# DTA114EET1 Series, SDTA114EET1 Series

**Preferred Devices**

# Bias Resistor Transistors

## 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 Bias Resistor Transistor (BRT) contains a single transistor with a monolithic bias network consisting of two resistors; a series base resistor and a base−emitter resistor. The BRT eliminates these individual components by integrating them into a single device. The use of a BRT can reduce both system cost and board space. The device is housed in the SC−75/SOT−416 package which is designed for low power surface mount applications.

### Features

- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- The SC−75/SOT−416 package can be soldered using wave or reflow. The modified gull−winged leads absorb thermal stress during soldering eliminating the possibility of damage to the die.
- AEC−Q101 Qualified and PPAP Capable
- S Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements
- Pb−Free Packages are Available*

**MAXIMUM RATINGS** ($T_A$ = 25°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 |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

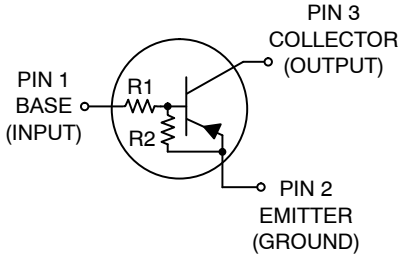
**ON Semiconductor®**

**http://onsemi.com**

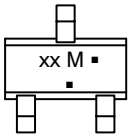
## PNP SILICON BIAS RESISTOR TRANSISTORS



**SC−75 (SOT−416)**
**CASE 463**
**STYLE 1**




### MARKING DIAGRAM




xx = Specific Device Code
xx = (Refer to page 4)
M = Date Code*
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*Date Code orientation may vary depending upon manufacturing location.

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

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

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## THERMAL CHARACTERISTICS

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Total Device Dissipation, FR−4 Board (Note 1)<br>@ $T_A$ = 25°C<br>Derate above 25°C | $P_D$ | <br>200<br>1.6 | <br>mW<br>mW/°C |
| Thermal Resistance,<br>Junction−to−Ambient (Note 1) | $R_{\theta JA}$ | <br>600 | °C/W |
| Total Device Dissipation,<br>FR−4 Board (Note 2) @ $T_A$ = 25°C<br>Derate above 25°C | $P_D$ | <br>300<br>2.4 | <br>mW<br>mW/°C |
| Thermal Resistance, Junction−to−Ambient (Note 2) | $R_{\theta JA}$ | 400 | °C/W |
| Junction and Storage Temperature Range | $T_J$, $T_{stg}$ | −55 to +150 | °C |

1. FR−4 @ Minimum Pad.
2. FR−4 @ 1.0 × 1.0 Inch Pad.

## ELECTRICAL CHARACTERISTICS ($T_A$ = 25°C unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | |
| Collector−Base Cutoff Current ($V_{CB}$ = 50 V, $I_E$ = 0) | $I_{CBO}$ | − | − | 100 | nAdc |
| Collector−Emitter Cutoff Current ($V_{CE}$ = 50 V, $I_B$ = 0) | $I_{CEO}$ | − | − | 500 | nAdc |
| Emitter−Base Cutoff Current<br>($V_{EB}$ = 6.0 V, $I_C$ = 0) | $I_{EBO}$ | | | | mAdc |
| DTA114EET1 | | − | − | 0.5 | |
| DTA124EET1 | | − | − | 0.2 | |
| DTA144EET1 | | − | − | 0.1 | |
| DTA114YET1, SDTA114YET1 | | − | − | 0.2 | |
| DTA114TET1 | | − | − | 0.9 | |
| DTA143TET1 | | − | − | 1.9 | |
| DTA123EET1 | | − | − | 2.3 | |
| DTA143EET1 | | − | − | 1.5 | |
| DTA143ZET1 | | − | − | 0.18 | |
| DTA124XET1 | | − | − | 0.13 | |
| DTA123JET1 | | − | − | 0.2 | |
| DTA115EET1 | | − | − | 0.05 | |
| DTA144WET1 | | − | − | 0.13 | |
| Collector−Base Breakdown Voltage<br>($I_C$ = 10 μA, $I_E$ = 0) | $V_{(BR)CBO}$ | 50 | − | − | Vdc |
| Collector−Emitter Breakdown Voltage (Note 3)<br>($I_C$ = 2.0 mA, $I_B$ = 0) | $V_{(BR)CEO}$ | 50 | − | − | Vdc |

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

## ELECTRICAL CHARACTERISTICS ($T_A$ = 25°C unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **ON CHARACTERISTICS** (Note 4) | | | | | |
| DC Current Gain<br>($V_{CE}$ = 10 V, $I_C$ = 5.0 mA) | $h_{FE}$ | | | | − |
| DTA114EET1 | | 35 | 60 | − | |
| DTA124EET1 | | 60 | 100 | − | |
| DTA144EET1 | | 80 | 140 | − | |
| DTA114YET1, SDTA114YET1 | | 80 | 140 | − | |
| DTA114TET1 | | 160 | 250 | − | |
| DTA143TET1 | | 160 | 250 | − | |
| DTA123EET1 | | 8.0 | 15 | − | |
| DTA143EET1 | | 15 | 27 | − | |
| DTA143ZET1 | | 80 | 140 | − | |
| DTA124XET1 | | 80 | 130 | − | |
| DTA123JET1 | | 80 | 140 | − | |
| DTA115EET1 | | 80 | 150 | − | |
| DTA144WET1 | | 80 | 140 | − | |

**ELECTRICAL CHARACTERISTICS** ($T_A$ = 25°C unless otherwise noted)

**ON CHARACTERISTICS** (Note 4)

| | | | | | |
|---|---|---|---|---|---|
| Collector−Emitter Saturation Voltage ($I_C$ = 10 mA, $I_E$ = 0.3 mA)<br>($I_C$ = 10 mA, $I_B$ = 5 mA)<br>DTA123EET1<br>($I_C$ = 10 mA, $I_B$ = 1 mA)<br>DTA114TET1/DTA143TET1<br>DTA143ZET1/DTA124XET1<br>DTA143EET1 | $V_{CE(sat)}$ | – | – | 0.25 | Vdc |
| Output Voltage (on)<br>($V_{CC}$ = 5.0 V, $V_B$ = 2.5 V, $R_L$ = 1.0 kΩ) | $V_{OL}$ | | | | Vdc |
| DTA114EET1 | | – | – | 0.2 | |
| DTA124EET1 | | – | – | 0.2 | |
| DTA114YET1, SDTA114YET1 | | – | – | 0.2 | |
| DTA114TET1 | | – | – | 0.2 | |
| DTA143TET1 | | – | – | 0.2 | |
| DTA123EET1 | | – | – | 0.2 | |
| DTA143EET1 | | – | – | 0.2 | |
| DTA143ZET1 | | – | – | 0.2 | |
| DTA124XET1 | | – | – | 0.2 | |
| DTA123JET1 | | – | – | 0.2 | |
| ($V_{CC}$ = 5.0 V, $V_B$ = 3.5 V, $R_L$ = 1.0 kΩ)<br>DTA144EET1 | | – | – | 0.2 | |
| ($V_{CC}$ = 5.0 V, $V_B$ = 5.5 V, $R_L$ = 1.0 kΩ)<br>DTA115EET1 | | – | – | 0.2 | |
| ($V_{CC}$ = 5.0 V, $V_B$ = 4.0 V, $R_L$ = 1.0 kΩ)<br>DTA144WET1 | | – | – | 0.2 | |

