

DTA114E SERIES

Preferred Devices

Bias Resistor Transistor

PNP Silicon Surface Mount Transistor 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 BRT (Bias Resistor Transistor) 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 TO-92 package which is designed for through hole applications.



ON Semiconductor

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PNP SILICON BIAS RESISTOR TRANSISTOR

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 |
| Total Power Dissipation @ $T_A = 25^\circ\text{C}$ (1.) Derate above 25°C | P_D | 350 2.81 | mW mW/°C |

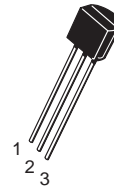
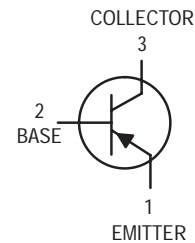
THERMAL CHARACTERISTICS

| Characteristic | Symbol | Value | Unit |
|---|-----------------|-------------|-----------|
| Thermal Resistance, Junction to Ambient (surface mounted) | $R_{\theta JA}$ | 357 | °C/W |
| Operating and Storage Temperature Range | T_J, T_{stg} | -55 to +150 | °C |
| Maximum Temperature for Soldering Purposes, Time in Solder Bath | T_L | 260 10 | °C Sec |

DEVICE MARKING AND RESISTOR VALUES

| Device | Marking | R1 (K) | R2 (K) | Shipping |
|---------|---------|--------|----------|----------|
| DTA114E | DTA114E | 10 | 10 | 5000/Box |
| DTA124E | DTA124E | 22 | 22 | |
| DTA144E | DTA144E | 47 | 47 | |
| DTA114Y | DTA114Y | 10 | 47 | |
| DTA114T | DTA114T | 10 | ∞ | |
| DTA143T | DTA143T | 4.7 | ∞ | |
| DTB113E | DTB113E | 1.0 | 1.0 | |
| DTA123E | DTA123E | 2.2 | 2.2 | |
| DTA143E | DTA143E | 4.7 | 4.7 | |
| DTA143Z | DTA143Z | 4.7 | 4.7 | |

1. Device mounted on a FR-4 glass epoxy printed circuit board using the minimum recommended footprint.



**CASE 29
TO-92 (TO-226)
STYLE 1**

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

DTA114E SERIES

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 _{CB0} | — | — | 100 | nAdc |
| Collector–Emitter Cutoff Current (V _{CE} = 50 V, I _B = 0) | I _{CEO} | — | — | 500 | nAdc |
| Emitter–Base Cutoff Current (V _{EB} = 6.0 V, I _C = 0) | I _{EBO} | — | — | 0.5 | mAdc |
| DTA114E | | — | — | 0.2 | |
| DTA124E | | — | — | 0.1 | |
| DTA144E | | — | — | 0.2 | |
| DTA114Y | | — | — | 0.9 | |
| DTA114T | | — | — | 1.9 | |
| DTA143T | | — | — | 4.3 | |
| DTB113E | | — | — | 2.3 | |
| DTA123E | | — | — | 1.5 | |
| DTA143E | | — | — | 0.18 | |
| DTA143Z | | — | — | | |
| Collector–Base Breakdown Voltage (I _C = 10 μA, I _E = 0) | V _{(BR)CBO} | 50 | — | — | Vdc |
| Collector–Emitter Breakdown Voltage ⁽²⁾ (I _C = 2.0 mA, I _B = 0) | V _{(BR)CEO} | 50 | — | — | Vdc |

