

# DTA114EXV3T1 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 SC-89 package which is designed for low power surface mount applications.

- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- Available in 8 mm, 7 inch/3000 Unit Tape & Reel
- Lead-Free Plating (Pure Sn)

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

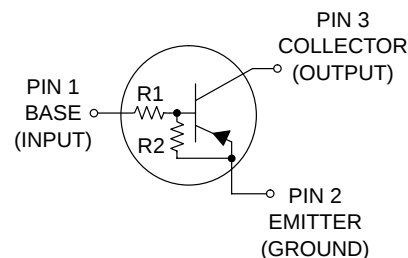
| Rating                    | Symbol    | Value | Unit |
|---------------------------|-----------|-------|------|
| Collector-Base Voltage    | $V_{CB0}$ | 50    | Vdc  |
| Collector-Emitter Voltage | $V_{CEO}$ | 50    | Vdc  |
| Collector Current         | $I_C$     | 100   | mAdc |



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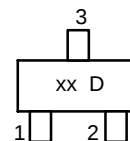
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### PNP SILICON DIGITAL TRANSISTORS



SC-89  
CASE 463C  
STYLE 1

#### MARKING DIAGRAM



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

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

## DTA114EXV3T1 Series

### DEVICE MARKING AND RESISTOR VALUES

| Device       | Marking | R1 (K) | R2 (K) | Shipping†        |
|--------------|---------|--------|--------|------------------|
| DTA114EXV3T1 | 6A      | 10     | 10     | 3000/Tape & Reel |
| DTA124EXV3T1 | 6B      | 22     | 22     |                  |
| DTA144EXV3T1 | 6C      | 47     | 47     |                  |
| DTA114YXV3T1 | 6D      | 10     | 47     |                  |
| DTA114TXV3T1 | 6E      | 10     | ∞      |                  |
| DTA143TXV3T1 | 6F      | 4.7    | ∞      |                  |
| DTA144WXV3T1 | 6P      | 47     | 22     |                  |
| DTA144TXV3T1 | 6T      | 47     | ∞      |                  |
| DTA143XXV3T1 | 6R      | 4.7    | 10     |                  |
|              |         |        |        |                  |

†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.

### THERMAL CHARACTERISTICS

| Characteristic                                                                                                 | Symbol          | Max         | Unit                       |
|----------------------------------------------------------------------------------------------------------------|-----------------|-------------|----------------------------|
| Total Device Dissipation,<br>FR-4 Board (Note 1) @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$           | 200<br>1.6  | mW<br>mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction to Ambient (Note 1)                                                               | $R_{\theta JA}$ | 600         | $^\circ\text{C/W}$         |
| Total Device Dissipation,<br>FR-4 Board (Note 2) @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$           | 300<br>2.4  | mW<br>mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction to Ambient (Note 2)                                                               | $R_{\theta JA}$ | 400         | $^\circ\text{C/W}$         |
| 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.

## DTA114EXV3T1 Series

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

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

#### OFF CHARACTERISTICS

|                                                                                       |               |    |   |      |      |
|---------------------------------------------------------------------------------------|---------------|----|---|------|------|
| Collector–Base Cutoff Current ( $V_{CB} = 50\text{ V}$ , $I_E = 0$ )                  | $I_{CBO}$     | –  | – | 100  | nAdc |
| Collector–Emitter Cutoff Current ( $V_{CE} = 50\text{ V}$ , $I_B = 0$ )               | $I_{CEO}$     | –  | – | 500  | nAdc |
| Emitter–Base Cutoff Current<br>( $V_{EB} = 6.0\text{ V}$ , $I_C = 0$ )                | $I_{EBO}$     | –  | – | 0.5  | mAdc |
| DTA114EXV3T1                                                                          |               | –  | – | 0.2  |      |
| DTA124EXV3T1                                                                          |               | –  | – | 0.1  |      |
| DTA144EXV3T1                                                                          |               | –  | – | 0.2  |      |
| DTA114YXV3T1                                                                          |               | –  | – | 0.9  |      |
| DTA114TXV3T1                                                                          |               | –  | – | 1.9  |      |
| DTA143TXV3T1                                                                          |               | –  | – | 0.13 |      |
| DTA144WXV3T1                                                                          |               | –  | – | 0.2  |      |
| DTA144TXV3T1                                                                          |               | –  | – | 1.0  |      |
| DTA143XXV3T1                                                                          |               | –  | – |      |      |
| Collector–Base Breakdown Voltage ( $I_C = 10\text{ }\mu\text{A}$ , $I_E = 0$ )        | $V_{(BR)CBO}$ | 50 | – | –    | Vdc  |
| Collector–Emitter Breakdown Voltage (Note 3)<br>( $I_C = 2.0\text{ mA}$ , $I_B = 0$ ) | $V_{(BR)CEO}$ | 50 | – | –    | Vdc  |

