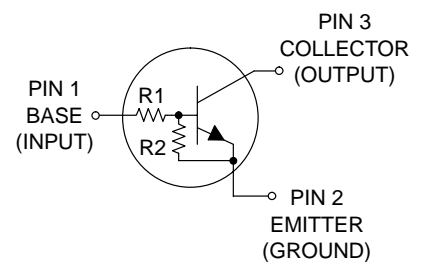
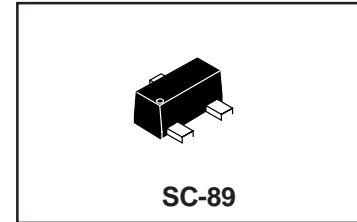


NPN Silicon Surface Mount Transistors with Monolithic Bias Resistor Network

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-89 package which is designed for low power surface mount applications.

- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- The SC-89 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.
- We declare that the material of product compliance with RoHS requirements.
- S- Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.



MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ 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

THERMAL CHARACTERISTICS

Rating	Symbol	Value	Unit
Total Device Dissipation, FR-4 Board (Note 1) @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	200 1.6	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient (Note 1)	$R_{\theta JA}$	600	$^\circ\text{C/W}$
Total Device Dissipation, FR-4 Board (Note 2) @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	300 2.4	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	400	$^\circ\text{C/W}$
Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. FR-4 @ Minimum Pad
2. FR-4 @ 1.0×1.0 Inch Pad

ORDERING INFORMATION AND RESISTOR VALUES

Device	Marking	R1 (K)	R2 (K)	Package	Shipping†
DTC114EET1G	8A	10	10	SC-89	3000 Tape & Reel
DTC124EET1G	8B	22	22	SC-89	3000 Tape & Reel
DTC144EET1G	8C	47	47	SC-89	3000 Tape & Reel
DTC114YET1G	8D	10	47	SC-89	3000 Tape & Reel
DTC114TET1G	94	10	∞	SC-89	3000 Tape & Reel
DTC143TET1G	8F	4.7	∞	SC-89	3000 Tape & Reel
DTC123EET1G	8H	2.2	2.2	SC-89	3000 Tape & Reel
DTC143EET1G	8J	4.7	4.7	SC-89	3000 Tape & Reel
DTC143ZET1G	8K	4.7	47	SC-89	3000 Tape & Reel
DTC124XET1G	8L	22	47	SC-89	3000 Tape & Reel
DTC123JET1G	8M	2.2	47	SC-89	3000 Tape & Reel
DTC115EET1G	8N	100	100	SC-89	3000 Tape & Reel
DTC144WET1G	8P	47	22	SC-89	3000 Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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 (V _{EB} = 6.0 V, I _C = 0)	I _{EBO}	-	-	0.5	mAdc
DTC114EET1G		-	-	0.2	
DTC124EET1G		-	-	0.1	
DTC144EET1G		-	-	0.2	
DTC114YET1G		-	-	0.9	
DTC114TET1G		-	-	1.9	
DTC143TET1G		-	-	2.3	
DTC123EET1G		-	-	1.5	
DTC143EET1G		-	-	0.18	
DTC143ZET1G		-	-	0.13	
DTC124XET1G		-	-	0.2	
DTC123JET1G		-	-	0.05	
DTC115EET1G		-	-	0.13	
DTC144WET1G		-	-		
Collector-Base Breakdown Voltage (I _C = 10 μA, I _E = 0)	V _{(BR)CBO}	50	-	-	Vdc
Collector-Emitter Breakdown Voltage (Note 3) (I _C = 2.0 mA, I _B = 0)	V _{(BR)CEO}	50	-	-	Vdc

