

# NPN Silicon Epitaxial Transistor

## BCP68T1G

This NPN Silicon Epitaxial Transistor is designed for use in low voltage, high current applications. The device is housed in the SOT-223 package, which is designed for medium power surface mount applications.

### Features

- High Current
- The SOT-223 Package Can Be Soldered Using Wave or Reflow
- SOT-223 package ensures level mounting, resulting in improved thermal conduction, and allows visual inspection of soldered joints. The formed leads absorb thermal stress during soldering, eliminating the possibility of damage to the die
- The PNP Complement is BCP69T1
- S 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

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

| Rating                                                                                            | Symbol         | Value      | Unit                      |
|---------------------------------------------------------------------------------------------------|----------------|------------|---------------------------|
| Collector-Emitter Voltage                                                                         | $V_{CEO}$      | 20         | Vdc                       |
| Collector-Base Voltage                                                                            | $V_{CBO}$      | 25         | Vdc                       |
| Emitter-Base Voltage                                                                              | $V_{EBO}$      | 5.0        | Vdc                       |
| Collector Current                                                                                 | $I_C$          | 1.0        | Adc                       |
| Collector Current - Peak (Note 2)                                                                 | $I_{CM}$       | 3.0        | Adc                       |
| Base Current - Continuous                                                                         | $I_B$          | 0.4        | Adc                       |
| Base Current - Peak                                                                               | $I_{BM}$       | 0.4        | Adc                       |
| 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/ $^\circ\text{C}$ |
| Operating and Storage Temperature Range                                                           | $T_J, T_{stg}$ | -65 to 150 | $^\circ\text{C}$          |

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.
2. Reference SOA curve for  $I_C$  peak.

### THERMAL CHARACTERISTICS

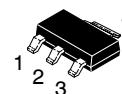
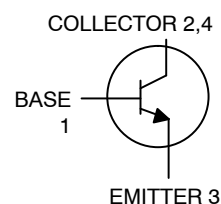
| Characteristic                                                          | Symbol          | Max       | Unit                      |
|-------------------------------------------------------------------------|-----------------|-----------|---------------------------|
| Thermal Resistance, Junction-to-Ambient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



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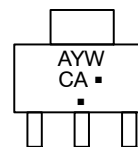
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## MEDIUM POWER NPN SILICON HIGH CURRENT TRANSISTOR SURFACE MOUNT



SOT-223  
CASE 318E  
STYLE 1

### MARKING DIAGRAM



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

(Note: Microdot may be in either location)

### ORDERING INFORMATION

| Device                   | Package           | Shipping†         |
|--------------------------|-------------------|-------------------|
| BCP68T1G                 | SOT-223 (Pb-Free) | 1,000/Tape & Reel |
| SBCP68T1G*, NSVBCP68T1G* | SOT-223 (Pb-Free) | 1,000/Tape & Reel |
| BCP68T3G                 | SOT-223 (Pb-Free) | 4,000/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.

# BCP68T1G

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

| Characteristics                                                                        | Symbol               | Min | Typ | Max | Unit |
|----------------------------------------------------------------------------------------|----------------------|-----|-----|-----|------|
| <b>OFF CHARACTERISTICS</b>                                                             |                      |     |     |     |      |
| Collector-Emitter Breakdown Voltage<br>(I <sub>C</sub> = 100 µAdc, I <sub>E</sub> = 0) | V <sub>(BR)CES</sub> | 25  | –   | –   | Vdc  |
| Collector-Emitter Breakdown Voltage<br>(I <sub>C</sub> = 1.0 mAdc, I <sub>B</sub> = 0) | V <sub>(BR)CEO</sub> | 20  | –   | –   | Vdc  |
| Emitter-Base Breakdown Voltage<br>(I <sub>E</sub> = 10 µAdc, I <sub>C</sub> = 0)       | V <sub>(BR)EBO</sub> | 5.0 | –   | –   | Vdc  |
| Collector-Base Cutoff Current<br>(V <sub>CB</sub> = 25 Vdc, I <sub>E</sub> = 0)        | I <sub>CBO</sub>     | –   | –   | 10  | µAdc |
| Emitter-Base Cutoff Current<br>(V <sub>EB</sub> = 5.0 Vdc, I <sub>C</sub> = 0)         | I <sub>EBO</sub>     | –   | –   | 10  | µAdc |

