

# PNP Silicon Epitaxial Transistors

## BCP53 Series

This PNP Silicon Epitaxial transistor is designed for use in audio amplifier applications. The device is housed in the SOT-223 package which is designed for medium power surface mount applications.

- High Current
- NPN Complement is BCP56
- The SOT-223 Package can be soldered using wave or reflow.  
The formed leads absorb thermal stress during soldering, eliminating the possibility of damage to the die
- Device Marking:  
BCP53T1G = AH  
BCP53-10T1G = AH-10  
BCP53-16T1G = AH-16
- S and NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### THERMAL CHARACTERISTICS

| Characteristic                                            | Symbol          | Max  | Unit |
|-----------------------------------------------------------|-----------------|------|------|
| Thermal Resistance, Junction-to-Ambient (Surface Mounted) | $R_{\theta JA}$ | 83.3 | °C/W |
| Lead Temperature for Soldering, 0.0625" from case         | $T_L$           | 260  | °C   |
| Time in Solder Bath                                       |                 | 10   | s    |

### MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

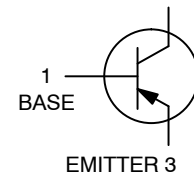
| Rating                                                                                            | Symbol         | Value       | Unit       |
|---------------------------------------------------------------------------------------------------|----------------|-------------|------------|
| Collector-Emitter Voltage                                                                         | $V_{CEO}$      | -80         | V          |
| Collector-Base Voltage                                                                            | $V_{CBO}$      | -100        | V          |
| Emitter-Base Voltage                                                                              | $V_{EBO}$      | -5.0        | V          |
| Collector Current                                                                                 | $I_C$          | 1.5         | A          |
| Collector Current - Peak, single pulse, $t_p \leq 1$ ms                                           | $I_{CM}$       | 3.0         | A          |
| Base Current - Continuous                                                                         | $I_B$          | -0.3        | A          |
| Base Collector Current - Peak, single pulse, $t_p \leq 1$ ms                                      | $I_{BM}$       | -0.4        | A          |
| Total Power Dissipation<br>@ $T_A = 25^\circ\text{C}$ (Note 1)<br>Derate above $25^\circ\text{C}$ | $P_D$          | 1.5<br>12   | W<br>mW/°C |
| Operating and Storage Temperature Range                                                           | $T_J, T_{stg}$ | -65 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. Device mounted on a glass epoxy printed circuit board 1.575 in. x 1.575 in. x 0.059 in.; mounting pad for the collector lead min. 0.93 sq. in.

## MEDIUM POWER HIGH CURRENT SURFACE MOUNT PNP TRANSISTORS

COLLECTOR 2, 4

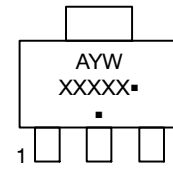


EMITTER 3

### MARKING DIAGRAM



SOT-223  
CASE 318E  
STYLE 1



A = Assembly Location  
Y = Year  
W = Work Week  
XXXXX = Specific Device Code  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

### ORDERING INFORMATION

| Device         | Package           | Shipping†        |
|----------------|-------------------|------------------|
| BCP53T1G       | SOT-223 (Pb-Free) | 1000/Tape & Reel |
| SBCP53-10T1G   | SOT-223 (Pb-Free) | 1000/Tape & Reel |
| BCP53-10T1G    | SOT-223 (Pb-Free) | 1000/Tape & Reel |
| SBCP53-10T1G   | SOT-223 (Pb-Free) | 1000/Tape & Reel |
| BCP53-16T1G    | SOT-223 (Pb-Free) | 1000/Tape & Reel |
| SBCP53-16T1G   | SOT-223 (Pb-Free) | 1000/Tape & Reel |
| BCP53-16T3G    | SOT-223 (Pb-Free) | 4000/Tape & Reel |
| NSVBCP53-16T3G | SOT-223 (Pb-Free) | 4000/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.

