



N-Channel 1.8-V (G-S) MOSFET

PRODUCT SUMMARY

V _{DS} (V)	r _{DS(on)} (Ω)	I _D (mA)
20	0.70 @ V _{GS} = 4.5 V	600
	0.85 @ V _{GS} = 2.5 V	500
	1.25 @ V _{GS} = 1.8 V	350

FEATURES

- TrenchFET® Power MOSFET: 1.8-V Rated
- Gate-Source ESD Protected: 2000 V
- High-Side Switching
- Low On-Resistance: 0.7 Ω
- Low Threshold: 0.8 V (typ)
- Fast Switching Speed: 10 ns



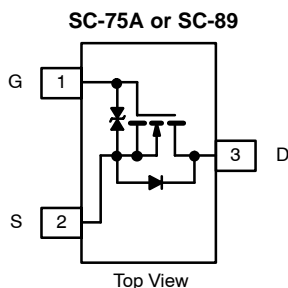
Pb-free
Available

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



ORDERING INFORMATION

Part Number	Package	Marking Code
Si1012R-T1 Si1012R-T1—E3 (Lead (Pb)-Free)	SC-75A (SOT-416)	C
Si1012X-T1 Si1012X-T1—E3 (Lead (Pb)-Free)	SC-89 (SOT-490)	A

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C UNLESS OTHERWISE NOTED)

Parameter	Symbol	5 secs	Steady State	Unit	
Drain-Source Voltage	V _{DS}	20		V	
Gate-Source Voltage	V _{GS}	±6			
Continuous Drain Current (T _J = 150°C) ^b	I _D	T _A = 25°C	600	500	mA
		T _A = 85°C	400	350	
Pulsed Drain Current ^a	I _{DM}	1000			
Continuous Source Current (diode conduction) ^b	I _S	275	250		
Maximum Power Dissipation ^b for SC-75	P _D	T _A = 25°C	175	150	mW
		T _A = 85°C	90	80	
Maximum Power Dissipation ^b for SC-89	P _D	T _A = 25°C	275	250	
		T _A = 85°C	160	140	
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

- d. Pulse width limited by maximum junction temperature.
e. Surface Mounted on FR4 Board.



SPECIFICATIONS (T _A = 25 °C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	0.45		0.9	V
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±4.5 V		±0.5	±1.0	μA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 20 V, V _{GS} = 0 V		0.3	100	nA
		V _{DS} = 20 V, V _{GS} = 0 V, T _J = 85 °C			5	μA
On-State Drain Current ^a	I _{D(on)}	V _{DS} = 5 V, V _{GS} = 4.5 V	700			mA
Drain-Source On-State Resistance ^a	r _{DS(on)}	V _{GS} = 4.5 V, I _D = 600 mA		0.41	0.70	Ω
		V _{GS} = 2.5 V, I _D = 500 mA		0.53	0.85	
		V _{GS} = 1.8 V, I _D = 350 mA		0.70	1.25	
Forward Transconductance ^a	g _{fs}	V _{DS} = 10 V, I _D = 400 mA		1.0		S
Diode Forward Voltage ^a	V _{SD}	I _S = 150 mA, V _{GS} = 0 V		0.8	1.2	V
Dynamic^b						
Total Gate Charge	Q _g	V _{DS} = 10 V, V _{GS} = 4.5 V, I _D = 250 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		5		ns
Rise Time	t _r			5		
Turn-Off Delay Time	t _{d(off)}			25		
Fall Time	t _f			11		