ON CHARACTERISTICS ⁽²⁾

| | | | | | |
|--|----------------------|-----|-----|------|-----|
| DC Current Gain (V _{CE} = 10 V, I _C = 5.0 mA) | h _{FE} | 35 | 60 | — | |
| DTA114E | | 60 | 100 | — | |
| DTA124E | | 80 | 140 | — | |
| DTA144E | | 80 | 140 | — | |
| DTA114Y | | 160 | 250 | — | |
| DTA114T | | 160 | 250 | — | |
| DTA143T | | 3.0 | 5.0 | — | |
| DTB113E | | 8.0 | 15 | — | |
| DTA123E | | 15 | 27 | — | |
| DTA143E | | 80 | 140 | — | |
| DTA143Z | | | | | |
| Collector–Emitter Saturation Voltage (I _C = 10 mA, I _E = 0.3 mA) DTA144E/DTA114Y DTB113E/DTA143E (I _C = 10 mA, I _B = 5 mA) DTA123E (I _C = 10 mA, I _B = 1 mA) DTA114T/DTA143T/ DTA143Z/DTA124E | V _{CE(sat)} | — | — | 0.25 | Vdc |
| Output Voltage (on) (V _{CC} = 5.0 V, V _B = 2.5 V, R _L = 1.0 kΩ) | V _{OL} | — | — | 0.2 | Vdc |
| DTA114E | | — | — | 0.2 | |
| DTA124E | | — | — | 0.2 | |
| DTA114Y | | — | — | 0.2 | |
| DTA114T | | — | — | 0.2 | |
| DTA143T | | — | — | 0.2 | |
| DTB113E | | — | — | 0.2 | |
| DTA123E | | — | — | 0.2 | |
| DTA143E | | — | — | 0.2 | |
| DTA143Z | | — | — | 0.2 | |
| DTA144E | | — | — | 0.2 | |
| (V _{CC} = 5.0 V, V _B = 3.5 V, R _L = 1.0 kΩ) | | — | — | 0.2 | |

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

DTA114E SERIES

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

| Characteristic | | Symbol | Min | Typ | Max | Unit |
|--|--|--------------------------------|--|---|---|------|
| Output Voltage (off) (V _{CC} = 5.0 V, V _B = 0.5 V, R _L = 1.0 kΩ) | DTA114T DTA113T DTA144E DTA114Y DTA143Z | V _{OH} | 4.9 | — | — | Vdc |
| (V _{CC} = 5.0 V, V _B = 0.05 V, R _L = 1.0 kΩ) | DTB113E | | | | | |
| (V _{CC} = 5.0 V, V _B = 0.25 V, R _L = 1.0 kΩ) | DTA114T DTA143T DTA123E DTA143E | | | | | |
| Input Resistor | DTA114E DTA124E DTA144E DTA114Y DTA114T DTA143T DTB113E DTA123E DTA143E DTA143Z | R1 | 7.0 15.4 32.9 7.0 7.0 3.3 0.7 1.5 3.3 3.3 | 10 22 47 10 10 4.7 1.0 2.2 4.7 4.7 | 13 28.6 61.1 13 13 6.1 1.3 2.9 6.1 6.1 | kΩ |
| Resistor Ratio | DTA114E/DTA124E/DTA144E DTA114Y DTA114T/DTA143T DTB113E/DTA123E/DTA143E DTA143Z | R ₁ /R ₂ | 0.8 0.17 — 0.8 0.055 | 1.0 0.21 — 1.0 0.1 | 1.2 0.25 — 1.2 0.185 | |

