

P-Channel 20-V (D-S) MOSFET

PRODUCT SUMMARY		
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (mA)
- 20	8 at V _{GS} = - 4.5 V	- 150
	12 at V _{GS} = - 2.5 V	- 125
	15 at V _{GS} = - 1.8 V	- 100
	20 at V _{GS} = - 1.5 V	- 30

FEATURES

- Halogen-free Option Available
- High-Side Switching
- Low On-Resistance: 8 Ω
- Low Threshold: 0.9 V (typ.)
- Fast Switching Speed: 45 ns
- TrenchFET® Power MOSFETs: 1.5-V Rated
- ESD Protected: 2000 V



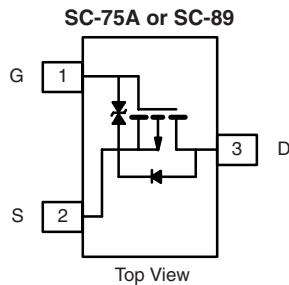
RoHS
COMPLIANT

APPLICATIONS

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

BENEFITS

- Ease in Driving Switches
- Low Offset (Error) Voltage
- Low-Voltage Operation
- High-Speed Circuits
- Low Battery Voltage Operation



SC-75A (SOT- 416): Si1031R
SC-89 (SOT- 490): Si1031X

Marking Code: H

Ordering Information:

Si1031R-T1-E3 (SC-75A, Lead (Pb)-free)
Si1031R-T1-GE3 (SC-75A, Lead (Pb)-free and Halogen-free)
Si1031X-T1-E3 (SC-89, Lead (Pb)-free)
Si1031X-T1-GE3 (SC-89, Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS T _A = 25 °C, unless otherwise noted							
Parameter	Symbol	Si1031R		Si1031X		Unit	
		5 s	Steady State	5 s	Steady State		
Drain-Source Voltage	V _{DS}	- 20				V	
Gate-Source Voltage	V _{GS}	± 6					
Continuous Drain Current (T _J = 150 °C) ^a	I _D	T _A = 25 °C	- 150	- 140	- 165	- 155	mA
		T _A = 85 °C	- 110	- 100	- 150	- 125	
Pulsed Drain Current ^a	I _{DM}	- 500		- 600		mW	
Continuous Source Current (Diode Conduction) ^a	I _S	- 250	- 200	- 340	- 240		
Maximum Power Dissipation ^a	P _D	T _A = 25 °C	280	250	340	300	mW
		T _A = 85 °C	145	130	170	150	
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 150				°C	
Gate-Source ESD Rating (HBM, Method 3015)	ESD	2000				V	

Notes:

a. Surface Mounted on FR4 board.

SPECIFICATIONS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ. ^a	Max.	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = -250\text{ }\mu\text{A}$	-0.40		-1.2	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 2.8\text{ V}$		± 0.5	± 1.0	μA
		$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 4.5\text{ V}$		± 1.0	± 2.0	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -16\text{ V}$, $V_{GS} = 0\text{ V}$		-1	-500	nA
		$V_{DS} = -16\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 85\text{ }^\circ\text{C}$			-10	μA
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} = -5\text{ V}$, $V_{GS} = -4.5\text{ V}$	-200			mA
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}$, $I_D = -150\text{ mA}$			8	Ω
		$V_{GS} = -2.5\text{ V}$, $I_D = -125\text{ mA}$			12	
		$V_{GS} = -1.8\text{ V}$, $I_D = -100\text{ mA}$			15	
		$V_{GS} = -1.5\text{ V}$, $I_D = -30\text{ mA}$			20	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -10\text{ V}$, $I_D = 150\text{ mA}$		0.4		S
Diode Forward Voltage ^a	V_{SD}	$I_S = -150\text{ mA}$, $V_{GS} = 0\text{ V}$			-1.2	V
Dynamic^b						
Total Gate Charge	Q_g	$V_{DS} = -10\text{ V}$, $V_{GS} = -4.5\text{ V}$, $I_D = -150\text{ mA}$		1500		μC
Gate-Source Charge	Q_{gs}			150		
Gate-Drain Charge	Q_{gd}			450		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10\text{ V}$, $R_L = 65\text{ }\Omega$ $I_D \cong -150\text{ mA}$, $V_{GEN} = -4.5\text{ V}$, $R_G = 10\text{ }\Omega$			55	ns
Rise Time	t_r				30	
Turn-Off Delay Time	$t_{d(off)}$				60	
Fall Time	t_f				30	

