



**THE DATASHEET OF  
DDTC124EE-7-F**



**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**

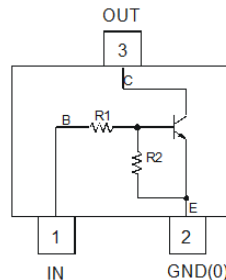
**Mechanical Data**

- Case: SOT523
- 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)

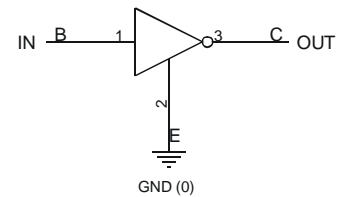
Part Number	R1, R2 (NOM)
DDTC123EE	2.2kΩ
DDTC143EE	4.7kΩ
DDTC114EE	10kΩ
DDTC124EE	22kΩ
DDTC144EE	47kΩ
DDTC115EE	100kΩ



Top View



Device Schematic

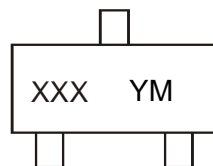


Equivalent Inverter Circuit

**Ordering Information (Note 4)**

Product	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
DDTC123EE-7-F	AEC-Q101	N04	7	8	3000
DDTC143EE-7-F	AEC-Q101	N08	7	8	3000
DDTC114EE-7-F	AEC-Q101	N13	7	8	3000
DDTC124EE-7-F	AEC-Q101	N17	7	8	3000
DDTC144EE-7-F	AEC-Q101	N20	7	8	3000
DDTC115EE-7-F	AEC-Q101	N24	7	8	3000

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  2. See <https://www.diodes.com/quality/lead-free/> 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: G = 2019  
 M = Month ex: 9 = September

## Date Code Key

Year	2019	2020	2021	2022	2023	2024	2025	2026
Code	G	H	I	J	K	L	M	N

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

**Absolute Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Supply Voltage <Pin: (3) to (2)>		V <sub>CC</sub>	50	V
Input Voltage <Pin: (1) to (2)>	DDTC123EE	V <sub>IN</sub>	-10 to +12	V
	DDTC143EE		-10 to +30	
	DDTC114EE		-10 to +40	
	DDTC124EE		-10 to +40	
	DDTC144EE		-10 to +40	
	DDTC115EE		-10 to +40	
Output Current	DDTC123EE	I <sub>O</sub>	100	mA
	DDTC143EE		100	
	DDTC114EE		50	
	DDTC124EE		30	
	DDTC144EE		100	
	DDTC115EE		20	
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 <sub>θJA</sub>	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.)

Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition
Input Voltage		V <sub>I(OFF)</sub> (Note 7)	0.5	1.1	—	V	V <sub>CC</sub> = 5V, I <sub>O</sub> = 100μA V <sub>O</sub> = 0.3V, I <sub>O</sub> = 20mA, DDTC123EE V <sub>O</sub> = 0.3V, I <sub>O</sub> = 20mA, DDTC143EE V <sub>O</sub> = 0.3V, I <sub>O</sub> = 10mA, DDTC114EE V <sub>O</sub> = 0.3V, I <sub>O</sub> = 5mA, DDTC124EE V <sub>O</sub> = 0.3V, I <sub>O</sub> = 2mA, DDTC144EE V <sub>O</sub> = 0.3V, I <sub>O</sub> = 1mA, DDTC115EE
		V <sub>I(ON)</sub> (Note 8)	—	1.9	3		
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	I <sub>I</sub>	—	—	3.8 1.8 0.88 0.36 0.18 0.15	mA	V <sub>I</sub> = 5V
Output Current		I <sub>O(OFF)</sub>	—	—	0.5	μA	V <sub>CC</sub> = 50V, V <sub>I</sub> = 0V
DC Current Gain	DDTC123EE DDTC143EE DDTC114EE DDTC124EE DDTC144EE DDTC115EE	G <sub>I</sub>	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		ΔR <sub>1</sub>	-30	—	+30	%	—
Resistance Ratio Tolerance		ΔR <sub>2</sub> /R <sub>1</sub>	0.8	1	1.2	%	—
Gain-Bandwidth Product (Note 9)		f <sub>T</sub>	—	250	—	MHz	V <sub>CE</sub> = -10V, I <sub>E</sub> = 5mA, f = 100MHz

- Notes:
- Mounted on FR-4 PC Board with minimum recommended pad layout.
  - 150mW per element must not be exceeded.
  - Guarantees that the device will be switched OFF if the Input Voltage is less than 0.5V.
  - Guarantees that the device will be switched ON if the Input Voltage is more than 3V.
  - Transistor only.

