

# DTA114EM3T5G Series

Preferred Devices

## Digital Transistors (BRT)

### PNP Silicon Surface Mount Transistors with Monolithic Bias Resistor Network

This new series of digital transistors is designed to replace a single device and its external resistor bias network. The digital transistor contains a single transistor with a monolithic bias network consisting of two resistors; a series base resistor and a base-emitter resistor. The digital transistor eliminates these individual components by integrating them into a single device. The use of a digital transistor can reduce both system cost and board space. The device is housed in the SOT-723 package which is designed for low power surface mount applications.

- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- The SOT-723 Package can be Soldered using Wave or Reflow.
- Available in 4 mm, 8000 Unit Tape & Reel
- These are Pb-Free Devices

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

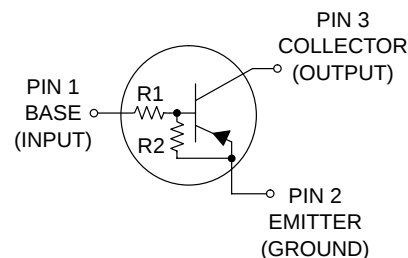
| Rating                    | Symbol    | Value | Unit |
|---------------------------|-----------|-------|------|
| Collector-Base Voltage    | $V_{CBO}$ | 50    | Vdc  |
| Collector-Emitter Voltage | $V_{CEO}$ | 50    | Vdc  |
| Collector Current         | $I_C$     | 100   | mAdc |



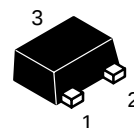
ON Semiconductor®

<http://onsemi.com>

### PNP SILICON DIGITAL TRANSISTORS



#### MARKING DIAGRAM



SOT-723  
CASE 631AA  
Style 1



xx = Specific Device Code  
(See Marking Table on page 2)  
M = Date Code

#### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

**Preferred** devices are recommended choices for future use and best overall value.

## DTA114EM3T5G Series

### ORDERING INFORMATION, DEVICE MARKING AND RESISTOR VALUES

| Device        | Marking | R1 (K) | R2 (K) | Package              | Shipping <sup>†</sup> |
|---------------|---------|--------|--------|----------------------|-----------------------|
| DTA114EM3T5G  | 6A      | 10     | 10     | SOT-723<br>(Pb-Free) | 8000/Tape & Reel      |
| DTA124EM3T5G* | 6B      | 22     | 22     |                      |                       |
| DTA144EM3T5G  | 6C      | 47     | 47     |                      |                       |
| DTA114YM3T5G  | 6D      | 10     | 47     |                      |                       |
| DTA114TM3T5G  | 6E      | 10     | ∞      |                      |                       |
| DTA143TM3T5G* | 6F      | 4.7    | ∞      |                      |                       |
| DTA123EM3T5G* | 6H      | 2.2    | 2.2    |                      |                       |
| DTA143EM3T5G* | 6J      | 4.7    | 4.7    |                      |                       |
| DTA143ZM3T5G* | 6K      | 4.7    | 47     |                      |                       |
| DTA124XM3T5G  | 6L      | 22     | 47     |                      |                       |
| DTA123JM3T5G* | 6M      | 2.2    | 47     |                      |                       |
| DTA115EM3T5G  | 6N      | 100    | 100    |                      |                       |
| DTA144WM3T5G* | 6P      | 47     | 22     |                      |                       |

\*Available upon request

†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.

### THERMAL CHARACTERISTICS

| Characteristic                                                                                                  | Symbol          | Max         | Unit                       |
|-----------------------------------------------------------------------------------------------------------------|-----------------|-------------|----------------------------|
| Total Device Dissipation,<br>FR-4 Board (Note 1.) @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$           | 260<br>2.0  | mW<br>mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction to Ambient (Note 1.)                                                               | $R_{\theta JA}$ | 480         | $^\circ\text{C/W}$         |
| Total Device Dissipation,<br>FR-4 Board (Note 2.) @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$           | 600<br>4.8  | mW<br>mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction to Ambient (Note 2.)                                                               | $R_{\theta JA}$ | 205         | $^\circ\text{C/W}$         |
| Junction and Storage Temperature Range                                                                          | $T_J, T_{stg}$  | -55 to +150 | $^\circ\text{C}$           |