DTA114E SERIES

TYPICAL ELECTRICAL CHARACTERISTICS DTA114E

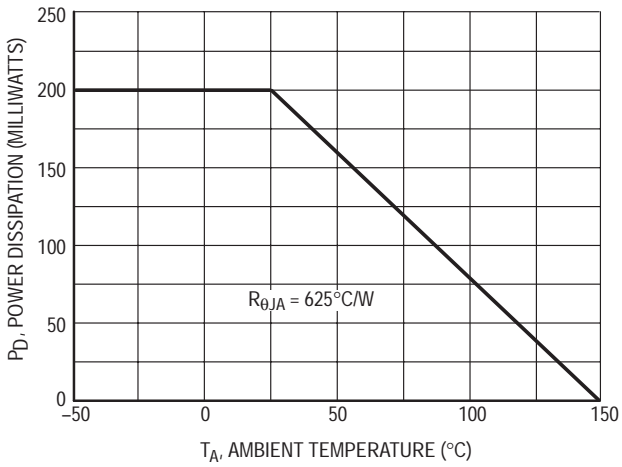


Figure 1. Derating Curve

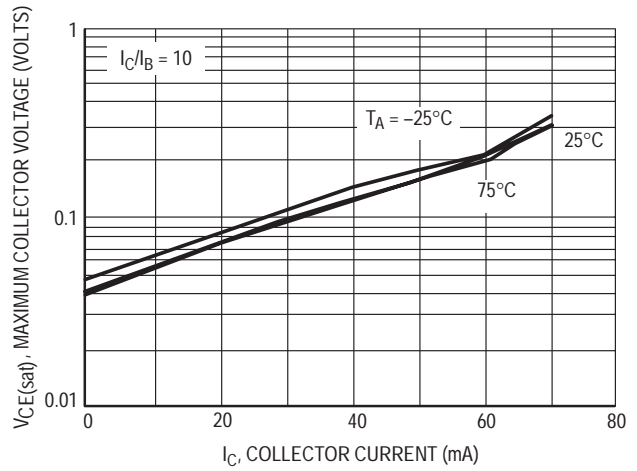


Figure 2. V_{CE(sat)} versus I_C

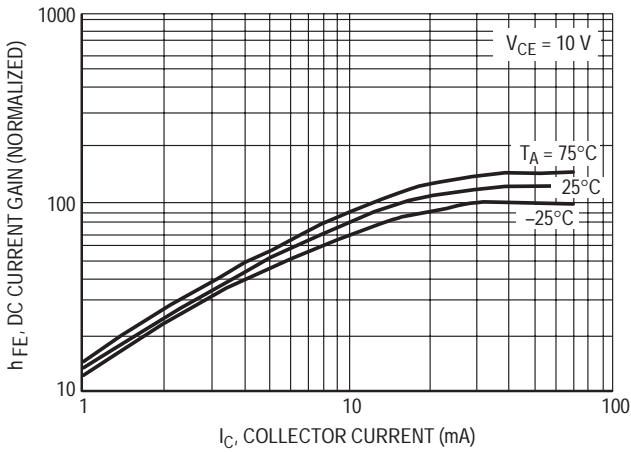


Figure 3. DC Current Gain

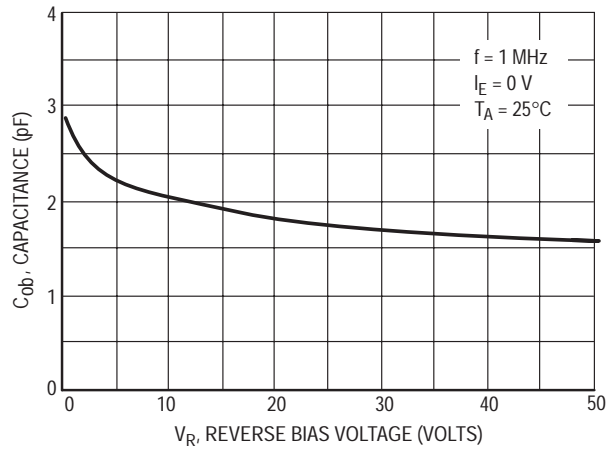


Figure 4. Output Capacitance

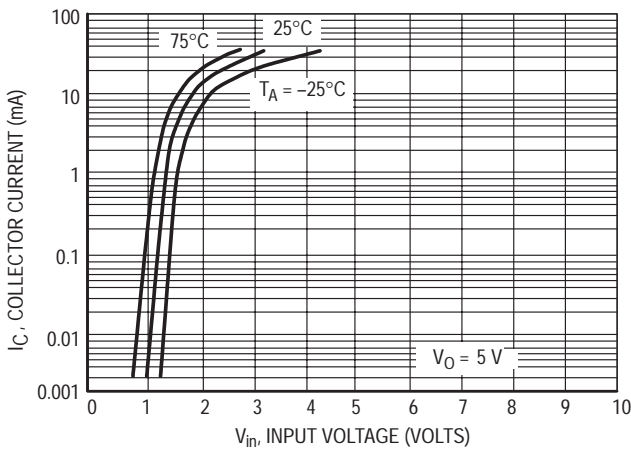


Figure 5. Output Current versus Input Voltage

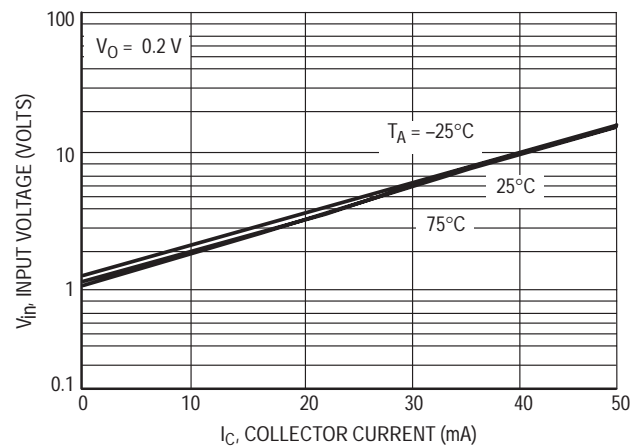


Figure 6. Input Voltage versus Output Current

DTA114E SERIES

TYPICAL ELECTRICAL CHARACTERISTICS DTA124E

