

# 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/°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	

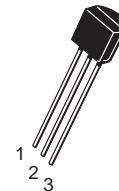
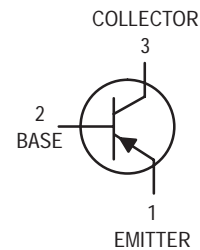
1. Device mounted on a FR-4 glass epoxy printed circuit board using the minimum recommended footprint.



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

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
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 ( $V_{EB} = 6.0\text{ V}$ , $I_C = 0$ )	$I_{EBO}$	—	—	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 ( $I_C = 10\ \mu\text{A}$ , $I_E = 0$ )	$V_{(BR)CBO}$	50	—	—	Vdc
Collector–Emitter Breakdown Voltage <sup>(2.)</sup> ( $I_C = 2.0\text{ mA}$ , $I_B = 0$ )	$V_{(BR)CEO}$	50	—	—	Vdc
<b>ON CHARACTERISTICS <sup>(2.)</sup></b>					
DC Current Gain ( $V_{CE} = 10\text{ V}$ , $I_C = 5.0\text{ mA}$ )	$h_{FE}$	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 ( $I_C = 10\text{ mA}$ , $I_E = 0.3\text{ mA}$ ) DTA144E/DTA114Y DTB113E/DTA143E ( $I_C = 10\text{ mA}$ , $I_B = 5\text{ mA}$ ) DTA123E ( $I_C = 10\text{ mA}$ , $I_B = 1\text{ mA}$ ) DTA114T/DTA143T/ DTA143Z/DTA124E	$V_{CE(sat)}$	—	—	0.25	Vdc
Output Voltage (on) ( $V_{CC} = 5.0\text{ V}$ , $V_B = 2.5\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ )	$V_{OL}$	—	—	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	
( $V_{CC} = 5.0\text{ V}$ , $V_B = 3.5\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ )		—	—	0.2	

2. Pulse Test: Pulse Width < 300  $\mu\text{s}$ , 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) DTA114T DTA113T DTA144E DTA114Y DTA143Z (V <sub>CC</sub> = 5.0 V, V <sub>B</sub> = 0.05 V, R <sub>L</sub> = 1.0 kΩ) DTB113E (V <sub>CC</sub> = 5.0 V, V <sub>B</sub> = 0.25 V, R <sub>L</sub> = 1.0 kΩ) 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

