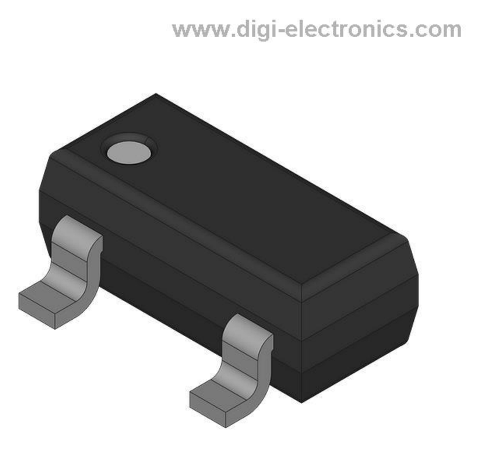
# NTR3A085PZT1G Datasheet



https://www.DiGi-Electronics.com

| | |
|---|---|
| DiGi Electronics Part Number | NTR3A085PZT1G-DG |
| Manufacturer | onsemi |
| Manufacturer Product Number | NTR3A085PZT1G |
| Description | SMALL SIGNAL FIELD-EFFECT TRANSI |
| Detailed Description | P-Channel 20 V 1.9A (Ta) 420mW (Ta) Surface Mount SOT-23-3 (TO-236) |

## Purchase and inquiry

| | |
|---|---|
| Manufacturer Product Number: | Manufacturer: |
| NTR3A085PZT1G | onsemi |
| Series: | Product Status: |
| - | Active |
| FET Type: | Technology: |
| P-Channel | MOSFET (Metal Oxide) |
| Drain to Source Voltage (Vdss): | Current - Continuous Drain (Id) @ 25°C: |
| 20 V | 1.9A (Ta) |
| Drive Voltage (Max Rds On, Min Rds On): | Rds On (Max) @ Id, Vgs: |
| 1.5V, 4.5V | 77mOhm @ 1.6A, 4.5V |
| Vgs(th) (Max) @ Id: | Gate Charge (Qg) (Max) @ Vgs: |
| 1V @ 250µA | 6.9 nC @ 4.5 V |
| Vgs (Max): | Input Capacitance (Ciss) (Max) @ Vds: |
| ±8V | 586 pF @ 10 V |
| FET Feature: | Power Dissipation (Max): |
| - | 420mW (Ta) |
| Operating Temperature: | Grade: |
| -55°C ~ 150°C (TJ) | - |
| Qualification: | Mounting Type: |
| - | Surface Mount |
| Supplier Device Package: | Package / Case: |
| SOT-23-3 (TO-236) | TO-236-3, SC-59, SOT-23-3 |

## Environmental & Export classification

| | |
|---|---|
| ECCN: | HTSUS: |
| EAR99 | 8541.21.0095 |

# NTR3A085PZ

## MOSFET – Power, Single P-Channel, SOT-23

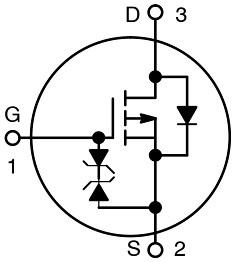
## -20 V, -2.7 A

**ON Semiconductor®**

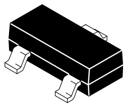
www.onsemi.com

| $V_{(BR)DSS}$ | $R_{DS(on)}$ Max | $I_D$ MAX |
|---|---|---|
| −20 V | 77 mΩ @ −4.5 V | −2.7 A |
| | 105 mΩ @ −2.5 V | |
| | 160 mΩ @ −1.8 V | |

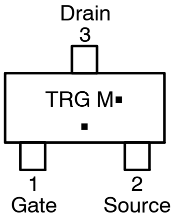
### P−Channel MOSFET



### MARKING DIAGRAM & PIN ASSIGNMENT



SOT−23
CASE 318
STYLE 21



TRG = Specific Device Code
M = Date Code*
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*Date Code orientation may vary depending upon manufacturing location.

