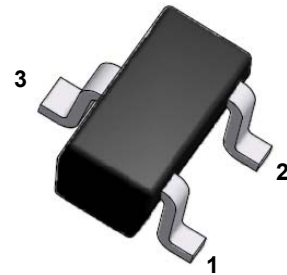


## SOT-523 Bias Resistor Transistor NPN Silicon Surface Mount Transistor with Monolithic Bias Resistor Network

Green Product

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 device is designed for low power surface mount applications.



SOT-523 (SC-75A)

### Absolute Maximum Ratings (T<sub>A</sub> = 25°C unless otherwise noted)

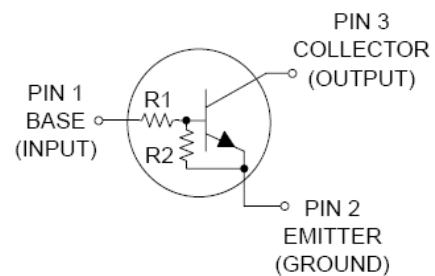
Symbol	Parameter	Value	Units
V <sub>CBO</sub>	Collector-Base Voltage	50	V
V <sub>CEO</sub>	Collector-Emitter Voltage	50	V
I <sub>C</sub>	Collector Current	100	mA
P <sub>D</sub>	Power Dissipation	150	mW
R <sub>θJA</sub>	Thermal Resistance from Junction to Ambient	600	°C /W
T <sub>J</sub> T <sub>STG</sub>	Junction & Storage Temperature Range	-55 to +150	°C

These ratings are limiting values above which the serviceability of the device may be impaired.

### Specification Features:

- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- RoHS Compliant
- Green EMC
- Matte Tin(Sn) Lead Finish
- Weight: approx. 0.002g

### Electrical Symbol:



**Device Marking & Resistor Values:**

Device	Marking	R1 (K $\Omega$ )	R2 (K $\Omega$ )
DTC114EE	24	10	10
DTC124EE	25	22	22
DTC144EE	26	47	47
DTC114YE	64	10	47
DTC114TE	04	10	$\infty$
DTC143TE	03	4.7	$\infty$
DTC123EE	22	2.2	2.2
DTC143EE	23	4.7	4.7
DTC143ZE	E23	4.7	47
DTC124XE	45	22	47
DTC123JE	E42	2.2	47

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

**Off Characteristics**

Symbol	Parameter	Test Condition	Limits			Unit
			Min	Typ	Max	
$I_{CBO}$	Collector-Base Cutoff Current	$V_{CB} = 50\text{V}, I_E = 0\text{A}$	-	-	100	nA
$I_{CEO}$	Collector-Emitter Cutoff Current	$V_{CE} = 50\text{V}, I_B = 0\text{A}$	-	-	500	nA
$I_{EBO}$	Emitter-Base Cutoff Current	$V_{EB} = 6.0\text{V}, I_C = 0\text{A}$				
	DTC114EE		-	-	0.50	mA
	DTC124EE		-	-	0.20	
	DTC144EE		-	-	0.10	
	DTC114YE		-	-	0.20	
	DTC114TE		-	-	0.90	
	DTC143TE		-	-	1.90	
	DTC123EE		-	-	2.30	
	DTC143EE		-	-	1.50	
	DTC143ZE		-	-	0.18	
	DTC124XE		-	-	0.13	
	DTC123JE		-	-	0.20	
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = 10\mu\text{A}, I_E = 0\text{A}$	50	-	-	Volts
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage (Note 1)	$I_C = 2.0\text{mA}, I_B = 0\text{A}$	50	-	-	Volts

Note 1: Pulse Test. Pulse width &lt;300us, Duty cycle &lt; 2.0%

**On Characteristics** (Note 1)

Symbol	Parameter	Test Condition	Limits			Unit
			Min	Typ	Max	
<b>H<sub>FE</sub></b>	DC Current Gain	V <sub>CE</sub> = 10V, I <sub>C</sub> = 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	--		
<b>V<sub>CE(sat)</sub></b>	Collector-Emitter Saturation Voltage					
	DTC114EE	I <sub>C</sub> = 10mA, I <sub>B</sub> = 0.3mA				
	DTC124EE	I <sub>C</sub> = 10mA, I <sub>B</sub> = 0.3mA				
	DTC144EE	I <sub>C</sub> = 10mA, I <sub>B</sub> = 0.3mA				
	DTC114YE	I <sub>C</sub> = 10mA, I <sub>B</sub> = 0.3mA				
	DTC114TE	I <sub>C</sub> = 10mA, I <sub>B</sub> = 1mA	--	--	0.25	Volts
	DTC143TE	I <sub>C</sub> = 10mA, I <sub>B</sub> = 1mA				
	DTC123EE	I <sub>C</sub> = 10mA, I <sub>D</sub> = 5mA				
	DTC143EE	I <sub>C</sub> = 10mA, I <sub>D</sub> = 1mA				
	DTC143ZE	I <sub>C</sub> = 10mA, I <sub>D</sub> = 1mA				
	DTC124XE	I <sub>C</sub> = 10mA, I <sub>B</sub> = 1mA				
DTC123JE	I <sub>C</sub> = 10mA, I <sub>B</sub> = 0.3mA					
<b>V<sub>OL</sub></b>	Output Voltage (on)	R <sub>L</sub> = 1.0KΩ				
	DTC114EE	V <sub>CC</sub> = 5.0V, V <sub>B</sub> = 2.5V				
	DTC124EE	V <sub>CC</sub> = 5.0V, V <sub>B</sub> = 2.5V				
	DTC144EE	V <sub>CC</sub> = 5.0V, V <sub>B</sub> = 3.5V				
	DTC114YE	V <sub>CC</sub> = 5.0V, V <sub>B</sub> = 2.5V				
	DTC114TE	V <sub>CC</sub> = 5.0V, V <sub>B</sub> = 2.5V				
	DTC143TE	V <sub>CC</sub> = 5.0V, V <sub>B</sub> = 2.5V	--	--	0.20	Volts
	DTC123EE	V <sub>CC</sub> = 5.0V, V <sub>B</sub> = 2.5V				
	DTC143EE	V <sub>CC</sub> = 5.0V, V <sub>B</sub> = 2.5V				
	DTC143ZE	V <sub>CC</sub> = 5.0V, V <sub>B</sub> = 2.5V				
	DTC124XE	V <sub>CC</sub> = 5.0V, V <sub>B</sub> = 2.5V				
DTC123JE	V <sub>CC</sub> = 5.0V, V <sub>B</sub> = 2.5V					

