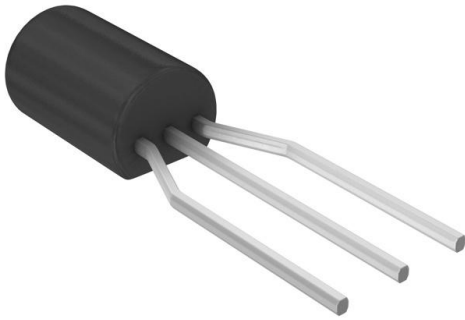


MPSW45RLRE Datasheet

www.digi-electronics.com



<https://www.DiGi-Electronics.com>

| | |
|------------------------------|---|
| DiGi Electronics Part Number | MPSW45RLRE-DG |
| Manufacturer | onsemi |
| Manufacturer Product Number | MPSW45RLRE |
| Description | TRANS NPN DARL 40V 1A TO92 |
| Detailed Description | Bipolar (BJT) Transistor NPN - Darlington 40 V 1 A 100MHz 1 W Through Hole TO-92 (TO-226) |



Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

DiGi is a global authorized distributor of electronic components.

Purchase and inquiry

Manufacturer Product Number:

MPSW45RLRE

Series:

-

Transistor Type:

NPN - Darlington

Voltage - Collector Emitter Breakdown (Max):

40 V

Current - Collector Cutoff (Max):

100nA (ICBO)

Power - Max:

1 W

Operating Temperature:

-55°C ~ 150°C (TJ)

Package / Case:

TO-226-3, TO-92-3 Long Body (Formed Leads)

Base Product Number:

MPSW45

Manufacturer:

onsemi

Product Status:

Obsolete

Current - Collector (Ic) (Max):

1 A

Vce Saturation (Max) @ Ib, Ic:

1.5V @ 2mA, 1A

DC Current Gain (hFE) (Min) @ Ic, Vce:

25000 @ 200mA, 5V

Frequency - Transition:

100MHz

Mounting Type:

Through Hole

Supplier Device Package:

TO-92 (TO-226)

Environmental & Export classification

RoHS Status:

RoHS non-compliant

REACH Status:

REACH Unaffected

HTSUS:

8541.29.0075

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99

MPSW45, MPSW45A

One Watt Darlington Transistors

NPN Silicon

Features

- Pb-Free Packages are Available*

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--|----------------|-------------|---------------------------|
| Collector - Emitter Voltage | V_{CES} | 40 50 | Vdc |
| Collector - Base Voltage | V_{CBO} | 50 60 | Vdc |
| Emitter - Base Voltage | V_{EBO} | 12 | Vdc |
| Collector Current - Continuous | I_C | 1.0 | Adc |
| Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 1.0 8.0 | W mW/ $^\circ\text{C}$ |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C | P_D | 2.5 20 | W mW/ $^\circ\text{C}$ |
| Operating and Storage Junction Temperature Range | T_J, T_{stg} | -55 to +150 | $^\circ\text{C}$ |

THERMAL CHARACTERISTICS

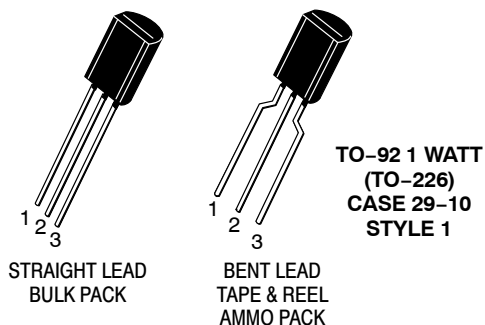
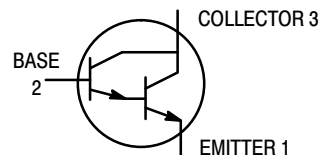
| Characteristic | Symbol | Max | Unit |
|---|-----------------|-----|---------------------------|
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 125 | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 50 | $^\circ\text{C}/\text{W}$ |

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.

