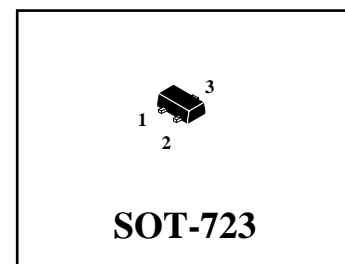
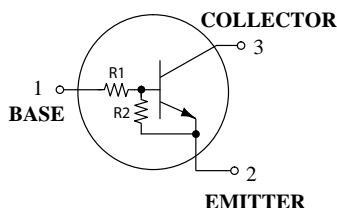


### Bias Resistor Transistor NPN Silicon

 Lead(Pb)-Free



### Maximum Ratings (TA=25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Collector-Base Voltage	$V_{CBO}$	50	V
Collector-Emitter Voltage	$V_{CEO}$	50	V
Collector Current-Continuous	$I_C$	100	mA

### Thermal Characteristics

Characteristics	Symbol	Max	Unit
Total Device Dissipation FR-5 Board FR-4 Board <sup>(1)</sup> T <sub>A</sub> =25°C Derate above 25°C	$P_D$	260 2.0	mW mW/°C
Thermal Resistance, Junction to Ambient <sup>(1)</sup>	$R_{\theta JA}$	480	°C/W
Total Device Dissipation FR-5 Board FR-4 Board <sup>(2)</sup> T <sub>A</sub> =25°C Derate above 25°C	$P_D$	600 4.8	mW mW/°C
Thermal Resistance, Junction to Ambient <sup>(2)</sup>	$R_{\theta JA}$	205	°C/W
Junction Temperature Range	$T_J$	+150	°C
Storage Temperature Range	Tstg	-55 to +150	°C

1. FR-4 @ Minimum pad

2. FR-4 @1.0 x 1.0 Inch pad

### Device Marking and Resistor Values

Device	Marking	R1(K)	R2(K)
DTC114EM	8A	10	10
DTC124EM	8B	22	22
DTC144EM	8C	47	47
DTC114YM	8D	10	47
DTC114TM	94	10	∞
DTC143TM	8F	4.7	∞
DTC123EM	8H	2.2	2.2

Device	Marking	R1(K)	R2(K)
DTC143EM	8J	4.7	4.7
DTC143ZM	8K	4.7	47
DTC124XM	8L	22	47
DTC123JM	8M	2.2	47
DTC115EM	8N	100	100
DTC144WM	8P	47	22
DTC144TM	8T	47	∞

**Electrical Characteristics** ( $T_A=25^\circ\text{C}$  Unless Otherwise noted)

Characteristics	Symbol	Min	Typ	Max	Unit
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**Off Characteristics**

Collector-Emitter Breakdown Voltage <sup>(1)</sup> $I_C=2.0\text{mA}, I_B=0$	$V_{(BR)CEO}$	50	-	-	V
Collector-Base Breakdown Voltage $I_C=10\mu\text{A}, I_E=0$	$V_{(BR)CBO}$	50	-	-	V
Collector-Base Cutoff Voltage $V_{CB}=50\text{V}, I_E=0$	$I_{CBO}$	-	-	100	nA
Collector-Emitter Cutoff Current $V_{CE}=50\text{V}, I_B=0$	$I_{CEO}$	-	-	500	nA
Emitter-Base Cutoff Current $V_{EB}=6.0\text{V}, I_C=0$					
	DTC114EM	-	-	0.5	mA
	DTC124EM	-	-	0.2	
	DTC144EM	-	-	0.1	
	DTC114YM	-	-	0.2	
	DTC114TM	-	-	0.9	
	DTC143TM	-	-	1.9	
	DTC123EM	-	-	2.3	
	DTC143EM	-	-	1.5	
	DTC143ZM	-	-	0.18	
	DTC124XM	-	-	0.13	
	DTC123JM	-	-	0.2	
	DTC115EM	-	-	0.05	
	DTC144WM	-	-	0.13	
	DTC144TM	-	-	0.2	

