

# 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.

#### 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/ $^\circ\text{C}$

#### THERMAL CHARACTERISTICS

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

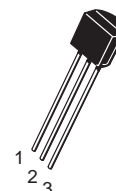
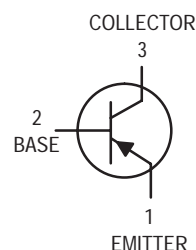
1. Device mounted on a FR-4 glass epoxy printed circuit board using the minimum recommended footprint.



ON Semiconductor

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### PNP SILICON BIAS RESISTOR TRANSISTOR



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
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### OFF CHARACTERISTICS

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

### ON CHARACTERISTICS <sup>(2.)</sup>

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	V <sub>OH</sub>	4.9	—	—	Vdc
	DTA113T					
	DTA144E					
	DTA114Y					
	DTA143Z					
	DTB113E					
	DTA114T					
	DTA143T					
	DTA123E					
	DTA143E					
Input Resistor	DTA114E	R <sub>1</sub>	7.0	10	13	kΩ
	DTA124E		15.4	22	28.6	
	DTA144E		32.9	47	61.1	
	DTA114Y		7.0	10	13	
	DTA114T		7.0	10	13	
	DTA143T		3.3	4.7	6.1	
	DTB113E		0.7	1.0	1.3	
	DTA123E		1.5	2.2	2.9	
	DTA143E		3.3	4.7	6.1	
	DTA143Z		3.3	4.7	6.1	
Resistor Ratio	DTA114E/DTA124E/DTA144E	R <sub>1</sub> /R <sub>2</sub>	0.8	1.0	1.2	
	DTA114Y		0.17	0.21	0.25	
	DTA114T/DTA143T		—	—	—	
	DTB113E/DTA123E/DTA143E		0.8	1.0	1.2	
	DTA143Z		0.055	0.1	0.185	