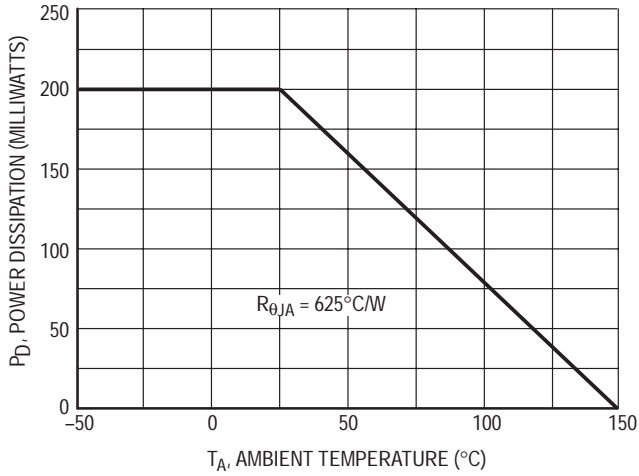


Figure 1. Derating Curve

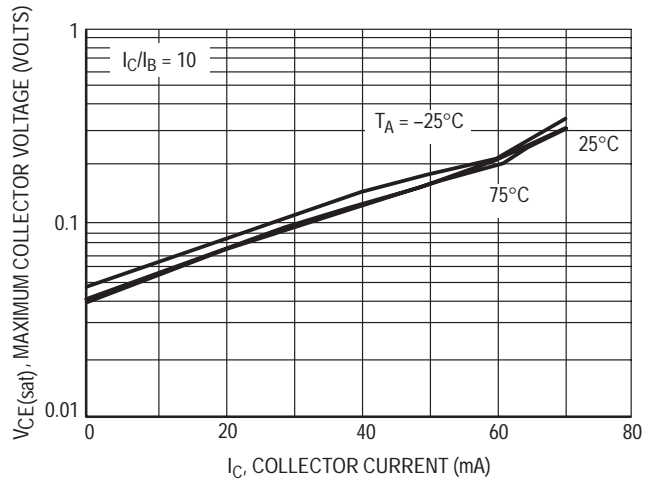


Figure 2.  $V_{CE(sat)}$  versus  $I_C$

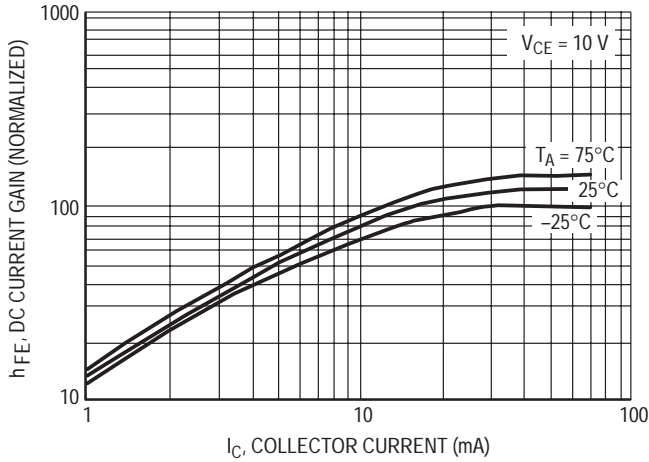


Figure 3. DC Current Gain

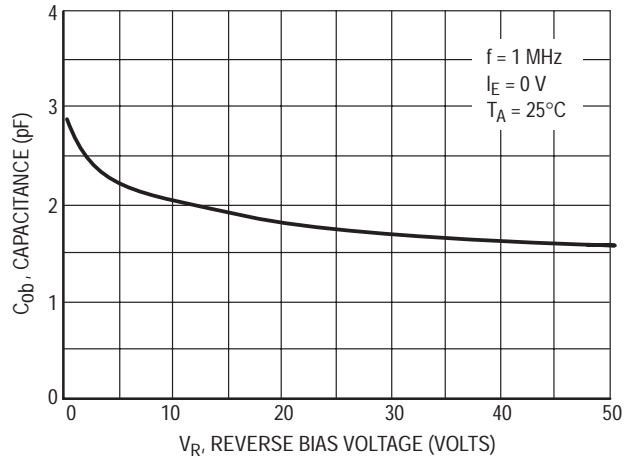


Figure 4. Output Capacitance

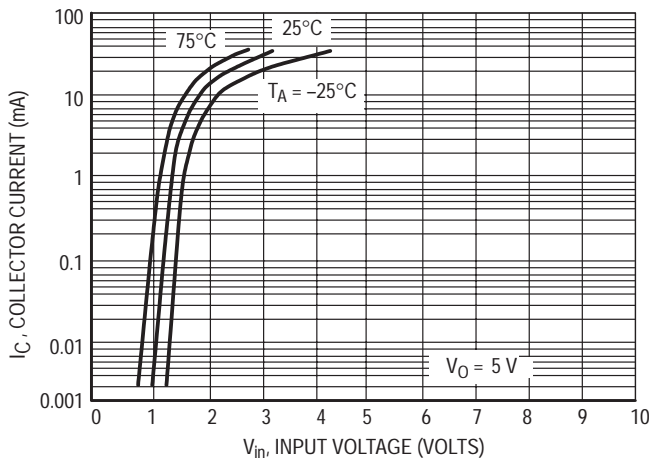


Figure 5. Output Current versus Input Voltage

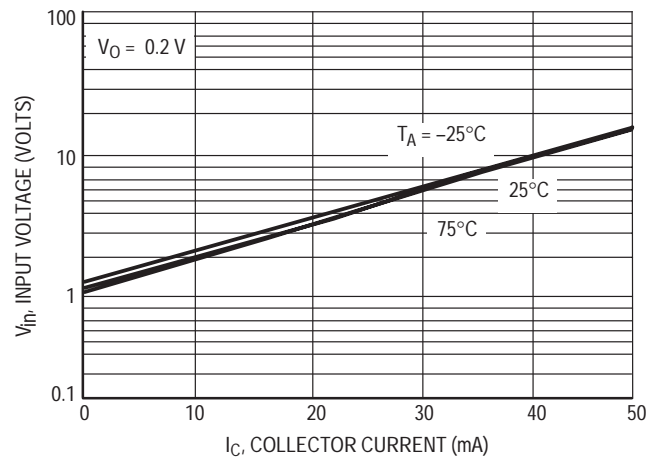
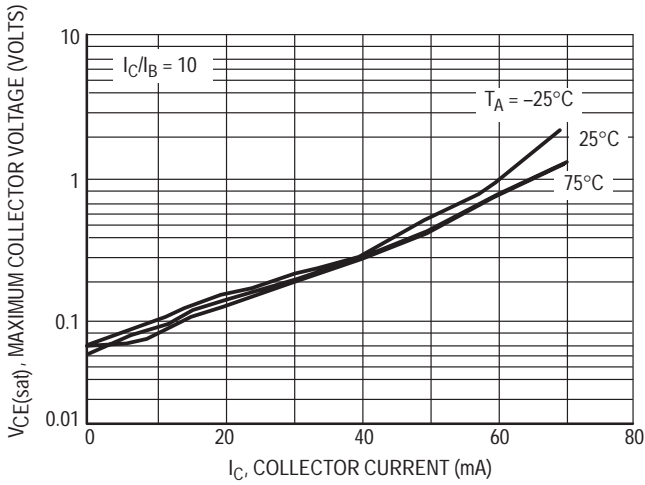


