Bias Resistor Transistor

PNP Silicon Surface Mount Transistor with Monolithic Bias Resistor Network

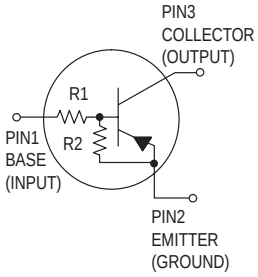
MUN5111T1 SERIES

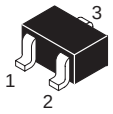
Motorola Preferred Devices

PNP SILICON BIAS RESISTOR TRANSISTOR

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 SC–70/SOT–323 package which is designed for low power surface mount applications.

- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- The SC–70/SOT–323 package can be soldered using wave or reflow. The modified gull–winged leads absorb thermal stress during soldering eliminating the possibility of damage to the die.
- Available in 8 mm embossed tape and reel
  Use the Device Number to order the 7 inch/3000 unit reel.
  Replace “T1” with “T3” in the Device Number to order the 13 inch/10,000 unit reel.





CASE 419–02, STYLE 3
SC–70/SOT–323

MAXIMUM RATINGS (T_A = 25°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°C(1) Derate above 25°C	P_D	150 1.2	mW mW/°C

THERMAL CHARACTERISTICS

Thermal Resistance — Junction–to–Ambient (surface mounted)	$R_{\theta JA}$	833	°C/W
Operating and Storage Temperature Range	T_J, T_{stg}	–65 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)
MUN5111T1	6A	10	10
MUN5112T1	6B	22	22
MUN5113T1	6C	47	47
MUN5114T1	6D	10	47
MUN5115T1(2)	6E	10	∞
MUN5116T1(2)	6F	4.7	∞
MUN5130T1(2)	6G	1.0	1.0
MUN5131T1(2)	6H	2.2	2.2
MUN5132T1(2)	6J	4.7	4.7
MUN5133T1(2)	6K	4.7	47
MUN5134T1(2)	6L	22	47

1. Device mounted on a FR–4 glass epoxy printed circuit board using the minimum recommended footprint.
2. New devices. Updated curves to follow in subsequent data sheets.

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

REV 2

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_{CBO}	—	—	100	nAdc
Collector–Emitter Cutoff Current (V_{CE} = 50 V, I_B = 0)		I_{CEO}	—	—	500	nAdc
Emitter–Base Cutoff Current	MUN5111T1	I_{EBO}	—	—	0.5	mAdc
(V_{EB} = 6.0 V, I_C = 0)	MUN5112T1		—	—	0.2	
	MUN5113T1		—	—	0.1	
	MUN5114T1		—	—	0.2	
	MUN5115T1		—	—	0.9	
	MUN5116T1		—	—	1.9	
	MUN5130T1		—	—	4.3	
	MUN5131T1		—	—	2.3	
	MUN5132T1		—	—	1.5	
	MUN5133T1		—	—	0.18	
	MUN5134T1		—	—	0.13	
Collector–Base Breakdown Voltage (I_C = 10 μA, I_E = 0)		$V_{(BR)CBO}$	50	—	—	Vdc
Collector–Emitter Breakdown Voltage[3] (I_C = 2.0 mA, I_B = 0)		$V_{(BR)CEO}$	50	—	—	Vdc
ON CHARACTERISTICS[3]						
DC Current Gain	MUN5111T1	h_{FE}	35	60	—	
(V_{CE} = 10 V, I_C = 5.0 mA)	MUN5112T1		60	100	—	
	MUN5113T1		80	140	—	
	MUN5114T1		80	140	—	
	MUN5115T1		160	250	—	
	MUN5116T1		160	250	—	
	MUN5130T1		3.0	5.0	—	
	MUN5131T1		8.0	15	—	
	MUN5132T1		15	27	—	
	MUN5133T1		80	140	—	
	MUN5134T1		80	130	—	
Collector–Emitter Saturation Voltage (I_C = 10 mA, I_E = 0.3 mA) (I_C = 10 mA, I_B = 5 mA) MUN5130T1/MUN5131T1 (I_C = 10 mA, I_B = 1 mA) MUN5115T1/MUN5116T1/ MUN5132T1/MUN5133T1/MUN5134T1		$V_{CE(sat)}$	—	—	0.25	Vdc
Output Voltage (on)		V_{OL}				Vdc
(V_{CC} = 5.0 V, V_B = 2.5 V, R_L = 1.0 kΩ)	MUN5111T1		—	—	0.2	
	MUN5112T1		—	—	0.2	
	MUN5114T1		—	—	0.2	
	MUN5115T1		—	—	0.2	
	MUN5116T1		—	—	0.2	
	MUN5130T1		—	—	0.2	
	MUN5131T1		—	—	0.2	
	MUN5132T1		—	—	0.2	
	MUN5133T1		—	—	0.2	
	MUN5134T1		—	—	0.2	
(V_{CC} = 5.0 V, V_B = 3.5 V, R_L = 1.0 kΩ)	MUN5113T1		—	—	0.2	