## BCP53 Series

### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

| Characteristics | Symbol | Min | Typ | Max | Unit |
|-----------------|--------|-----|-----|-----|------|
|-----------------|--------|-----|-----|-----|------|

#### OFF CHARACTERISTICS

|                                                                                                         |               |      |   |      |      |
|---------------------------------------------------------------------------------------------------------|---------------|------|---|------|------|
| Collector–Base Breakdown Voltage<br>( $I_C = -100\ \mu\text{Adc}$ , $I_E = 0$ )                         | $V_{(BR)CBO}$ | -100 | – | –    | Vdc  |
| Collector–Emitter Breakdown Voltage<br>( $I_C = -1.0\ \text{mAdc}$ , $I_B = 0$ )                        | $V_{(BR)CEO}$ | -80  | – | –    | Vdc  |
| Collector–Emitter Breakdown Voltage<br>( $I_C = -100\ \mu\text{Adc}$ , $R_{BE} = 1.0\ \text{k}\Omega$ ) | $V_{(BR)CER}$ | -100 | – | –    | Vdc  |
| Emitter–Base Breakdown Voltage<br>( $I_E = -10\ \mu\text{Adc}$ , $I_C = 0$ )                            | $V_{(BR)EBO}$ | -5.0 | – | –    | Vdc  |
| Collector–Base Cutoff Current<br>( $V_{CB} = -30\ \text{Vdc}$ , $I_E = 0$ )                             | $I_{CBO}$     | –    | – | -100 | nAdc |
| Emitter–Base Cutoff Current<br>( $V_{EB} = -5.0\ \text{Vdc}$ , $I_C = 0$ )                              | $I_{EBO}$     | –    | – | -100 | nAdc |

#### ON CHARACTERISTICS

|                                                                                                                                                                                                                                                                                                                              |               |                                     |                               |                                     |     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------------------------------|-------------------------------|-------------------------------------|-----|
| DC Current Gain<br>( $I_C = -5.0\ \text{mAdc}$ , $V_{CE} = -2.0\ \text{Vdc}$ )<br>All Part Types<br>( $I_C = -150\ \text{mAdc}$ , $V_{CE} = -2.0\ \text{Vdc}$ )<br>BCP53, SBCP53<br>BCP53-10, SBCP53-10<br>BCP53-16, SBCP53-16, NSVBCP53-16<br>( $I_C = -500\ \text{mAdc}$ , $V_{CE} = -2.0\ \text{Vdc}$ )<br>All Part Types | $h_{FE}$      | 25<br><br>40<br>63<br>100<br><br>25 | –<br><br>–<br>–<br>–<br><br>– | –<br><br>250<br>160<br>250<br><br>– | –   |
| Collector–Emitter Saturation Voltage<br>( $I_C = -500\ \text{mAdc}$ , $I_B = -50\ \text{mAdc}$ )                                                                                                                                                                                                                             | $V_{CE(sat)}$ | –                                   | –                             | -0.5                                | Vdc |
| Base–Emitter On Voltage<br>( $I_C = -500\ \text{mAdc}$ , $V_{CE} = -2.0\ \text{Vdc}$ )                                                                                                                                                                                                                                       | $V_{BE(on)}$  | –                                   | –                             | -1.0                                | Vdc |

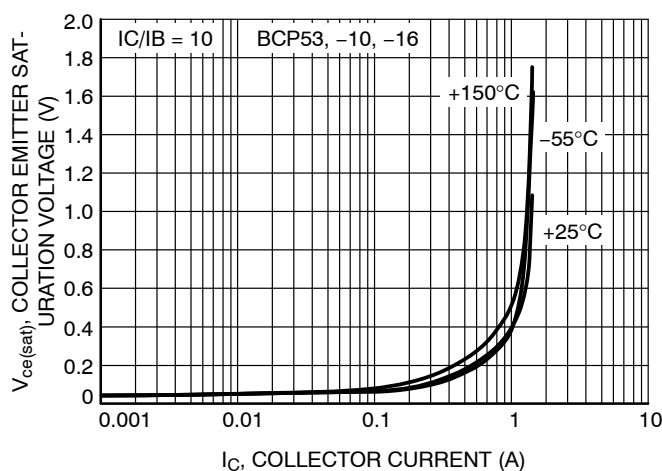
#### DYNAMIC CHARACTERISTICS

|                                                                                                                       |       |   |    |   |     |
|-----------------------------------------------------------------------------------------------------------------------|-------|---|----|---|-----|
| Current–Gain – Bandwidth Product<br>( $I_C = -10\ \text{mAdc}$ , $V_{CE} = -5.0\ \text{Vdc}$ , $f = 35\ \text{MHz}$ ) | $f_T$ | – | 50 | – | MHz |
|-----------------------------------------------------------------------------------------------------------------------|-------|---|----|---|-----|