Notes

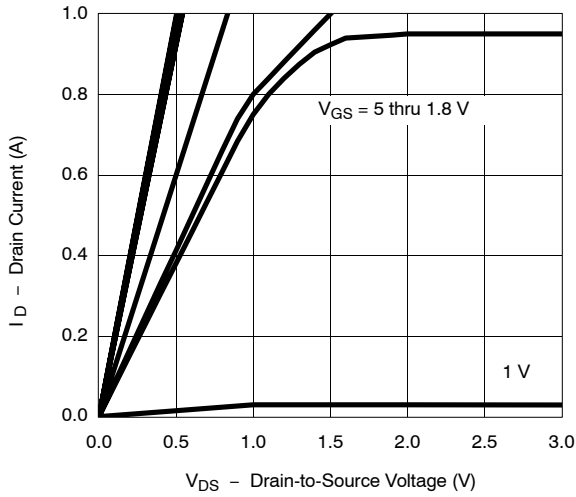
- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
- b. Guaranteed by design, not subject to production testing.

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.

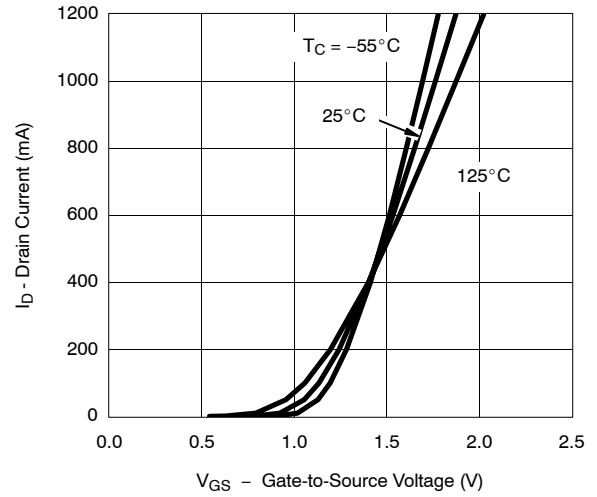


TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ UNLESS NOTED)