### ORDERING INFORMATION

| Device | Package | Shipping† |
|---|---|---|
| NTR3A085PZT1G | 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.

### Features

- Leading −20 V Trench for Low $R_{DS(on)}$
- −1.8 V Rated for Low Voltage Gate Drive
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

### Applications

- Power Load Switch

**MAXIMUM RATINGS** ($T_J$ = 25°C unless otherwise stated)

| Parameter | | | Symbol | Value | Unit |
|---|---|---|---|---|---|
| Drain−to−Source Voltage | | | $V_{DSS}$ | −20 | V |
| Gate−to−Source Voltage | | | $V_{GS}$ | ±8 | V |
| Continuous Drain Current (Note 1) | Steady State | $T_A$ = 25°C | $I_D$ | −2.5 | A |
| | | $T_A$ = 85°C | | −1.8 | |
| | t ≤ 10 s | $T_A$ = 25°C | | −2.7 | |
| Power Dissipation (Note 1) | Steady State | $T_A$ = 25°C | $P_D$ | 0.72 | W |
| | t ≤ 10 s | | | 0.81 | |
| Continuous Drain Current (Note 2) | Steady State | $T_A$ = 25°C | $I_D$ | −1.9 | A |
| | | $T_A$ = 85°C | | −1.4 | |
| Power Dissipation (Note 2) | | $T_A$ = 25°C | $P_D$ | 0.42 | W |
| Pulsed Drain Current | $t_p$ = 10 μs | | $I_{DM}$ | −10 | A |
| ESD HBM, JESD22−A114 (Note 3) | | | $V_{ESD}$ | 1000 | V |
| Operating Junction and Storage Temperature | | | $T_J$, $T_{STG}$ | −55 to 150 | °C |
| Source Current (Body Diode) | | | $I_S$ | −1.1 | A |
| Lead Temperature for Soldering Purposes (1/8 in from case for 10 s) | | | $T_L$ | 260 | °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.

### THERMAL RESISTANCE RATINGS

| Parameter | Symbol | Max | Unit |
|---|---|---|---|
| Junction−to−Ambient – Steady State (Note 1) | $R_{\theta JA}$ | 175 | °C/W |
| Junction−to−Ambient – t ≤ 10 s (Note 1) | $R_{\theta JA}$ | 155 | |
| Junction−to−Ambient – Steady State (Note 2) | $R_{\theta JA}$ | 301 | |

1. Surface−mounted on FR4 board using 1 in sq. pad size (Cu area = 727 mm sq., 1 oz).
2. Surface−mounted on FR4 board using minimum pad size (Cu area = 3.8 mm sq., 1 oz).
3. ESD Rating: HBM Class 1C