#### ON CHARACTERISTICS (Note 3)

|                                                                                                                                                                                                                                                                                  |                                                                                                                                              |               |                                                       |                                                           |                                                             |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------------------------------------------------|-----------------------------------------------------------|-------------------------------------------------------------|-----|
| DC Current Gain<br>( $V_{CE} = 10\text{ V}$ , $I_C = 5.0\text{ mA}$ )                                                                                                                                                                                                            | DTA114EXV3T1<br>DTA124EXV3T1<br>DTA144EXV3T1<br>DTA114YXV3T1<br>DTA114TXV3T1<br>DTA143TXV3T1<br>DTA144WXV3T1<br>DTA144TXV3T1<br>DTA143XXV3T1 | $h_{FE}$      | 35<br>60<br>80<br>80<br>160<br>160<br>80<br>160<br>20 | 60<br>100<br>140<br>140<br>250<br>250<br>140<br>250<br>35 | –<br>–<br>–<br>–<br>–<br>–<br>–<br>–<br>–                   |     |
| Collector–Emitter Saturation Voltage ( $I_C = 10\text{ mA}$ , $I_E = 0.3\text{ mA}$ )<br>( $I_C = 10\text{ mA}$ , $I_B = 5.0\text{ mA}$ ) DTA123EXV3T1<br>( $I_C = 10\text{ mA}$ , $I_B = 1.0\text{ mA}$ ) DTA114TXV3T1/ DTA143TXV3T1/<br>DTA143ZXV3T1/DTA124XXV3T1/DTA143EXV3T1 |                                                                                                                                              | $V_{CE(sat)}$ | –                                                     | –                                                         | 0.25                                                        | Vdc |
| Output Voltage (on)<br>( $V_{CC} = 5.0\text{ V}$ , $V_B = 2.5\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ )<br><br>( $V_{CC} = 5.0\text{ V}$ , $V_B = 3.5\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ )<br>( $V_{CC} = 5.0\text{ V}$ , $V_B = 4.0\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ ) | DTA114EXV3T1<br>DTA124EXV3T1<br>DTA114YXV3T1<br>DTA114TXV3T1<br>DTA143TXV3T1<br>DTA144EXV3T1<br>DTA144WXV3T1<br>DTA144TXV3T1<br>DTA143XXV3T1 | $V_{OL}$      | –<br>–<br>–<br>–<br>–<br>–<br>–<br>–<br>–             | –<br>–<br>–<br>–<br>–<br>–<br>–<br>–<br>–                 | 0.2<br>0.2<br>0.2<br>0.2<br>0.2<br>0.2<br>0.2<br>0.2<br>0.2 | Vdc |
| Output Voltage (off) ( $V_{CC} = 5.0\text{ V}$ , $V_B = 0.5\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ )<br>( $V_{CC} = 5.0\text{ V}$ , $V_B = 0.25\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ )                                                                                         | DTA114TXV3T1<br>DTA143TXV3T1                                                                                                                 | $V_{OH}$      | 4.9                                                   | –                                                         | –                                                           | Vdc |

3. Pulse Test: Pulse Width < 300  $\mu\text{s}$ , Duty Cycle < 2.0%.

## DTA114EXV3T1 Series

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

| Characteristic                             | Symbol    | Min  | Typ  | Max  | Unit       |
|--------------------------------------------|-----------|------|------|------|------------|
| Input Resistor                             |           |      |      |      |            |
| DTA114EXV3T1                               | R1        | 7.0  | 10   | 13   | k $\Omega$ |
| DTA124EXV3T1                               |           | 15.4 | 22   | 28.6 |            |
| DTA144EXV3T1                               |           | 32.9 | 47   | 61.1 |            |
| DTA114YXV3T1                               |           | 7.0  | 10   | 13   |            |
| DTA114TXV3T1                               |           | 7.0  | 10   | 13   |            |
| DTA143TXV3T1                               |           | 3.3  | 4.7  | 6.1  |            |
| DTA144WXV3T1                               |           | 32.9 | 47   | 61.1 |            |
| DTA144TXV3T1                               |           | 32.9 | 47   | 61.1 |            |
| DTA143XXV3T1                               |           | 3.3  | 4.7  | 6.1  |            |
| Resistor Ratio                             |           |      |      |      |            |
| DTA114EXV3T1/DTA124EXV3T1/<br>DTA144EXV3T1 | $R_1/R_2$ | 0.8  | 1.0  | 1.2  |            |
| DTA114YXV3T1                               |           | 0.17 | 0.21 | 0.25 |            |
| DTA114TXV3T1/DTA143TXV3T1/<br>DTA144TXV3T1 |           | –    | –    | –    |            |
| DTA144WXV3T1                               |           | 1.7  | 2.1  | 2.6  |            |
| DTA143XXV3T1                               |           | 0.38 | 0.47 | 0.56 |            |