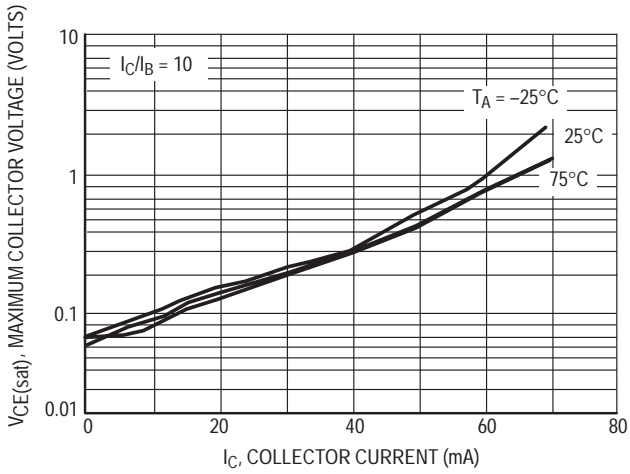


Figure 7. $V_{CE(sat)}$ versus I_C

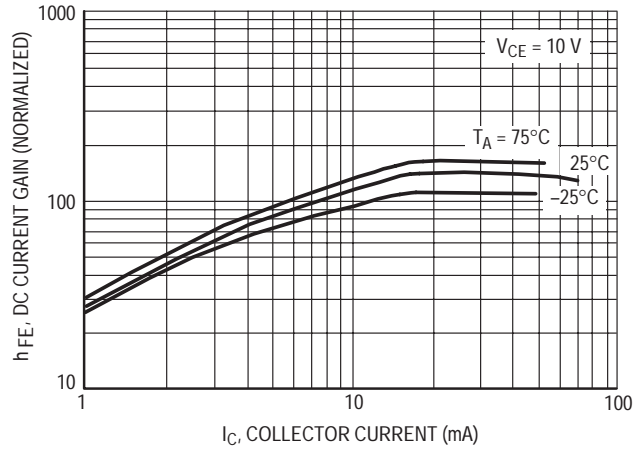


Figure 8. DC Current Gain

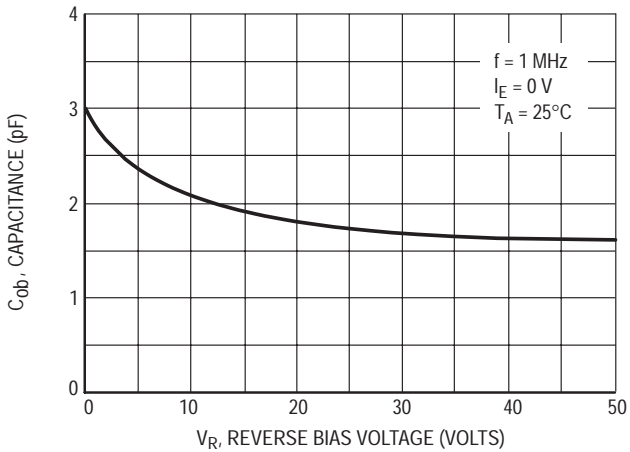


Figure 9. Output Capacitance

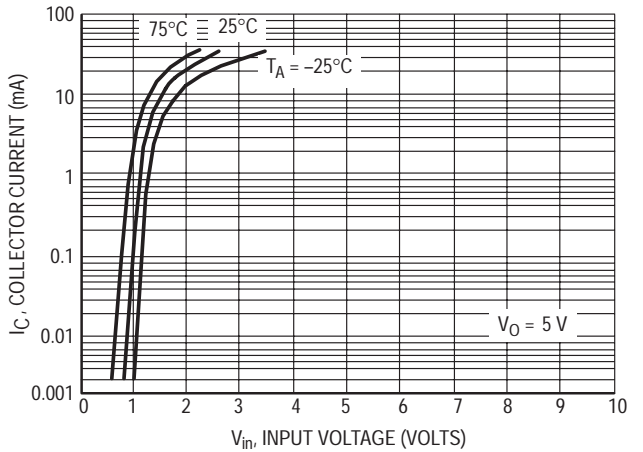


Figure 10. Output Current versus Input Voltage

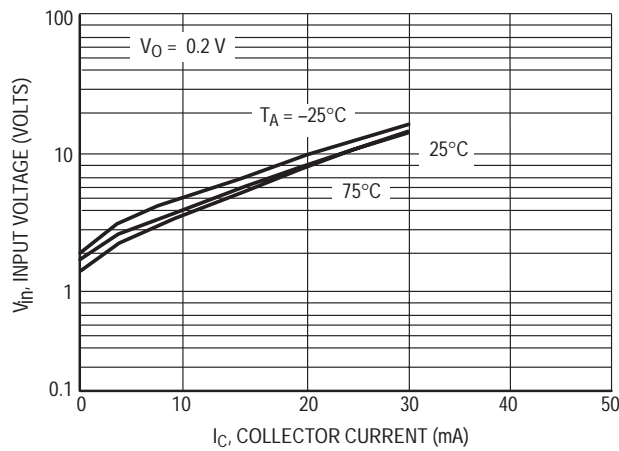


Figure 11. Input Voltage versus Output Current

DTA114E SERIES

TYPICAL ELECTRICAL CHARACTERISTICS DTA144E

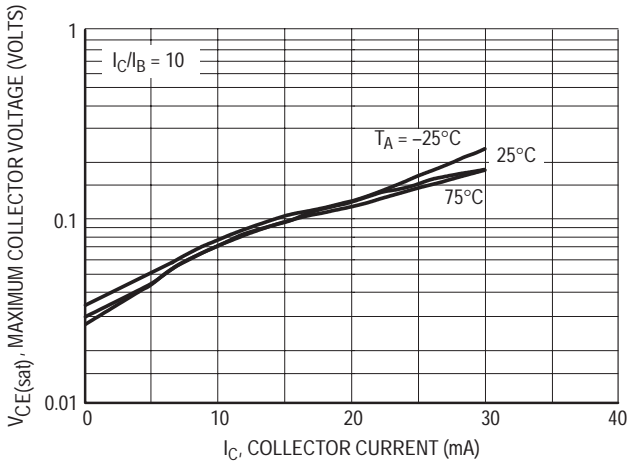


Figure 12. $V_{CE(sat)}$ versus I_C

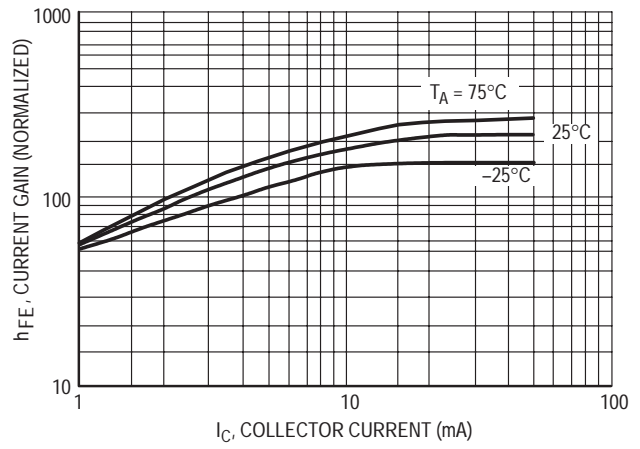


Figure 13. DC Current Gain

