

DTC114EXV3T1 Series

Digital Transistors (BRT)

NPN 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 digital transistor contains a single transistor with a monolithic bias network consisting of two resistors; a series base resistor and a base-emitter resistor. The digital transistor eliminates these individual components by integrating them into a single device. The use of a digital transistor can reduce both system cost and board space. The device is housed in the SC-89 package which is designed for low power surface mount applications.

- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- Available in 8 mm, 7 inch/3000 Unit Tape & Reel
- Lead-Free Solder Plating (Pure Sn)

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

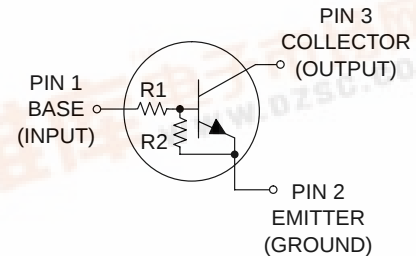
Rating	Symbol	Value	Unit
Collector-Base Voltage	V_{CB0}	50	Vdc
Collector-Emitter Voltage	V_{CEO}	50	Vdc
Collector Current	I_C	100	mAdc



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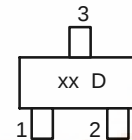
<http://onsemi.com>

NPN SILICON DIGITAL TRANSISTORS



SC-89
CASE 463C
STYLE 1

MARKING DIAGRAM



xx = Specific Device Code
(See Marking Table on page 2)
D = Date Code



DTC114EXV3T1 Series

DEVICE MARKING AND RESISTOR VALUES

Device	Marking	R1 (K)	R2 (K)	Shipping†
DTC114EXV3T1	8A	10	10	3000/Tape & Reel
DTC124EXV3T1	8B	22	22	
DTC144EXV3T1	8C	47	47	
DTC114YXV3T1	8D	10	47	
DTC114TXV3T1	94	10	∞	
DTC143TXV3T1	8F	4.7	∞	

†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.

THERMAL CHARACTERISTICS

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

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

DTC114EXV3T1 Series

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

Characteristic	Symbol	Min	Typ	Max	Unit
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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 (V _{EB} = 6.0 V, I _C = 0)	I _{EBO}	–	–	0.5	mAdc
DTC114EXV3T1		–	–	0.2	
DTC124EXV3T1		–	–	0.1	
DTC144EXV3T1		–	–	0.2	
DTC114YXV3T1		–	–	0.9	
DTC114TXV3T1		–	–	1.9	
DTC143TXV3T1		–	–		
Collector–Base Breakdown Voltage (I _C = 10 μA, I _E = 0)	V _{(BR)CBO}	50	–	–	Vdc
Collector–Emitter Breakdown Voltage (Note 3) (I _C = 2.0 mA, I _B = 0)	V _{(BR)CEO}	50	–	–	Vdc

ON CHARACTERISTICS (Note 3)

DC Current Gain (V _{CE} = 10 V, I _C = 5.0 mA)	DTC114EXV3T1 DTC124EXV3T1 DTC144EXV3T1 DTC114YXV3T1 DTC114TXV3T1 DTC143TXV3T1	h _{FE}	35 60 80 80 160 160	60 100 140 140 350 350	– – – – – –	
Collector–Emitter Saturation Voltage (I _C = 10 mA, I _B = 0.3 mA) (I _C = 10 mA, I _B = 1.0 mA) DTC143TXV3T1/DTC114TXV3T1		V _{CE(sat)}	–	–	0.25	Vdc
Output Voltage (on) (V _{CC} = 5.0 V, V _B = 2.5 V, R _L = 1.0 kΩ)	DTC114EXV3T1 DTC124EXV3T1 DTC114YXV3T1 DTC114TXV3T1 DTC143TXV3T1 DTC144EXV3T1	V _{OL}	– – – – – –	– – – – – –	0.2 0.2 0.2 0.2 0.2 0.2	Vdc
Output Voltage (off) (V _{CC} = 5.0 V, V _B = 0.5 V, R _L = 1.0 kΩ) (V _{CC} = 5.0 V, V _B = 0.25 V, R _L = 1.0 kΩ)	DTC143TXV3T1 DTC114TXV3T1	V _{OH}	4.9	–	–	Vdc
Input Resistor	DTC114EXV3T1 DTC124EXV3T1 DTC144EXV3T1 DTC114YXV3T1 DTC114TXV3T1 DTC143TXV3T1	R ₁	7.0 15.4 32.9 7.0 7.0 3.3	10 22 47 10 10 4.7	13 28.6 61.1 13 13 6.1	kΩ
Resistor Ratio	DTC114EXV3T1/DTC124EXV3T1/ DTC144EXV3T1 DTC114YXV3T1 DTC143TXV3T1/DTC114TXV3T1	R ₁ /R ₂	0.8 0.17 –	1.0 0.21 –	1.2 0.25 –	

