



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 SOT-23 package which is designed for low power surface mount applications.

The MUN2111~MUN2134 are available in SOT-23 Package.

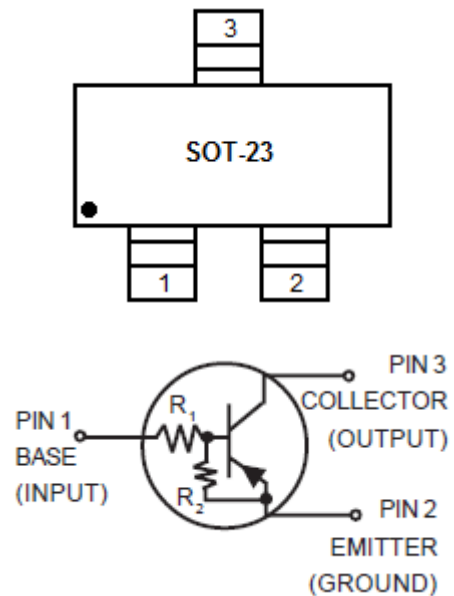
FEATURES

- Simplifies Circuit Design
- Reduces Board Space and Component Count
- The SOT-23 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 SOT-23 Package

ORDERING INFORMATION

Package Type	Part Number
SOT-23	MUN2111
	MUN2112
	MUN2113
	MUN2114
	MUN2115
	MUN2116
	MUN2130
	MUN2131
	MUN2132
	MUN2133
	MUN2134
Note	SPQ: 3,000pcs/Reel
AiT provides all RoHS Compliant Products	

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 Derate above 25°C	P _D	246 ^{NOTE1}	mW
		400 ^{NOTE2}	
		1.5 ^{NOTE1}	°C/W
		2.0 ^{NOTE2}	
Thermal Resistance Junction-to-Ambient	R _{θJA}	508 ^{NOTE1}	°C/W
		311 ^{NOTE2}	
Thermal Resistance Junction-to-Lead	R _{θJL}	174 ^{NOTE1}	°C/W
		208 ^{NOTE2}	
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	-	-	MUN2111	0.5	mAdc
					MUN2112	0.2	
					MUN2113	0.1	
					MUN2114	0.2	
					MUN2115	0.9	
					MUN2116	1.9	
					MUN2130	4.3	
					MUN2131	2.3	
					MUN2132	1.5	
					MUN2133	0.18	
					MUN2134	0.13	
Collector-Base Breakdown Voltage	V _{(BR)CBO}	I _C = 10μA, I _E = 0	50	-	-	Vdc	
Collector-Emitter Breakdown Voltage ^{NOTE3}	V _{(BR)CEO}	I _C = 2.0mA, I _B = 0	50	-	-	Vdc	

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



Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
ON CHARACTERISTICS NOTE3							
DC Current Gain	h_{FE}	$V_{CE} = 10V, I_C = 5.0mA$	MUN2111	35	60	-	-
			MUN2112	60	100		
			MUN2113	80	140		
			MUN2114	80	140		
			MUN2115	160	250		
			MUN2116	160	250		
			MUN2130	3.0	5.0		
			MUN2131	8.0	15		
			MUN2132	15	27		
			MUN2133	80	140		
			MUN2134	80	130		
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 10mA, I_B = 0.3mA$	-	-	0.25	Vdc	
		$I_C = 10mA, I_B = 5mA$					MUN2130
							MUN2131
		$I_C = 10mA, I_B = 1mA$					MUN2115
							MUN2116
							MUN2132
							MUN2133
MUN2134							
Output Voltage (on)	V_{OL}	$V_{CC} = 5.0V, V_B = 2.5V, R_L = 1.0k\Omega$	MUN2111	-	-	0.2	Vdc
			MUN2112				
			MUN2114				
			MUN2115				
			MUN2116				
			MUN2130				
			MUN2131				
			MUN2132				
			MUN2133				
			MUN2134				
		$V_{CC} = 5.0V, V_B = 3.5V, R_L = 1.0k\Omega$	MUN2113				
Output Voltage (off)	V_{OH}	$V_{CC} = 5.0V, V_B = 0.5V, R_L = 1.0k\Omega$	4.9	-	-	Vdc	
		$V_{CC} = 5.0V, V_B = 0.25V, R_L = 1.0k\Omega$					MUN2115
							MUN2116
							MUN2131
		MUN2132					
$V_{CC} = 5.0V, V_B = 0.050V, R_L = 1.0k\Omega$	MUN2130						

