

# 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.



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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 $25^\circ\text{C}$	$P_D$	350 2.81	mW mW/°C

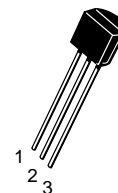
#### THERMAL CHARACTERISTICS

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

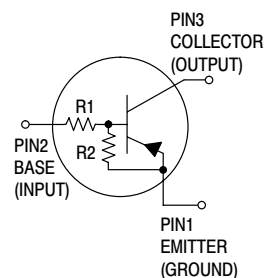
#### DEVICE MARKING AND RESISTOR VALUES

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	$\infty$	
DTA143T	DTA143T	4.7	$\infty$	
DTB113E	DTB113E	1.0	1.0	
DTA123E	DTA123E	2.2	2.2	
DTA143E	DTA143E	4.7	4.7	
DTA143Z	DTA143Z	4.7	47	

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<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 (V <sub>EB</sub> = 6.0 V, I <sub>C</sub> = 0)	DTA114E DTA124E DTA144E DTA114Y DTA114T DTA143T DTB113E DTA123E DTA143E DTA143Z	I <sub>EBO</sub>	—	—	0.5 0.2 0.1 0.2 0.9 1.9 4.3 2.3 1.5 0.18	mAdc
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 <sup>(2.)</sup> (I <sub>C</sub> = 2.0 mA, I <sub>B</sub> = 0)	V <sub>(BR)CEO</sub>	50	—	—	Vdc	
<b>ON CHARACTERISTICS <sup>(2.)</sup></b>						
DC Current Gain (V <sub>CE</sub> = 10 V, I <sub>C</sub> = 5.0 mA)	DTA114E DTA124E DTA144E DTA114Y DTA114T DTA143T DTB113E DTA123E DTA143E DTA143Z	h <sub>FE</sub>	35 60 80 80 160 160 3.0 8.0 15 80	60 100 140 140 250 250 5.0 15 27 140	— — — — — — — — — —	
Collector–Emitter Saturation Voltage (I <sub>C</sub> = 10 mA, I <sub>E</sub> = 0.3 mA) DTA144E/DTA114Y DTB113E/DTA143E (I <sub>C</sub> = 10 mA, I <sub>B</sub> = 5 mA) DTA123E (I <sub>C</sub> = 10 mA, I <sub>B</sub> = 1 mA) DTA114T/DTA143T/ DTA143Z/DTA124E		V <sub>CE(sat)</sub>	—	—	0.25	Vdc
Output Voltage (on) (V <sub>CC</sub> = 5.0 V, V <sub>B</sub> = 2.5 V, R <sub>L</sub> = 1.0 kΩ)  (V <sub>CC</sub> = 5.0 V, V <sub>B</sub> = 3.5 V, R <sub>L</sub> = 1.0 kΩ)	DTA114E DTA124E DTA114Y DTA114T DTA143T DTB113E DTA123E DTA143E DTA143Z DTA144E	V <sub>OL</sub>	— — — — — — — — — —	— — — — — — — — — —	0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	Vdc

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

## DTA114E Series

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

Characteristic	Symbol	Min	Typ	Max	Unit	
Output Voltage (off) (V <sub>CC</sub> = 5.0 V, V <sub>B</sub> = 0.5 V, R <sub>L</sub> = 1.0 kΩ)  (V <sub>CC</sub> = 5.0 V, V <sub>B</sub> = 0.05 V, R <sub>L</sub> = 1.0 kΩ) (V <sub>CC</sub> = 5.0 V, V <sub>B</sub> = 0.25 V, R <sub>L</sub> = 1.0 kΩ)	DTA114T DTA113T DTA144E DTA114Y DTA143Z DTB113E DTA114T DTA143T DTA123E DTA143E	V <sub>OH</sub>	4.9	—	—	Vdc
Input Resistor	DTA114E DTA124E DTA144E DTA114Y DTA114T DTA143T DTB113E DTA123E DTA143E DTA143Z	R <sub>1</sub>	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 <sub>1</sub> /R <sub>2</sub>	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

