MOSFET – Single, N-Channel, SOT-23

30 V, 2.1 A

MGSF1N03L, MVGSF1N03L

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
- MV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- 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

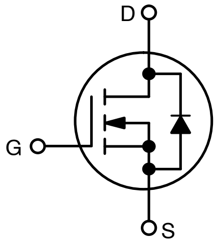
Parameter	Symbol	Max	Unit
Junction-to-Foot – Steady State	$R_{\theta JL}$	180	°C/W
Junction-to-Ambient – Steady State (Note 1)	$R_{\theta JA}$	300	
Junction-to-Ambient – t < 10 s (Note 1)	$R_{\theta JA}$	250	
Junction-to-Ambient – Steady State (Note 2)	$R_{\theta JA}$	400	

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

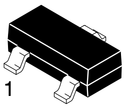
1. Surface-mounted on FR4 board using 650 mm^2, 1 oz. Cu pad size.
2. Surface-mounted on FR4 board using 50 mm^2, 1 oz. Cu pad size.
3. ESD Rating Information: HBM Class 0.

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

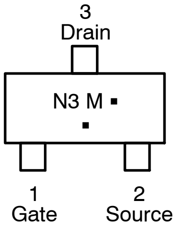
N-Channel



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
MVGSF1N03LT1G	SOT-23 (Pb-Free)	3000 / Tape & Reel

DISCONTINUED (Note 1)

MGSF1N03LT3G	SOT-23 (Pb-Free)	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.

1. **DISCONTINUED:** This device is not recommended for new design. Please contact your **onsemi** representative for information. The most current information on this device may be available on www.onsemi.com.

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

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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