## ON CHARACTERISTICS

|                                                                                                                                                                                             |                      |                |             |               |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------|-------------|---------------|-----|
| DC Current Gain<br>(I <sub>C</sub> = 5.0 mAdc, V <sub>CE</sub> = 10 Vdc)<br>(I <sub>C</sub> = 500 mAdc, V <sub>CE</sub> = 1.0 Vdc)<br>(I <sub>C</sub> = 1.0 Adc, V <sub>CE</sub> = 1.0 Vdc) | h <sub>FE</sub>      | 50<br>85<br>60 | –<br>–<br>– | –<br>375<br>– | –   |
| Collector-Emitter Saturation Voltage<br>(I <sub>C</sub> = 1.0 Adc, I <sub>B</sub> = 100 mAdc)                                                                                               | V <sub>CE(sat)</sub> | –              | –           | 0.5           | Vdc |
| Base-Emitter On Voltage<br>(I <sub>C</sub> = 1.0 Adc, V <sub>CE</sub> = 1.0 Vdc)                                                                                                            | V <sub>BE(on)</sub>  | –              | –           | 1.0           | Vdc |

## DYNAMIC CHARACTERISTICS

|                                                                                           |                  |   |     |   |     |
|-------------------------------------------------------------------------------------------|------------------|---|-----|---|-----|
| Current-Gain – Bandwidth Product<br>(I <sub>C</sub> = 10 mAdc, V <sub>CE</sub> = 5.0 Vdc) | f <sub>T</sub>   | – | 60  | – | MHz |
| Output Capacitance (V <sub>CB</sub> = 10 Vdc, I <sub>E</sub> = 0, f = 1.0 MHz)            | C <sub>obo</sub> | – | 15  | – | pF  |
| Output Capacitance (V <sub>EB</sub> = 5 Vdc, I <sub>E</sub> = 0, f = 1.0 MHz)             | C <sub>ibo</sub> | – | 145 | – | 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.

