

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

FEATURES

- TrenchFET® Power MOSFET: 1.8-V Rated
- Gate-Source ESD Protected: 2000 V
- High-Side Switching
- Low On-Resistance: 1.2 Ω
- Low Threshold: 0.8 V (typ)
- Fast Switching Speed: 14 ns
- S- Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

BENEFITS

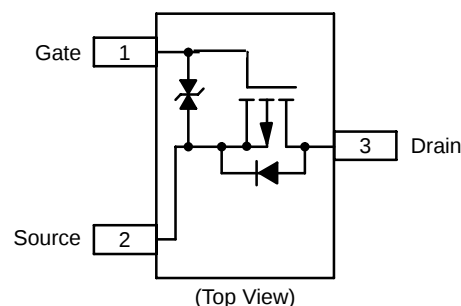
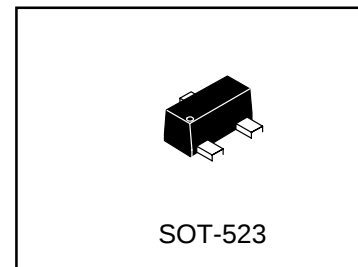
- Ease in Driving Switches
- Low Offset (Error) Voltage
- Low-Voltage Operation
- High-Speed Circuits
- Low Battery Voltage Operation

APPLICATIONS

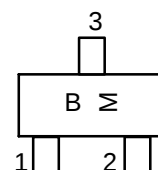
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories
- Battery Operated Systems
- Power Supply Converter Circuits
- Load/Power Switching Cell Phones, Pagers

ORDERING INFORMATION

Device	Marking	Shipping
LM1013T	B	3000/Tape&Reel



MARKING DIAGRAM



B = Specific Device Code
M = Month Code

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	T _A = 25 °C	I _D	-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	mW
Maximum Power Dissipation ^b for SC-75	T _A = 25 °C	P _D	175	150	
	T _A = 85 °C		90	80	
Maximum Power Dissipation ^b for SC-89	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 ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