**ELECTRICAL CHARACTERISTICS** ($T_J$ = 25°C unless otherwise specified)

| Parameter | Symbol | Test Condition | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | | |
| Drain−to−Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0 V, $I_D$ = −250 μA | | −20 | | | V |
| Drain−to−Source Breakdown Voltage Temperature Coefficient | $V_{(BR)DSS}/T_J$ | $I_D$ = −250 μA, ref to 25°C | | | 22 | | mV/°C |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{GS}$ = 0 V,<br>$V_{DS}$ = −20 V | $T_J$ = 25°C | | | −1 | μA |
| | | | $T_J$ = 125°C | | | −100 | μA |
| Gate−to−Source Leakage Current | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ±8 V | | | | ±10 | μA |
| **ON CHARACTERISTICS** (Note 4) | | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS}$ = $V_{DS}$, $I_D$ = −250 μA | | −0.4 | | −1.0 | V |
| Negative Threshold Temperature Coefficient | $V_{GS(TH)}/T_J$ | | | | 3.0 | | mV/°C |
| Drain−to−Source On Resistance | $R_{DS(on)}$ | $V_{GS}$ = −4.5 V | $I_D$ = −1.6 A | | 54 | 77 | mΩ |
| | | $V_{GS}$ = −2.5 V | $I_D$ = −1.3 A | | 67 | 105 | |
| | | $V_{GS}$ = −1.8 V | $I_D$ = −0.9 A | | 87 | 160 | |
| | | $V_{GS}$ = −1.5 V | $I_D$ = −0.3 A | | 110 | | |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$ = −5 V, $I_D$ = −2.3 A | | | 12 | | S |
| **CHARGES AND CAPACITANCES** | | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{GS}$ = 0 V, f = 1.0 MHz, $V_{DS}$ = −10 V | | | 586 | | pF |
| Output Capacitance | $C_{oss}$ | | | | 81 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | | 72 | | |
| Total Gate Charge | $Q_{G(TOT)}$ | $V_{GS}$ = −4.5 V, $V_{DS}$ = −10 V,<br>$I_D$ = −1.6 A | | | 6.9 | | nC |
| Threshold Gate Charge | $Q_{G(TH)}$ | | | | 0.5 | | |
| Gate−to−Source Charge | $Q_{GS}$ | | | | 0.8 | | |
| Gate−to−Drain Charge | $Q_{GD}$ | | | | 1.6 | | |
| **SWITCHING CHARACTERISTICS** (Note 5) | | | | | | | |
| Turn−On Delay Time | $t_{d(on)}$ | $V_{GS}$ = −4.5 V, $V_{DS}$ = −10 V,<br>$I_D$ = −1.6 A, $R_G$ = 6.0 Ω | | | 6.8 | | ns |
| Rise Time | $t_r$ | | | | 11 | | |
| Turn−Off Delay Time | $t_{d(off)}$ | | | | 32 | | |
| Fall Time | $t_f$ | | | | 23 | | |
| **DRAIN−SOURCE DIODE CHARACTERISTICS** | | | | | | | |
| Forward Diode Voltage | $V_{SD}$ | $V_{GS}$ = 0 V,<br>$I_S$ = −1.1 A | $T_J$ = 25°C | | −0.7 | −1.2 | V |
| | | | $T_J$ = 125°C | | −0.6 | | |
| Reverse Recovery Time | $t_{RR}$ | $V_{GS}$ = 0 V, $dI_{SD}/dt$ = 100 A/μs,<br>$I_S$ = −1.6 A | | | 11 | | ns |
| Charge Time | $t_a$ | | | | 6.0 | | |
| Discharge Time | $t_b$ | | | | 5.0 | | |
| Reverse Recovery Charge | $Q_{RR}$ | | | | 3.6 | | nC |

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 ms, duty cycle ≤ 2%.
5. Switching characteristics are independent of operating junction temperatures.