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

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) (V_{CC} = 5.0 V, V_B = 0.050 V, R_L = 1.0 kΩ) MUN5130T1 (V_{CC} = 5.0 V, V_B = 0.25 V, R_L = 1.0 kΩ) MUN5115T1 MUN5116T1 MUN5131T1 MUN5132T1		V_{OH}	4.9	—	—	Vdc
Input Resistor	MUN5111T1	R1	7.0	10	13	kΩ
	MUN5112T1		15.4	22	28.6	
	MUN5113T1		32.9	47	61.1	
	MUN5114T1		7.0	10	13	
	MUN5115T1		7.0	10	13	
	MUN5116T1		3.3	4.7	6.1	
	MUN5130T1		0.7	1.0	1.3	
	MUN5131T1		1.5	2.2	2.9	
	MUN5132T1		3.3	4.7	6.1	
	MUN5133T1		3.3	4.7	6.1	
	MUN5134T1		15.4	22	28.6	
Resistor Ratio	MUN5111T1/MUN5112T1/MUN5113T1	R_1/R_2	0.8	1.0	1.2	
	MUN5114T1		0.17	0.21	0.25	
	MUN5115T1/MUN5116T1		—	—	—	
	MUN5130T1/MUN5131T1/MUN5132T1		0.8	1.0	1.2	
	MUN5133T1		0.055	0.1	0.185	
	MUN5134T1		0.38	0.47	0.56	