1. FR-4 @ Minimum Pad

2. FR-4 @  $1.0 \times 1.0$  Inch Pad

# DTA114EM3T5G Series

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

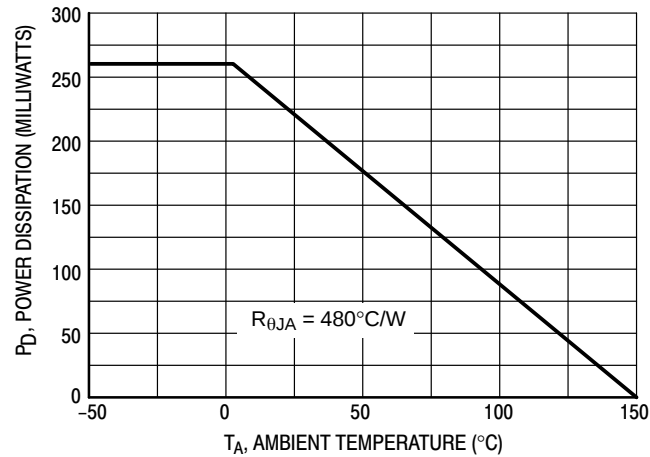
| Characteristic                                                                                                                                                                                                                                                                 | Symbol               | Min | Typ | Max  | Unit |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-----|-----|------|------|
| <b>OFF CHARACTERISTICS</b>                                                                                                                                                                                                                                                     |                      |     |     |      |      |
| Collector–Base Cutoff Current (V <sub>CB</sub> = 50 V, I <sub>E</sub> = 0)                                                                                                                                                                                                     | I <sub>CBO</sub>     | –   | –   | 100  | nAdc |
| Collector–Emitter Cutoff Current (V <sub>CE</sub> = 50 V, I <sub>B</sub> = 0)                                                                                                                                                                                                  | I <sub>CEO</sub>     | –   | –   | 500  | nAdc |
| Emitter–Base Cutoff Current<br>(V <sub>EB</sub> = 6.0 V, I <sub>C</sub> = 0)                                                                                                                                                                                                   | I <sub>EBO</sub>     | –   | –   | 0.5  | mAdc |
| DTA114EM3T5G                                                                                                                                                                                                                                                                   |                      | –   | –   | 0.2  |      |
| DTA124EM3T5G                                                                                                                                                                                                                                                                   |                      | –   | –   | 0.1  |      |
| DTA144EM3T5G                                                                                                                                                                                                                                                                   |                      | –   | –   | 0.2  |      |
| DTA114YM3T5G                                                                                                                                                                                                                                                                   |                      | –   | –   | 0.9  |      |
| DTA114TM3T5G                                                                                                                                                                                                                                                                   |                      | –   | –   | 1.9  |      |
| DTA143TM3T5G                                                                                                                                                                                                                                                                   |                      | –   | –   | 2.3  |      |
| DTA123EM3T5G                                                                                                                                                                                                                                                                   |                      | –   | –   | 1.5  |      |
| DTA143EM3T5G                                                                                                                                                                                                                                                                   |                      | –   | –   | 0.18 |      |
| DTA143ZM3T5G                                                                                                                                                                                                                                                                   |                      | –   | –   | 0.13 |      |
| DTA124XM3T5G                                                                                                                                                                                                                                                                   |                      | –   | –   | 0.2  |      |
| DTA123JM3T5G                                                                                                                                                                                                                                                                   |                      | –   | –   | 0.05 |      |
| DTA115EM3T5G                                                                                                                                                                                                                                                                   |                      | –   | –   | 0.13 |      |
| DTA144WM3T5G                                                                                                                                                                                                                                                                   |                      | –   | –   |      |      |
| Collector–Base Breakdown Voltage (I <sub>C</sub> = 10 μA, I <sub>E</sub> = 0)                                                                                                                                                                                                  | V <sub>(BR)CBO</sub> | 50  | –   | –    | Vdc  |
| Collector–Emitter Breakdown Voltage (Note 3.)<br>(I <sub>C</sub> = 2.0 mA, I <sub>B</sub> = 0)                                                                                                                                                                                 | V <sub>(BR)CEO</sub> | 50  | –   | –    | Vdc  |
| <b>ON CHARACTERISTICS (Note 3.)</b>                                                                                                                                                                                                                                            |                      |     |     |      |      |
| DC Current Gain<br>(V <sub>CE</sub> = 10 V, I <sub>C</sub> = 5.0 mA)                                                                                                                                                                                                           | h <sub>FE</sub>      | 35  | 60  | –    |      |
| DTA114EM3T5G                                                                                                                                                                                                                                                                   |                      | 60  | 100 | –    |      |
| DTA124EM3T5G                                                                                                                                                                                                                                                                   |                      | 80  | 140 | –    |      |
| DTA144EM3T5G                                                                                                                                                                                                                                                                   |                      | 80  | 140 | –    |      |
| DTA114YM3T5G                                                                                                                                                                                                                                                                   |                      | 160 | 250 | –    |      |
| DTA114TM3T5G                                                                                                                                                                                                                                                                   |                      | 160 | 250 | –    |      |
| DTA143TM3T5G                                                                                                                                                                                                                                                                   |                      | 8.0 | 15  | –    |      |
| DTA123EM3T5G                                                                                                                                                                                                                                                                   |                      | 15  | 27  | –    |      |
| DTA143EM3T5G                                                                                                                                                                                                                                                                   |                      | 80  | 140 | –    |      |
| DTA143ZM3T5G                                                                                                                                                                                                                                                                   |                      | 80  | 130 | –    |      |
| DTA124XM3T5G                                                                                                                                                                                                                                                                   |                      | 80  | 140 | –    |      |
| DTA123JM3T5G                                                                                                                                                                                                                                                                   |                      | 80  | 150 | –    |      |
| DTA115EM3T5G                                                                                                                                                                                                                                                                   |                      | 80  | 140 | –    |      |
| DTA144WM3T5G                                                                                                                                                                                                                                                                   |                      |     |     |      |      |
| Collector–Emitter Saturation Voltage (I <sub>C</sub> = 10 mA, I <sub>E</sub> = 0.3 mA)<br>(I <sub>C</sub> = 10 mA, I <sub>B</sub> = 5 mA) DTA123EM3T5G<br>(I <sub>C</sub> = 10 mA, I <sub>B</sub> = 1 mA) DTA114TM3T5G/DTA143TM3T5G/<br>DTA143ZM3T5G/DTA124XM3T5G/DTA143EM3T5G | V <sub>CE(sat)</sub> | –   | –   | 0.25 | Vdc  |
| Output Voltage (on)<br>(V <sub>CC</sub> = 5.0 V, V <sub>B</sub> = 2.5 V, R <sub>L</sub> = 1.0 kΩ)                                                                                                                                                                              | V <sub>OL</sub>      | –   | –   | 0.2  | Vdc  |
| DTA114EM3T5G                                                                                                                                                                                                                                                                   |                      | –   | –   | 0.2  |      |
| DTA124EM3T5G                                                                                                                                                                                                                                                                   |                      | –   | –   | 0.2  |      |
| DTA114YM3T5G                                                                                                                                                                                                                                                                   |                      | –   | –   | 0.2  |      |
| DTA114TM3T5G                                                                                                                                                                                                                                                                   |                      | –   | –   | 0.2  |      |
| DTA143TM3T5G                                                                                                                                                                                                                                                                   |                      | –   | –   | 0.2  |      |
| DTA123EM3T5G                                                                                                                                                                                                                                                                   |                      | –   | –   | 0.2  |      |
| DTA143EM3T5G                                                                                                                                                                                                                                                                   |                      | –   | –   | 0.2  |      |
| DTA143ZM3T5G                                                                                                                                                                                                                                                                   |                      | –   | –   | 0.2  |      |
| DTA124XM3T5G                                                                                                                                                                                                                                                                   |                      | –   | –   | 0.2  |      |
| DTA123JM3T5G                                                                                                                                                                                                                                                                   |                      | –   | –   | 0.2  |      |
| (V <sub>CC</sub> = 5.0 V, V <sub>B</sub> = 3.5 V, R <sub>L</sub> = 1.0 kΩ) DTA144EM3T5G                                                                                                                                                                                        |                      | –   | –   | 0.2  |      |
| (V <sub>CC</sub> = 5.0 V, V <sub>B</sub> = 5.5 V, R <sub>L</sub> = 1.0 kΩ) DTA115EM3T5G                                                                                                                                                                                        |                      | –   | –   | 0.2  |      |
| (V <sub>CC</sub> = 5.0 V, V <sub>B</sub> = 4.0 V, R <sub>L</sub> = 1.0 kΩ) DTA144WM3T5G                                                                                                                                                                                        |                      | –   | –   | 0.2  |      |
| Output Voltage (off) (V <sub>CC</sub> = 5.0 V, V <sub>B</sub> = 0.5 V, R <sub>L</sub> = 1.0 kΩ)<br>(V <sub>CC</sub> = 5.0 V, V <sub>B</sub> = 0.25 V, R <sub>L</sub> = 1.0 kΩ)                                                                                                 | V <sub>OH</sub>      | 4.9 | –   | –    | Vdc  |
| DTA114TM3T5G                                                                                                                                                                                                                                                                   |                      |     |     |      |      |
| DTA143TM3T5G                                                                                                                                                                                                                                                                   |                      |     |     |      |      |
| DTA123EM3T5G                                                                                                                                                                                                                                                                   |                      |     |     |      |      |
| DTA143EM3T5G                                                                                                                                                                                                                                                                   |                      |     |     |      |      |