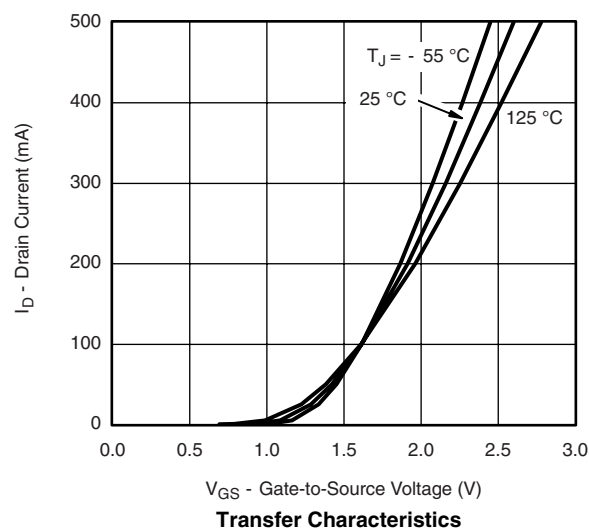
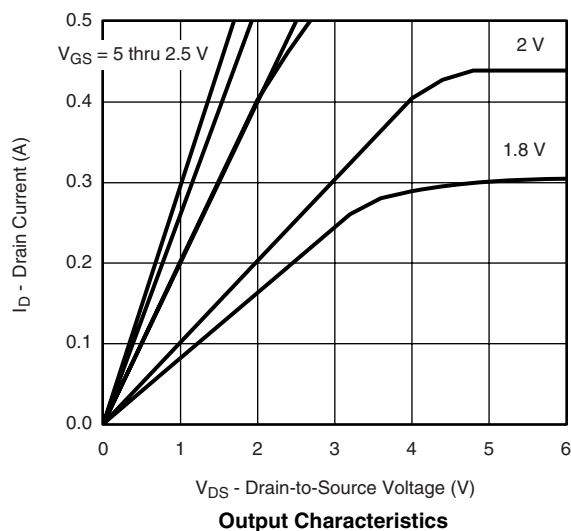
Notes:

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

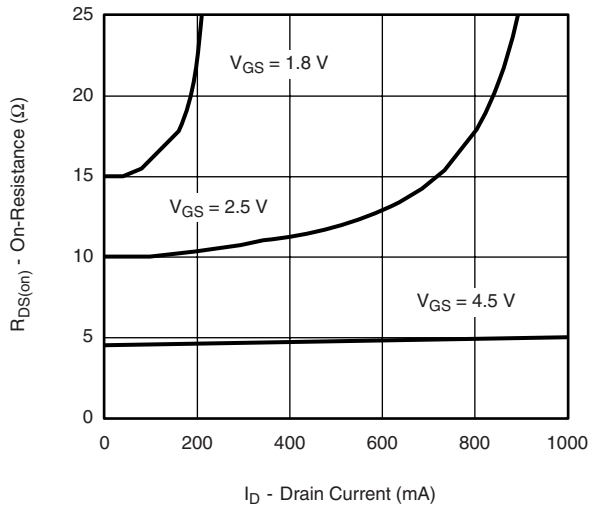
b. Guaranteed by design, not subject to production testing.

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.

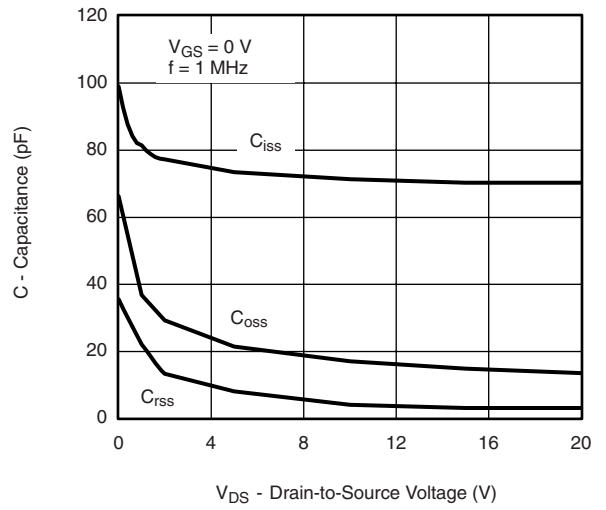
TYPICAL CHARACTERISTICS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted



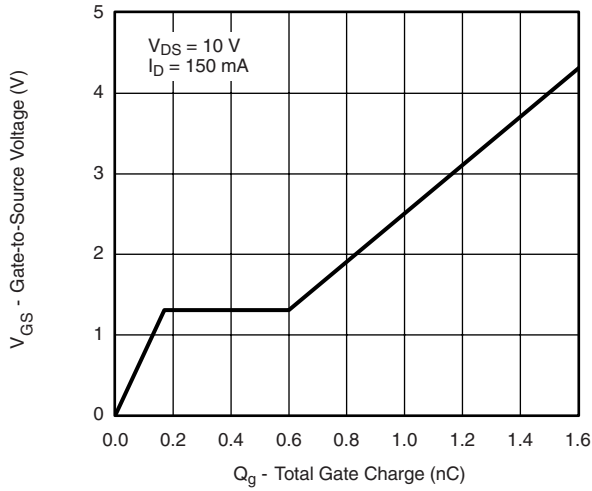
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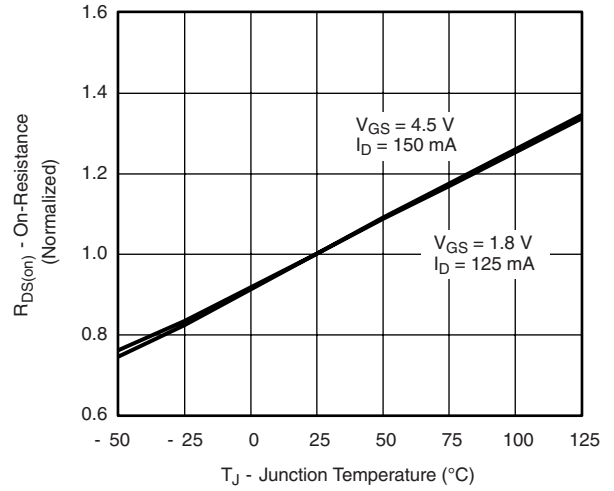
On-Resistance vs. Drain Current



