



DESCRIPTION

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 package which is designed for low power surface mount applications.

The MUN5111~ MUN5137 is available in SC-70 package

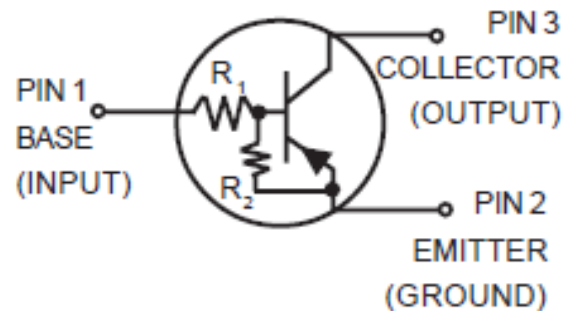
ORDERING INFORMATION

Package Type	Part Number
SC-70	MUN5111
	MUN5112
	MUN5113
	MUN5114
	MUN5115
	MUN5116
	MUN5130
	MUN5131
	MUN5132
	MUN5133
	MUN5134
	MUN5135
	MUN5136
	MUN5137
Note	3,000pcs/Reel
AiT provides all RoHS Compliant Products	

FEATURES

- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- The modified gull-winged leads absorb thermal stress during soldering eliminating the possibility of damage to the die.
- Available in SC-70 package

PIN DESCRIPTION





ABSOLUTE MAXIMUM RATINGS

T_A = 25°C, unless otherwise noted

V _{CBO} , Collector-Base Voltage	50Vdc
V _{CEO} , Collector-Emitter Voltage	50Vdc
I _C , Collector Current	100mAdc

Stresses above may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated in the Electrical Characteristics are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

THERMAL CHARACTERISTICS

Parameter		Symbol	Max.	Unit
Total Device Dissipation	T _A = 25°C	P _D	202 ^{NOTE1} 310 ^{NOTE2}	mW
	Derate above 25°C		1.6 ^{NOTE1} 2.5 ^{NOTE2}	°C/W
Thermal Resistance-Junction-to-Ambient		R _{θJA}	618 ^{NOTE1} 403 ^{NOTE2}	°C/W
Thermal Resistance -Junction-to-Lead		R _{θJL}	280 ^{NOTE1} 332 ^{NOTE2}	°C/W
Junction and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

NOTE1: FR-4 @ Minimum Pad

NOTE2: FR-4 @ 1.0 x 1.0 inch Pad



ELECTRICAL CHARACTERISTICS

T_A = 25°C unless otherwise noted

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
OFF CHARACTERISTICS							
Collector-Base Cutoff Current	I _{CBO}	V _{CB} = 50V, I _E = 0	-	-	100	nAdc	
Collector-Emitter Cutoff Current	I _{CEO}	V _{CE} = 50V, I _B = 0	-	-	500	nAdc	
Emitter-Base Cutoff Current	I _{EBO}	V _{EB} = 6.0V, I _C = 0	-	-	0.5	mAdc	
					MUN5112		0.2
					MUN5113		0.1
					MUN5114		0.2
					MUN5115		0.9
					MUN5116		1.9
					MUN5130		4.3
					MUN5131		2.3
					MUN5132		1.5
					MUN5133		0.18
					MUN5134		0.13
					MUN5135		0.2
					MUN5136		0.05
					MUN5137		0.13
Collector-Base Breakdown Voltage	V _{(BR)CBO}	I _C = 10μA, I _E = 0	50	-	-	Vdc	
Collector-Emitter Breakdown Voltage <small>NOTE 3</small>	V _{(BR)CEO}	I _C = 2.0mA, I _B = 0	50	-	-	Vdc	

NOTE3: Pulse Test: Pulse Width < 300 μs, Duty Cycle < 2.0%



Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
ON CHARACTERISTICS ^{NOTE3}							
DC Current Gain	h_{FE}	$V_{CE} = 10V,$ $I_C = 5.0mA$	MUN5111	35	60	-	
			MUN5112	60	100		
			MUN5113	80	140		
			MUN5114	80	140		
			MUN5115	160	250		
			MUN5116	160	250		
			MUN5130	3.0	5.0		
			MUN5131	8.0	15		
			MUN5132	15	27		
			MUN5133	80	140		
			MUN5134	80	130		
			MUN5135	80	140		
			MUN5136	80	150		
			MUN5137	80	140		
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 10mA, I_E = 0.3mA$	-	-	0.25	Vdc	
		$I_C = 10mA,$ $I_B = 5mA$					MUN5130
							MUN5131
		$I_C = 10mA,$ $I_B = 1mA$					MUN5115
							MUN5116
							MUN5132
							MUN5134

NOTE3: Pulse Test: Pulse Width < 300 μ s, Duty Cycle < 2.0%



Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
Output Voltage (on)	V _{OL}	V _{CC} = 5.0V, V _B = 2.5V, R _L = 1.0kΩ	-	-	0.2	Vdc	
							MUN5111
							MUN5112
							MUN5114
							MUN5115
							MUN5116
							MUN5130
							MUN5131
							MUN5132
							MUN5133
		MUN5134					
		MUN5135					
		V _{CC} = 5.0V, V _B = 3.5V, R _L = 1.0kΩ				MUN5113	
		V _{CC} = 5.0V, V _B = 5.5V, R _L = 1.0kΩ				MUN5136	
		V _{CC} = 5.0V, V _B = 4.0V, R _L = 1.0kΩ				MUN5137	
Output Voltage (off)	V _{OH}	V _{CC} =5.0V, V _B =0.5 V, R _L =1.0kΩ	4.9	-	-	Vdc	
		V _{CC} = 5.0V, V _B = 0.05V, R _L = 1.0kΩ					MUN5130
		V _{CC} = 5.0V, V _B = 0.25V, R _L = 1.0kΩ					MUN5115
							MUN5116
							MUN5131
		MUN5132					

