

N-Channel Switch

J111, J112, J113, MMBFJ111, MMBFJ112, MMBFJ113

Features

- This Device is Designed for Low Level Analog Switching, Sample and Hold Circuits and Chopper Stabilized Amplifiers
- Sourced from Process 51
- Source & Drain are Interchangeable
- These are Pb-Free Devices

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C unless otherwise noted) (Note 1, 2)

| Symbol | Parameter | Value | Unit |
|-----------------------------------|--|------------|------|
| V _{DG} | Drain-Gate Voltage | 35 | V |
| V _{GS} | Gate-Source Voltage | -35 | V |
| I _{GF} | Forward Gate Current | 50 | mA |
| T _J , T _{STG} | Operating and Storage Junction Temperature Range | -55 to 150 | °C |

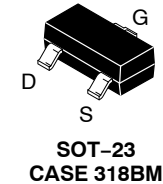
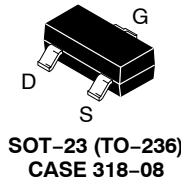
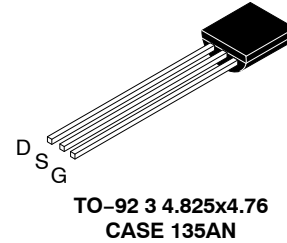
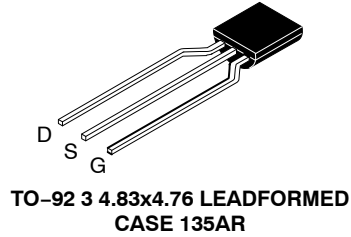
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. These ratings are based on a maximum junction temperature of 150°C.
2. These are steady-state limits. ON Semiconductor should be consulted on applications involving pulsed or low-duty-cycle operations.

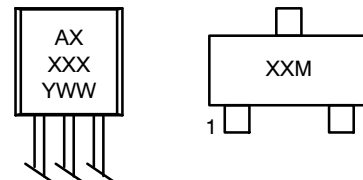
THERMAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

| Symbol | Parameter | Max | | Unit |
|------------------|---|--------------------------------|--|-------|
| | | J111 / J112 / J113 (Note 3) | MMBFJ111 / MMBFJ112 / MMBFJ113 (Note 4) | |
| P _D | Total Device Dissipation | 625 | 350 | mW |
| | Derate Above 25°C | 5.0 | 2.8 | mW/°C |
| R _{θJC} | Thermal Resistance, Junction-to-Case | 125 | - | °C/W |
| R _{θJA} | Thermal Resistance, Junction-to-Ambient | 200 | 357 | °C/W |

3. PCB size: FR-4, 76 mm x 114 mm x 1.57 mm (3.0 inch x 4.5 inch x 0.062 inch) with minimum land pattern size.
4. Device mounted on FR-4 PCB 36 mm x 18 mm x 1.5 mm; mounting pad for the collector lead minimum 6 cm².



MARKING DIAGRAMS



XXXX, XX = Specific Device Code
A = Assembly Plant Code
Y = Year
WW = Work Week
M = Date Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 6 of this data sheet.

J111, J112, J113, MMBFJ111, MMBFJ112, MMBFJ113

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

| Symbol | Parameter | Test Condition | Min | Max | Unit |
|--------|-----------|----------------|-----|-----|------|
|--------|-----------|----------------|-----|-----|------|

OFF CHARACTERISTICS

| | | | | | | |
|----------------------|-------------------------------|--|-----|------|-------|---|
| V _{(BR)GSS} | Gate-Source Breakdown Voltage | I _G = -1.0 μA, V _{DS} = 0 | -35 | - | V | |
| I _{GSS} | Gate Reverse Current | V _{GS} = -15 V, V _{DS} = 0 | - | -1.0 | nA | |
| V _{GS(off)} | Gate-Source Cut-Off Voltage | V _{DS} = 5 V, I _D = 1.0 μA | 111 | -3.0 | -10.0 | V |
| | | | 112 | -1.0 | -5.0 | |
| | | | 113 | -0.5 | -3.0 | |
| I _{D(off)} | Drain Cutoff Leakage Current | V _{DS} = 5.0 V, V _{GS} = -10 V | - | 1.0 | nA | |