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

## Electrical Characteristics (TA=25°C Unless Otherwise noted)

Characteristics	Symbol	Min	Typ	Max	Unit	
<b>On Characteristics<sup>(3)</sup></b>						
DC Current Gain $V_{CE}=10V, I_C=5.0mA$	DTC114EM DTC124EM DTC144EM DTC114YM DTC114TM DTC143TM DTC123EM DTC143EM DTC143ZM DTC124XM DTC123JM DTC115EM DTC144WM DTC144TM	$h_{FE}$	35 60 80 80 160 160 8.0 15 80 80 80 80 80 160	60 100 140 140 250 250 15 27 140 130 140 150 140 350	- - - - - - - - - - - - - -	-
Collector-Emitter Saturation Voltage $I_C=10mA, I_B=0.3mA$ $I_C=10mA, I_B=5.0mA$ $I_C=10mA, I_B=1.0mA$	DTC123EM DTC143TM / DTC114TM DTC143EM / DTC143ZM DTC124XM / DTC144TM	$V_{CE(sat)}$	-	-	0.25	-
Output Voltage(on) $V_{CC}=5.0V, V_B=2.5V, R_L=1.0K\Omega$  $V_{CC}=5.0V, V_B=3.5V, R_L=1.0K\Omega$  $V_{CC}=5.0V, V_B=5.5V, R_L=1.0K\Omega$ $V_{CC}=5.0V, V_B=4.0V, R_L=1.0K\Omega$	DTC114EM DTC124EM DTC114YM DTC114TM DTC143TM DTC123EM DTC143EM DTC143ZM DTC124XM DTC123JM DTC144EM DTC144TM DTC115EM DTC144WM	$V_{OL}$	-	-	0.2	V

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

## Electrical Characteristics (T<sub>A</sub>=25°C Unless Otherwise noted)

Characteristics	Symbol	Min	Typ	Max	Unit
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### On Characteristics<sup>(4)</sup>

Output Voltage(off) V <sub>CC</sub> =5.0V, V <sub>B</sub> =0.5V R <sub>L</sub> =1.0KΩ V <sub>CC</sub> =5.0V, V <sub>B</sub> =0.25V R <sub>L</sub> =1.0KΩ	DTC143TM DTC143ZM DTC114TM DTC144TM	V <sub>OH</sub>	4.9	-	-	V
Input Resistor	DTC114EM DTC124EM DTC144EM DTC114YM DTC114TM DTC143TM DTC123EM DTC143EM DTC143ZM DTC124XM DTC123JM DTC115EM DTC144WM DTC144TM	R1	7.0 15.4 32.9 7.0 7.0 3.3 1.5 3.3 3.3 15.4 15.4 70 32.9 32.9	10 22 47 10 10 4.7 2.2 4.7 4.7 22 2.2 100 47 47	13 28.6 61.1 13 13 6.1 2.9 6.1 6.1 28.6 2.86 130 61.1 61.1	kΩ
Resistor Ratio	DTC114EM / DTC124EM DTC144EM / DTC115EM DTC114YM DTC143TM / DTC114TM / DTC144TM DTC123EM / DTC143EM DTC143ZM DTC124XM DTC123JM DTC144WM	R1/R2	0.8 0.17 - 0.8 0.055 0.38 0.038 1.7	1.0 0.21 - 1.0 0.1 0.47 0.047 2.1	1.2 0.25 - 1.2 0.185 0.56 0.056 2.6	-