# DTA114E SERIES

## TYPICAL ELECTRICAL CHARACTERISTICS DTA114E

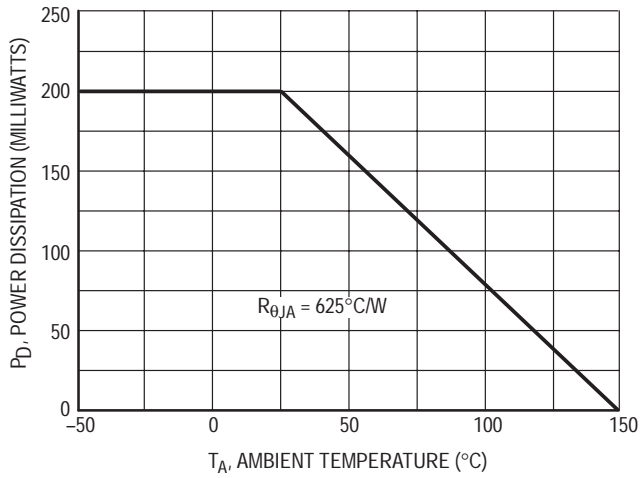


Figure 1. Derating Curve

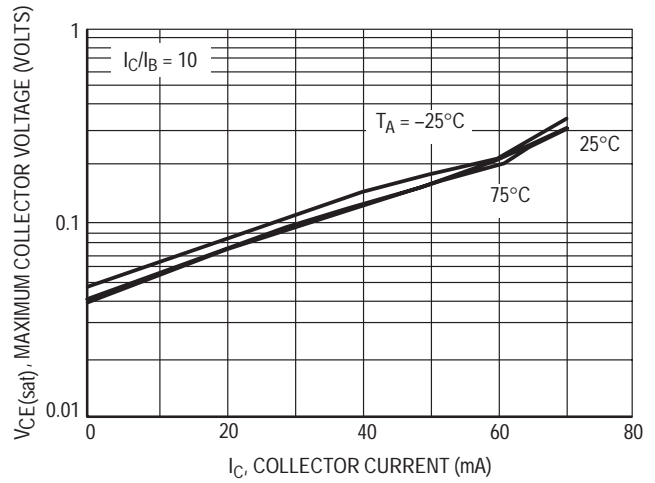


Figure 2.  $V_{CE(sat)}$  versus  $I_C$

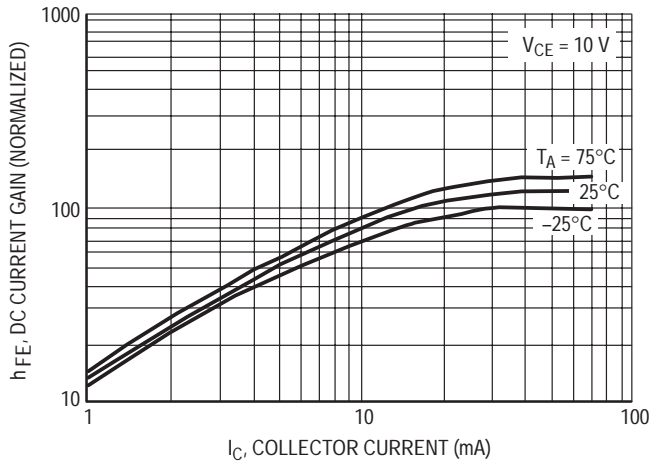


Figure 3. DC Current Gain

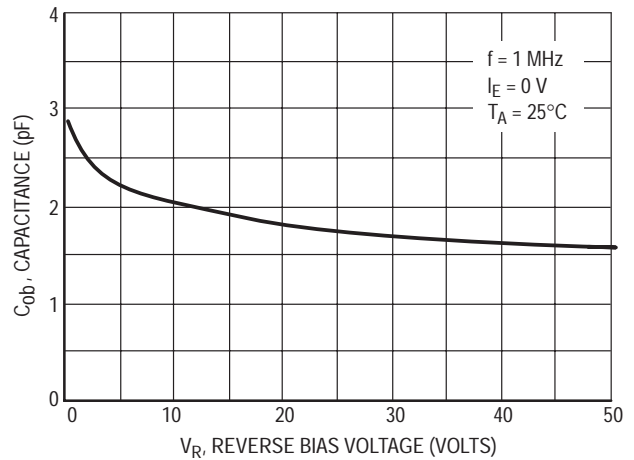


Figure 4. Output Capacitance

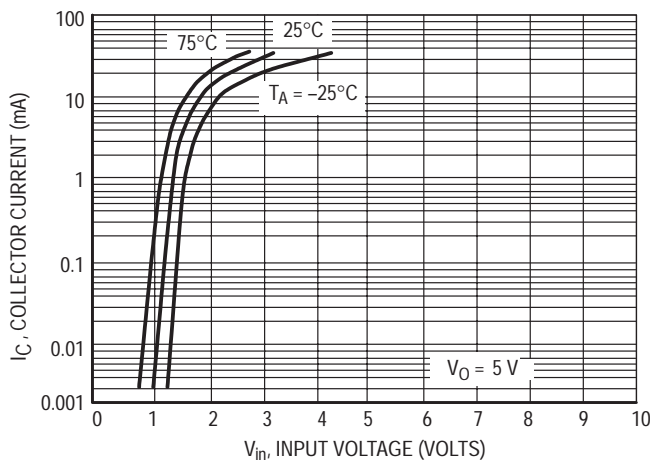


Figure 5. Output Current versus Input Voltage

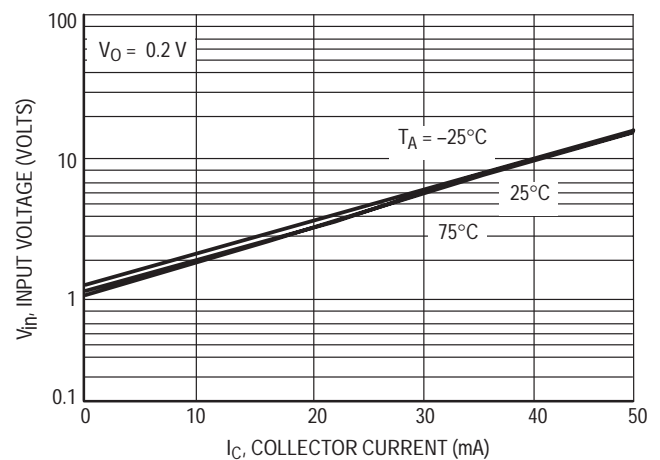


