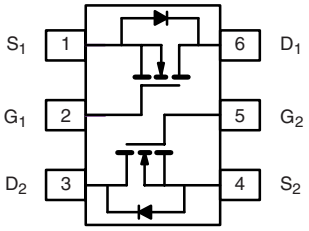
N-Channel 20-V (D-S) MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (mA)
20	5 at V_{GS} = 4.5 V	200
	7 at V_{GS} = 2.5 V	175
	9 at V_{GS} = 1.8 V	150
	10 at V_{GS} = 1.5 V	50

SC-89



Top View

Marking Code: L

Ordering Information: Si1034X-T1-E3 (Lead (Pb)-free)
Si1034X-T1-GE3 (Lead (Pb)-free and Halogen-free)

FEATURES

- **Halogen-free Option Available**
- TrenchFET® Power MOSFET: 1.5 V Rated
- Low-Side Switching
- Low On-Resistance: 5 Ω
- Low Threshold: 0.9 V (typ.)
- Fast Switching Speed: 35 ns (typ.)
- 1.5 V Operation
- Gate-Source ESD Protected: 2000 V

Pb-free
RoHS COMPLIANT

BENEFITS

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

APPLICATIONS

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

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

Parameter		Symbol	5 s	Steady State	Unit
Drain-Source Voltage		V_{DS}	20		V
Gate-Source Voltage		V_{GS}	± 5		
Continuous Drain Current (T_J = 150 °C)[a]	T_A = 25 °C	I_D	190	180	mA
	T_A = 85 °C		140	130	
Pulsed Drain Current[b]		I_{DM}	650		
Continuous Source Current (Diode Conduction)		I_S	450	380	
Maximum Power Dissipation[a]	T_A = 25 °C	P_D	280	250	mW
	T_A = 85 °C		145	130	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150		°C
Gate-Source ESD Rating (HBM, Method 3015)		ESD	2000		V

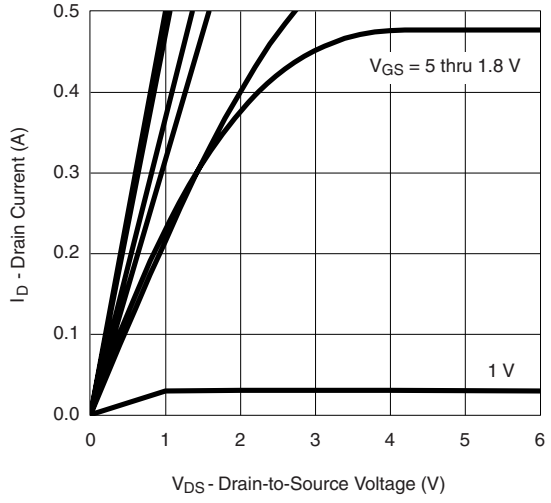
Notes:
a. Surface Mounted on FR4 board.
b. Pulse width limited by maximum junction temperature.

SPECIFICATIONS T_A = 25 °C, unless otherwise noted						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Static						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	0.40		1.2	V
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 2.8 V		± 0.5	± 1.0	µA
		V_{DS} = 0 V, V_{GS} = ± 4.5 V		± 1.0	± 3.0	
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 16 V, V_{GS} = 0 V		1	500	nA
		V_{DS} = 16 V, V_{GS} = 0 V, T_J = 85 °C			10	µA
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} = 5 V, V_{GS} = 4.5 V	250			mA
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 4.5 V, I_D = 200 mA			5	Ω
		V_{GS} = 2.5 V, I_D = 175 mA			7	
		V_{GS} = 1.8 V, I_D = 150 mA			9	
		V_{DS} = 1.5 V, I_D = 40 mA			10	
Forward Transconductance[a]	g_{fs}	V_{DS} = 10 V, I_D = 200 mA		0.5		S
Diode Forward Voltage[a]	V_{SD}	I_S = 150 mA, V_{GS} = 0 V			1.2	V
Dynamic[b]						
Total Gate Charge	Q_g	V_{DS} = 10 V, V_{GS} = 4.5 V, I_D = 150 mA		750		pC
Gate-Source Charge	Q_{gs}			75		
Gate-Drain Charge	Q_{gd}			225		
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 10 V, R_L = 47 Ω I_D ≅ 200 mA, V_{GEN} = 4.5 V, R_G = 10 Ω			50	ns
Rise Time	t_r				25	
Turn-Off Delay Time	$t_{d(off)}$				50	
Fall Time	t_f				25	