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



Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
ON CHARACTERISTICS NOTE3							
Input Resistor	R ₁		MUN2111	7.0	10	13	kΩ
			MUN2112	15.4	22	28.6	
			MUN2113	32.9	47	61.1	
			MUN2114	7.0	10	13	
			MUN2115	7.0	10	13	
			MUN2116	3.3	4.7	6.1	
			MUN2130	0.7	1.0	1.3	
			MUN2131	1.5	2.2	2.9	
			MUN2132	3.3	4.7	6.1	
			MUN2133	3.3	4.7	6.1	
			MUN2134	15.4	22	28.6	
	R ₂		MUN2111	-	10	-	kΩ
			MUN2112	-	22	-	
			MUN2113	-	47	-	
			MUN2114	-	47	-	
			MUN2115	-	∞	-	
			MUN2116	-	∞	-	
			MUN2130	-	1.0	-	
			MUN2131	-	2.2	-	
			MUN2132	-	4.7	-	
			MUN2133	-	47	-	
			MUN2134	-	47	-	
Resistor Ratio	R ₁ /R ₂		MUN2111	0.8	1.0	1.2	-
			MUN2112				
			MUN2113				
			MUN2114	0.17	0.21	0.25	
			MUN2115	-	-	-	
			MUN2116				
			MUN2130	0.8	1.0	1.2	
			MUN2131				
			MUN2132				
			MUN2133	0.055	0.1	0.185	

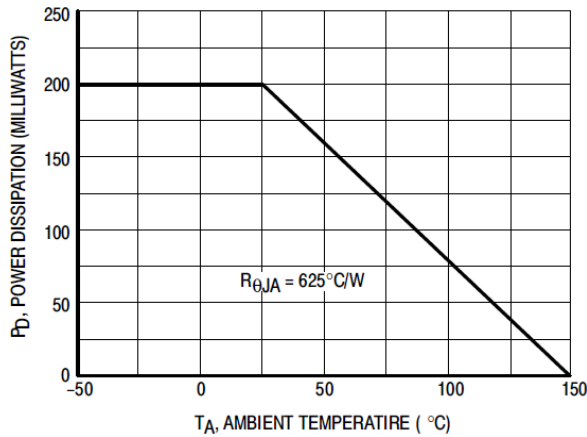
NOTE3: Pulse Test: Pulse Width < 300μs, Duty Cycle < 2.0%.