4. PulseTest: Pulse Width < 300us, Duty Cycle < 2.0%

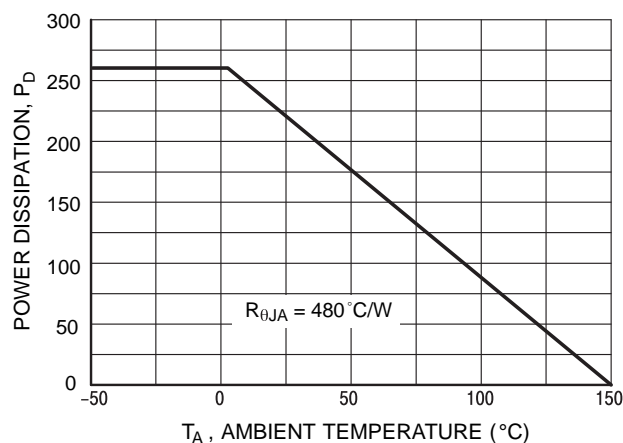


Figure.1 Derating Curve

TYPICAL ELECTRICAL CHARACTERISTICS - DTC114EM Series

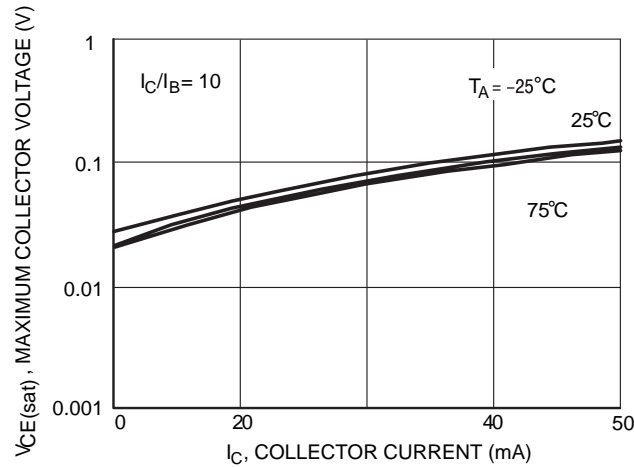


Figure.2  $V_{CE(sat)}$  vs  $I_C$

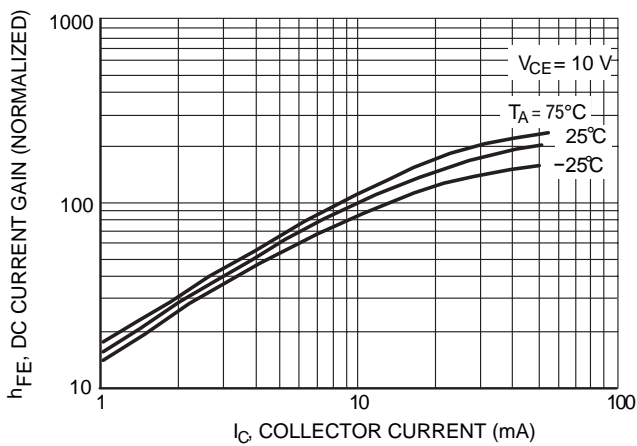


Figure.3 DC Current Gain

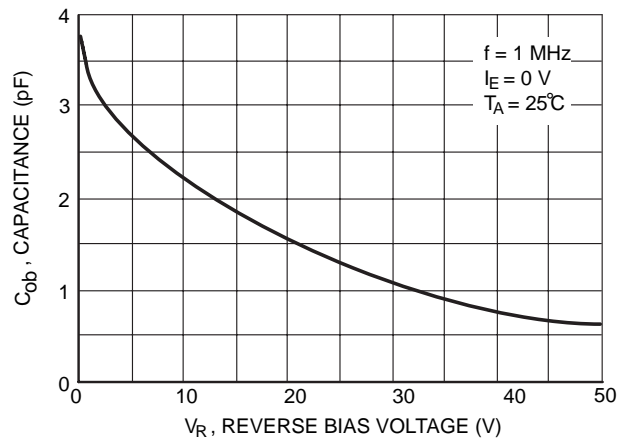


Figure.4 Output Capacitance

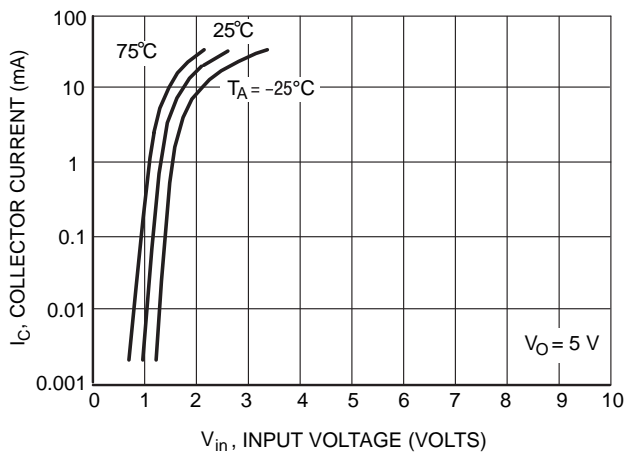


