



New Product

Si1013R/X
Vishay Siliconix

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

TrenchFET[®]
MOSFETs
1.8-V Rated



**ESD Protected
2000 V**

PRODUCT SUMMARY		
V _{DS} (V)	r _{DS(on)} (Ω)	I _D (mA)
-20	1.2 @ V _{GS} = -4.5 V	-350
	1.6 @ V _{GS} = -2.5 V	-300
	2.7 @ V _{GS} = -1.8 V	-150

FEATURES

- High-Side Switching
- Low On-Resistance: 1.2 Ω
- Low Threshold: 0.8 V (typ)
- Fast Switching Speed: 14 ns
- 1.8-V Operation
- Gate-Source ESD Protection

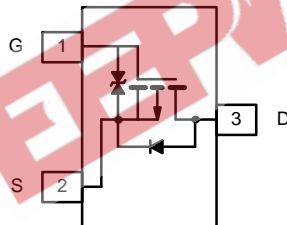
BENEFITS

- 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

SC-75A or SC-89



Top View

Ordering Information:

SC-75A (SOT-416):
Si1013R-Marking Code : D

SC-89 (SOT-490):
Si1013X-Marking Code: B

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	-400	-350	mA
		T _A = 85°C	-300	-275	
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

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



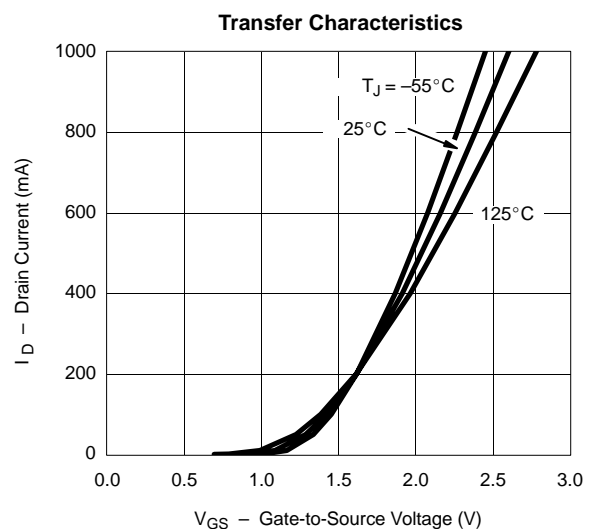
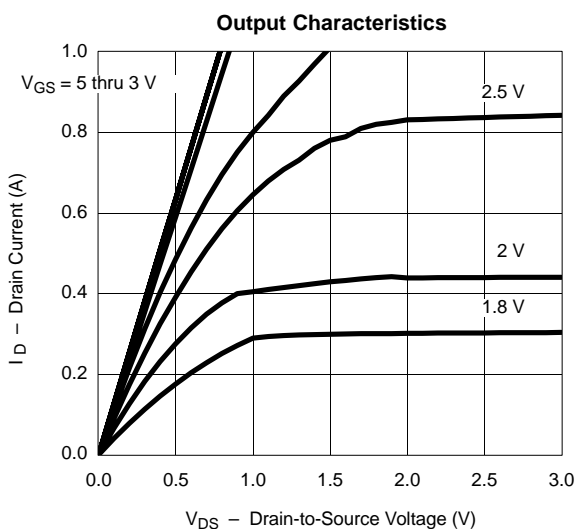
SPECIFICATIONS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = -250\ \mu\text{A}$	-0.45			V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\ \text{V}$, $V_{GS} = \pm 4.5\ \text{V}$		± 1	± 2	μA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -16\ \text{V}$, $V_{GS} = 0\ \text{V}$		-0.3	-100	nA
		$V_{DS} = -16\ \text{V}$, $V_{GS} = 0\ \text{V}$, $T_J = 85^\circ\text{C}$			-5	μA
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} = -5\ \text{V}$, $V_{GS} = -4.5\ \text{V}$	-700			mA
Drain-Source On-State Resistance ^a	$r_{DS(on)}$	$V_{GS} = -4.5\ \text{V}$, $I_D = -350\ \text{mA}$		0.8	1.2	Ω
		$V_{GS} = -2.5\ \text{V}$, $I_D = -300\ \text{mA}$		1.2	1.6	
		$V_{GS} = -1.8\ \text{V}$, $I_D = -150\ \text{mA}$		1.8	2.7	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -10\ \text{V}$, $I_D = -250\ \text{mA}$		0.4		S
Diode Forward Voltage ^a	V_{SD}	$I_S = -150\ \text{mA}$, $V_{GS} = 0\ \text{V}$		-0.8	-1.2	V
Dynamic^b						
Total Gate Charge	Q_g	$V_{DS} = -10\ \text{V}$, $V_{GS} = -4.5\ \text{V}$, $I_D = -250\ \text{mA}$		1500		pC
Gate-Source Charge	Q_{gs}			150		
Gate-Drain Charge	Q_{gd}			450		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10\ \text{V}$, $R_L = 47\ \Omega$ $I_D = -200\ \text{mA}$, $V_{GEN} = -4.5\ \text{V}$, $R_G = 10\ \Omega$		5		ns
Rise Time	t_r			9		
Turn-Off Delay Time	$t_{d(off)}$			35		
Fall Time	t_f			11		

Notes

- a. Pulse test; pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.