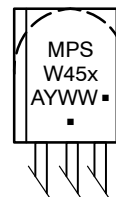


ON Semiconductor®

<http://onsemi.com>



MARKING DIAGRAM



MPSW45x = Device Code
 x = 45A Devices
 A = Assembly Location
 Y = Year
 WW = Work Week
 ■ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

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

MPSW45, MPSW45A**ELECTRICAL CHARACTERISTICS** ($T_A = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic | | Symbol | Min | Max | Unit |
|--|-------------------|---------------|----------|------------|------|
| OFF CHARACTERISTICS | | | | | |
| Collector – Emitter Breakdown Voltage ($I_C = 100\ \mu\text{Adc}$, $V_{BE} = 0$) | MPSW45 MPSW45A | $V_{(BR)CES}$ | 40 50 | – – | Vdc |
| Collector – Base Breakdown Voltage ($I_C = 100\ \mu\text{Adc}$, $I_E = 0$) | MPSW45 MPSW45A | $V_{(BR)CBO}$ | 50 60 | – – | Vdc |
| Emitter – Base Breakdown Voltage ($I_E = 10\ \mu\text{Adc}$, $I_C = 0$) | | $V_{(BR)EBO}$ | 12 | – | Vdc |
| Collector Cutoff Current ($V_{CB} = 30\ \text{Vdc}$, $I_E = 0$) ($V_{CB} = 40\ \text{Vdc}$, $I_E = 0$) | MPSW45 MPSW45A | I_{CBO} | – – | 100 100 | nAdc |
| Emitter Cutoff Current ($V_{EB} = 10\ \text{Vdc}$, $I_C = 0$) | | I_{EBO} | – | 100 | nAdc |

ON CHARACTERISTICS (Note 1)

| | | | | | |
|---|--|---------------|---------------------------|-------------------|-----|
| DC Current Gain ($I_C = 200\ \text{mAdc}$, $V_{CE} = 5.0\ \text{Vdc}$) ($I_C = 500\ \text{mAdc}$, $V_{CE} = 5.0\ \text{Vdc}$) ($I_C = 1.0\ \text{Adc}$, $V_{CE} = 5.0\ \text{Vdc}$) | | h_{FE} | 25,000 15,000 4,000 | 150,000 – – | – |
| Collector – Emitter Saturation Voltage ($I_C = 1.0\ \text{Adc}$, $I_B = 2.0\ \text{mAdc}$) | | $V_{CE(sat)}$ | – | 1.5 | Vdc |
| Base – Emitter Saturation Voltage ($I_C = 1.0\ \text{Adc}$, $I_B = 2.0\ \text{mAdc}$) | | $V_{BE(sat)}$ | – | 2.0 | Vdc |
| Base – Emitter On Voltage ($I_C = 1.0\ \text{Adc}$, $V_{CE} = 5.0\ \text{Vdc}$) | | $V_{BE(on)}$ | – | 2.0 | Vdc |

SMALL-SIGNAL CHARACTERISTICS

| | | | | | |
|---|--|----------|-----|-----|-----|
| Current – Gain – Bandwidth Product ($I_C = 200\ \text{mAdc}$, $V_{CE} = 5.0\ \text{Vdc}$, $f = 100\ \text{MHz}$) | | f_T | 100 | – | MHz |
| Collector – Base Capacitance ($V_{CB} = 10\ \text{Vdc}$, $I_E = 0$, $f = 1.0\ \text{MHz}$) | | C_{cb} | – | 6.0 | pF |

1. Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$; Duty Cycle $\leq 2.0\%$.

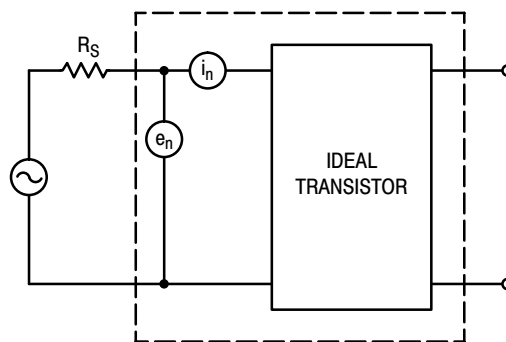


Figure 1. Transistor Noise Model

MPSW45, MPSW45A

NOISE CHARACTERISTICS

($V_{CE} = 5.0 \text{ Vdc}$, $T_A = 25^\circ\text{C}$)