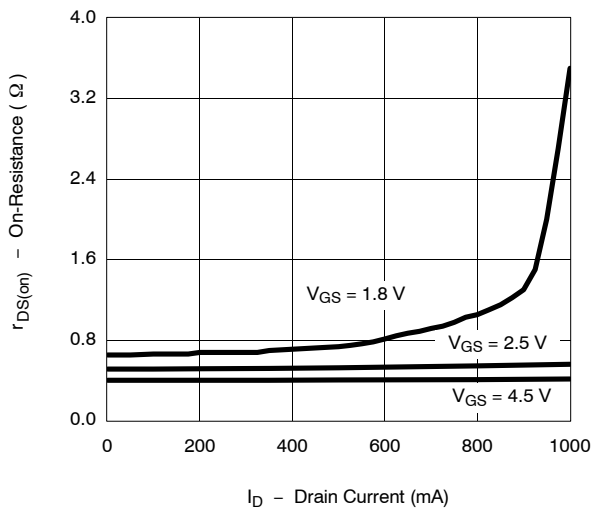
Output Characteristics



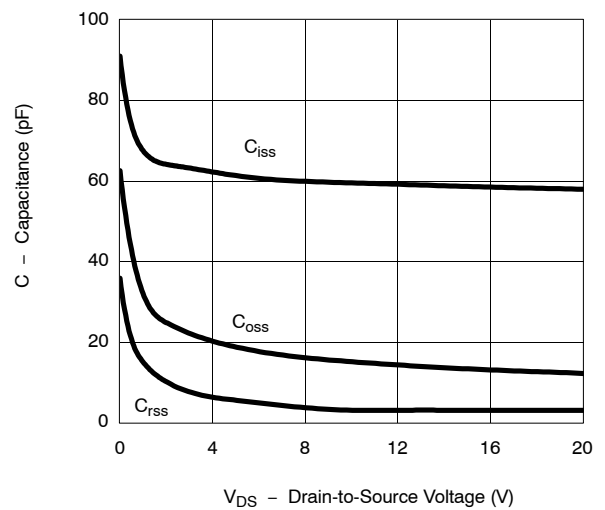
Transfer Characteristics



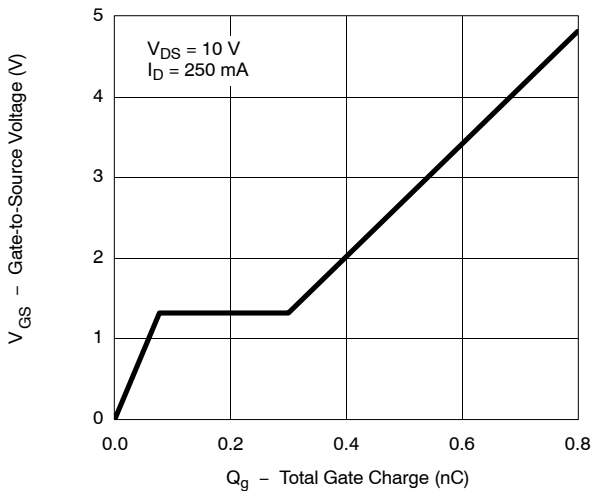
On-Resistance vs. Drain Current



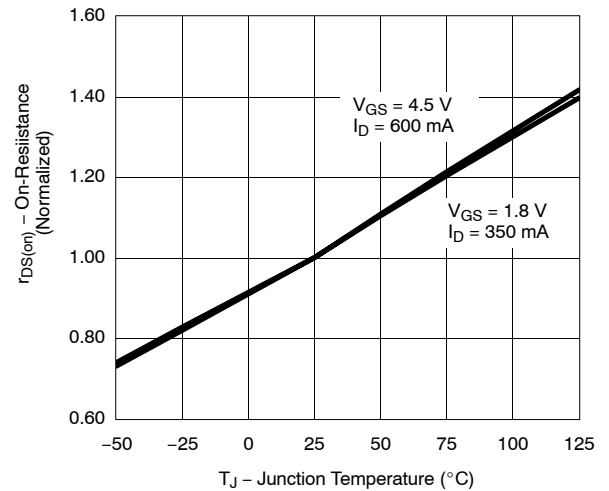
Capacitance



Gate Charge

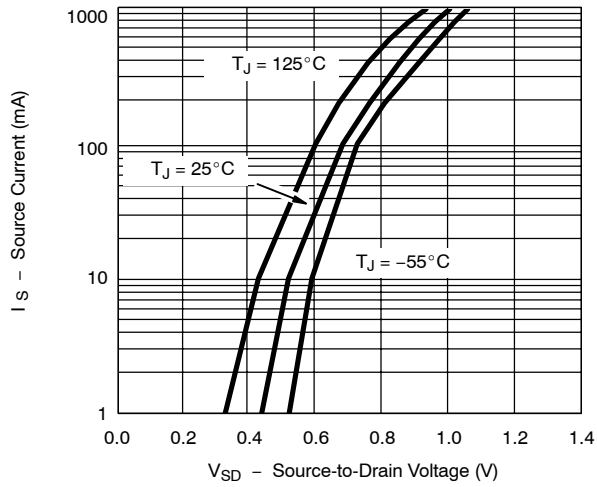


On-Resistance vs. Junction Temperature

