

MGSF1N03LT1

Preferred Device

Power MOSFET

30 V, 2.1 A, Single N-Channel, SOT-23

These miniature surface mount MOSFETs low $R_{DS(on)}$ assure minimal power loss and conserve energy, making these devices ideal for use in space sensitive power management circuitry. Typical applications are dc-dc converters and power management in portable and battery-powered products such as computers, printers, PCMCIA cards, cellular and cordless telephones.

- Low $R_{DS(on)}$ Provides Higher Efficiency and Extends Battery Life
- Miniature SOT-23 Surface Mount Package Saves Board Space

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Parameter			Symbol	Value	Unit
Drain-to-Source Voltage			V _{DSS}	30	V
Gate-to-Source Voltage			V _{GS}	±20	V
Continuous Drain Current (Note 1)	Steady State	T _A = 25°C	I _D	2.1	A
		T _A = 85°C		1.5	
	t ≤ 10 s	T _A = 25°C		2.8	
Power Dissipation (Note 1)	Steady State	T _A = 25°C	P _D	0.73	W
Continuous Drain Current (Note 2)	Steady State	T _A = 25°C	I _D	1.6	A
		T _A = 85°C		1.1	
Power Dissipation (Note 2)		T _A = 25°C	P _D	0.42	W
Pulsed Drain Current	tp = 10 μs		I _{DM}	6.0	A
ESD Capability (Note 3)	C = 100 pF, RS = 1500 Ω		ESD	125	V
Operating Junction and Storage Temperature			T _J , T _{STG}	−55 to 150	°C
Source Current (Body Diode)			I _S	2.1	A
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T _L	260	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction-to-Ambient – Steady State (Note 1)	$R_{\theta JA}$	170	$^\circ\text{C/W}$
Junction-to-Ambient – $t < 10\text{ s}$ (Note 1)	$R_{\theta JA}$	100	
Junction-to-Ambient – Steady State (Note 2)	$R_{\theta JA}$	300	

1. Surface-mounted on FR4 board using 1 in sq pad size.
2. Surface-mounted on FR4 board using the minimum recommended pad size.
3. ESD Rating Information: HBM Class 0.

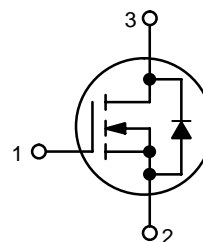


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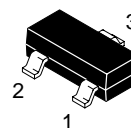
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$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D MAX
30 V	80 m Ω @ 10 V	2.1 A
	125 m Ω @ 4.5 V	

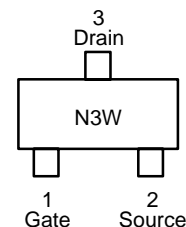
N-Channel



MARKING DIAGRAM/ PIN ASSIGNMENT



SOT-23
CASE 318
STYLE 21



N3 = Specific Device Code
W = Work Week

ORDERING INFORMATION

Device	Package	Shipping†
MGSF1N03LT1	SOT-23	3000/Tape & Reel
MGSF1N03LT3	SOT-23	10000/Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

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ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage ($V_{GS} = 0\text{ Vdc}$, $I_D = 10\text{ }\mu\text{Adc}$)	$V_{(BR)DSS}$	30	–	–	Vdc
Zero Gate Voltage Drain Current ($V_{DS} = 30\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$) ($V_{DS} = 30\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$, $T_J = 125^\circ\text{C}$)	I_{DSS}	– –	– –	1.0 10	μAdc
Gate-Body Leakage Current ($V_{GS} = \pm 20\text{ Vdc}$, $V_{DS} = 0\text{ Vdc}$)	I_{GSS}	–	–	± 100	nAdc

ON CHARACTERISTICS (Note 1)

Gate Threshold Voltage ($V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{Adc}$)	$V_{GS(th)}$	1.0	1.7	2.4	Vdc
Static Drain-to-Source On-Resistance ($V_{GS} = 10\text{ Vdc}$, $I_D = 1.2\text{ Adc}$) ($V_{GS} = 4.5\text{ Vdc}$, $I_D = 1.0\text{ Adc}$)	$r_{DS(on)}$	– –	0.08 0.125	0.10 0.145	Ohms

