

# DTC114EE to DTC123JE

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### NPN Silicon Surface Mount Transistor with Monolithic Bias Resistor Network

#### General description

SOT-523 Bias Resistor Transistor.  
 NPN Silicon Surface Mount Transistor 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 device is 3 designed for low power surface mount applications.

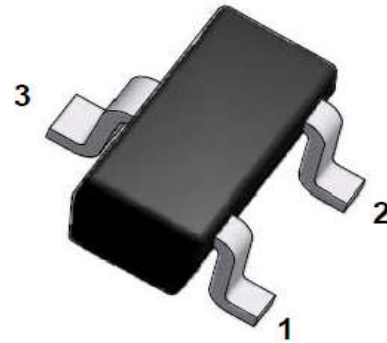
#### FEATURES

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

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

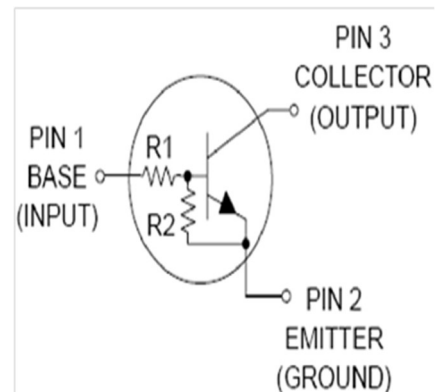
Symbol	Parameter	Value	Units
V <sub>CB0</sub>	Collector-Base Voltage	50	V
V <sub>CE0</sub>	Collector-Emitter Voltage	50	V
I <sub>C</sub>	Collector Current	100	mA
P <sub>D</sub>	Power Dissipation	150	mW
R <sub>θJA</sub>	Thermal Resistance from Junction to Ambient	600	°C /W
T <sub>J</sub> T <sub>STG</sub>	Junction & Storage Temperature Range	-55 to +150	°C

#### Green Product



SOT-523 (SC-75A)

#### Electrical Symbol:



# DTC114EE to DTC123JE

## Device Marking & Resistor Values:

Device	Marking	R1 (KΩ)	R2 (KΩ)
DTC114EE	24	10	10
DTC124EE	25	22	22
DTC144EE	26	47	47
DTC114YE	64	10	47
DTC114TE	04	10	∞
DTC143TE	03	4.7	∞
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<sub>A</sub> = 25°C unless otherwise noted)

### Off Characteristics

Symbol	Parameter	Test Condition	Limits			Unit	
			Min	Typ	Max		
I <sub>CB0</sub>	Collector-Base Cutoff Current	V <sub>CB</sub> = 50V, I <sub>E</sub> = 0A	-	-	100	nA	
I <sub>CE0</sub>	Collector-Emitter Cutoff Current	V <sub>CE</sub> = 50V, I <sub>B</sub> = 0A	-	-	500	nA	
I <sub>EB0</sub>	Emitter-Base Cutoff Current	V <sub>EB</sub> = 6.0V, I <sub>C</sub> = 0A	-	-		mA	
	DTC114EE						0.50
	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 <sub>(BR)CBO</sub>	Collector-Base Breakdown Voltage	I <sub>C</sub> = 10μA, I <sub>E</sub> = 0A	50	-	-	Volts	
V <sub>(BR)CEO</sub>	Collector-Emitter Breakdown Voltage (Note 1)	I <sub>C</sub> = 2.0mA, I <sub>B</sub> = 0A	50	-	-	Volts	

Note 1: Pulse Test. Pulse width < 300μs, Duty cycle < 2.0%

# DTC114EE to DTC123JE

## On Characteristics (Note 1)

Symbol	Parameter	Test Condition	Limits			Unit
			Min	Typ	Max	
<b>H<sub>FE</sub></b>	DC Current Gain					
	DTC114EE	V <sub>CE</sub> = 10V, I <sub>C</sub> = 5.0mA	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 V <sub>CC</sub> = 5.0V,				
	DTC144EE	V <sub>B</sub> = 3.5V V <sub>CC</sub> = 5.0V, V <sub>B</sub> = 2.5V				
	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	--	--	0.20	Volts
	DTC143TE	V <sub>CC</sub> = 5.0V, V <sub>B</sub> = 2.5V				
	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				

# DTC114EE to DTC123JE

## On Characteristics

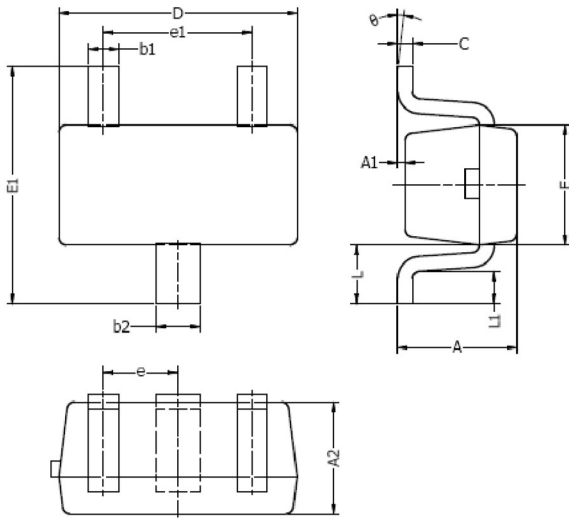
Symbol	Parameter	Test Condition	Limits			Unit
			Min	Typ	Max	
V <sub>OH</sub>	Output Voltage (on)	R <sub>L</sub> = 1.0KΩ	4.9	--	--	Volts
	DTC114EE	V <sub>CC</sub> =5.0V, V <sub>B</sub> =0.5V				
	DTC124EE	V <sub>CC</sub> =5.0V, V <sub>B</sub> =0.5V				
	DTC144EE	V <sub>CC</sub> =5.0V, V <sub>B</sub> =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 (TA = 25°C unless otherwise noted)

Symbol	Characteristic	Min	Typ	Max	Unit
R1	Input Resistor				KΩ
	DTC114EE	7.0	10	13	
	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	

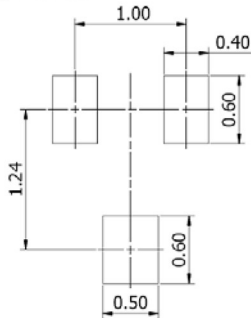
# DTC114EE to DTC123JE

## 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
theta	0°	8°	0°	8°

### Typical Soldering Pattern:



### Note:

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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