Figure.5 Output Current vs Input Voltage

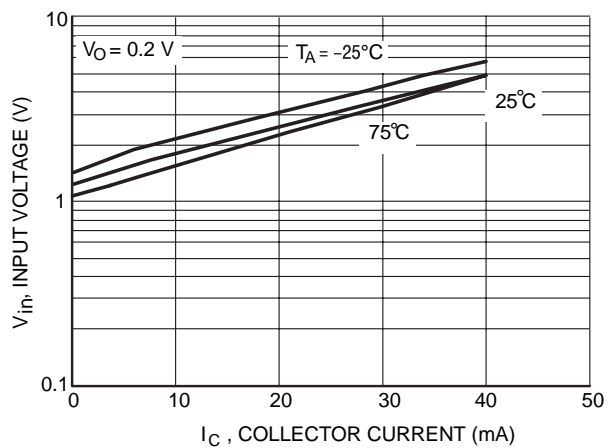


Figure.6 Input Voltage vs Output Current

TYPICAL ELECTRICAL CHARACTERISTICS - DTC124EM

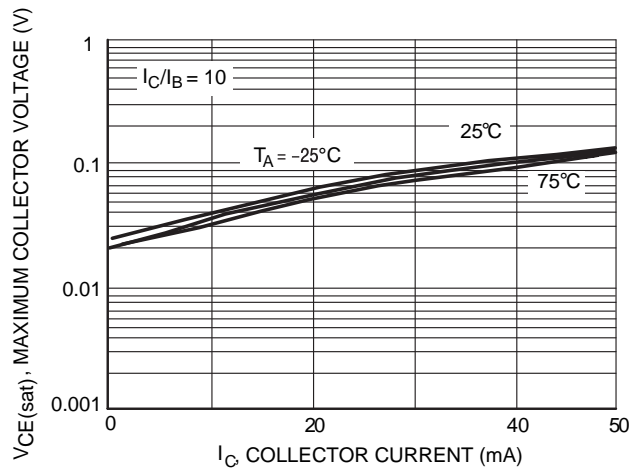


Figure.7  $V_{CE(sat)}$  vs  $I_C$

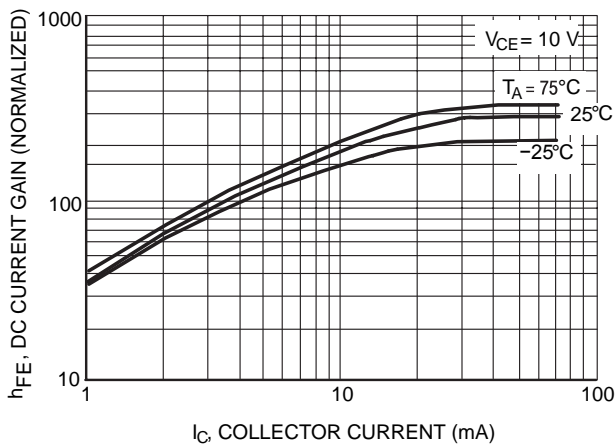


Figure 8. DC Current Gain

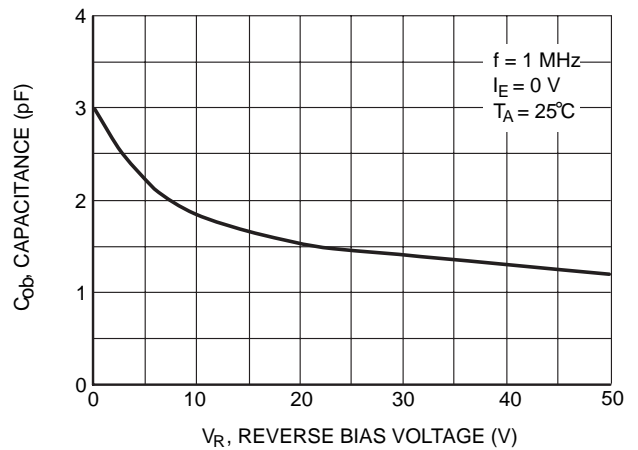


Figure.9 Output Capacitance