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

**ELECTRICAL CHARACTERISTICS** ($T_A$ = 25°C unless otherwise noted) (continued)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **ON CHARACTERISTICS** (Note 6) | | | | | |
| Output Voltage (off) ($V_{CC}$ = 5.0 V, $V_B$ = 0.5 V, $R_L$ = 1.0 kΩ)<br>($V_{CC}$ = 5.0 V, $V_B$ = 0.25 V, $R_L$ = 1.0 kΩ)<br>DTA114TET1<br>DTA143TET1<br>DTA123EET1<br>DTA143EET1 | $V_{OH}$ | 4.9 | – | – | Vdc |
| Input Resistor | R1 | | | | kΩ |
| DTA114EET1 | | 7.0 | 10 | 13 | |
| DTA124EET1 | | 15.4 | 22 | 28.6 | |
| DTA144EET1 | | 32.9 | 47 | 61.1 | |
| DTA114YET1, SDTA114YET1 | | 7.0 | 10 | 13 | |
| DTA114TET1 | | 7.0 | 10 | 13 | |
| DTA143TET1 | | 3.3 | 4.7 | 6.1 | |
| DTA123EET1 | | 1.5 | 2.2 | 2.9 | |
| DTA143EET1 | | 3.3 | 4.7 | 6.1 | |
| DTA143ZET1 | | 3.3 | 4.7 | 6.1 | |
| DTA124XET1 | | 15.4 | 22 | 28.6 | |
| DTA123JET1 | | 1.54 | 2.2 | 2.86 | |
| DTA115EET1 | | 70 | 100 | 130 | |
| DTA144WET1 | | 32.9 | 47 | 61.1 | |
| Resistor Ratio | $R_1/R_2$ | | | | – |
| DTA114EET1/DTA124EET1 | | – | – | – | |
| DTA144EET1/DTA115EET1 | | 0.8 | 1.0 | 1.2 | |
| DTA114YET1, SDTA114YET1 | | 0.17 | 0.21 | 0.25 | |
| DTA114TET1/DTA143TET1 | | – | – | – | |
| DTA123EET1/DTA143EET1 | | 0.8 | 1.0 | 1.2 | |
| DTA143ZET1 | | 0.055 | 0.1 | 0.185 | |
| DTA124XET1 | | 0.38 | 0.47 | 0.56 | |
| DTA123JET1 | | 0.038 | 0.047 | 0.056 | |
| DTA144WET1 | | 1.7 | 2.1 | 2.6 | |

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

**ORDERING INFORMATION AND RESISTOR VALUES**

| Device | Marking | R1 (K) | R2 (K) | Package | Shipping† |
|---|---|---|---|---|---|
| DTA114EET1 | 6A | 10 | 10 | SC−75 | 3,000 Tape & Reel |
| DTA114EET1G | | | | SC−75 (Pb−Free) | 3,000 Tape & Reel |
| DTA124EET1 | 6B | 22 | 22 | SC−75 | 3,000 Tape & Reel |
| DTA124EET1G | | | | SC−75 (Pb−Free) | 3,000 Tape & Reel |
| DTA144EET1 | 6C | 47 | 47 | SC−75 | 3,000 Tape & Reel |
| DTA144EET1G | | | | SC−75 (Pb−Free) | 3,000 Tape & Reel |
| DTA114YET1 | 6D | 10 | 47 | SC−75 | 3,000 Tape & Reel |
| DTA114YET1G | | | | SC−75 (Pb−Free) | 3,000 Tape & Reel |
| SDTA114YET1G | | | | SC−75 (Pb−Free) | 3,000 Tape & Reel |
| DTA114TET1 | 6E | 10 | ∞ | SC−75 | 3,000 Tape & Reel |
| DTA114TET1G | | | | SC−75 (Pb−Free) | 3,000 Tape & Reel |
| DTA143TET1 | 6F | 4.7 | ∞ | SC−75 | 3,000 Tape & Reel |
| DTA143TET1G | | | | SC−75 (Pb−Free) | 3,000 Tape & Reel |
| DTA123EET1 | 6H | 2.2 | 2.2 | SC−75 | 3,000 Tape & Reel |
| DTA123EET1G | | | | SC−75 (Pb−Free) | 3,000 Tape & Reel |
| DTA143EET1 | 43 | 4.7 | 4.7 | SC−75 | 3,000 Tape & Reel |
| DTA143EET1G | | | | SC−75 (Pb−Free) | 3,000 Tape & Reel |
| DTA143ZET1 | 6K | 4.7 | 47 | SC−75 | 3,000 Tape & Reel |
| DTA143ZET1G | | | | SC−75 (Pb−Free) | 3,000 Tape & Reel |
| DTA124XET1 | 6L | 22 | 47 | SC−75 | 3,000 Tape & Reel |
| DTA124XET1G | | | | SC−75 (Pb−Free) | 3,000 Tape & Reel |
| DTA123JET1 | 6M | 2.2 | 47 | SC−75 | 3,000 Tape & Reel |
| DTA123JET1G | | | | SC−75 (Pb−Free) | 3,000 Tape & Reel |
| DTA115EET1 | 6N | 100 | 100 | SC−75 | 3,000 Tape & Reel |
| DTA115EET1G | | | | SC−75 (Pb−Free) | 3,000 Tape & Reel |
| DTA144WET1 | 6P | 47 | 22 | SC−75 | 3,000 Tape & Reel |
| DTA144WET1G | | | | SC−75 (Pb−Free) | 3,000 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.

