



Complementary N- and P-Channel 20-V (D-S) MOSFET

PRODUCT SUMMARY			
	V <sub>DS</sub> (V)	r <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (mA)
N-Channel	20	0.70 @ V <sub>GS</sub> = 4.5 V	600
		0.85 @ V <sub>GS</sub> = 2.5 V	500
		1.25 @ V <sub>GS</sub> = 1.8 V	350
P-Channel	-20	1.2 @ V <sub>GS</sub> = -4.5 V	-400
		1.6 @ V <sub>GS</sub> = -2.5 V	-300
		2.7 @ V <sub>GS</sub> = -1.8 V	-150

**TrenchFET<sup>®</sup>**  
MOSFETs  
1.8-V Rated



**ESD Protected**  
2000 V

**FEATURES**

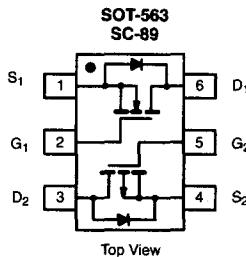
- Very Small Footprint
- High-Side Switching
- Low On-Resistance:  
N-Channel, 0.7 Ω  
P-Channel, 1.2 Ω
- Low Threshold: ±0.8 V (typ)
- Fast Switching Speed: 14 ns
- 1.8-V Operation
- Gate-Source ESD Protection

**BENEFITS**

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

**APPLICATIONS**

- Replace Digital Transistor, Level-Shifter
- Battery Operated Systems
- Power Supply Converter Circuits
- Load/Power Switching Cell Phones, Pagers



Marking Code: A

ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25°C UNLESS OTHERWISE NOTED)							
Parameter	Symbol	N-Channel		P-Channel		Unit	
		5 secs	Steady State	5 secs	Steady State		
Drain-Source Voltage	V <sub>DS</sub>	20		-20		V	
Gate-Source Voltage	V <sub>GS</sub>	±6					
Continuous Drain Current (T <sub>J</sub> = 150°C) <sup>a</sup>	I <sub>D</sub>	T <sub>A</sub> = 25°C	515	485	-390	-370	mA
		T <sub>A</sub> = 85°C	370	350	-280	-265	
Pulsed Drain Current <sup>b</sup>	I <sub>DM</sub>	650		-650			
Continuous Source Current (Diode Conduction) <sup>a</sup>	I <sub>S</sub>	450	380	-450	-380		
Maximum Power Dissipation <sup>a</sup>	P <sub>D</sub>	T <sub>A</sub> = 25°C	280	250	280	250	mW
		T <sub>A</sub> = 85°C	145	130	145	130	
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-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 ( $T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)								
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit		
<b>Static</b>								
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$	N-Ch	0.45			V	
		$V_{DS} = V_{GS}, I_D = -250 \mu\text{A}$	P-Ch	-0.45				
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 4.5 \text{ V}$	N-Ch	$\pm 0.5$	$\pm 1.0$	$\mu\text{A}$		
			P-Ch	$\pm 1.0$	$\pm 2.0$			
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 16 \text{ V}, V_{GS} = 0 \text{ V}$	N-Ch	0.3	100	nA		
		$V_{DS} = -16 \text{ V}, V_{GS} = 0 \text{ V}$	P-Ch	-0.3	-100			
		$V_{DS} = 16 \text{ V}, V_{GS} = 0 \text{ V}, T_J = 85^\circ\text{C}$	N-Ch			5	$\mu\text{A}$	
		$V_{DS} = -16 \text{ V}, V_{GS} = 0 \text{ V}, T_J = 85^\circ\text{C}$	P-Ch			-5		
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = 5 \text{ V}, V_{GS} = 4.5 \text{ V}$	N-Ch	700		mA		
		$V_{DS} = -5 \text{ V}, V_{GS} = -4.5 \text{ V}$	P-Ch	-700				
Drain-Source On-State Resistance <sup>a</sup>	$r_{DS(on)}$	$V_{GS} = 4.5 \text{ V}, I_D = 600 \text{ mA}$	N-Ch	0.41	0.70	$\Omega$		
		$V_{GS} = -4.5 \text{ V}, I_D = -350 \text{ mA}$	P-Ch	0.80	1.2			
		$V_{GS} = 2.5 \text{ V}, I_D = 500 \text{ mA}$	N-Ch	0.53	0.85			
		$V_{GS} = -2.5 \text{ V}, I_D = -300 \text{ mA}$	P-Ch	1.20	1.6			
		$V_{GS} = 1.8 \text{ V}, I_D = 350 \text{ mA}$	N-Ch	0.70	1.25			
		$V_{GS} = -1.8 \text{ V}, I_D = -150 \text{ mA}$	P-Ch	1.80	2.7			
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 10 \text{ V}, I_D = 400 \text{ mA}$	N-Ch	1.0		S		
		$V_{DS} = -10 \text{ V}, I_D = -250 \text{ mA}$	P-Ch	0.4				
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = 150 \text{ mA}, V_{GS} = 0 \text{ V}$	N-Ch	0.8	1.2	V		
		$I_S = -150 \text{ mA}, V_{GS} = 0 \text{ V}$	P-Ch	-0.8	-1.2			
<b>Dynamic<sup>b</sup></b>								
Total Gate Charge	$Q_g$	N-Channel $V_{DS} = 10 \text{ V}, V_{GS} = 4.5 \text{ V}, I_D = 250 \text{ mA}$ P-Channel $V_{DS} = -10 \text{ V}, V_{GS} = -4.5 \text{ V}, I_D = -250 \text{ mA}$	N-Ch		750	pC		
			P-Ch		1500			
Gate-Source Charge	$Q_{gs}$		N-Ch		75			
		P-Ch		150				
Gate-Drain Charge	$Q_{gd}$	N-Ch		225				
		P-Ch		450				
Turn-On Time	$t_{ON}$	N-Channel $V_{DD} = 10 \text{ V}, R_L = 47 \Omega$ $I_D = 200 \text{ mA}, V_{GEN} = 4.5 \text{ V}, R_G = 10 \Omega$	N-Ch	5		ns		
			P-Ch	5				
Turn-Off Time	$t_{OFF}$	P-Channel $V_{DD} = -10 \text{ V}, R_L = 47 \Omega$ $I_D = -200 \text{ A}, V_{GEN} = -4.5 \text{ V}, R_G = 10 \Omega$	N-Ch	25				
			P-Ch	35				