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

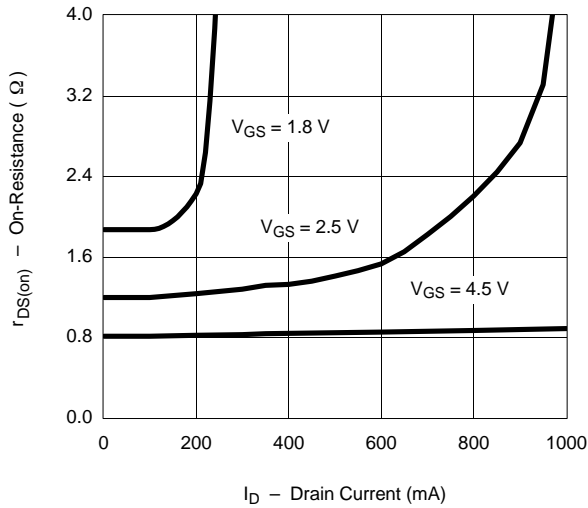
For the following graphs, p-channel negative polarities for all voltage and current values are represented as positive values.



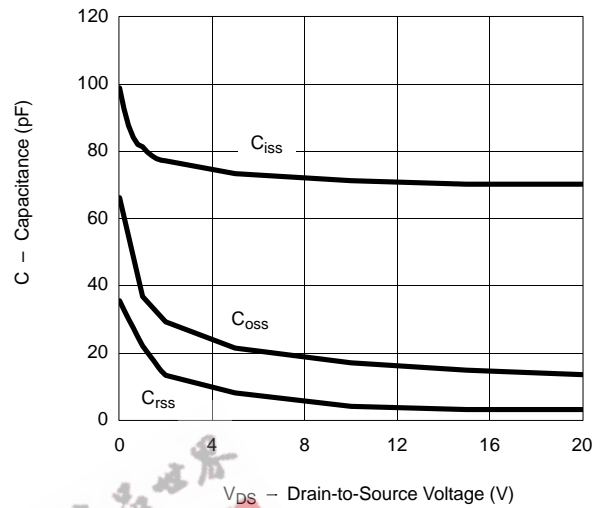


TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ UNLESS NOTED)

