



DESCRIPTION

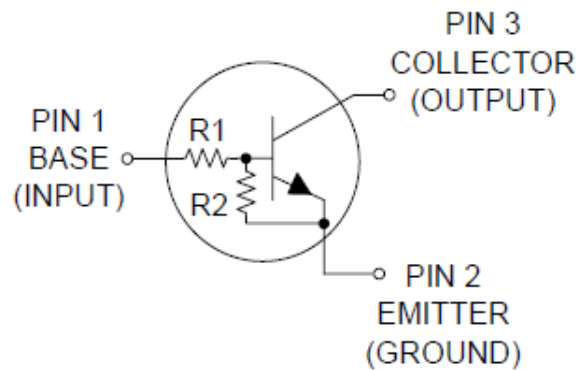
This new series of digital transistors is designed to replace a single device and its external resistor bias network. The Bias Resistor Transistor (BRT) contains a single transistor with a monolithic bias network consisting of two resistors; a series base resistor and a base-emitter resistor. The BRT 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 DTC114EE~WE is available in SC-89 package

FEATURES

- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- Available in SC-89 package

PIN DESCRIPTION



ORDERING INFORMATION

Package Type	Part Number
SC-89	DTC114EE
	DTC124EE
	DTC144EE
	DTC114YE
	DTC114TE
	DTC143TE
	DTC123EE
	DTC143EE
	DTC143ZE
	DTC124XE
	DTC123JE
	DTC115EE
	DTC144WE
Note	SPQ: 3,000pcs/Reel
AiT provides all RoHS Compliant Products	



ABSOLUTE MAXIMUM RATINGS

T_A = 25°C, unless otherwise noted

V _{CB0} , Collector-Base Voltage	50Vdc
V _{CE0} , 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	Value	Unit
Total Device Dissipation, FR-4 Board ^{NOTE1} @ T _A = 25°C Derate above 25°C	P _D	200 1.6	mW mW/°C
Thermal Resistance, Junction-to-Ambient ^{NOTE1}	R _{θJA}	600	°C/W
Total Device Dissipation, FR-4 Board ^{NOTE2} @ T _A = 25°C Derate above 25°C	P _D	300 2.4	mW mW/°C
Thermal Resistance, Junction-to-Ambient ^{NOTE2}	R _{θJA}	400	°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 × 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 _{CB0}	V _{CB} = 50 V, I _E = 0			100	nAdc
Collector-Emitter Cutoff Current	I _{CEO}	V _{CE} = 50 V, I _B = 0			500	nAdc
Emitter-Base Cutoff Current	I _{EBO}	V _{EB} = 6.0 V, I _C = 0	DTC114EE		0.5	mAdc
			DTC124EE		0.2	
			DTC144EE		0.1	
			DTC114YE		0.2	
			DTC114TE		0.9	
			DTC143TE		1.9	
			DTC123EE		2.3	
			DTC143EE		1.5	
			DTC143ZE		0.18	
			DTC124XE		0.13	
			DTC123JE		0.2	
			DTC115EE		0.05	
DTC144WE		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
ON CHARACTERISTICS ^{NOTE3}						
DC Current Gain	h _{FE}	V _{CE} =10V, I _C =5.0mA	DTC114EE	35	60	
			DTC124EE	60	100	
			DTC144EE	80	140	
			DTC114YE	80	140	
			DTC114TE	160	350	
			DTC143TE	160	350	
			DTC123EE	8.0	15	
			DTC143EE	15	30	
			DTC143ZE	80	200	
			DTC124XE	80	150	
			DTC123JE	80	140	
			DTC115EE	80	150	
DTC144WE	80	140				



Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 10mA, I_B = 0.3mA$				
		$I_C = 10mA, I_B = 5mA$				
		$I_C = 10mA, I_B = 1mA$			0.25	Vdc
Output Voltage (on)	V_{OL}	$V_{CC} = 5.0V, V_B = 2.5V, R_L = 1.0k\Omega$			0.2	Vdc
				0.2		
				0.2		
				0.2		
				0.2		
Output Voltage (off)	V_{OH}	$V_{CC} = 5.0V, V_B = 0.5V, R_L = 1.0k\Omega$				Vdc
		$V_{CC} = 5.0V, V_B = 0.25V, R_L = 1.0k\Omega$		4.9		



Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Resistor	R1	DTC114EE	7.0	10	13	kΩ
		DTC124EE	15.4	22	28.6	
		DTC144EE	32.9	47	61.1	
		DTC114YE	7.0	10	13	
		DTC114TE	7.0	10	13	
		DTC143TE	3.3	4.7	6.1	
		DTC123EE	1.5	2.2	2.9	
		DTC143EE	3.3	4.7	6.1	
		DTC143ZE	3.3	4.7	6.1	
		DTC124XE	15.4	22	28.6	
		DTC123JE	1.54	2.2	2.86	
		DTC115EE	70	100	130	
		DTC144WE	32.9	47	61.1	
Resistor Ratio	R1/R2	DTC114EE/DTC124EE/ DTC144EE/DTC115EE	0.8	1.0	1.2	
		DTC114YE	0.17	0.21	0.25	
		DTC143TE/DTC114TE	-	-	-	
		DTC123EE/DTC143EE	0.8	1.0	1.2	
		DTC143ZE	0.055	0.1	0.185	
		DTC124XE	0.38	0.47	0.56	
		DTC123JE	0.038	0.047	0.056	
DTC144WE	1.7	2.1	2.6			

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

RESISTOR VALUES

Device	R1 (k)	R2 (k)
DTC114EE	10	10
DTC124EE	22	22
DTC144EE	47	47
DTC114YE	10	47
DTC114TE	10	∞
DTC143TE	4.7	∞
DTC123EE	2.2	2.2
DTC143EE	4.7	4.7
DTC143ZE	4.7	47
DTC124XE	22	47
DTC123JE	2.2	47
DTC115EE	100	100
DTC144WE	47	22