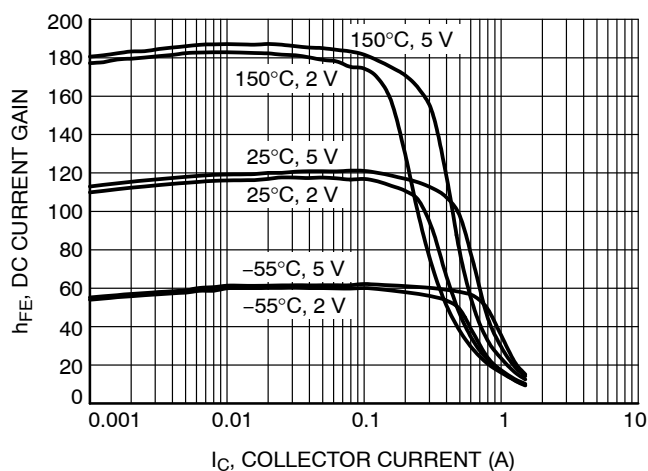
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

# BCP53 Series

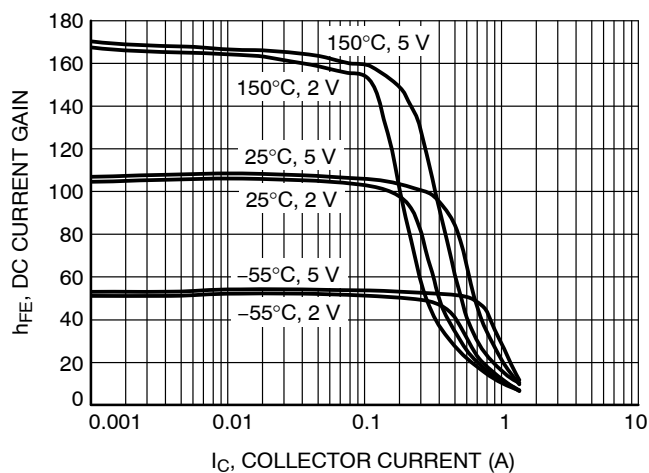
## TYPICAL CHARACTERISTICS



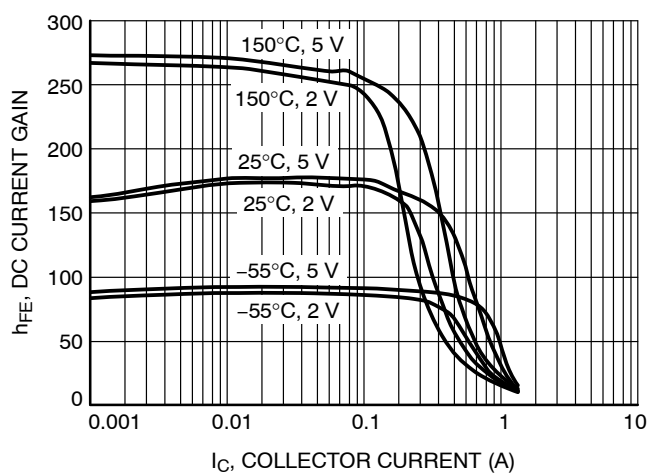
**Figure 1. Collector Emitter Saturation Voltage vs. Collector Current**



