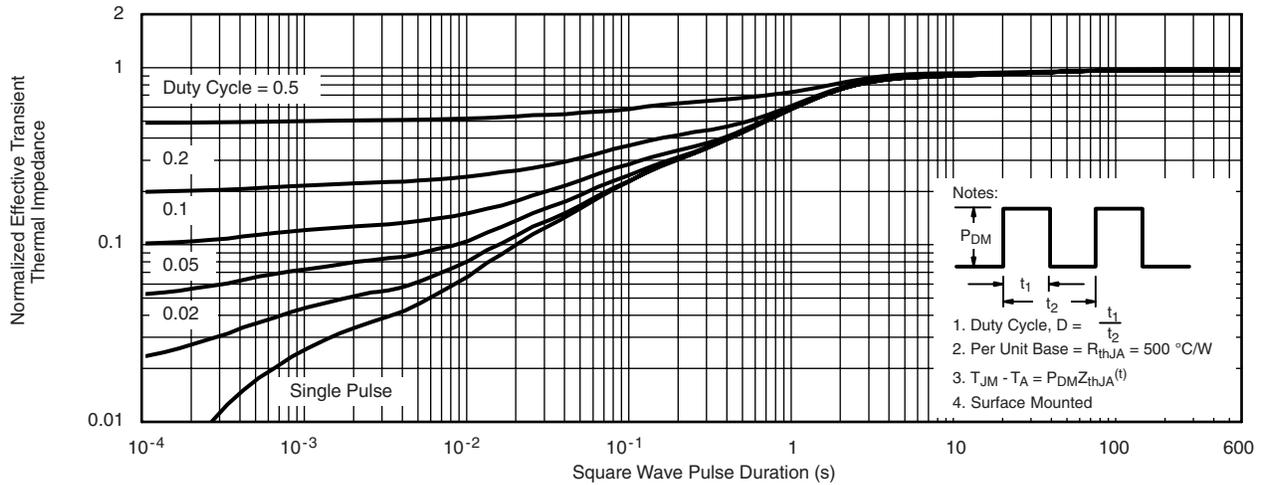
On-Resistance vs. Gate-Source Voltage



Threshold Voltage Variance Over Temperature



Single Pulse Power, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Ambient

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