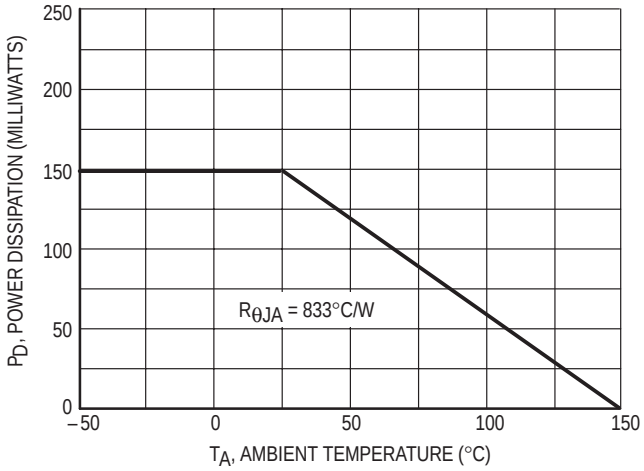


Figure 1. Derating Curve

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5111T1

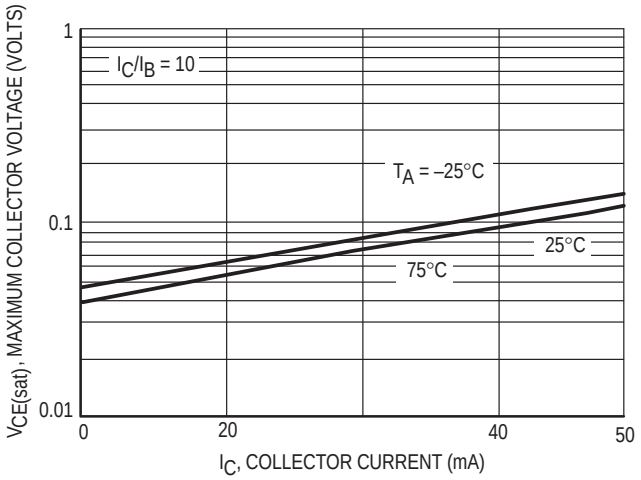


Figure 2. $V_{CE(sat)}$ versus I_C

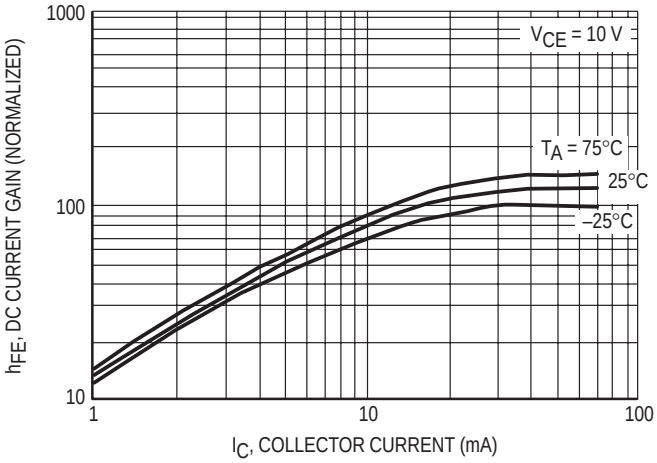


Figure 3. DC Current Gain

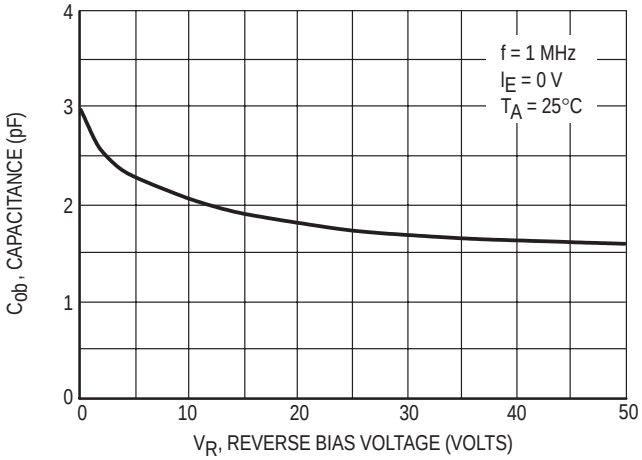


Figure 4. Output Capacitance

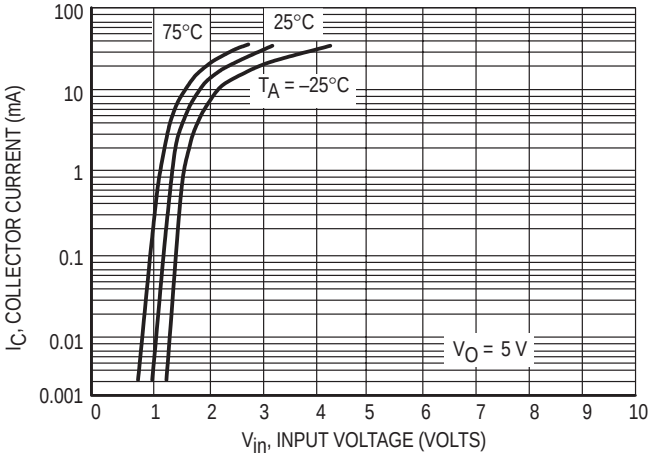