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

DTC114EXV3T1 Series

[查询"DTC114EXV3T1"供应商](#)

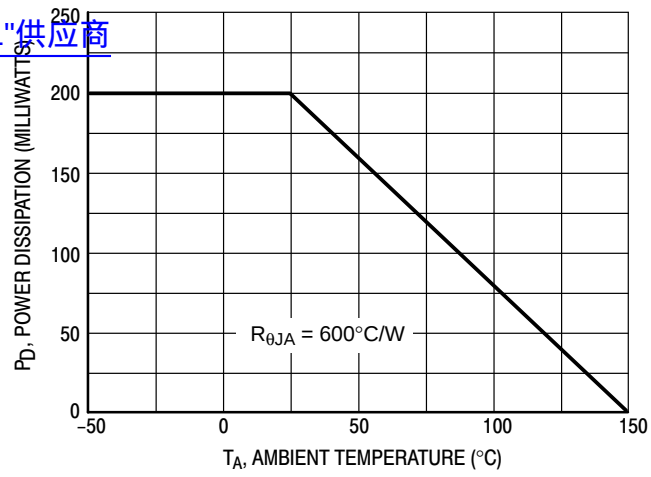


Figure 1. Derating Curve

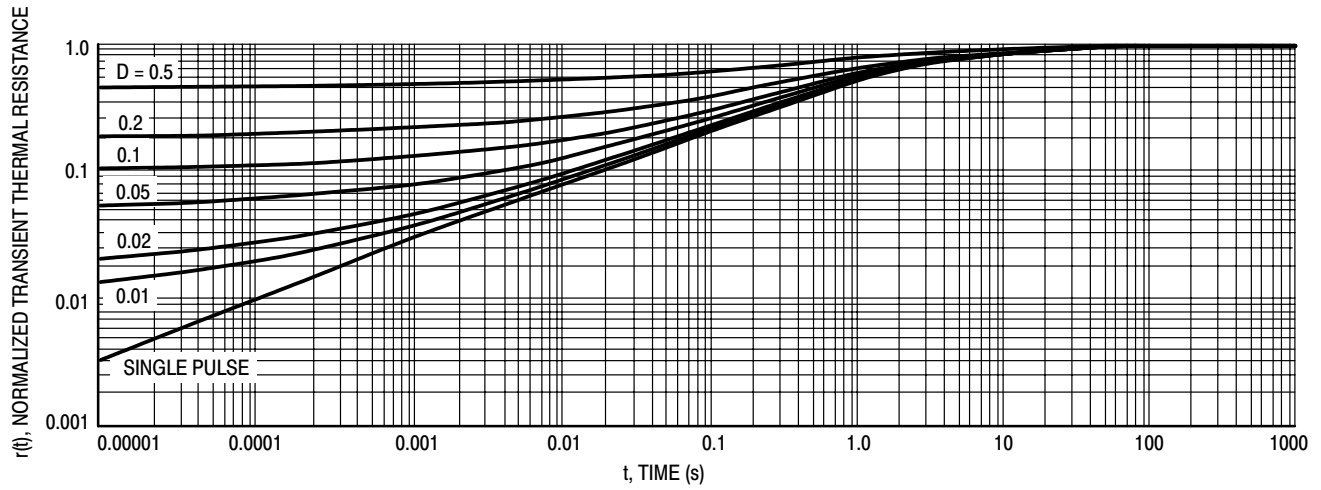


Figure 2. Normalized Thermal Response

DTC114EXV3T1 Series

TYPICAL ELECTRICAL CHARACTERISTICS – DTC114EXV3T1

[查询"DTC114EXV3T1"供应商](#)