Characteristic		Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS (Note 3)						
DC Current Gain ($V_{CE} = 10\text{ V}$, $I_C = 5.0\text{ mA}$)	DTC114EET1G DTC124EET1G DTC144EET1G DTC114YET1G DTC114TET1G DTC143TET1G DTC123EET1G DTC143EET1G DTC143ZET1G DTC124XET1G DTC123JET1G DTC115EET1G DTC144WET1G	h_{FE}	35 60 80 80 160 160 8.0 15 80 80 80 80 80	60 100 140 140 350 350 15 30 200 150 140 150 140	– – – – – – – – – – – – –	
Collector–Emitter Saturation Voltage ($I_C = 10\text{ mA}$, $I_B = 0.3\text{ mA}$) ($I_C = 10\text{ mA}$, $I_B = 5\text{ mA}$) DTC123EET1G ($I_C = 10\text{ mA}$, $I_B = 1\text{ mA}$) DTC143TET1G/DTC114TET1G/ DTC143EET1G/DTC143ZET1G/DTC124XET1G		$V_{CE(sat)}$	–	–	0.25	Vdc
Output Voltage (on) ($V_{CC} = 5.0\text{ V}$, $V_B = 2.5\text{ V}$, $R_L = 1.0\text{ k}\Omega$) ($V_{CC} = 5.0\text{ V}$, $V_B = 3.5\text{ V}$, $R_L = 1.0\text{ k}\Omega$) ($V_{CC} = 5.0\text{ V}$, $V_B = 5.5\text{ V}$, $R_L = 1.0\text{ k}\Omega$) ($V_{CC} = 5.0\text{ V}$, $V_B = 4.0\text{ V}$, $R_L = 1.0\text{ k}\Omega$)	DTC114EET1G DTC124EET1G DTC114YET1G DTC114TET1G DTC143TET1G DTC123EET1G DTC143EET1G DTC143ZET1G DTC124XET1G DTC123JET1G DTC144EET1G DTC115EET1G DTC144WET1G	V_{OL}	– – – – – – – – – – – – –	– – – – – – – – – – – – –	0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	Vdc
Output Voltage (off) ($V_{CC} = 5.0\text{ V}$, $V_B = 0.5\text{ V}$, $R_L = 1.0\text{ k}\Omega$) ($V_{CC} = 5.0\text{ V}$, $V_B = 0.25\text{ V}$, $R_L = 1.0\text{ k}\Omega$)	DTC143TET1G DTC143ZET1G DTC114TET1G DTC115EET1G	V_{OH}	4.9	–	–	Vdc

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

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted) (Continued)

Characteristic		Symbol	Min	Typ	Max	Unit
Input Resistor	DTC114EET1G DTC124EET1G DTC144EET1G DTC114YET1G DTC114TET1G DTC143TET1G DTC123EET1G DTC143EET1G DTC143ZET1G DTC124XET1G DTC123JET1G DTC115EET1G DTC144WET1G	R1	7.0 15.4 32.9 7.0 7.0 3.3 1.5 3.3 3.3 15.4 1.54 70 32.9	10 22 47 10 10 4.7 2.2 4.7 4.7 22 2.2 100 47	13 28.6 61.1 13 13 6.1 2.9 6.1 6.1 28.6 2.86 130 61.1	$\text{k}\Omega$
Resistor Ratio	DTC114EET1G/DTC124EET1G/ DTC144EET1G/DTC115EET1G DTC114YET1G DTC143TET1G/ DTC114TET1G DTC123EET1G/ DTC143EET1G DTC143ZET1G DTC124XET1G DTC123JET1G DTC144WET1G	R_1/R_2	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	