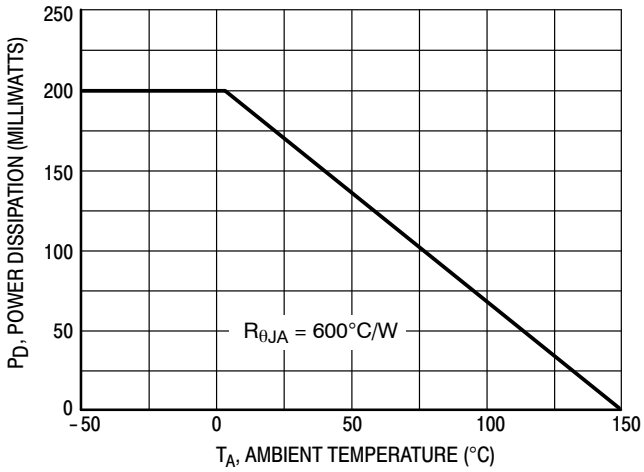



**Figure 1. Derating Curve**

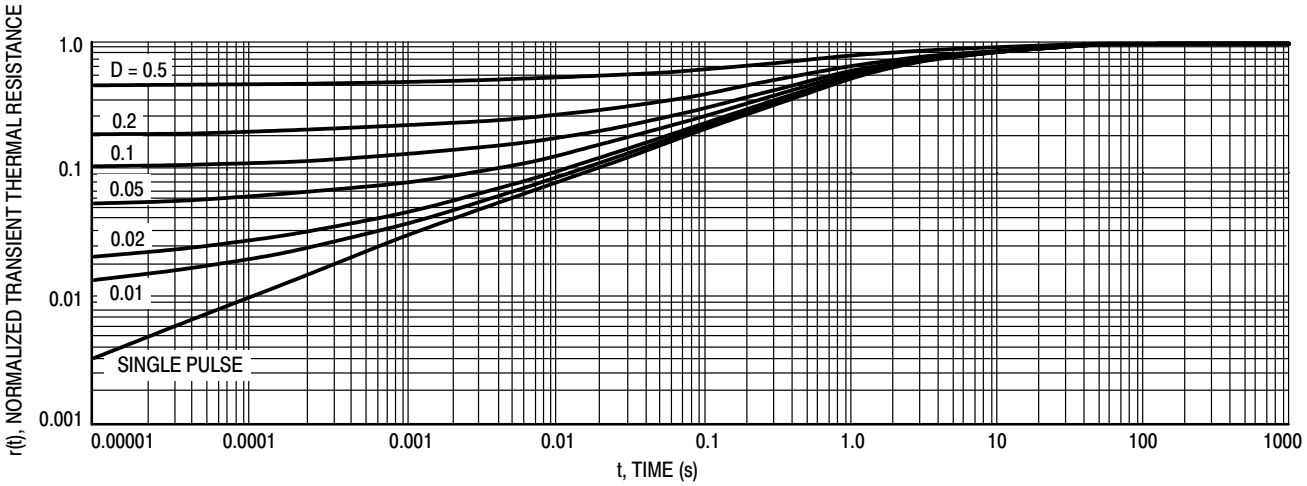



**Figure 2. Normalized Thermal Response**

## TYPICAL ELECTRICAL CHARACTERISTICS – DTA114EET1

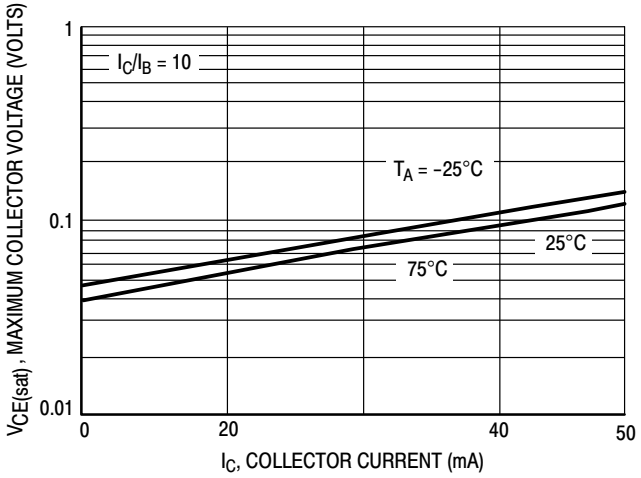



**Figure 3. $V_{CE(sat)}$ versus $I_C$**

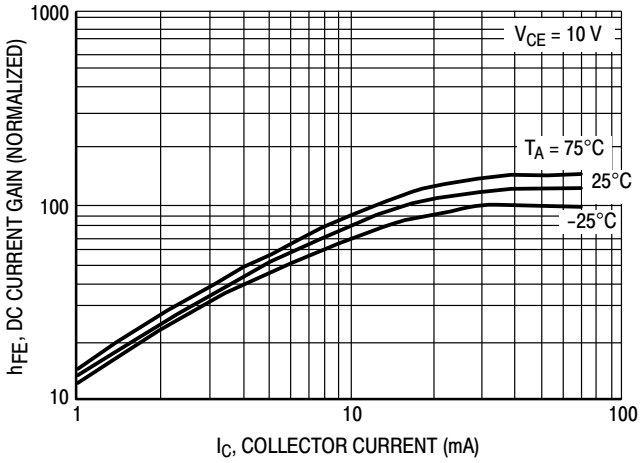



**Figure 4. DC Current Gain**

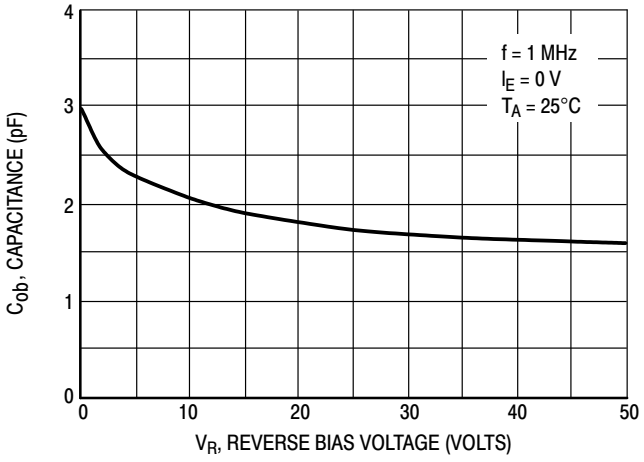



**Figure 5. Output Capacitance**

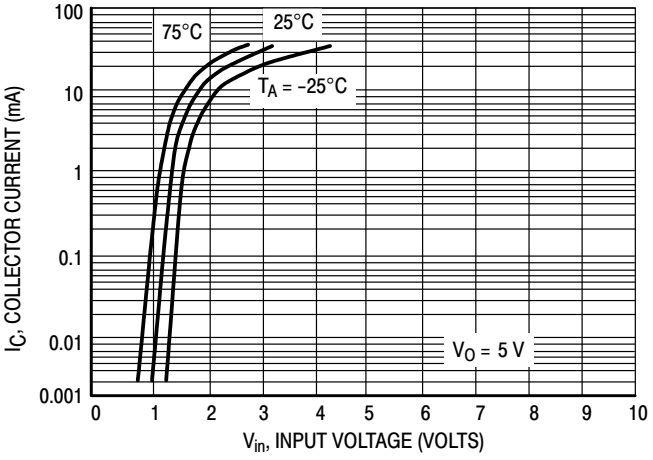



**Figure 6. Output Current versus Input Voltage**

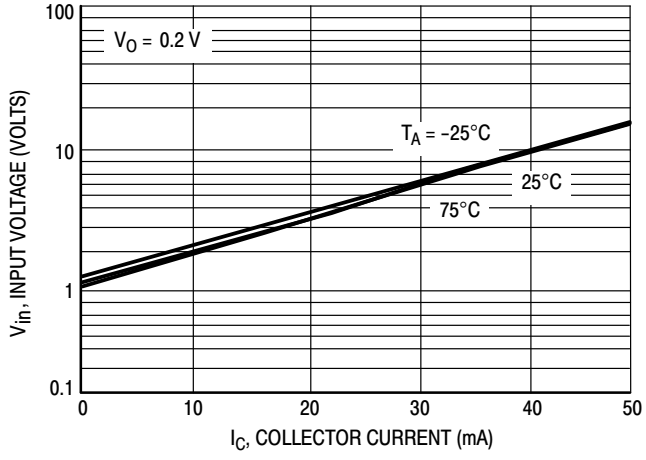



**Figure 7. Input Voltage versus Output Current**

## TYPICAL ELECTRICAL CHARACTERISTICS – DTA123EET1

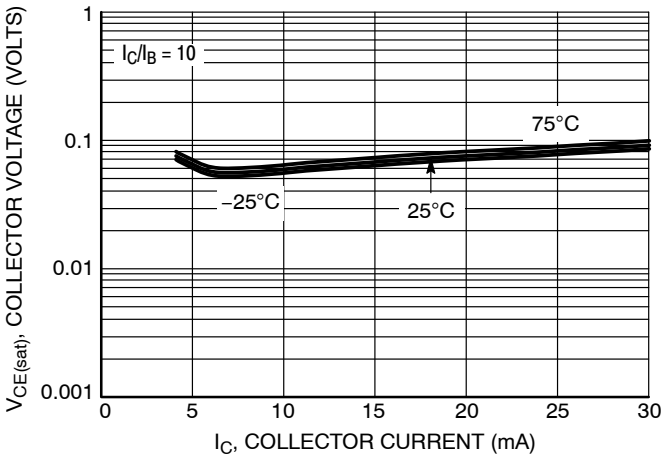



**Figure 8. $V_{CE(sat)}$ versus $I_C$**

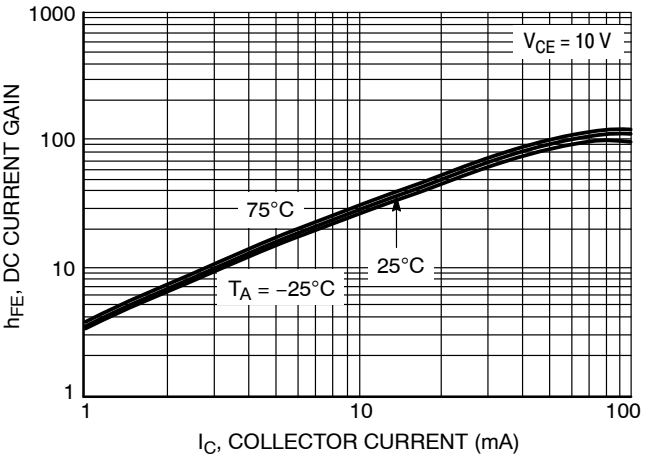