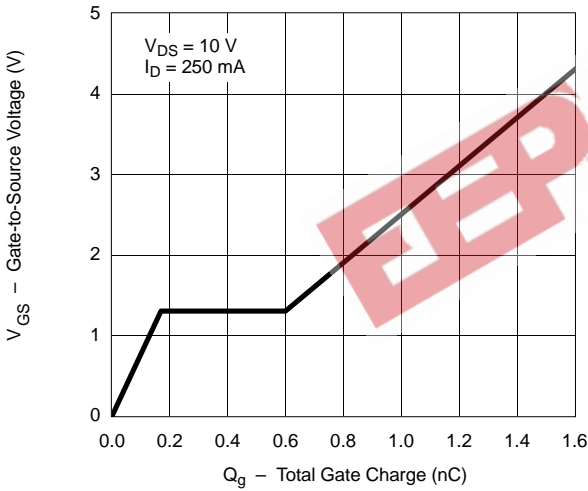
On-Resistance vs. Drain Current



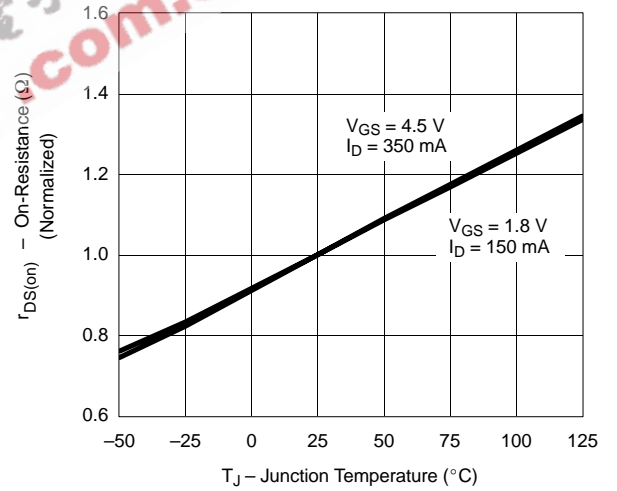
Capacitance



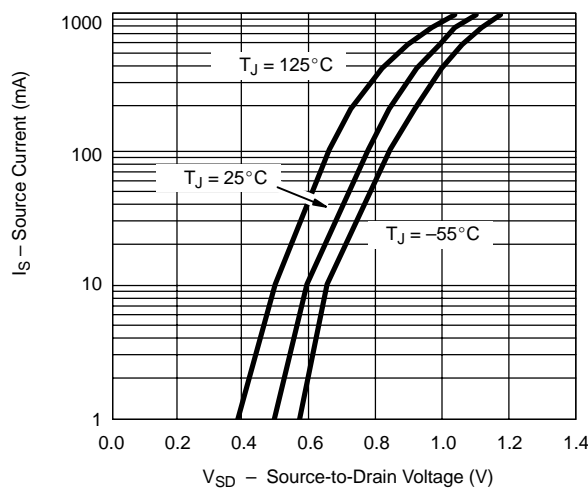
Gate Charge



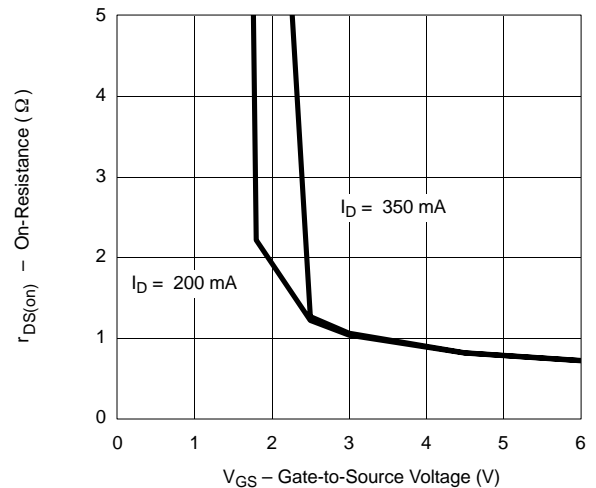
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage

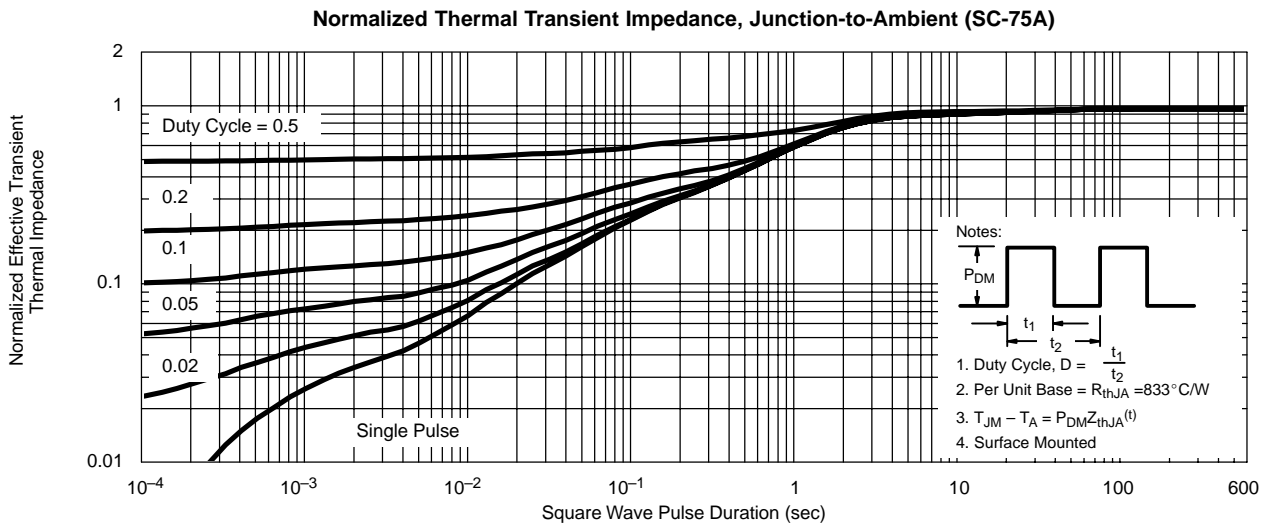
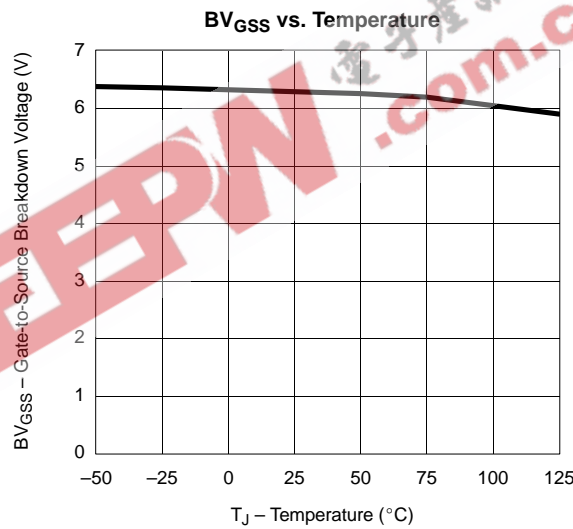
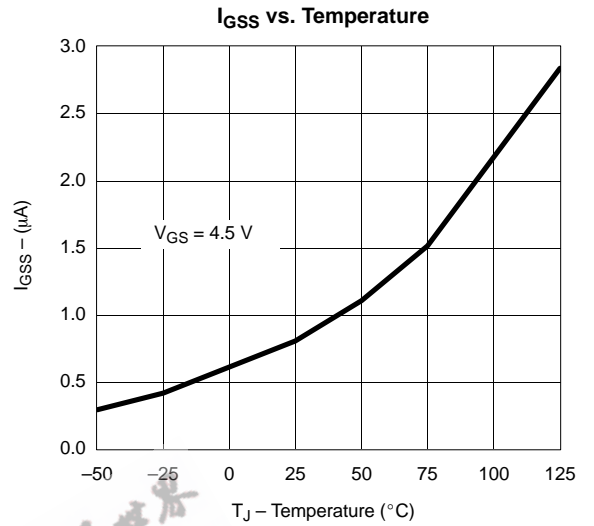
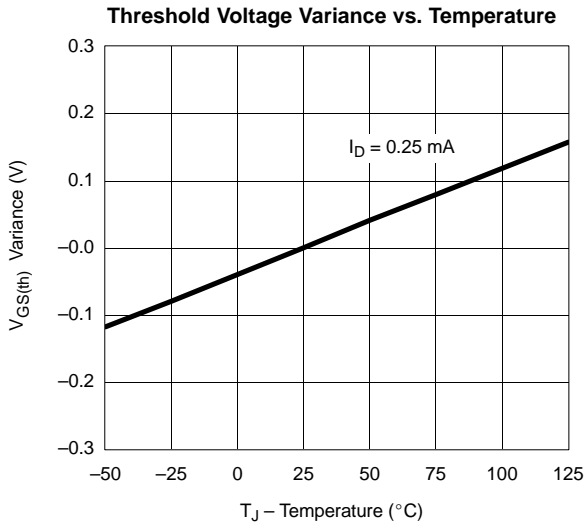