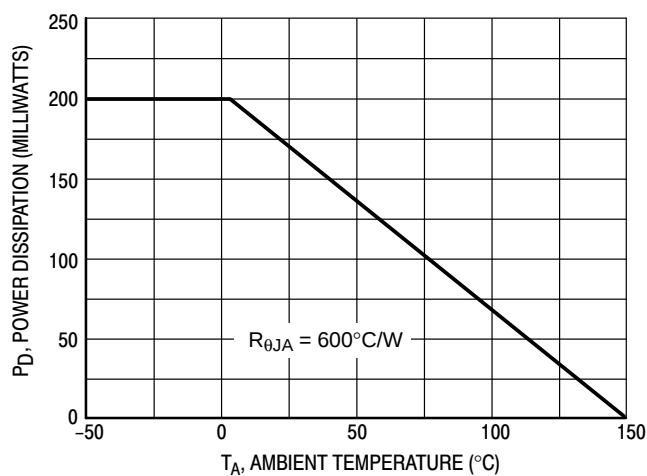


Figure 1. Derating Curve

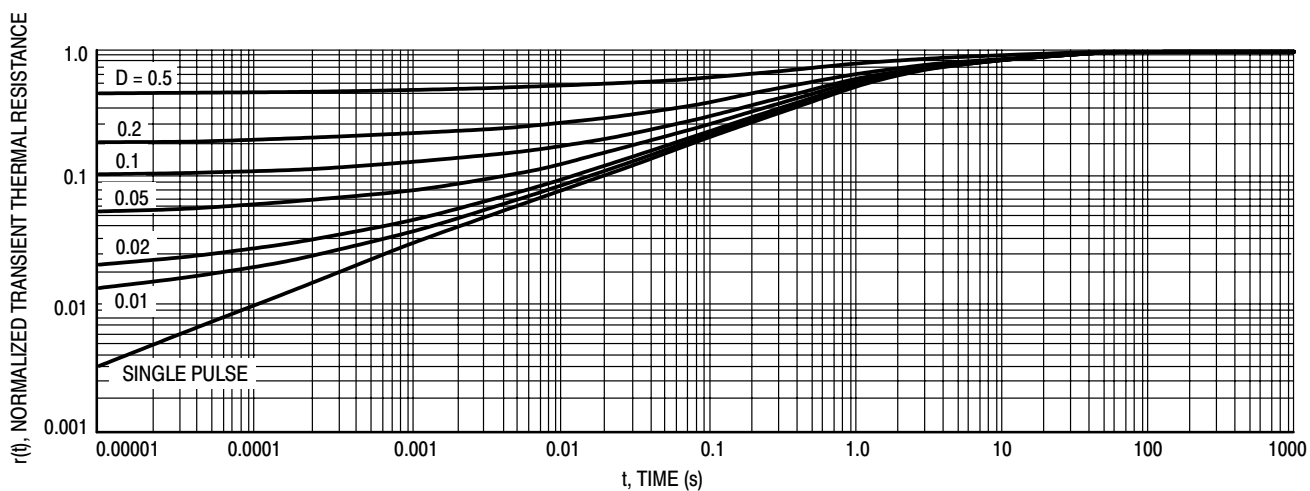


Figure 2. Normalized Thermal Response

# DTA114EXV3T1 Series

## TYPICAL ELECTRICAL CHARACTERISTICS – DTA114EXV3T1

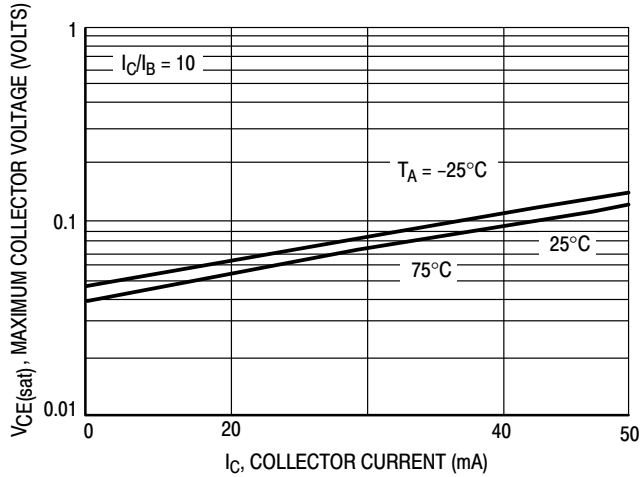


Figure 3.  $V_{CE(sat)}$  versus  $I_C$

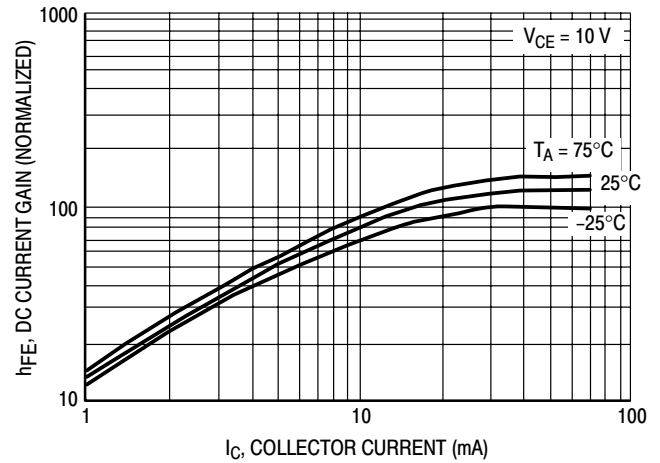


Figure 4. DC Current Gain

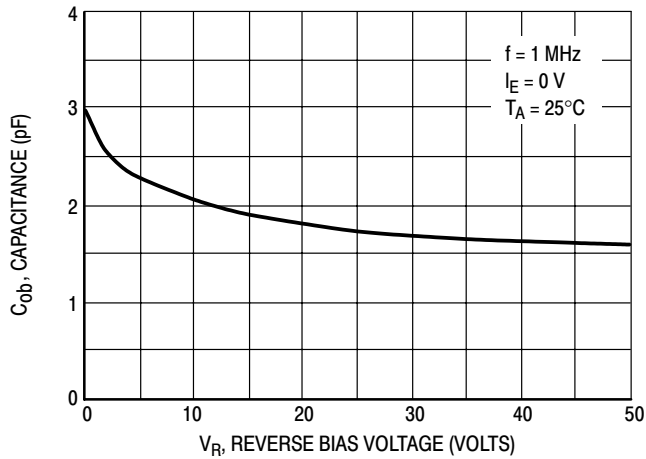


Figure 5. Output Capacitance

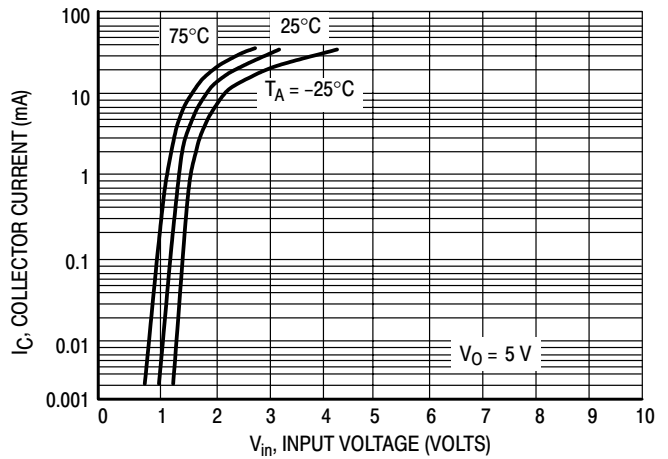


Figure 6. Output Current versus Input Voltage

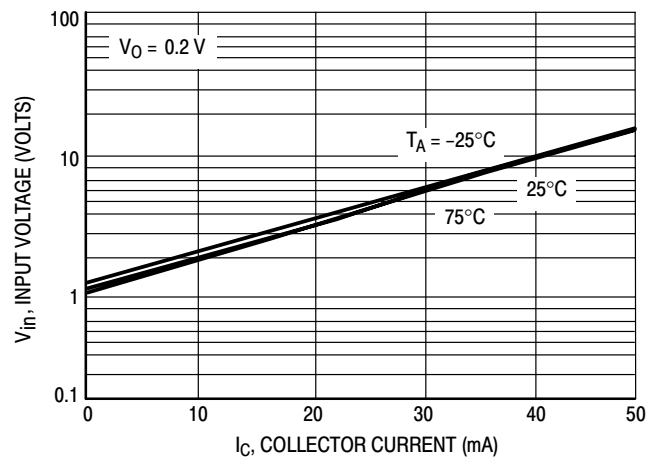


Figure 7. Input Voltage versus Output Current