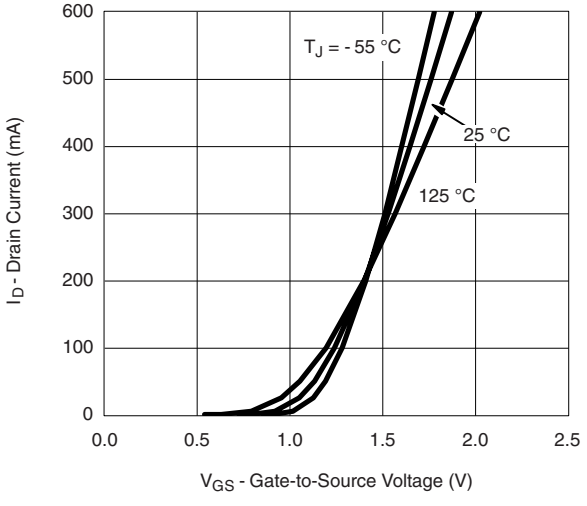
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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 °C, unless otherwise noted

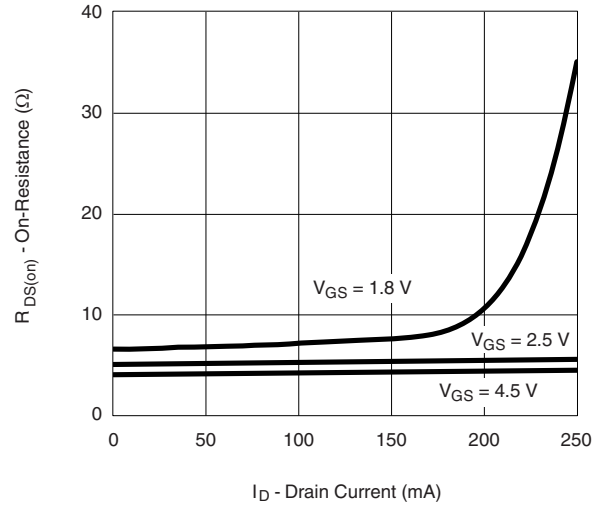


Output Characteristics

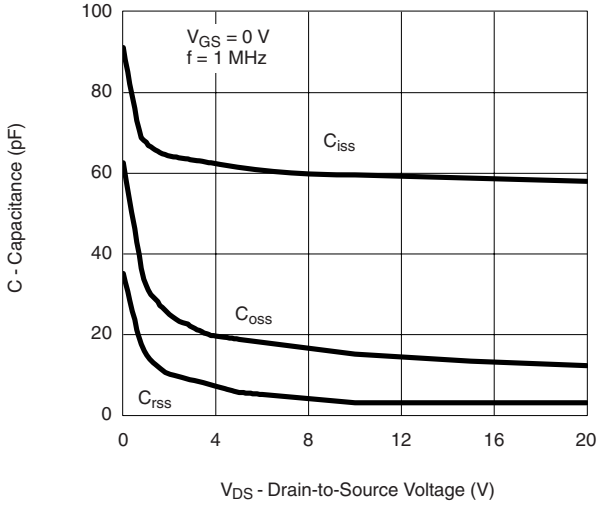


Transfer Characteristics

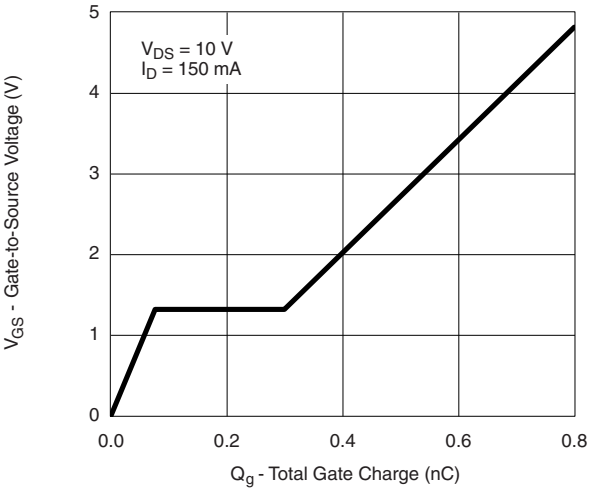
TYPICAL CHARACTERISTICS T_A = 25 °C, unless otherwise noted