**Figure 9. DC Current Gain**

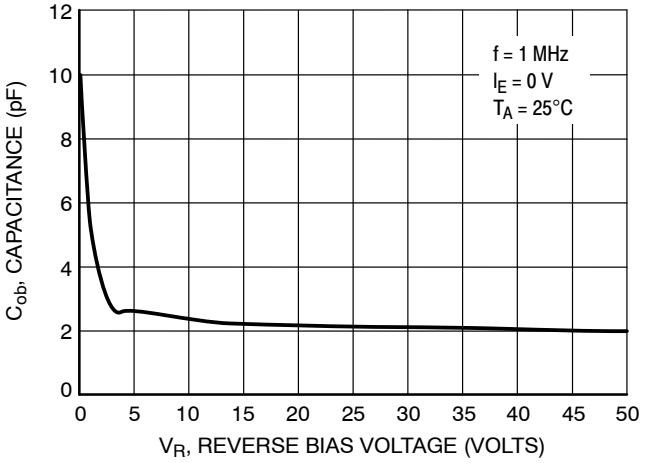



**Figure 10. Output Capacitance**

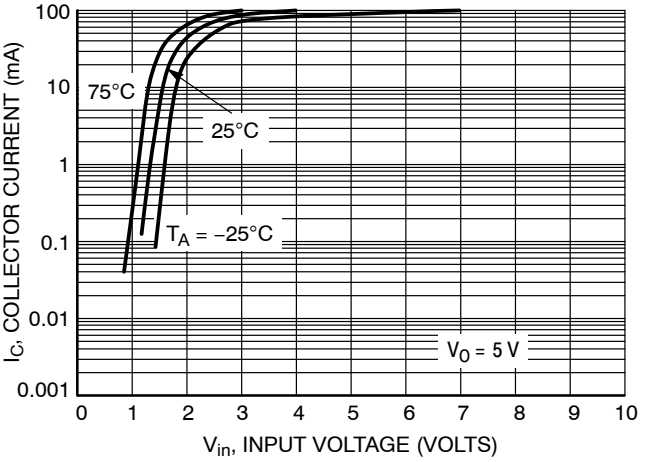



**Figure 11. Output Current versus Input Voltage**

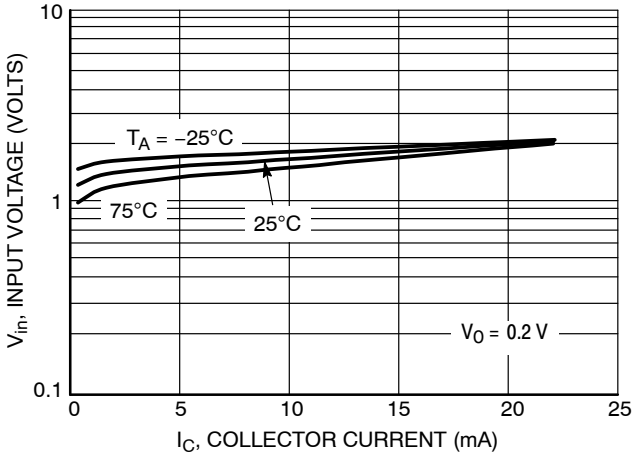



**Figure 12. Input Voltage versus Output Current**

## TYPICAL ELECTRICAL CHARACTERISTICS – DTA124EET1

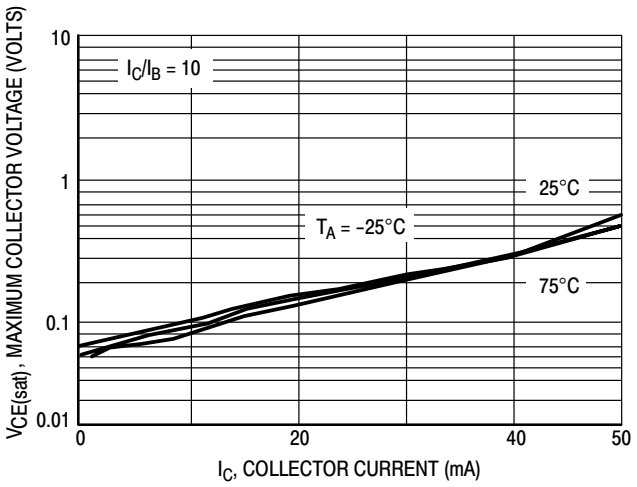



**Figure 13. $V_{CE(sat)}$ versus $I_C$**

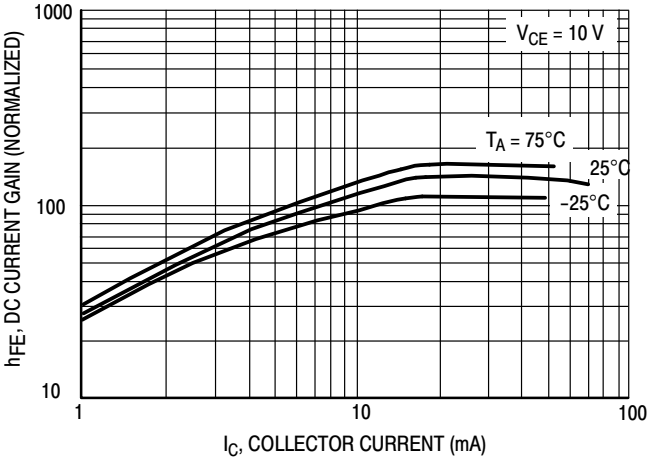



**Figure 14. DC Current Gain**

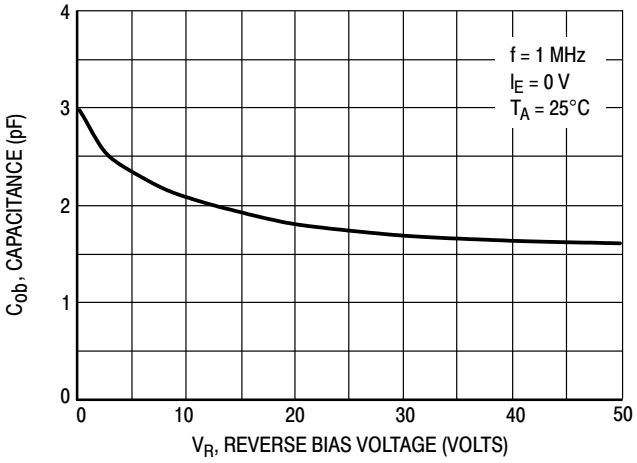



**Figure 15. Output Capacitance**

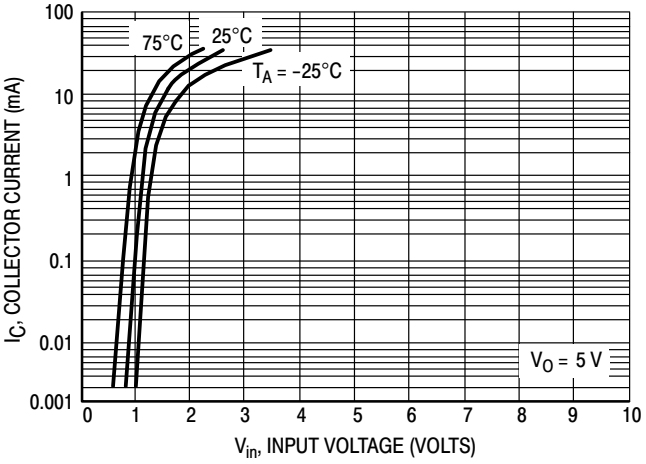



**Figure 16. Output Current versus Input Voltage**

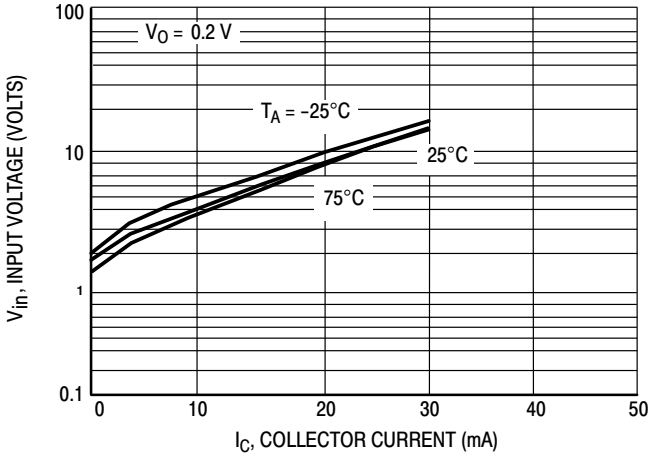