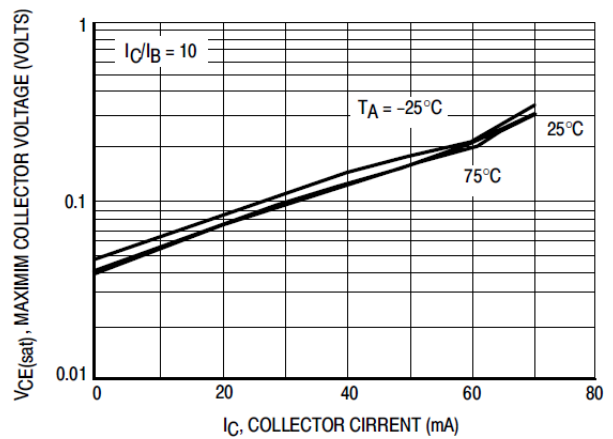
TYPICAL CHARACTERISTICS

MUN2111

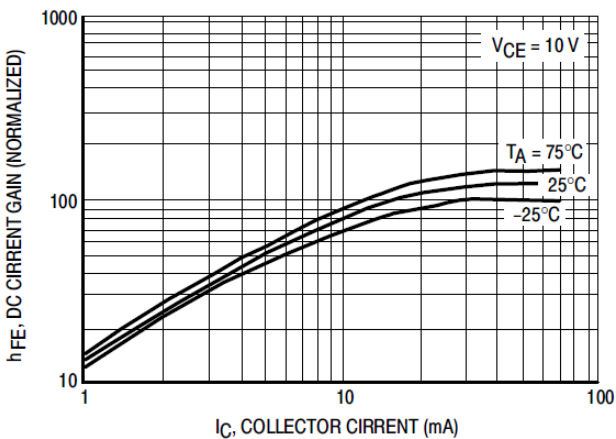
1. Derating Curve



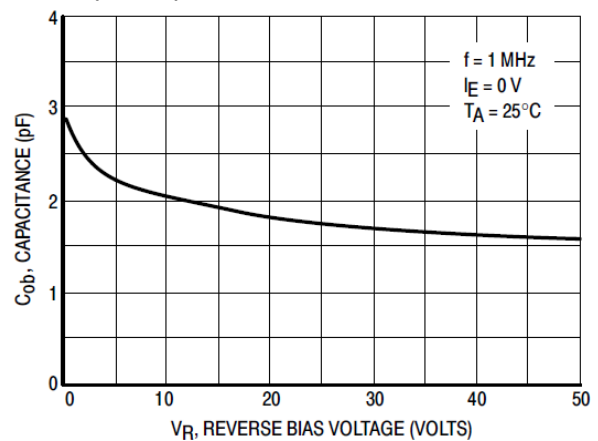
2. $V_{CE(sat)}$ versus I_C



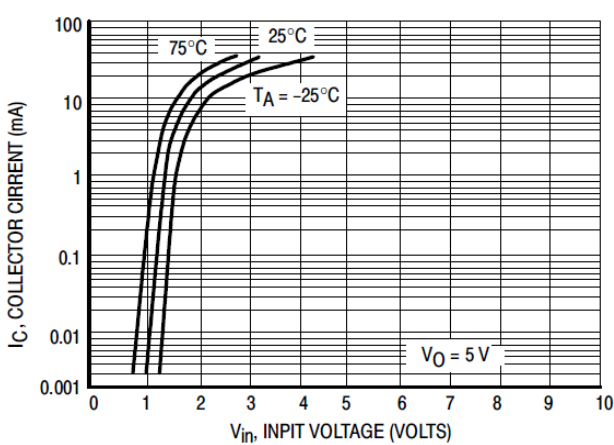
3. DC Current Gain



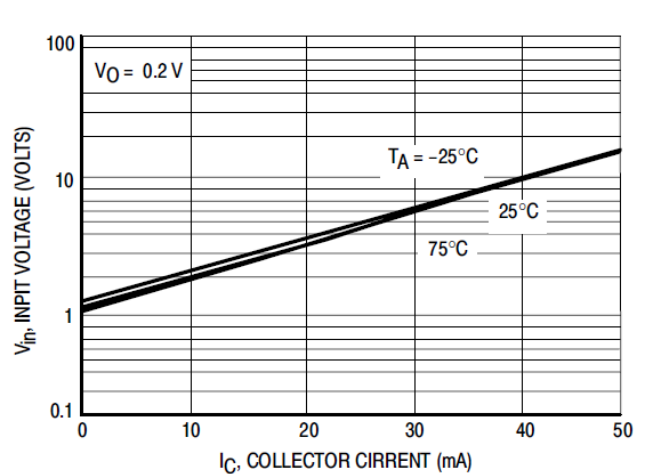
4. Output Capacitance



5. Output Current versus Input Voltage



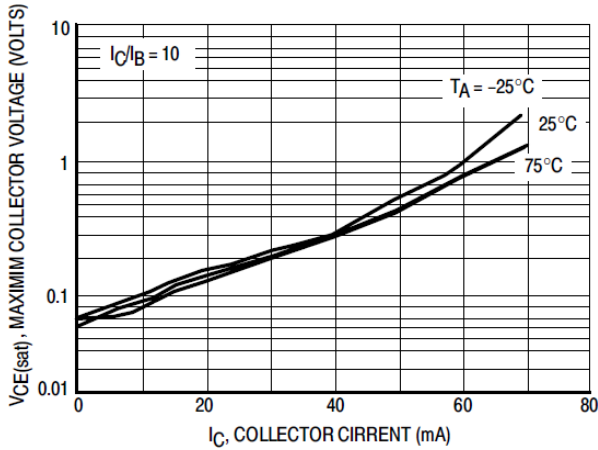