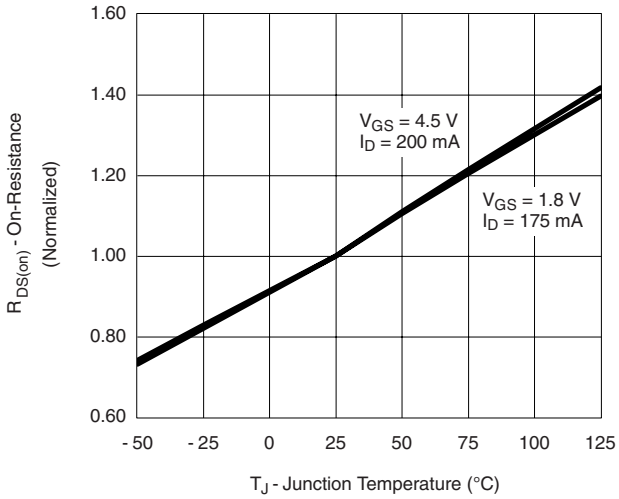
On-Resistance vs. Drain Current



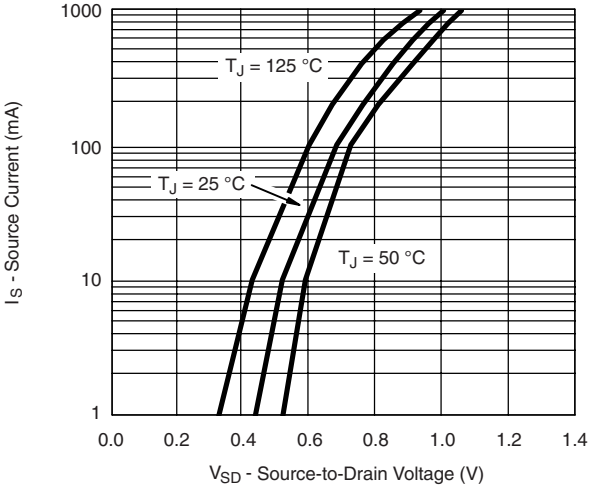
Capacitance



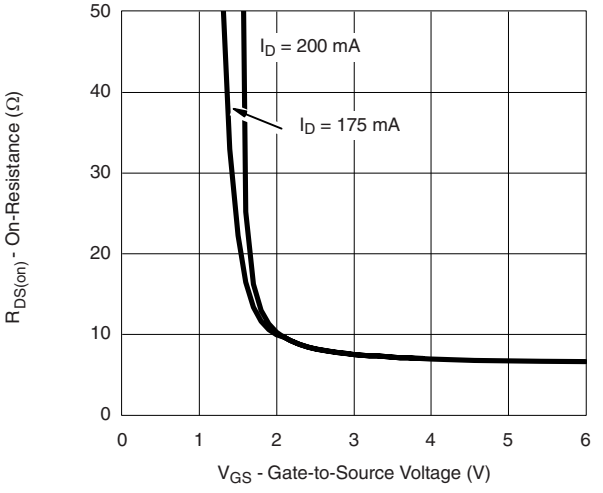
Gate Charge



On-Resistance vs. Junction Temperature

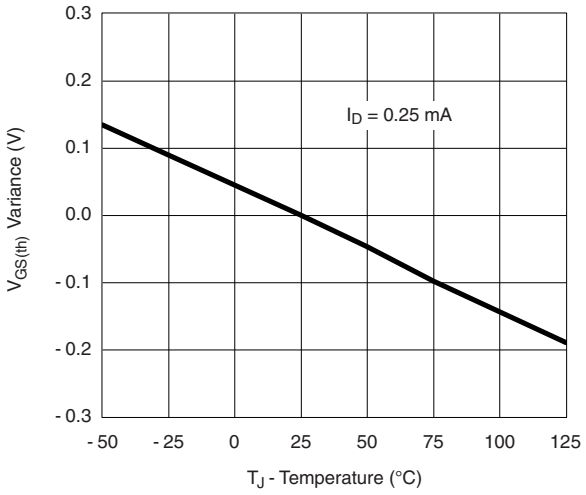


Surge-Drain Diode Forward Voltage

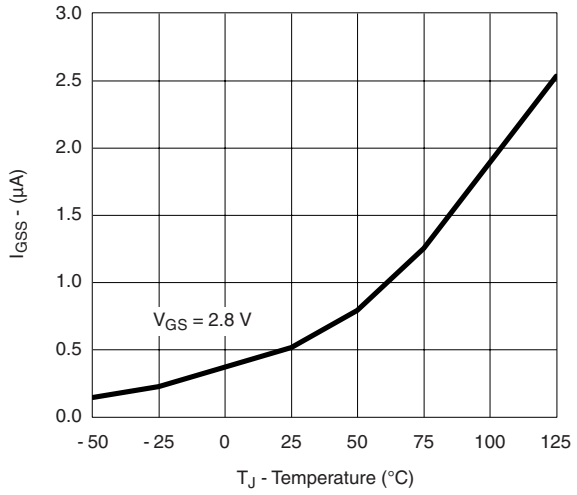


On-Resistance vs. Gate-to-Source Voltage