3. Pulse Test: Pulse Width < 300 μs, Duty Cycle < 2.0%

## DTA114EM3T5G Series

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

| Characteristic      |                                        | Symbol    | Min   | Typ   | Max   | Unit       |
|---------------------|----------------------------------------|-----------|-------|-------|-------|------------|
| Input Resistor      | DTA114EM3T5G                           | R1        | 7.0   | 10    | 13    | k $\Omega$ |
|                     | DTA124EM3T5G                           |           | 15.4  | 22    | 28.6  |            |
|                     | DTA144EM3T5G                           |           | 32.9  | 47    | 61.1  |            |
|                     | DTA114YM3T5G                           |           | 7.0   | 10    | 13    |            |
|                     | DTA114TM3T5G                           |           | 7.0   | 10    | 13    |            |
|                     | DTA143TM3T5G                           |           | 3.3   | 4.7   | 6.1   |            |
|                     | DTA123EM3T5G                           |           | 1.5   | 2.2   | 2.9   |            |
|                     | DTA143EM3T5G                           |           | 3.3   | 4.7   | 6.1   |            |
|                     | DTA143ZM3T5G                           |           | 3.3   | 4.7   | 6.1   |            |
|                     | DTA124XM3T5G                           |           | 15.4  | 22    | 28.6  |            |
|                     | DTA123JM3T5G                           |           | 1.54  | 2.2   | 2.86  |            |
|                     | DTA115EM3T5G                           |           | 70    | 100   | 130   |            |
|                     | DTA144WM3T5G                           |           | 32.9  | 47    | 61.1  |            |
| Resistor Ratio<br>/ | DTA114EM3T5G/DTA124EM3T5G/DTA144EM3T5G | $R_1/R_2$ | 0.8   | 1.0   | 1.2   |            |
|                     | DTA115EM3T5G                           |           | 0.17  | 0.21  | 0.25  |            |
|                     | DTA114YM3T5G                           |           | –     | –     | –     |            |
|                     | DTA114TM3T5G/DTA143TM3T5G              |           | 0.8   | 1.0   | 1.2   |            |
|                     | DTA123EM3T5G/DTA143EM3T5G              |           | 0.055 | 0.1   | 0.185 |            |
|                     | DTA143ZM3T5G                           |           | 0.38  | 0.47  | 0.56  |            |
|                     | DTA124XM3T5G                           |           | 0.038 | 0.047 | 0.056 |            |
|                     | DTA123JM3T5G                           |           | 1.7   | 2.1   | 2.6   |            |
|                     | DTA144WM3T5G                           |           |       |       |       |            |