**Figure 17. Input Voltage versus Output Current**

## TYPICAL ELECTRICAL CHARACTERISTICS – DTA144EET1

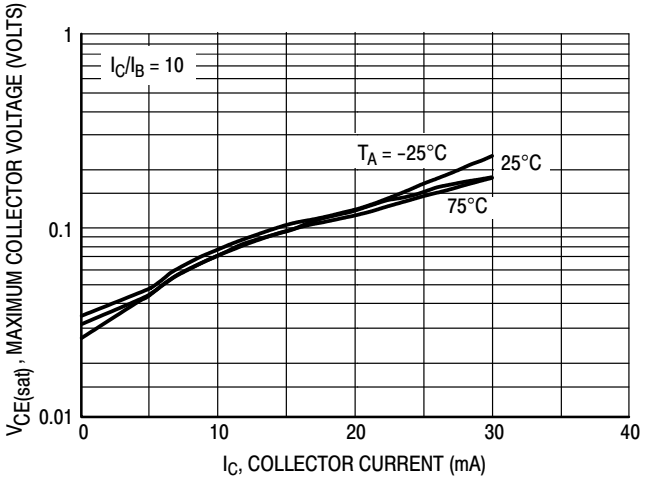



**Figure 18. $V_{CE(sat)}$ versus $I_C$**

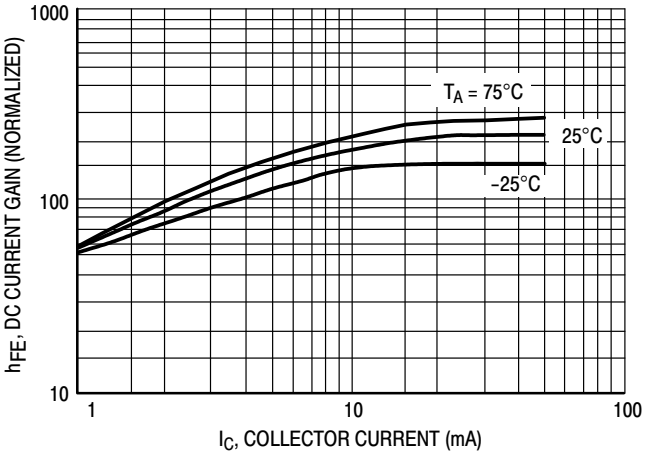



**Figure 19. DC Current Gain**

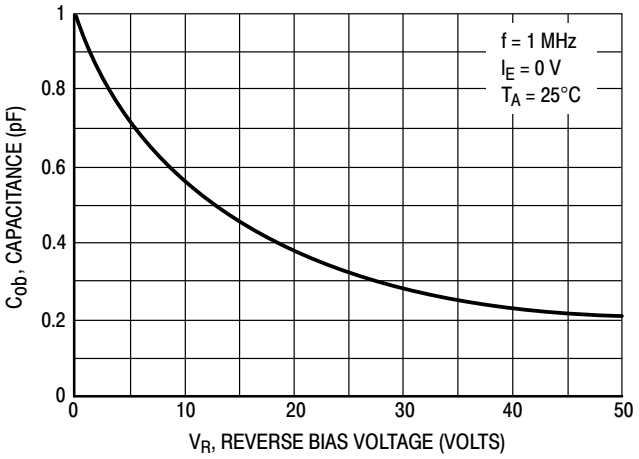



**Figure 20. Output Capacitance**

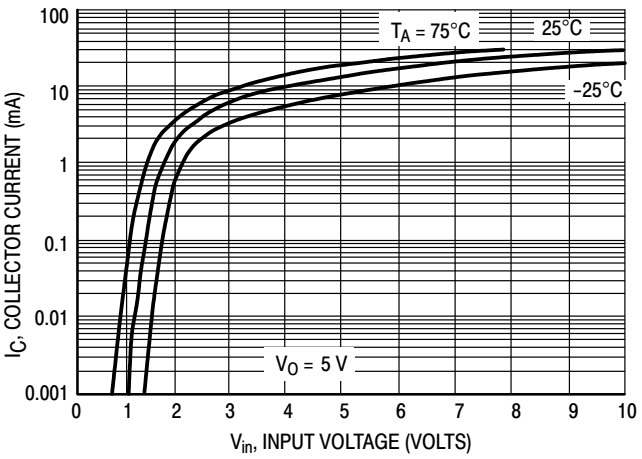



**Figure 21. Output Current versus Input Voltage**

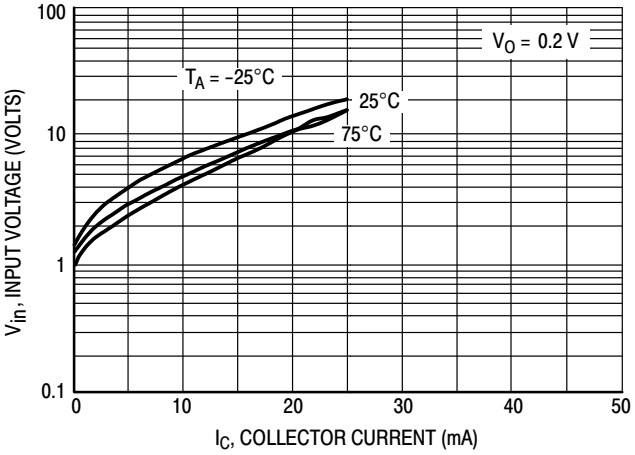



**Figure 22. Input Voltage versus Output Current**

## TYPICAL ELECTRICAL CHARACTERISTICS – DTA114YET1, SDTA114YET1

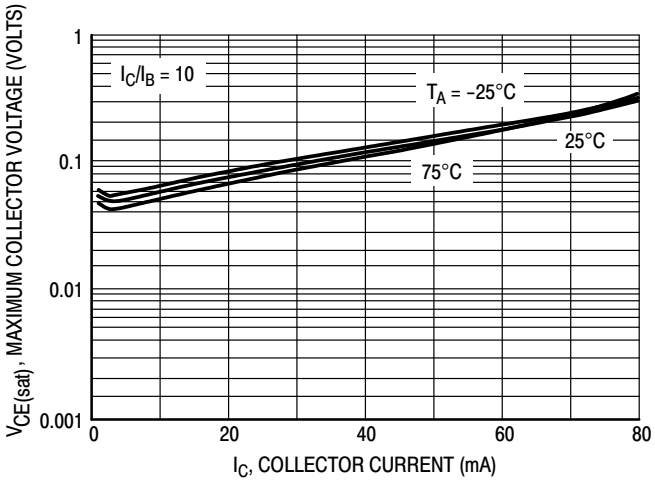



**Figure 23. $V_{CE(sat)}$ versus $I_C$**

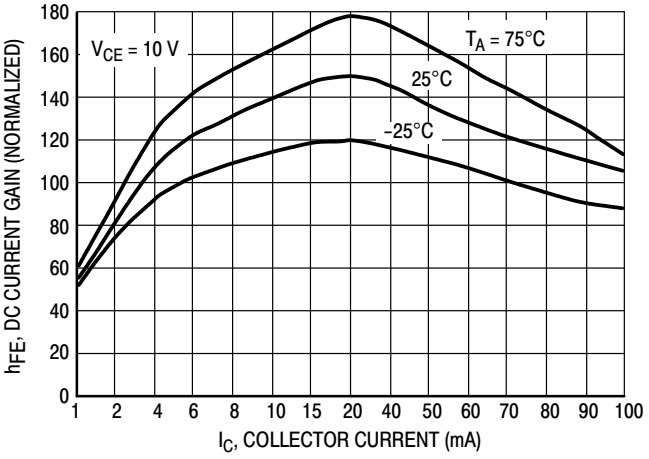



**Figure 24. DC Current Gain**

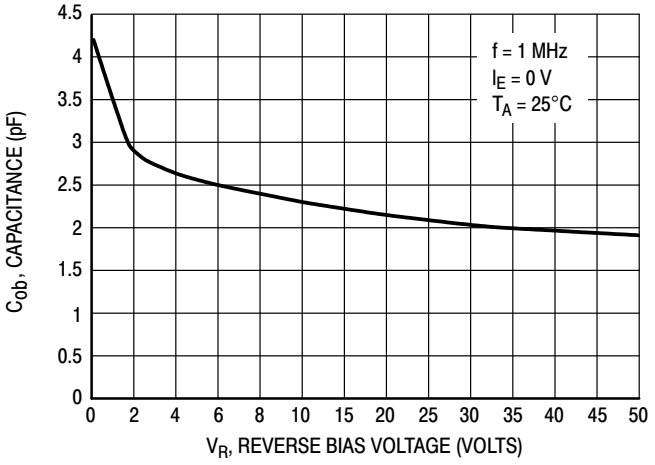