# DTA114EXV3T1 Series

## TYPICAL ELECTRICAL CHARACTERISTICS – DTA124EXV3T1

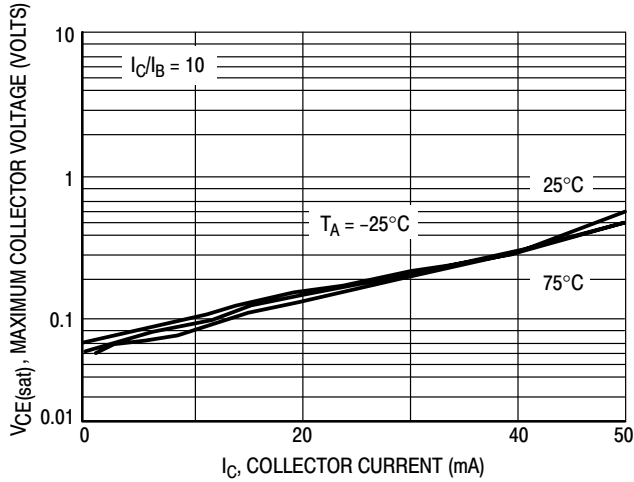


Figure 8.  $V_{CE(sat)}$  versus  $I_C$

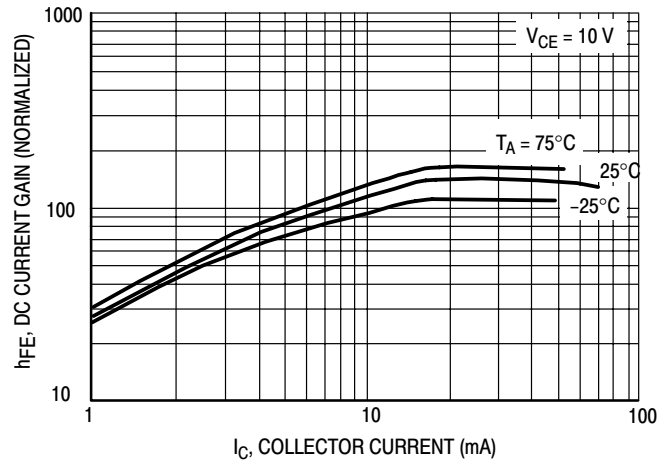


Figure 9. DC Current Gain

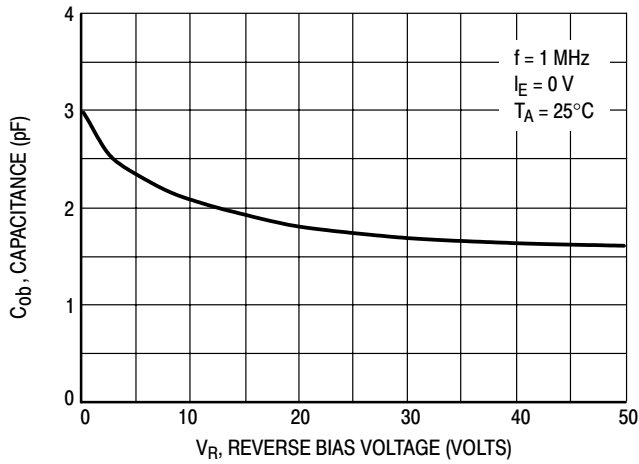


Figure 10. Output Capacitance

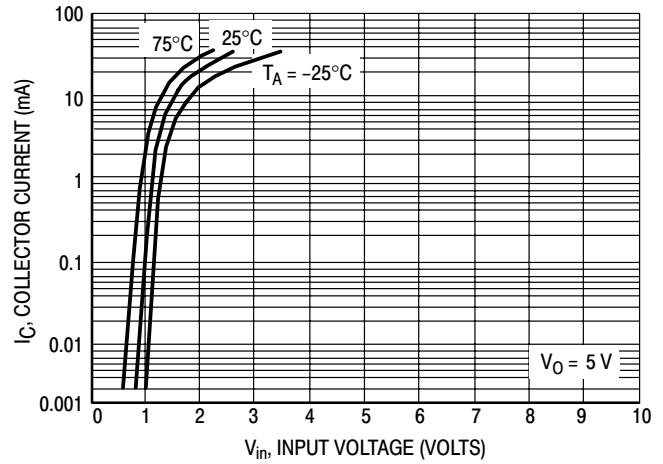


Figure 11. Output Current versus Input Voltage

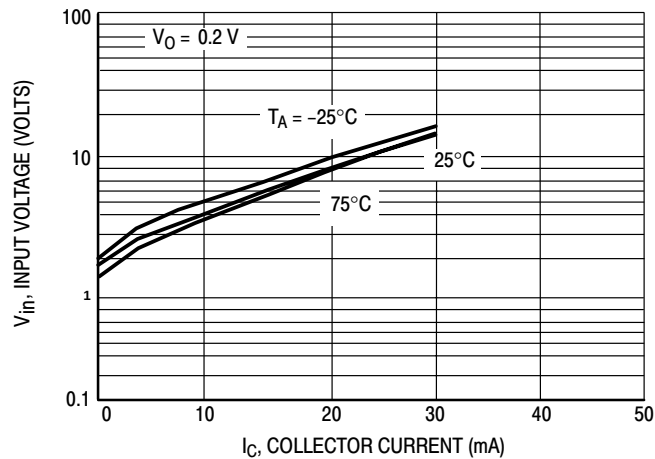


Figure 12. Input Voltage versus Output Current

# DTA114EXV3T1 Series

## TYPICAL ELECTRICAL CHARACTERISTICS – DTA144EXV3T1

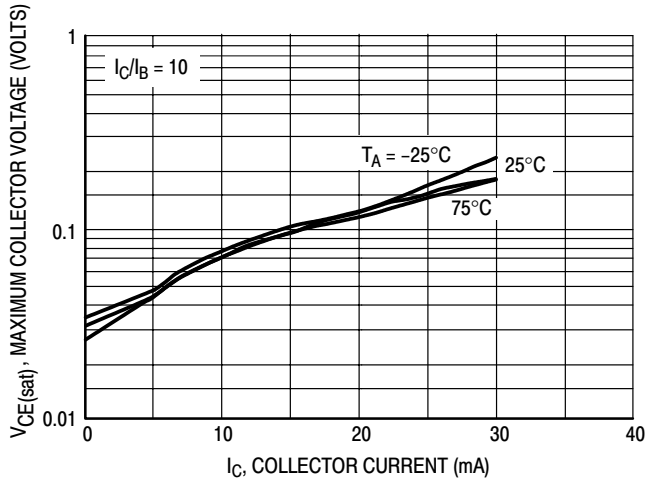


Figure 13.  $V_{CE(sat)}$  versus  $I_C$

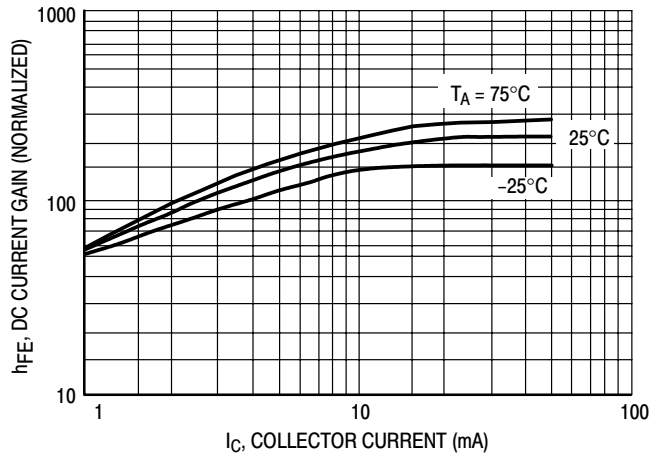


