MGSF1N03L, MVGSF1N03L

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
- AEC−Q101 Qualified and PPAP Capable − MVGSF1N03LT1
- These Devices are Pb−Free and are RoHS Compliant

MAXIMUM RATINGS (T_J = 25°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 $R_{\theta JL}$	Steady State	T_A = 25°C	I_D	2.1	A
		T_A = 85°C		1.5	
Power Dissipation $R_{\theta JL}$	Steady State	T_A = 25°C	P_D	0.69	W
Continuous Drain Current (Note 1)	Steady State	T_A = 25°C	I_D	1.6	A
		T_A = 85°C		1.2	
Power Dissipation (Note 1)		T_A = 25°C	P_D	0.42	W
Pulsed Drain Current	t_p = 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 sec)			T_L	260	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction−to−Foot − Steady State	$R_{\theta JL}$	180	°C/W
Junction−to−Ambient − Steady State (Note 1)	$R_{\theta JA}$	300	
Junction−to−Ambient − t < 10 s (Note 1)	$R_{\theta JA}$	250	
Junction−to−Ambient − Steady State (Note 2)	$R_{\theta JA}$	400	

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Surface−mounted on FR4 board using 650 mm^2, 1 oz. Cu pad size.
2. Surface−mounted on FR4 board using 50 mm^2, 1 oz. Cu pad size.
3. ESD Rating Information: HBM Class 0.

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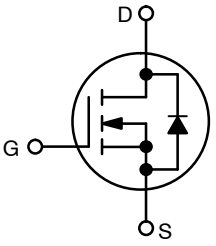
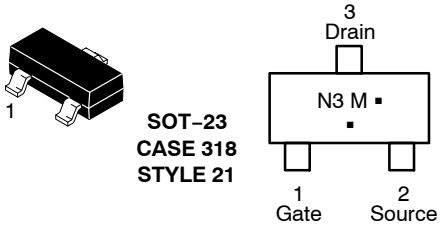
$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D MAX
30 V	80 mΩ @ 10 V	2.1 A
	125 mΩ @ 4.5 V	

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†
MGSF1N03LT1G	SOT−23 Pb−Free	3000 / Tape & Reel
MGSF1N03LT3G	SOT−23 (Pb−Free)	10000 / Tape & Reel
MVGSF1N03LT1G	SOT−23 (Pb−Free)	3000 / 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.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain−to−Source Breakdown Voltage (V_{GS} = 0 Vdc, I_D = 10 μAdc)		$V_{(BR)DSS}$	30	–	–	Vdc
Zero Gate Voltage Drain Current (V_{DS} = 30 Vdc, V_{GS} = 0 Vdc) (V_{DS} = 30 Vdc, V_{GS} = 0 Vdc, T_J = 125°C)		I_{DSS}	 – –	 – –	 1.0 10	μAdc
Gate−Body Leakage Current (V_{GS} = ± 20 Vdc, V_{DS} = 0 Vdc)		I_{GSS}	–	–	±100	nAdc
ON CHARACTERISTICS (Note 4)						
Gate Threshold Voltage (V_{DS} = V_{GS}, I_D = 250 μAdc)		$V_{GS(th)}$	1.0	1.7	2.4	Vdc
Static Drain−to−Source On−Resistance (V_{GS} = 10 Vdc, I_D = 1.2 Adc) (V_{GS} = 4.5 Vdc, I_D = 1.0 Adc)		$r_{DS(on)}$	 – –	 0.08 0.125	 0.10 0.145	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	(V_{DS} = 5.0 Vdc)	C_{iss}	–	140	–	pF
Output Capacitance	(V_{DS} = 5.0 Vdc)	C_{oss}	–	100	–	
Transfer Capacitance	(V_{DG} = 5.0 Vdc)	C_{rss}	–	40	–	
SWITCHING CHARACTERISTICS (Note 5)						
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 5)		V_{SD}	–	0.8	–	V