Figure 5. Output Current versus Input Voltage

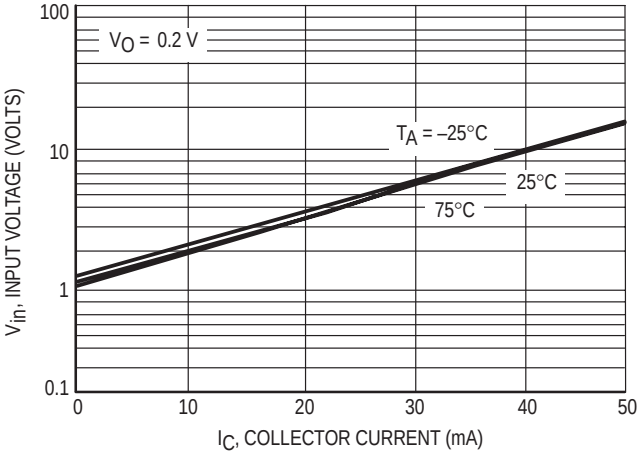


Figure 6. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5112T1

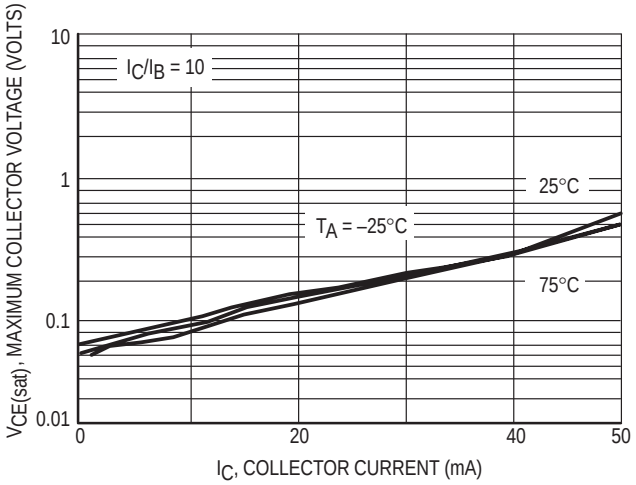


Figure 7. $V_{CE(sat)}$ versus I_C

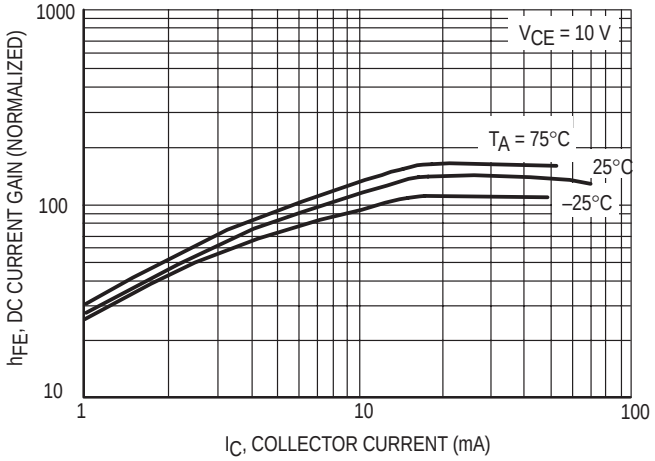


Figure 8. DC Current Gain

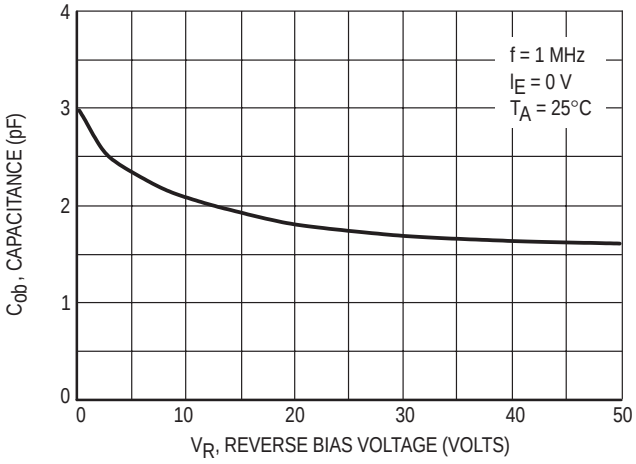


Figure 9. Output Capacitance