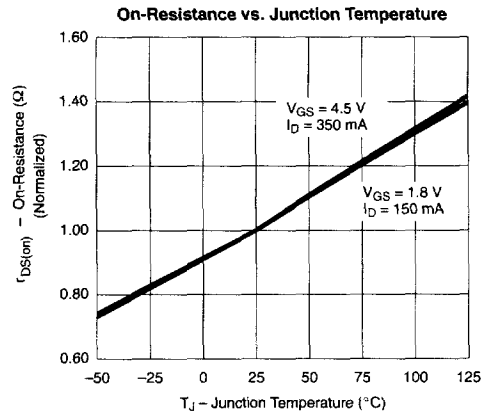
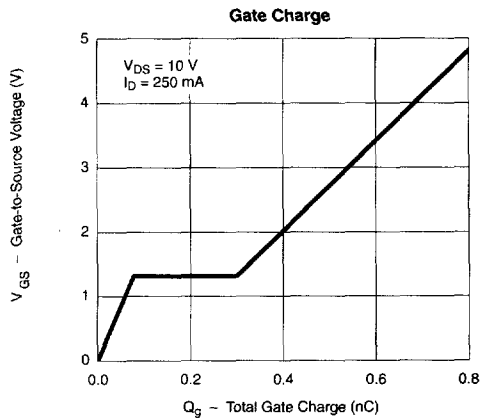
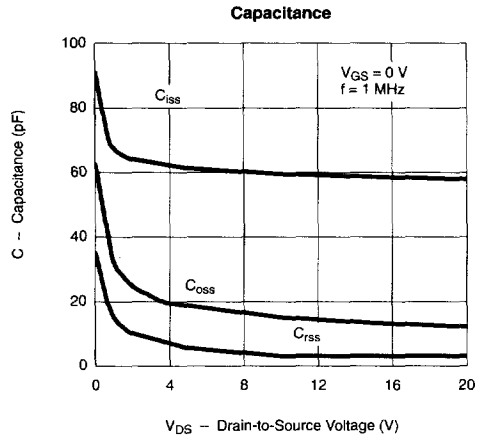
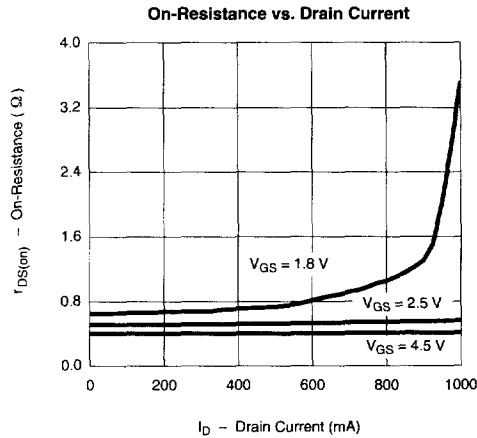
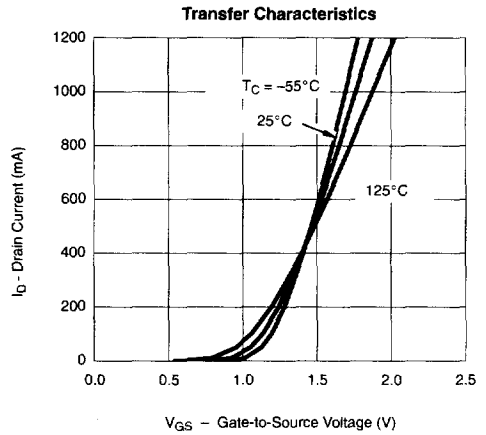
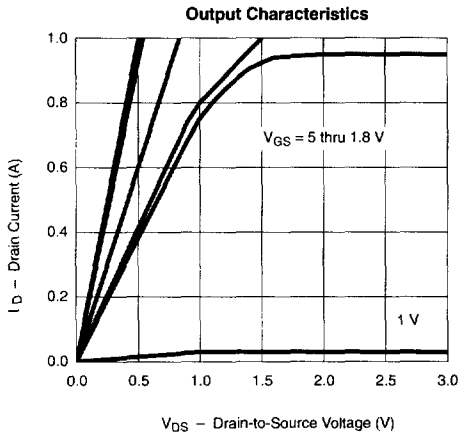
## Notes