NOTE3: Pulse Test: Pulse Width < 300 μs, Duty Cycle < 2.0%



Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Resistor	R ₁	MUN5111	7.0	10	13	kΩ
		MUN5112	15.4	22	28.6	
		MUN5113	32.9	47	61.1	
		MUN5114	7.0	10	13	
		MUN5115	7.0	10	13	
		MUN5116	3.3	4.7	6.1	
		MUN5130	0.7	1.0	1.3	
		MUN5131	1.5	2.2	2.9	
		MUN5132	3.3	4.7	6.1	
		MUN5133	3.3	4.7	6.1	
		MUN5134	15.4	22	28.6	
		MUN5135	1.54	2.2	2.86	
		MUN5136	70	100	130	
		MUN5137	32.9	47	61.1	
Resistor Ratio	R ₁ /R ₂	MUN5111	0.8	1.0	1.2	
		MUN5112				
		MUN5113				
		MUN5136				
		MUN5114	0.17	0.21	0.25	
		MUN5115	-	-	-	
		MUN5116				
		MUN5130				
		MUN5131	0.8	1.0	1.2	
		MUN5132				
		MUN5133	0.055	0.1	0.185	
		MUN5134	0.38	0.47	0.56	
		MUN5135	0.038	0.047	0.056	
		MUN5137	1.7	2.1	2.6	

NOTE3: Pulse Test: Pulse Width < 300 μs, Duty Cycle < 2.0%



TYPICAL CHARACTERISTICS

Figure 1. Derating Curve

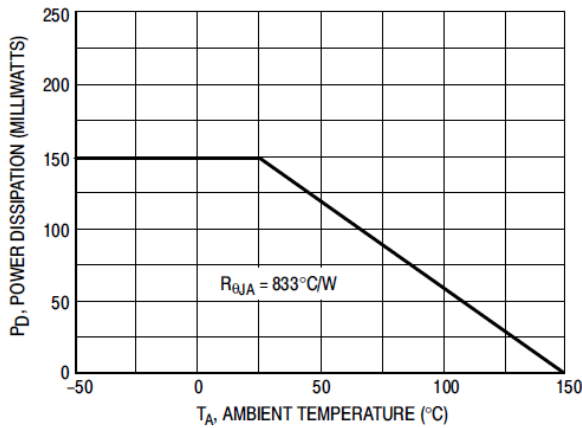


Figure 3. DC Current Gain

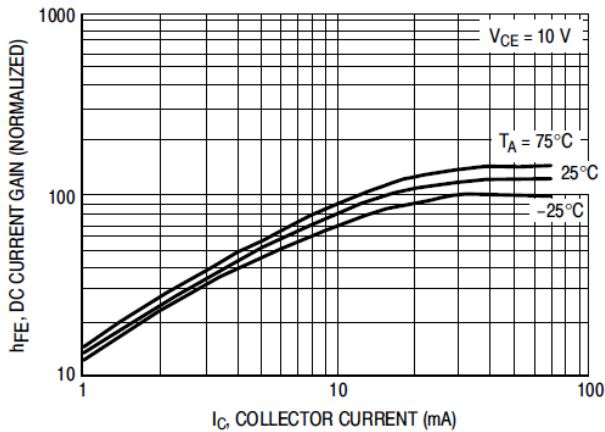
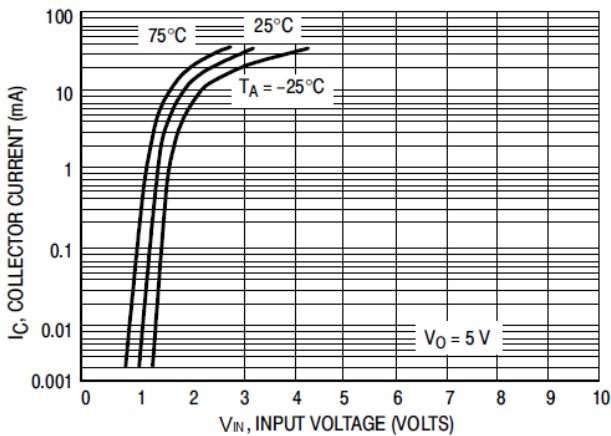


