

# 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.

#### Features

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

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

Parameter		Symbol	Value	Unit	
Drain-to-Source Voltage		$V_{DS}$	30	V	
Gate-to-Source Voltage		$V_{GS}$	$\pm 20$	V	
Continuous Drain Current (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	2.1	A	
		$T_A = 85^\circ\text{C}$	1.5		
	$t \leq 10$ s	$T_A = 25^\circ\text{C}$	2.8		
Power Dissipation (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	$P_D$	0.73	W
Continuous Drain Current (Note 2)	Steady State	$T_A = 25^\circ\text{C}$	$I_D$	1.6	A
		$T_A = 85^\circ\text{C}$		1.1	
Power Dissipation (Note 2)		$T_A = 25^\circ\text{C}$	$P_D$	0.42	W
Pulsed Drain Current	$t_p = 10$ $\mu\text{s}$	$I_{DM}$	6.0	A	
ESD Capability (Note 3)	$C = 100$ pF, $RS = 1500$ $\Omega$	ESD	125	V	
Operating Junction and Storage Temperature		$T_J, T_{STG}$	-55 to 150	$^\circ\text{C}$	
Source Current (Body Diode)		$I_S$	2.1	A	
Lead Temperature for Soldering Purposes (1/8" from case for 10 sec)		$T_L$	260	$^\circ\text{C}$	

#### THERMAL RESISTANCE RATINGS

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

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

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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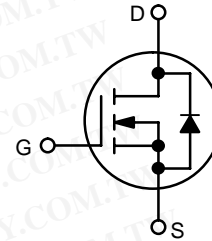


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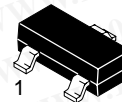
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$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	$I_D$ MAX
30 V	80 m $\Omega$ @ 10 V	2.1 A
	125 m $\Omega$ @ 4.5 V	

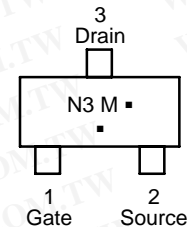
#### N-Channel



#### MARKING DIAGRAM/ PIN ASSIGNMENT



SOT-23  
CASE 318  
STYLE 21



N3 = Specific Device Code  
 M = Date Code\*  
 ■ = Pb-Free Package

(Note: Microdot may be in either location)  
 \*Date Code orientation and/or overbar may vary depending upon manufacturing location.

#### ORDERING INFORMATION

Device	Package	Shipping†
MGSF1N03LT1	SOT-23	3000/Tape & Reel
MGSF1N03LT1G	SOT-23 Pb-Free	3000/Tape & Reel
MGSF1N03LT3	SOT-23	10,000/Tape & Reel
MGSF1N03LT3G	SOT-23 (Pb-Free)	10,000/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.

Preferred devices are recommended choices for future use and best overall value.

# MGSF1N03LT1

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit	
<b>OFF CHARACTERISTICS</b>						
Drain-to-Source Breakdown Voltage (V <sub>GS</sub> = 0 Vdc, I <sub>D</sub> = 10 μAdc)	V <sub>(BR)DSS</sub>	30	-	-	Vdc	
Zero Gate Voltage Drain Current (V <sub>DS</sub> = 30 Vdc, V <sub>GS</sub> = 0 Vdc) (V <sub>DS</sub> = 30 Vdc, V <sub>GS</sub> = 0 Vdc, T <sub>J</sub> = 125°C)	I <sub>DSS</sub>	-	-	1.0 10	μAdc	
Gate-Body Leakage Current (V <sub>GS</sub> = ± 20 Vdc, V <sub>DS</sub> = 0 Vdc)	I <sub>GSS</sub>	-	-	±100	nAdc	
<b>ON CHARACTERISTICS (Note 4)</b>						
Gate Threshold Voltage (V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μAdc)	V <sub>GS(th)</sub>	1.0	1.7	2.4	Vdc	
Static Drain-to-Source On-Resistance (V <sub>GS</sub> = 10 Vdc, I <sub>D</sub> = 1.2 Adc) (V <sub>GS</sub> = 4.5 Vdc, I <sub>D</sub> = 1.0 Adc)	r <sub>DS(on)</sub>	-	0.08 0.125	0.10 0.145	Ω	
<b>DYNAMIC CHARACTERISTICS</b>						
Input Capacitance	(V <sub>DS</sub> = 5.0 Vdc)	C <sub>iss</sub>	-	140	-	pF
Output Capacitance	(V <sub>DS</sub> = 5.0 Vdc)	C <sub>oss</sub>	-	100	-	
Transfer Capacitance	(V <sub>DG</sub> = 5.0 Vdc)	C <sub>rss</sub>	-	40	-	
<b>SWITCHING CHARACTERISTICS (Note 5)</b>						
Turn-On Delay Time	(V <sub>DD</sub> = 15 Vdc, I <sub>D</sub> = 1.0 Adc, R <sub>L</sub> = 50 Ω)	t <sub>d(on)</sub>	-	2.5	-	ns
Rise Time		t <sub>r</sub>	-	1.0	-	
Turn-Off Delay Time		t <sub>d(off)</sub>	-	16	-	
Fall Time		t <sub>f</sub>	-	8.0	-	
Gate Charge (See Figure 6)		Q <sub>T</sub>	-	6000	-	pC
<b>SOURCE-DRAIN DIODE CHARACTERISTICS</b>						
Continuous Current	I <sub>S</sub>	-	-	0.6	A	
Pulsed Current	I <sub>SM</sub>	-	-	0.75		
Forward Voltage (Note 5)	V <sub>SD</sub>	-	0.8	-	V	

- Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
- Switching characteristics are independent of operating junction temperature.

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## TYPICAL ELECTRICAL CHARACTERISTICS

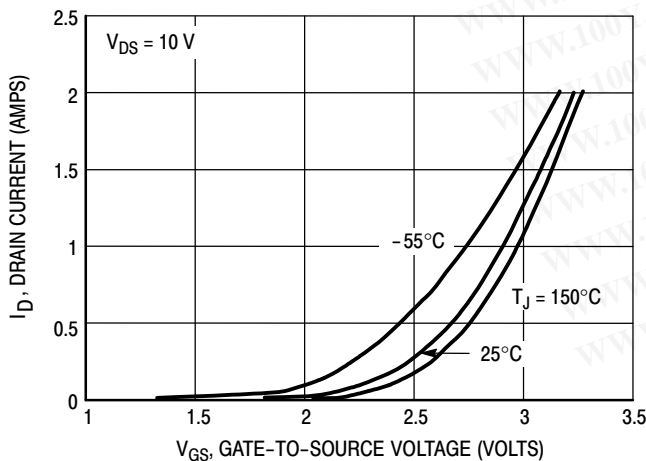


Figure 1. Transfer Characteristics

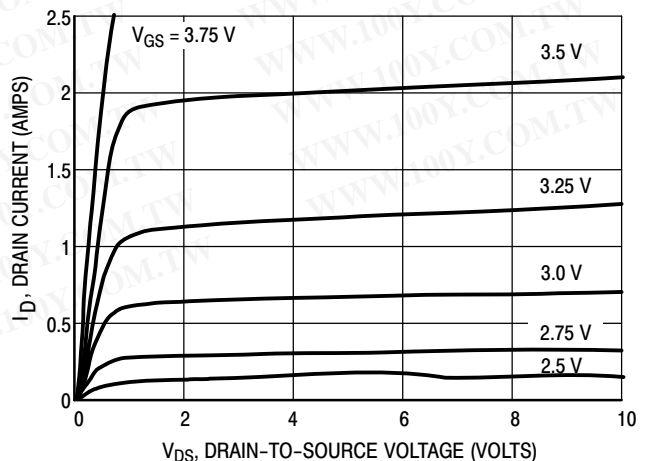


Figure 2. On-Region Characteristics

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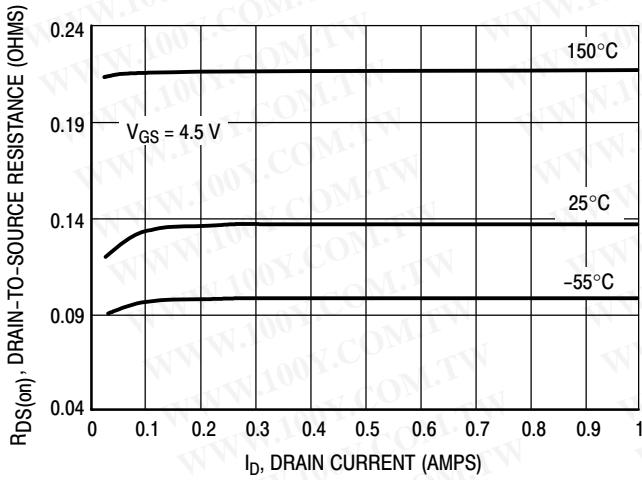