Figure 6. Input Voltage versus Output Current

# DTA114E SERIES

## TYPICAL ELECTRICAL CHARACTERISTICS DTA124E

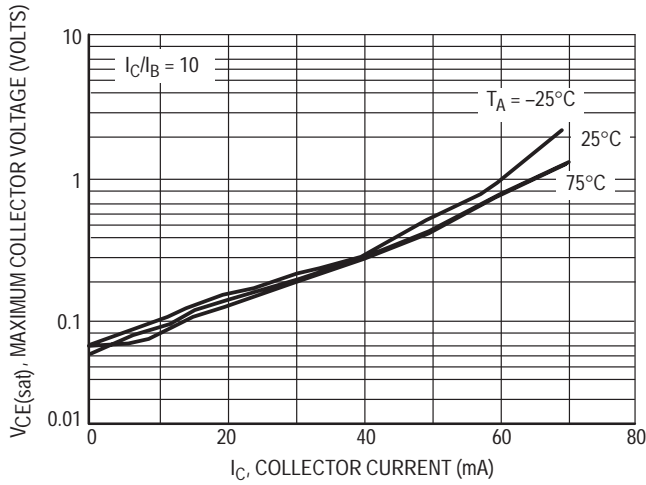


Figure 7.  $V_{CE(sat)}$  versus  $I_C$

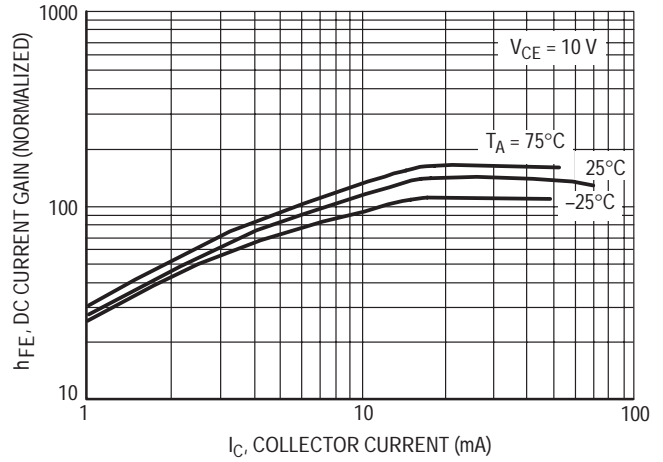


Figure 8. DC Current Gain

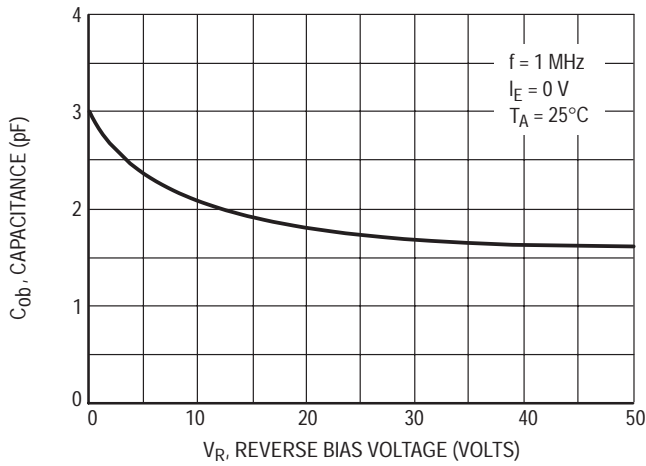


Figure 9. Output Capacitance

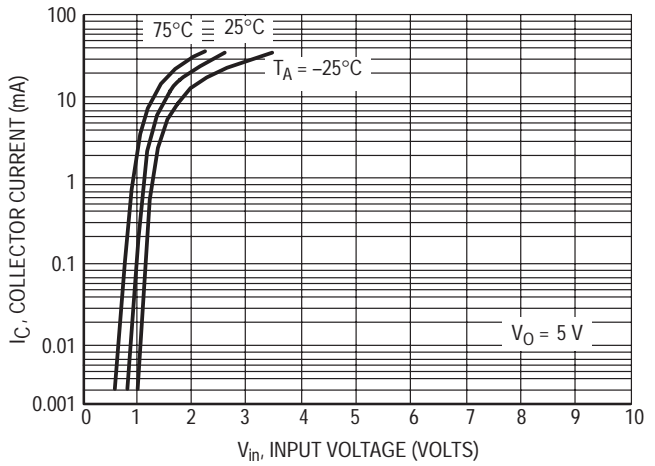


Figure 10. Output Current versus Input Voltage

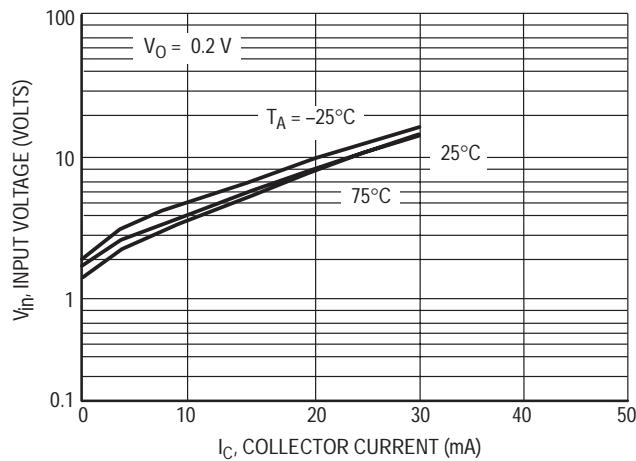


Figure 11. Input Voltage versus Output Current