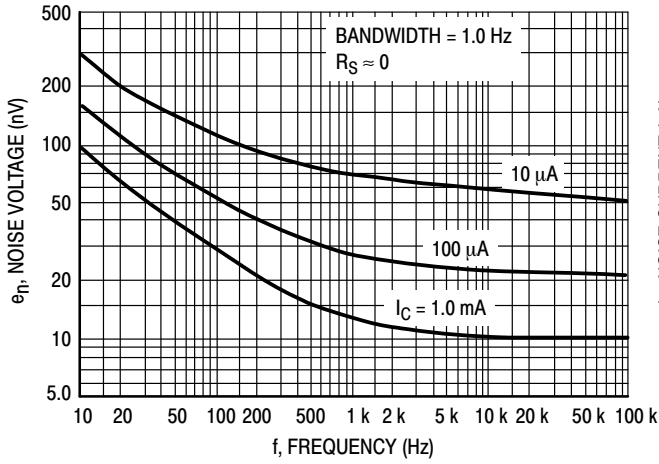


Figure 2. Noise Voltage

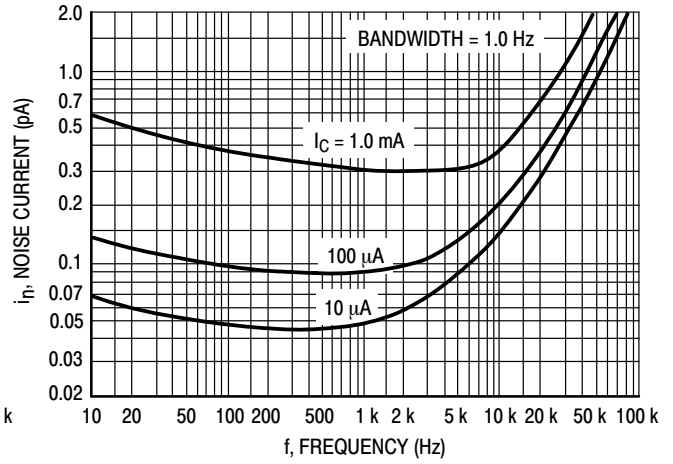


Figure 3. Noise Current

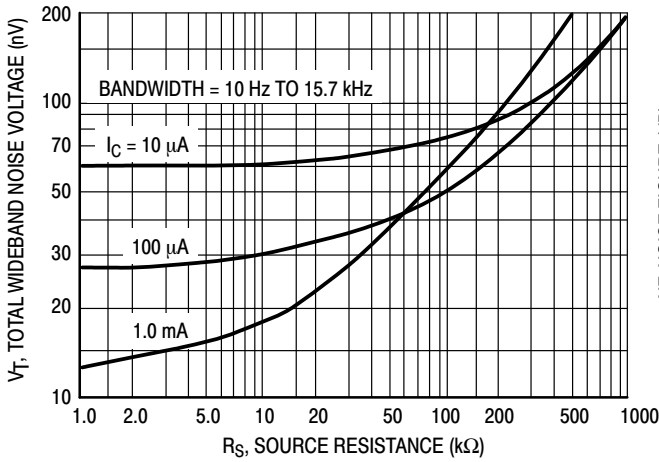


Figure 4. Total Wideband Noise Voltage

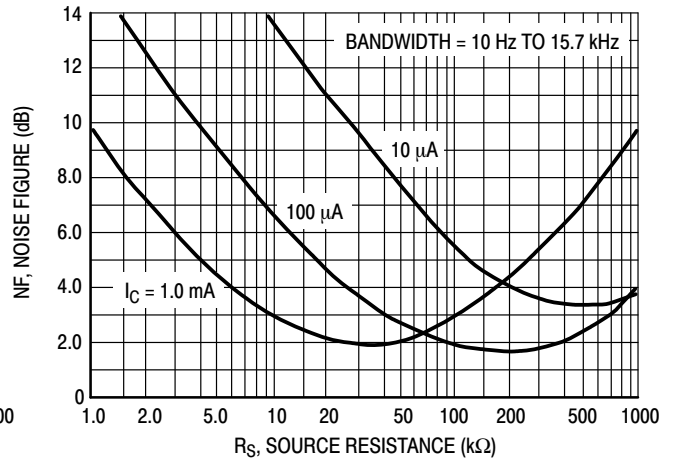


Figure 5. Wideband Noise Figure

MPSW45, MPSW45A

SMALL-SIGNAL CHARACTERISTICS

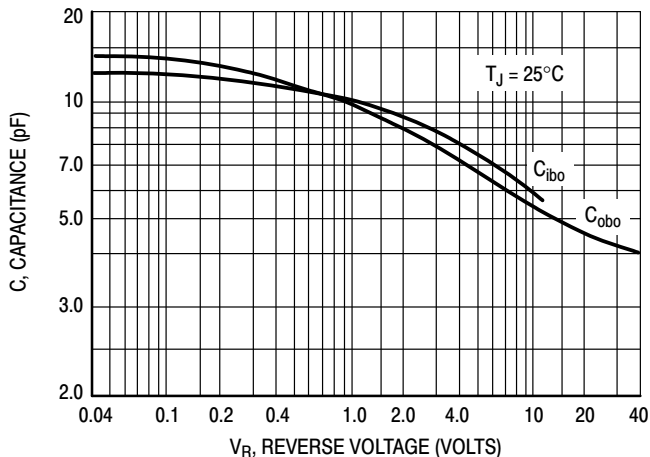


Figure 6. Capacitance

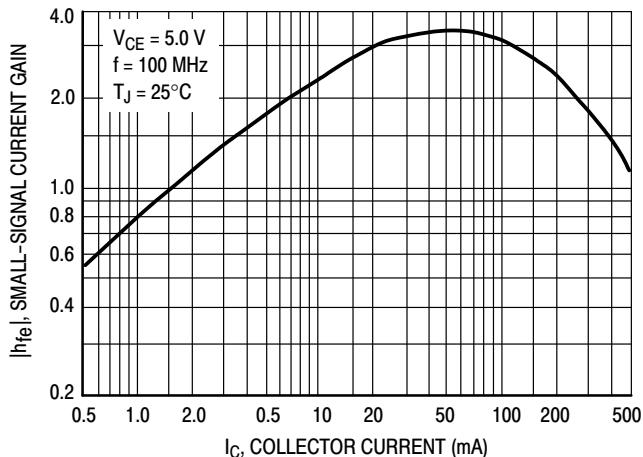