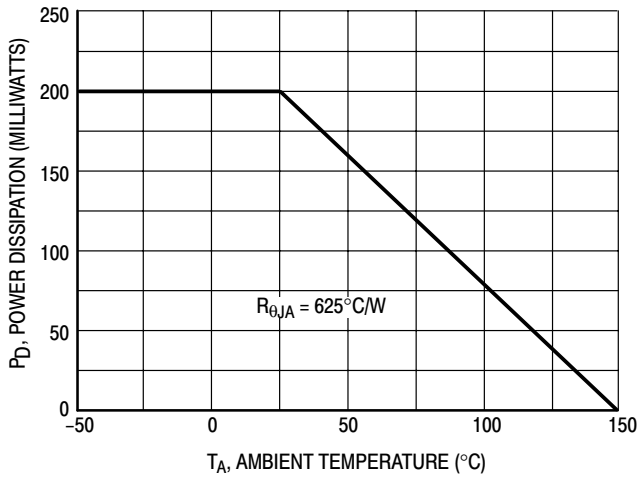


Figure 1. Derating Curve

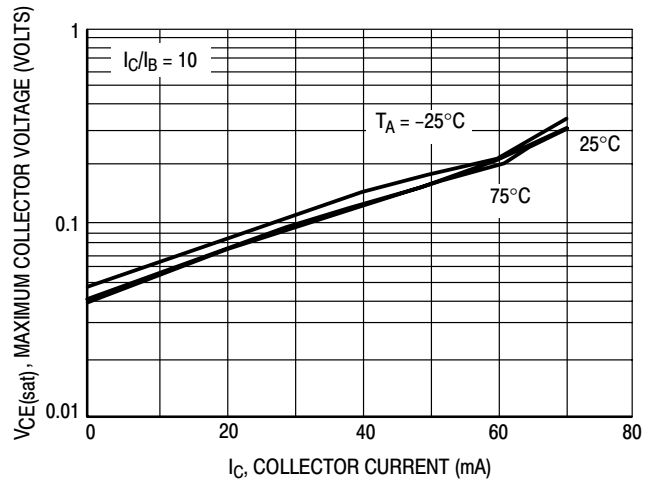


Figure 2.  $V_{CE(sat)}$  versus  $I_C$

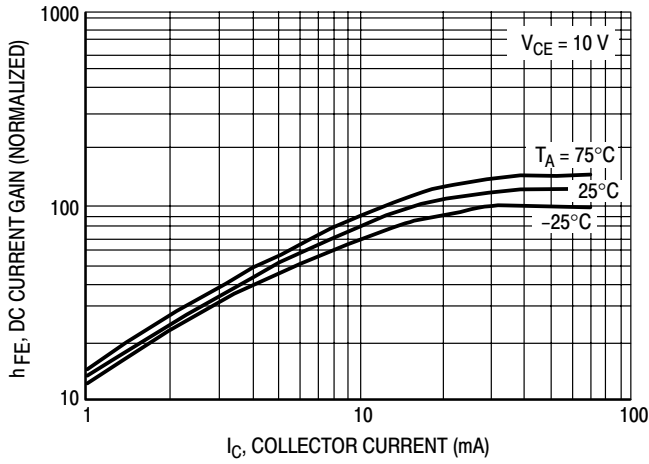


Figure 3. DC Current Gain

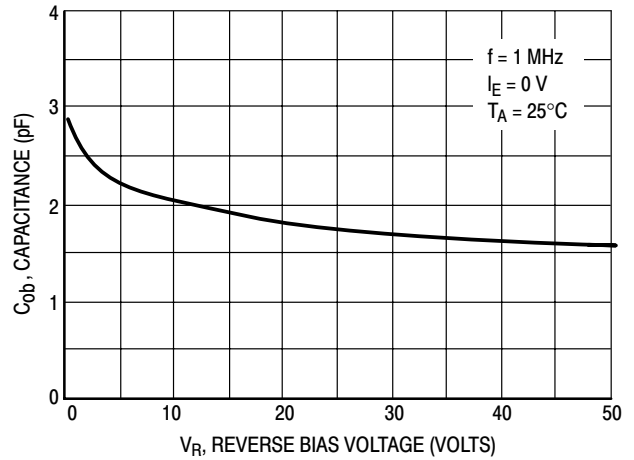


Figure 4. Output Capacitance

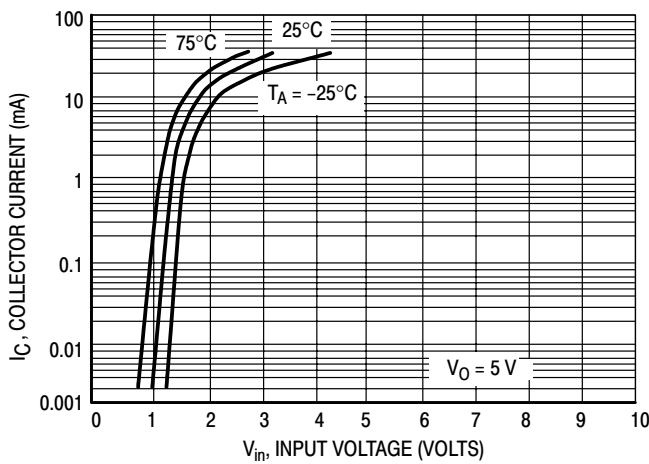


Figure 5. Output Current versus Input Voltage