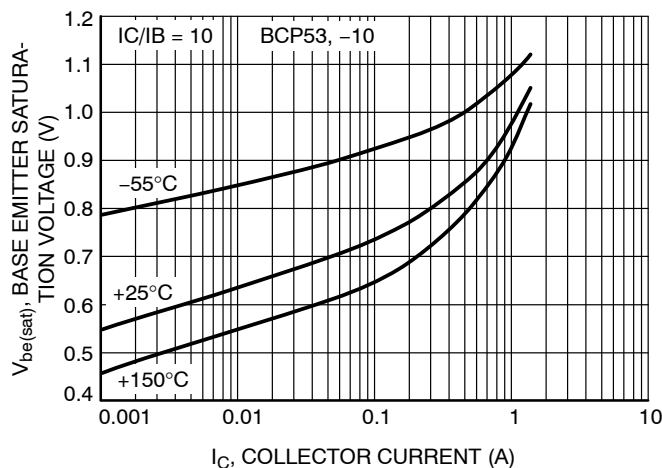
**Figure 2. DC Current Gain vs. Collector Current (BCP53)**



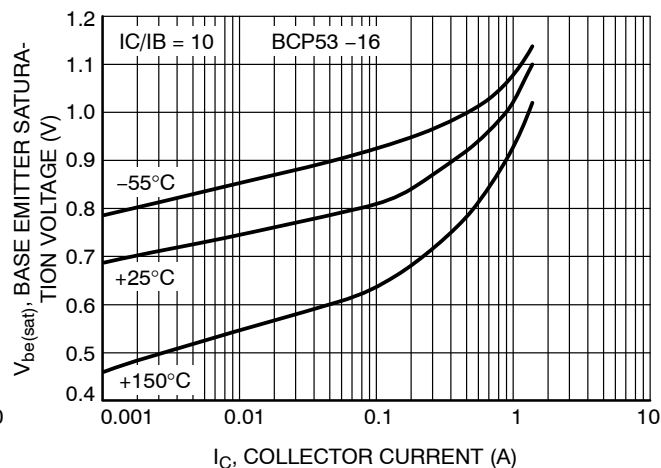
**Figure 3. DC Current Gain vs. Collector Current (BCP53-10)**



**Figure 4. DC Current Gain vs. Collector Current (BCP53-16)**



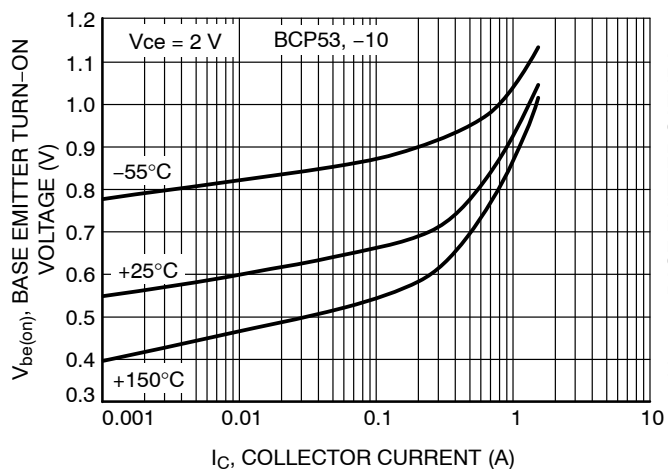
**Figure 5. BCP53, -10 Base Emitter Saturation Voltage vs. Collector Current**



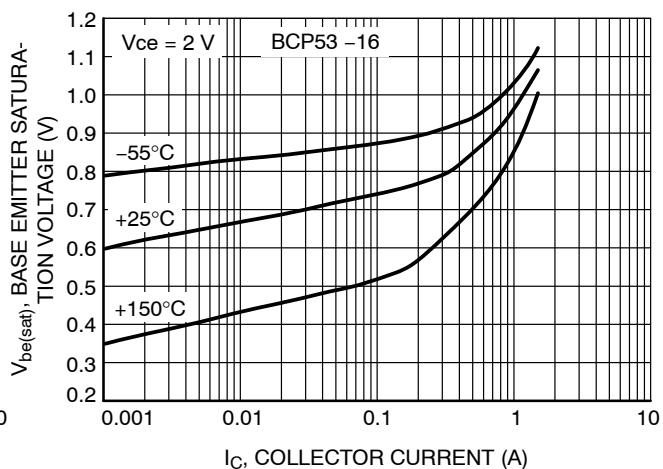
**Figure 6. BCP53-16 Base Emitter Saturation Voltage vs. Collector Current**