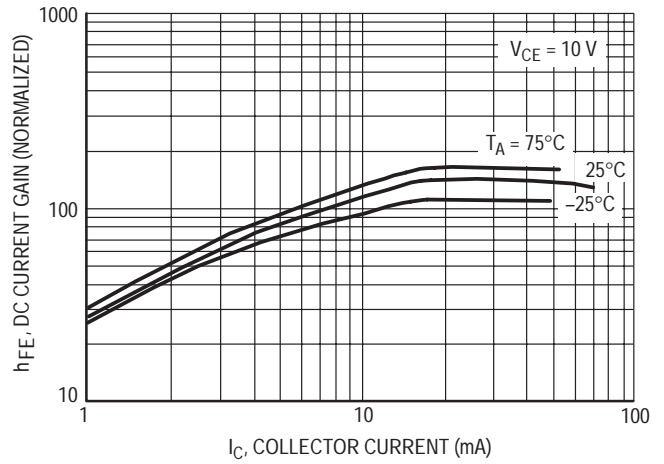
Figure 6. Input Voltage versus Output Current

# DTA114E SERIES

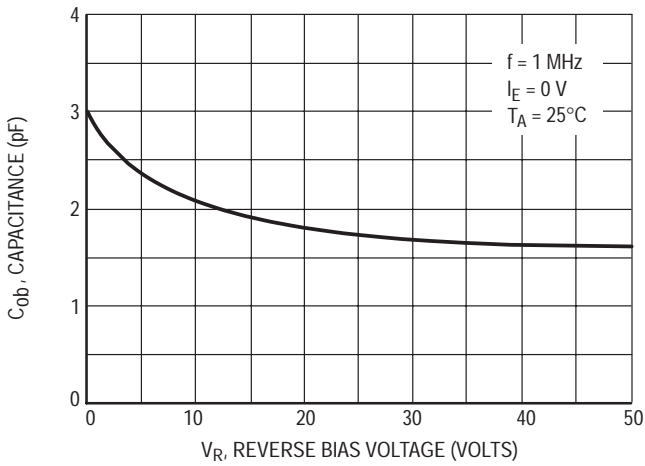
## TYPICAL ELECTRICAL CHARACTERISTICS DTA124E



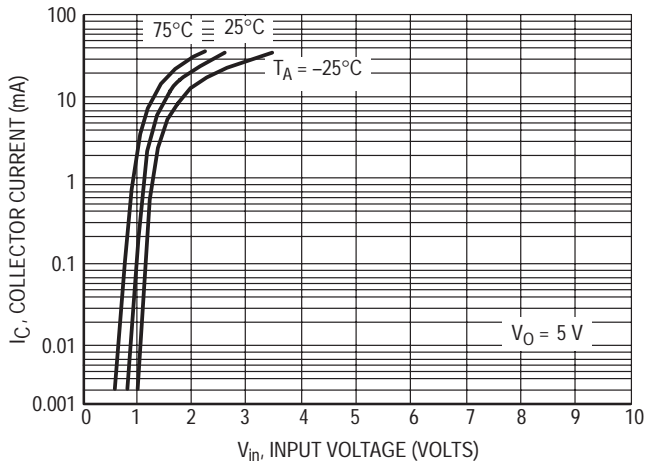
**Figure 7.  $V_{CE(sat)}$  versus  $I_C$**