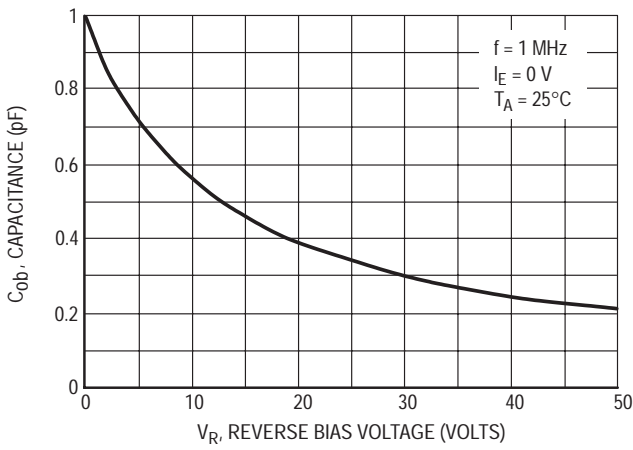


Figure 14. Output Capacitance

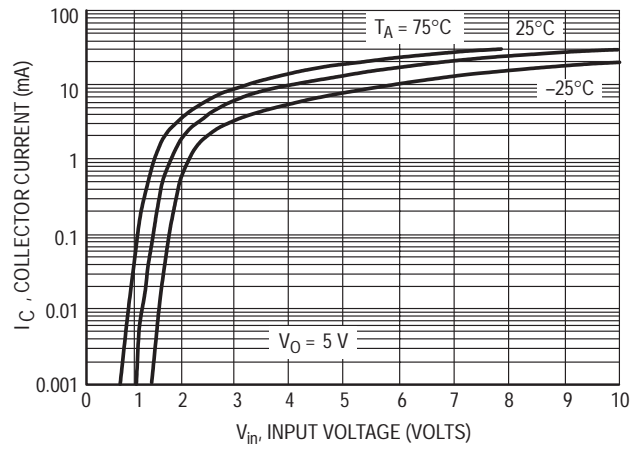


Figure 15. Output Current versus Input Voltage

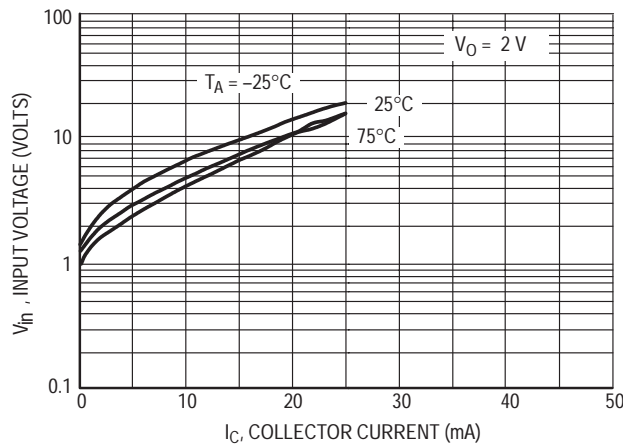


Figure 16. Input Voltage versus Output Current

DTA114E SERIES

TYPICAL ELECTRICAL CHARACTERISTICS DTA114Y

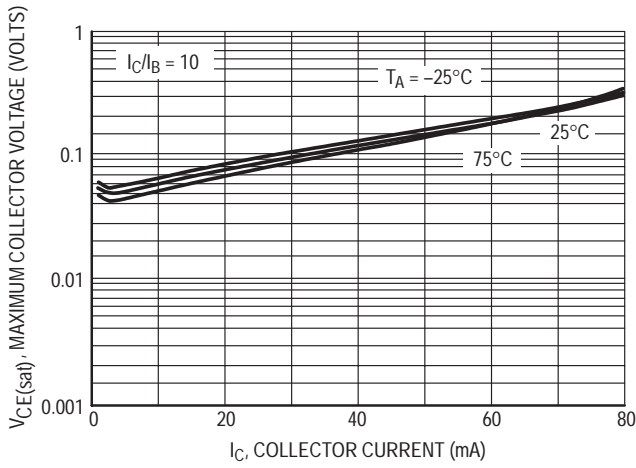


Figure 17. $V_{CE(sat)}$ versus I_C

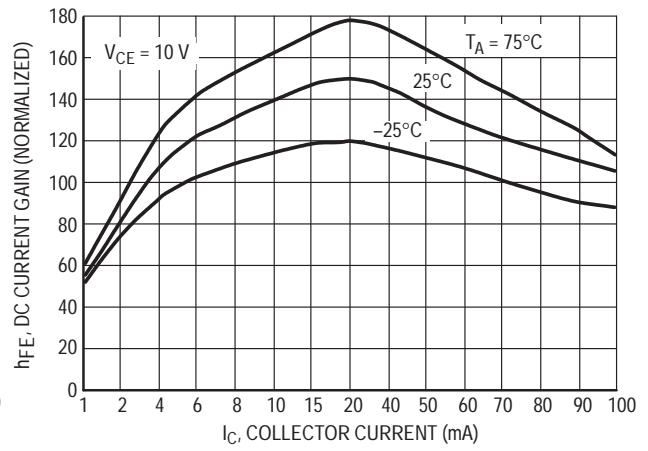


Figure 18. DC Current Gain

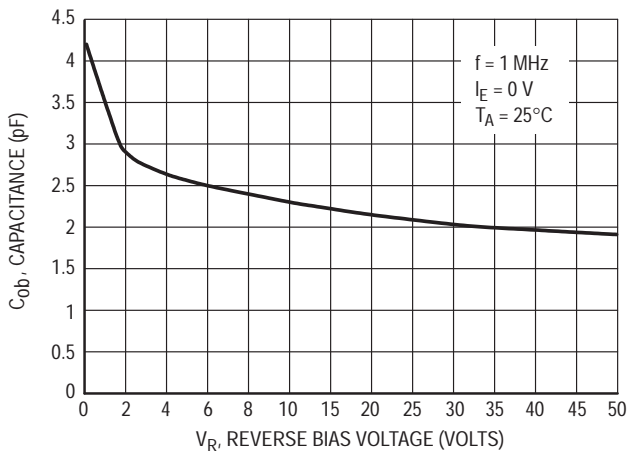


Figure 19. Output Capacitance

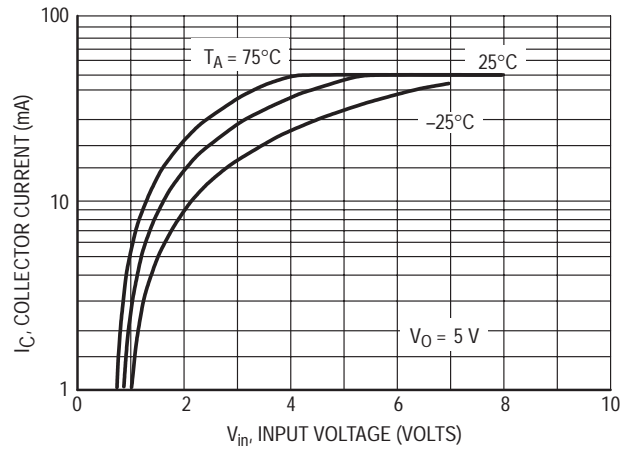