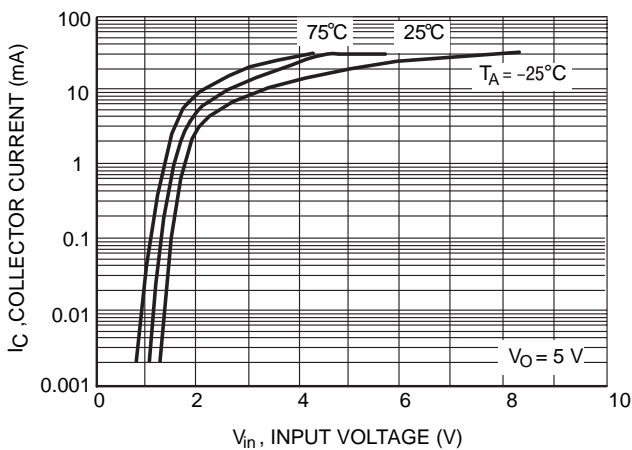


Figure.10 Output Current vs Input Voltage

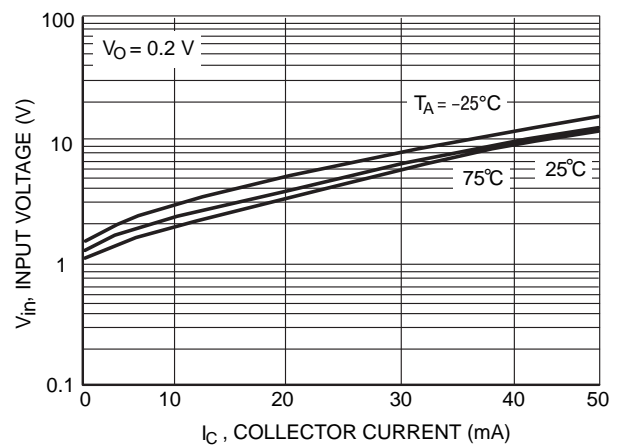


Figure.11 Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS – DTC144EM

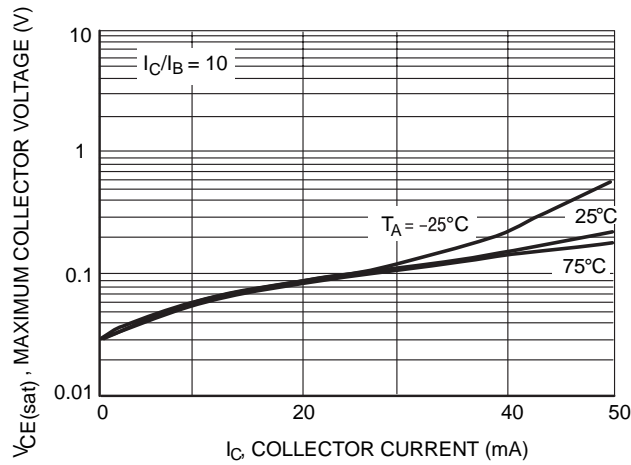


Figure.12  $V_{CE(sat)}$  vs  $I_C$

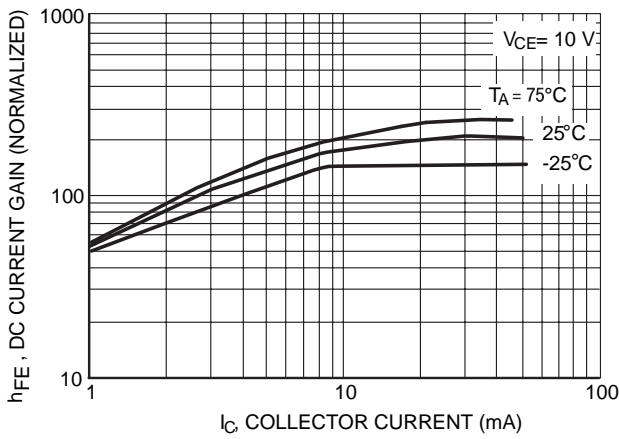


Figure.13 DC Current Gain

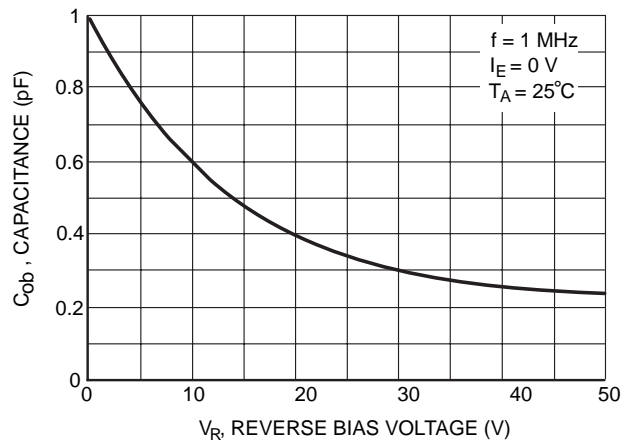


Figure 14. Output Capacitance