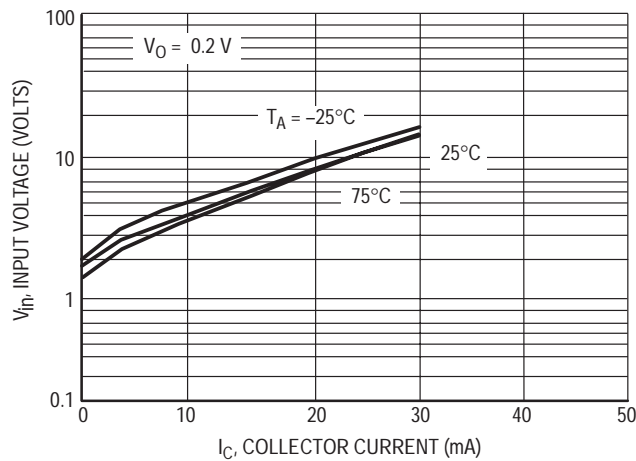
**Figure 8. DC Current Gain**



**Figure 9. Output Capacitance**



**Figure 10. Output Current versus Input Voltage**



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

# DTA114E SERIES

## TYPICAL ELECTRICAL CHARACTERISTICS DTA144E

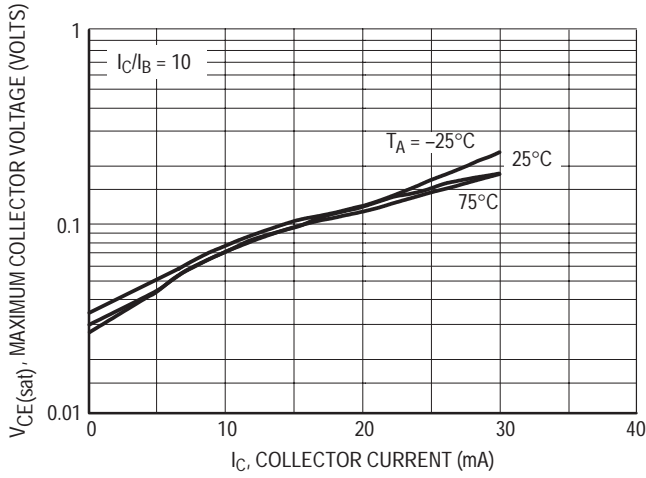


Figure 12.  $V_{CE(sat)}$  versus  $I_C$

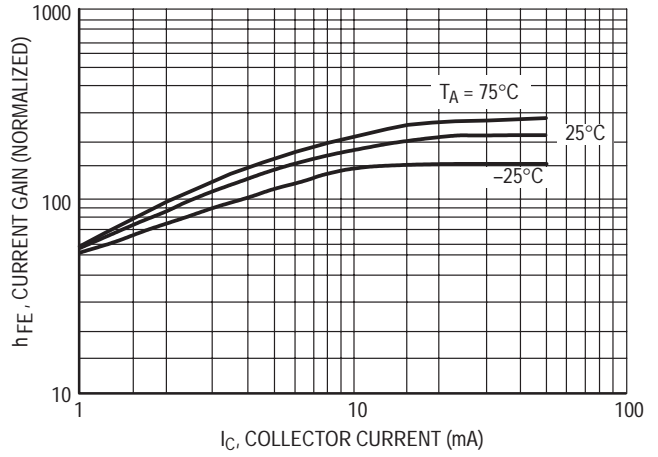


Figure 13. DC Current Gain

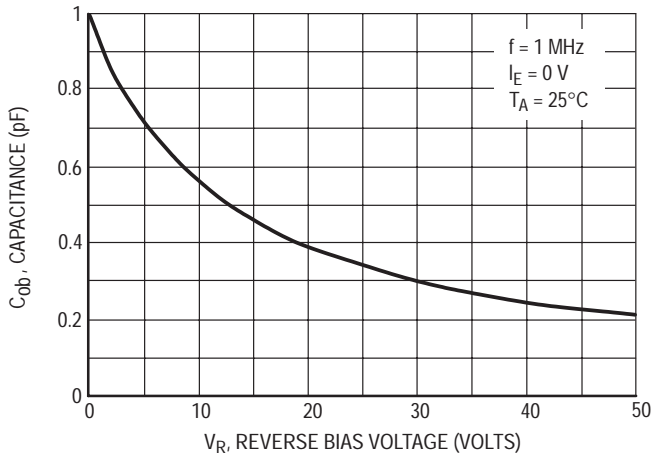


Figure 14. Output Capacitance