**Figure 25. Output Capacitance**

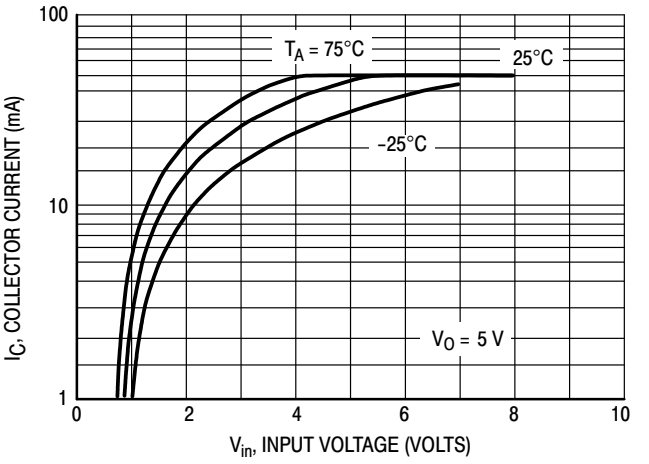



**Figure 26. Output Current versus Input Voltage**

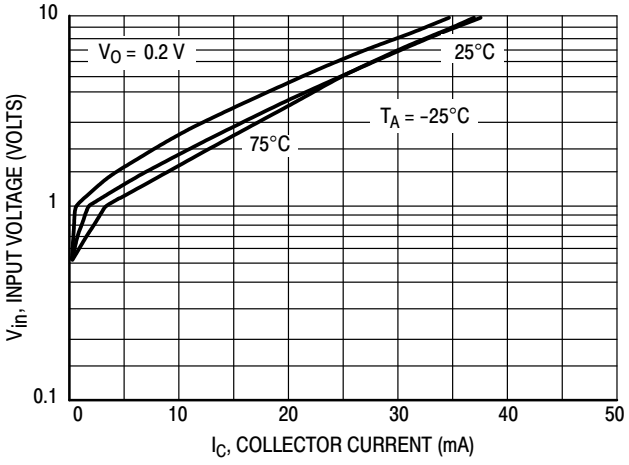



**Figure 27. Input Voltage versus Output Current**

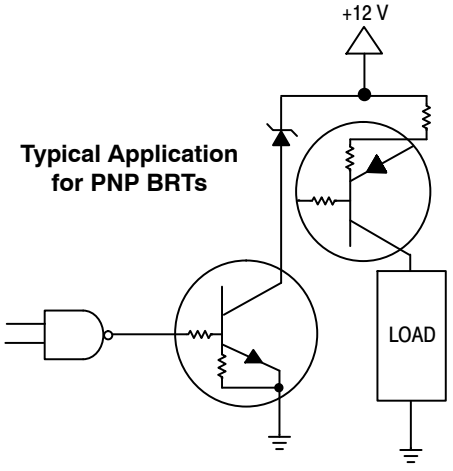



**Figure 28. Inexpensive, Unregulated Current Source**

## TYPICAL ELECTRICAL CHARACTERISTICS — DTA115EET1

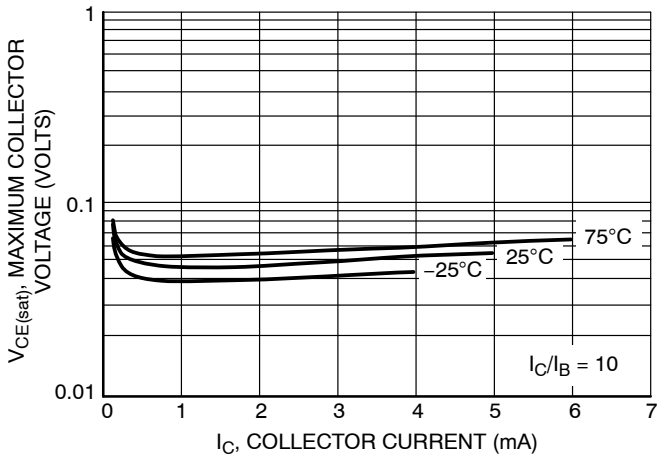



**Figure 29. Maximum Collector Voltage versus Collector Current**

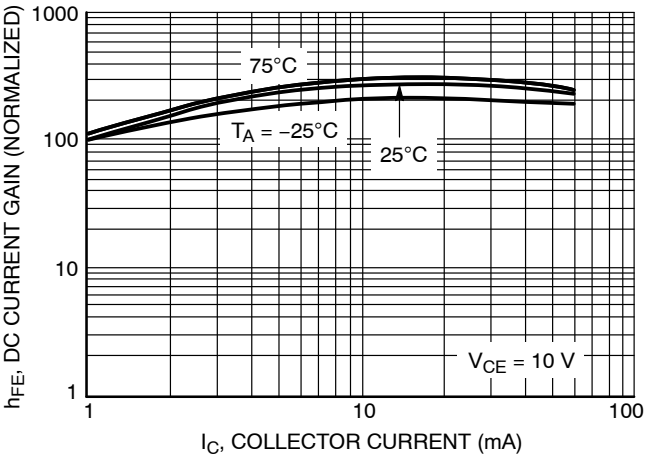



**Figure 30. DC Current Gain**

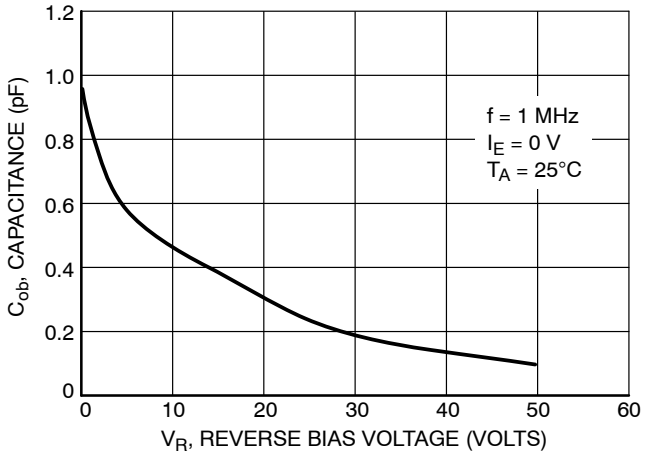



**Figure 31. Output Capacitance**

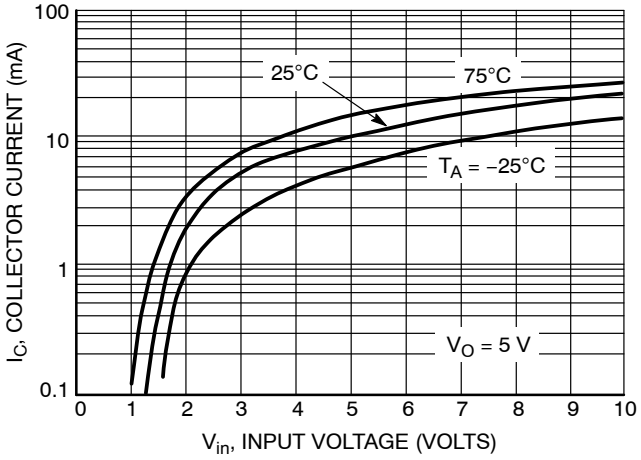



**Figure 32. Output Current versus Input Voltage**

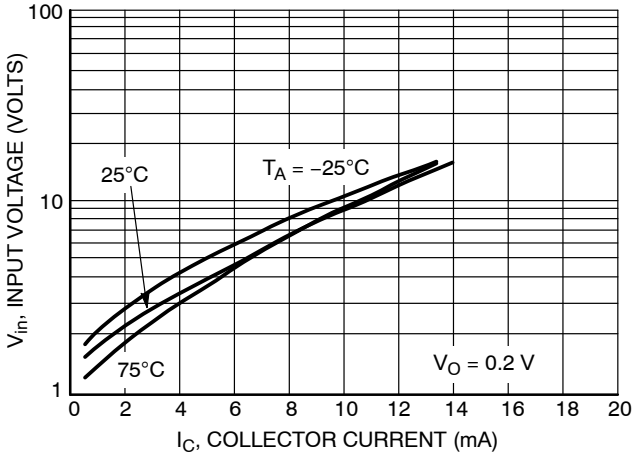