ON CHARACTERISTICS

| | | | | | | |
|---------------------|--|--|-----|-----|-----|----|
| I _{DSS} | Zero-Gate Voltage Drain Current (Note 5) | V _{DS} = 15 V, V _{GS} = 0 | 111 | 20 | - | mA |
| | | | 112 | 5.0 | - | |
| | | | 113 | 2.0 | - | |
| r _{DS(on)} | Drain-Source On Resistance | V _{DS} ≤ 0.1 V, V _{GS} = 0 | 111 | - | 30 | Ω |
| | | | 112 | - | 50 | |
| | | | 113 | - | 100 | |

SMALL SIGNAL CHARACTERISTICS

| | | | | | |
|--|---|---|---|-----|----|
| C _{dg(on)} C _{sg(on)} | Drain-Gate & Source-Gate On Capacitance | V _{DS} = 0, V _{GS} = 0, f = 1.0 MHz | - | 28 | pF |
| C _{dg(off)} | Drain-Gate Off Capacitance | V _{DS} = 0, V _{GS} = -10 V, f = 1.0 MHz | - | 5.0 | pF |
| C _{sg(off)} | Source-Gate Off Capacitance | V _{DS} = 0, V _{GS} = -10 V, f = 1.0 MHz | - | 5.0 | pF |

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.