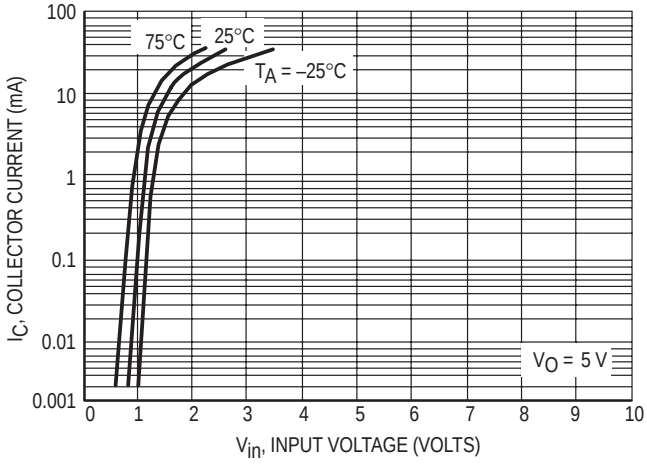


Figure 10. Output Current versus Input Voltage

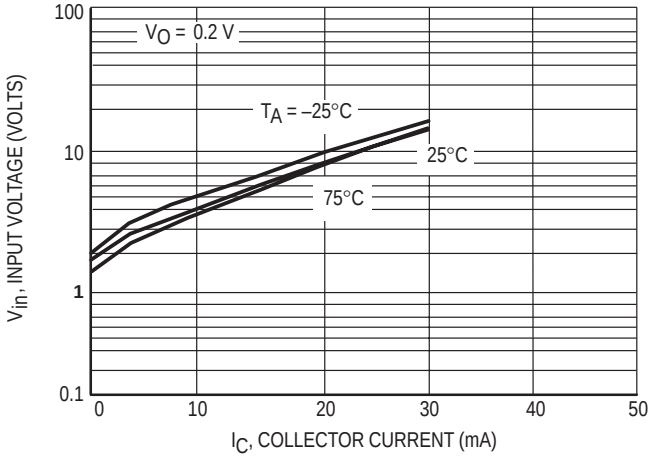


Figure 11. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5113T1

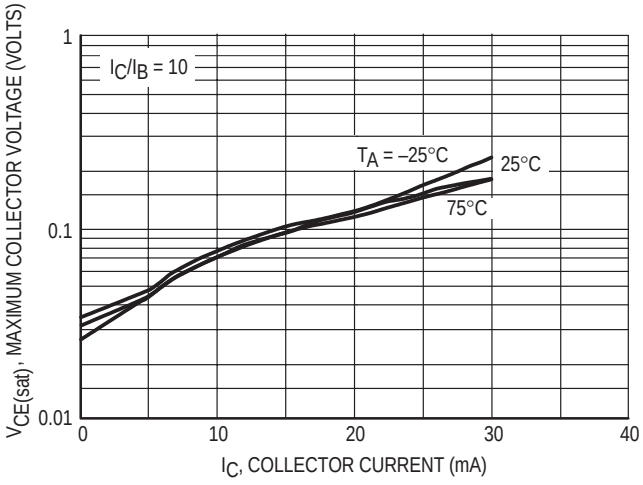


Figure 12. $V_{CE(sat)}$ versus I_C

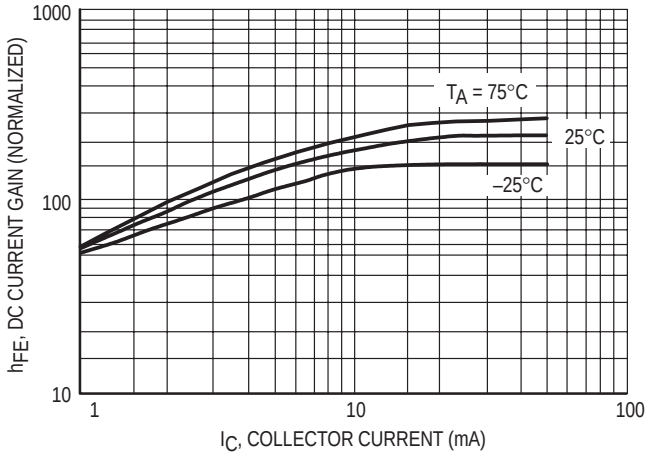


Figure 13. DC Current Gain