Figure 5. Output Current versus Input Voltage



MUN5111

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

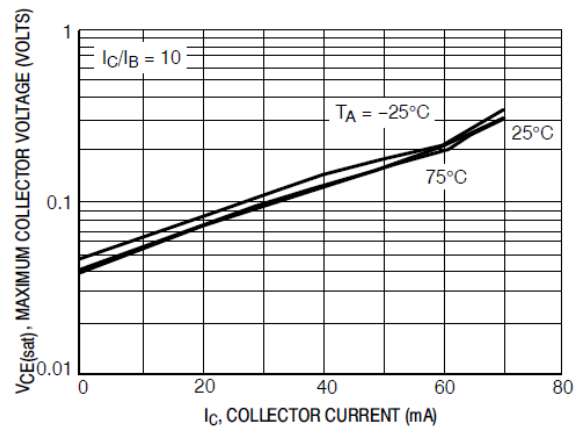


Figure 4. Output Capacitance

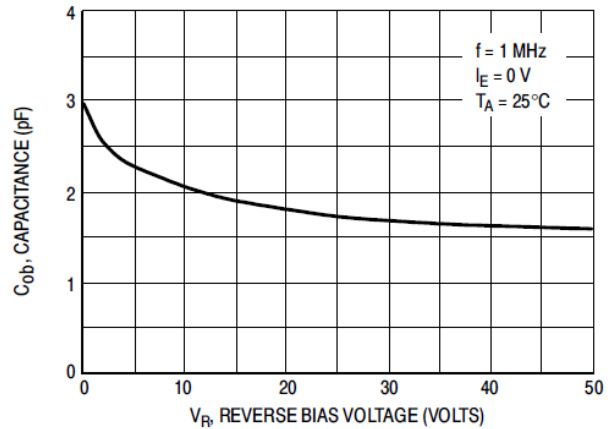
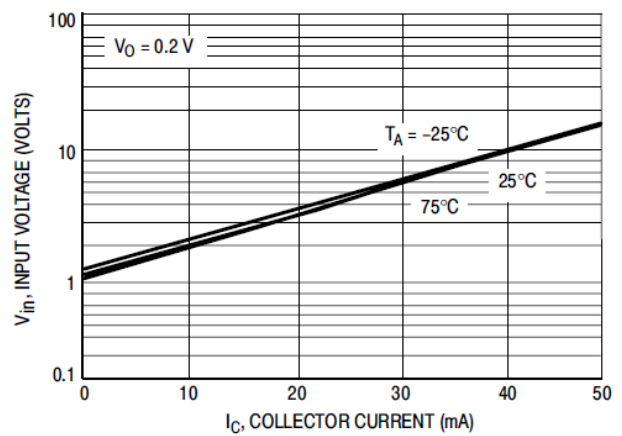


Figure 6. Input Voltage versus Output Current





MUN5112

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

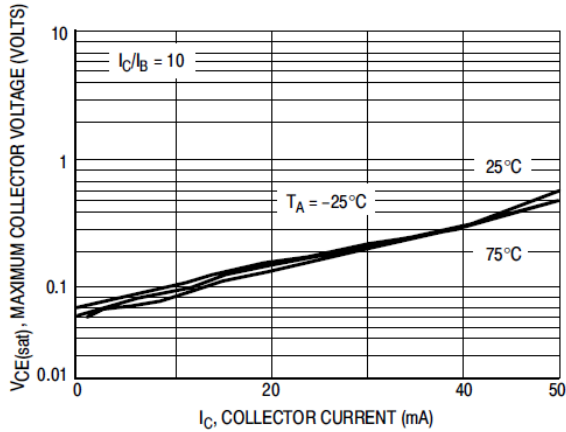


Figure 8. DC Current Gain

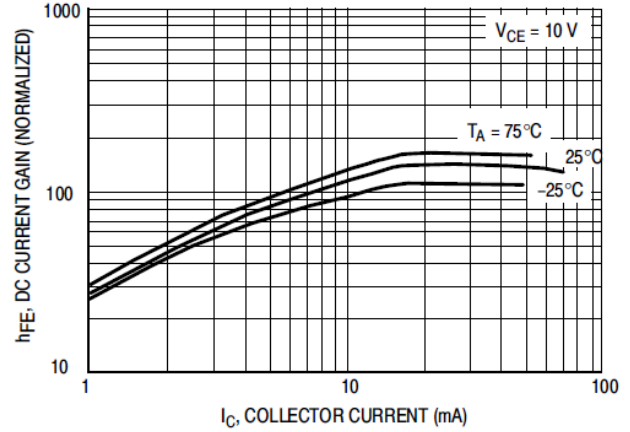


Figure 9. Output Capacitance

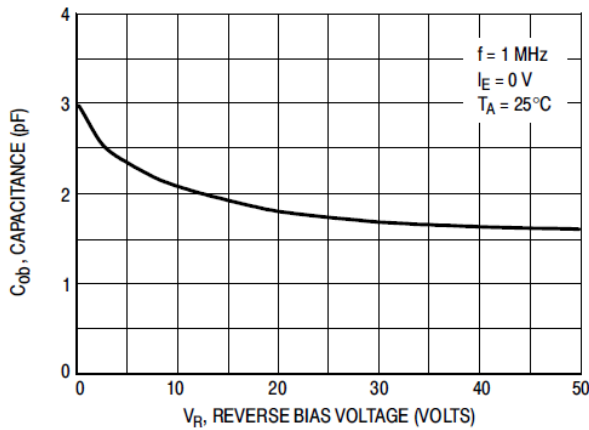


Figure 10. Output Current versus Input Voltage

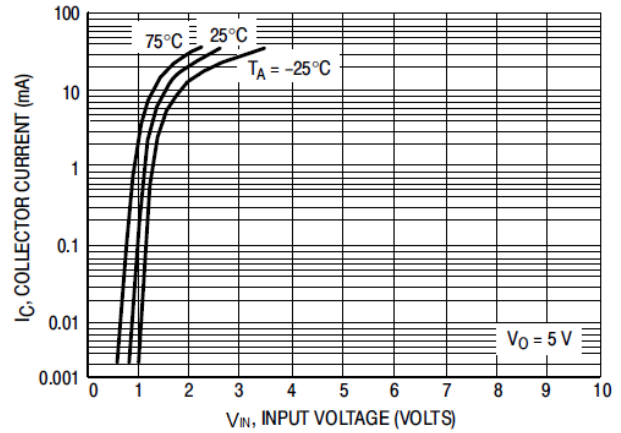
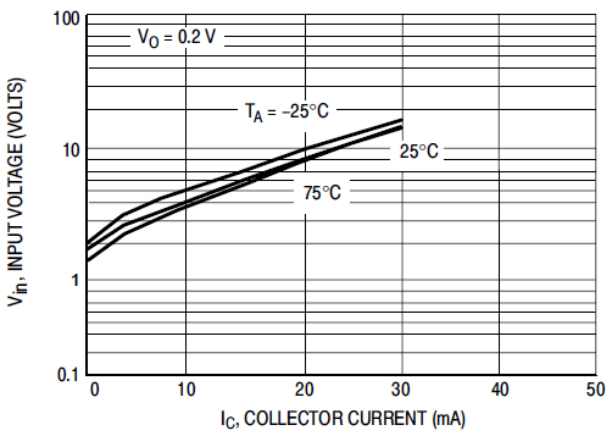