## TYPICAL ELECTRICAL CHARACTERISTICS

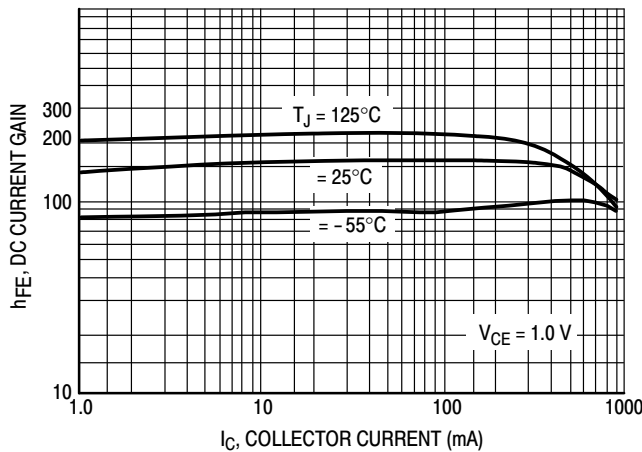


Figure 1. DC Current Gain

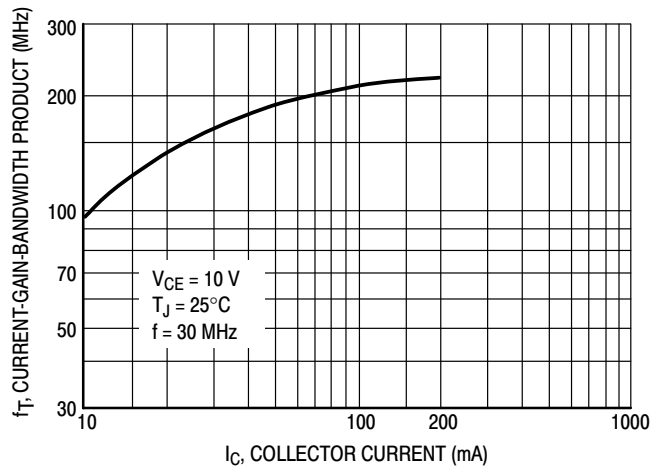


Figure 2. Current-Gain-Bandwidth Product

## TYPICAL ELECTRICAL CHARACTERISTICS

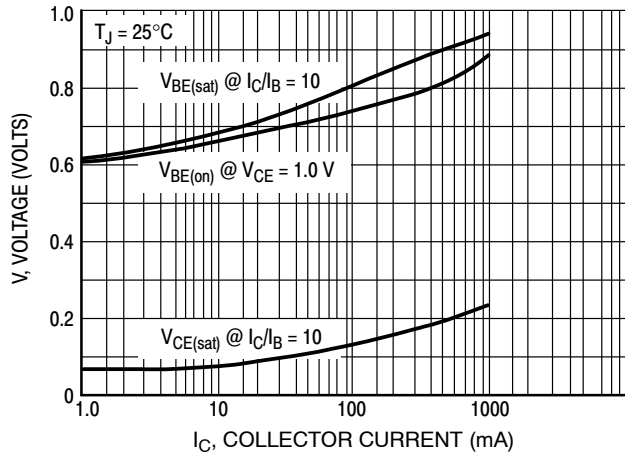


Figure 3. "On" Voltage

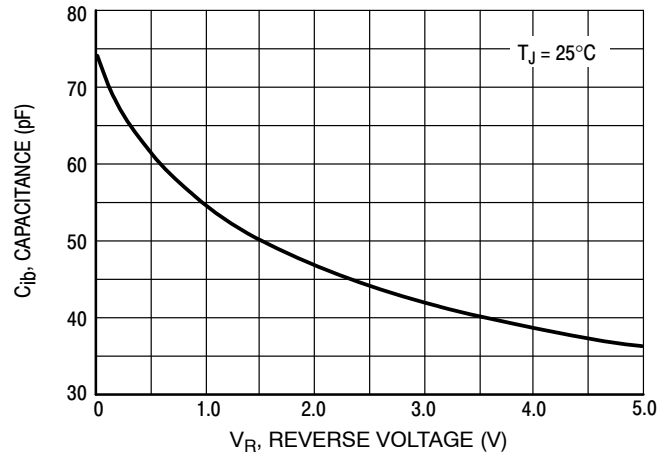


Figure 4. Capacitance

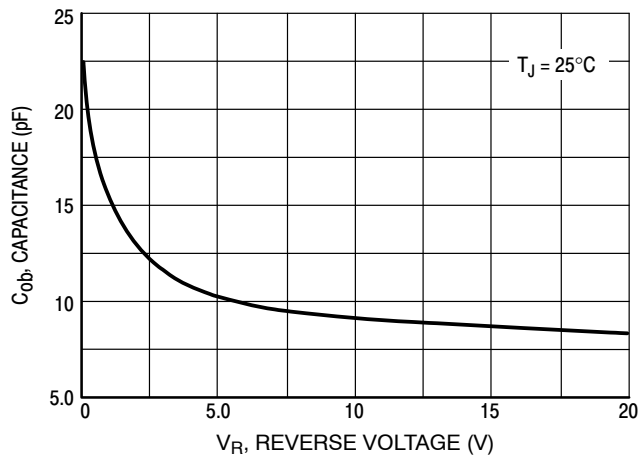


Figure 5. Capacitance

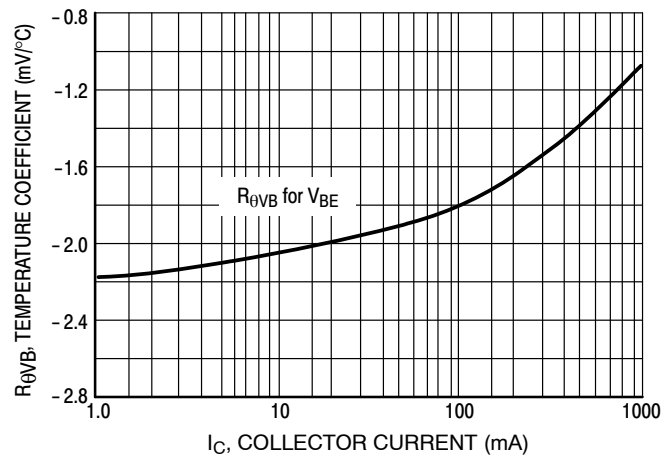


Figure 6. Base-Emitter Temperature Coefficient

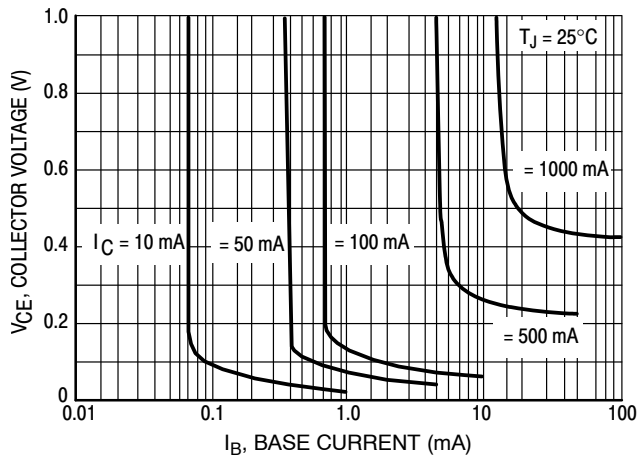


Figure 7. Saturation Region