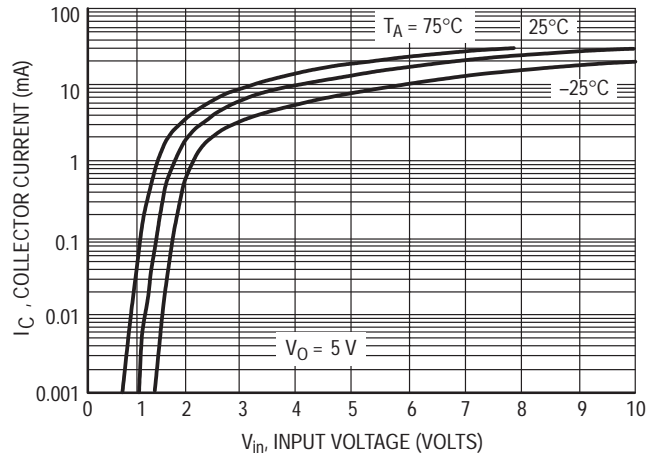


Figure 15. Output Current versus Input Voltage

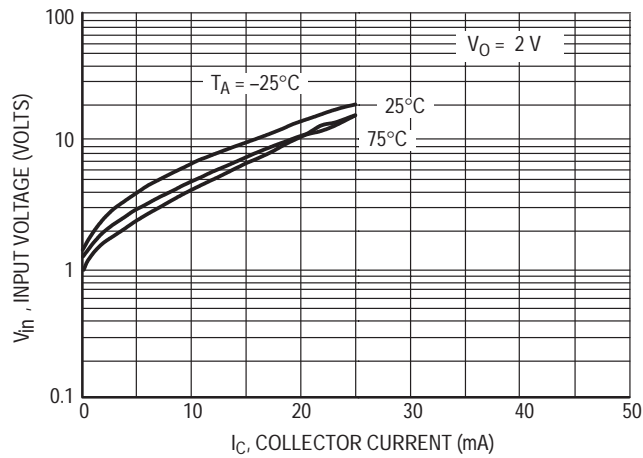


Figure 16. Input Voltage versus Output Current

# DTA114E SERIES

## TYPICAL ELECTRICAL CHARACTERISTICS DTA114Y

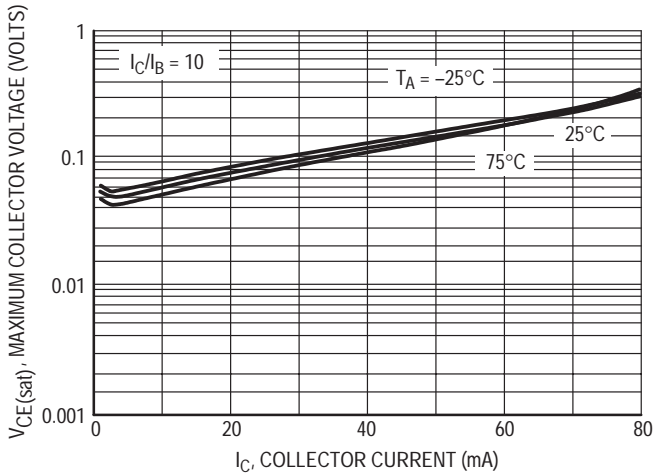


Figure 17.  $V_{CE(sat)}$  versus  $I_C$

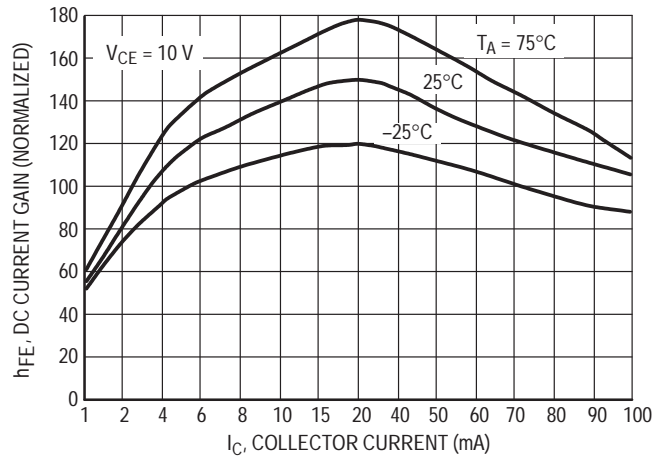


Figure 18. DC Current Gain

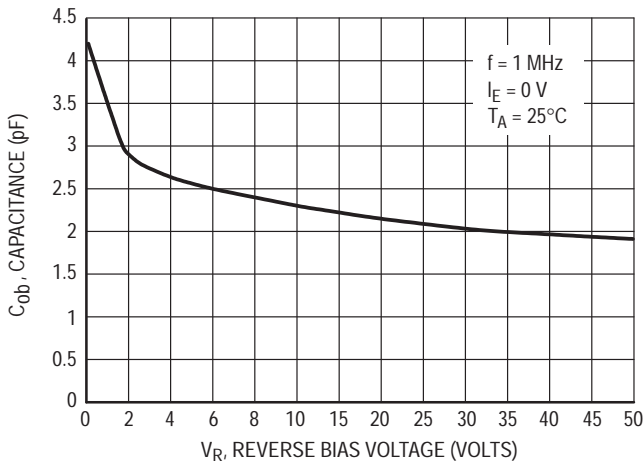


Figure 19. Output Capacitance

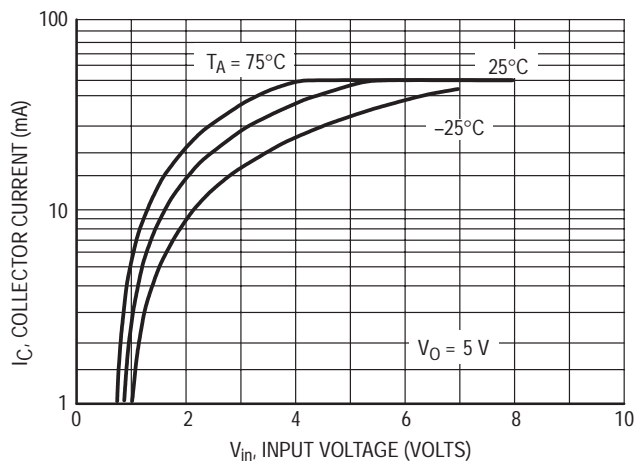