Figure 11. Input Voltage versus Output Current





MUN5113

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

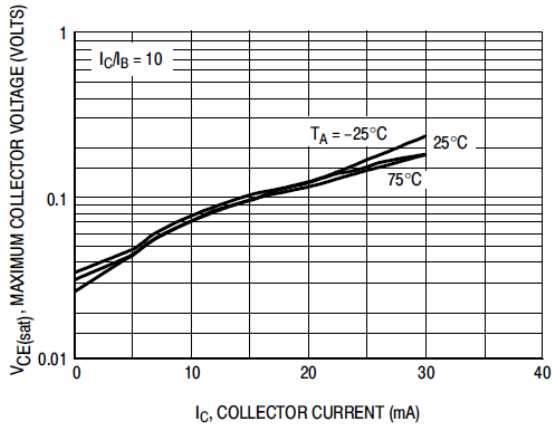


Figure 13. DC Current Gain

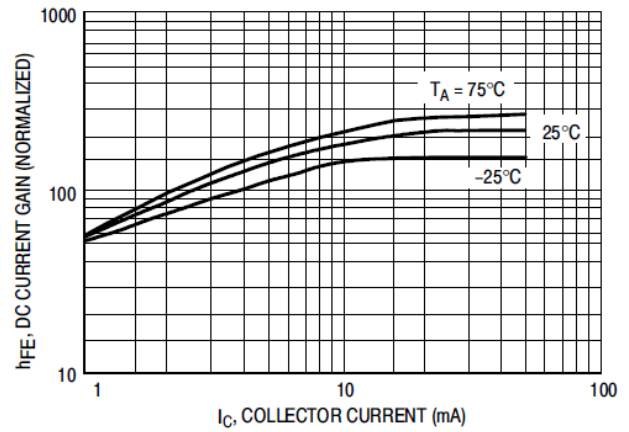


Figure 14. Output Capacitance

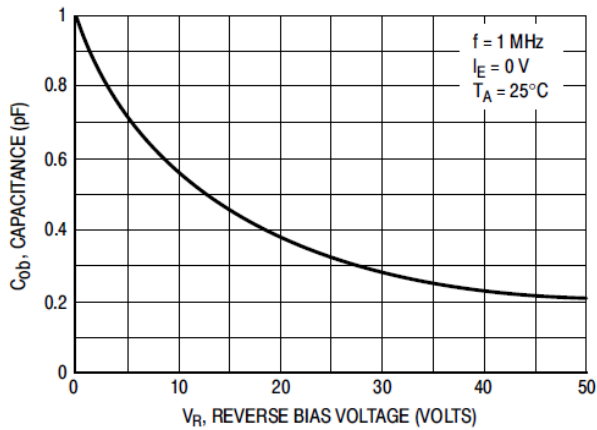


Figure 15. Output Current versus Input Voltage

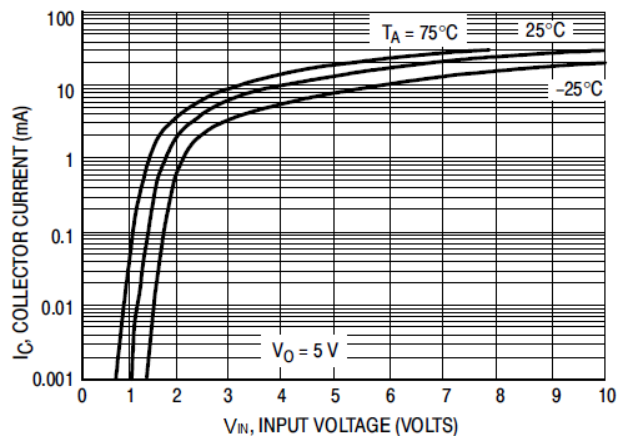
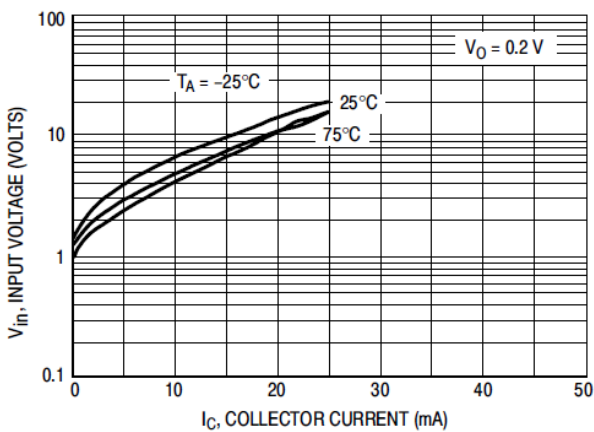