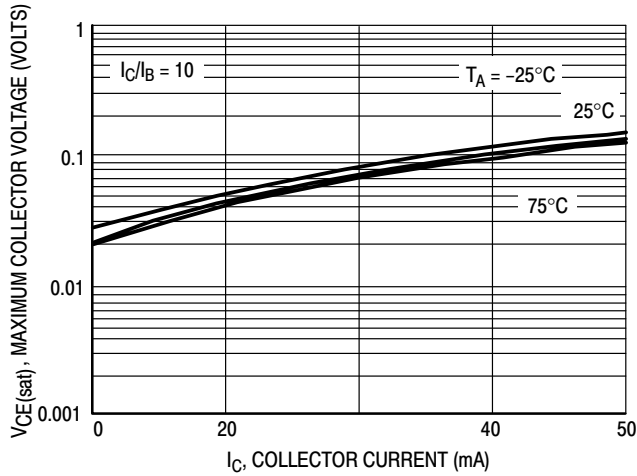


Figure 3. $V_{CE(sat)}$ versus I_C

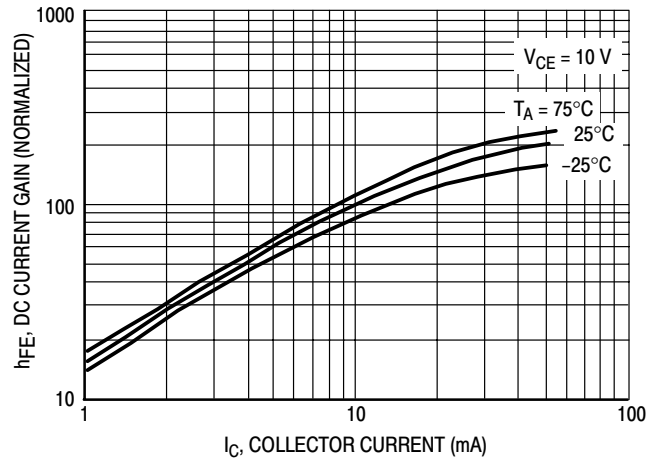


Figure 4. DC Current Gain

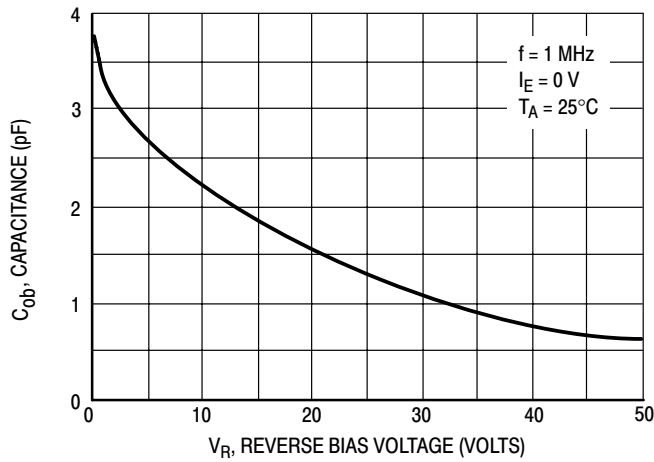


Figure 5. Output Capacitance

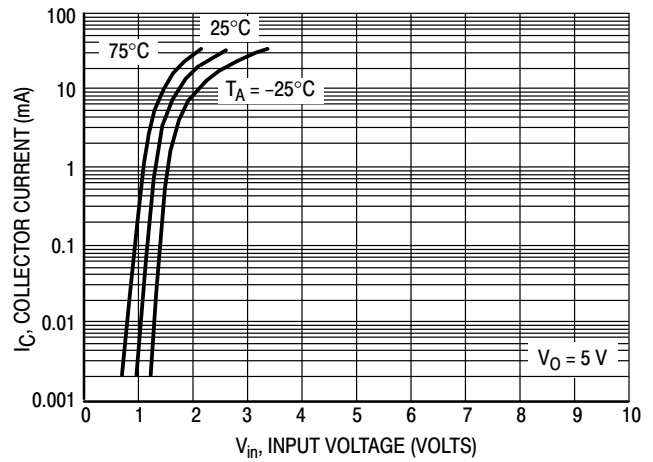


Figure 6. Output Current versus Input Voltage

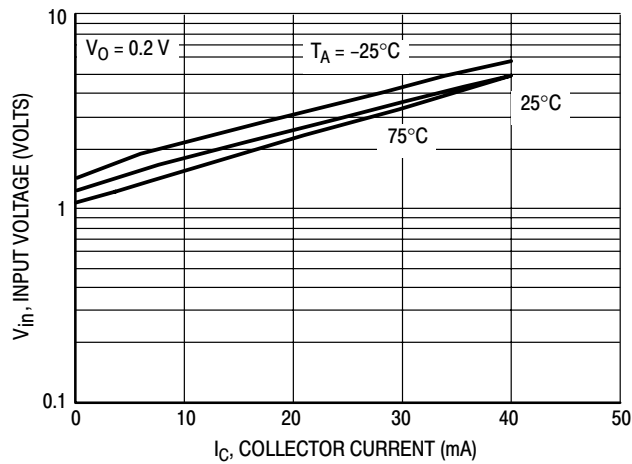


Figure 7. Input Voltage versus Output Current

DTC114EXV3T1 Series

TYPICAL ELECTRICAL CHARACTERISTICS – DTC124EXV3T1

[查询"DTC144EXV3T1"供应商](#)