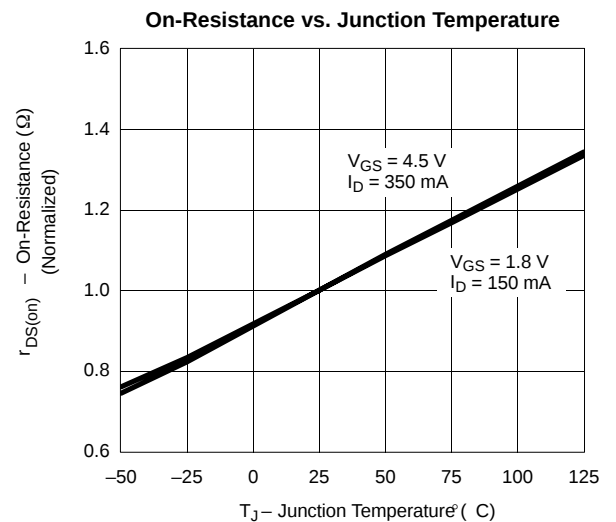
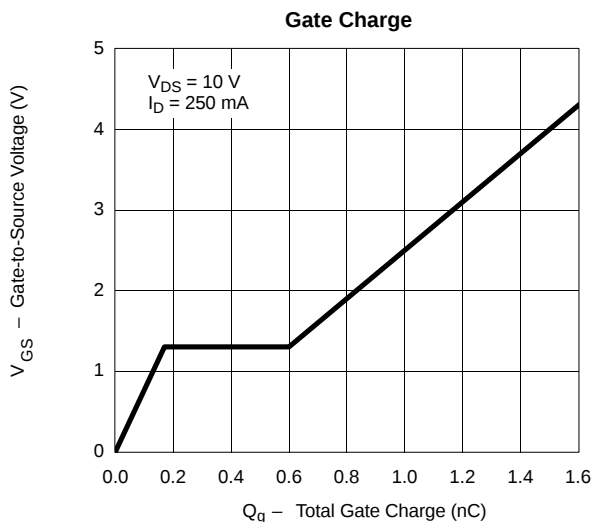
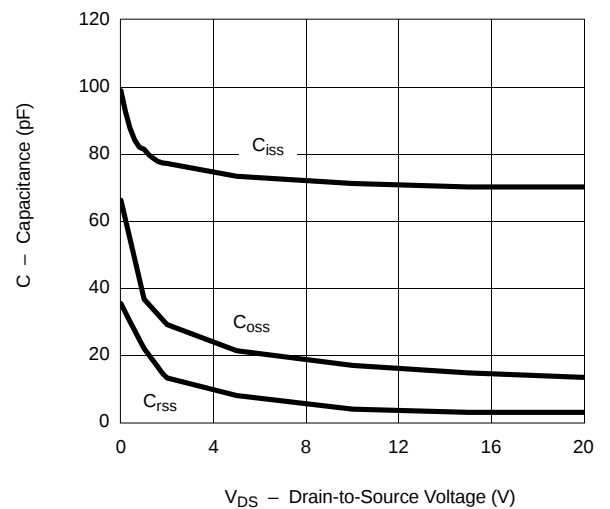
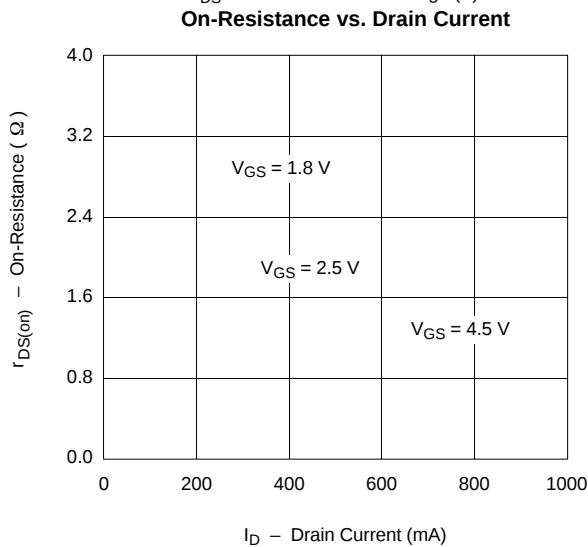
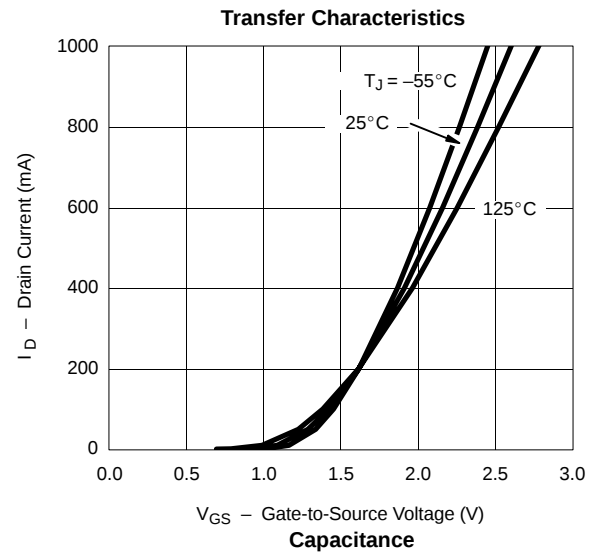
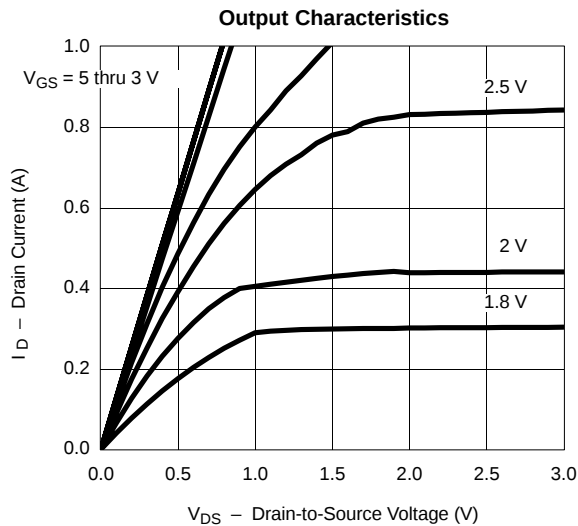
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\ \mu\text{A}$	-0.45			V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\ \text{V}, V_{GS} = \pm 4.5\ \text{V}$		± 1	± 2	μA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -16\ \text{V}, V_{GS} = 0\ \text{V}$		-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	
		$V_{GS} = -1.8\ \text{V}, I_D = -10\ \text{mA}$		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	$t_{d(on)}$	$V_{DD} = -10\ \text{V}, R_L = 47\ \Omega$ $I_D \cong -200\ \text{mA}, V_{GEN} = -4.5\ \text{V}, R_G = 10\ \Omega$		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.