## TYPICAL CHARACTERISTICS

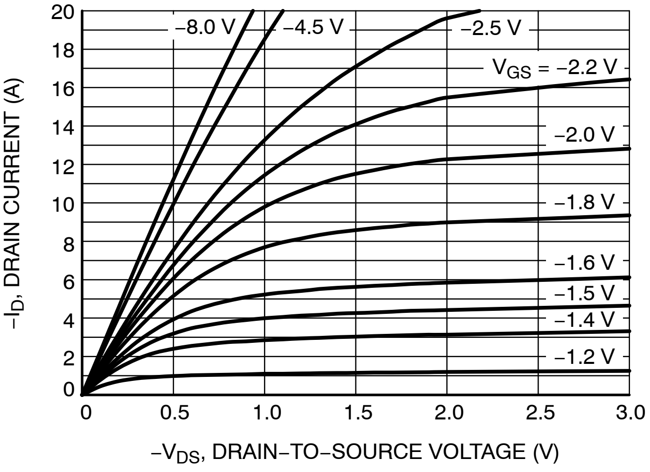


**Figure 1. On−Region Characteristics**

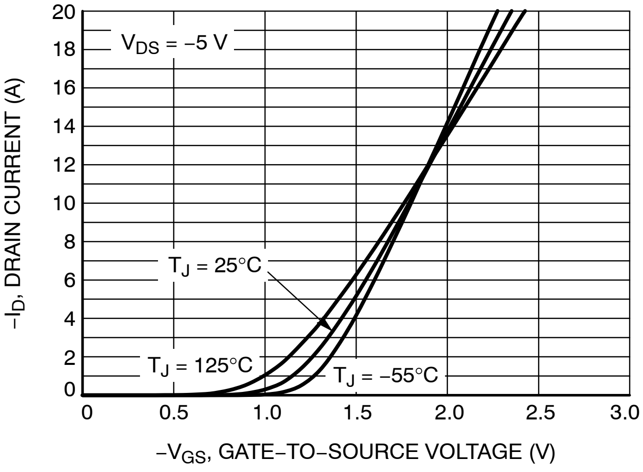


**Figure 2. Transfer Characteristics**

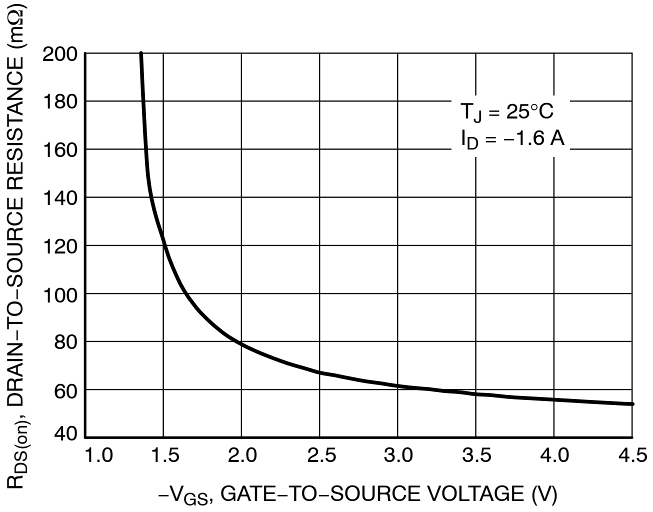


**Figure 3. On−Resistance vs. Gate−to−Source Voltage**

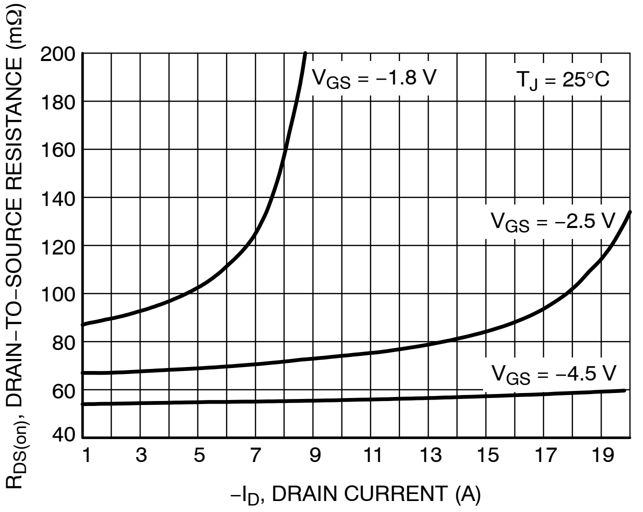


**Figure 4. On−Resistance vs. Drain Current and Gate Voltage**

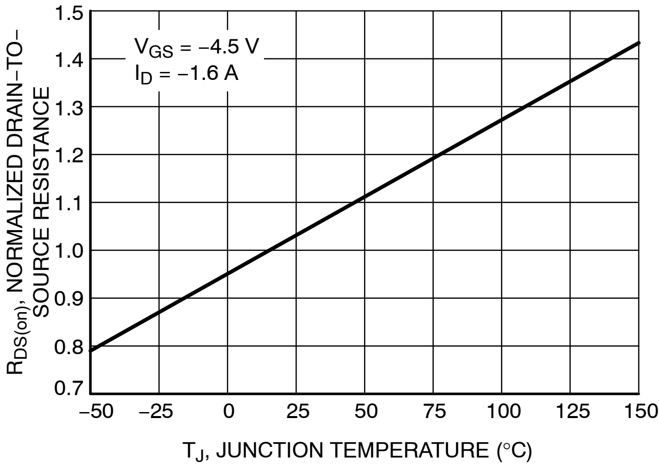