Figure 16. Input Voltage versus Output Current





MUN5114

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

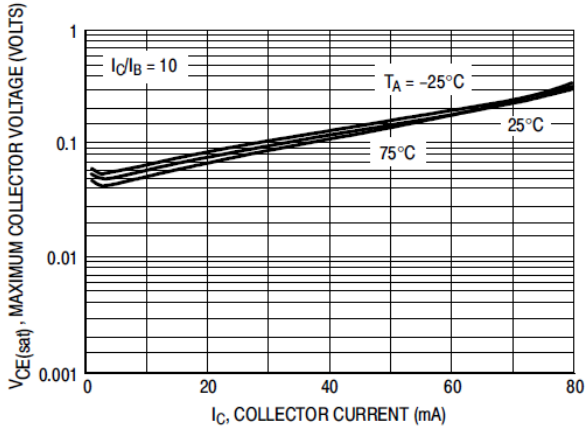


Figure 19. Output Capacitance

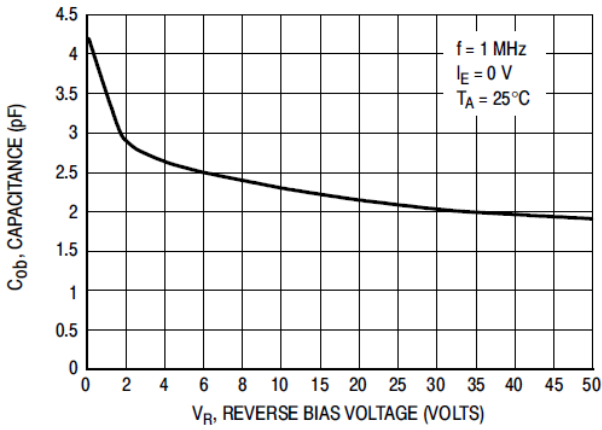


Figure 21 Input Voltage versus Output Current

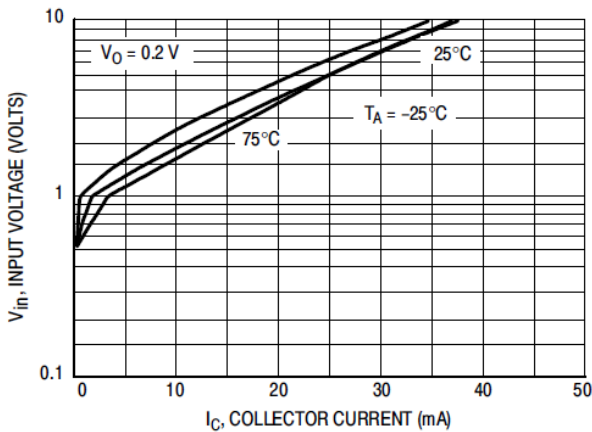


Figure 18. DC Current Gain

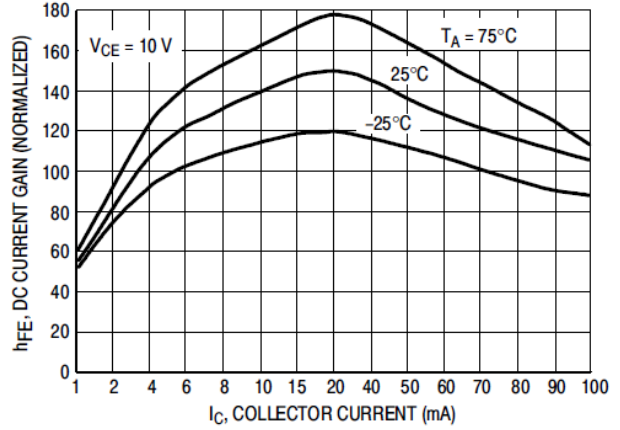


Figure 20. Output Current versus Input Voltage

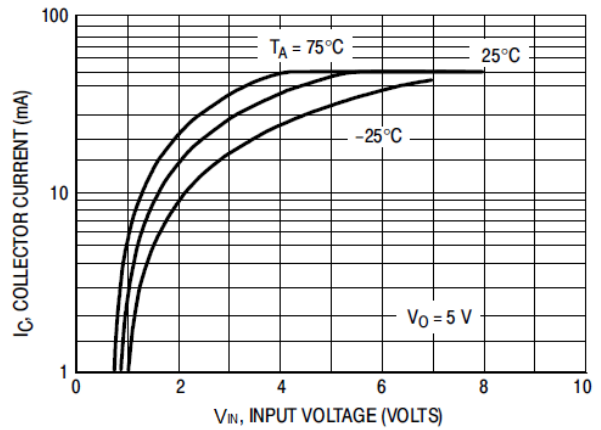
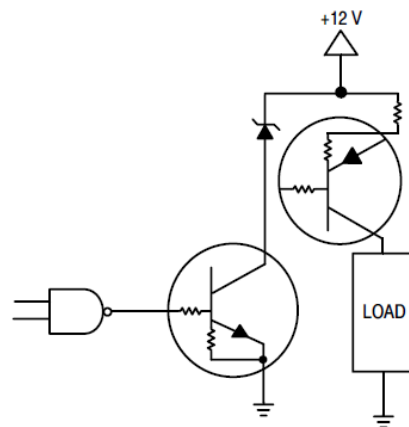


