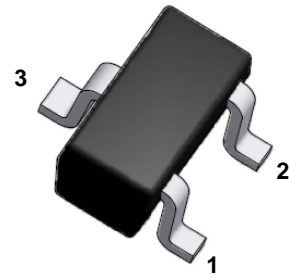


SOT-523 Bias Resistor Transistor NPN Silicon Surface Mount Transistor with Monolithic Bias Resistor Network

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_A = 25°C unless otherwise noted)

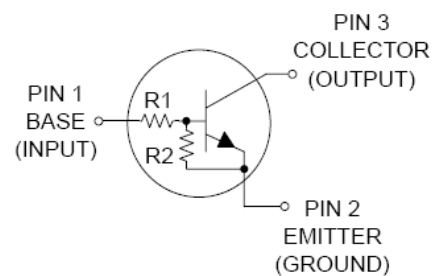
Symbol	Parameter	Value	Units
V _{CB0}	Collector-Base Voltage	50	V
V _{CEO}	Collector-Emitter Voltage	50	V
I _C	Collector Current	100	mA
P _D	Power Dissipation	150	mW
R _{θJA}	Thermal Resistance from Junction to Ambient	600	°C/W
T _J T _{STG}	Junction & Storage Temperature Range	-55 to +150	°C

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 Ω)	R2 (K Ω)
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 ($T_A = 25^\circ\text{C}$ 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	$V_{EB} = 6.0\text{V}, I_C = 0\text{A}$	-	-	0.50	mA
			-	-	0.20	
			-	-	0.10	
			-	-	0.20	
			-	-	0.90	
			-	-	1.90	
			-	-	2.30	
			-	-	1.50	
			-	-	0.18	
			-	-	0.13	
			-	-	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 <300us, Duty cycle < 2.0%

On Characteristics (Note 1)

Symbol	Parameter	Test Condition	Limits			Unit		
			Min	Typ	Max			
H_{FE}	DC Current Gain	$V_{CE} = 10V, I_C = 5.0mA$						
			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	--					
V_{CE(sat)}	Collector-Emitter Saturation Voltage							
			DTC114EE	$I_C = 10mA, I_B = 0.3mA$				
			DTC124EE	$I_C = 10mA, I_B = 0.3mA$				
			DTC144EE	$I_C = 10mA, I_B = 0.3mA$				
			DTC114YE	$I_C = 10mA, I_B = 0.3mA$				
			DTC114TE	$I_C = 10mA, I_B = 1mA$	--	--	0.25	Volts
			DTC143TE	$I_C = 10mA, I_B = 1mA$				
			DTC123EE	$I_C = 10mA, I_B = 5mA$				
			DTC143EE	$I_C = 10mA, I_B = 1mA$				
			DTC143ZE	$I_C = 10mA, I_B = 1mA$				
			DTC124XE	$I_C = 10mA, I_B = 1mA$				
DTC123JE	$I_C = 10mA, I_B = 0.3mA$							
V_{OL}	Output Voltage (on)	$R_L = 1.0K\Omega$						
			DTC114EE	$V_{CC} = 5.0V, V_B = 2.5V$				
			DTC124EE	$V_{CC} = 5.0V, V_B = 2.5V$				
			DTC144EE	$V_{CC} = 5.0V, V_B = 3.5V$				
			DTC114YE	$V_{CC} = 5.0V, V_B = 2.5V$				
			DTC114TE	$V_{CC} = 5.0V, V_B = 2.5V$	--	--	0.20	Volts
			DTC143TE	$V_{CC} = 5.0V, V_B = 2.5V$				
			DTC123EE	$V_{CC} = 5.0V, V_B = 2.5V$				
			DTC143EE	$V_{CC} = 5.0V, V_B = 2.5V$				
			DTC143ZE	$V_{CC} = 5.0V, V_B = 2.5V$				
			DTC124XE	$V_{CC} = 5.0V, V_B = 2.5V$				
			DTC123JE	$V_{CC} = 5.0V, V_B = 2.5V$				

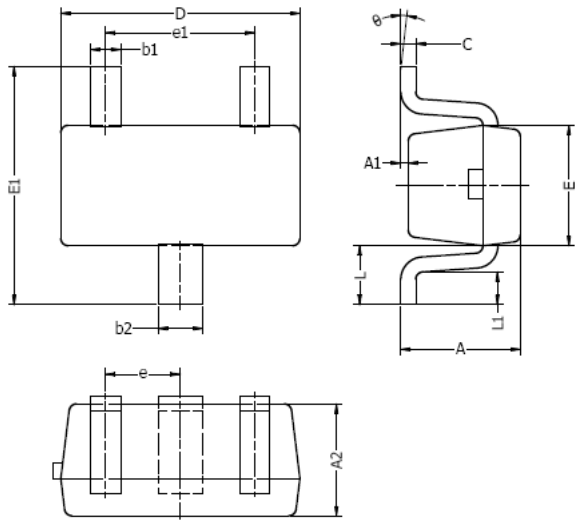
On Characteristics

Symbol	Parameter	Test Condition	Limits			Unit
			Min	Typ	Max	
V _{OH}	Output Voltage (on)	R _L = 1.0KΩ	4.9	--	--	Volts
		DTC114EE V _{CC} =5.0V, V _B =0.5V				
		DTC124EE V _{CC} =5.0V, V _B =0.5V				
		DTC144EE V _{CC} =5.0V, V _B =0.5V				
		DTC114YE V _{CC} =5.0V, V _B =0.5V				
		DTC114TE V _{CC} =5.0V, V _B =0.25V				
		DTC143TE V _{CC} =5.0V, V _B =0.25V				
		DTC123EE V _{CC} =5.0V, V _B =0.5V				
		DTC143EE V _{CC} =5.0V, V _B =0.5V				
		DTC143ZE V _{CC} =5.0V, V _B =0.25V				
		DTC124XE V _{CC} =5.0V, V _B =0.5V				
		DTC123JE V _{CC} =5.0V, V _B =0.5V				

Electrical Characteristics (T_A = 25°C unless otherwise noted)

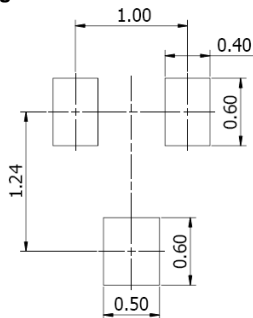
Symbol	Characteristic		Min	Typ	Max	Unit
R1	Input Resistor	DTC114EE	7.0	10	13	KΩ
		DTC124EE	15.4	22	28.6	
		DTC144EE	32.9	47	61.1	
		DTC114YE	7.0	10	13	
		DTC114TE	7.0	10	13	
		DTC143TE	3.3	4.7	6.1	
		DTC123EE	1.5	2.2	2.9	
		DTC143EE	3.3	4.7	6.1	
		DTC143ZE	3.3	4.7	6.1	
		DTC124XE	15.4	22	28.6	
DTC123JE	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
theta	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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