# DTA114E SERIES

## TYPICAL ELECTRICAL CHARACTERISTICS DTA144E

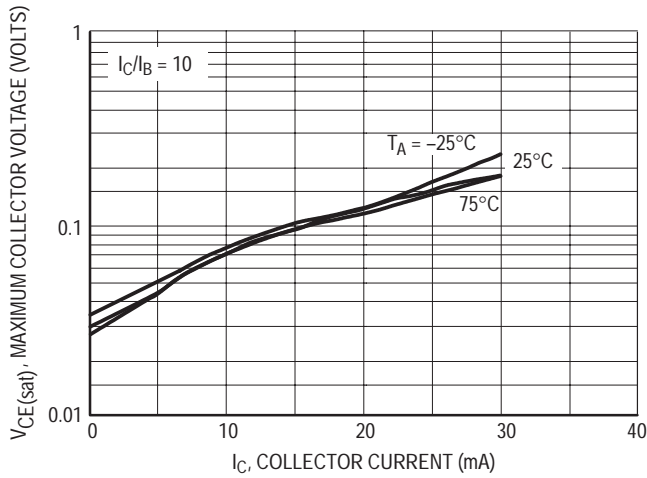


Figure 12.  $V_{CE(sat)}$  versus  $I_C$

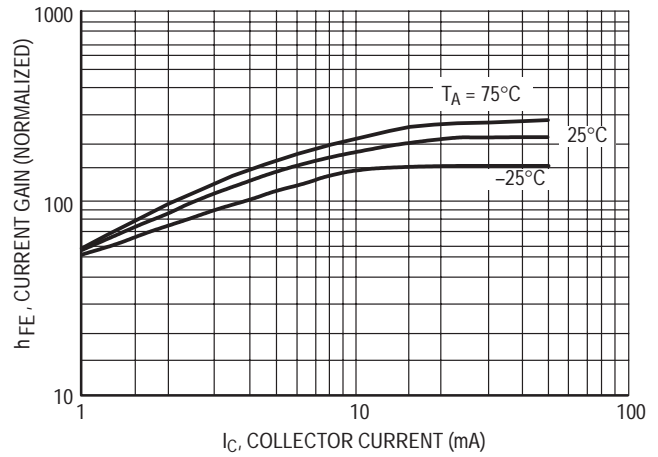


Figure 13. DC Current Gain

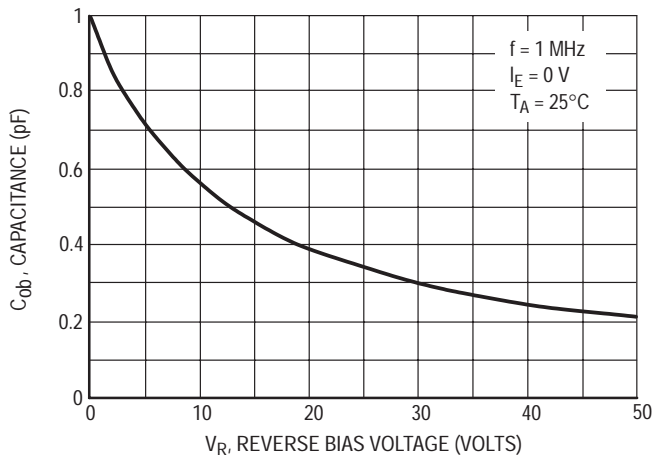


Figure 14. Output Capacitance

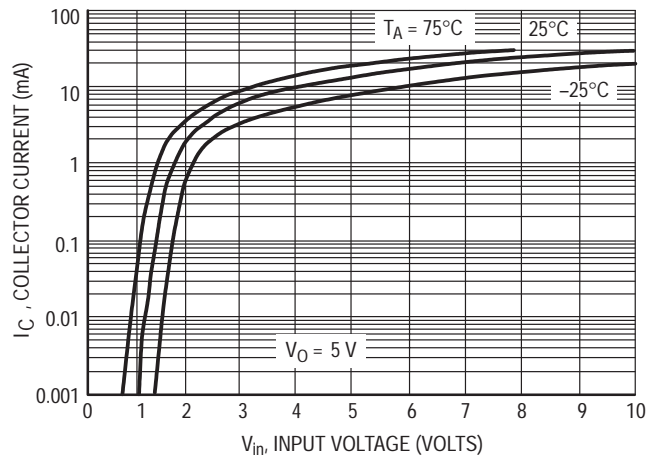


Figure 15. Output Current versus Input Voltage

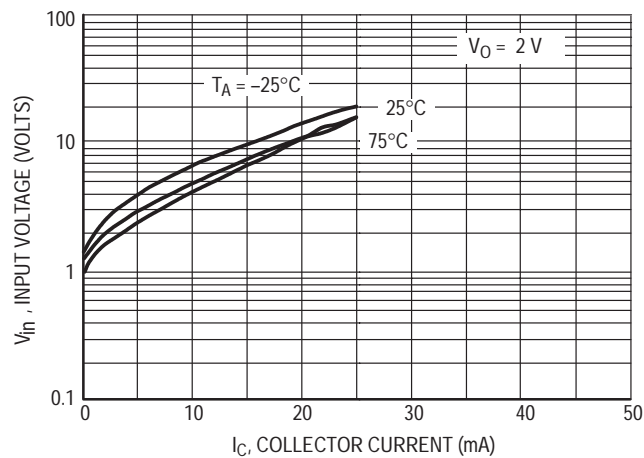


Figure 16. Input Voltage versus Output Current