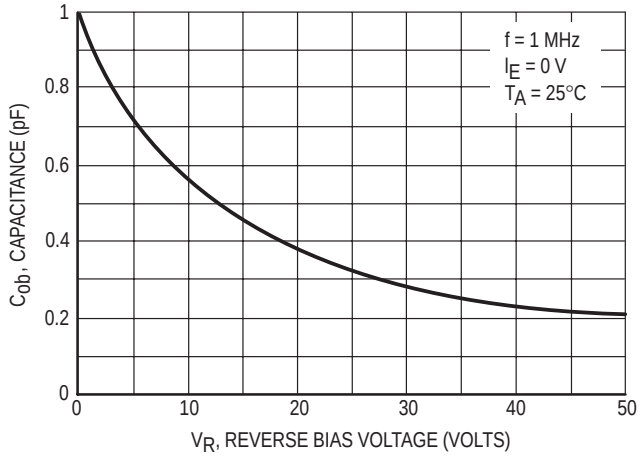


Figure 14. Output Capacitance

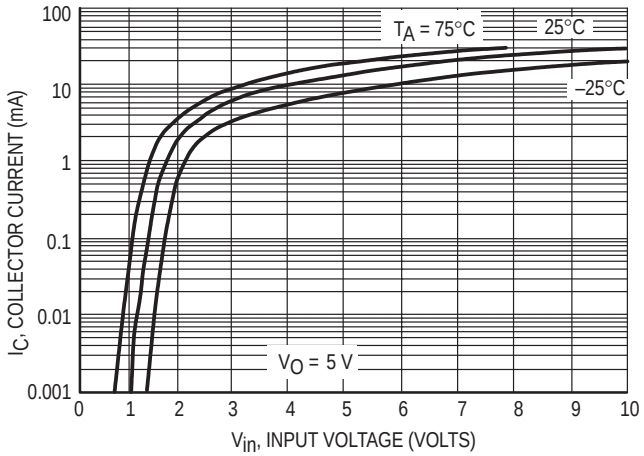


Figure 15. Output Current versus Input Voltage

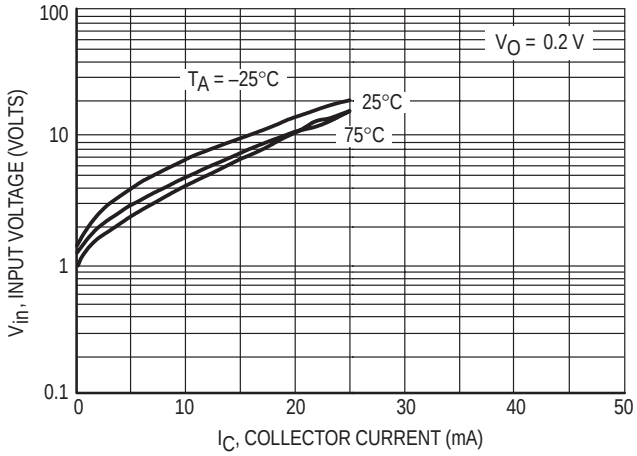


Figure 16. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — MUN5114T1

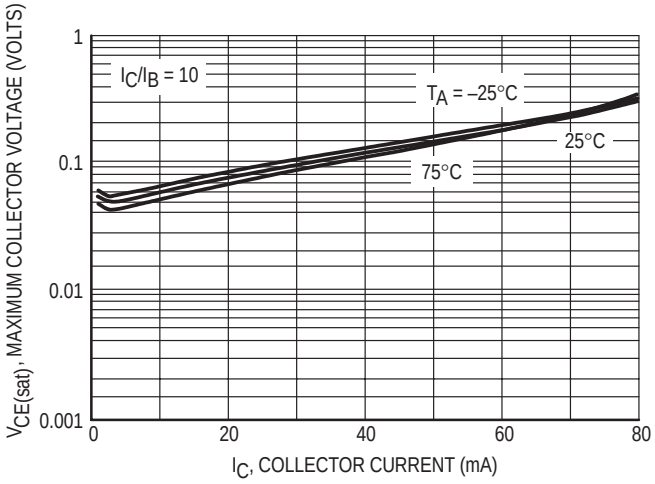


Figure 17. $V_{CE(sat)}$ versus I_C

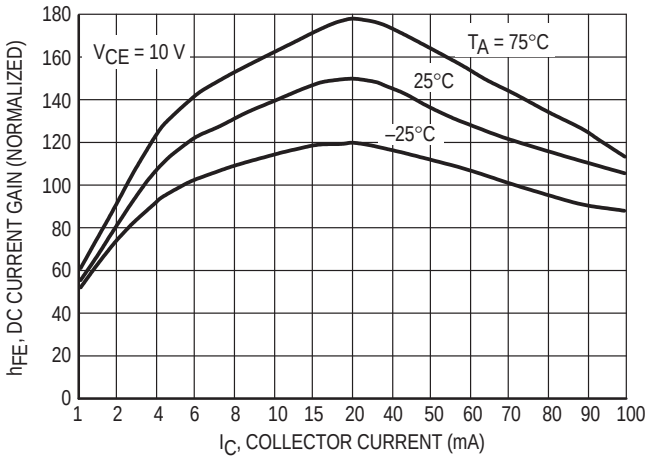