TYPICAL ELECTRICAL CHARACTERISTICS - DTC114EET1G

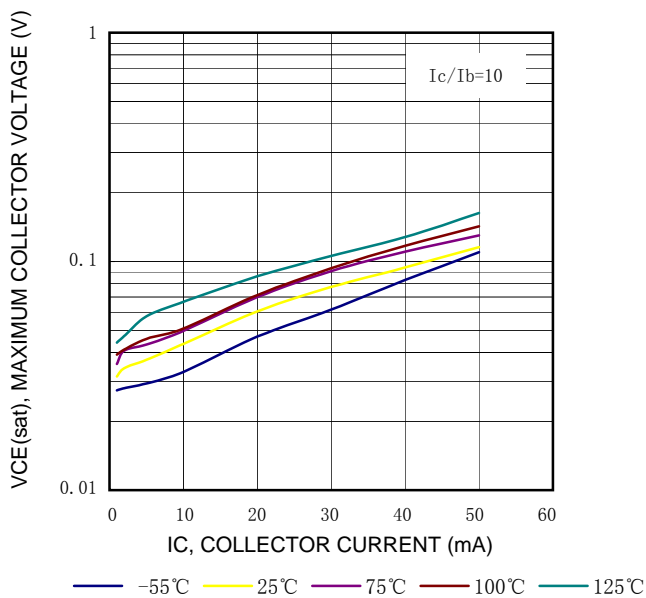


Fig. 1 VCE(sat) VS IC

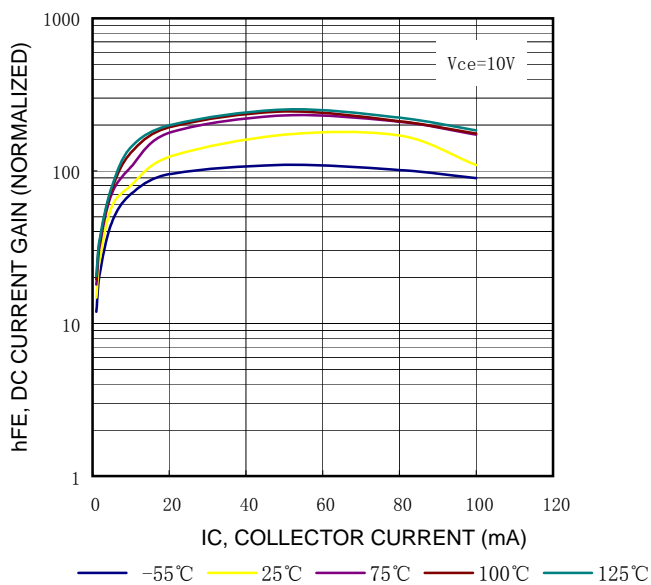


Fig. 2 DC CURRENT GAIN

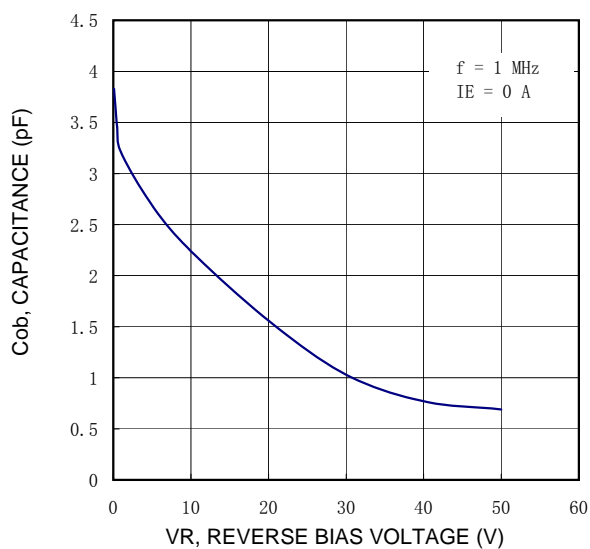


Fig. 3 OUTPUT CAPACITANCE

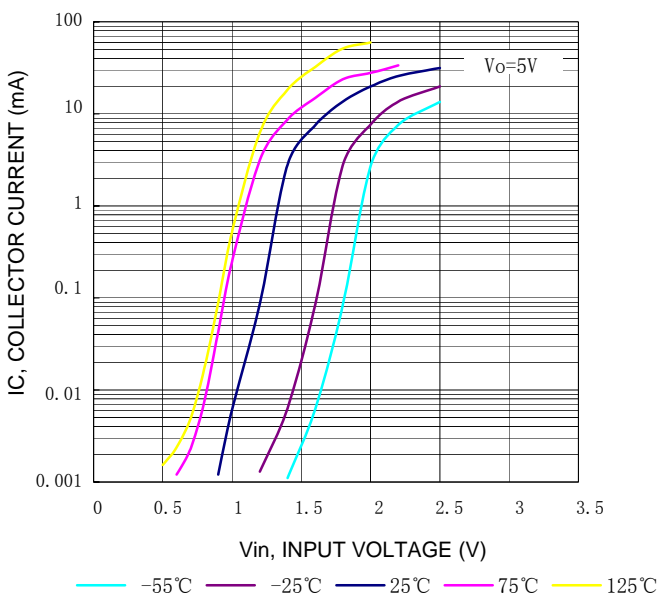


Fig. 4 OUTPUT CURRENT VS INPUT VOLTAGE

TYPICAL ELECTRICAL CHARACTERISTICS – DTC114EET1G