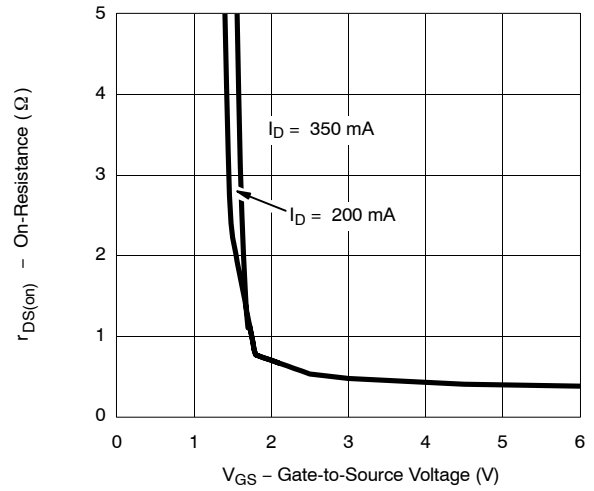


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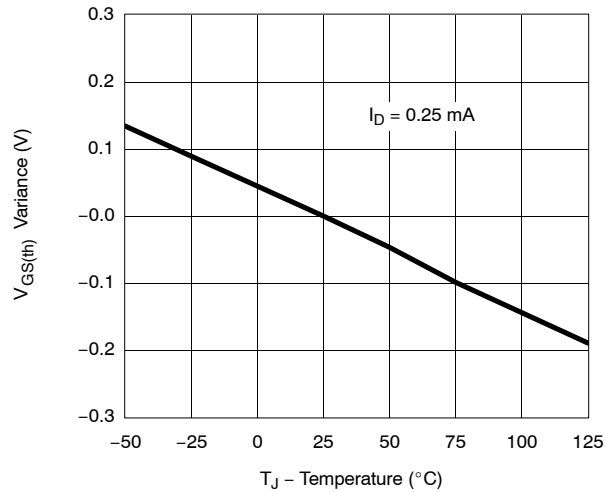
Source-Drain Diode Forward Voltage



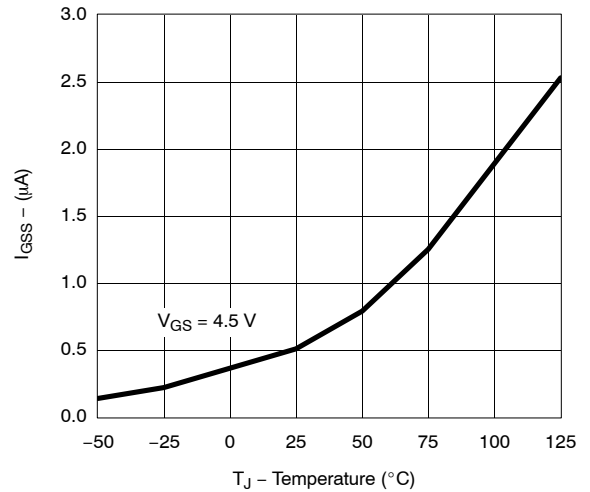
On-Resistance vs. Gate-to-Source Voltage



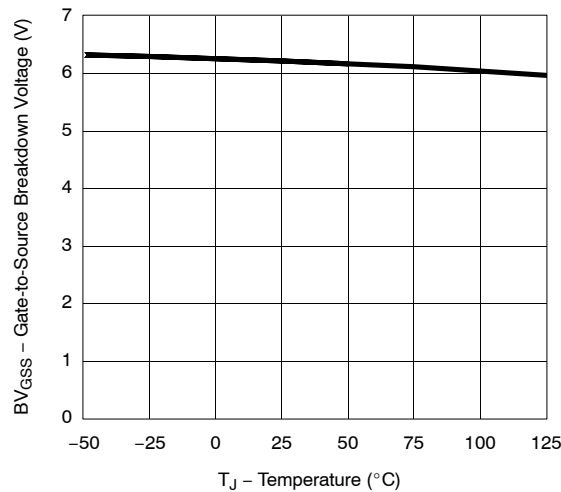
Threshold Voltage Variance vs. Temperature