TYPICAL ELECTRICAL CHARACTERISTICS

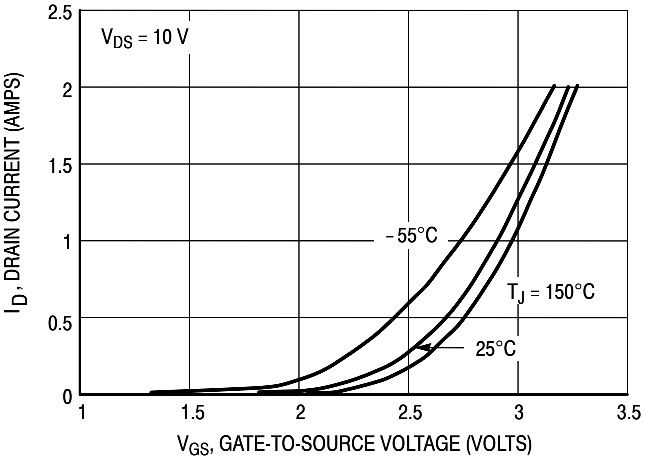


Figure 1. Transfer Characteristics

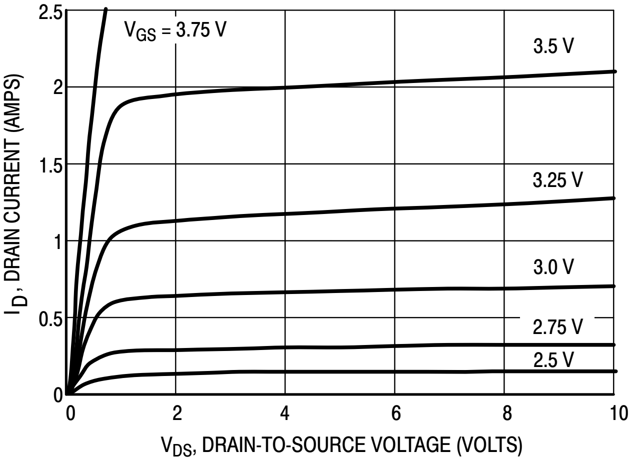


Figure 2. On-Region Characteristics

TYPICAL ELECTRICAL CHARACTERISTICS

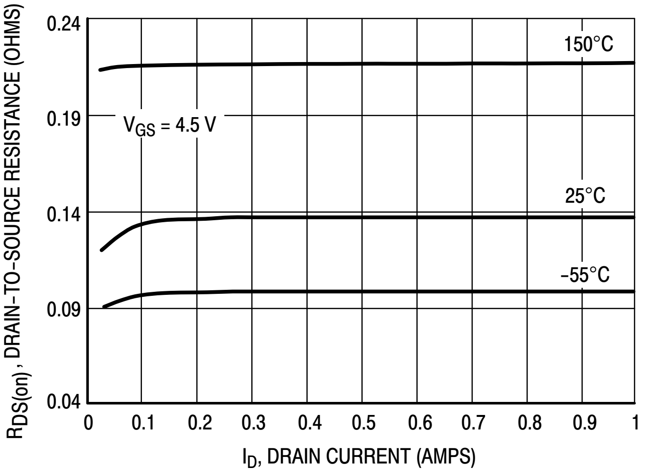


Figure 3. On-Resistance versus Drain Current

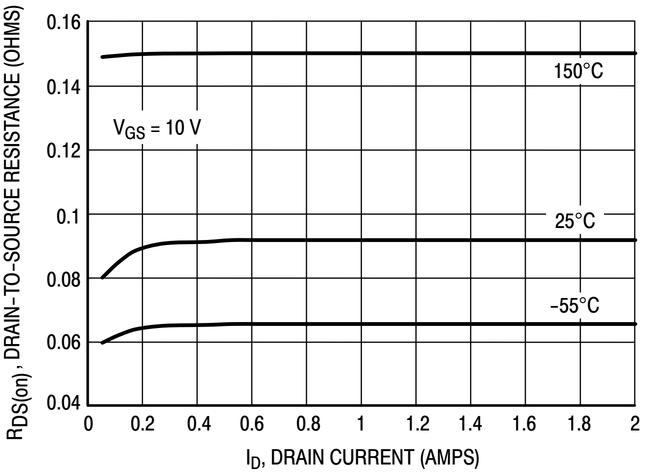


Figure 4. On-Resistance versus Drain Current

TYPICAL ELECTRICAL CHARACTERISTICS

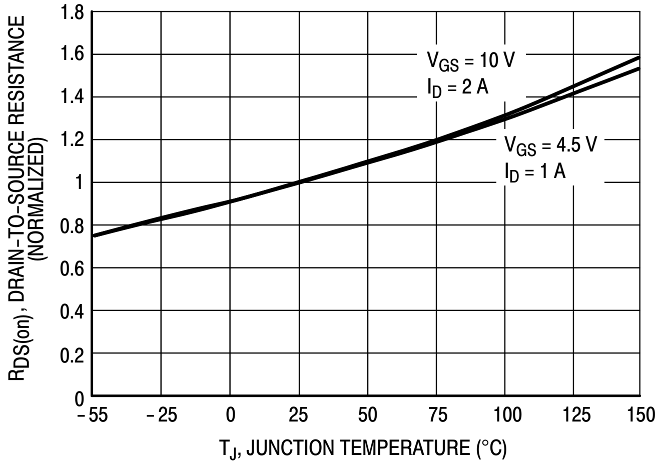