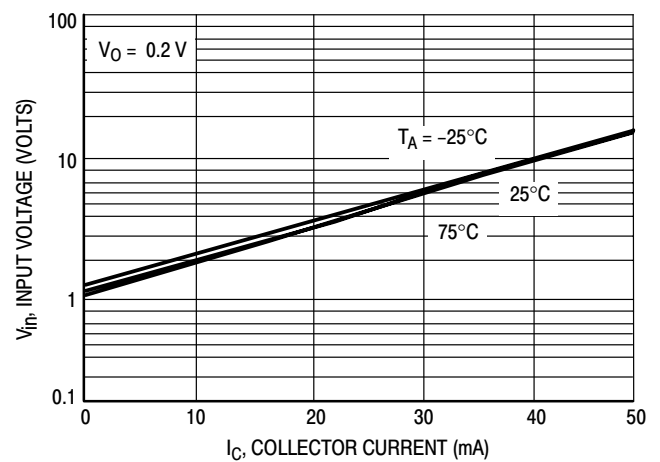


Figure 6. Input Voltage versus Output Current

# DTA114E Series

## TYPICAL ELECTRICAL CHARACTERISTICS DTA124E

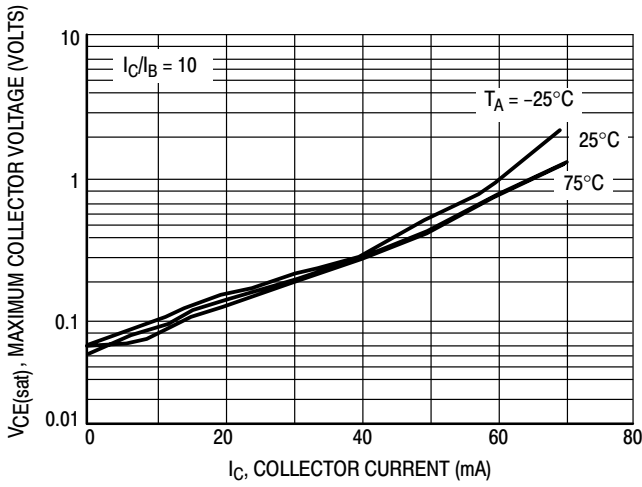


Figure 7.  $V_{CE(sat)}$  versus  $I_C$

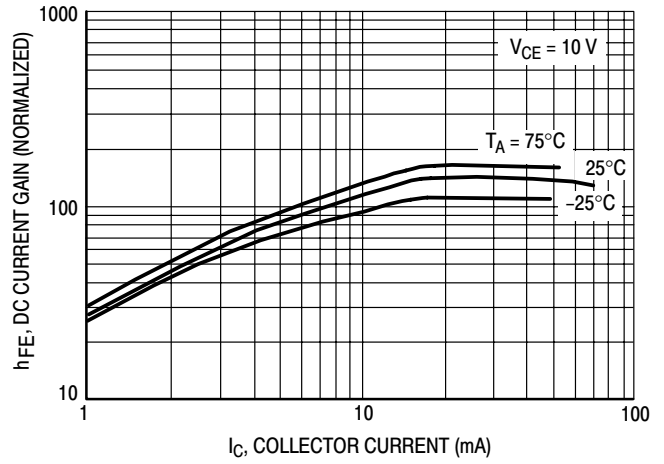


Figure 8. DC Current Gain

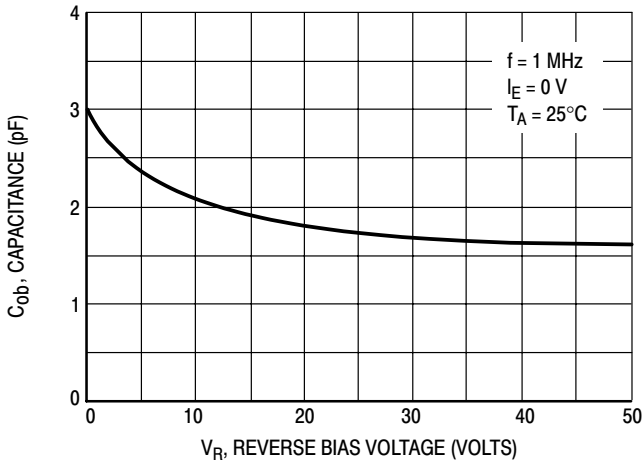


Figure 9. Output Capacitance