**Typical Electrical Characteristics**

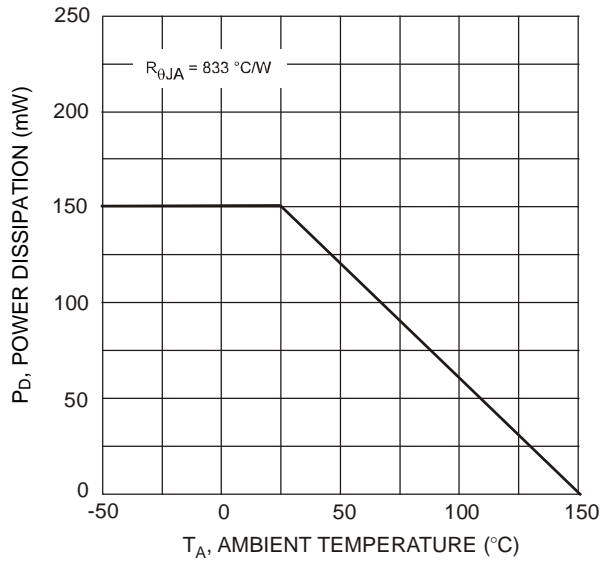


Fig. 1 Derating Curve

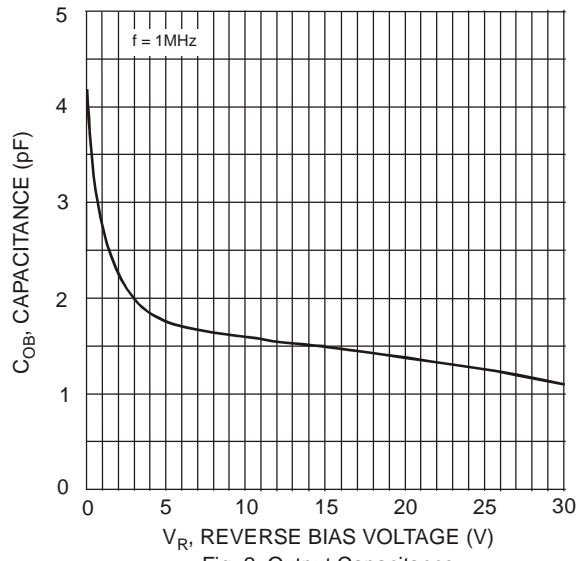


Fig. 2 Output Capacitance

**Typical Electrical Characteristics – DDTC123EE**

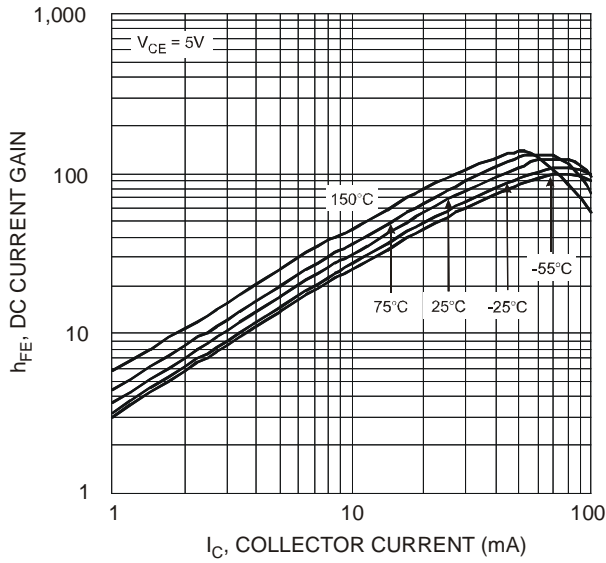


Fig. 3 Typical DC Current Gain vs. Collector Current

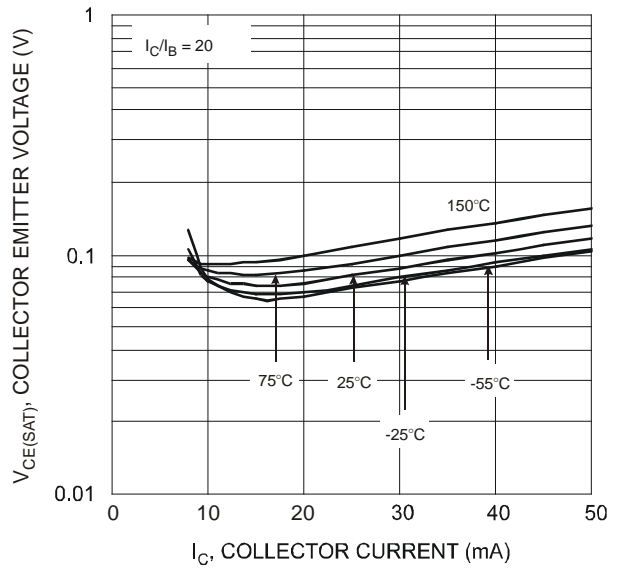


Fig. 4  $V_{CE(SAT)}$  vs.  $I_C$