Figure 14. DC Current Gain

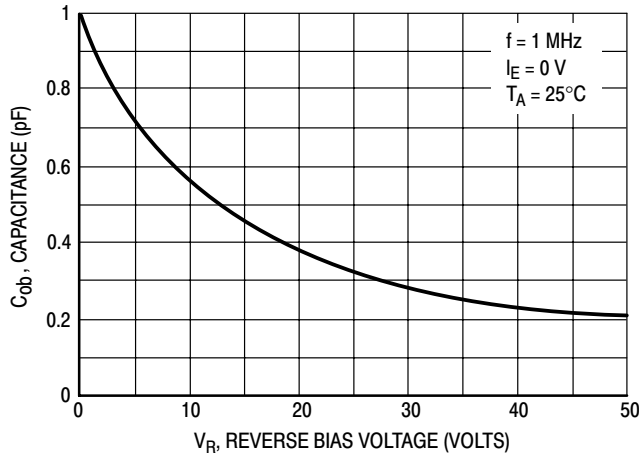


Figure 15. Output Capacitance

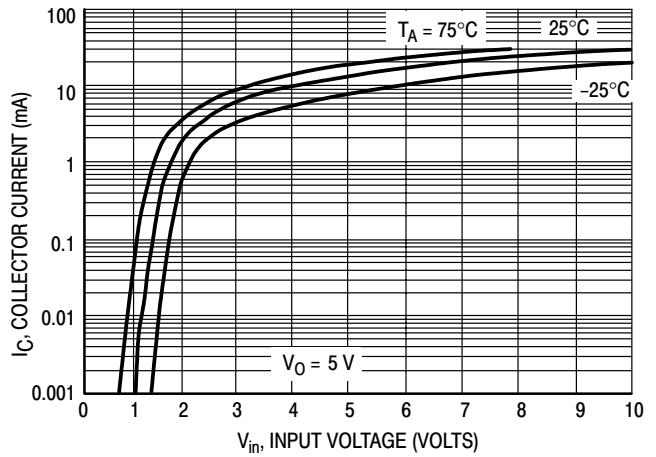


Figure 16. Output Current versus Input Voltage

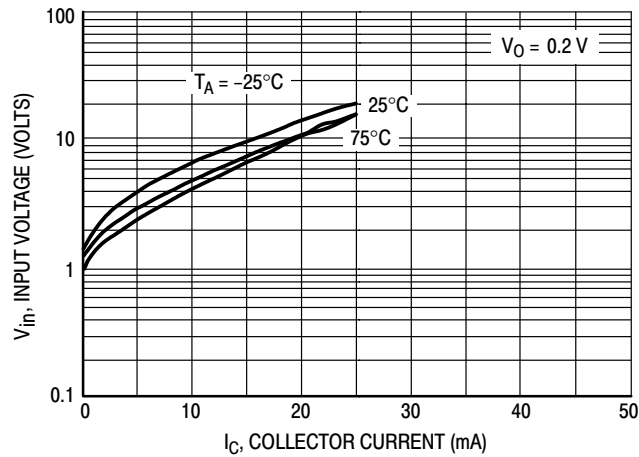


Figure 17. Input Voltage versus Output Current

# DTA114EXV3T1 Series

## TYPICAL ELECTRICAL CHARACTERISTICS – DTA114YXV3T1

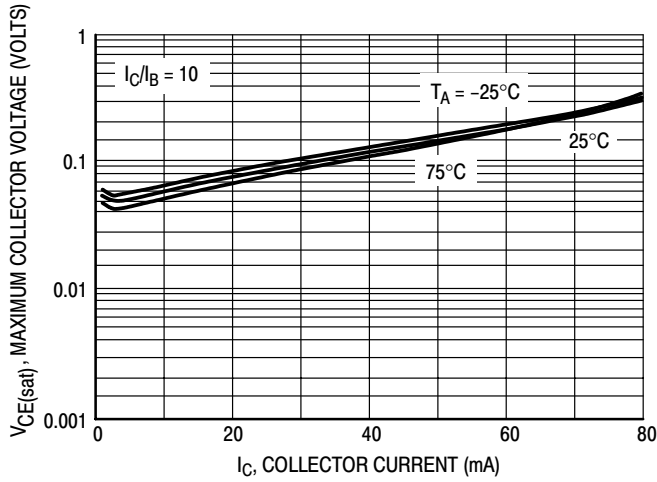


Figure 18.  $V_{CE(sat)}$  versus  $I_C$

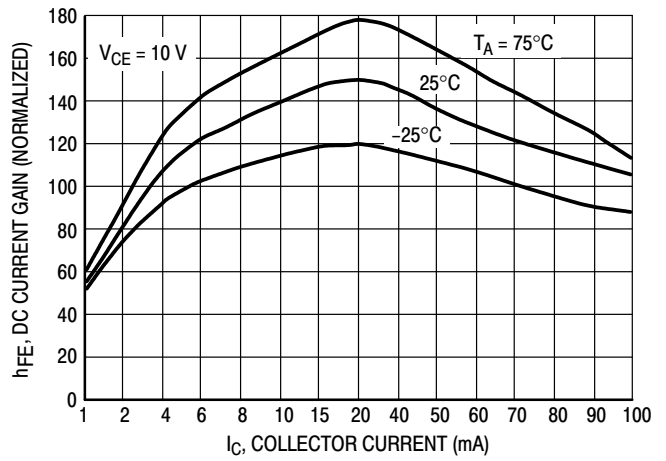


Figure 19. DC Current Gain

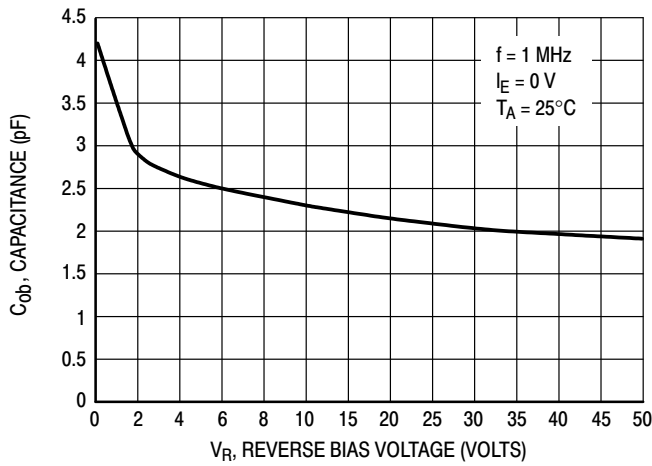


Figure 20. Output Capacitance

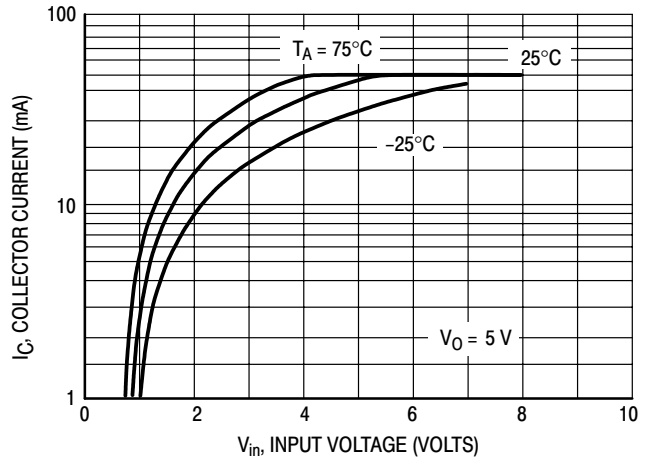