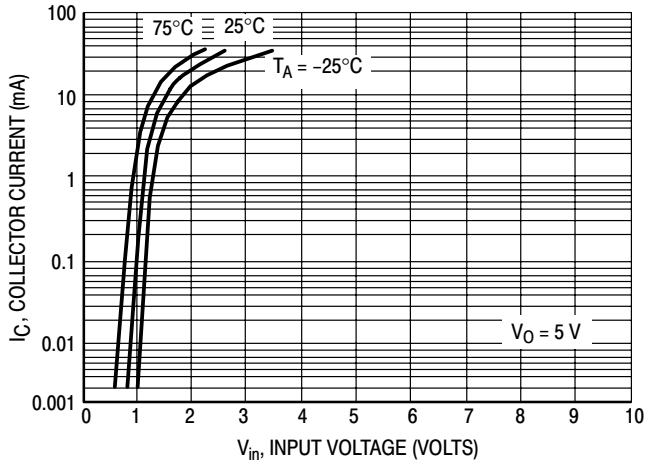


Figure 10. Output Current versus Input Voltage

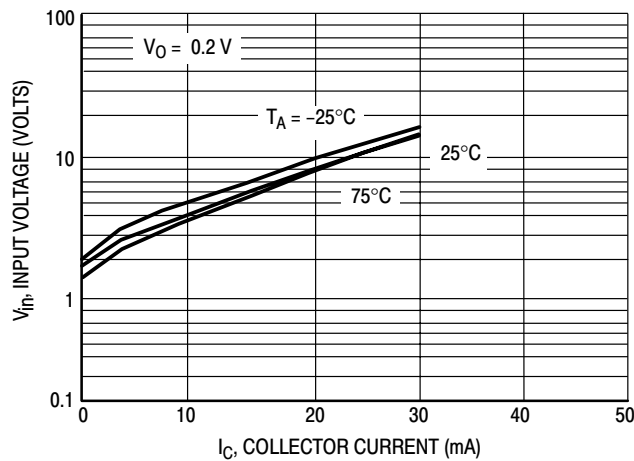


Figure 11. Input Voltage versus Output Current

# DTA114E Series

## TYPICAL ELECTRICAL CHARACTERISTICS DTA144E

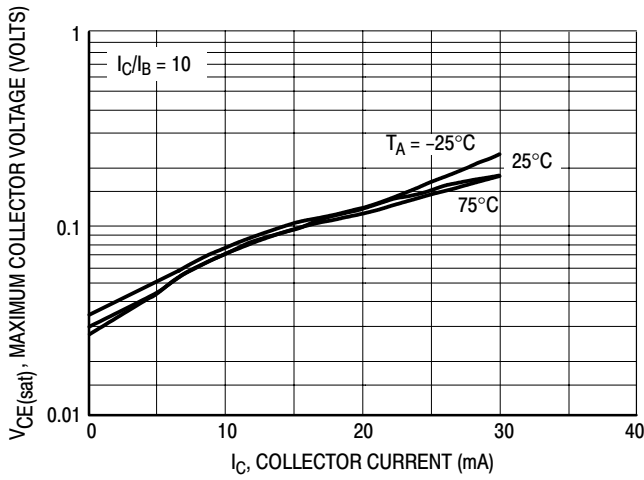


Figure 12.  $V_{CE(sat)}$  versus  $I_C$

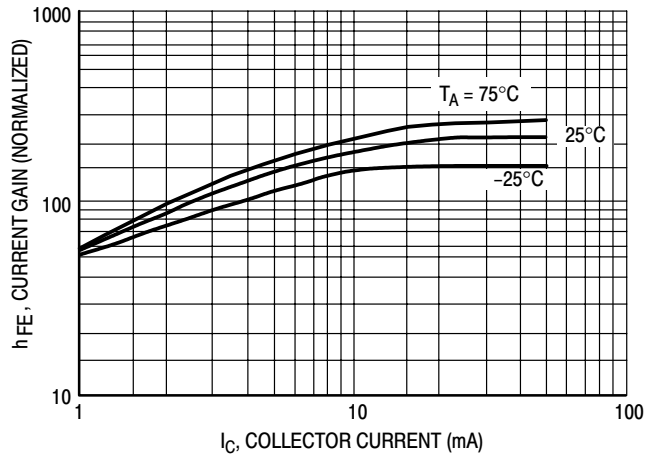


Figure 13. DC Current Gain