Figure 7. High Frequency Current Gain

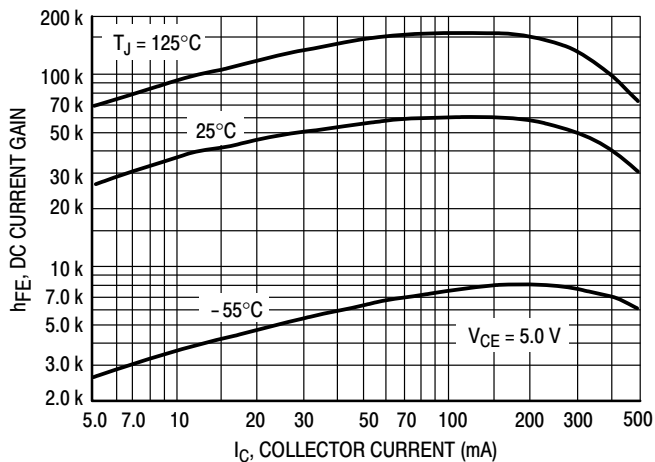


Figure 8. DC Current Gain

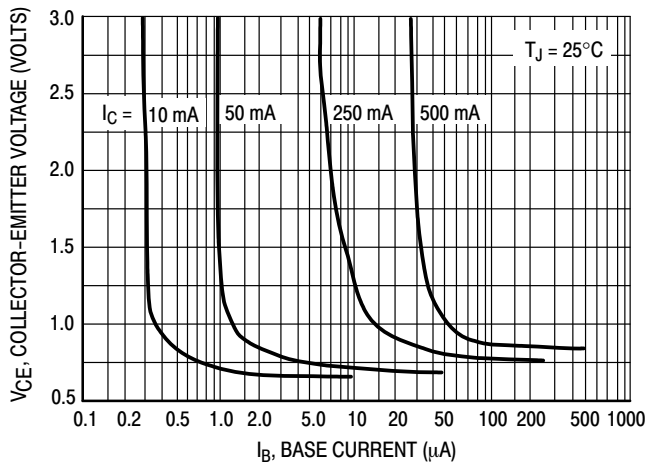


Figure 9. Collector Saturation Region

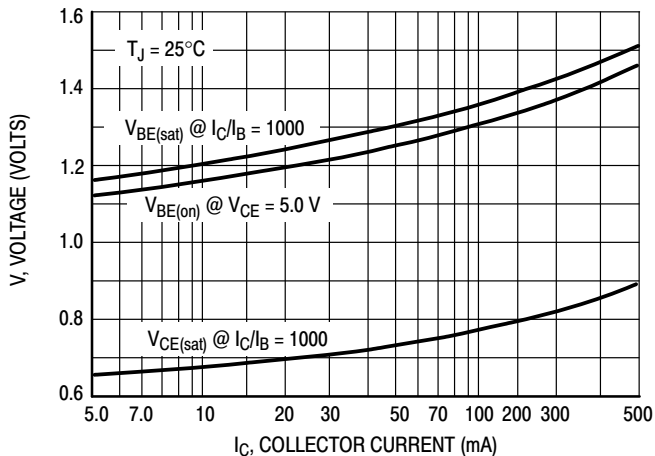


Figure 10. "On" Voltages

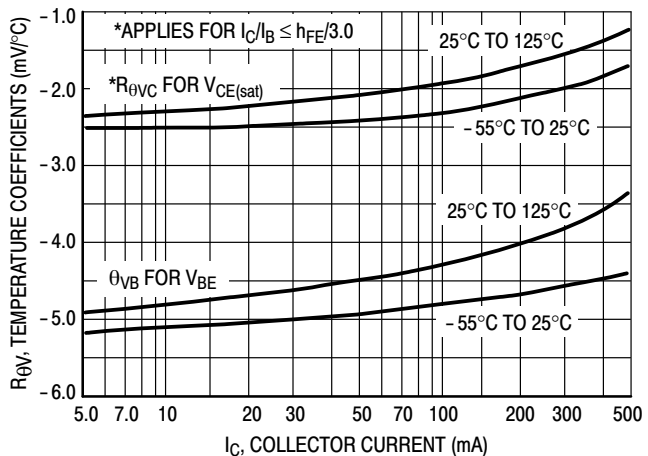


Figure 11. Temperature Coefficients

MPSW45, MPSW45A

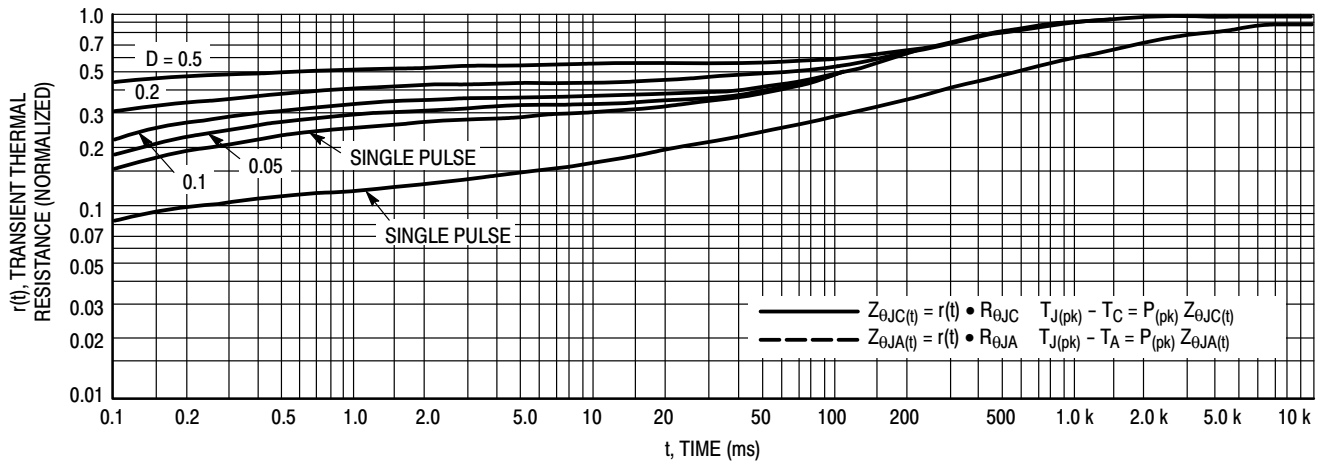