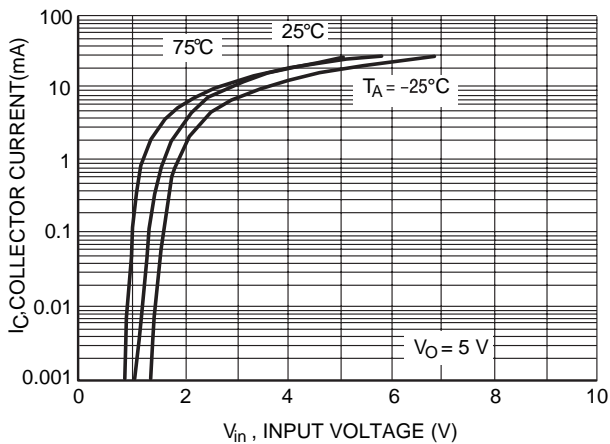


Figure.15 Output Current vs Input Voltage

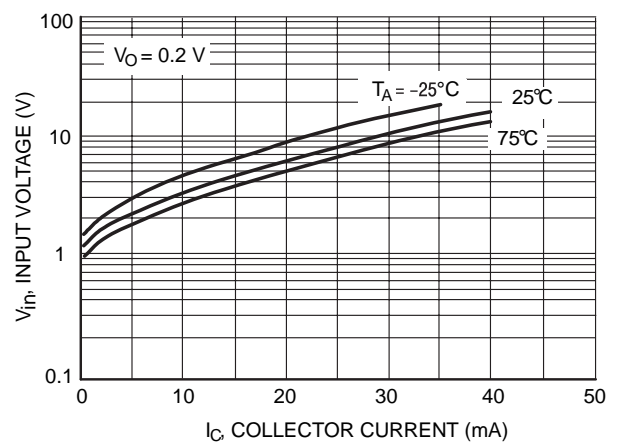


Figure.16 Input Voltage vs Output Current

TYPICAL ELECTRICAL CHARACTERISTICS – DTC114YM

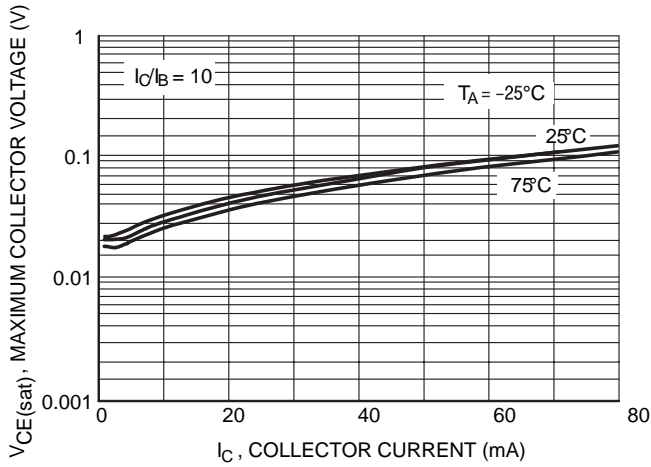


Figure.17  $V_{CE(sat)}$  vs  $I_C$

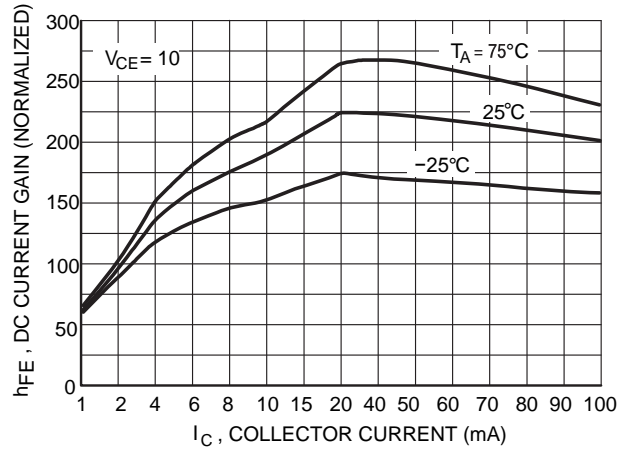


Figure.18 DC Current Gain

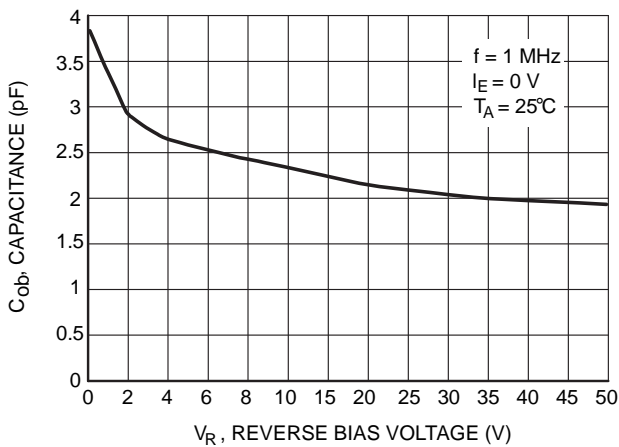