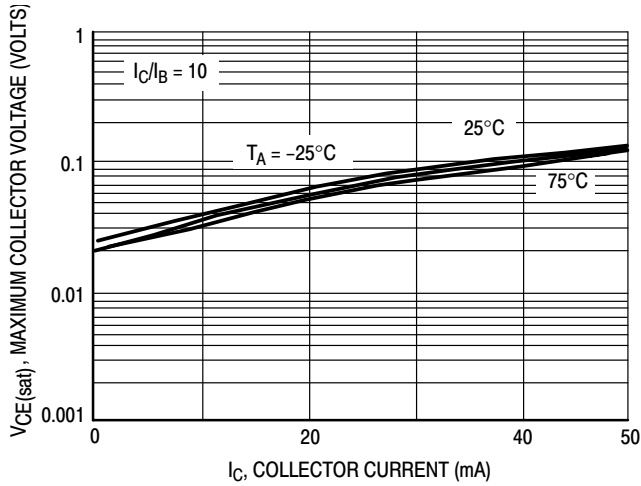


Figure 8. $V_{CE(sat)}$ versus I_C

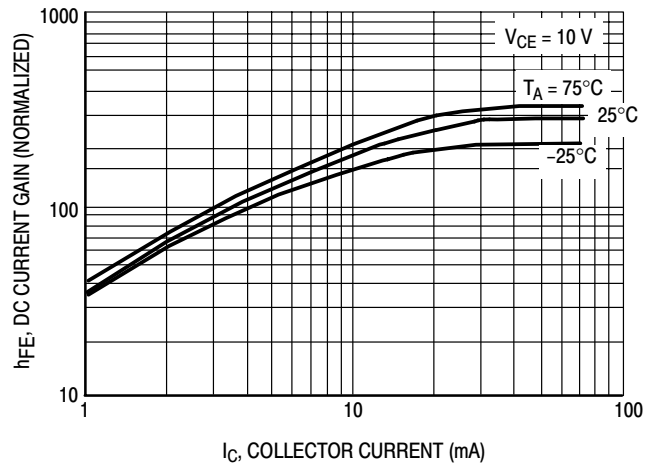


Figure 9. DC Current Gain

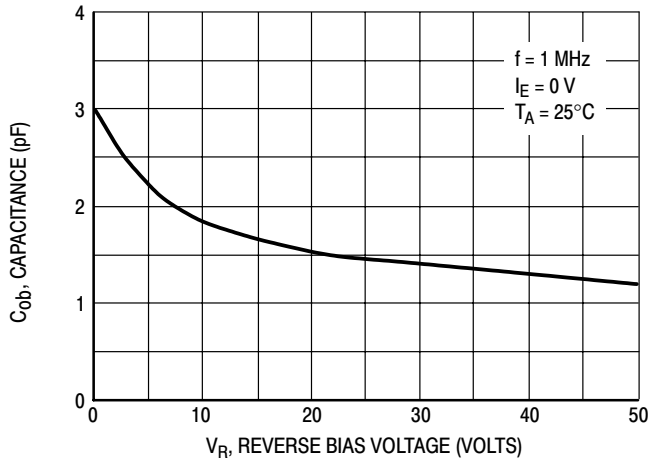


Figure 10. Output Capacitance

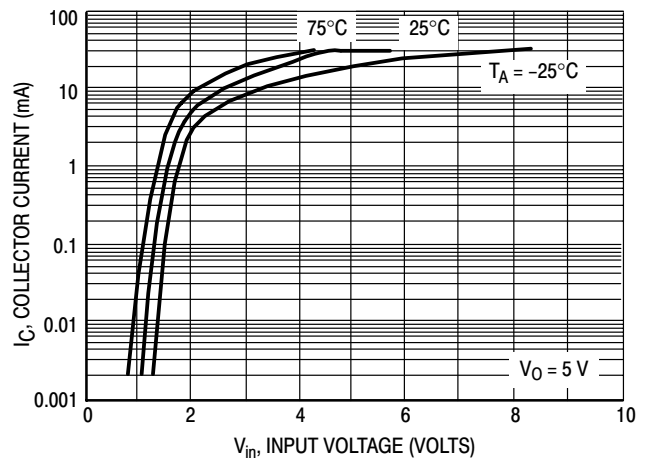


Figure 11. Output Current versus Input Voltage

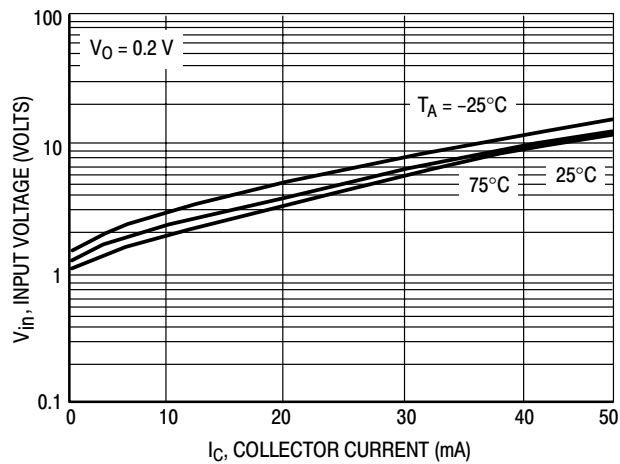


Figure 12. Input Voltage versus Output Current

DTC114EXV3T1 Series

TYPICAL ELECTRICAL CHARACTERISTICS – DTC144EXV3T1

[查询"DTC144EXV3T1"供应商](#)