I_{GSS} vs. Temperature



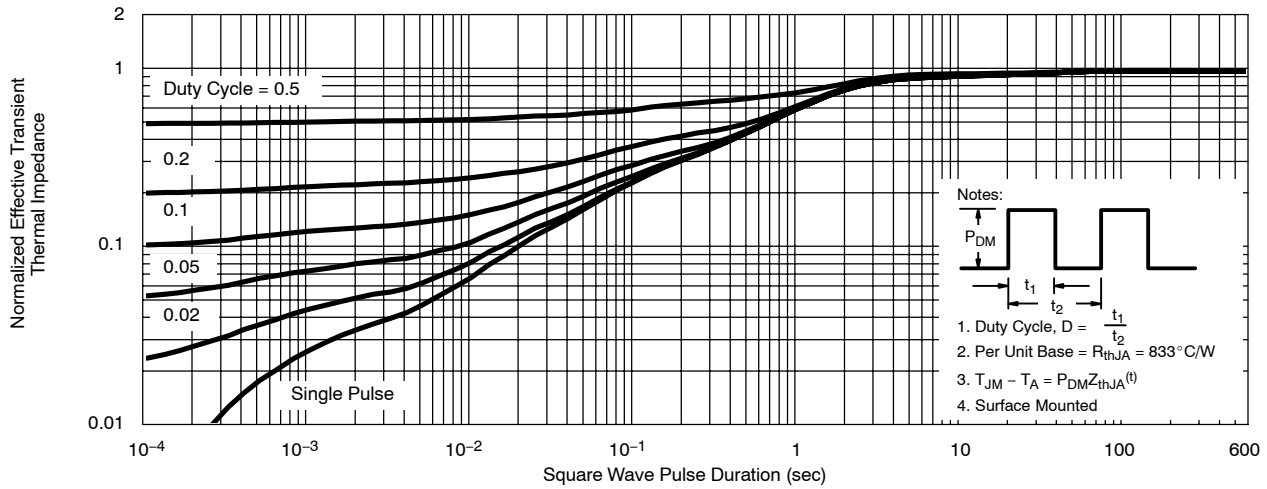
BV_{GSS} vs. Temperature



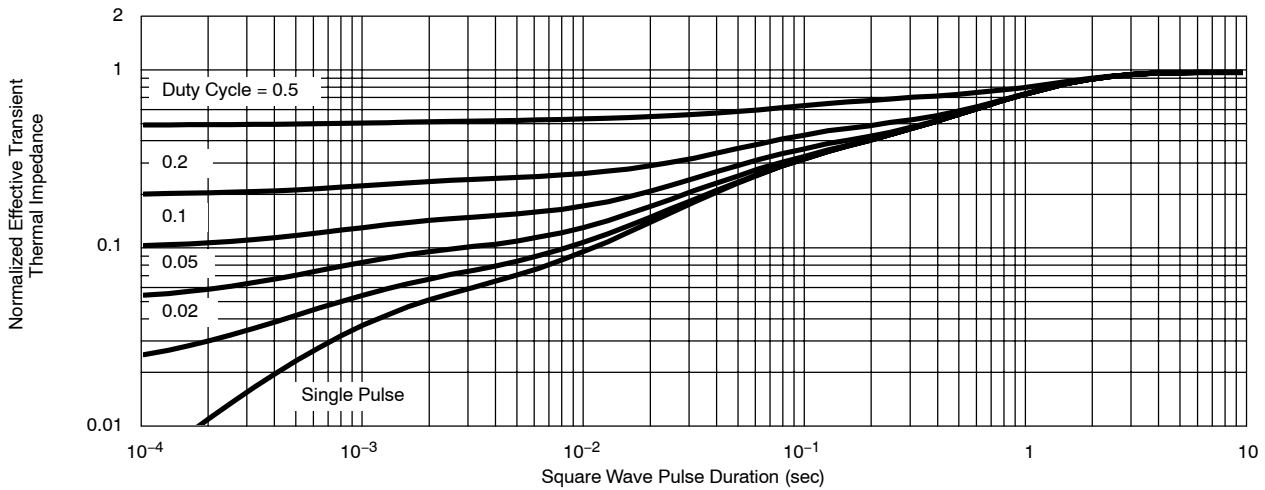


TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ UNLESS NOTED)

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



Normalized Thermal Transient Impedance, Junction-to-Foot



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