On-Resistance vs. Gate-to-Source Voltage





TYPICAL CHARACTERISTICS (T_A = 25 °C UNLESS NOTED)

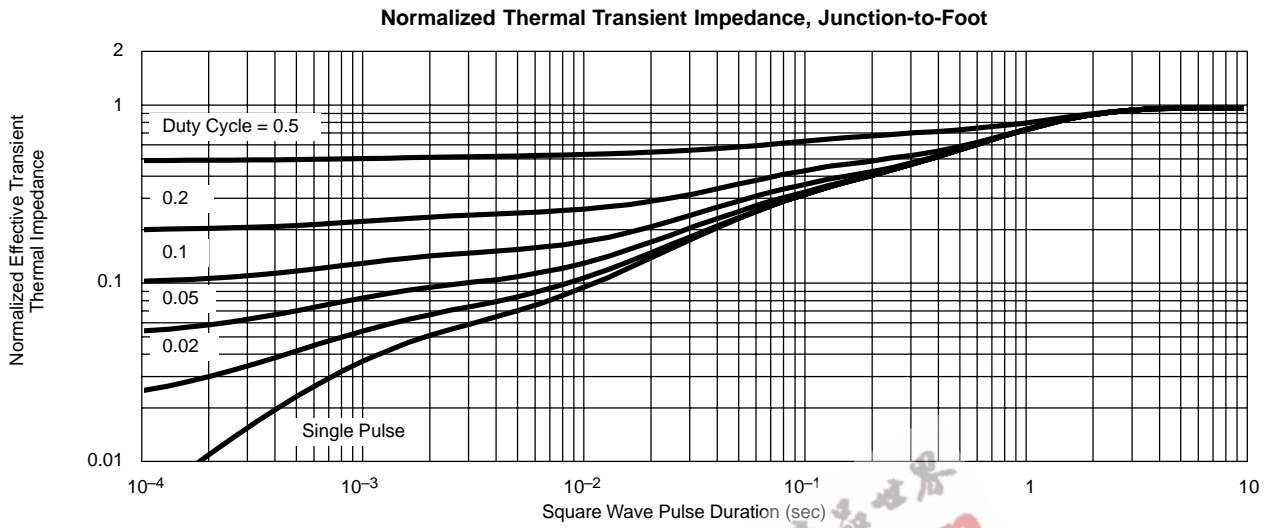




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TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ UNLESS NOTED)



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