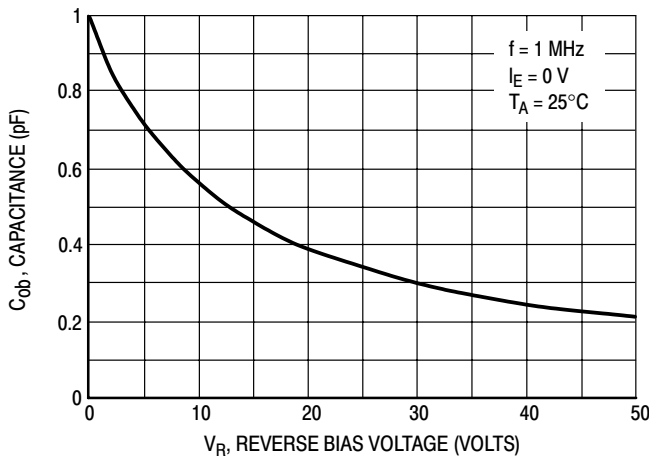


Figure 14. Output Capacitance

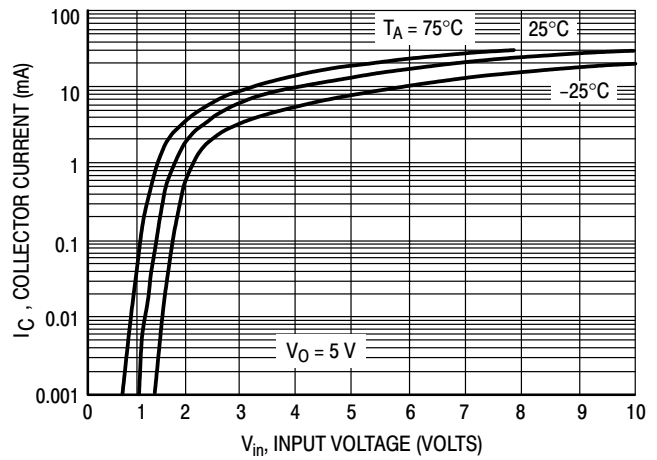


Figure 15. Output Current versus Input Voltage

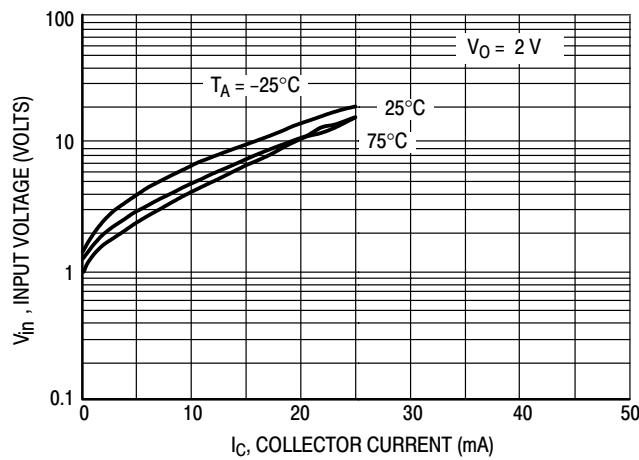


Figure 16. Input Voltage versus Output Current

# DTA114E Series

## TYPICAL ELECTRICAL CHARACTERISTICS DTA114Y

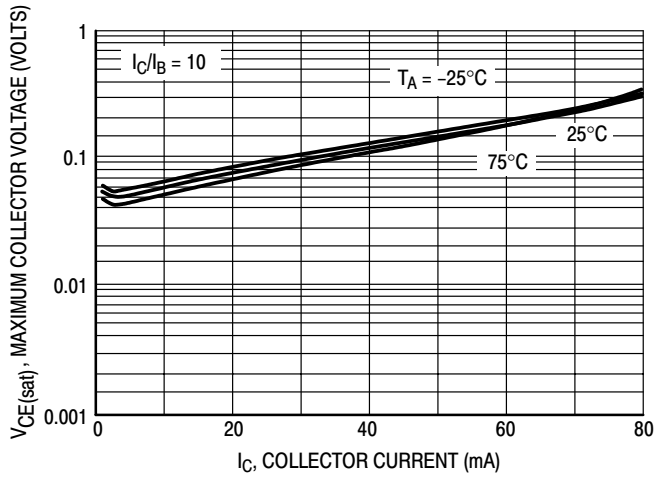


Figure 17.  $V_{CE(sat)}$  versus  $I_C$