TYPICAL CHARACTERISTICS

DTC114EE

Figure 1. $V_{CE(sat)}$ vs. I_C

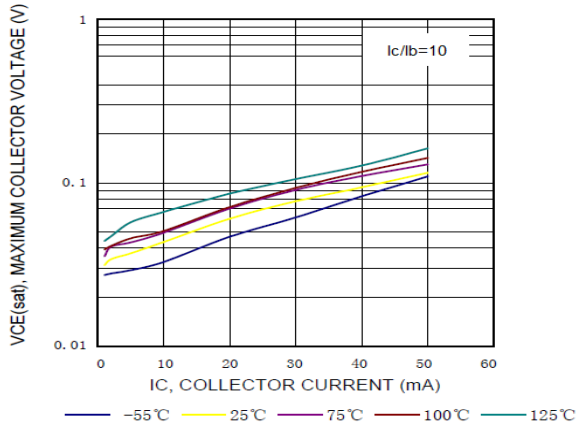


Figure 3. Output Capacitance

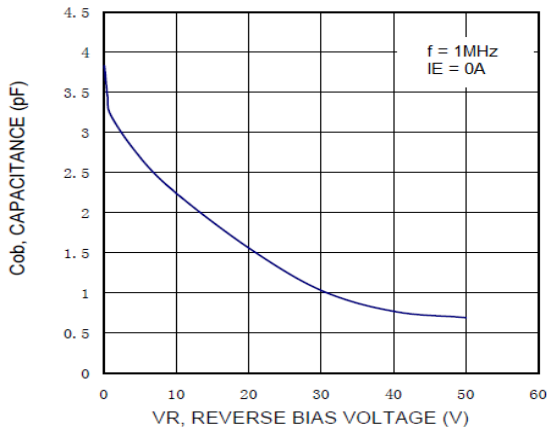


Figure 5. Input Voltage vs. Output Current

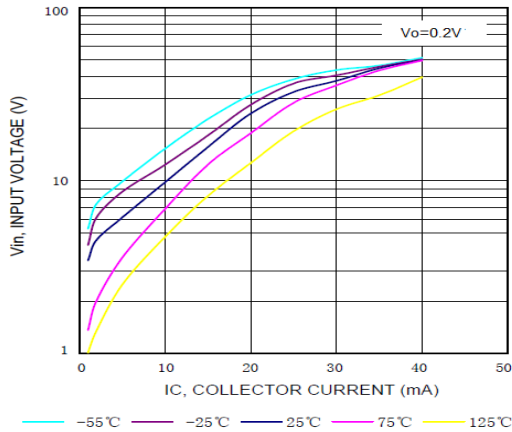


Figure 2. DC Current Gain

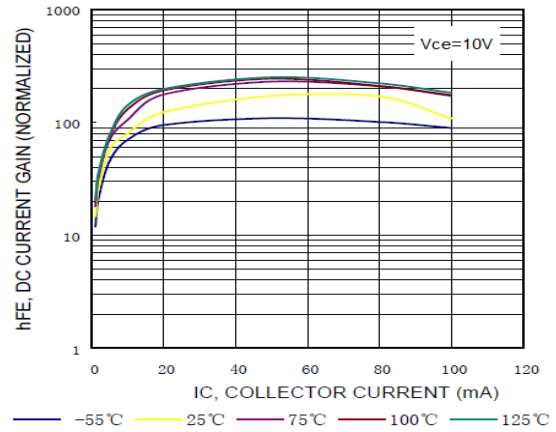
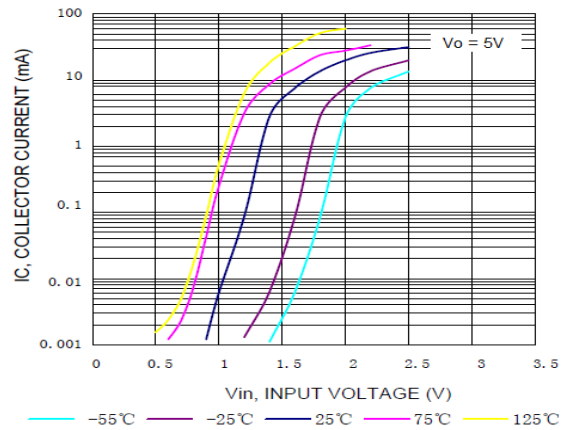