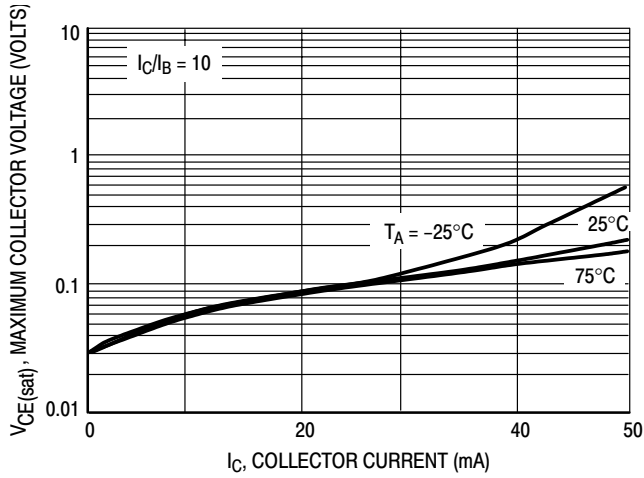


Figure 13. $V_{CE(sat)}$ versus I_C

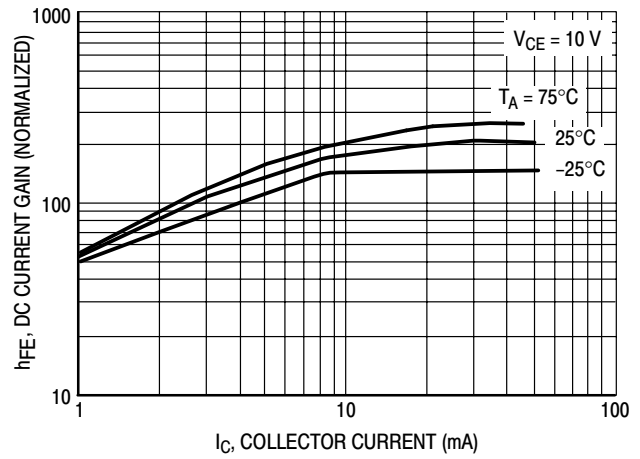


Figure 14. DC Current Gain

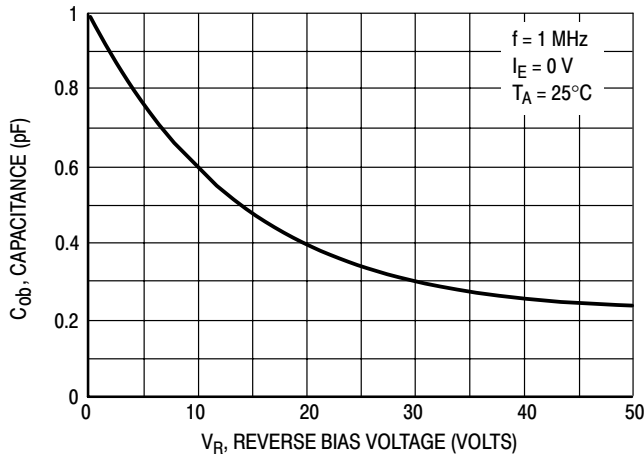


Figure 15. Output Capacitance

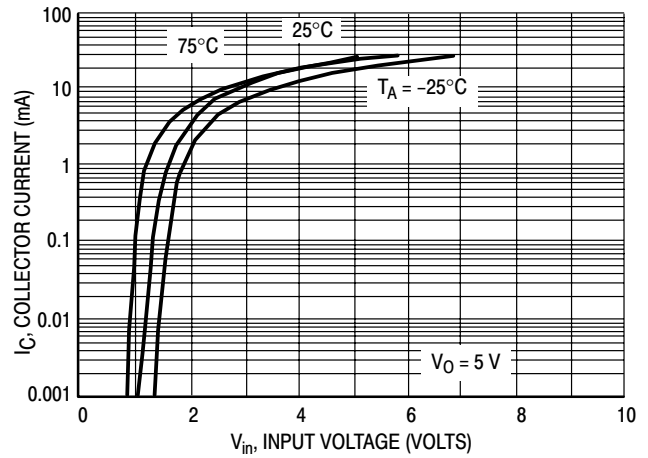


Figure 16. Output Current versus Input Voltage

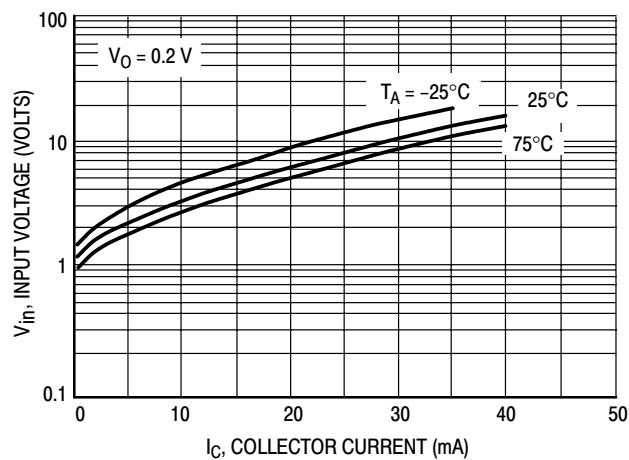


Figure 17. Input Voltage versus Output Current

DTC114EXV3T1 Series

TYPICAL ELECTRICAL CHARACTERISTICS – DTC114YXV3T1

[查询"DTC144EXV3T1"供应商](#)