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

TYPICAL ELECTRICAL CHARACTERISTICS

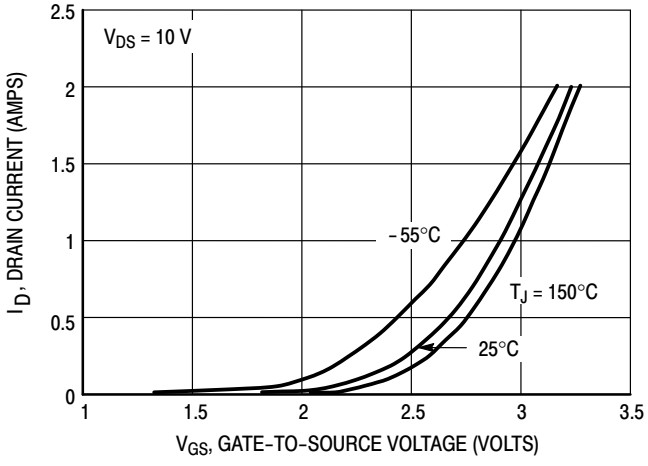


Figure 1. Transfer Characteristics

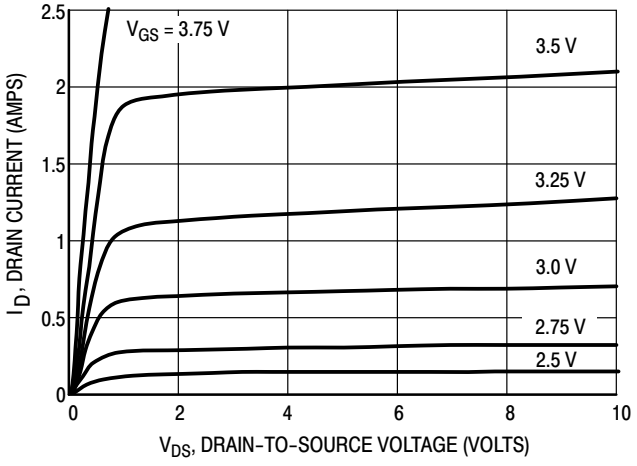


Figure 2. On−Region Characteristics

TYPICAL ELECTRICAL CHARACTERISTICS

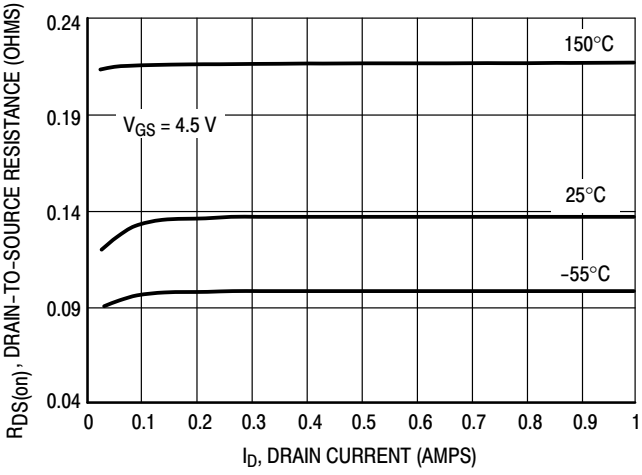


Figure 3. On−Resistance versus Drain Current

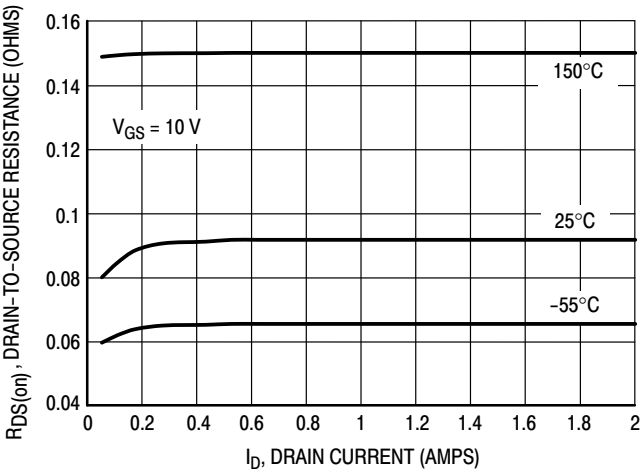


Figure 4. On−Resistance versus Drain Current

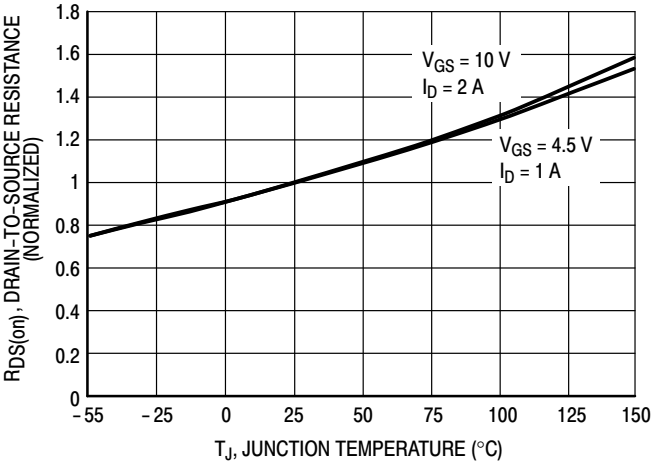