Figure 5. On-Resistance Variation with Temperature

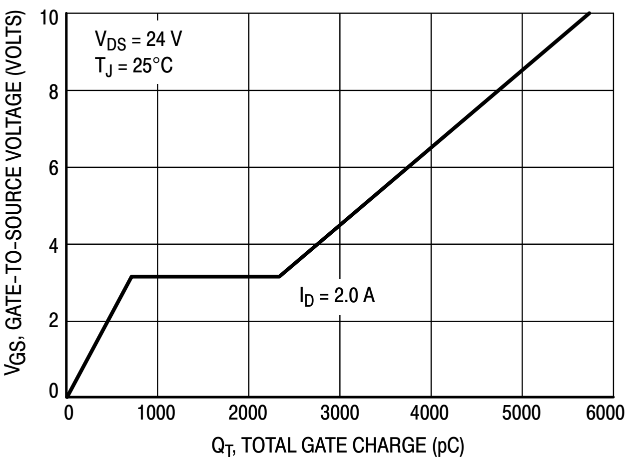


Figure 6. Gate Charge

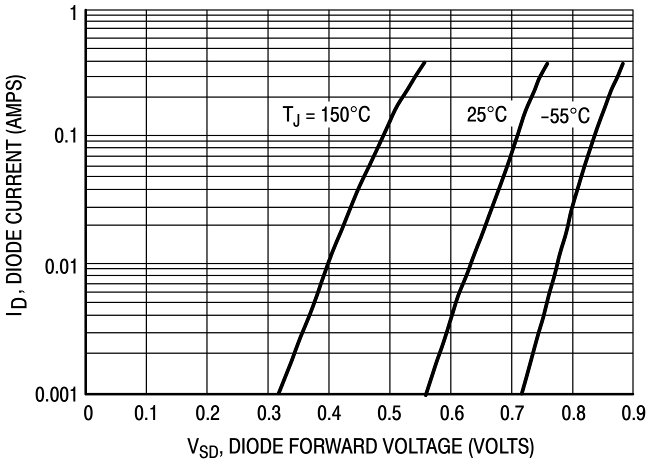


Figure 7. Body Diode Forward Voltage

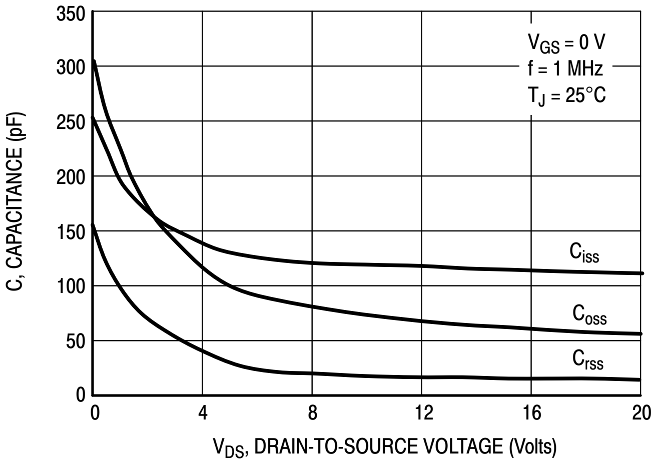


Figure 8. Capacitance

TYPICAL ELECTRICAL CHARACTERISTICS

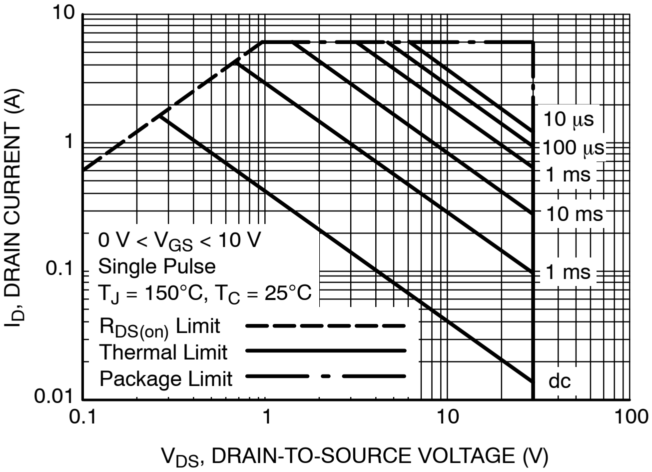


Figure 9. Maximum Rated Forward Biased Safe Operating Area

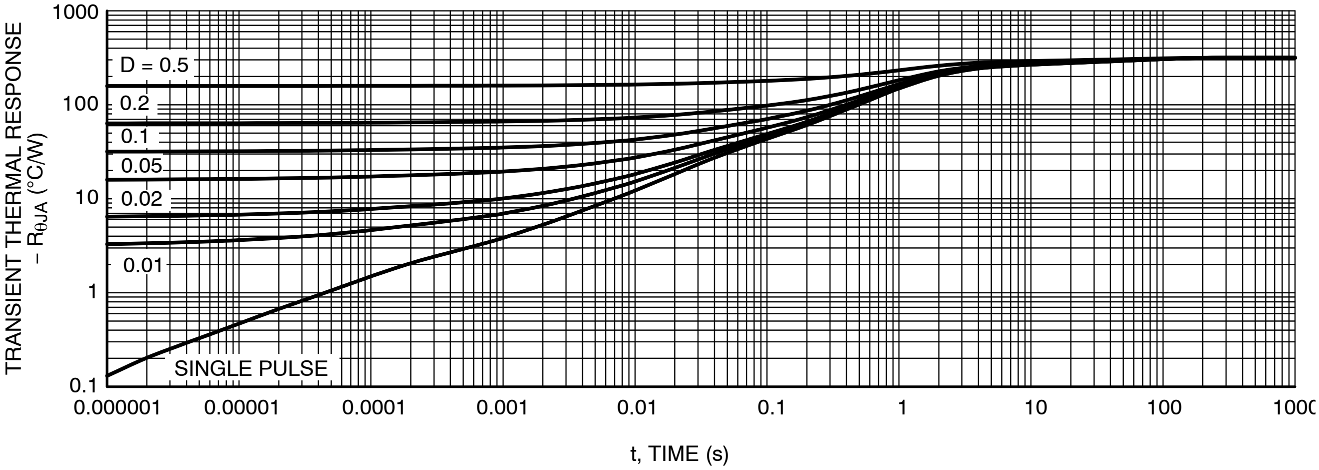
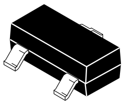