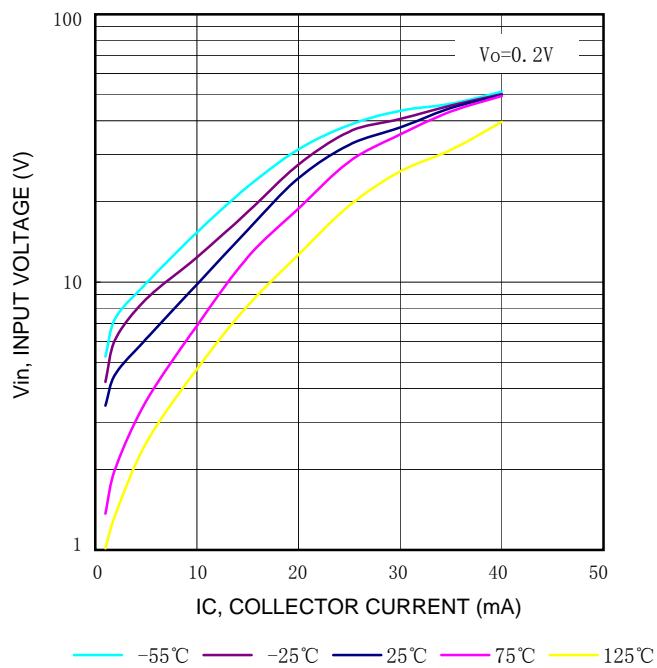


Fig. 5 INPUT VOLTAGE VS OUTPUT CURRENT

TYPICAL ELECTRICAL CHARACTERISTICS - DTC115EET1G

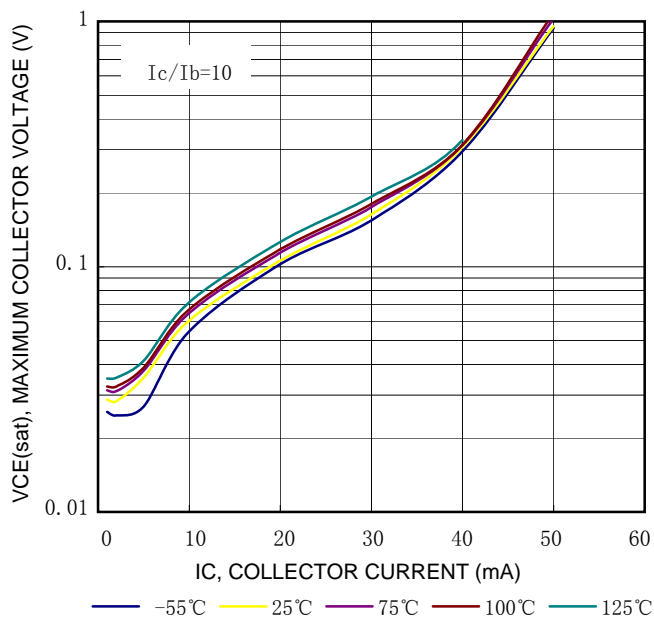


Fig. 6 $V_{CE(sat)}$ VS I_C

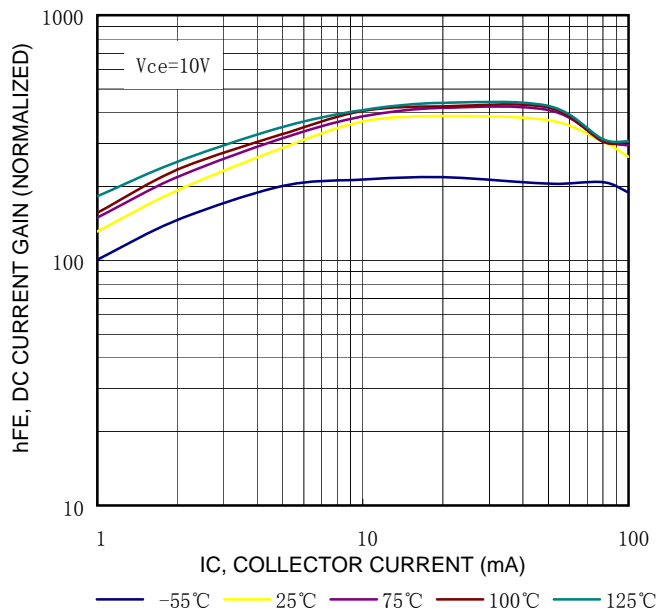


Fig. 7 DC CURRENT GAIN

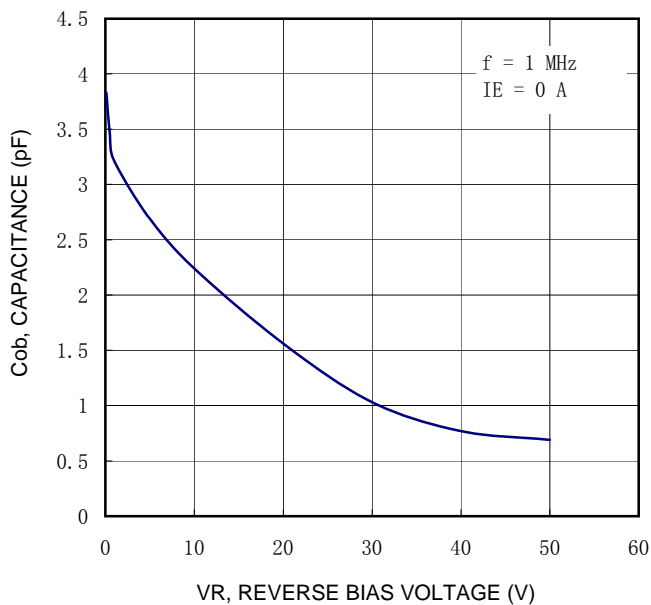


Fig. 8 OUTPUT CAPACITANCE

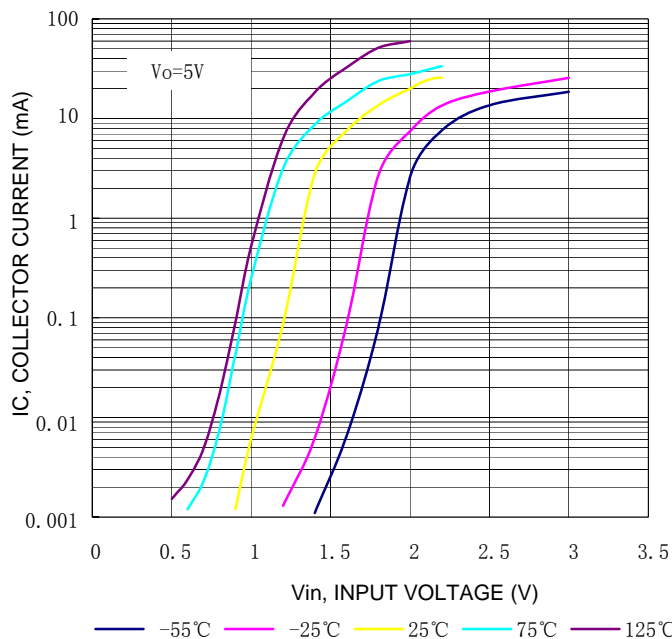