# BCP53 Series

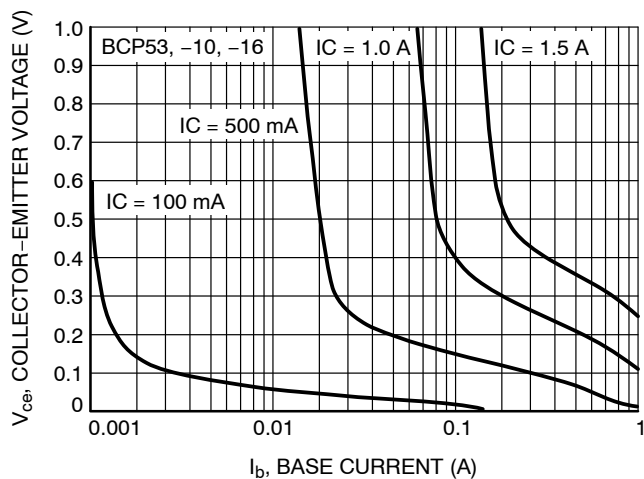
## TYPICAL CHARACTERISTICS



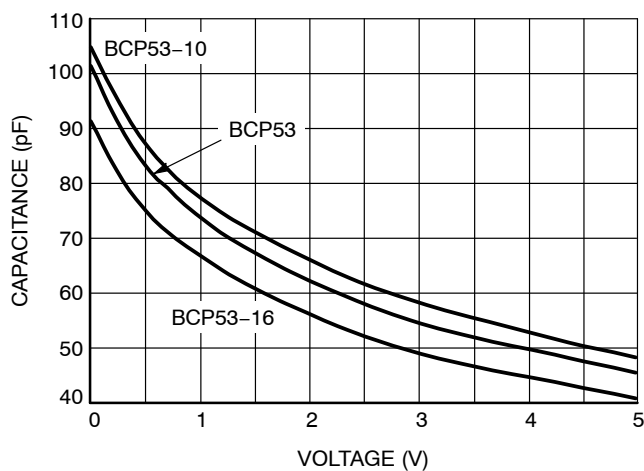
**Figure 7. BCP53, -10 Base Emitter Turn-On Voltage vs. Collector Current  $V_{BE(on)}$**



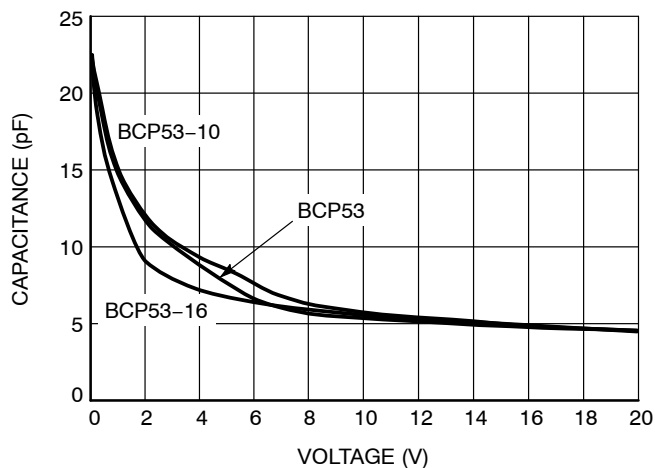
**Figure 8. BCP53-16 Base Emitter Turn-On Voltage vs. Collector Current**



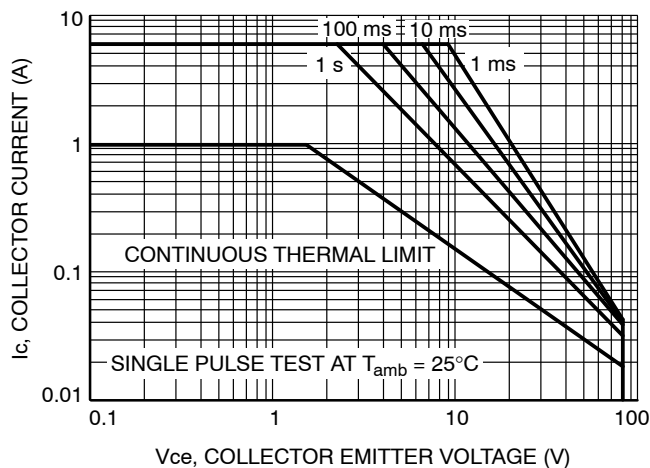
**Figure 9. BCP53, -10, -16 Saturation Region**