Figure 3. On-Resistance versus Drain Current

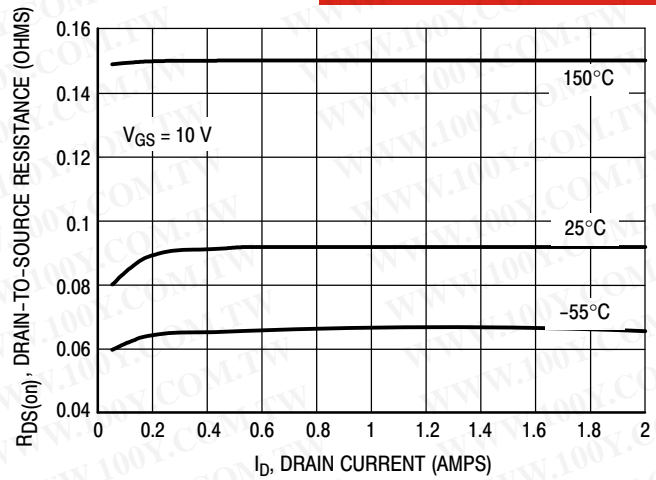


Figure 4. On-Resistance versus Drain Current

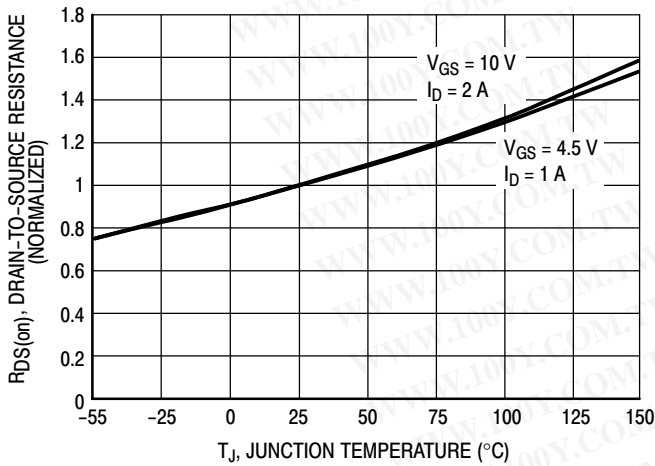


Figure 5. On-Resistance Variation with Temperature

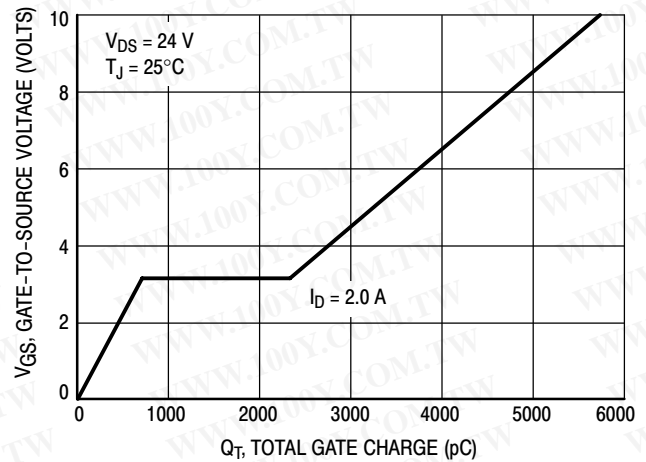


Figure 6. Gate Charge

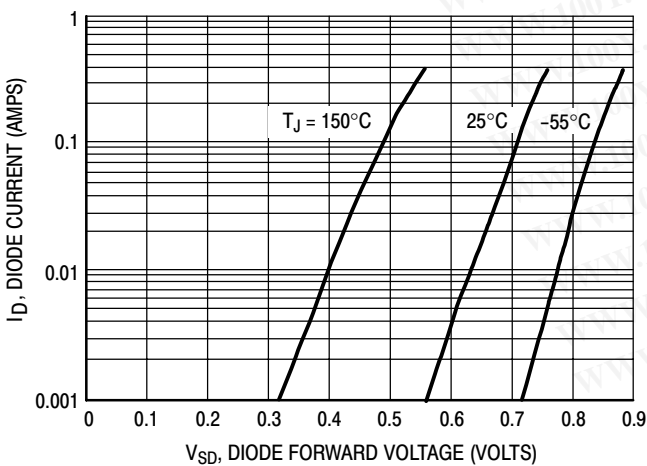


Figure 7. Body Diode Forward Voltage

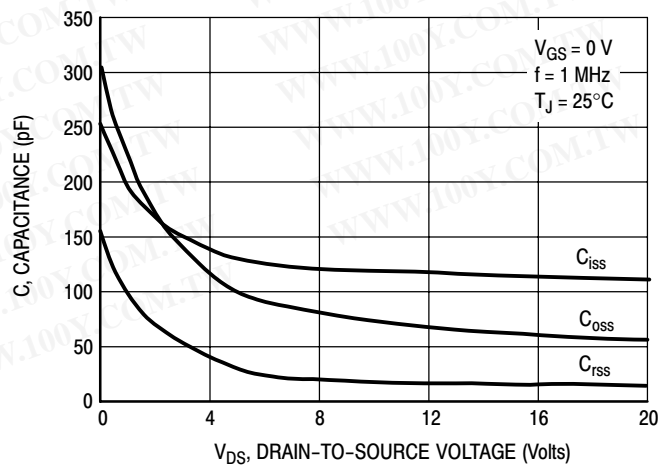


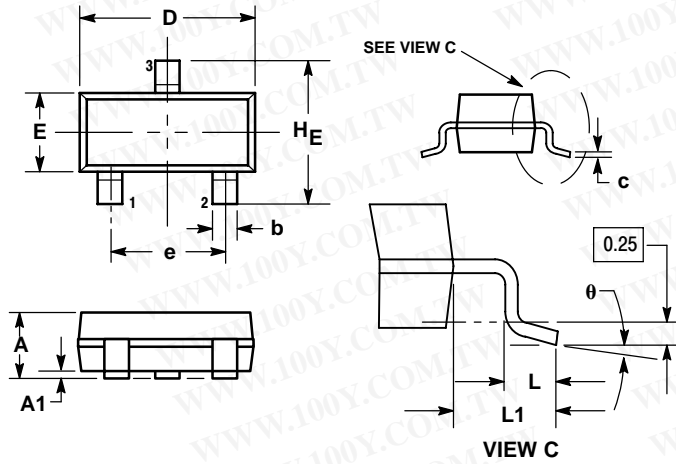
Figure 8. Capacitance

# MGSF1N03LT1

## PACKAGE DIMENSIONS

SOT-23 (TO-236)  
CASE 318-08  
ISSUE AN

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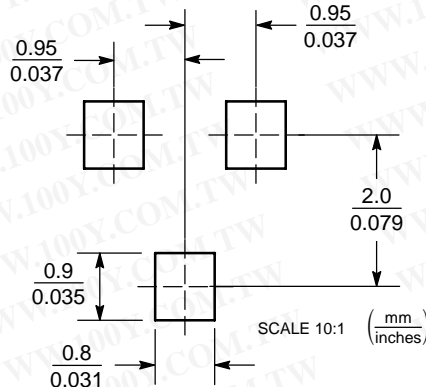
NOTES:

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 THRU -07 AND -09 OBSOLETE, NEW STANDARD 318-08.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.89	1.00	1.11	0.035	0.040	0.044
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.37	0.44	0.50	0.015	0.018	0.020
c	0.09	0.13	0.18	0.003	0.005	0.007
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.081
L	0.10	0.20	0.30	0.004	0.008	0.012
L1	0.35	0.54	0.69	0.014	0.021	0.029
HE	2.10	2.40	2.64	0.083	0.094	0.104

- STYLE 21:  
PIN 1. GATE  
2. SOURCE  
3. DRAIN

### SOLDERING FOOTPRINT\*



\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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