DYNAMIC CHARACTERISTICS

Input Capacitance	($V_{DS} = 5.0\text{ Vdc}$)	C_{iss}	–	140	–	pF
Output Capacitance	($V_{DS} = 5.0\text{ Vdc}$)	C_{oss}	–	100	–	
Transfer Capacitance	($V_{DG} = 5.0\text{ Vdc}$)	C_{rss}	–	40	–	

SWITCHING CHARACTERISTICS (Note 2)

Turn-On Delay Time	(V _{DD} = 15 Vdc, I _D = 1.0 Adc, R _L = 50 Ω)	$t_{d(on)}$	–	2.5	–	ns
Rise Time		t_r	–	1.0	–	
Turn-Off Delay Time		$t_{d(off)}$	–	16	–	
Fall Time		t_f	–	8.0	–	
Gate Charge (See Figure 6)		Q_T	–	6000	–	pC

SOURCE-DRAIN DIODE CHARACTERISTICS

Continuous Current	I_S	–	–	0.6	A
Pulsed Current	I_{SM}	–	–	0.75	
Forward Voltage (Note 2)	V_{SD}	–	0.8	–	V

1. Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2\%$.
2. Switching characteristics are independent of operating junction temperature.

TYPICAL ELECTRICAL CHARACTERISTICS

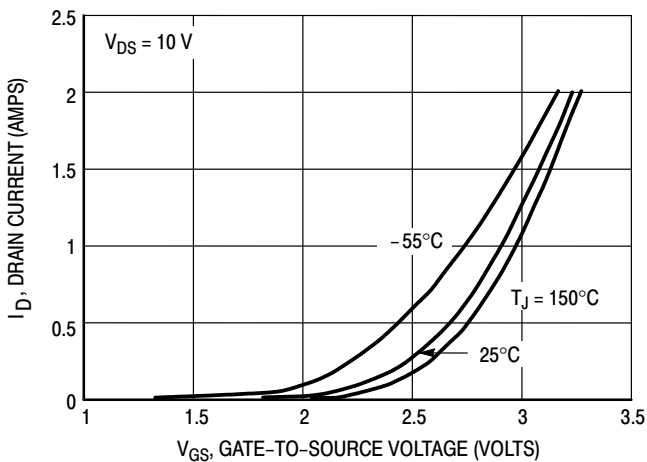


Figure 1. Transfer Characteristics

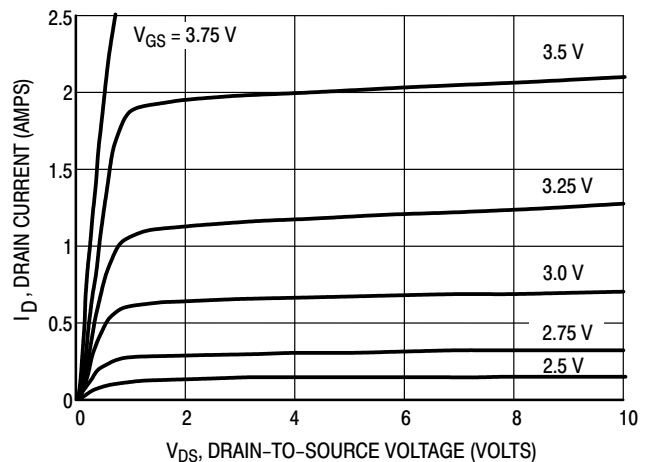


Figure 2. On-Region Characteristics

TYPICAL ELECTRICAL CHARACTERISTICS

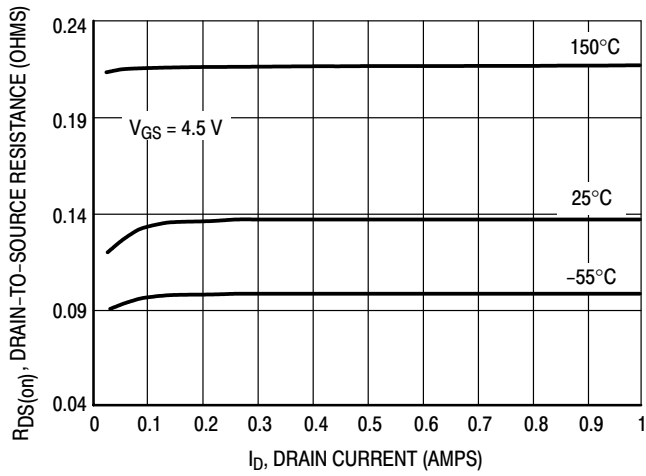


Figure 3. On-Resistance versus Drain Current

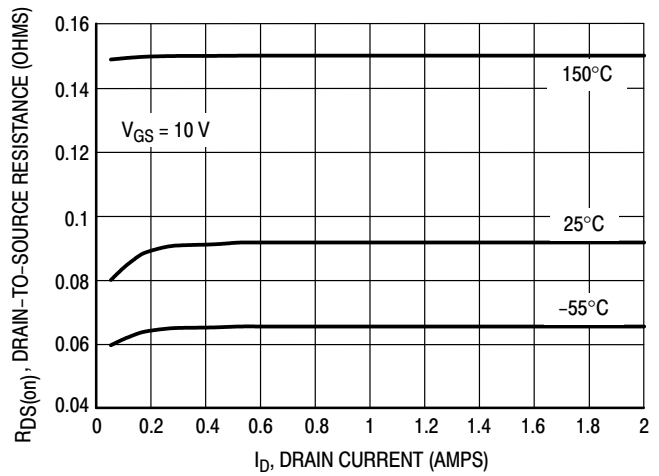


Figure 4. On-Resistance versus Drain Current

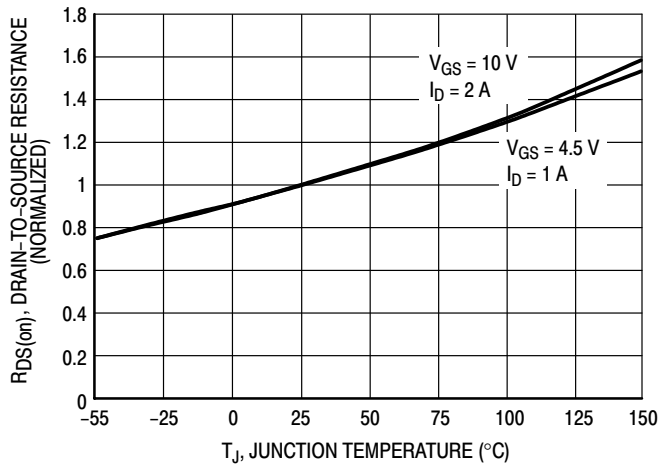


Figure 5. On-Resistance Variation with Temperature

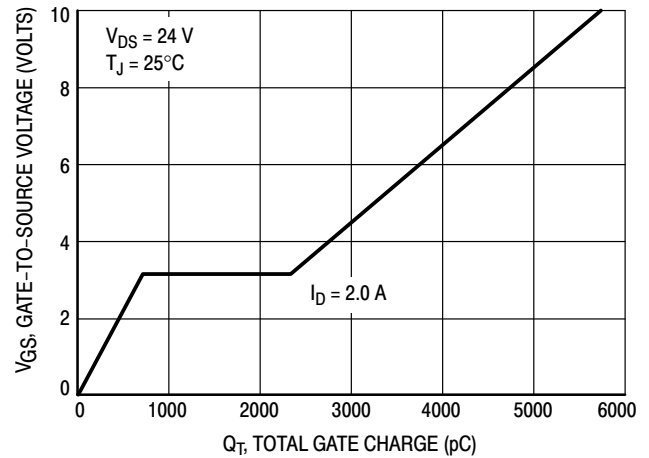


Figure 6. Gate Charge

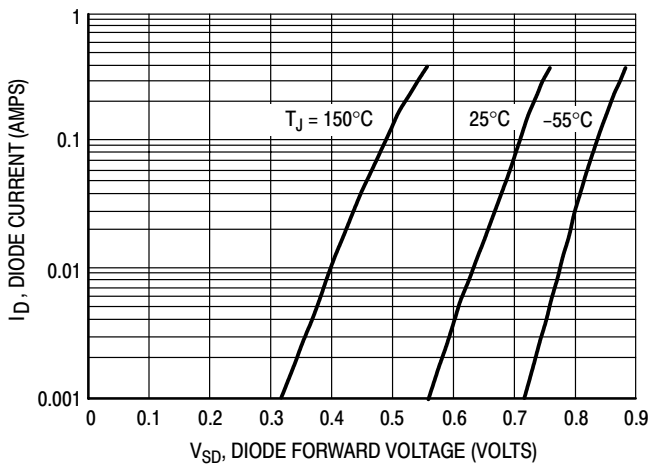


Figure 7. Body Diode Forward Voltage

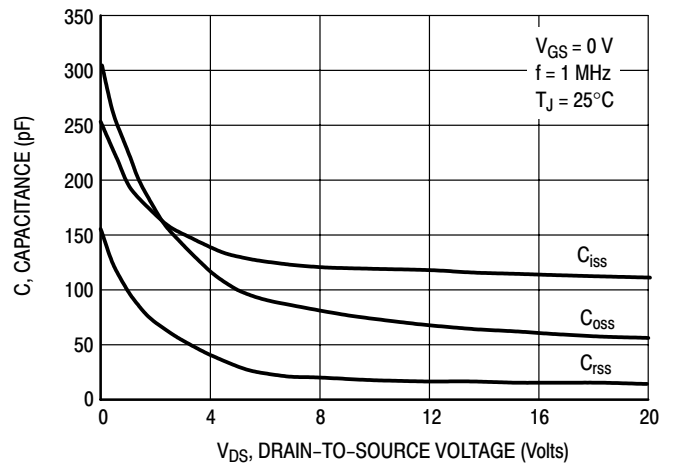