Figure 5. On−Resistance Variation with Temperature

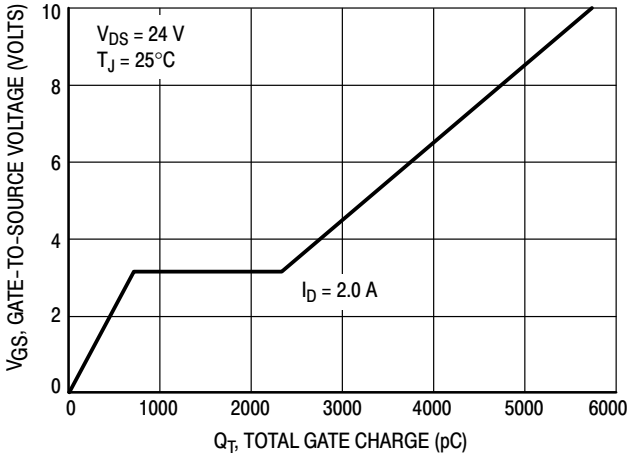


Figure 6. Gate Charge

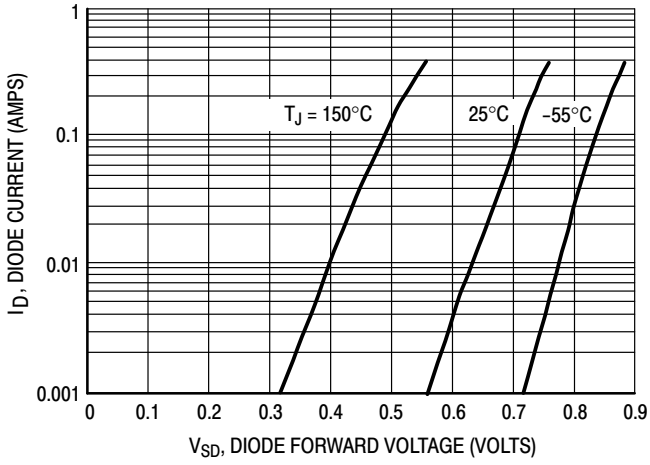


Figure 7. Body Diode Forward Voltage

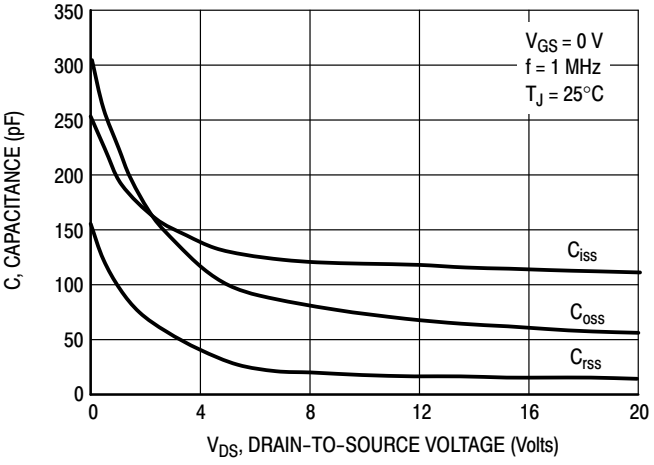


Figure 8. Capacitance

TYPICAL ELECTRICAL CHARACTERISTICS

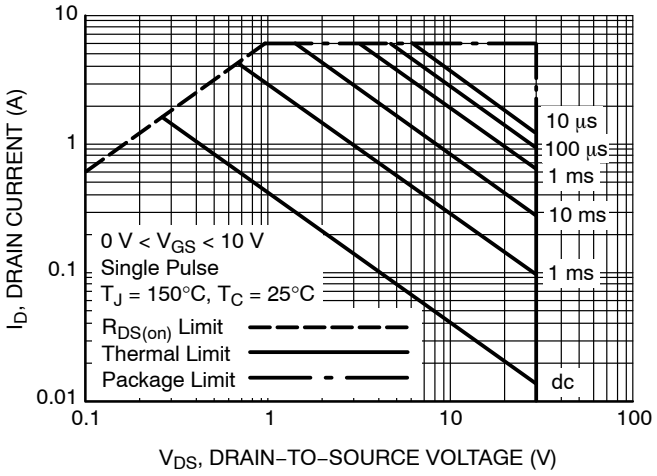


Figure 9. Maximum Rated Forward Biased Safe Operating Area

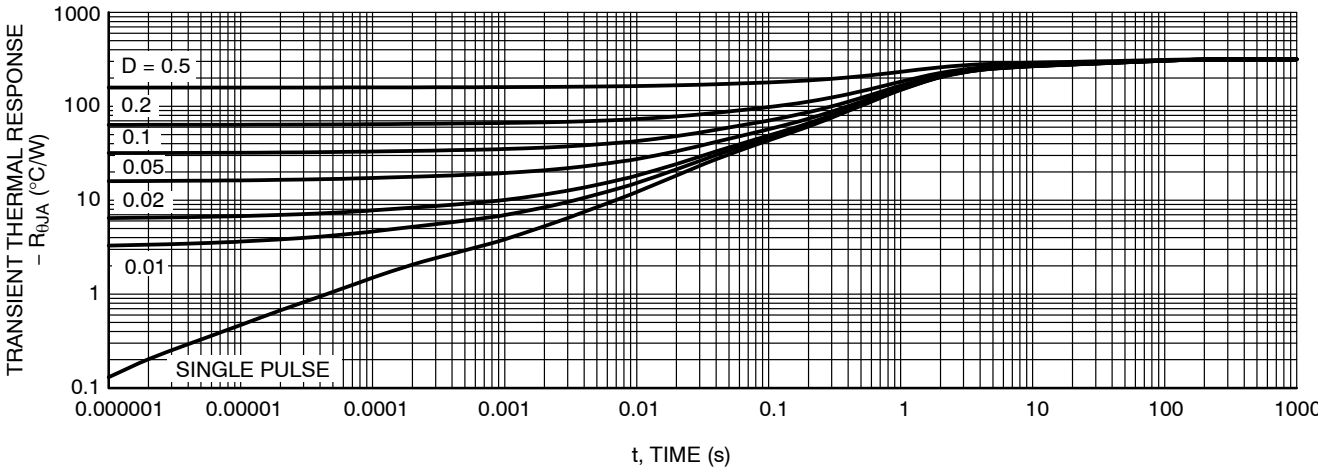
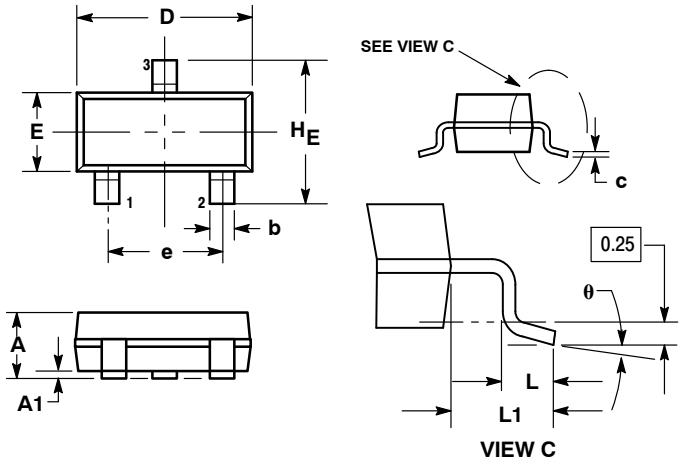


Figure 10. Thermal Response

PACKAGE DIMENSIONS

SOT−23 (TO−236)
CASE 318−08
ISSUE AP

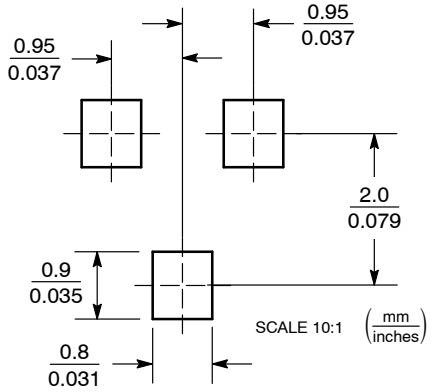


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

	MILLIMETERS			INCHES		
DIM	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
H_E	2.10	2.40	2.64	0.083	0.094	0.104
θ	0°	−−−	10°	0°	−−−	10°

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.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
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