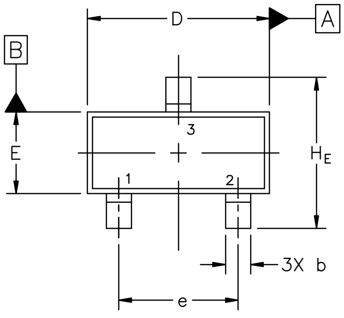
Figure 10. Thermal Response



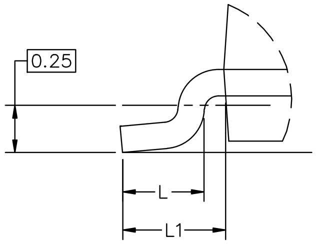
SCALE 4:1

SOT−23 (TO−236) 2.90x1.30x1.00 1.90P
CASE 318
ISSUE AU

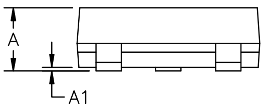
DATE 14 AUG 2024



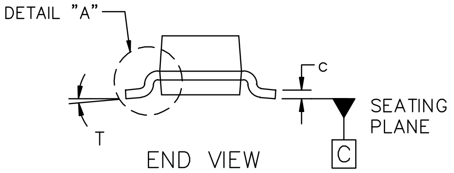
TOP VIEW



DETAIL ”A”
Scale 3:1



SIDE VIEW

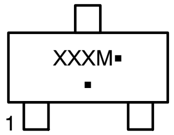


END VIEW

MILLIMETERS			
DIM	MIN	NOM	MAX
A	0.89	1.00	1.11
A1	0.01	0.06	0.10
b	0.37	0.44	0.50
c	0.08	0.14	0.20
D	2.80	2.90	3.04
E	1.20	1.30	1.40
e	1.78	1.90	2.04
L	0.30	0.43	0.55
L1	0.35	0.54	0.69
H_E	2.10	2.40	2.64
T	0°	−−−	10°

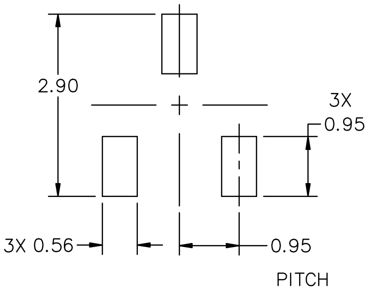
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSIONS: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

GENERIC
MARKING DIAGRAM*



XXX = Specific Device Code
M = Date Code
▪ = Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.



RECOMMENDED
MOUNTING FOOTPRINT

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

STYLES ON PAGE 2

DOCUMENT NUMBER:	**98ASB42226B**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red.
DESCRIPTION:	**SOT−23 (TO−236) 2.90x1.30x1.00 1.90P**	**PAGE 1 OF 2**

SOT−23 (TO−236) 2.90x1.30x1.00 1.90P
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ISSUE AU

DATE 14 AUG 2024

STYLE 1 THRU 5:
CANCELLED

STYLE 6:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

STYLE 7:
PIN 1. EMITTER
2. BASE
3. COLLECTOR

STYLE 8:
PIN 1. ANODE
2. NO CONNECTION
3. CATHODE

STYLE 9:
PIN 1. ANODE
2. ANODE
3. CATHODE

STYLE 10:
PIN 1. DRAIN
2. SOURCE
3. GATE

STYLE 11:
PIN 1. ANODE
2. CATHODE
3. CATHODE−ANODE

STYLE 12:
PIN 1. CATHODE
2. CATHODE
3. ANODE

STYLE 13:
PIN 1. SOURCE
2. DRAIN
3. GATE

STYLE 14:
PIN 1. CATHODE
2. GATE
3. ANODE

STYLE 15:
PIN 1. GATE
2. CATHODE
3. ANODE

STYLE 16:
PIN 1. ANODE
2. CATHODE
3. CATHODE

STYLE 17:
PIN 1. NO CONNECTION
2. ANODE
3. CATHODE

STYLE 18:
PIN 1. NO CONNECTION
2. CATHODE
3. ANODE

STYLE 19:
PIN 1. CATHODE
2. ANODE
3. CATHODE−ANODE

STYLE 20:
PIN 1. CATHODE
2. ANODE
3. GATE

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

STYLE 22:
PIN 1. RETURN
2. OUTPUT
3. INPUT

STYLE 23:
PIN 1. ANODE
2. ANODE
3. CATHODE

STYLE 24:
PIN 1. GATE
2. DRAIN
3. SOURCE

STYLE 25:
PIN 1. ANODE
2. CATHODE
3. GATE

STYLE 26:
PIN 1. CATHODE
2. ANODE
3. NO CONNECTION

STYLE 27:
PIN 1. CATHODE
2. CATHODE
3. CATHODE

STYLE 28:
PIN 1. ANODE
2. ANODE
3. ANODE

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