5. Pulse test: pulse width ≤ 300 μs, duty cycle ≤ 2%.

TYPICAL PERFORMANCE CHARACTERISTICS

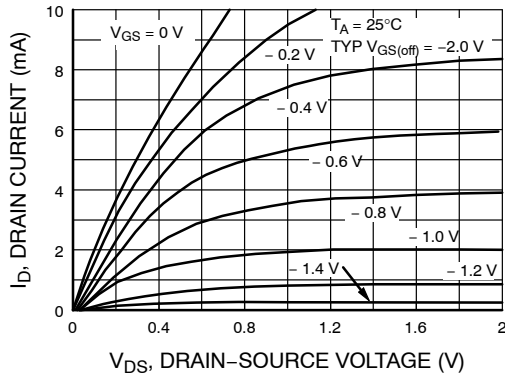


Figure 1. Common Drain-Source

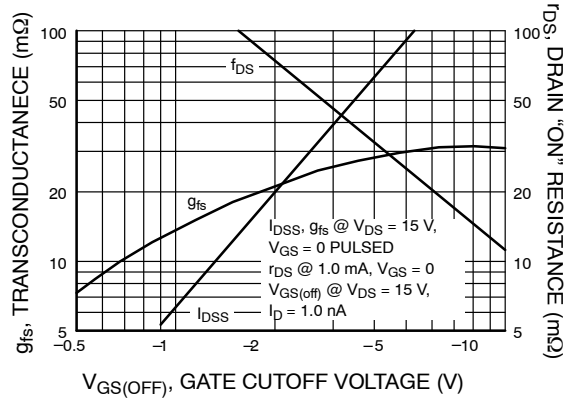


Figure 2. Parameter Interactions

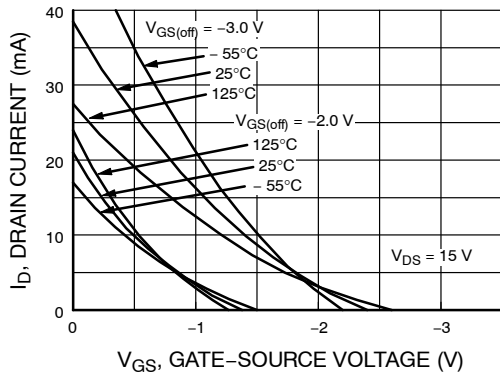


Figure 3. Transfer Characteristics

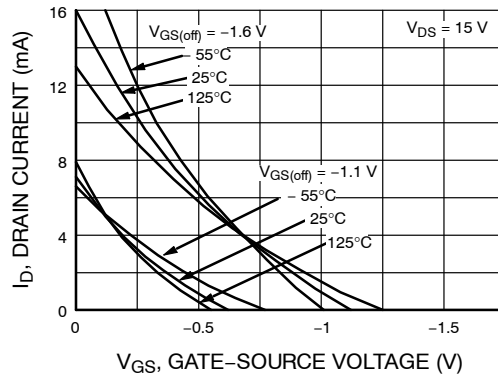


Figure 4. Transfer Characteristics

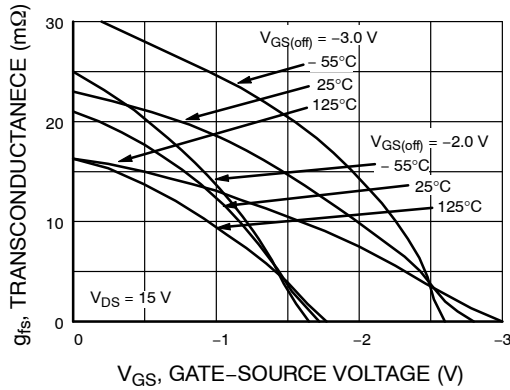


Figure 5. Transfer Characteristics

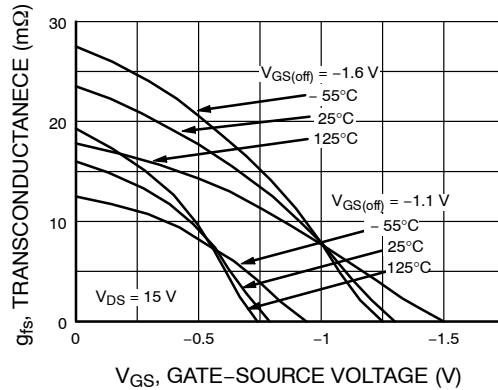


Figure 6. Transfer Characteristics

TYPICAL PERFORMANCE CHARACTERISTICS (CONTINUED)

