

#### NPN PRE-BIASED SMALL SIGNAL SURFACE MOUNT TRANSISTOR

#### **Features**

- Epitaxial Planar Die Construction
- Complementary PNP Types Available (DDTA)
- Built-In Biasing Resistors, R1 = R2
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- Qualified to AEC-Q101 Standards for High Reliability

#### **Mechanical Data**

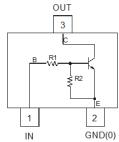
- Case: SOT-523
- Case Material: Molded Plastic, "Green" Molding Compound
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208(3)
- Weight: 0.002 grams (Approximate)

Part Number	R1, R2 (NOM)
DDTC123EE	2.2kΩ
DDTC143EE	4.7kΩ
DDTC114EE	10kΩ
DDTC124EE	22kΩ
DDTC144EE	47kΩ
DDTC115EE	100kΩ

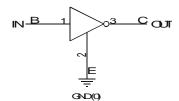
**SOT523** 







Device Schematic



**Equivalent Inverter Circuit** 

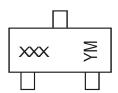
## **Ordering Information** (Note 4)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DDTC123EE-7-F	AEC-Q101	N04	7	8	3,000
DDTC143EE-7-F	AEC-Q101	N08	7	8	3,000
DDTC114EE-7-F	AEC-Q101	N13	7	8	3,000
DDTC124EE-7-F	AEC-Q101	N17	7	8	3,000
DDTC144EE-7-F	AEC-Q101	N20	7	8	3,000
DDTC115EE-7-F	AEC-Q101	N24	7	8	3,000

Notes:

- 1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
- 2. See http://www.diodes.com/quality/lead\_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-Free.
- 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
- 4. For packaging details, go to our website at http"//www.diodes.com/products/packages.html.

#### **Marking Information**



XXX = Product Type Marking Code, See Table Above

YM = Date Code Marking Y = Year ex: D = 2016

M = Month ex: 9 = September

#### Date Code Key

Year	2016		2017	2018		2019	2020		2021	2022		2023
Code	D		Е	F		G	Н			J		K
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	0	N	D



# **Absolute Maximum Ratings** (@ $T_A = +25^{\circ}C$ , unless otherwise specified.)

Charac	teristic	Symbol	Value	Unit
Supply Voltage <pin: (2)="" (3)="" to=""></pin:>		Vcc	50	V
Input Voltage <pin: (1)="" (2)="" to=""></pin:>	DDTC123EE DDTC143EE DDTC114EE DDTC124EE DDTC144EE DDTC115EE	V <sub>IN</sub>	-10 to +12 -10 to +30 -10 to +40 -10 to +40 -10 to +40 -10 to +40	V
Output Current	DDTC123EE DDTC143EE DDTC114EE DDTC124EE DDTC144EE DDTC115EE	Io	100 100 50 30 100 20	mA
Output Current		I <sub>C</sub> (Max)	100	mA

# Thermal Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation (Notes 5 & 6)	P <sub>D</sub>	150	mW
Thermal Resistance, Junction to Ambient Air (Note 5)	$R_{\theta JA}$	833	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