Figure 12. Thermal Response

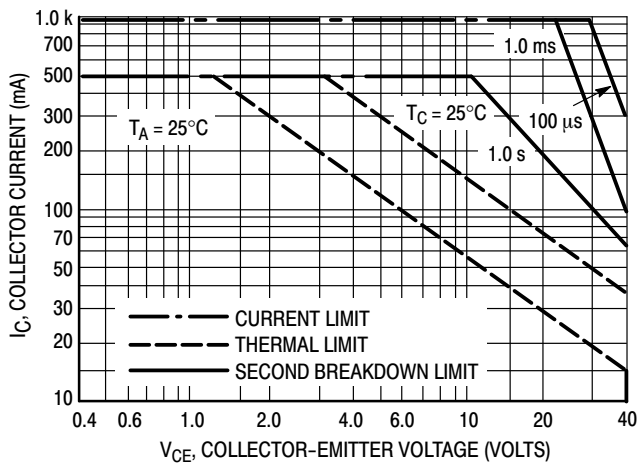
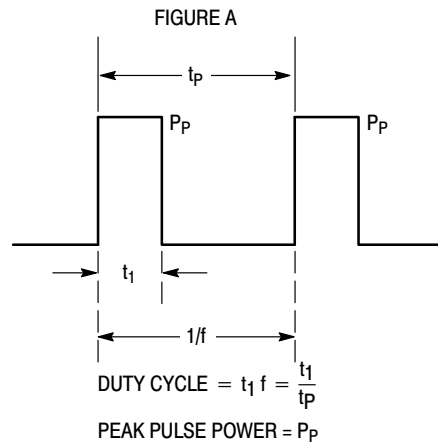


Figure 13. Active Region Safe Operating Area

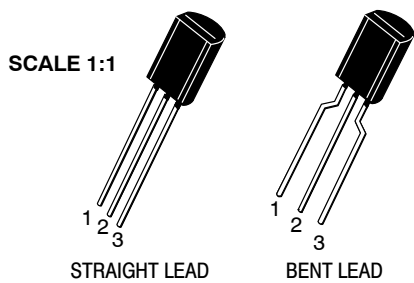


Design Note: Use of Transient Thermal Resistance Data

ORDERING INFORMATION

| Device | Package | Shipping† |
|--------------|--------------------|---------------------|
| MPSW45G | TO-92 (Pb-Free) | 5,000 Units / Box |
| MPSW45RLREG | TO-92 (Pb-Free) | 2,000 / Tape & Reel |
| MPSW45A | TO-92 | 5,000 Units / Box |
| MPSW45AG | TO-92 (Pb-Free) | 5,000 Units / Box |
| MPSW45ARLRA | TO-92 | 2,000 / Tape & Reel |
| MPSW45ARLRAG | TO-92 (Pb-Free) | 2,000 / Tape & Reel |
| MPSW45AZL1 | TO-92 | 2,000 / Ammo Pack |
| MPSW45AZL1G | TO-92 (Pb-Free) | 2,000 / Ammo Pack |

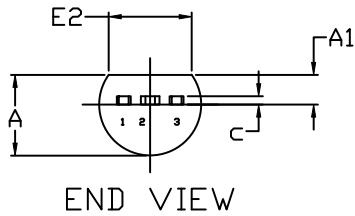
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.