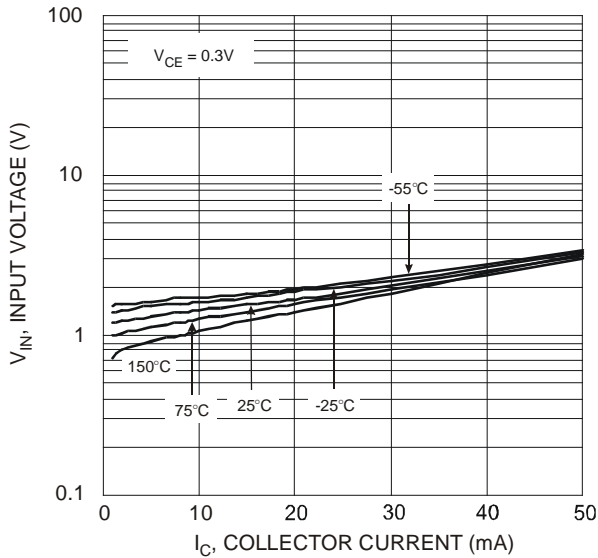


Fig. 5 Input Voltage vs. Collector Current

**Typical Electrical Characteristics – DDTC143EE**

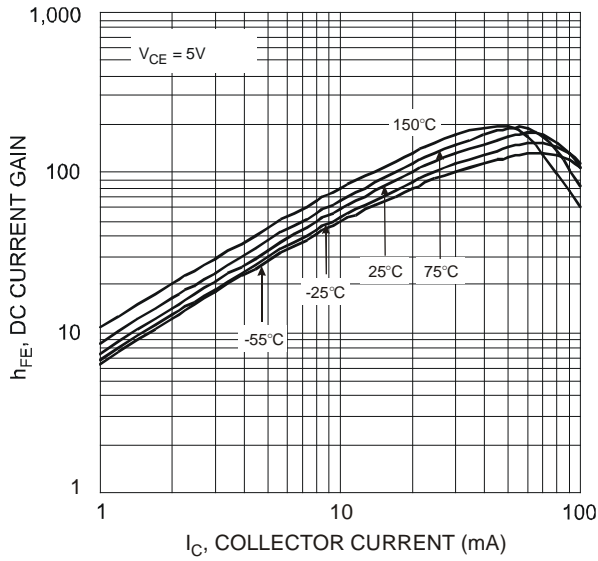


Fig. 6 Typical DC Current Gain vs. Collector Current

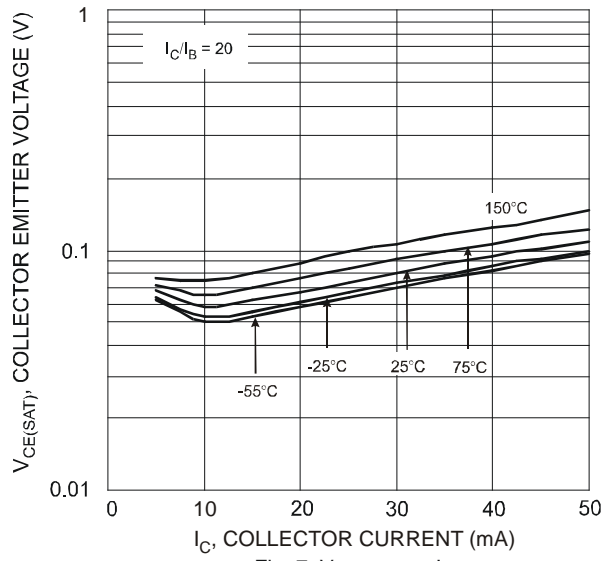


Fig. 7  $V_{CE(SAT)}$  vs.  $I_C$

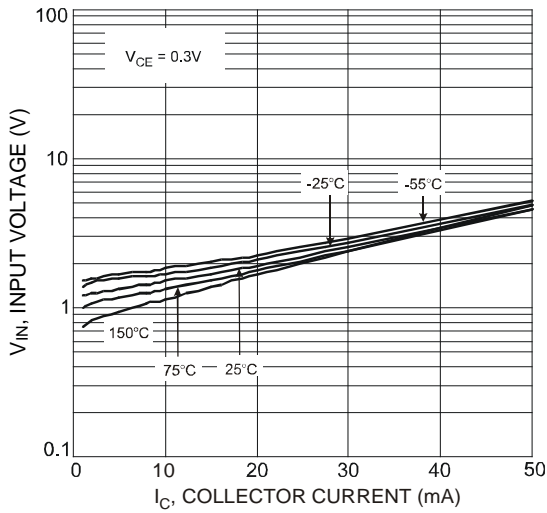


Fig. 8 Input Voltage vs. Collector Current