## **Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

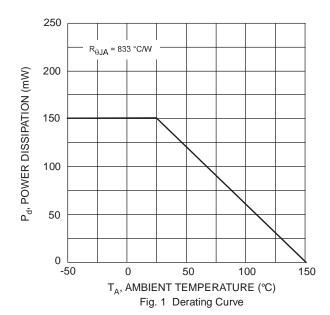
Characte	ristic	Symbol	Min	Тур	Max	Unit	Test Condition
		V <sub>I(off)</sub> (Note 7)	0.5	1.1			$V_{CC} = 5V, I_{O} = 100\mu A$
Input Voltage		V <sub>I(on)</sub> (Note 8)	_	1.9	3	V	$\begin{array}{l} \text{V}_{\text{O}} = 0.3 \text{V}, \ \text{I}_{\text{O}} = 20 \text{mA}, \ \text{DDTC123EE} \\ \text{V}_{\text{O}} = 0.3 \text{V}, \ \text{I}_{\text{O}} = 20 \text{mA}, \ \text{DDTC143EE} \\ \text{V}_{\text{O}} = 0.3 \text{V}, \ \text{I}_{\text{O}} = 10 \text{mA}, \ \text{DDTC114EE} \\ \text{V}_{\text{O}} = 0.3 \text{V}, \ \text{I}_{\text{O}} = 5 \text{mA}, \ \text{DDTC124EE} \\ \text{V}_{\text{O}} = 0.3 \text{V}, \ \text{I}_{\text{O}} = 2 \text{mA}, \ \text{DDTC144EE} \\ \text{V}_{\text{O}} = 0.3 \text{V}, \ \text{I}_{\text{O}} = 1 \text{mA}, \ \text{DDTC115EE} \\ \end{array}$
Output Voltage		V <sub>O(on)</sub>	_	0.1	0.3	V	I <sub>O</sub> /I <sub>I</sub> = 10mA/0.5mA, DDTC123EE I <sub>O</sub> /I <sub>I</sub> = 10mA/0.5mA, DDTC143EE I <sub>O</sub> /I <sub>I</sub> = 10mA/0.5mA, DDTC114EE I <sub>O</sub> /I <sub>I</sub> = 10mA/0.5mA, DDTC124EE I <sub>O</sub> /I <sub>I</sub> = 10mA/0.5mA, DDTC144EE I <sub>O</sub> /I <sub>I</sub> = 5mA/0.25mA, DDTC115EE
Input Current	DDTC123EE DDTC143EE DDTC114EE DDTC124EE DDTC144EE DDTC115EE	l <sub>1</sub>	_	_	3.8 1.8 0.88 0.36 0.18 0.15	mA	V <sub>1</sub> = 5V
Output Current		I <sub>O(off)</sub>	_	_	0.5	μΑ	$V_{CC} = 50V, V_{I} = 0V$
DC Current Gain	DDTC123EE DDTC143EE DDTC114EE DDTC124EE DDTC144EE DDTC115EE	Gı	20 20 30 56 68 82	_	_	_	V <sub>O</sub> = 5V, I <sub>O</sub> = 20mA V <sub>O</sub> = 5V, I <sub>O</sub> = 10mA V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA
Input Resistor Tolerance		$\Delta R_1$	-30	_	+30	%	_
Resistance Ratio Tolerance		$\Delta R_2/R_1$	0.8	1	1.2	%	_
Gain-Bandwidth Product (Note 9)		f⊤	_	250	_	MHz	$V_{CE} = -10V, I_{E} = 5mA,$ f = 100MHz

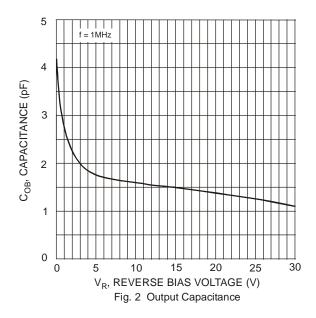
Notes:

- 5. Mounted on FR4 PC Board with minimum recommended pad layout.
- 6. 150mW per element must not be exceeded.
- 7. Guarantees that the device will be switched OFF if the Input Voltage is less than 0.5V.
  8. Guarantees that the device will be switched ON if the Input Voltage is more than 3V.
  9. Transistor only.



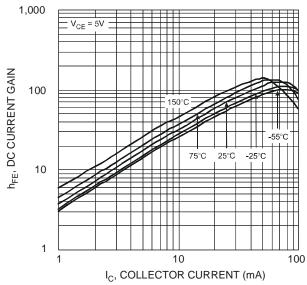
## **Typical Electrical Characteristics**







## Typical Electrical Characteristics - DDTC123EE





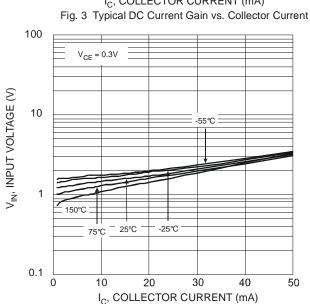
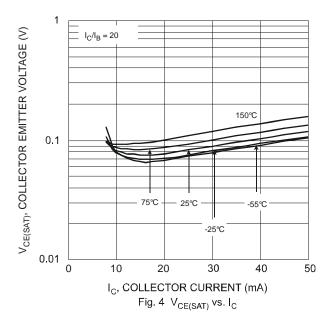
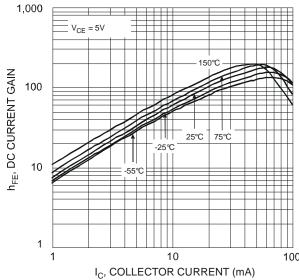


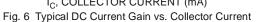
Fig. 5 Input Voltage vs. Collector Current





### Typical Electrical Characteristics - DDTC143EE





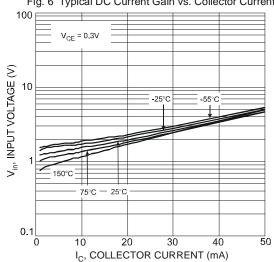
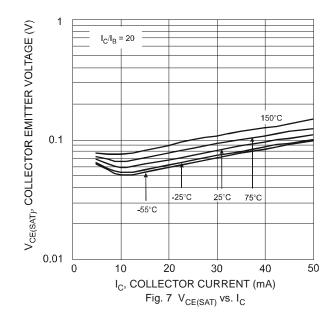
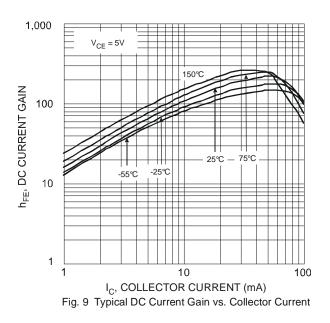