Figure 4. Output Current vs. Input Voltage





DTC115EE

Figure 6. $V_{CE(sat)}$ vs. I_C

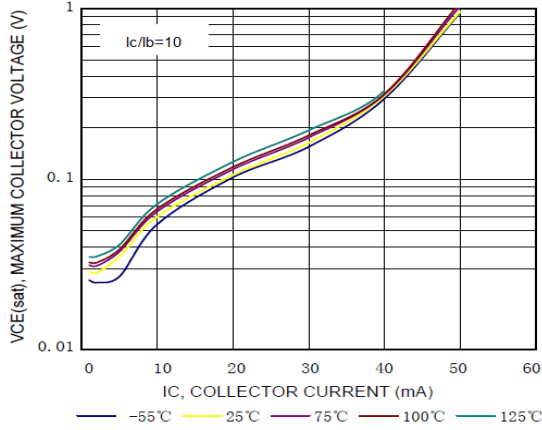


Figure 7. DC Current Gain

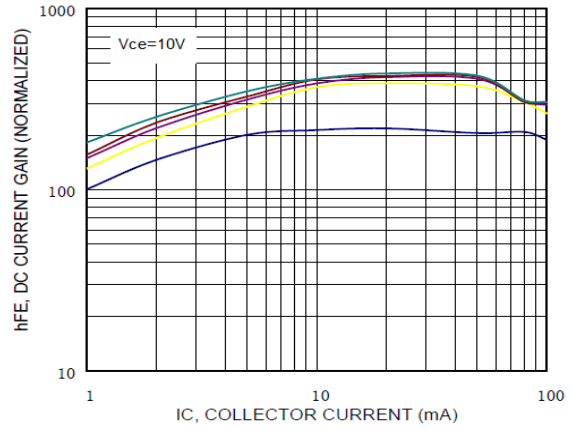


Figure 8. Output Capacitance

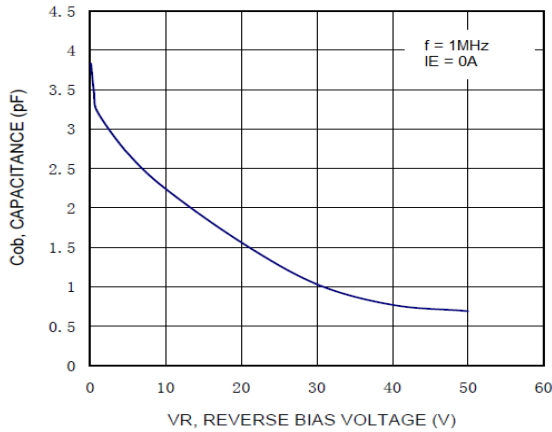


Figure 9. Output Current vs. Input Voltage

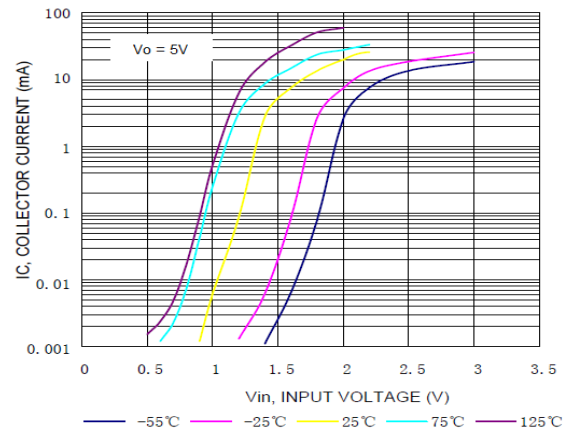
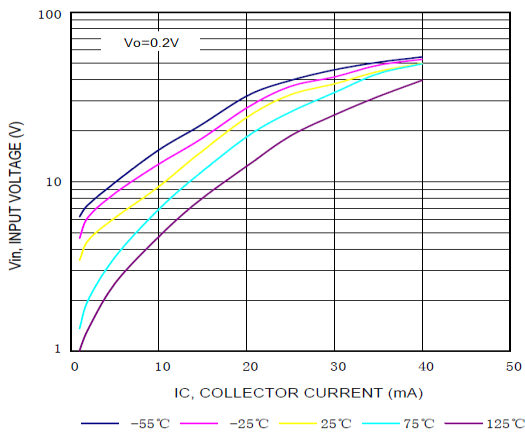