**Figure 10. Input Capacitance**



**Figure 11. Output Capacitance**



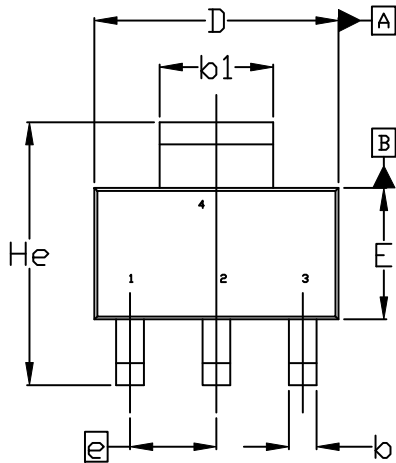
**Figure 12. Standard Operating Area**



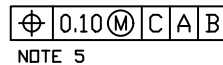
SCALE 1:1

**SOT-223 (TO-261)**  
CASE 318E-04  
ISSUE R

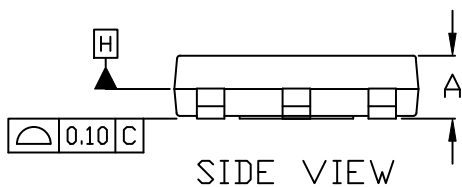
DATE 02 OCT 2018



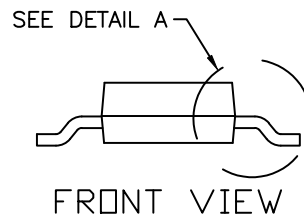
TOP VIEW



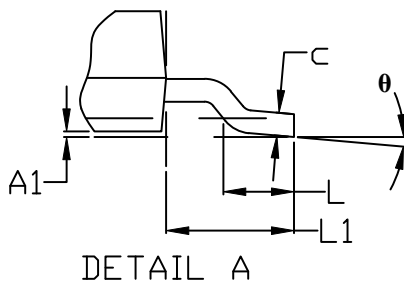
NOTE 5



SIDE VIEW



FRONT VIEW

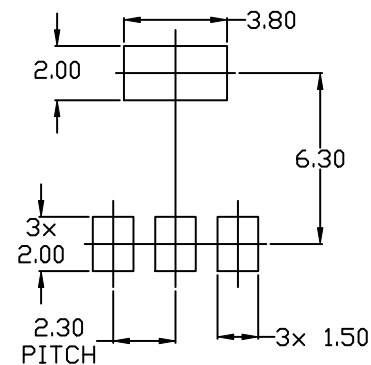


DETAIL A

## NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS D & E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.200MM PER SIDE.
4. DATUMS A AND B ARE DETERMINED AT DATUM H.
5. A1 IS DEFINED AS THE VERTICAL DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT OF THE PACKAGE BODY.
6. POSITIONAL TOLERANCE APPLIES TO DIMENSIONS b AND b1.

| MILLIMETERS |          |      |      |
|-------------|----------|------|------|
| DIM         | MIN.     | NOM. | MAX. |
| A           | 1.50     | 1.63 | 1.75 |
| A1          | 0.02     | 0.06 | 0.10 |
| b           | 0.60     | 0.75 | 0.89 |
| b1          | 2.90     | 3.06 | 3.20 |
| c           | 0.24     | 0.29 | 0.35 |
| D           | 6.30     | 6.50 | 6.70 |
| E           | 3.30     | 3.50 | 3.70 |
| e           | 2.30 BSC |      |      |
| L           | 0.20     | ---  | ---  |
| L1          | 1.50     | 1.75 | 2.00 |
| He          | 6.70     | 7.00 | 7.30 |
| θ           | 0°       | ---  | 10°  |