**Figure 1. Derating Curve**

# DTA114EM3T5G Series

## TYPICAL ELECTRICAL CHARACTERISTICS – DTA114EM3T5G

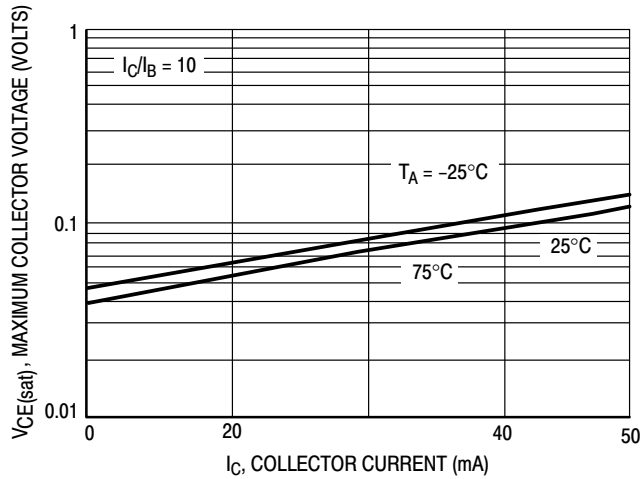


Figure 2.  $V_{CE(sat)}$  versus  $I_C$

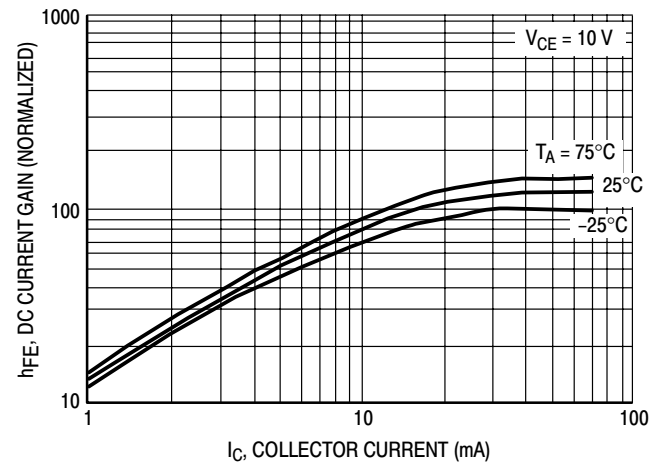


Figure 3. DC Current Gain

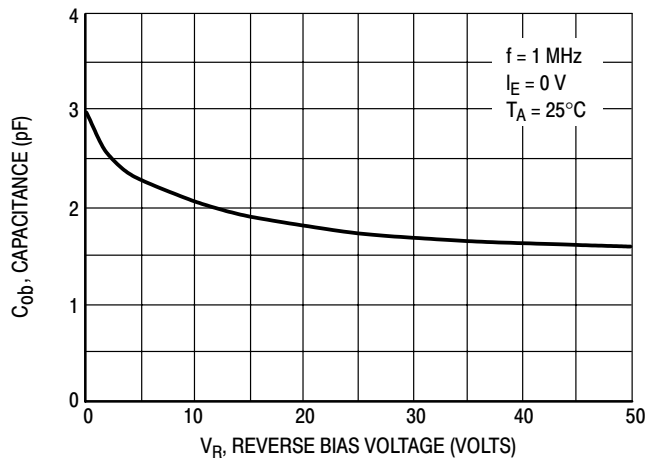


Figure 4. Output Capacitance

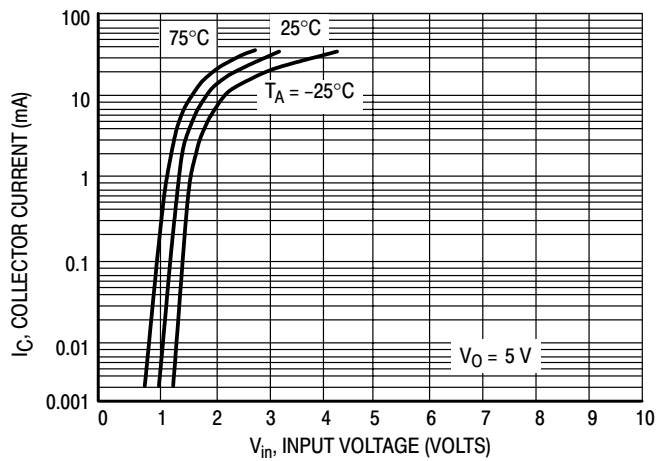


Figure 5. Output Current versus Input Voltage

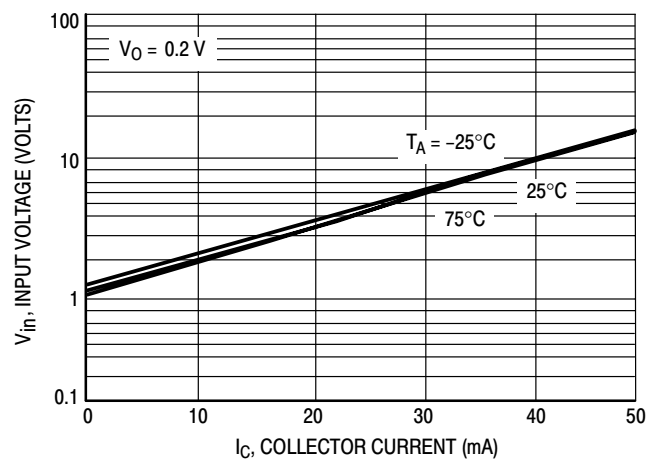


Figure 6. Input Voltage versus Output Current

# DTA114EM3T5G Series

## TYPICAL ELECTRICAL CHARACTERISTICS – DTA124EM3T5G

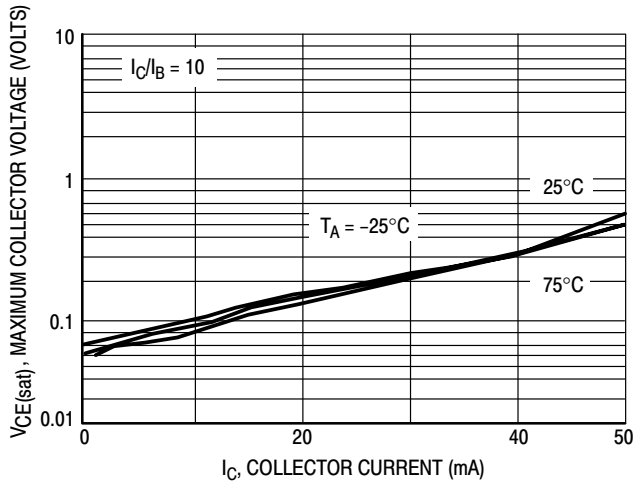


Figure 7.  $V_{CE(sat)}$  versus  $I_C$

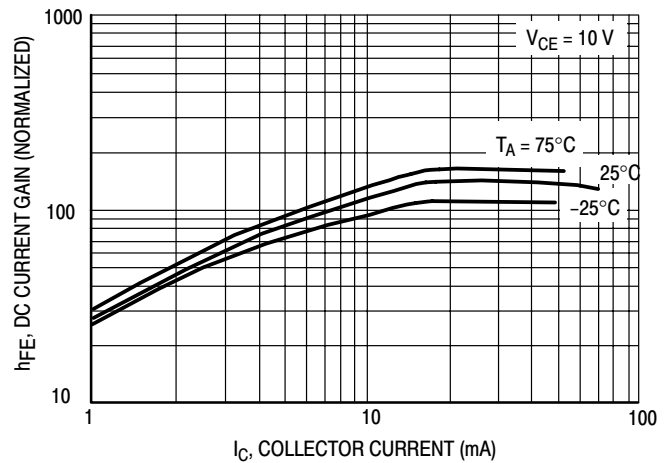


Figure 8. DC Current Gain

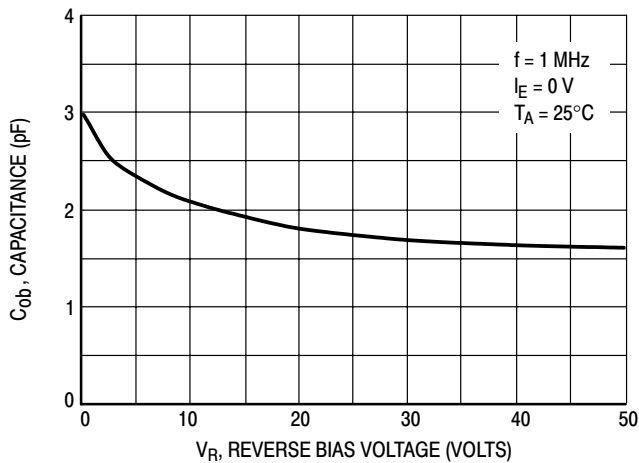


Figure 9. Output Capacitance

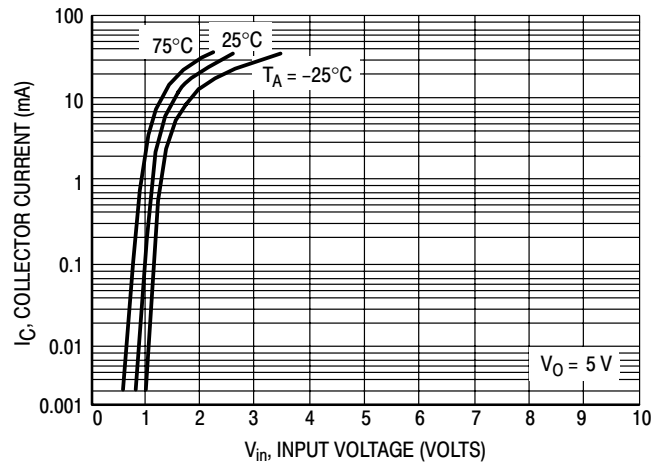