Figure 21. Output Current versus Input Voltage

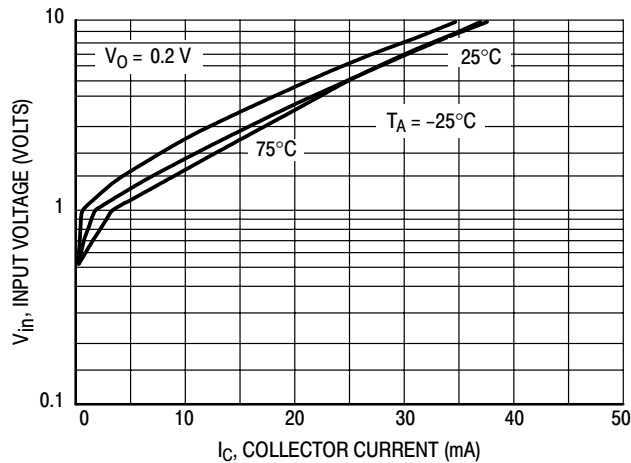


Figure 22. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — DTA144WXV3T1

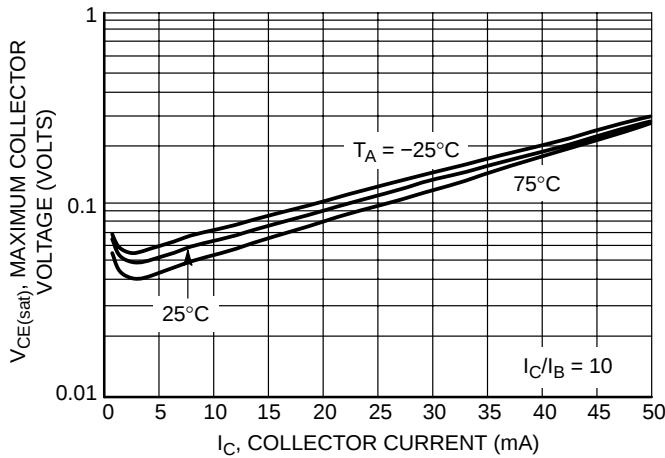


Figure 23. Maximum Collector Voltage versus Collector Current

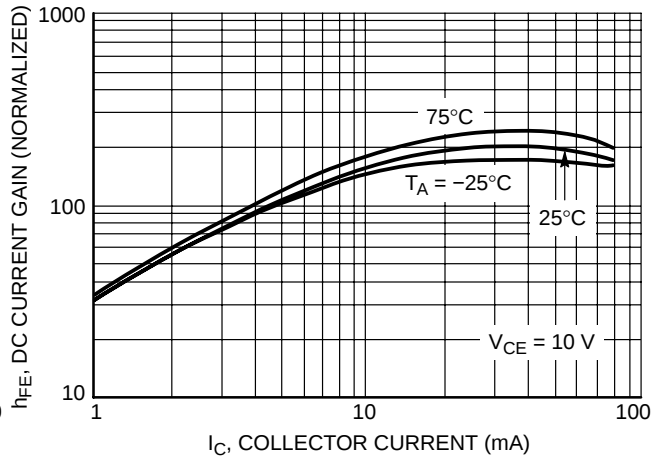


Figure 24. DC Current Gain

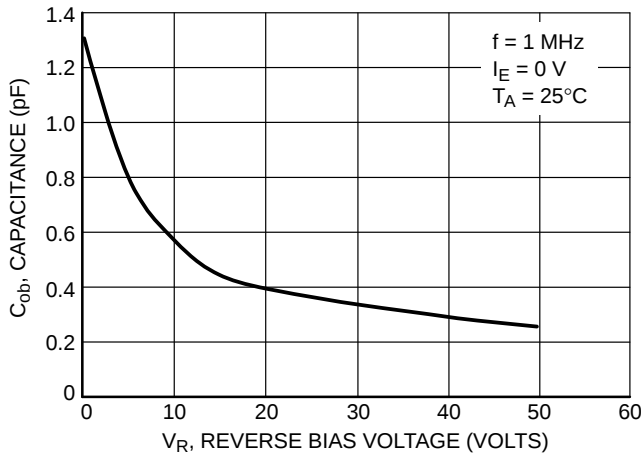


Figure 25. Output Capacitance

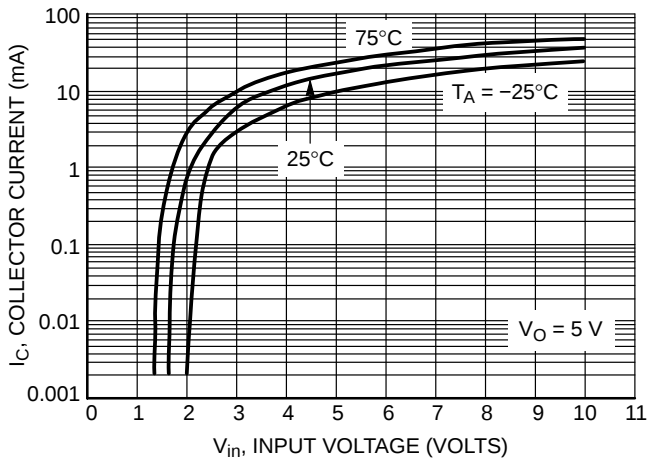


Figure 26. Output Current versus Input Voltage

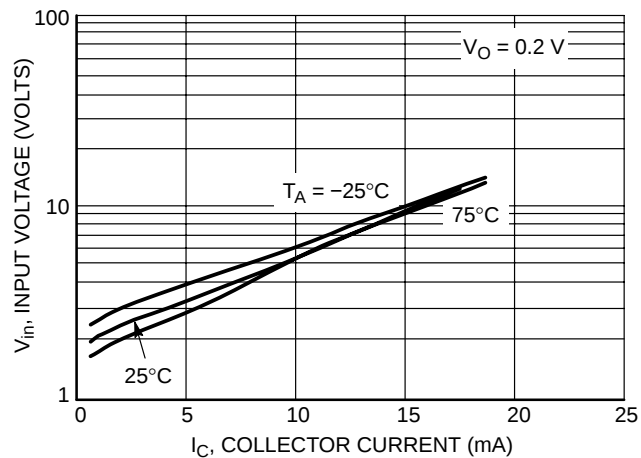


Figure 27. Input Voltage versus Output Current

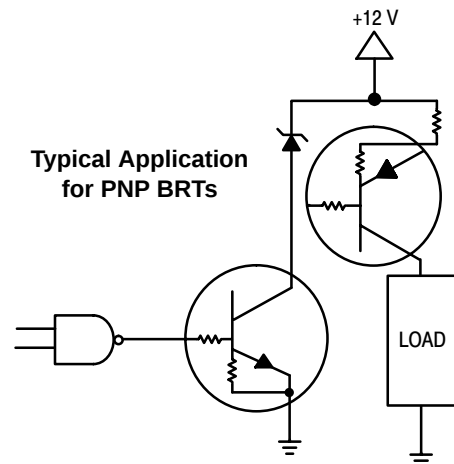