Figure 20. Output Current versus Input Voltage

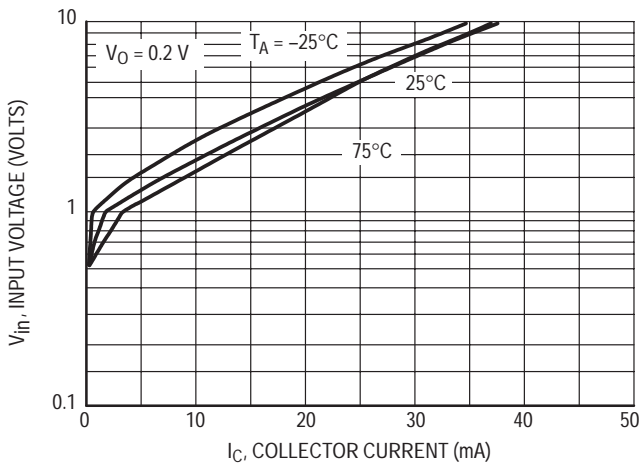


Figure 21. Input Voltage versus Output Current

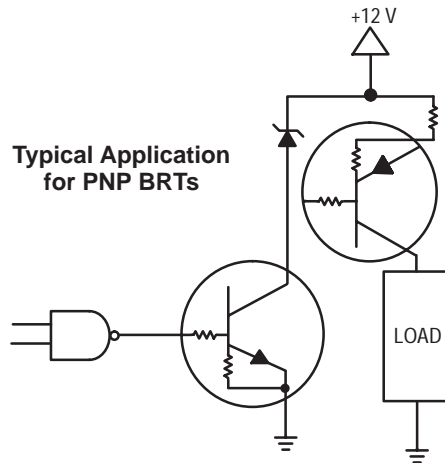
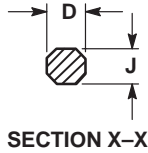
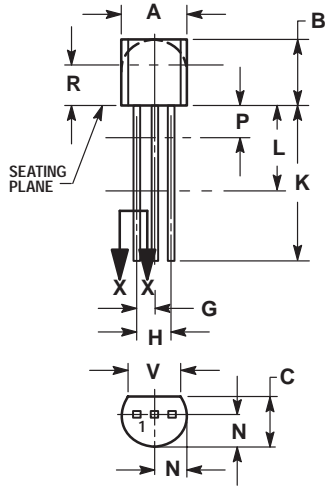


Figure 22. Inexpensive, Unregulated Current Source

# DTA114E SERIES

## PACKAGE DIMENSIONS

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



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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