Figure 22 Typical Application for PNP BRTs





MUN5132

Figure 23. Maximum Collector Voltage versus Collector Current

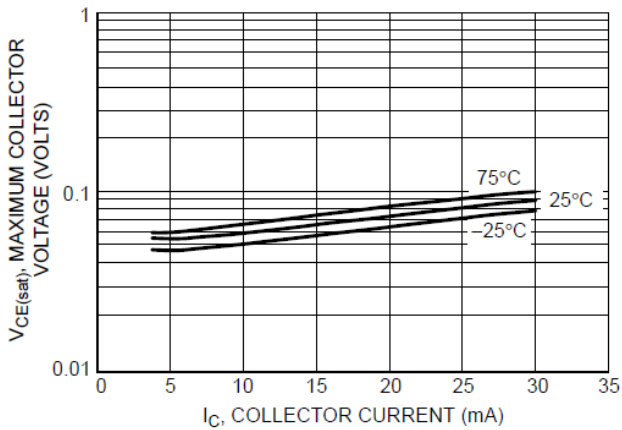


Figure 24. DC Current Gain

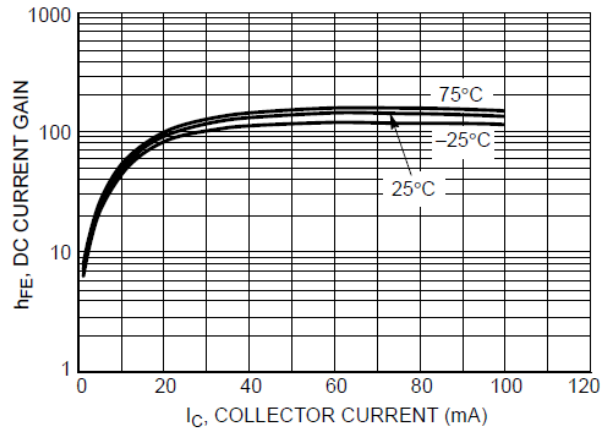


Figure 25. Output Capacitance

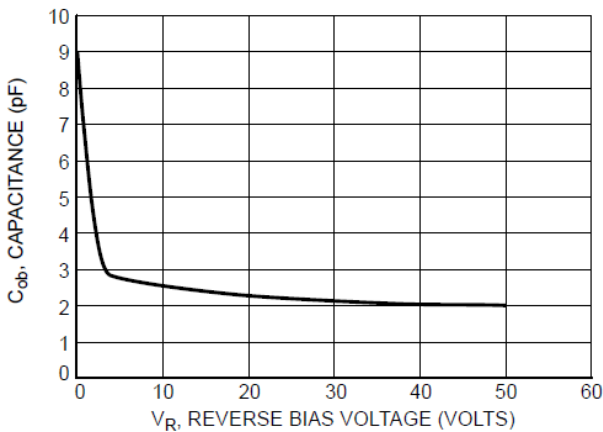


Figure 26. Output Current versus Input Voltage

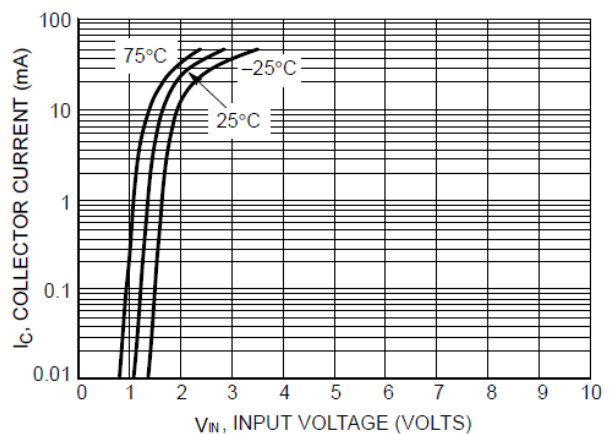
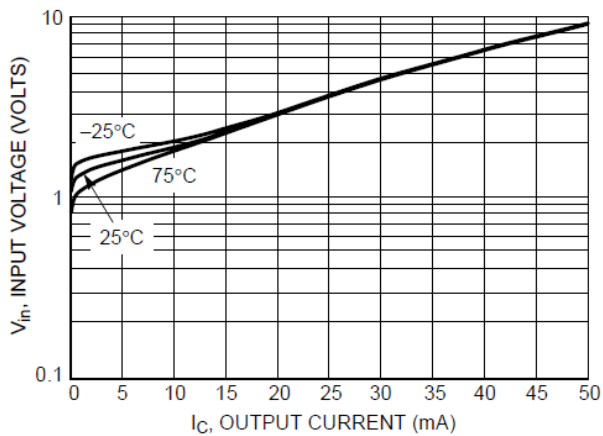