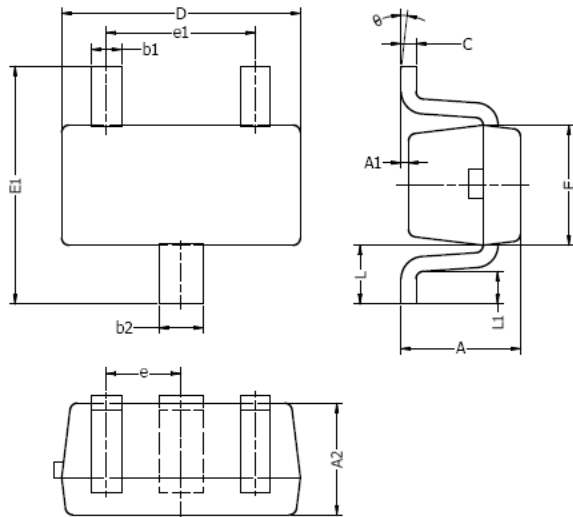
**On Characteristics**

Symbol	Parameter	Test Condition	Limits			Unit
			Min	Typ	Max	
V <sub>OH</sub>	Output Voltage (on)	R <sub>L</sub> = 1.0KΩ	4.9	--	--	Volts
		DTC114EE V <sub>CC</sub> =5.0V, V <sub>B</sub> =0.5V				
		DTC124EE V <sub>CC</sub> =5.0V, V <sub>B</sub> =0.5V				
		DTC144EE V <sub>CC</sub> =5.0V, V <sub>B</sub> =0.5V				
		DTC114YE V <sub>CC</sub> =5.0V, V <sub>B</sub> =0.5V				
		DTC114TE V <sub>CC</sub> =5.0V, V <sub>B</sub> =0.25V				
		DTC143TE V <sub>CC</sub> =5.0V, V <sub>B</sub> =0.25V				
		DTC123EE V <sub>CC</sub> =5.0V, V <sub>B</sub> =0.5V				
		DTC143EE V <sub>CC</sub> =5.0V, V <sub>B</sub> =0.5V				
		DTC143ZE V <sub>CC</sub> =5.0V, V <sub>B</sub> =0.25V				
		DTC124XE V <sub>CC</sub> =5.0V, V <sub>B</sub> =0.5V				
		DTC123JE V <sub>CC</sub> =5.0V, V <sub>B</sub> =0.5V				

**Electrical Characteristics** (T<sub>A</sub> = 25°C unless otherwise noted)

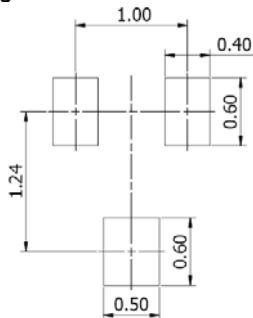
Symbol	Characteristic		Min	Typ	Max	Unit
R1	Input Resistor	DTC114EE	7.0	10	13	KΩ
		DTC124EE	15.4	22	28.6	
		DTC144EE	32.9	47	61.1	
		DTC114YE	7.0	10	13	
		DTC114TE	7.0	10	13	
		DTC143TE	3.3	4.7	6.1	
		DTC123EE	1.5	2.2	2.9	
		DTC143EE	3.3	4.7	6.1	
		DTC143ZE	3.3	4.7	6.1	
		DTC124XE	15.4	22	28.6	
		DTC123JE	1.54	2.2	2.86	
R1/R2	Resistor Ratio	DTC114EE	0.8	1.0	1.2	--
		DTC124EE	0.8	1.0	1.2	
		DTC144EE	0.8	1.0	1.2	
		DTC114YE	0.17	0.21	0.25	
		DTC114TE	-	-	-	
		DTC143TE	-	-	-	
		DTC123EE	0.8	1.0	1.2	
		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	

SOT-523 Package Outline



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.70	0.90	0.028	0.035
A1	0.00	0.10	0.000	0.004
A2	0.70	0.80	0.028	0.031
b1	0.15	0.25	0.006	0.010
b2	0.25	0.35	0.010	0.014
c	0.10	0.20	0.004	0.008
D	1.50	1.70	0.059	0.067
E	0.70	0.90	0.028	0.035
E1	1.45	1.75	0.057	0.069
e	0.50 TYP.		0.020 TYP.	
e1	0.90	1.10	0.035	0.043
L	0.40 REF.		0.016 REF.	
L1	0.10	0.30	0.004	0.012
θ	0°	8°	0°	8°

Typical Soldering Pattern:



NOTES:

1. Above package outline conforms to JEITA EAIJ ED-7500A SC-75A.
2. Dimensions are exclusive of Burrs, Mold Flash & Tie Bar extrusions.

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