**Figure 5. On−Resistance Variation with Temperature**

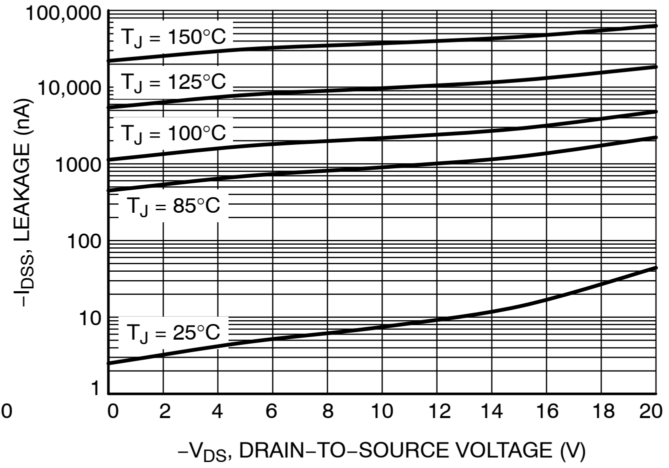


**Figure 6. Drain−to−Source Leakage Current vs. Voltage**

## TYPICAL CHARACTERISTICS

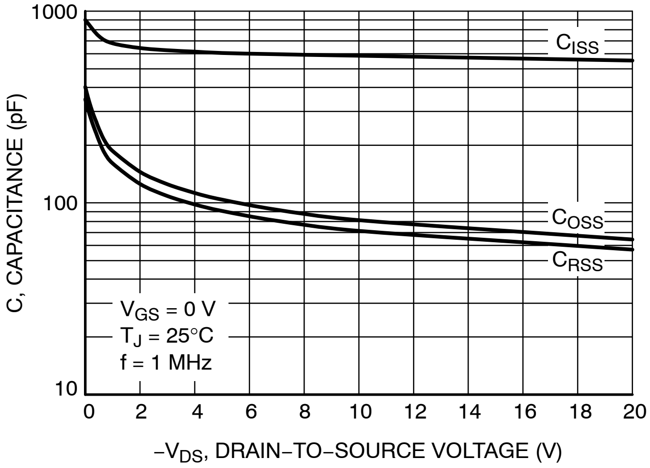


**Figure 7. Capacitance Variation**

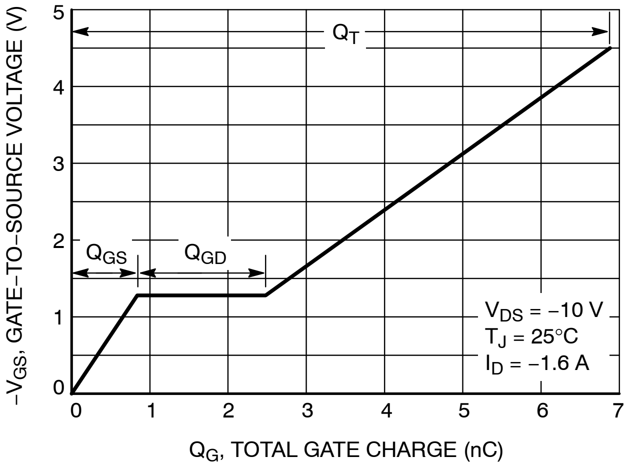


**Figure 8. Gate−to−Source vs. Total Charge**

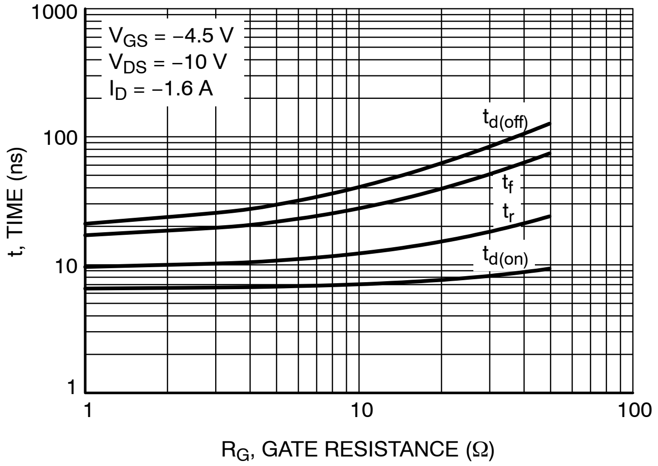