**Figure 33. Input Voltage versus Output Current**

## TYPICAL ELECTRICAL CHARACTERISTICS — DTA144WET1

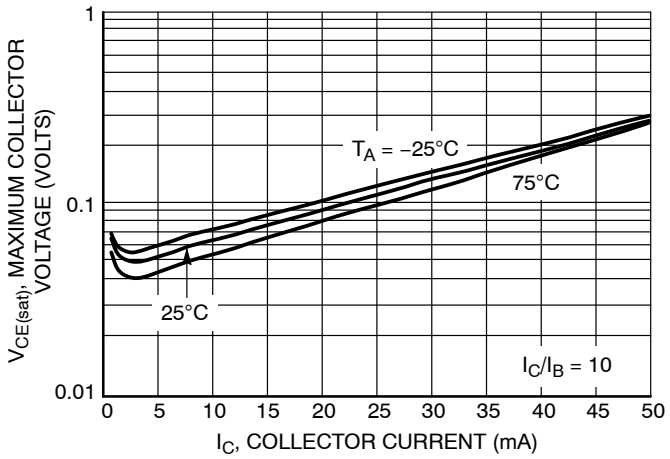



**Figure 34. Maximum Collector Voltage versus Collector Current**

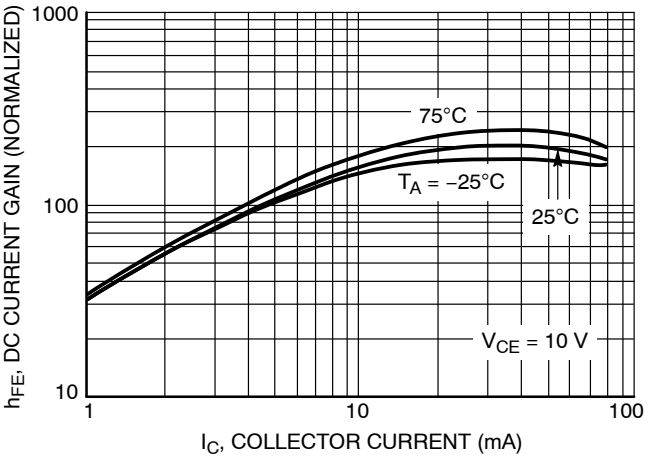



**Figure 35. DC Current Gain**

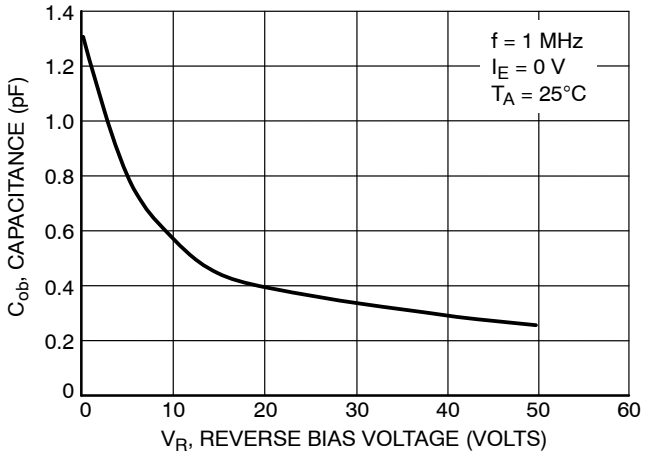



**Figure 36. Output Capacitance**

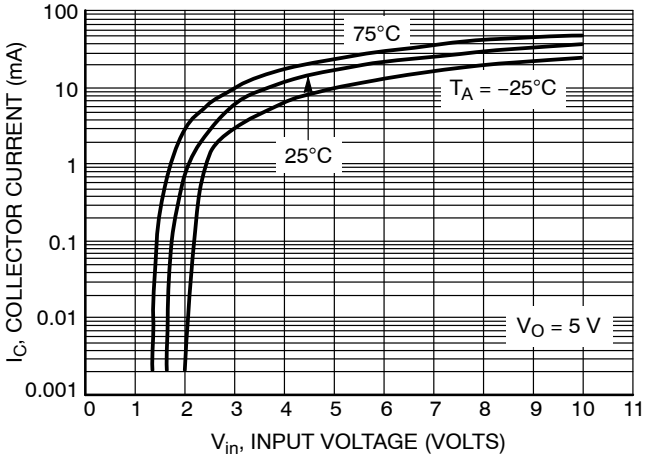



**Figure 37. Output Current versus Input Voltage**

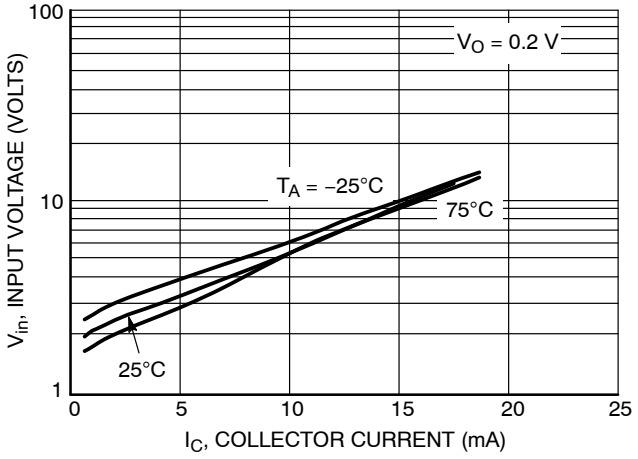
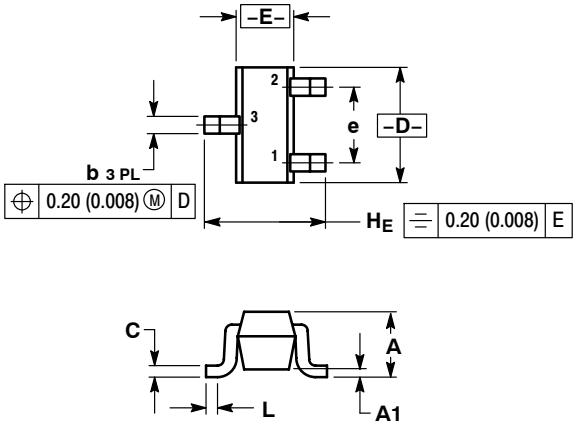



**Figure 38. Input Voltage versus Output Current**

## PACKAGE DIMENSIONS

**SC−75/SOT−416**
CASE 463−01
ISSUE F

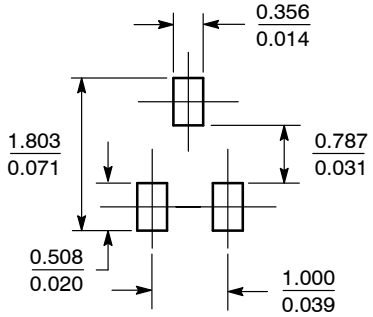



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.

| | MILLIMETERS | | | INCHES | | |
|---|---|---|---|---|---|---|
| DIM | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.70 | 0.80 | 0.90 | 0.027 | 0.031 | 0.035 |
| A1 | 0.00 | 0.05 | 0.10 | 0.000 | 0.002 | 0.004 |
| b | 0.15 | 0.20 | 0.30 | 0.006 | 0.008 | 0.012 |
| C | 0.10 | 0.15 | 0.25 | 0.004 | 0.006 | 0.010 |
| D | 1.55 | 1.60 | 1.65 | 0.059 | 0.063 | 0.067 |
| E | 0.70 | 0.80 | 0.90 | 0.027 | 0.031 | 0.035 |
| e | 1.00 BSC | | | 0.04 BSC | | |
| L | 0.10 | 0.15 | 0.20 | 0.004 | 0.006 | 0.008 |
| $H_E$ | 1.50 | 1.60 | 1.70 | 0.061 | 0.063 | 0.065 |

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

## SOLDERING FOOTPRINT*




SCALE 10:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

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

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