Figure 18. DC Current Gain

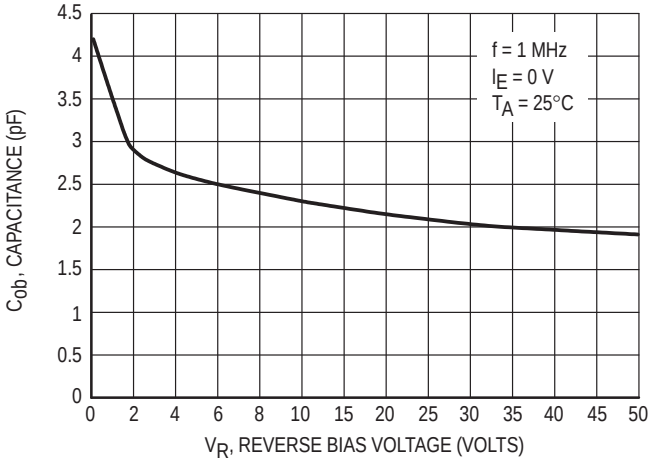


Figure 19. Output Capacitance

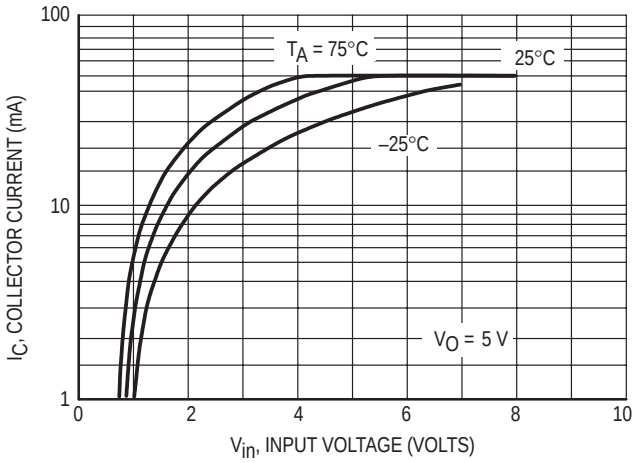


Figure 20. Output Current versus Input Voltage

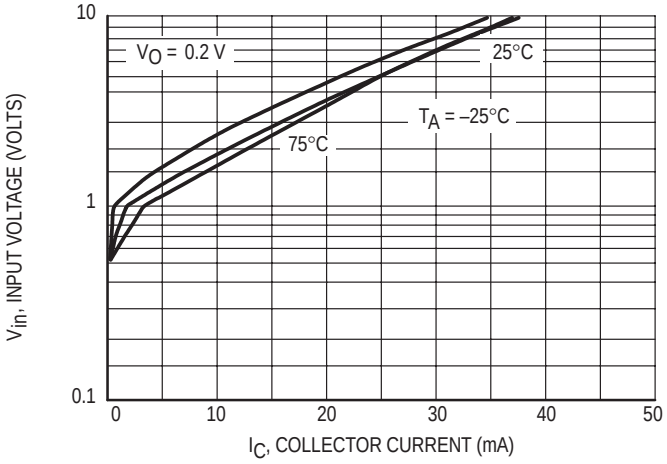


Figure 21. Input Voltage versus Output Current

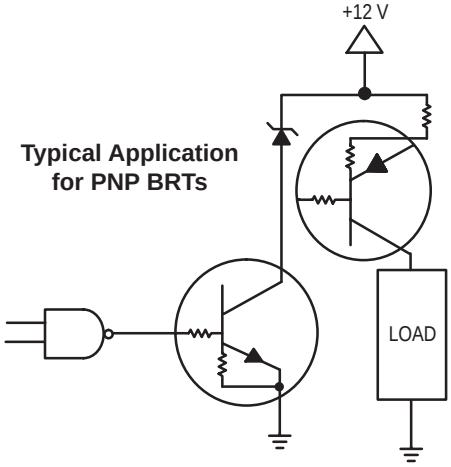


Figure 22. Inexpensive, Unregulated Current Source