6. Input Voltage versus Output Current



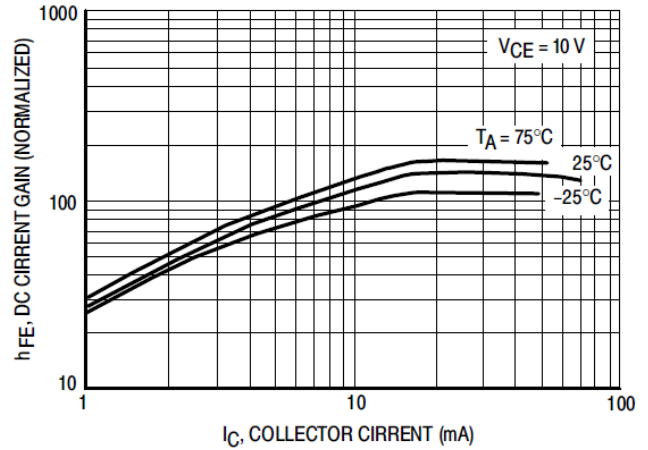


MUN2112

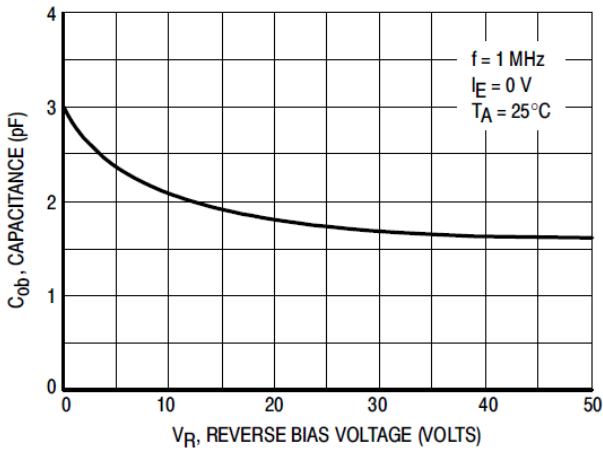
7. $V_{CE(sat)}$ versus I_C



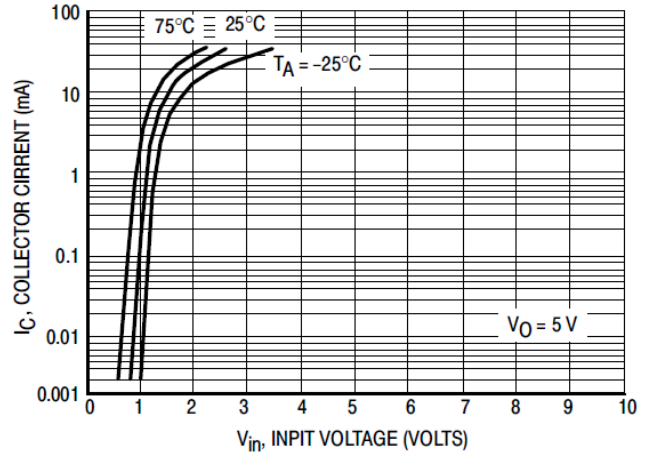
8. DC Current Gain



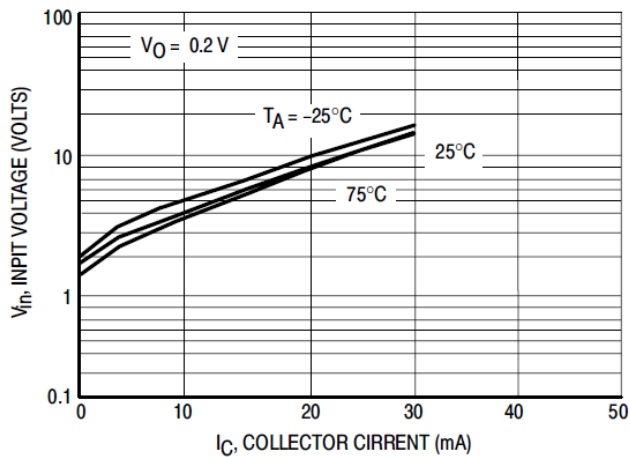
9. Output Capacitance



10. Output Current versus Input Voltage



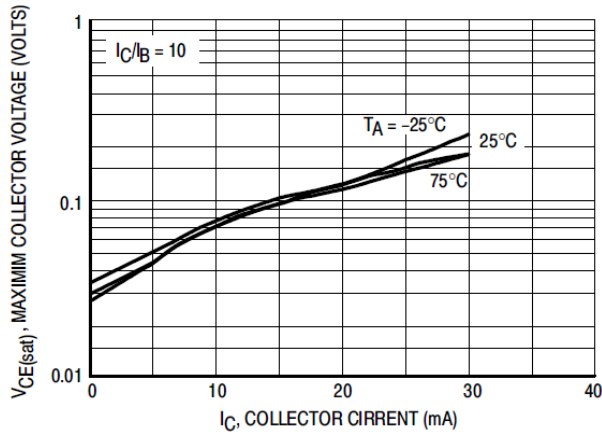
11. Input Voltage versus Output Current