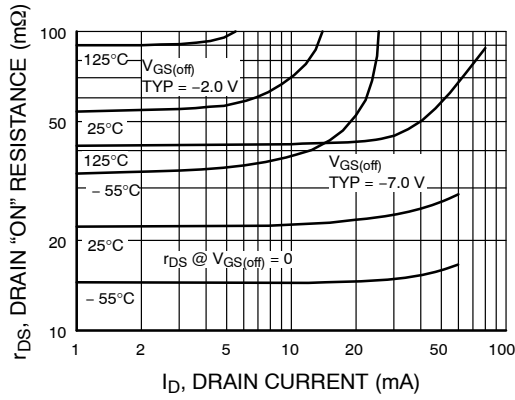


Figure 7. On Resistance vs. Drain Current

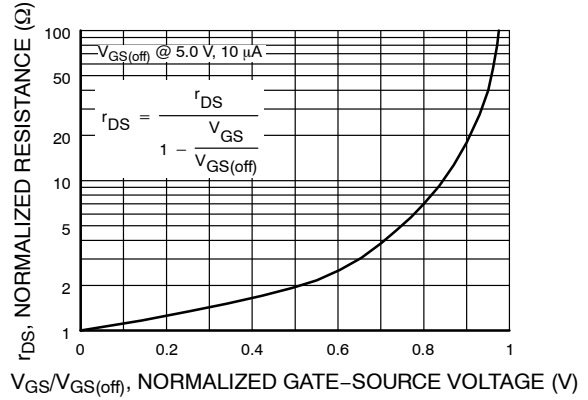


Figure 8. Normalized Drain Resistance vs. Bias Voltage

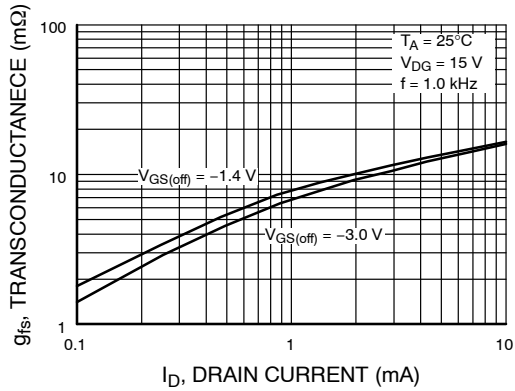


Figure 9. Transconductance vs. Drain Current

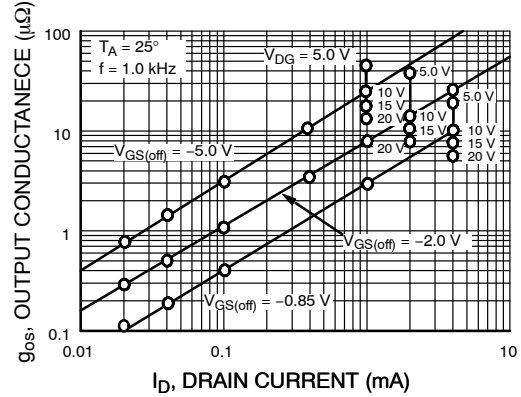


Figure 10. Output Conductance vs. Drain Current

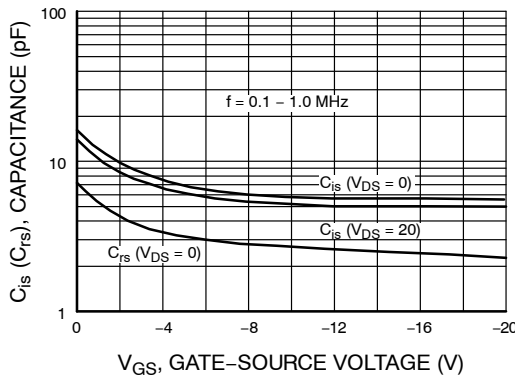


Figure 11. Capacitance vs. Voltage

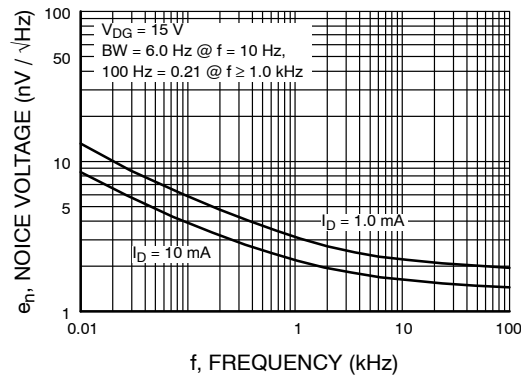


Figure 12. Noise Voltage vs. Frequency

J111, J112, J113, MMBFJ111, MMBFJ112, MMBFJ113

TYPICAL PERFORMANCE CHARACTERISTICS (CONTINUED)