Figure 27. Input Voltage versus Output Current





MUN5136

Figure 28. Maximum Collector Voltage versus Collector Current

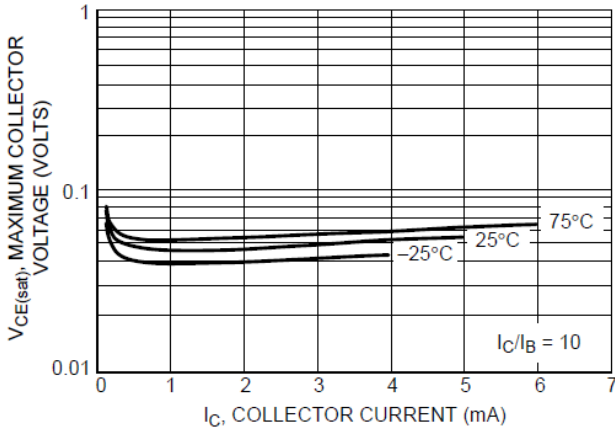


Figure 29. DC Current Gain

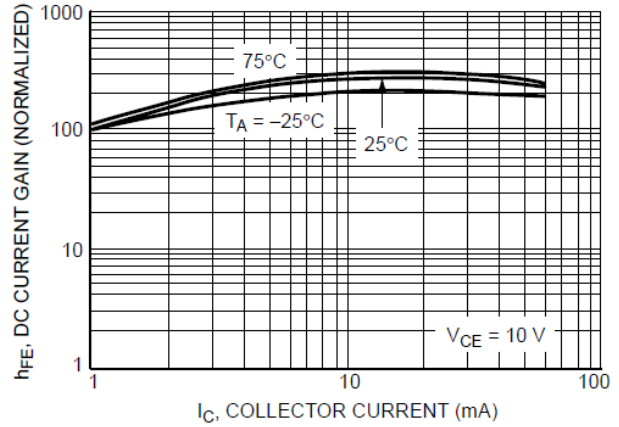


Figure 30. Output Capacitance

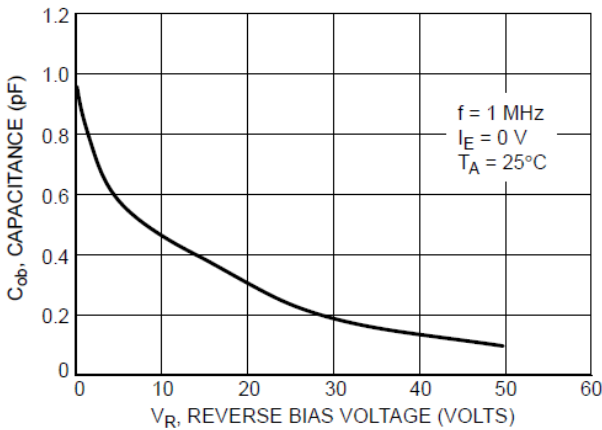


Figure 31. Output Current versus Input Voltage

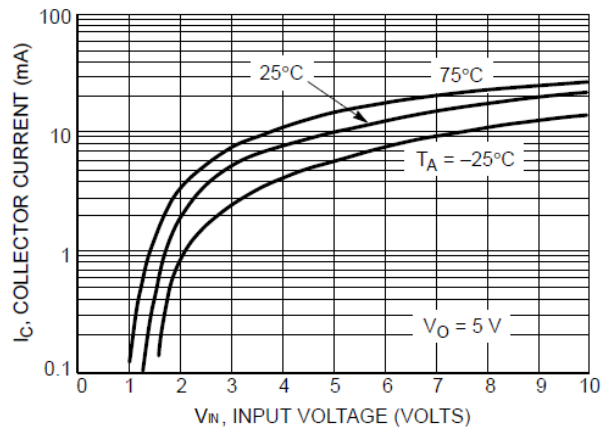
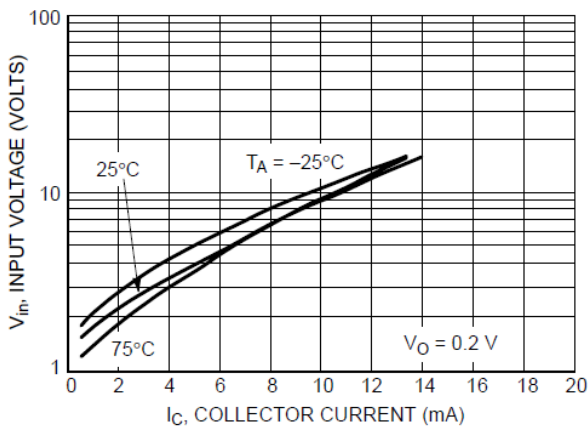