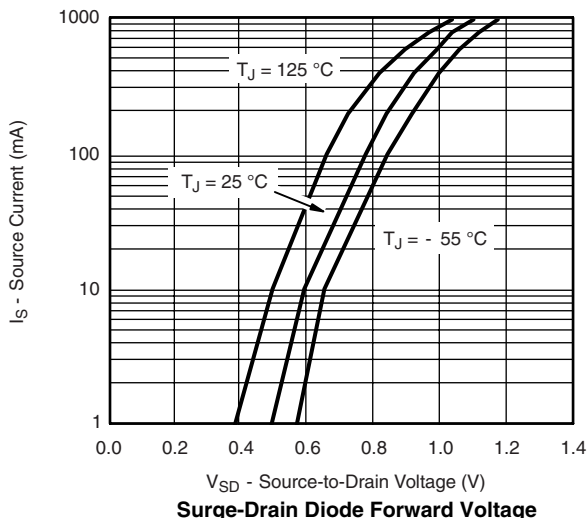
Capacitance



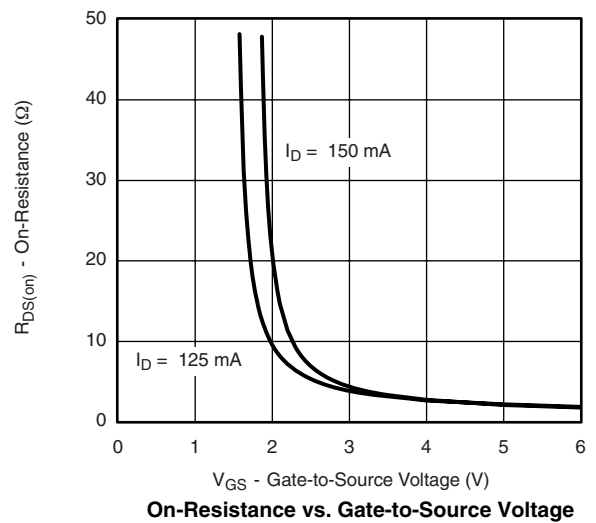
Gate Charge



On-Resistance vs. Junction Temperature

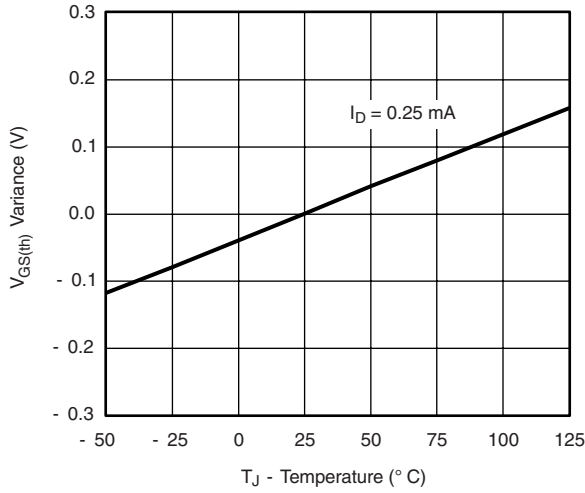


Surge-Drain Diode Forward Voltage

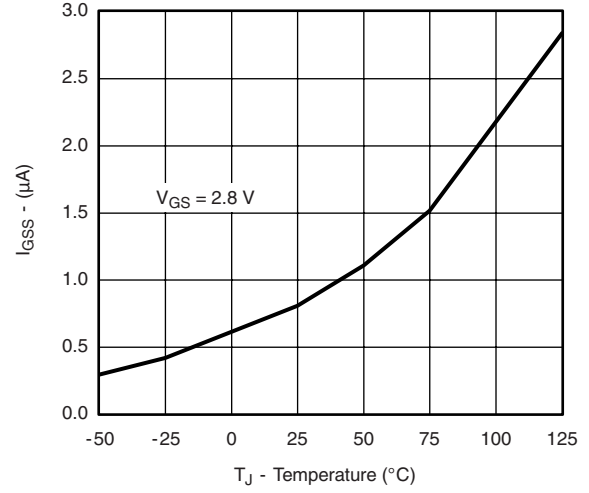


On-Resistance vs. Gate-to-Source Voltage

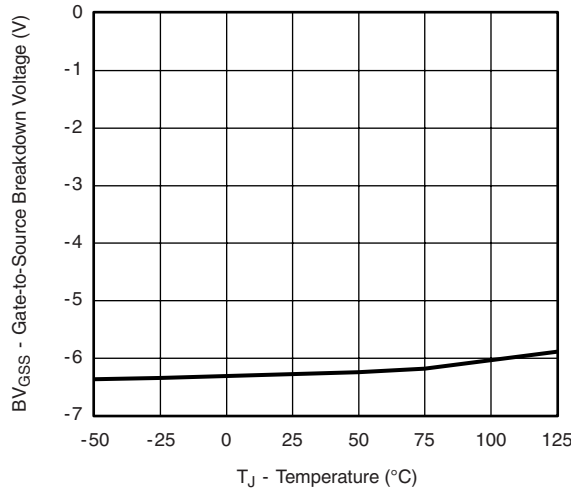
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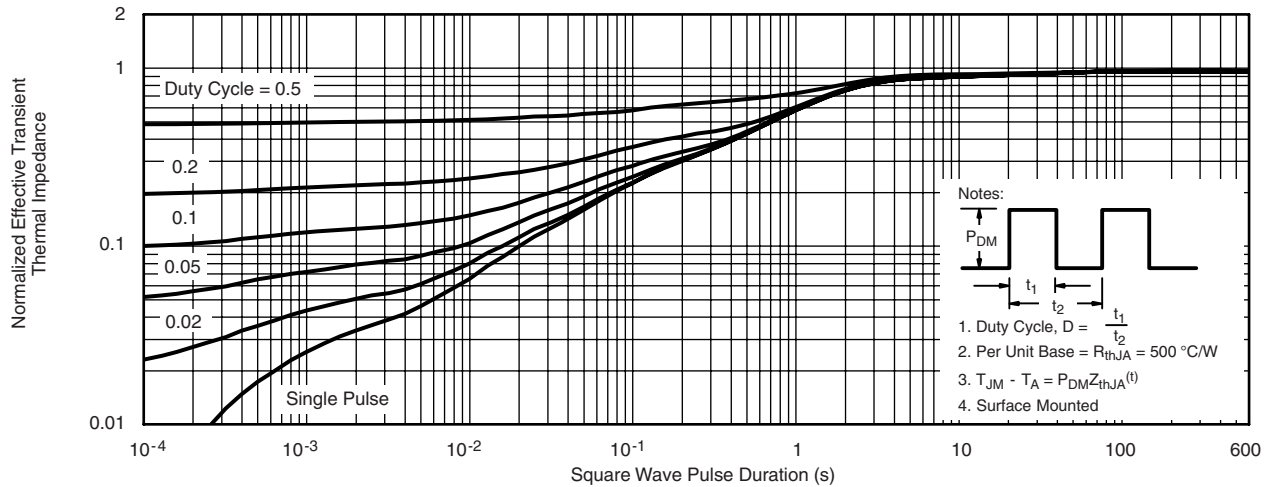
Threshold Voltage Variance vs. Temperature



I_{GSS} vs. Temperature



BV_{GSS} vs. Temperature



Normalized Thermal Transient Impedance, Junction-to-Ambient (SC-75A, Si1031R Only)

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