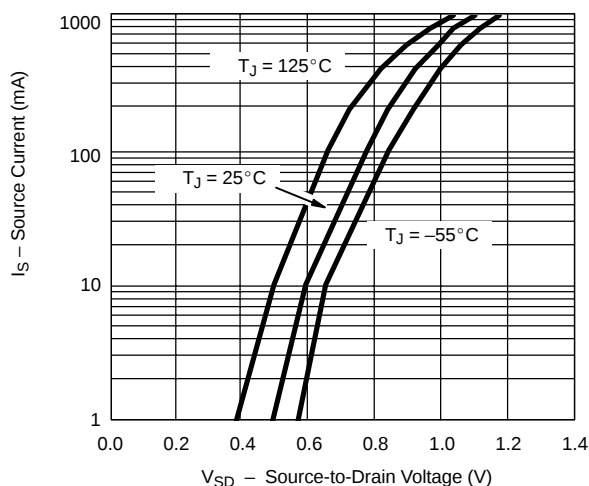
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ UNLESS NOTED)

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

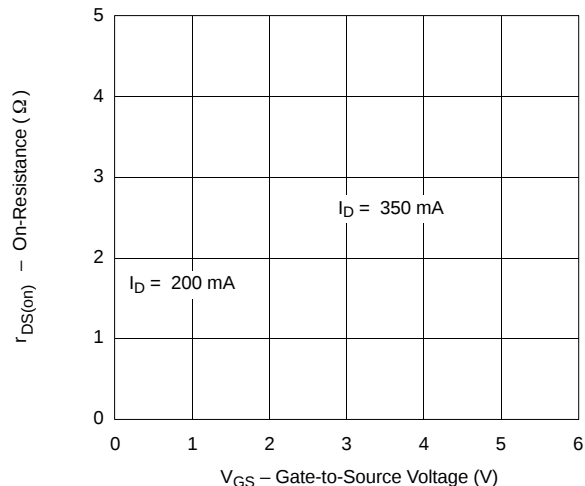


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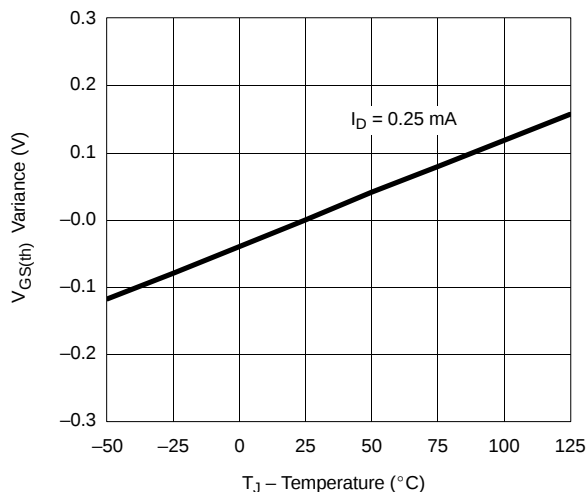
Source-Drain Diode Forward Voltage



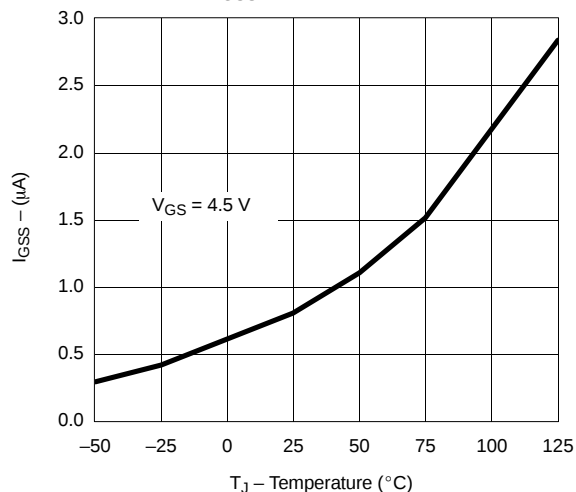
On-Resistance vs. Gate-to-Source Voltage