# DTA114E SERIES

## TYPICAL ELECTRICAL CHARACTERISTICS DTA114Y

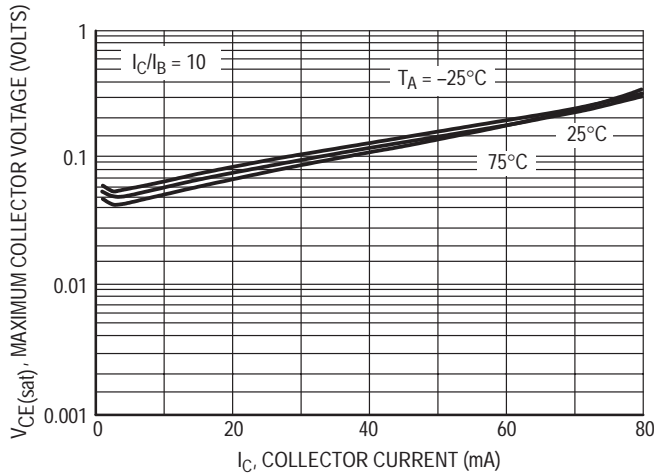


Figure 17.  $V_{CE(sat)}$  versus  $I_C$

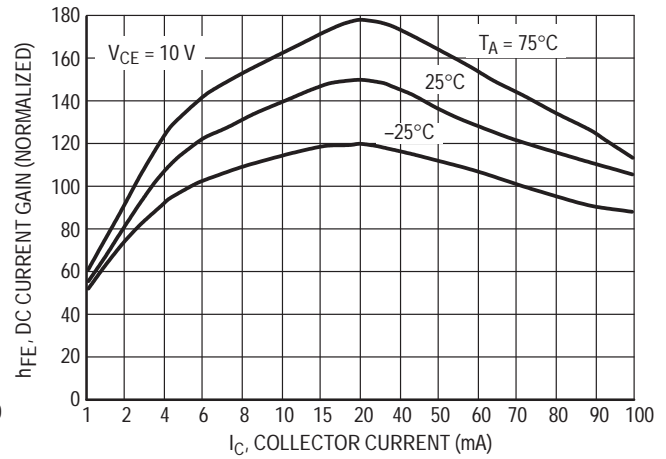


Figure 18. DC Current Gain

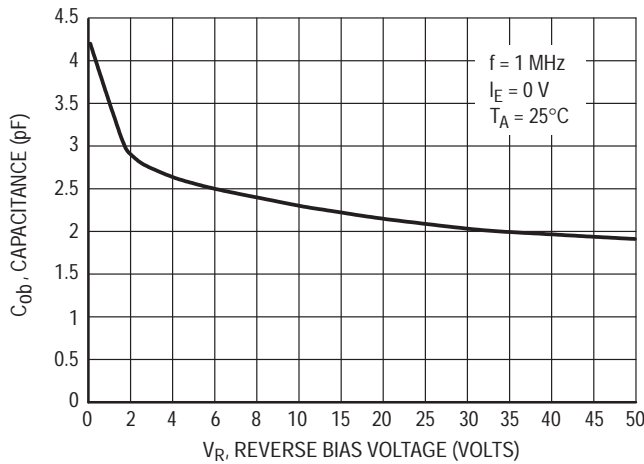


Figure 19. Output Capacitance

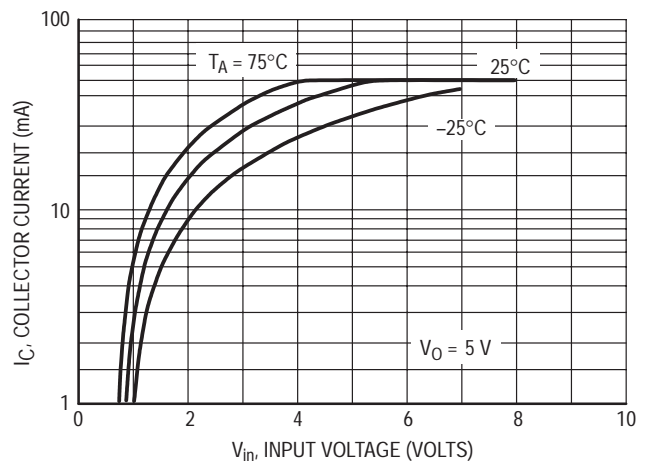


Figure 20. Output Current versus Input Voltage

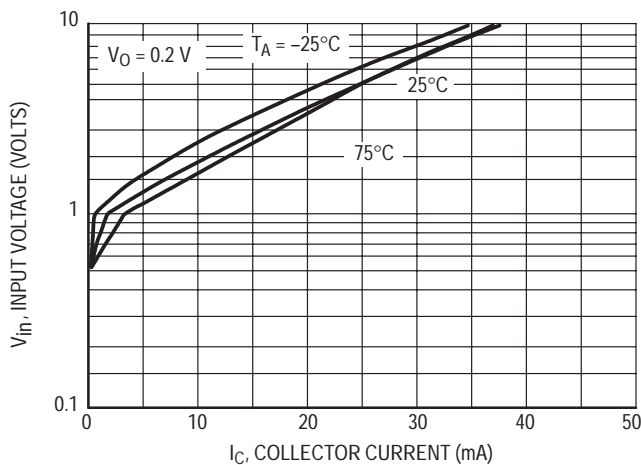


Figure 21. Input Voltage versus Output Current

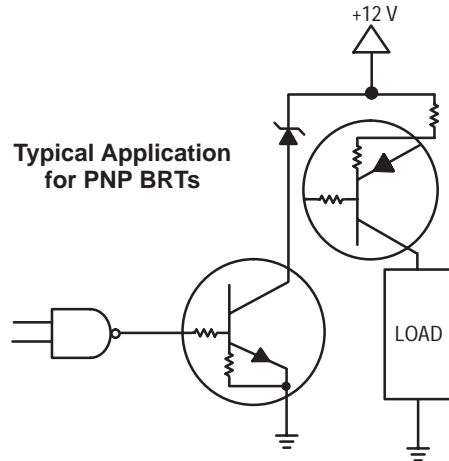
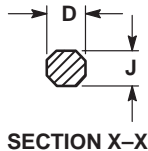
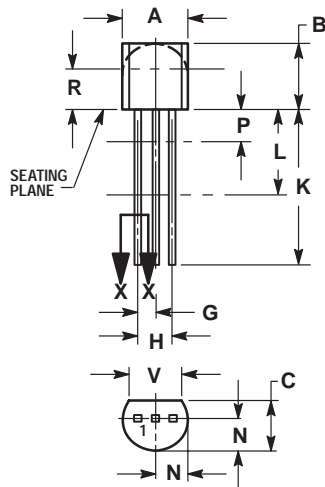


Figure 22. Inexpensive, Unregulated Current Source

# 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
E	0.045	0.055	1.15	1.39
F	0.095	0.105	2.42	2.66
G	0.015	0.020	0.39	0.50
H	0.500	---	12.70	---
I	0.250	---	6.35	---
J	0.080	0.105	2.04	2.66
K	---	0.100	---	2.54
L	0.115	---	2.93	---
M	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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