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ISSUE D

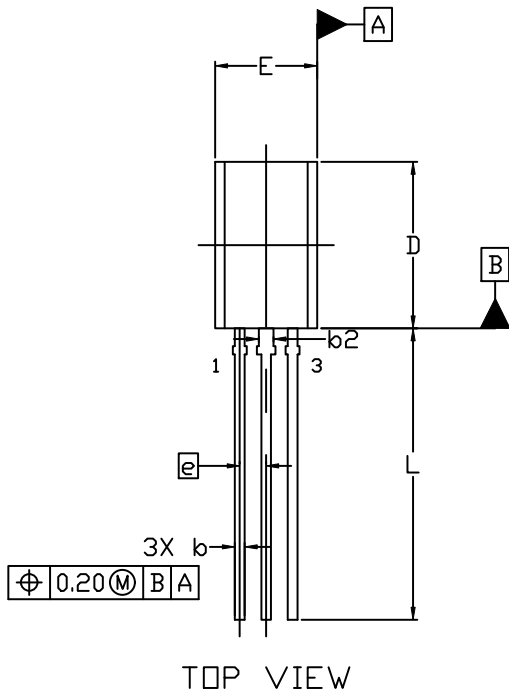
DATE 05 MAR 2021

STRAIGHT LEAD



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH OR GATE PROTRUSIONS.
4. DIMENSION b AND b2 DOES NOT INCLUDE DAMBAR PROTRUSION. LEAD WIDTH INCLUDING PROTRUSION SHALL NOT EXCEED 0.20. DIMENSION b2 LOCATED ABOVE THE DAMBAR PORTION OF MIDDLE LEAD.



| DIM | MILLIMETERS | | |
|-----|-------------|-------|-------|
| | MIN. | NOM. | MAX. |
| A | 3.75 | 3.90 | 4.05 |
| A1 | 1.28 | 1.43 | 1.58 |
| b | 0.38 | 0.465 | 0.55 |
| b2 | 0.62 | 0.70 | 0.78 |
| c | 0.35 | 0.40 | 0.45 |
| D | 7.85 | 8.00 | 8.15 |
| E | 4.75 | 4.90 | 5.05 |
| E2 | 3.90 | --- | --- |
| e | 1.27 BSC | | |
| L | 13.80 | 14.00 | 14.20 |

STYLES AND MARKING ON PAGE 3

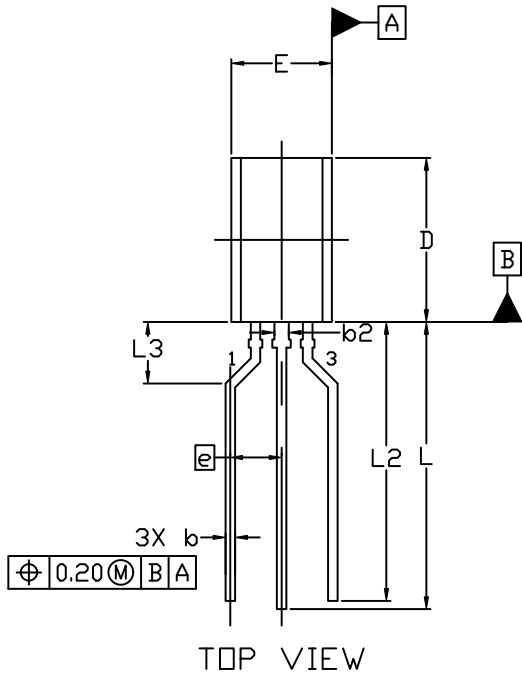
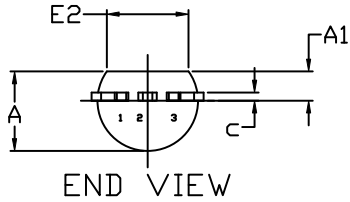
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FORMED LEAD



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH OR GATE PROTRUSIONS.
4. DIMENSION b AND b2 DOES NOT INCLUDE DAMBAR PROTRUSION. LEAD WIDTH INCLUDING PROTRUSION SHALL NOT EXCEED 0.20. DIMENSION b2 LOCATED ABOVE THE DAMBAR PORTION OF MIDDLE LEAD.

| DIM | MILLIMETERS | | |
|-----|-------------|-------|-------|
| | MIN. | NOM. | MAX. |
| A | 3.75 | 3.90 | 4.05 |
| A1 | 1.28 | 1.43 | 1.58 |
| b | 0.38 | 0.465 | 0.55 |
| b2 | 0.62 | 0.70 | 0.78 |
| c | 0.35 | 0.40 | 0.45 |
| D | 7.85 | 8.00 | 8.15 |
| E | 4.75 | 4.90 | 5.05 |
| E2 | 3.90 | --- | --- |
| e | 2.50 BSC | | |
| L | 13.80 | 14.00 | 14.20 |
| L2 | 13.20 | 13.60 | 14.00 |
| L3 | 3.00 REF | | |