- 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)

N-CHANNEL

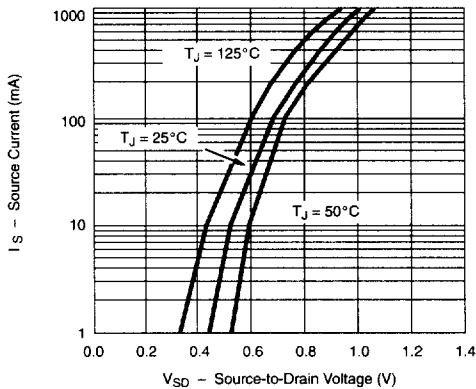




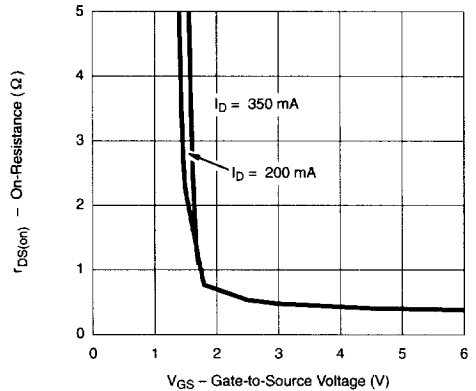
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**N-CHANNEL**

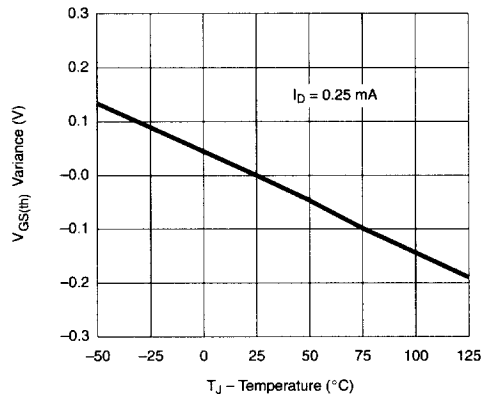
Source-Drain Diode Forward Voltage



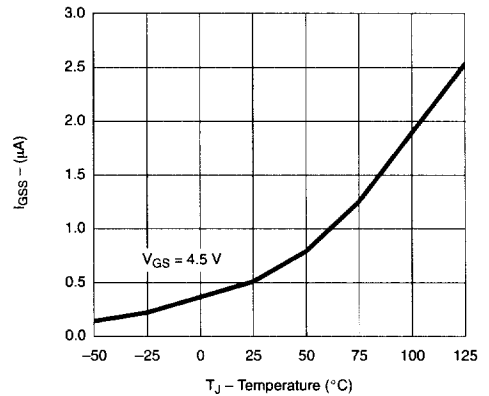
On-Resistance vs. Gate-to-Source Voltage