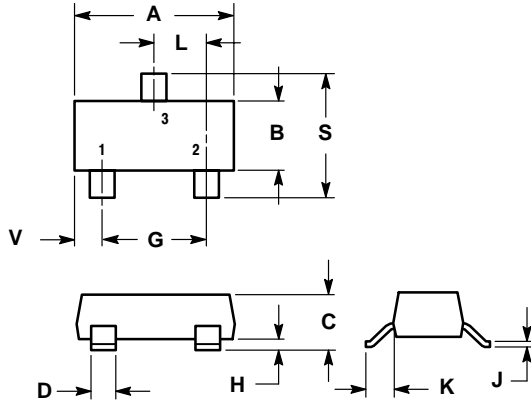


Figure 8. Capacitance

MGSF1N03LT1

PACKAGE DIMENSIONS

SOT-23 CASE 318-09 ISSUE AH



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318-01, -02, AND -06 OBSOLETE, NEW STANDARD 318-09.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.1102	0.1197	2.80	3.04
B	0.0472	0.0551	1.20	1.40
C	0.0385	0.0498	0.99	1.26
D	0.0140	0.0200	0.36	0.50
G	0.0670	0.0826	1.70	2.10
H	0.0040	0.0098	0.10	0.25
J	0.0034	0.0070	0.085	0.177
K	0.0180	0.0236	0.45	0.60
L	0.0350	0.0401	0.89	1.02
S	0.0830	0.0984	2.10	2.50
V	0.0177	0.0236	0.45	0.60

STYLE 21:

- PIN 1. GATE
2. SOURCE
3. DRAIN

SOLDERING FOOTPRINT

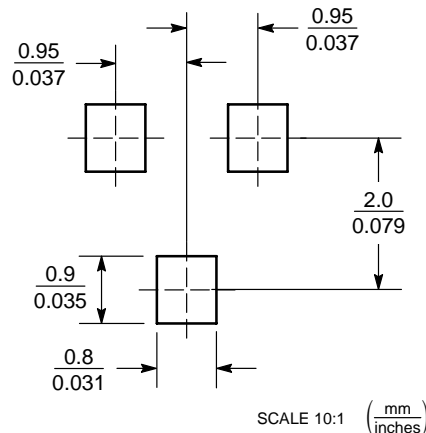



Figure 9. SOT-23

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