Figure 20. Output Current versus Input Voltage

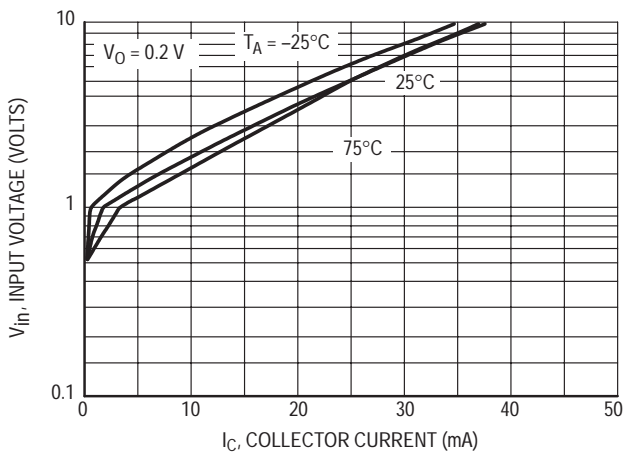


Figure 21. Input Voltage versus Output Current

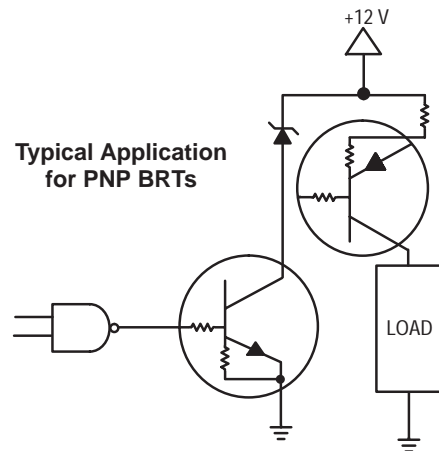
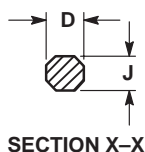
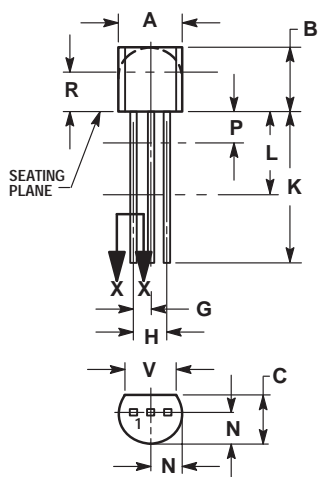


Figure 22. Inexpensive, Unregulated Current Source

DTA114E SERIES

PACKAGE DIMENSIONS

TO-92
(TO-226)
CASE 29-11
ISSUE AL




NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

| DIM | INCHES | | MILLIMETERS | |
|-----|--------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.175 | 0.205 | 4.45 | 5.20 |
| B | 0.170 | 0.210 | 4.32 | 5.33 |