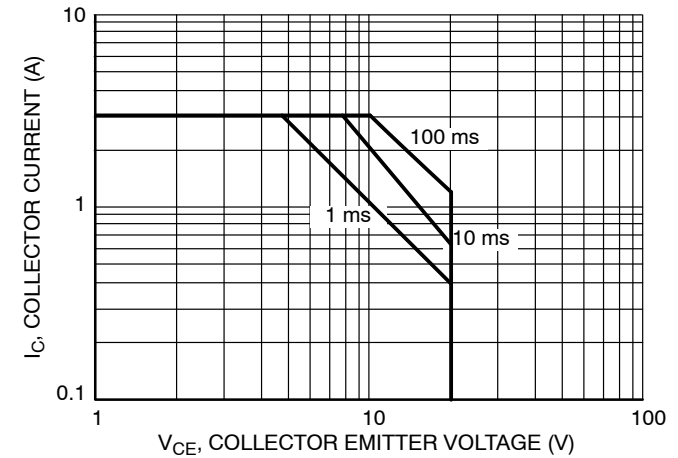


Figure 8. Safe Operating Area

## TYPICAL ELECTRICAL CHARACTERISTICS

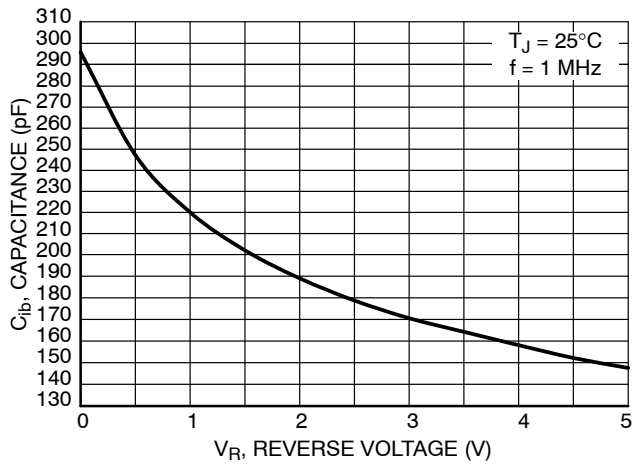


Figure 9. Input Capacitance

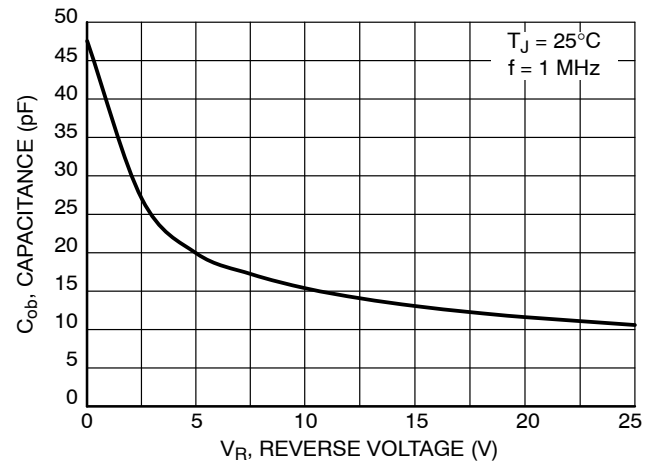


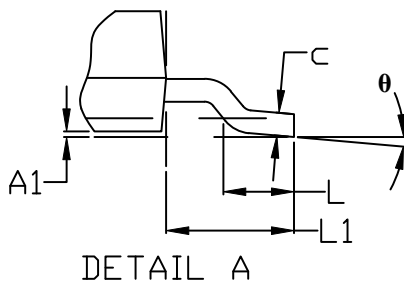
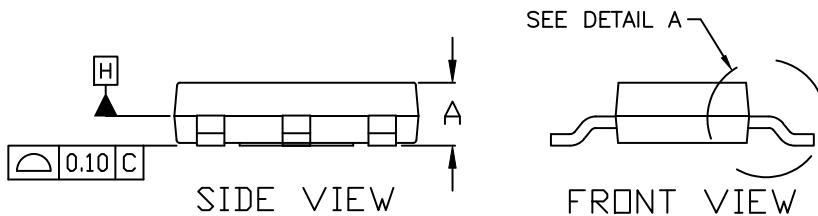
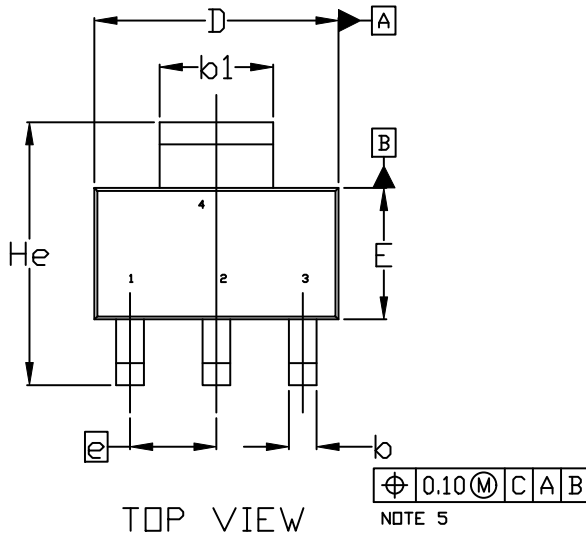
Figure 10. Output Capacitance



SCALE 1:1

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

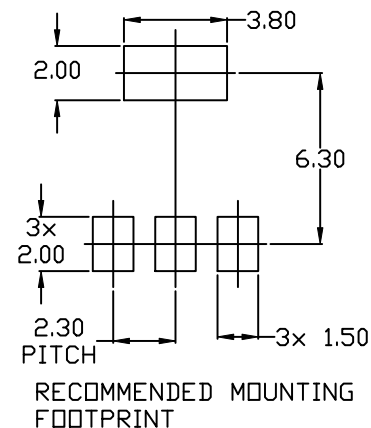
DATE 02 OCT 2018



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°  |



|                         |                         |                                                                                                                                                                                     |
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**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.

|                         |                         |                                                                                                                                                                                     |
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