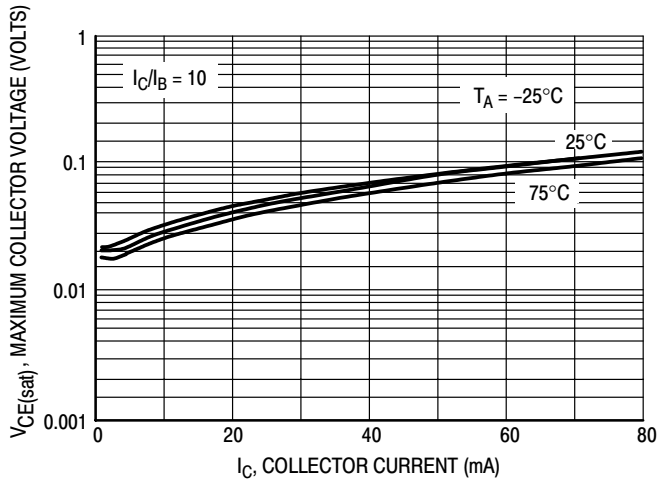


Figure 18. $V_{CE(sat)}$ versus I_C

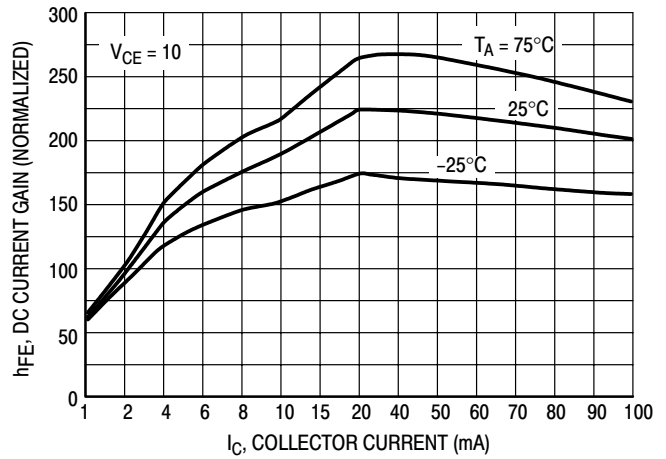


Figure 19. DC Current Gain

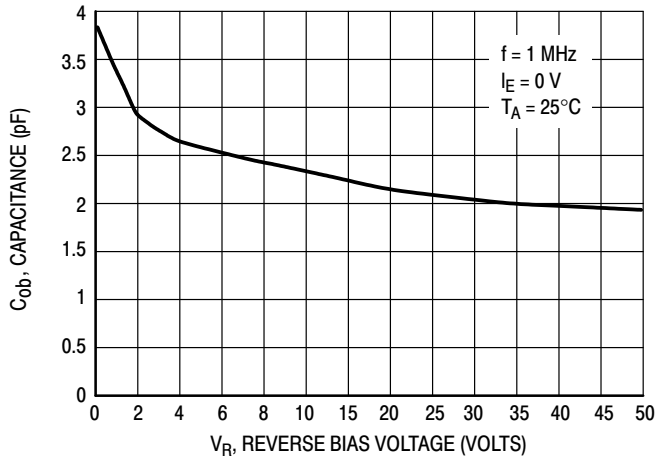


Figure 20. Output Capacitance

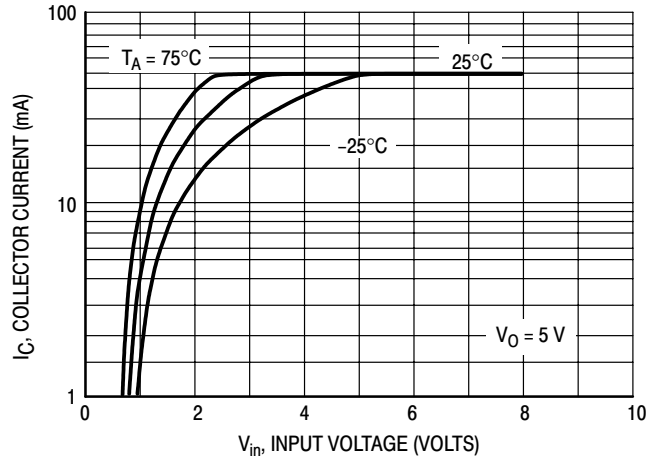


Figure 21. Output Current versus Input Voltage

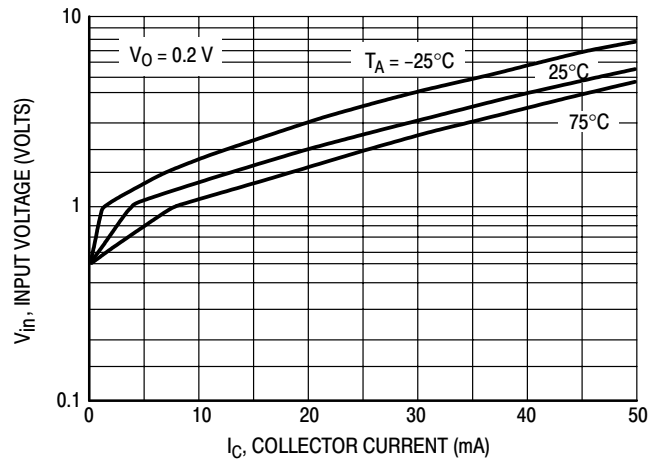


Figure 22. Input Voltage versus Output Current

DTC114EXV3T1 Series

[查询"DTC144EXV3T1"供应商](#) TYPICAL APPLICATIONS FOR NPN BRTs