Figure 10. Output Current versus Input Voltage

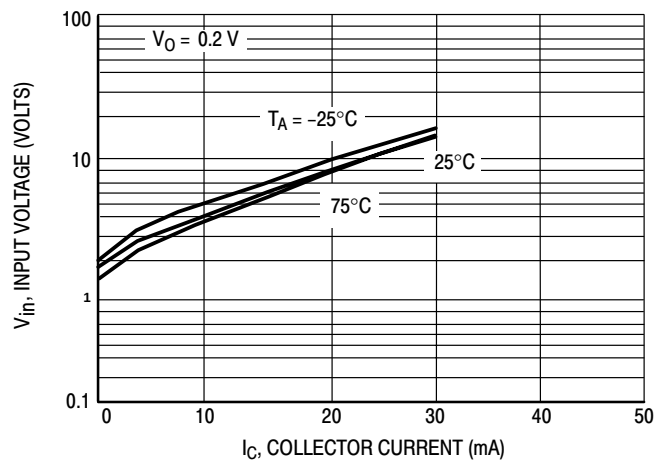


Figure 11. Input Voltage versus Output Current

# DTA114EM3T5G Series

## TYPICAL ELECTRICAL CHARACTERISTICS – DTA144EM3T5G

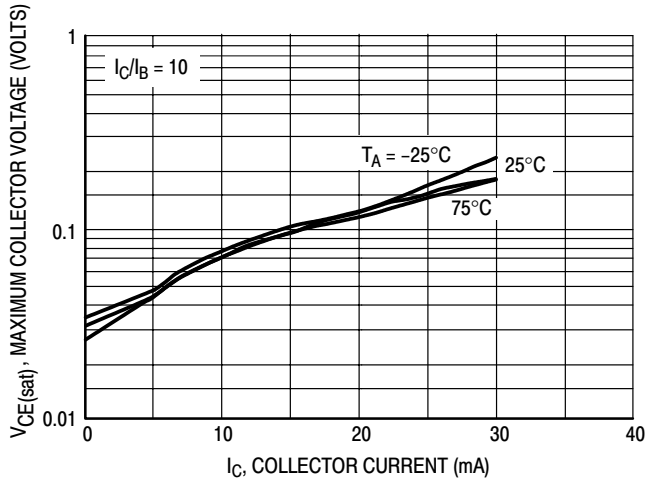


Figure 12.  $V_{CE(sat)}$  versus  $I_C$

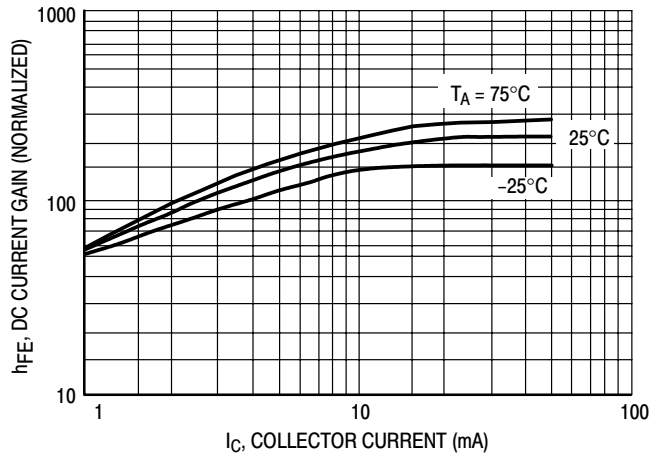


Figure 13. DC Current Gain

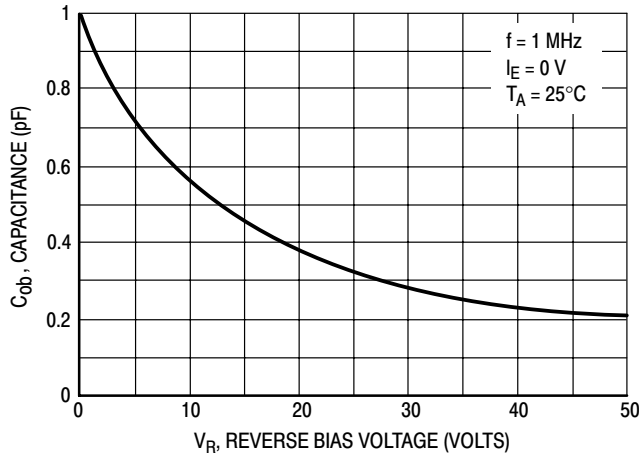


Figure 14. Output Capacitance

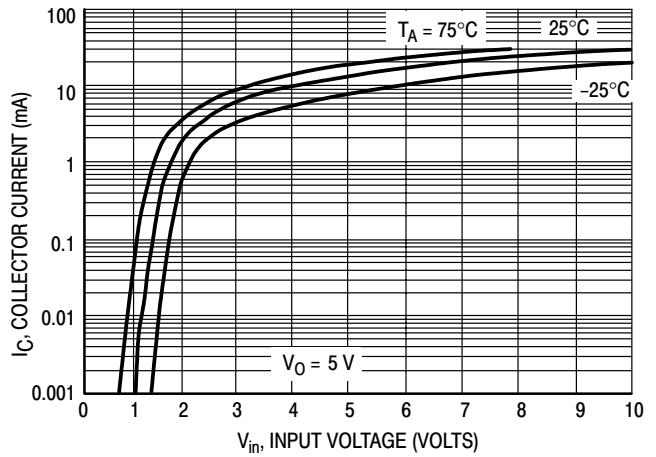


Figure 15. Output Current versus Input Voltage

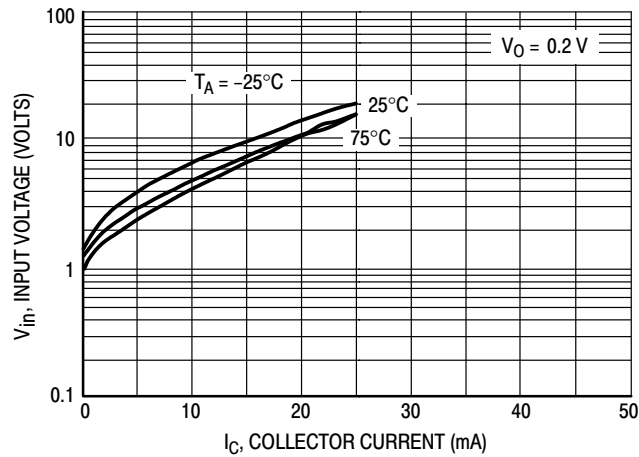


Figure 16. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS – DTA114YM3T5G

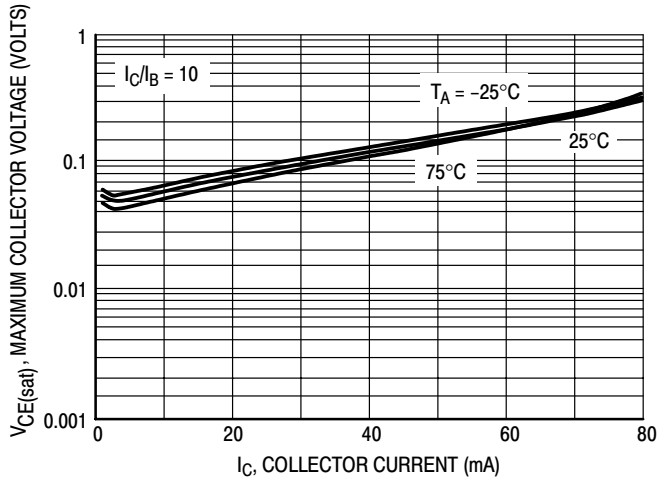


Figure 17.  $V_{CE(sat)}$  versus  $I_C$

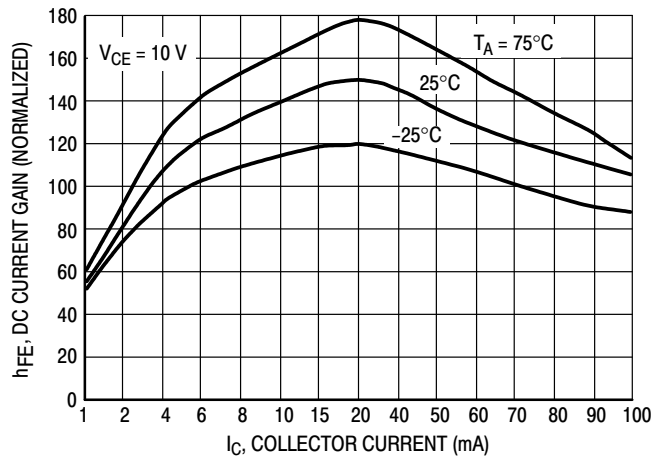


Figure 18. DC Current Gain

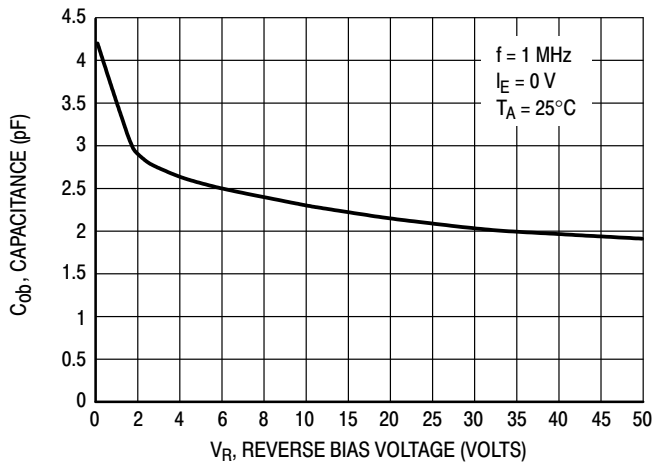