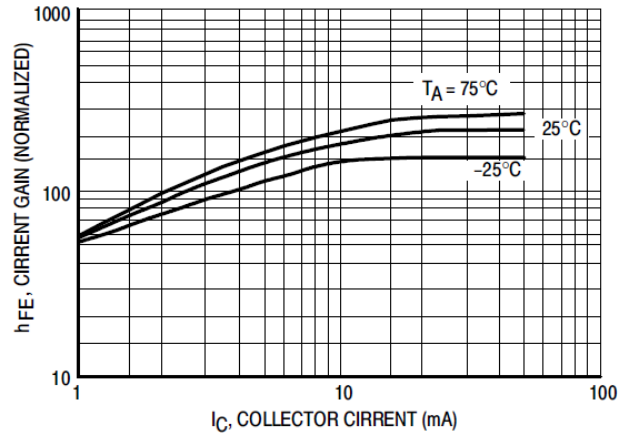


MUN2113

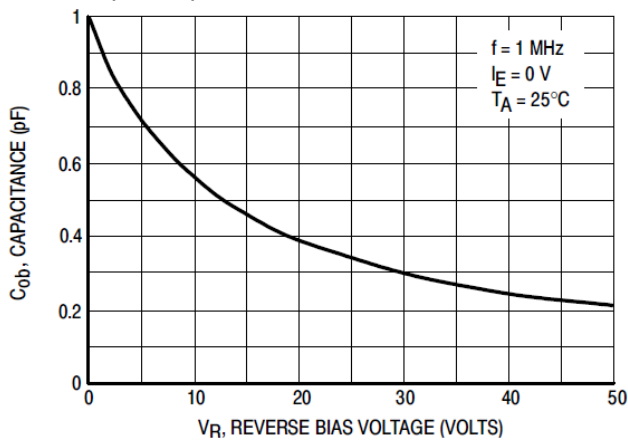
12. $V_{CE(sat)}$ versus I_C



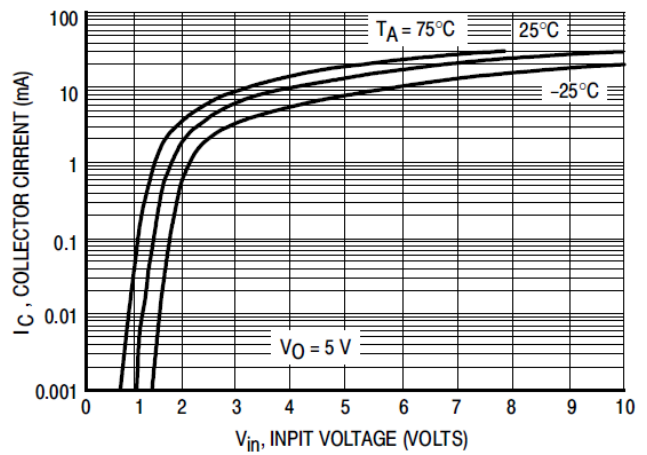
13. DC Current Gain



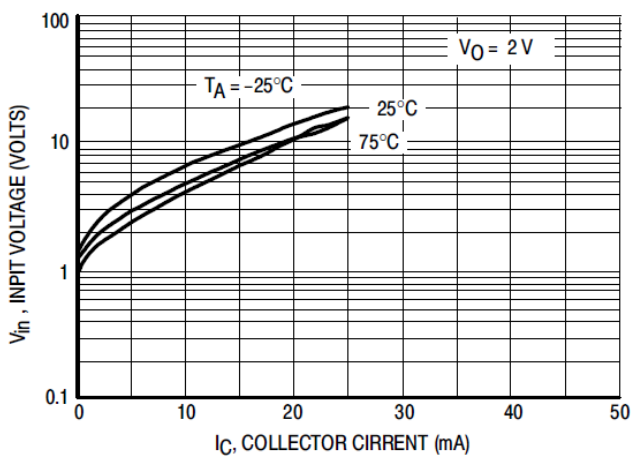
14. Output Capacitance



15. Output Current versus Input Voltage



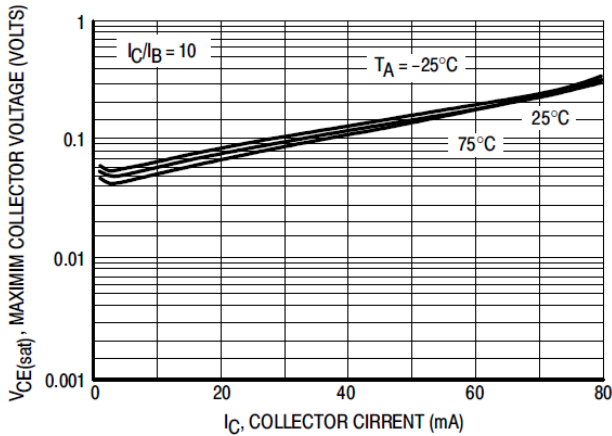
16. Input Voltage versus Output Current



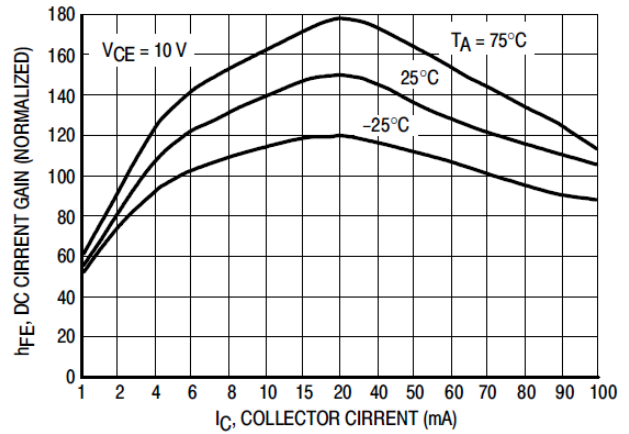


MUN2114