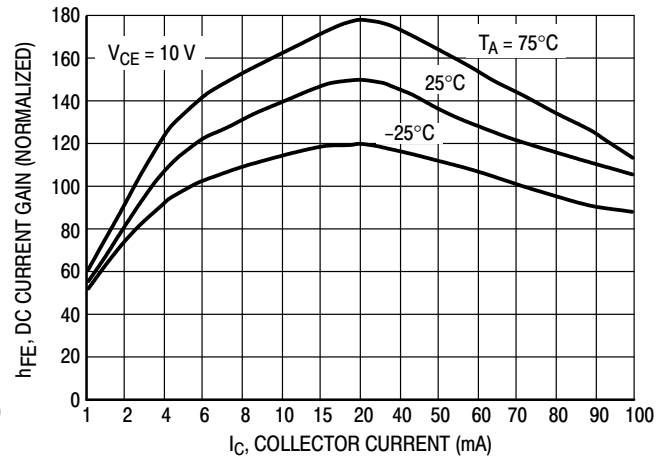


Figure 18. DC Current Gain

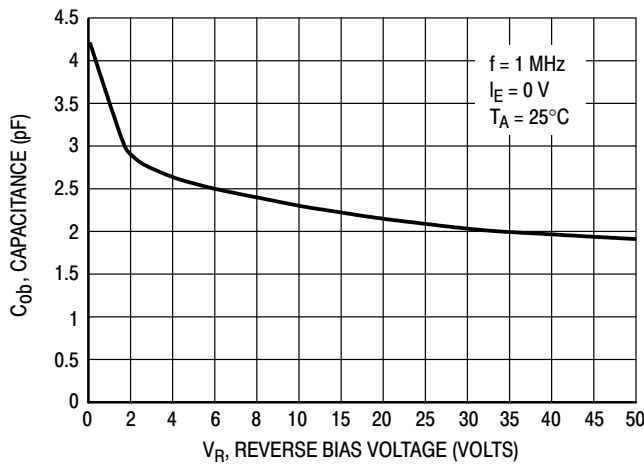


Figure 19. Output Capacitance

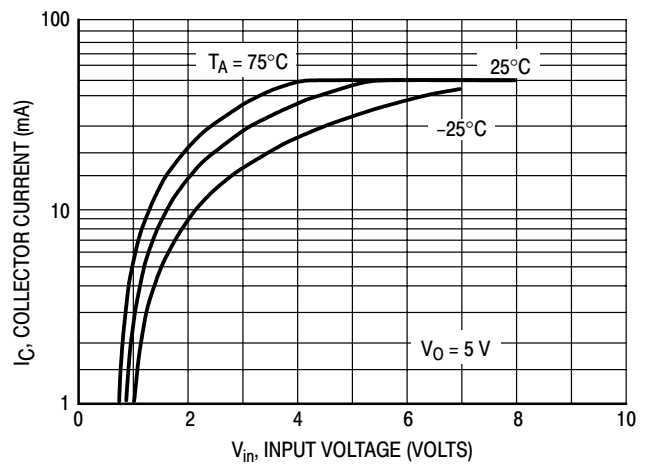


Figure 20. Output Current versus Input Voltage

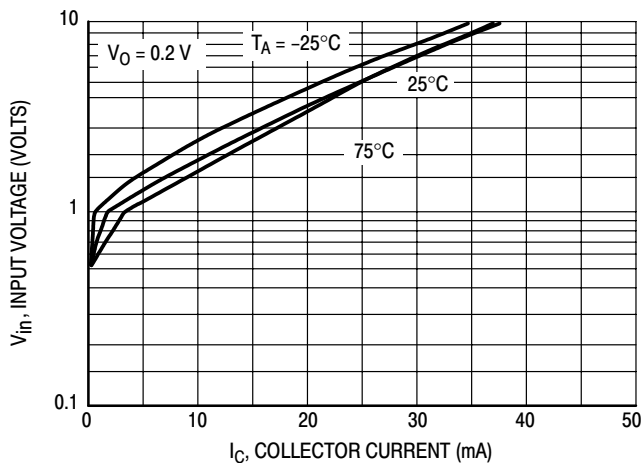


Figure 21. Input Voltage versus Output Current

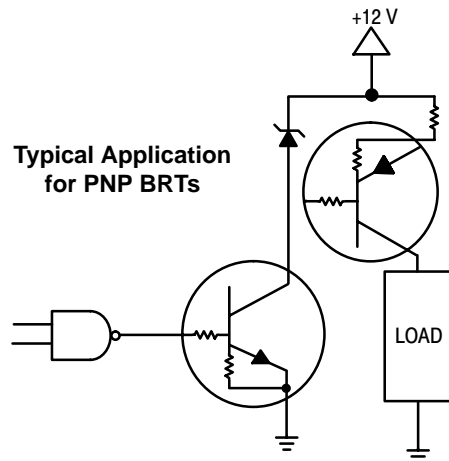
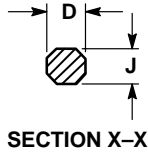
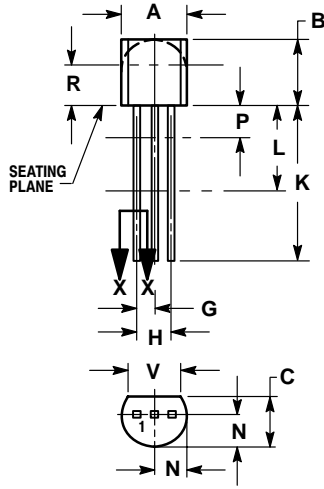


Figure 22. Inexpensive, Unregulated Current Source

# DTA114E Series

## PACKAGE DIMENSIONS


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



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

- 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	---

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