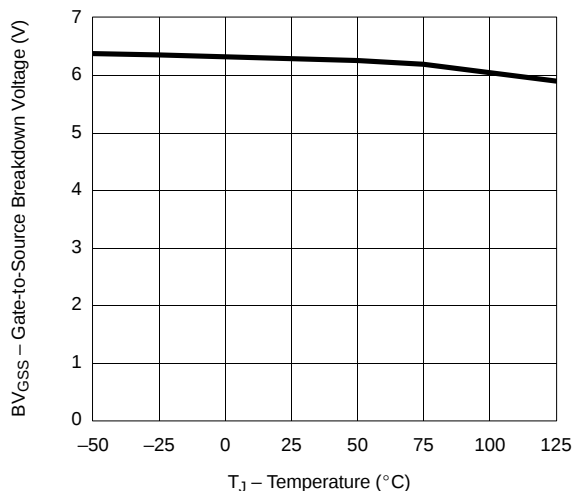
Threshold Voltage Variance vs. Temperature



I_{GSS} vs. Temperature

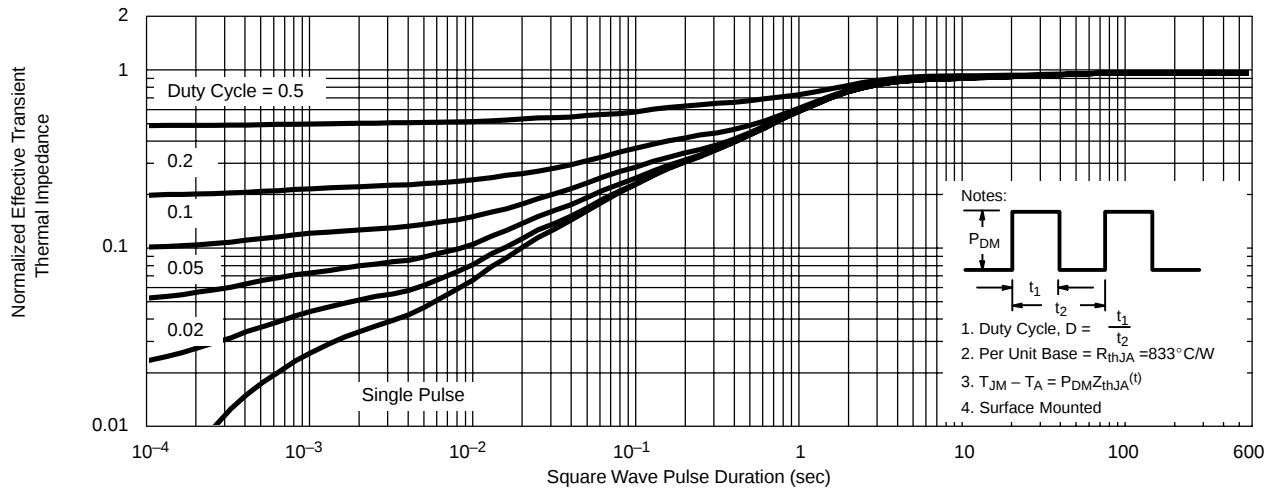


BV_{GSS} vs. Temperature

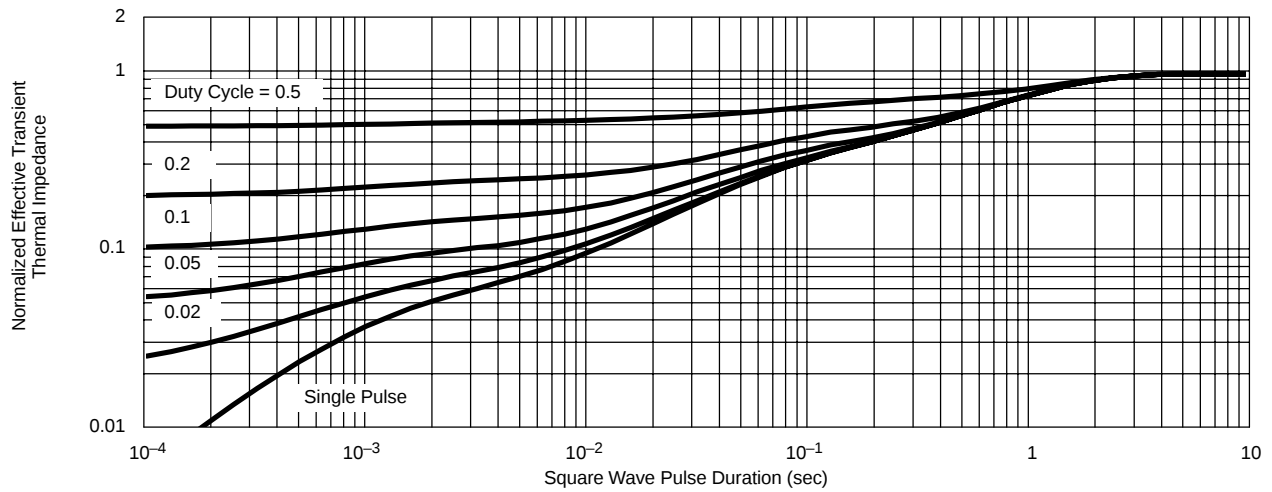


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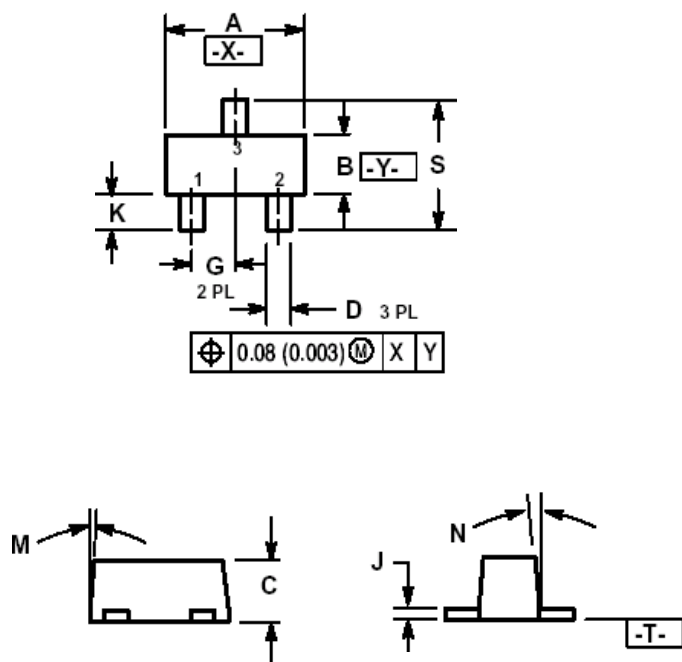
Normalized Thermal Transient Impedance, Junction-to-Ambient (SC-75A)



Normalized Thermal Transient Impedance, Junction-to-Foot



SOT-523



NOTES:

- 1.DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- 2.CONTROLLING DIMENSION: MILLIMETERS
- 3.MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
- 4.463C-01 OBSOLETE, NEW STANDARD 463C-02.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.50	1.60	1.70	0.059	0.063	0.067
B	0.75	0.85	0.95	0.030	0.034	0.040
C	0.60	0.70	0.80	0.024	0.028	0.031
D	0.23	0.28	0.33	0.009	0.011	0.013
G	0.50 BSC			0.020 BSC		
H	0.53 REF			0.021 REF		
J	0.10	0.15	0.20	0.004	0.006	0.008
K	0.30	0.40	0.50	0.012	0.016	0.020
L	1.10 REF			0.043 REF		
M	---	---	10 °	---	---	10 °
N	---	---	10 °	---	---	10 °
S	1.50	1.60	1.70	0.059	0.063	0.067