Figure 10. Input Voltage vs. Output Current





TYPICAL APPLICATIONS FOR NPN BRTs

Figure 11. Level Shifter: Connects 12 To 24 Volt Circuits To Logic

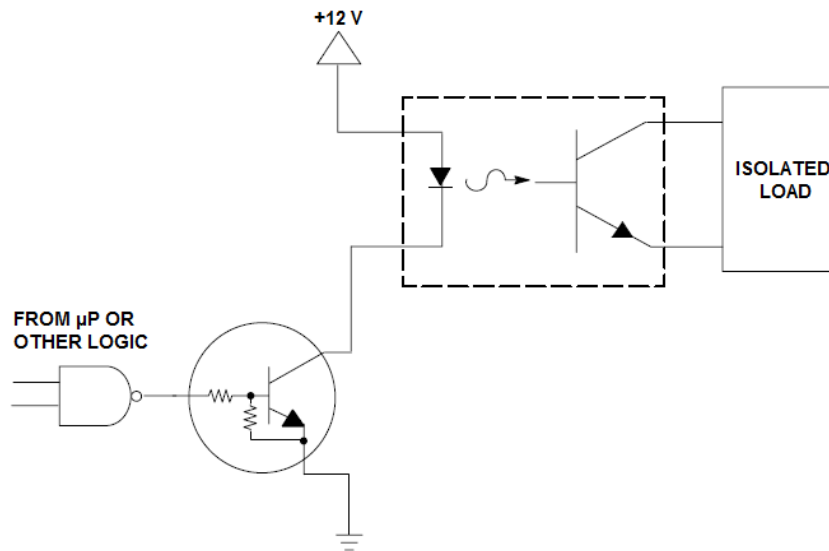


Figure 12. Open Collector Inverter: Inverts The Input Signal

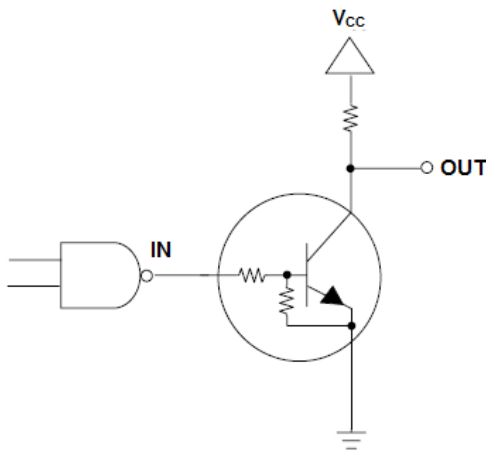
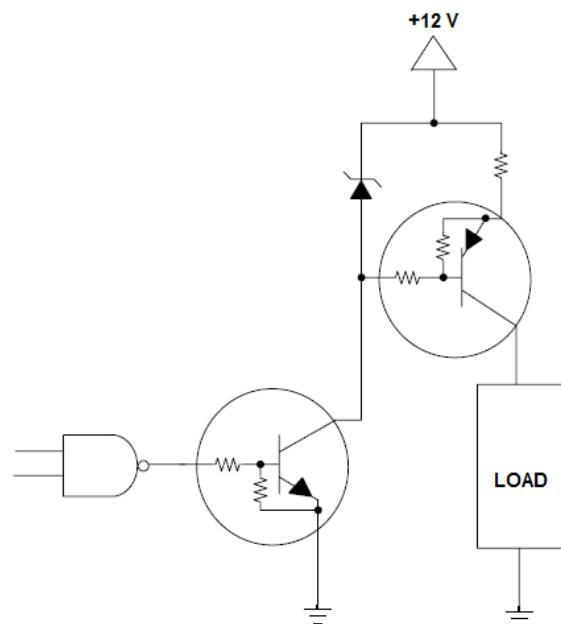


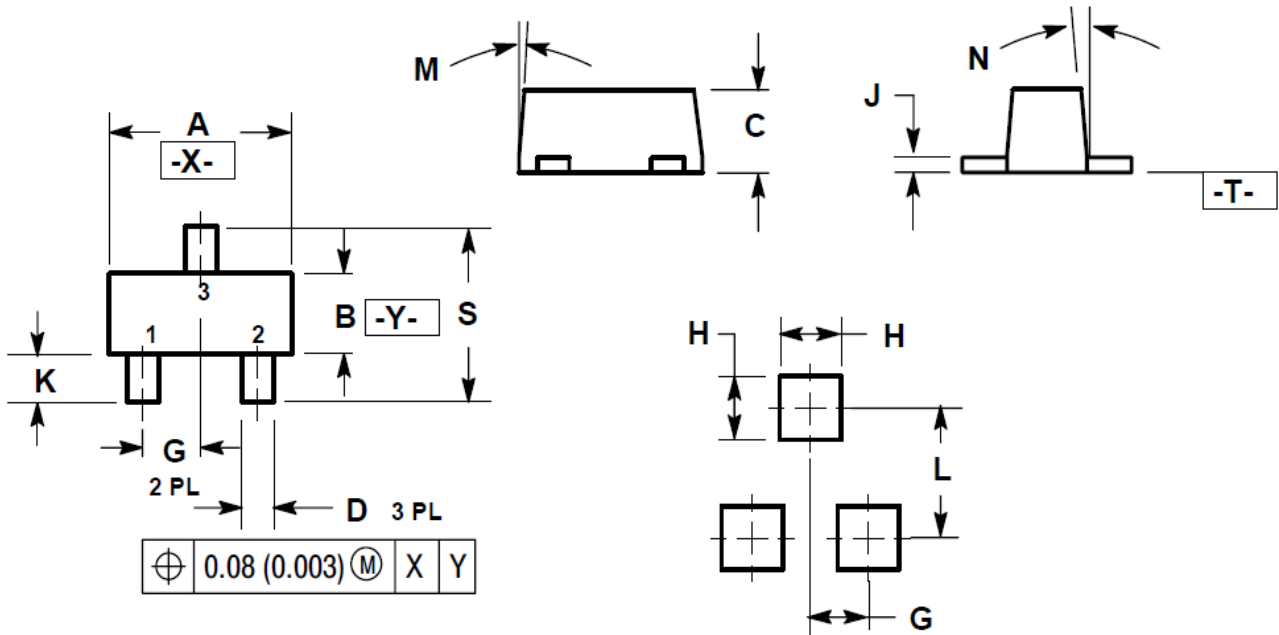
Figure 13. Inexpensive, Unregulated Current Source





PACKAGE INFORMATION

Dimension in SC-89 Package (Unit: mm)



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.50	1.70	0.059	0.067
B	0.75	0.95	0.030	0.040
C	0.60	0.80	0.024	0.031
D	0.23	0.33	0.009	0.013
G	0.50 BSC		0.020 BSC	
H	0.53 REF		0.021 REF	
J	0.10	0.20	0.004	0.008
K	0.30	0.50	0.012	0.020
L	1.10 REF		0.043 REF	
M	-	10°	-	10°
N	-	10°	-	10°
S	1.50	1.70	0.059	0.067



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