Figure.19 Output Capacitance

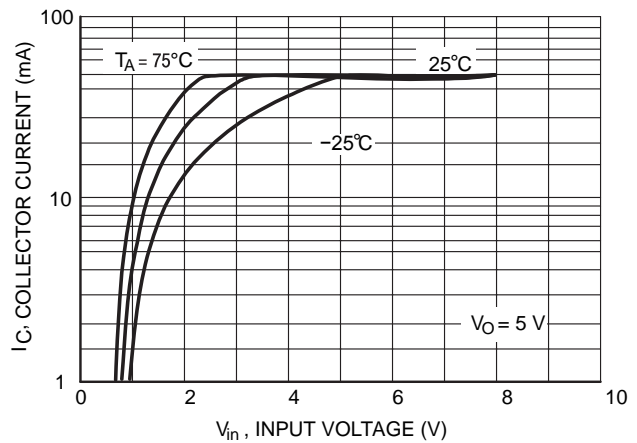


Figure.20 Output Current vs Input Voltage

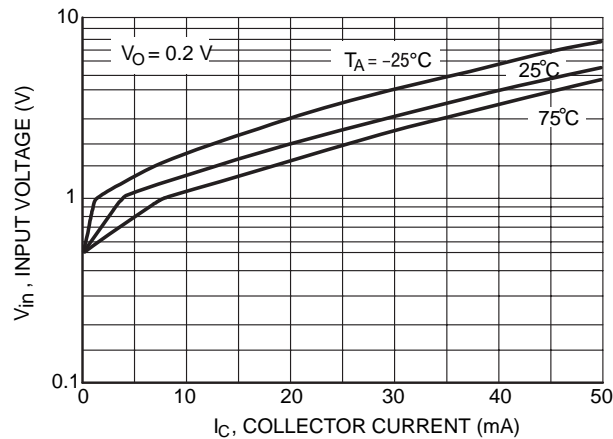


Figure.21 Input Voltage vs Output Current



TYPICAL APPLICATIONS FOR NPN BRTs

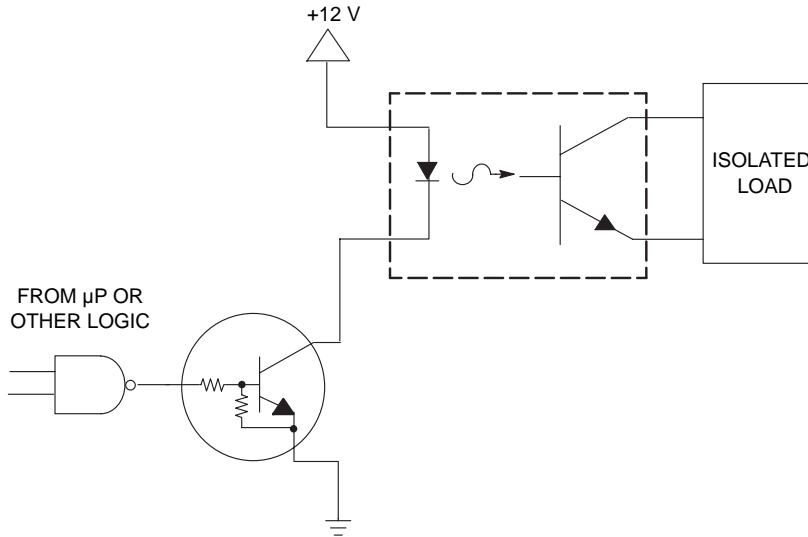


Figure.22 Level Shifter: Connects 12 or 24 Volt Circuits to Logic

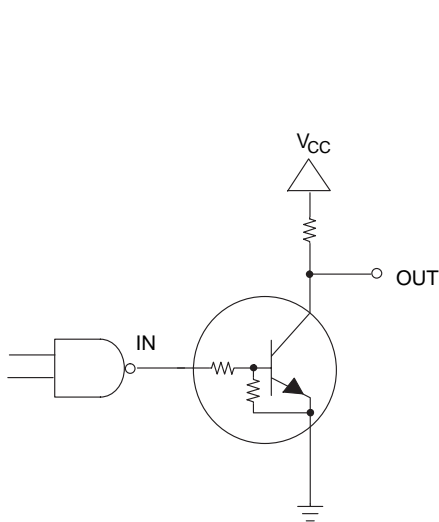


Figure.23 Open Collector Inverter: Inverts the Input Signal