Fig. 9 OUTPUT CURRENT VS INPUT VOLTAGE

TYPICAL ELECTRICAL CHARACTERISTICS – DTC115EET1G

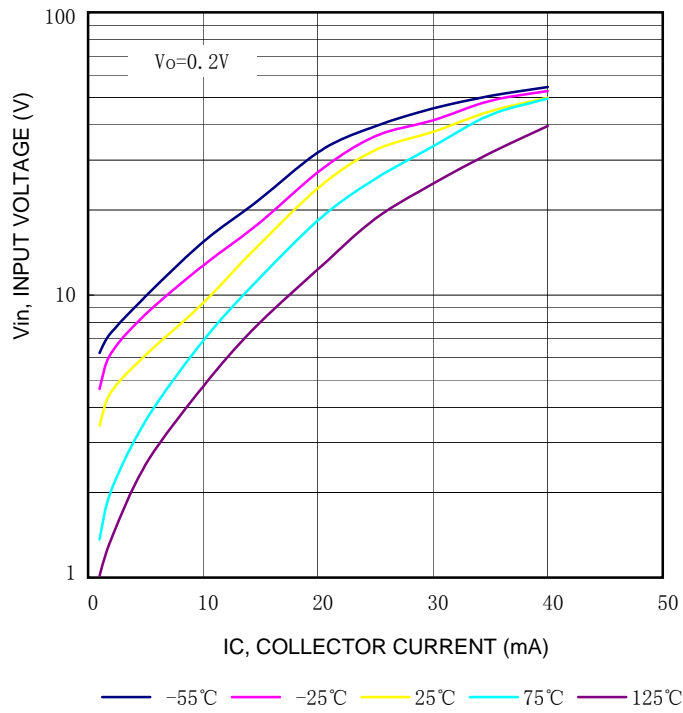


Fig. 10 INPUT VOLTAGE VS OUTPUT CURRENT

TYPICAL APPLICATIONS FOR NPN BRTs

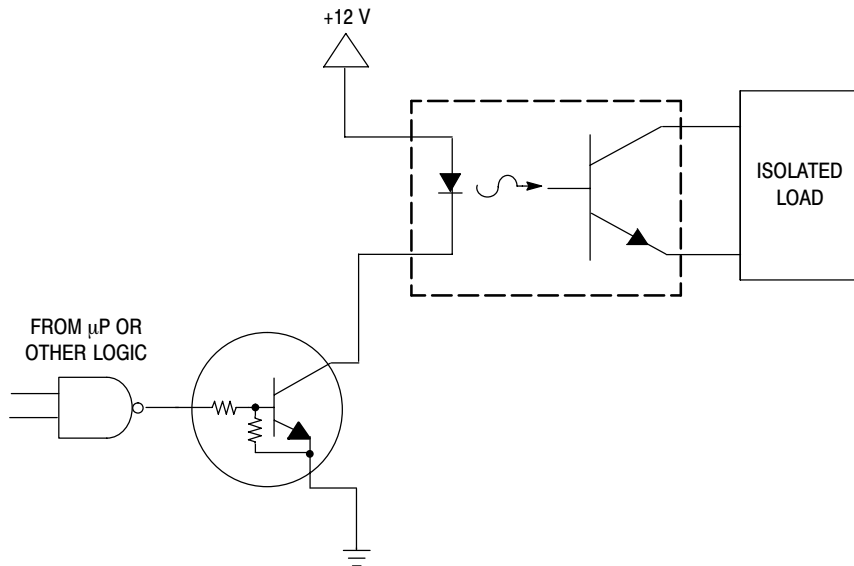


Fig. 11 LEVEL SHIFTER:CONNECTS 12 TO 24 VOLT CIRCUITS TO LOGIC

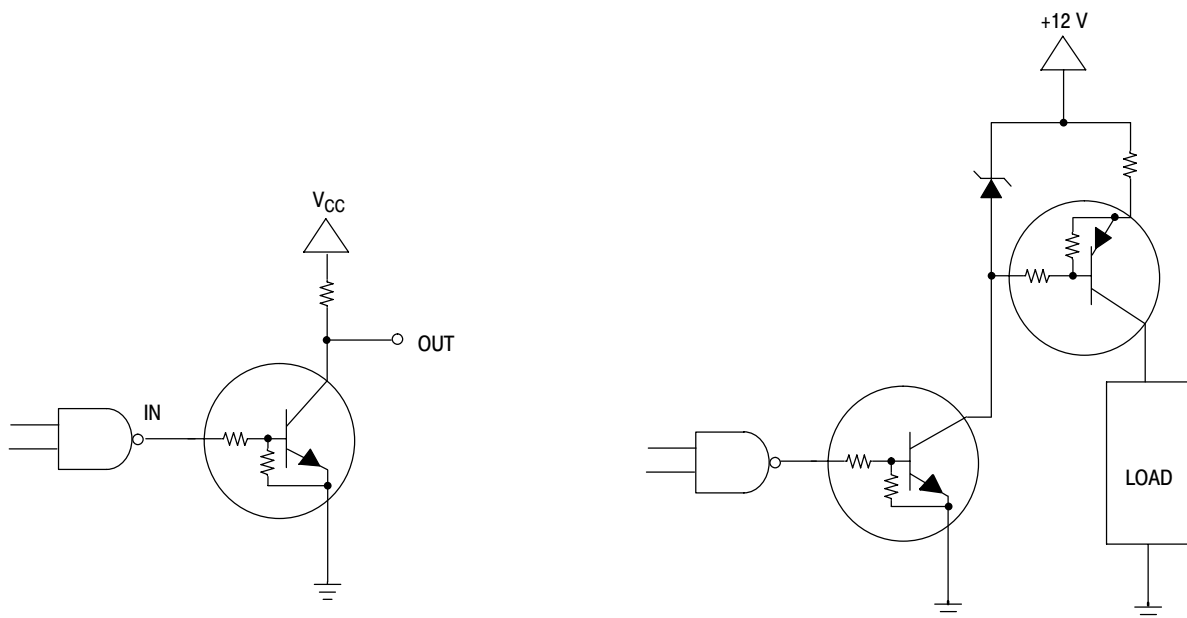
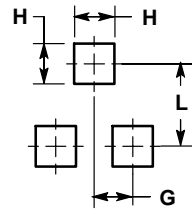