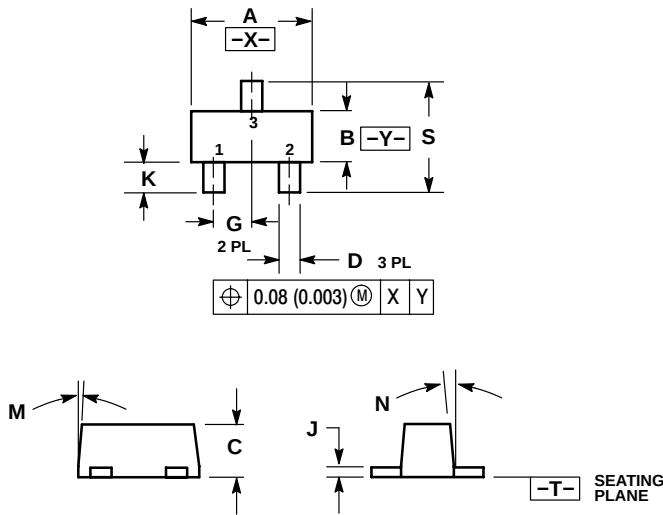


Figure 28. Inexpensive, Unregulated Current Source

# DTA114EXV3T1 Series

## PACKAGE DIMENSIONS

SC-89  
CASE 463C-03  
ISSUE C



### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 463C-01 OBSOLETE, NEW STANDARD 463C-02.

| DIM | MILLIMETERS |      |      | INCHES    |       |       |
|-----|-------------|------|------|-----------|-------|-------|
|     | MIN         | NOM  | MAX  | MIN       | NOM   | MAX   |
| A   | 1.50        | 1.60 | 1.70 | 0.059     | 0.063 | 0.067 |
| B   | 0.75        | 0.85 | 0.95 | 0.030     | 0.034 | 0.040 |
| C   | 0.60        | 0.70 | 0.80 | 0.024     | 0.028 | 0.031 |
| D   | 0.23        | 0.28 | 0.33 | 0.009     | 0.011 | 0.013 |
| G   | 0.50 BSC    |      |      | 0.020 BSC |       |       |
| H   | 0.53 REF    |      |      | 0.021 REF |       |       |
| J   | 0.10        | 0.15 | 0.20 | 0.004     | 0.006 | 0.008 |
| K   | 0.30        | 0.40 | 0.50 | 0.012     | 0.016 | 0.020 |
| L   | 1.10 REF    |      |      | 0.043 REF |       |       |
| M   | ---         | ---  | 10   | ---       | ---   | 10    |
| N   | ---         | ---  | 10   | ---       | ---   | 10    |
| S   | 1.50        | 1.60 | 1.70 | 0.059     | 0.063 | 0.067 |

### STYLE 1:

1. BASE
2. EMITTER
3. COLLECTOR

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