Figure 19. Output Capacitance

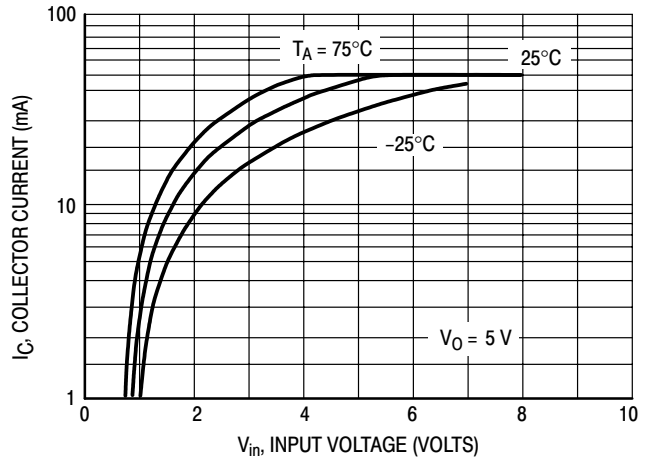


Figure 20. Output Current versus Input Voltage

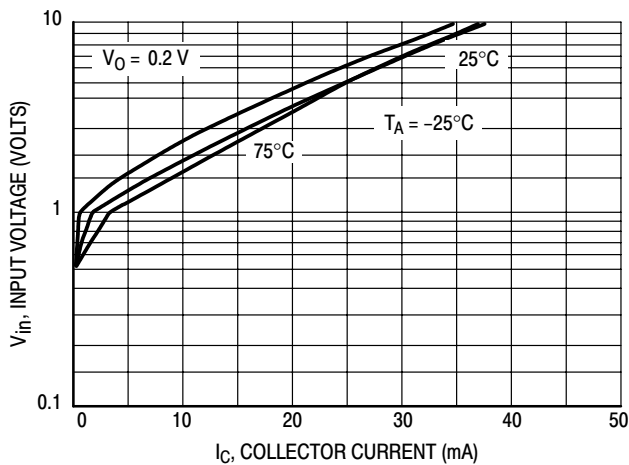


Figure 21. Input Voltage versus Output Current

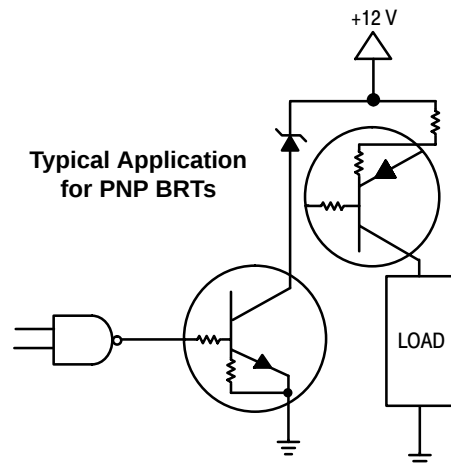


Figure 22. Inexpensive, Unregulated Current Source

TYPICAL ELECTRICAL CHARACTERISTICS — DTA115EM3T5G

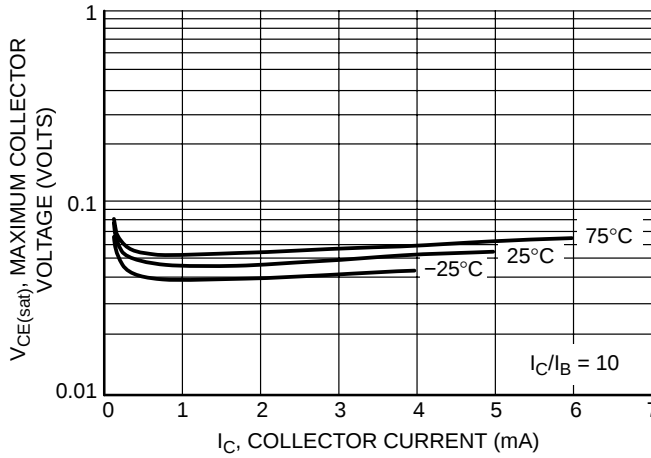


Figure 23. Maximum Collector Voltage versus Collector Current

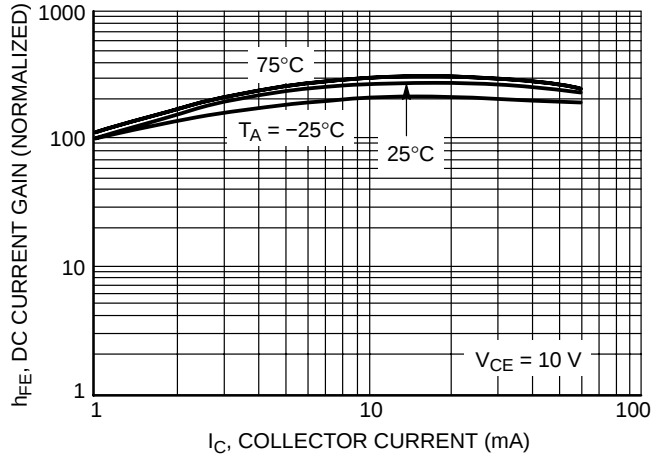


Figure 24. DC Current Gain

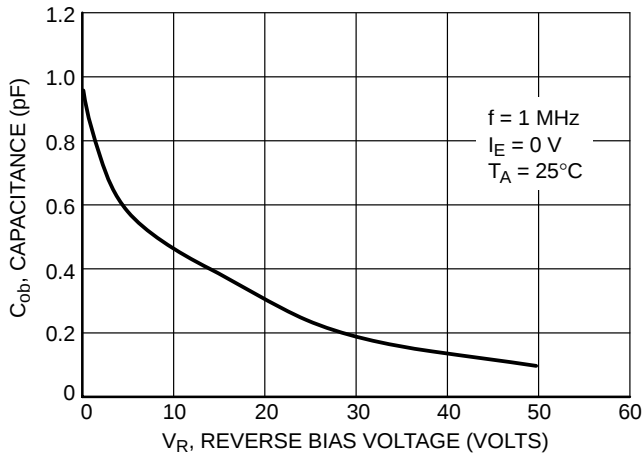


Figure 25. Output Capacitance

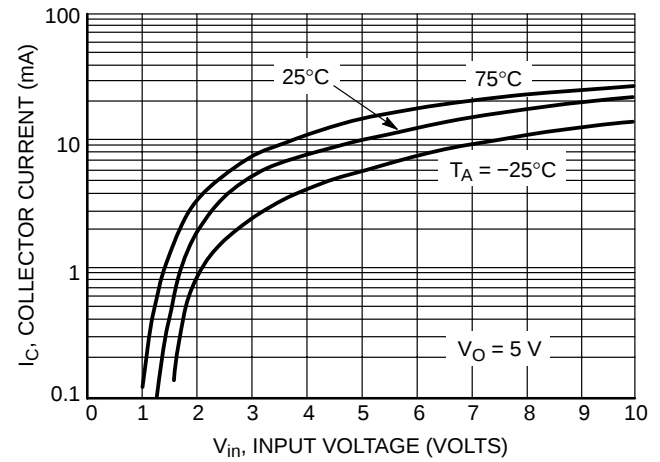


Figure 26. Output Current versus Input Voltage

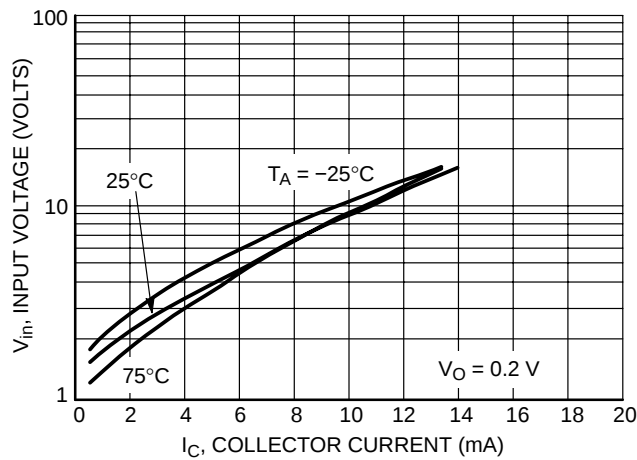


Figure 27. Input Voltage versus Output Current