RECOMMENDED MOUNTING  
FOOTPRINT

|                         |                         |                                                                                                                                                                                     |
|-------------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DOCUMENT NUMBER:</b> | <b>98ASB42680B</b>      | Electronic versions are uncontrolled except when accessed directly from the Document Repository.<br>Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| <b>DESCRIPTION:</b>     | <b>SOT-223 (TO-261)</b> | <b>PAGE 1 OF 2</b>                                                                                                                                                                  |

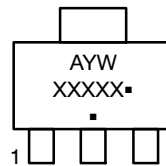
onsemi and onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

**SOT-223 (TO-261)**  
**CASE 318E-04**  
**ISSUE R**

DATE 02 OCT 2018

|                                                                              |                                                                             |                                                                               |                                                                       |                                                                       |
|------------------------------------------------------------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------|
| <b>STYLE 1:</b><br>PIN 1. BASE<br>2. COLLECTOR<br>3. EMITTER<br>4. COLLECTOR | <b>STYLE 2:</b><br>PIN 1. ANODE<br>2. CATHODE<br>3. NC<br>4. CATHODE        | <b>STYLE 3:</b><br>PIN 1. GATE<br>2. DRAIN<br>3. SOURCE<br>4. DRAIN           | <b>STYLE 4:</b><br>PIN 1. SOURCE<br>2. DRAIN<br>3. GATE<br>4. DRAIN   | <b>STYLE 5:</b><br>PIN 1. DRAIN<br>2. GATE<br>3. SOURCE<br>4. GATE    |
| <b>STYLE 6:</b><br>PIN 1. RETURN<br>2. INPUT<br>3. OUTPUT<br>4. INPUT        | <b>STYLE 7:</b><br>PIN 1. ANODE 1<br>2. CATHODE<br>3. ANODE 2<br>4. CATHODE | <b>STYLE 8:</b><br>CANCELLED                                                  | <b>STYLE 9:</b><br>PIN 1. INPUT<br>2. GROUND<br>3. LOGIC<br>4. GROUND | <b>STYLE 10:</b><br>PIN 1. CATHODE<br>2. ANODE<br>3. GATE<br>4. ANODE |
| <b>STYLE 11:</b><br>PIN 1. MT 1<br>2. MT 2<br>3. GATE<br>4. MT 2             | <b>STYLE 12:</b><br>PIN 1. INPUT<br>2. OUTPUT<br>3. NC<br>4. OUTPUT         | <b>STYLE 13:</b><br>PIN 1. GATE<br>2. COLLECTOR<br>3. EMITTER<br>4. COLLECTOR |                                                                       |                                                                       |

**GENERIC  
MARKING DIAGRAM\***



A = Assembly Location  
 Y = Year  
 W = Work Week  
 XXXXX = Specific Device Code  
 ■ = 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.

|                         |                         |                                                                                                                                                                                     |
|-------------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DOCUMENT NUMBER:</b> | <b>98ASB42680B</b>      | Electronic versions are uncontrolled except when accessed directly from the Document Repository.<br>Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| <b>DESCRIPTION:</b>     | <b>SOT-223 (TO-261)</b> | <b>PAGE 2 OF 2</b>                                                                                                                                                                  |

**onsemi** and **Onsemi** are trademarks of Semiconductor Components Industries, LLC dba **onsemi** or its subsidiaries in the United States and/or other countries. **onsemi** reserves the right to make changes without further notice to any products herein. **onsemi** makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. **onsemi** does not convey any license under its patent rights nor the rights of others.

**onsemi**, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## ADDITIONAL INFORMATION

### TECHNICAL PUBLICATIONS:

Technical Library: [www.onsemi.com/design/resources/technical-documentation](http://www.onsemi.com/design/resources/technical-documentation)  
onsemi Website: [www.onsemi.com](http://www.onsemi.com)

### ONLINE SUPPORT: [www.onsemi.com/support](http://www.onsemi.com/support)

For additional information, please contact your local Sales Representative at  
[www.onsemi.com/support/sales](http://www.onsemi.com/support/sales)