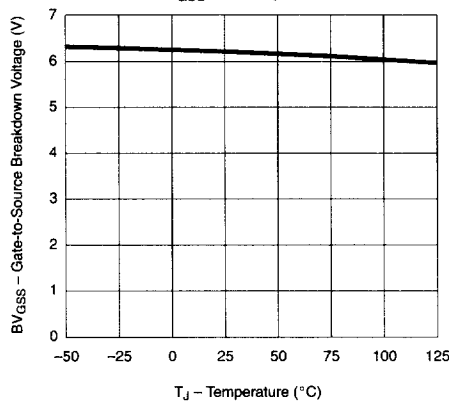
Threshold Voltage Variance vs. Temperature



I<sub>GSS</sub> vs. Temperature



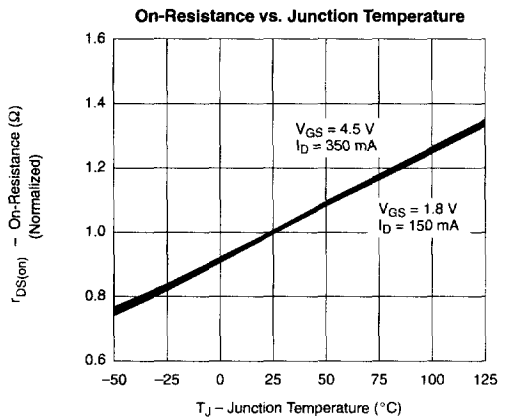
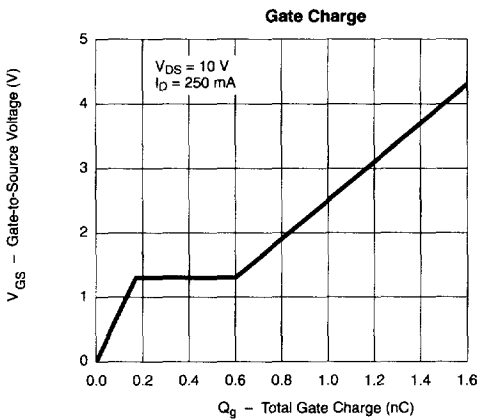
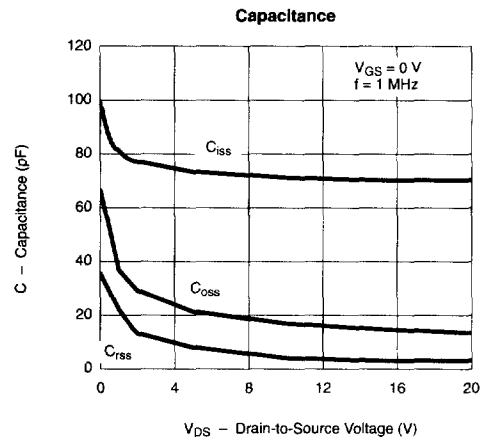
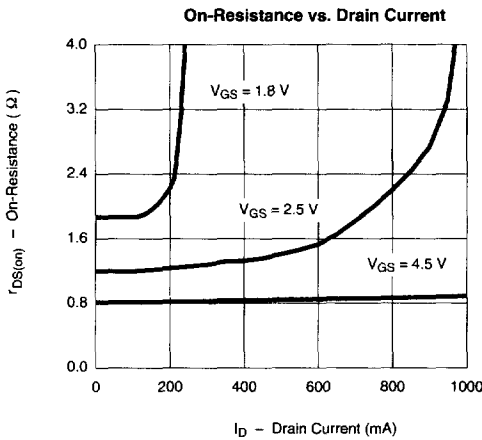
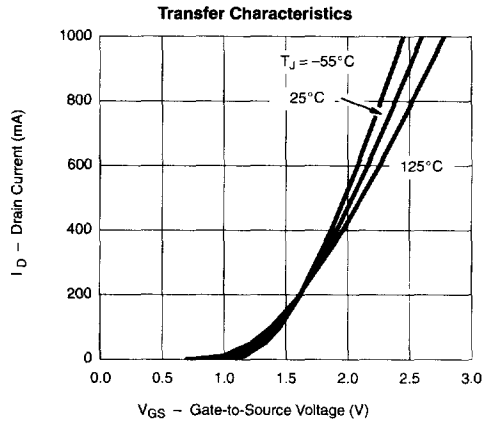
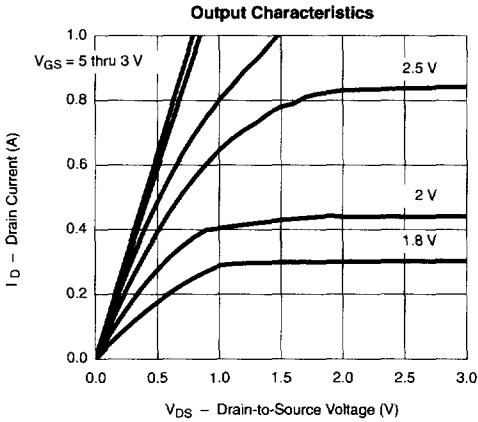
BV<sub>GSS</sub> vs. Temperature





**TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C UNLESS NOTED)**

**P-CHANNEL**

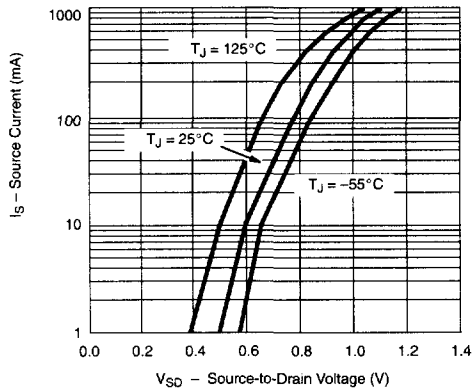




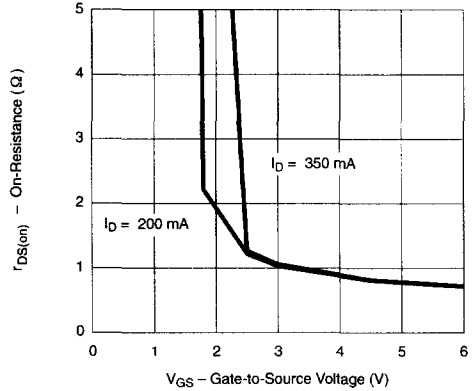
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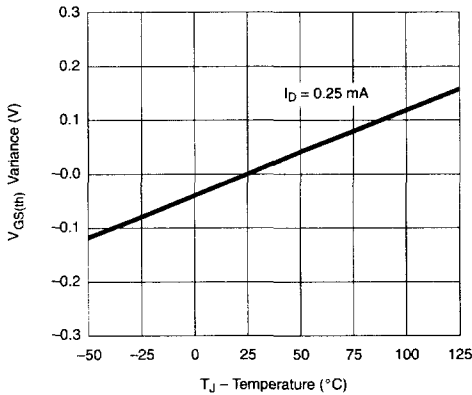
Source-Drain Diode Forward Voltage



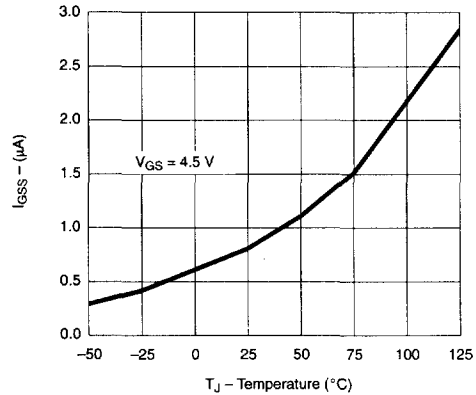
On-Resistance vs. Gate-to-Source Voltage



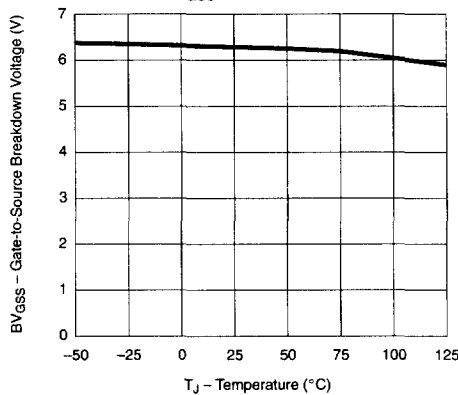
Threshold Voltage Variance vs. Temperature



I<sub>GSS</sub> vs. Temperature



BV<sub>GSS</sub> vs. Temperature





**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  UNLESS NOTED) N- OR P-CHANNEL**