# DTA114EM3T5G Series

## TYPICAL ELECTRICAL CHARACTERISTICS — DTA144WM3T5G

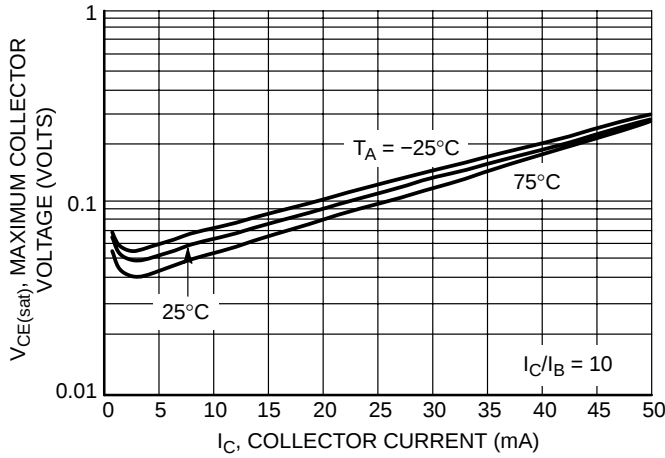


Figure 28. Maximum Collector Voltage versus Collector Current

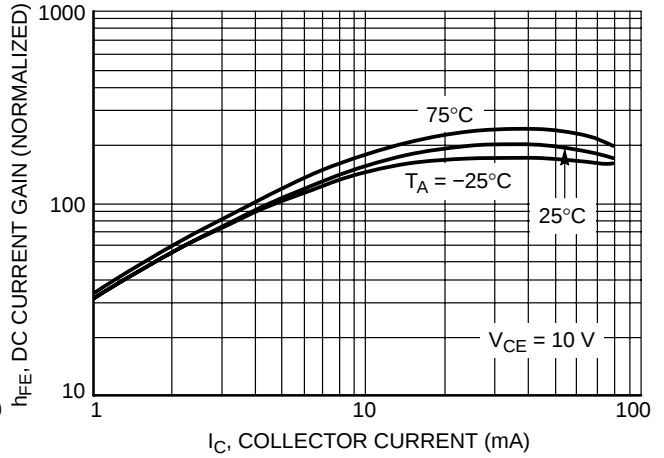


Figure 29. DC Current Gain

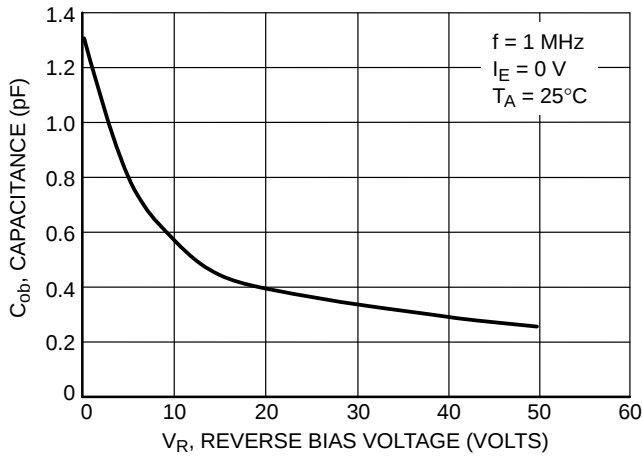


Figure 30. Output Capacitance

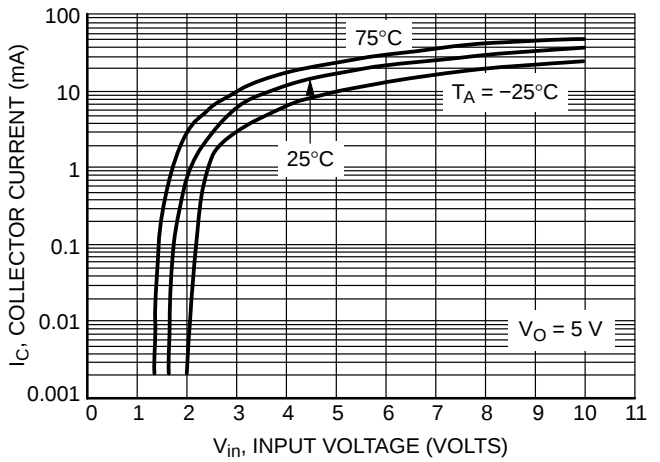


Figure 31. Output Current versus Input Voltage

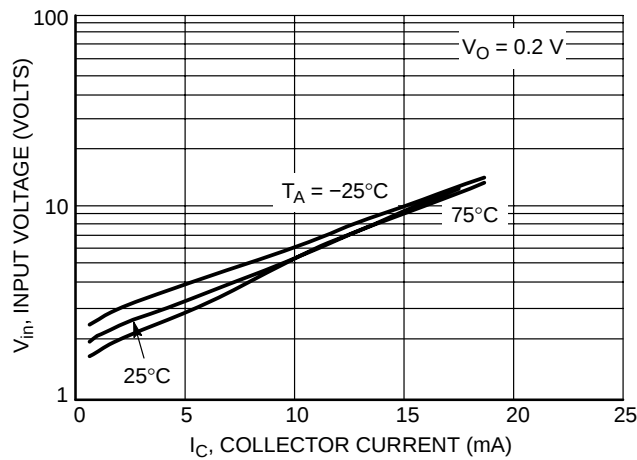
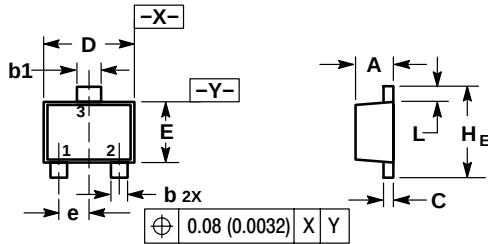


Figure 32. Input Voltage versus Output Current

# DTA114EM3T5G Series

## PACKAGE DIMENSIONS

**SOT-723**  
CASE 631AA-01  
ISSUE A



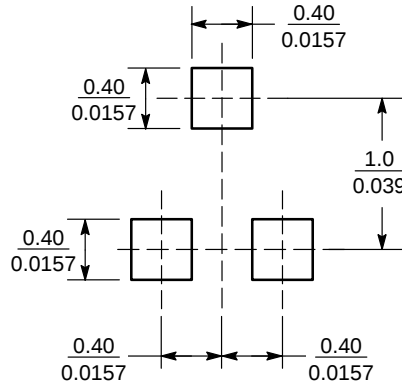
### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF 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              | 0.45        | 0.50 | 0.55 | 0.018     | 0.020  | 0.022  |
| b              | 0.15        | 0.20 | 0.27 | 0.0059    | 0.0079 | 0.0106 |
| b1             | 0.25        | 0.3  | 0.35 | 0.010     | 0.012  | 0.014  |
| C              | 0.07        | 0.12 | 0.17 | 0.0028    | 0.0047 | 0.0067 |
| D              | 1.15        | 1.20 | 1.25 | 0.045     | 0.047  | 0.049  |
| E              | 0.75        | 0.80 | 0.85 | 0.03      | 0.032  | 0.034  |
| e              | 0.40 BSC    |      |      | 0.016 BSC |        |        |
| H <sub>E</sub> | 1.15        | 1.20 | 1.25 | 0.045     | 0.047  | 0.049  |
| L              | 0.15        | 0.20 | 0.25 | 0.0059    | 0.0079 | 0.0098 |

STYLE 1:  
PIN 1. BASE  
2. EMITTER  
3. COLLECTOR

### SOLDERING FOOTPRINT\*



SCALE 20:1  $\left( \frac{\text{mm}}{\text{inches}} \right)$

### SOT-723

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

# DTA114EM3T5G Series

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