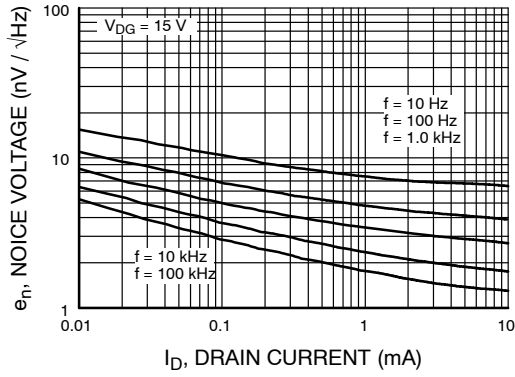


Figure 13. Noise Voltage vs. Current

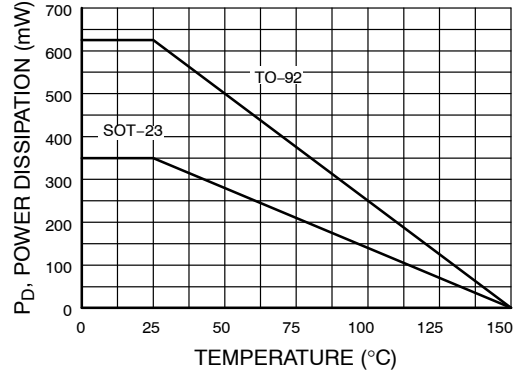


Figure 14. Power Dissipation vs. Ambient Temperature

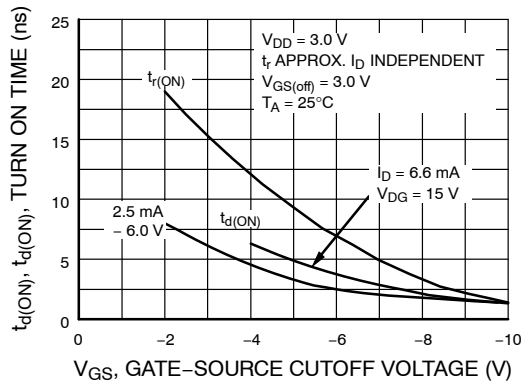


Figure 15. Switching Turn-On Time vs. Gate-Source Voltage

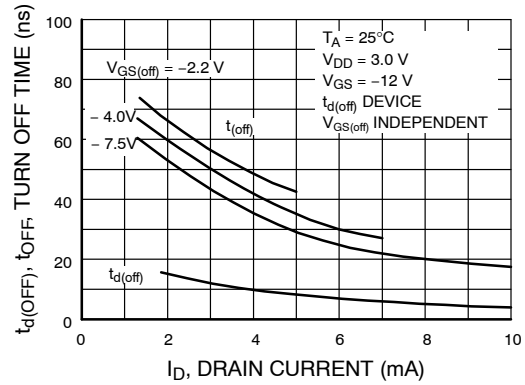


Figure 16. Switching Turn-Off Time vs. Drain Current

J111, J112, J113, MMBFJ111, MMBFJ112, MMBFJ113

ORDERING INFORMATION

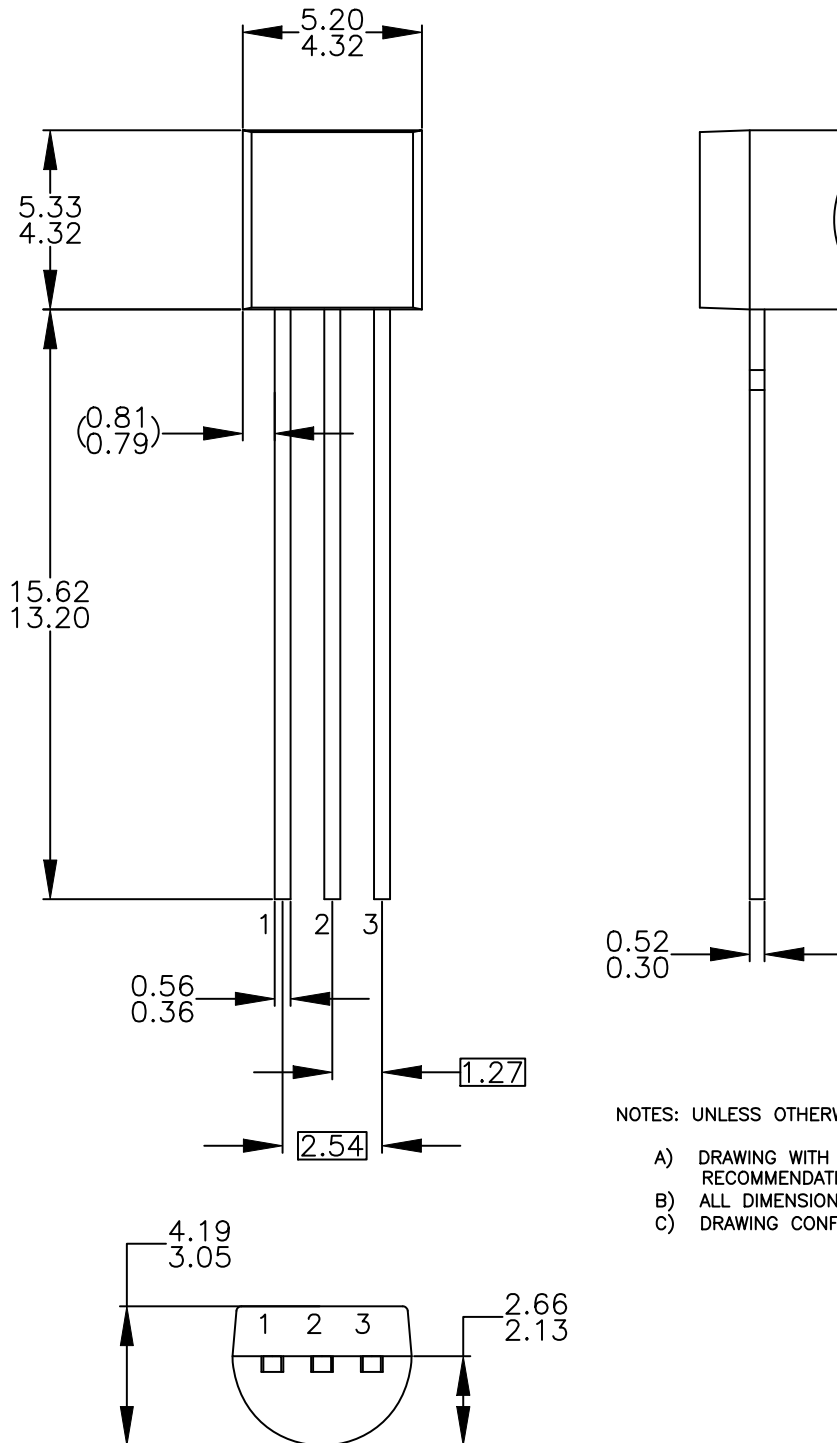
| Part Number | Top Mark | Package | Shipping [†] |
|-------------|------------------|------------------------|-----------------------|
| J111 | AJ 111 YWW | TO-92 3L (Pb-Free) | 10000 Units / Bulk |
| J111-D26Z | AJ 111 YWW | TO-92 3L (Pb-Free) | 2000 / Tape & Reel |
| J111-D74Z | AJ 111 YWW | TO-92 3L (Pb-Free) | 2000 / Ammo |
| J112 | AJ 112 YWW | TO-92 3L (Pb-Free) | 10000 Units / Bulk |
| J112-D26Z | AJ 112 YWW | TO-92 3L (Pb-Free) | 2000 / Tape & Reel |
| J112-D27Z | AJ 112 YWW | TO-92 3L (Pb-Free) | 2000 / Tape & Reel |
| J112-D74Z | AJ 112 YWW | TO-92 3L (Pb-Free) | 2000 / Ammo |
| J113 | AJ 113 YWW | TO-92 3L (Pb-Free) | 10000 Units / Bulk |
| J113-D74Z | AJ 113 YWW | TO-92 3L (Pb-Free) | 2000 / Ammo |
| MMBFJ111 | 6P | SOT-23 3L (Pb-Free) | 3000 / Tape & Reel |
| MMBFJ112 | 6R | SOT-23 3L (Pb-Free) | 3000 / Tape & Reel |
| MMBFJ113 | 6S | SOT-23 3L (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 Specifications Brochure, BRD8011/D.