**Figure 9. Resistive Switching Time Variation vs. Gate Resistance**

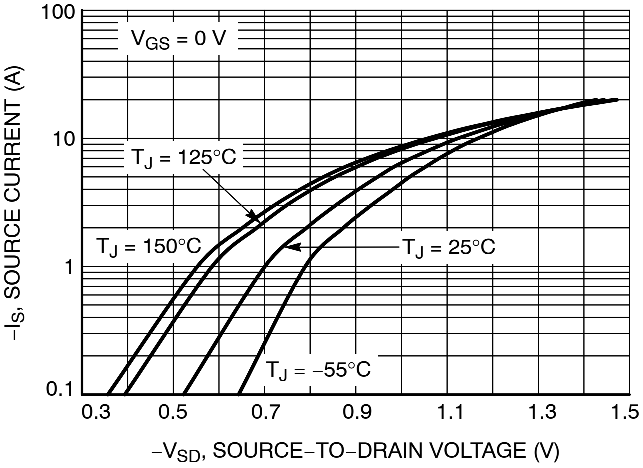


**Figure 10. Diode Forward Voltage vs. Current**

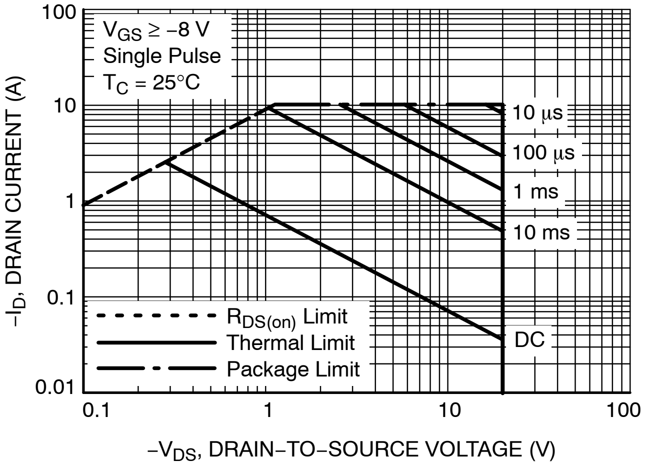


**Figure 11. Maximum Rated Forward Biased Safe Operating Area**

## TYPICAL CHARACTERISTICS

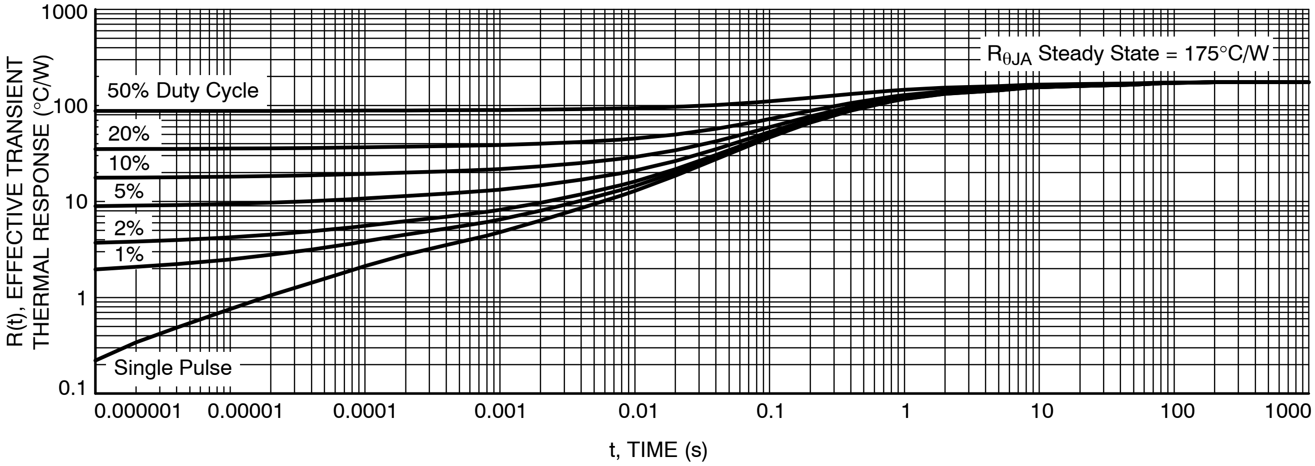
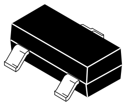