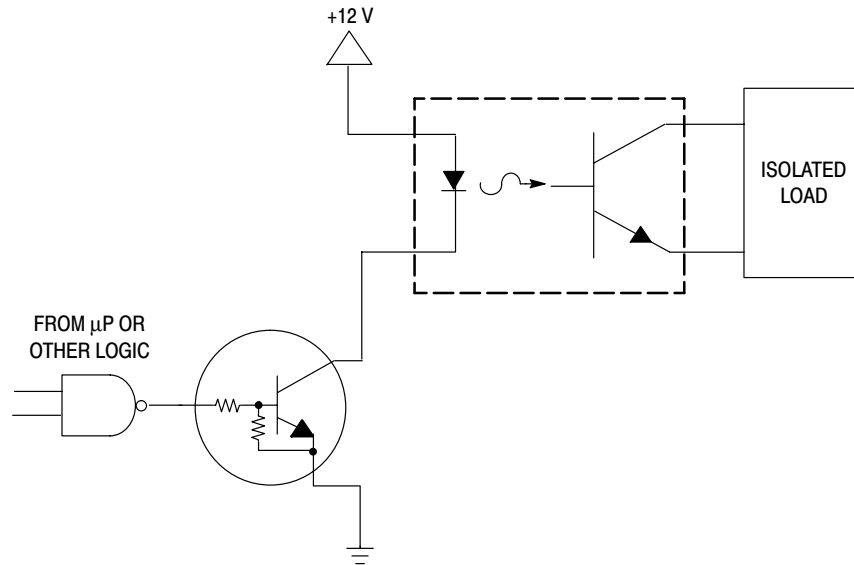


Figure 23. Level Shifter: Connects 12 or 24 Volt Circuits to Logic

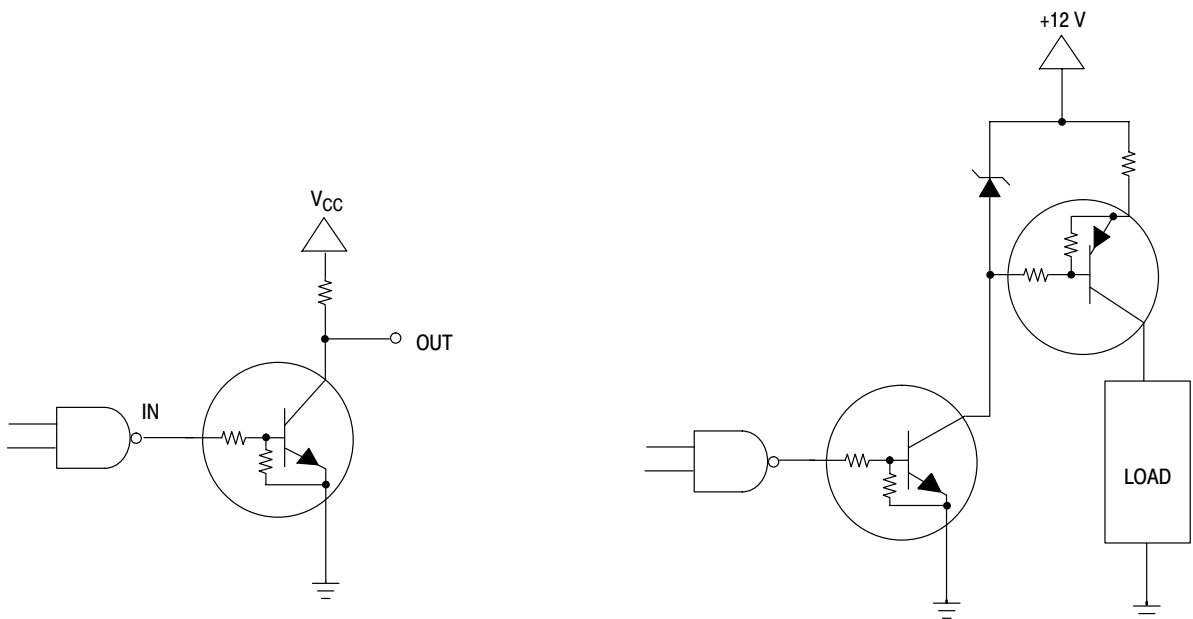


Figure 24. Open Collector Inverter:
Inverts the Input Signal

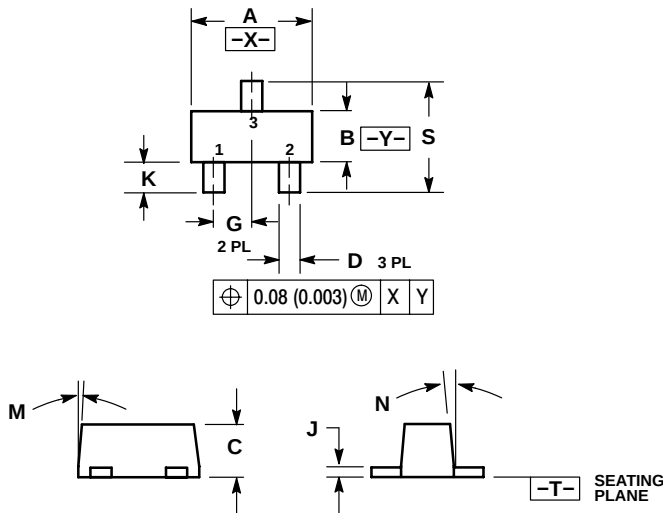
Figure 25. Inexpensive, Unregulated Current Source

DTC114EXV3T1 Series

[查询"DTC144EXV3T1"供应商](#)

PACKAGE DIMENSIONS

SC-89
CASE 463C-03
ISSUE C



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 463C-01 OBSOLETE, NEW STANDARD 463C-02.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.50	1.60	1.70	0.059	0.063	0.067
B	0.75	0.85	0.95	0.030	0.034	0.040
C	0.60	0.70	0.80	0.024	0.028	0.031
D	0.23	0.28	0.33	0.009	0.011	0.013
G	0.50 BSC			0.020 BSC		
H	0.53 REF			0.021 REF		
J	0.10	0.15	0.20	0.004	0.006	0.008
K	0.30	0.40	0.50	0.012	0.016	0.020
L	1.10 REF			0.043 REF		
M	---	---	10	---	---	10
N	---	---	10	---	---	10
S	1.50	1.60	1.70	0.059	0.063	0.067

STYLE 1:

1. BASE
2. EMITTER
3. COLLECTOR

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