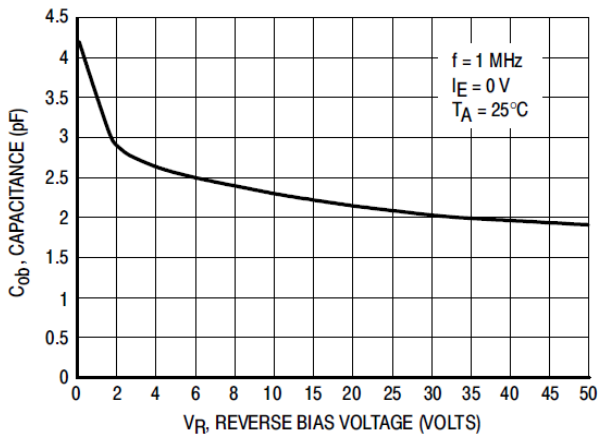
17. $V_{CE(sat)}$ versus I_C



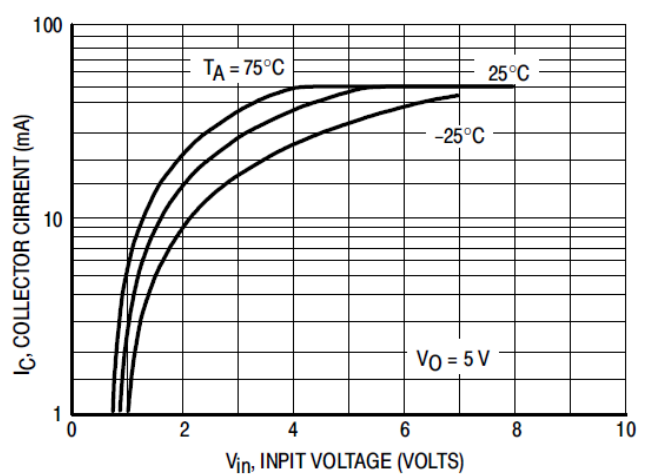
18. DC Current Gain



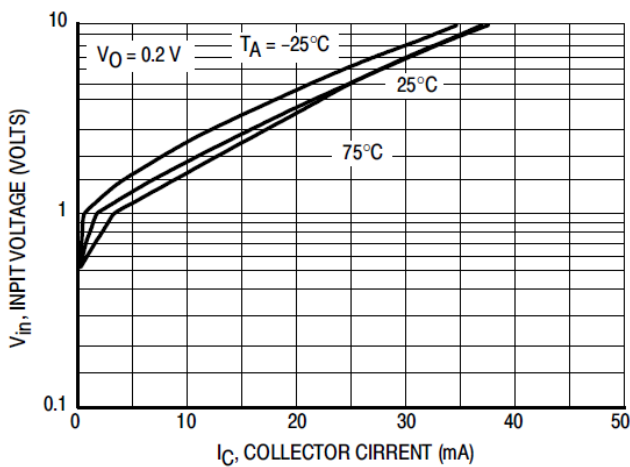
19. Output Capacitance



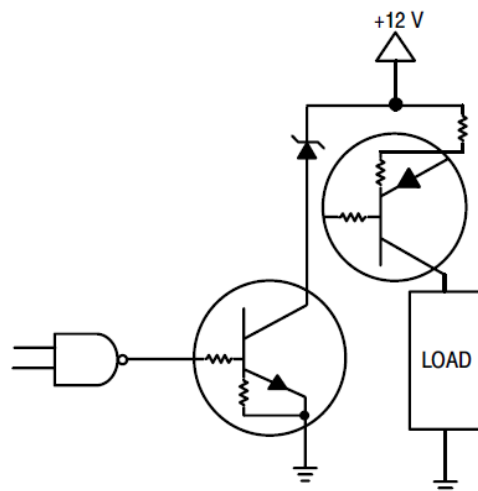
20. Output Current versus Input Voltage



21. Input Voltage versus Output Current



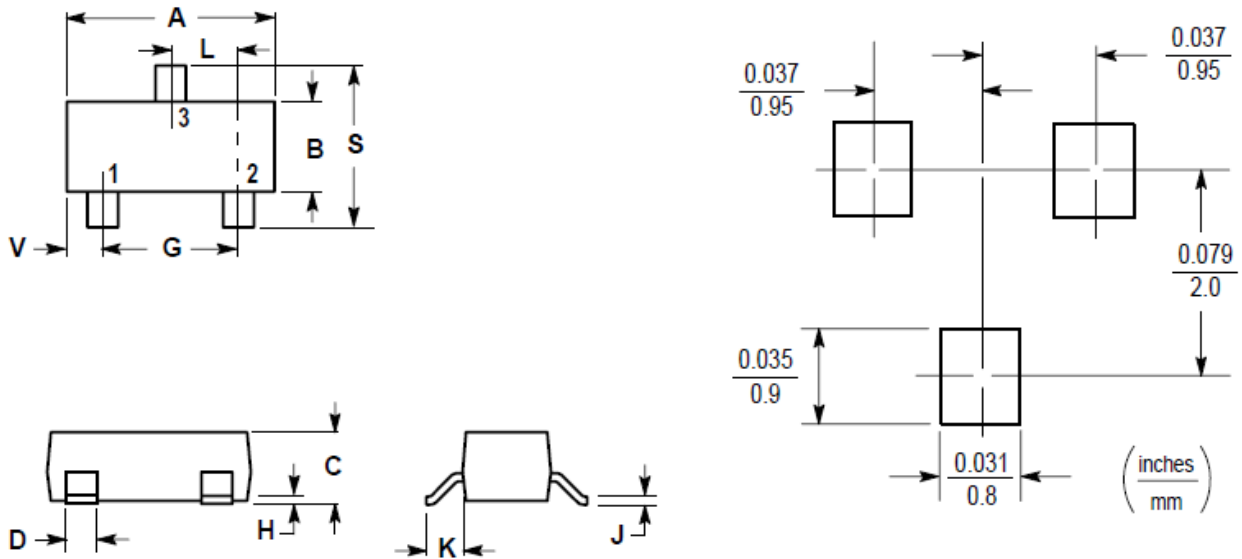
22. Typical Application for PNP BRTs





PACKAGE INFORMATION

Dimension in SOT-23 Package (Unit: mm)



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.1102	0.1197	2.80	3.04
B	0.0472	0.0551	1.20	1.40
C	0.0350	0.0440	0.89	1.11
D	0.0150	0.0200	0.37	0.50
G	0.0701	0.0807	1.78	2.04
H	0.0005	0.0040	0.013	0.100
J	0.0034	0.0070	0.085	0.177
K	0.0140	0.0285	0.35	0.69
L	0.0350	0.0401	0.89	1.02
S	0.0830	0.1039	2.10	2.64
V	0.0177	0.0236	0.45	0.60



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