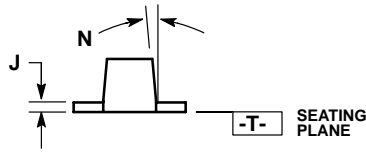
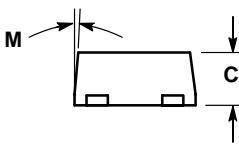
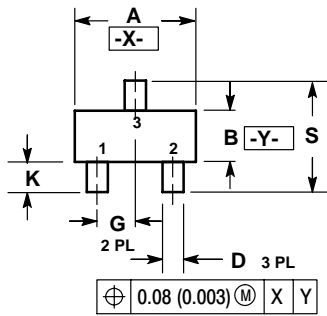


Fig. 12 OPEN COLLECTOR INVERTER:
 INVERTS THE INPUT SIGNAL

Fig. 13 INEXPENSIVE,UNREGULATED CURRENT SOURCE

SC-89



RECOMMENDED PATTERN OF SOLDER PADS

NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 463C-01 OBSOLETE, NEW STANDARD 463C-02.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.50	1.60	1.70	0.059	0.063	0.067
B	0.75	0.85	0.95	0.030	0.034	0.040
C	0.60	0.70	0.80	0.024	0.028	0.031
D	0.23	0.28	0.33	0.009	0.011	0.013
G	0.50 BSC			0.020 BSC		
H	0.53 REF			0.021 REF		
J	0.10	0.15	0.20	0.004	0.006	0.008
K	0.30	0.40	0.50	0.012	0.016	0.020
L	1.10 REF			0.043 REF		
M	---	---	10 °	---	---	10 °
N	---	---	10 °	---	---	10 °
S	1.50	1.60	1.70	0.059	0.063	0.067