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

TO-92 3 4.825x4.76
CASE 135AN
ISSUE O

DATE 31 JUL 2016



NOTES: UNLESS OTHERWISE SPECIFIED

- A) DRAWING WITH REFERENCE TO JEDEC TO-92 RECOMMENDATIONS.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DRAWING CONFORMS TO ASME Y14.5M-2009.

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CASE 135AR
ISSUE O

DATE 30 SEP 2016



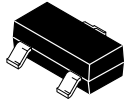
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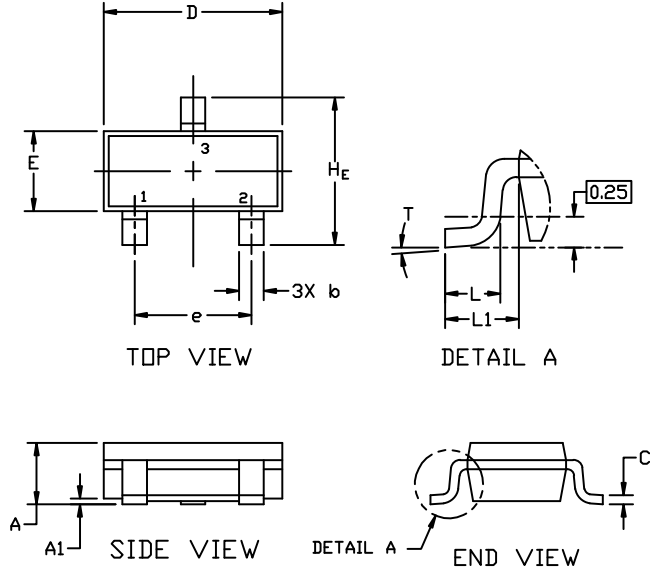
MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



SOT-23 (TO-236)
CASE 318
ISSUE AT

DATE 01 MAR 2023

SCALE 4:1

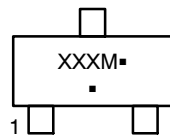


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M,1994.
2. CONTROLLING DIMENSION: 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.

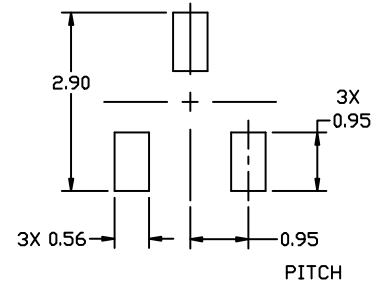
| DIM | MILLIMETERS | | | INCHES | | |
|----------------|-------------|------|------|--------|-------|-------|
| | MIN. | NOM. | MAX. | MIN. | NOM. | MAX. |
| A | 0.89 | 1.00 | 1.11 | 0.035 | 0.039 | 0.044 |
| A1 | 0.01 | 0.06 | 0.10 | 0.000 | 0.002 | 0.004 |
| b | 0.37 | 0.44 | 0.50 | 0.015 | 0.017 | 0.020 |
| c | 0.08 | 0.14 | 0.20 | 0.003 | 0.006 | 0.008 |
| 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 | 0.080 |
| L | 0.30 | 0.43 | 0.55 | 0.012 | 0.017 | 0.022 |
| L1 | 0.35 | 0.54 | 0.69 | 0.014 | 0.021 | 0.027 |
| H _E | 2.10 | 2.40 | 2.64 | 0.083 | 0.094 | 0.104 |
| T | 0° | --- | 10° | 0° | --- | 10° |

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 ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

STYLES ON PAGE 2

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MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS



SOT-23 (TO-236)
CASE 318
ISSUE AT

DATE 01 MAR 2023

- | | | | | | |
|---|---|---|---|---|---|
| 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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