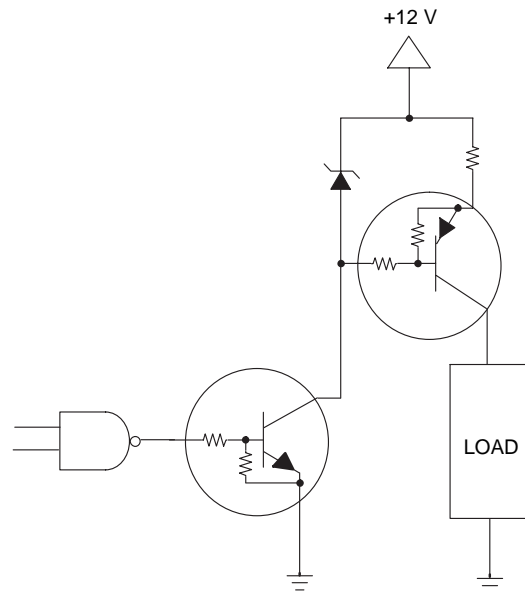
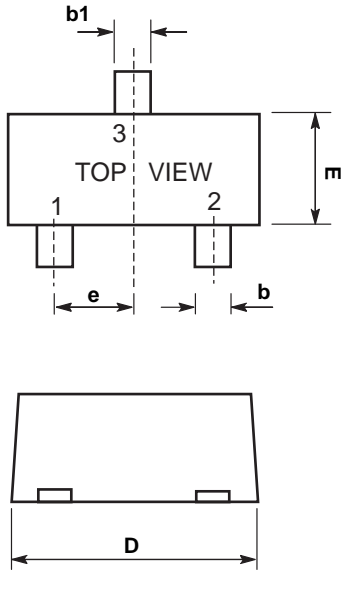


Figure.24 Inexpensive, Unregulated Current Source

SOT-723 Outline Dimensions

Unit:mm



SOT-723			
Dim	Min	Nom	Max
A	0.45	0.50	0.55
b	0.15	0.20	0.27
b1	0.25	0.3	0.35
C	0.07	0.12	0.17
D	1.15	1.20	1.25
E	0.75	0.80	0.85
e	0.40 BSC		
H <sub>E</sub>	1.15	1.20	1.25
L	0.15	0.20	0.25

SOLDERING FOOTPRINT

Unit:mm