| C | 0.125 | 0.165 | 3.18 | 4.19 |
| D | 0.016 | 0.021 | 0.407 | 0.533 |
| G | 0.045 | 0.055 | 1.15 | 1.39 |
| H | 0.095 | 0.105 | 2.42 | 2.66 |
| J | 0.015 | 0.020 | 0.39 | 0.50 |
| K | 0.500 | --- | 12.70 | --- |
| L | 0.250 | --- | 6.35 | --- |
| N | 0.080 | 0.105 | 2.04 | 2.66 |
| P | --- | 0.100 | --- | 2.54 |
| R | 0.115 | --- | 2.93 | --- |
| V | 0.135 | --- | 3.43 | --- |

- | | | | | |
|---|--|--|--|---|
| STYLE 1: PIN 1. EMITTER 2. BASE 3. COLLECTOR | STYLE 2: PIN 1. BASE 2. EMITTER 3. COLLECTOR | STYLE 3: PIN 1. ANODE 2. ANODE 3. CATHODE | STYLE 4: PIN 1. CATHODE 2. CATHODE 3. ANODE | STYLE 5: PIN 1. DRAIN 2. SOURCE 3. GATE |
| STYLE 6: PIN 1. GATE 2. SOURCE & SUBSTRATE 3. DRAIN | STYLE 7: PIN 1. SOURCE 2. DRAIN 3. GATE | STYLE 8: PIN 1. DRAIN 2. GATE 3. SOURCE & SUBSTRATE | STYLE 9: PIN 1. BASE 1 2. EMITTER 3. BASE 2 | STYLE 10: PIN 1. CATHODE 2. GATE 3. ANODE |
| STYLE 11: PIN 1. ANODE 2. CATHODE & ANODE 3. CATHODE | STYLE 12: PIN 1. MAIN TERMINAL 1 2. GATE 3. MAIN TERMINAL 2 | STYLE 13: PIN 1. ANODE 1 2. GATE 3. CATHODE 2 | STYLE 14: PIN 1. EMITTER 2. COLLECTOR 3. BASE | STYLE 15: PIN 1. ANODE 1 2. CATHODE 3. ANODE 2 |

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