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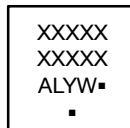
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DATE 05 MAR 2021

- | | | | | |
|---|--|--|---|---|
| <p>STYLE 1: PIN 1. EMITTER 2. BASE 3. COLLECTOR</p> | <p>STYLE 2: PIN 1. BASE 2. EMITTER 3. COLLECTOR</p> | <p>STYLE 3: PIN 1. ANODE 2. ANODE 3. CATHODE</p> | <p>STYLE 4: PIN 1. CATHODE 2. CATHODE 3. ANODE</p> | <p>STYLE 5: PIN 1. DRAIN 2. SOURCE 3. GATE</p> |
| <p>STYLE 6: PIN 1. GATE 2. SOURCE & SUBSTRATE 3. DRAIN</p> | <p>STYLE 7: PIN 1. SOURCE 2. DRAIN 3. GATE</p> | <p>STYLE 8: PIN 1. DRAIN 2. GATE 3. SOURCE & SUBSTRATE</p> | <p>STYLE 9: PIN 1. BASE 1 2. EMITTER 3. BASE 2</p> | <p>STYLE 10: PIN 1. CATHODE 2. GATE 3. ANODE</p> |
| <p>STYLE 11: PIN 1. ANODE 2. CATHODE & ANODE 3. CATHODE</p> | <p>STYLE 12: PIN 1. MAIN TERMINAL 1 2. GATE 3. MAIN TERMINAL 2</p> | <p>STYLE 13: PIN 1. ANODE 1 2. GATE 3. CATHODE 2</p> | <p>STYLE 14: PIN 1. EMITTER 2. COLLECTOR 3. BASE</p> | <p>STYLE 15: PIN 1. ANODE 1 2. CATHODE 3. ANODE 2</p> |
| <p>STYLE 16: PIN 1. ANODE 2. GATE 3. CATHODE</p> | <p>STYLE 17: PIN 1. COLLECTOR 2. BASE 3. EMITTER</p> | <p>STYLE 18: PIN 1. ANODE 2. CATHODE 3. NOT CONNECTED</p> | <p>STYLE 19: PIN 1. GATE 2. ANODE 3. CATHODE</p> | <p>STYLE 20: PIN 1. NOT CONNECTED 2. CATHODE 3. ANODE</p> |
| <p>STYLE 21: PIN 1. COLLECTOR 2. EMITTER 3. BASE</p> | <p>STYLE 22: PIN 1. SOURCE 2. GATE 3. DRAIN</p> | <p>STYLE 23: PIN 1. GATE 2. SOURCE 3. DRAIN</p> | <p>STYLE 24: PIN 1. EMITTER 2. COLLECTOR/ANODE 3. CATHODE</p> | <p>STYLE 25: PIN 1. MT 1 2. GATE 3. MT 2</p> |
| <p>STYLE 26: PIN 1. V_{CC} 2. GROUND 2 3. OUTPUT</p> | <p>STYLE 27: PIN 1. MT 2. SUBSTRATE 3. MT</p> | <p>STYLE 28: PIN 1. CATHODE 2. ANODE 3. GATE</p> | <p>STYLE 29: PIN 1. NOT CONNECTED 2. ANODE 3. CATHODE</p> | <p>STYLE 30: PIN 1. DRAIN 2. GATE 3. SOURCE</p> |
| <p>STYLE 31: PIN 1. GATE 2. DRAIN 3. SOURCE</p> | <p>STYLE 32: PIN 1. BASE 2. COLLECTOR 3. EMITTER</p> | <p>STYLE 33: PIN 1. RETURN 2. INPUT 3. OUTPUT</p> | <p>STYLE 34: PIN 1. INPUT 2. GROUND 3. LOGIC</p> | <p>STYLE 35: PIN 1. GATE 2. COLLECTOR 3. EMITTER</p> |

**GENERIC
MARKING DIAGRAM***



- XXXX = Specific Device Code
- A = Assembly Location
- L = Wafer Lot
- Y = Year
- W = Work Week
- = Pb-Free Package

(Note: Microdot may be in either location)

*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.

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ONLINE SUPPORT: www.onsemi.com/support

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