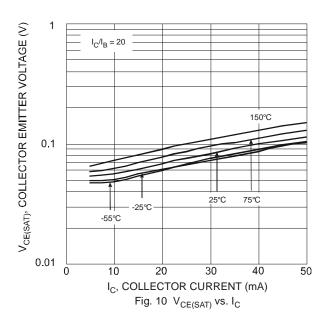
Fig. 8 Input Voltage vs. Collector Current





### Typical Electrical Characteristics - DDTC114EE





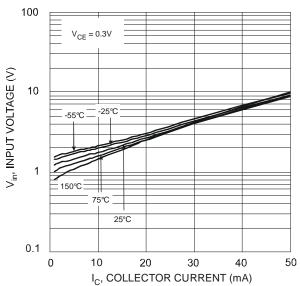
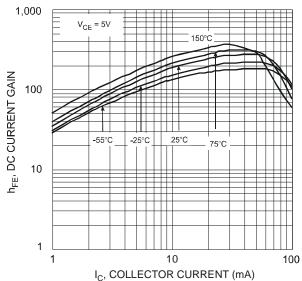


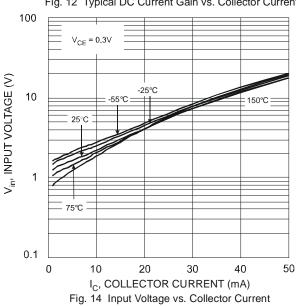
Fig. 11 Input Voltage vs. Collector Current

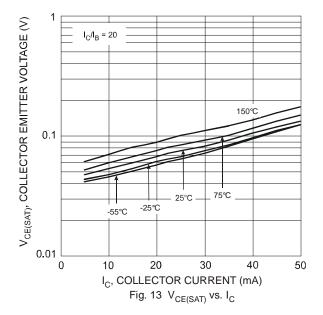


## Typical Electrical Characteristics - DDTC124EE











### Typical Electrical Characteristics - DDTC144EE

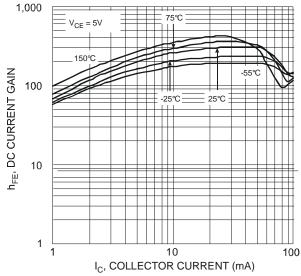
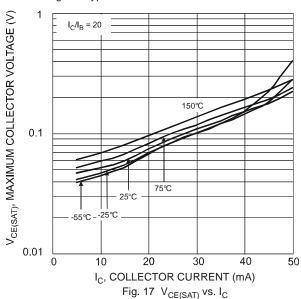
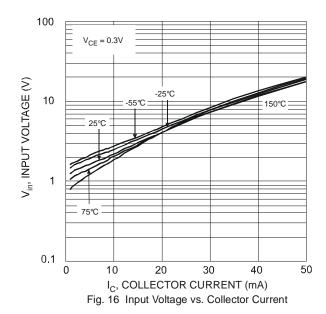


Fig. 15 Typical DC Current Gain vs. Collector Current

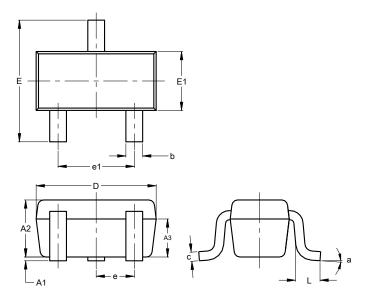






### **Package Outline Dimensions**

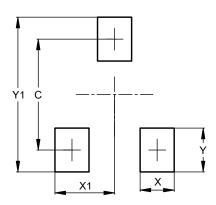
Please see http://www.diodes.com/package-outlines.html for the latest version.



	SOT523						
Dim	Min	Max	Тур				
Α	0.60	0.80	0.75				
A1	0.00	0.10	0.05				
А3	0.45	0.65	0.50				
b	0.15	0.30	0.22				
С	0.10	0.20	0.12				
D	1.50	1.70	1.60				
Е	1.45	1.75	1.60				
E1	0.75 0.85		0.80				
е		0.50 BS	C				
e1	0.90	1.10	1.00				
L	0.20	0.40	0.33				
а	0°		8°				
Al	All Dimensions in mm						

### **Suggested Pad Layout**

Please see http://www.diodes.com/package-outlines.html for the latest version.



Dimensions	Value
С	1.29
Х	0.40
X1	0.70
Υ	0.51
Y1	1.80



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