**Figure 12. Thermal Impedance (Junction−to−Ambient)**

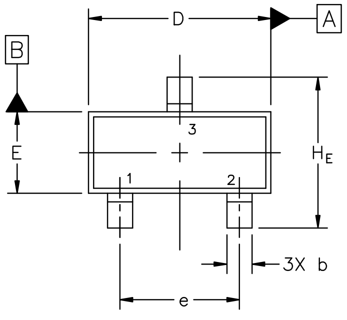
# MECHANICAL CASE OUTLINE
## PACKAGE DIMENSIONS



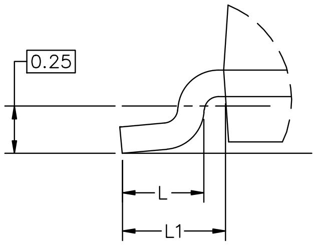
**SCALE 4:1**

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

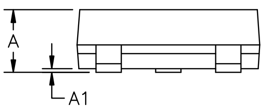
DATE 14 AUG 2024



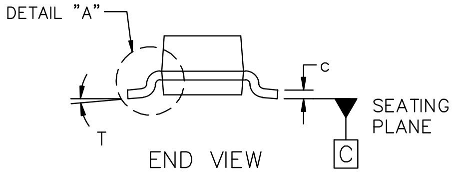
TOP VIEW



DETAIL "A"
Scale 3:1



SIDE VIEW

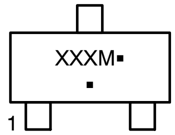


END VIEW

| DIM | MILLIMETERS MIN | MILLIMETERS NOM | MILLIMETERS 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° |

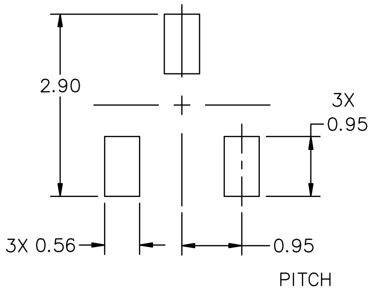
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSIONS: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

**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**

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|---|---|---|
| **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
CASE 318
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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◊

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DCI.

QUALITY MANAGEMENT SYSTEM CERTIFICATE

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DCI Certification Ltd

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ENVIRONMENTAL MANAGEMENT SYSTEM CERTIFICATE

DIGI ELECTRONICS HK LIMITED

GB/T 24001-2016 idt ISO14001:2015

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OCCUPATIONAL HEALTH & SAFETY MANAGEMENT SYSTEM CERTIFICATE

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DCI Certification Ltd

CR

CERTIFICATE OF INCORPORATION

ASA

MEMBERSHIP

Certificate

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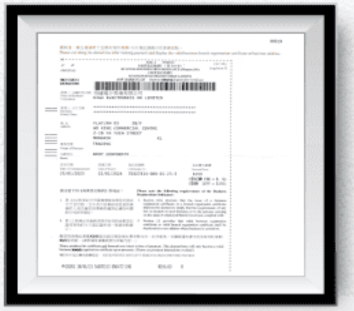

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