Figure 32. Input Voltage versus Output Current





MUN5137

Figure 33. Maximum Collector Voltage versus Collector Current

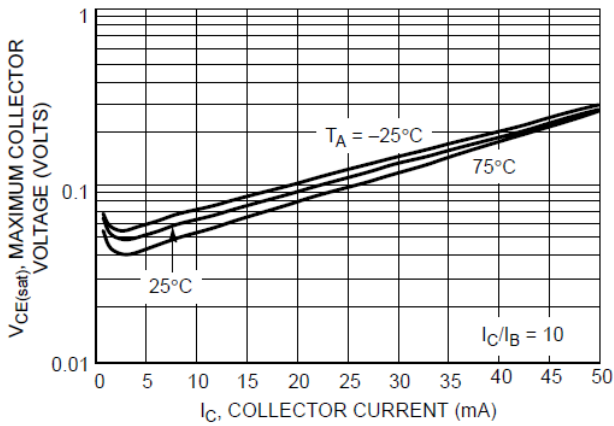


Figure 34. DC Current Gain

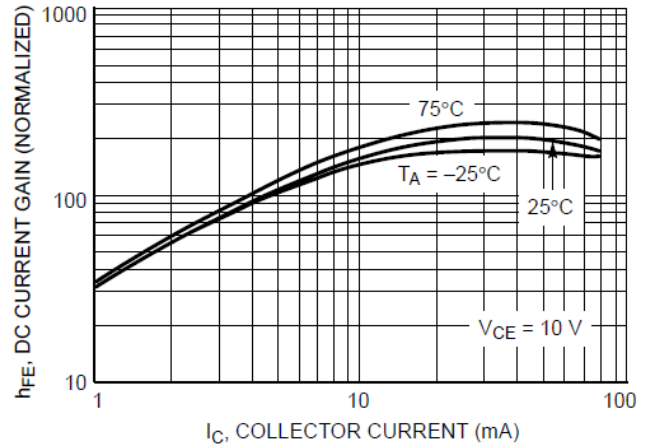


Figure 35. Output Capacitance

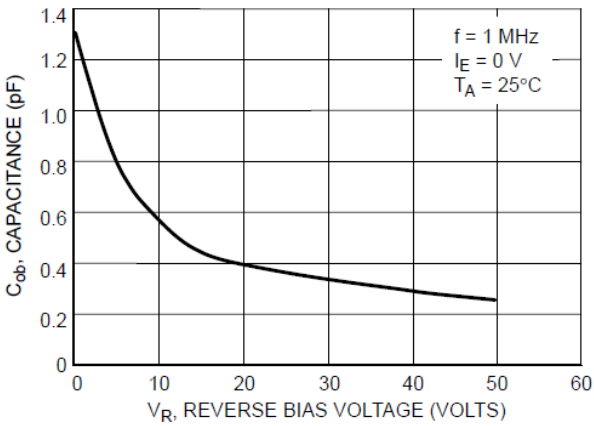


Figure 36. Output Current versus Input Voltage

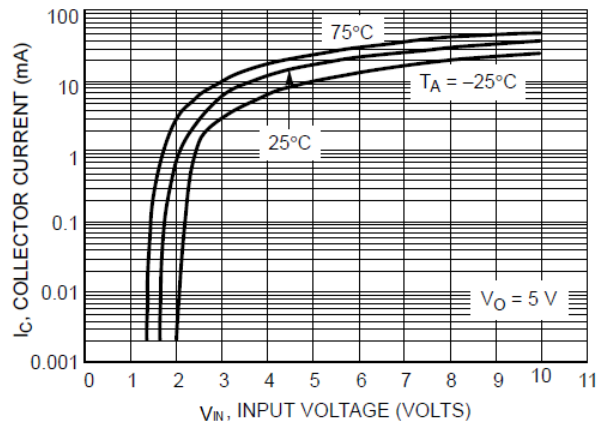
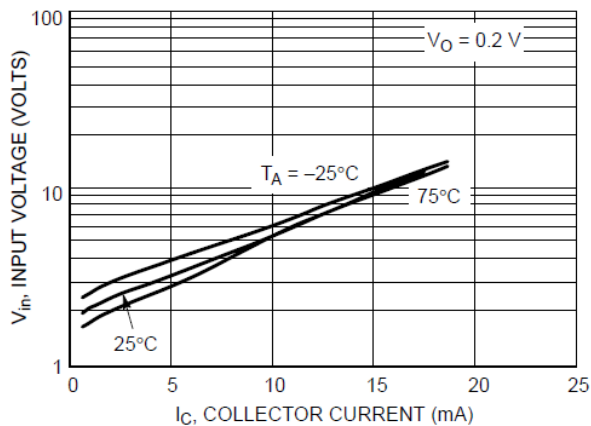


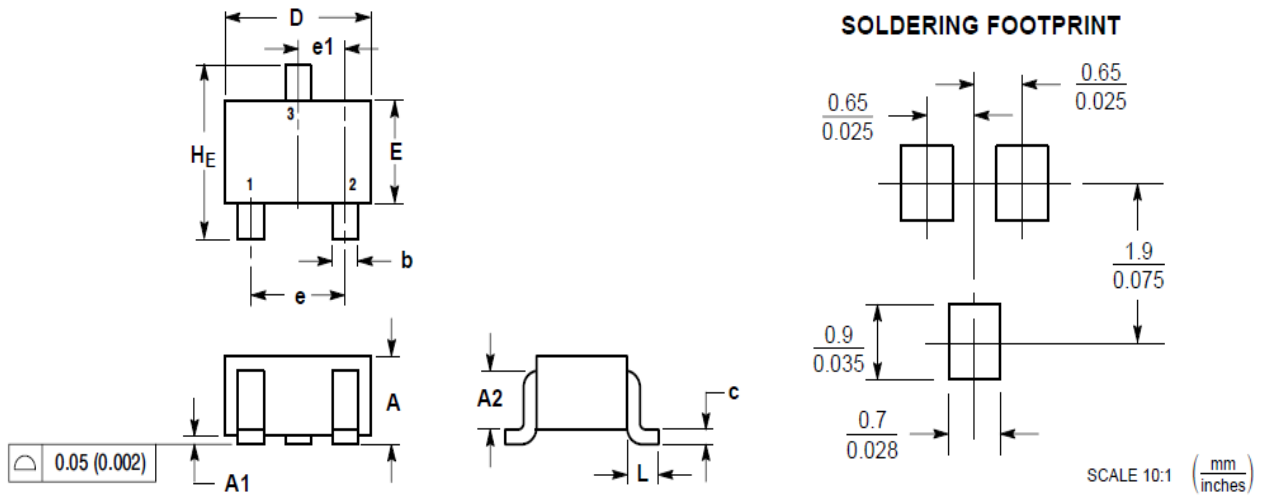
Figure 37. Input Voltage versus Output Current





PACKAGE INFORMATION

Dimension in SC-70 (Unit: mm)



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.80	1.00	0.032	0.040
A1	0.00	0.10	0.000	0.004
A2	0.7 REF		0.028 REF	
b	0.30	0.40	0.012	0.016
c	0.10	0.25	0.004	0.010
D	1.80	2.20	0.071	0.087
E	1.15	1.35	0.045	0.053
e	1.20	1.40	0.047	0.055
e1	0.65 BSC		0.026 BSC	
L	0.425 REF		0.017 REF	
He	2.00	2.40	0.079	0.095



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