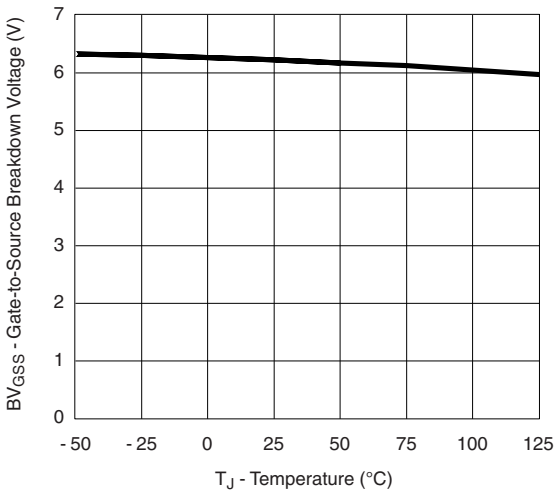
TYPICAL CHARACTERISTICS T_A = 25 °C, unless otherwise noted



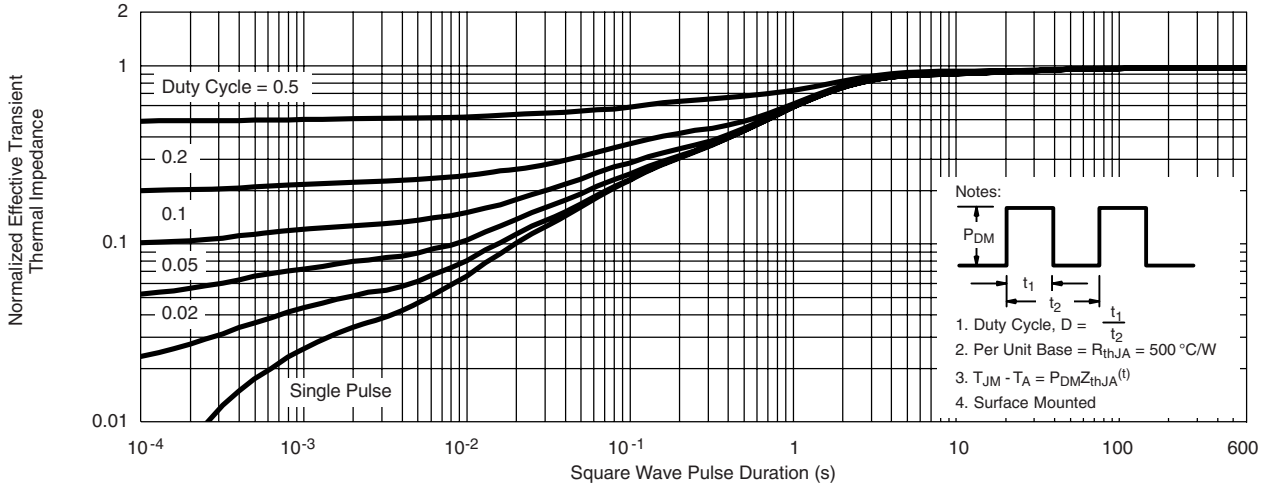
Threshold Voltage Variance vs. Temperature



I_{GSS} vs. Temperature



BV_{GSS} vs. Temperature



Normalized Thermal Transient Impedance, Junction-to-Ambient

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