**Typical Electrical Characteristics – DDTC114EE**

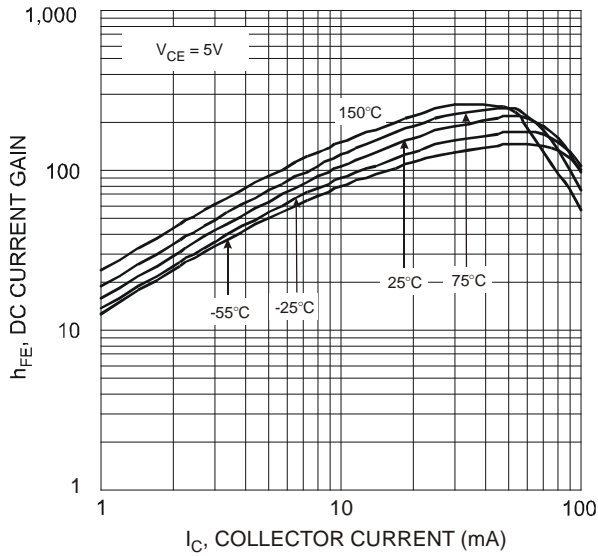


Fig. 9 Typical DC Current Gain vs. Collector Current

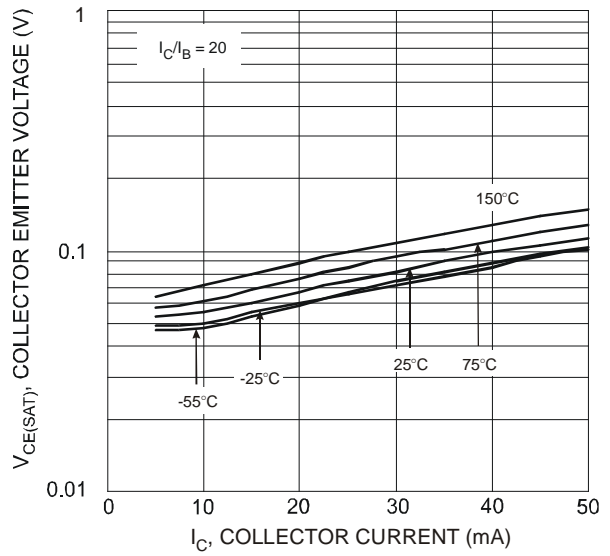


Fig. 10  $V_{CE(SAT)}$  vs.  $I_C$

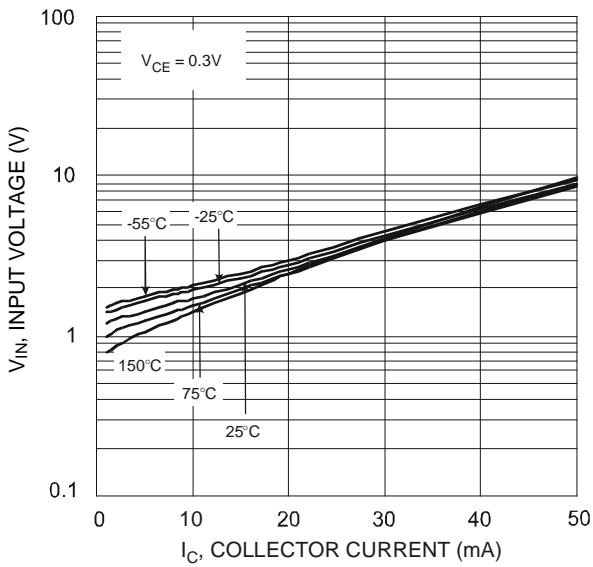


Fig. 11 Input Voltage vs. Collector Current

**Typical Electrical Characteristics – DDTC124EE**

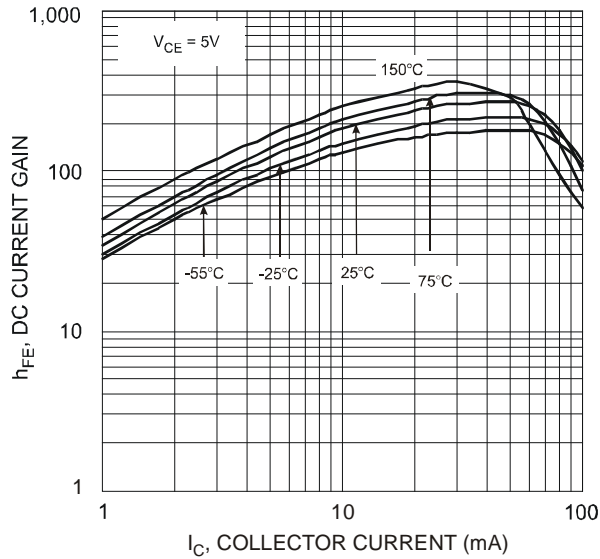


Fig. 12 Typical DC Current Gain vs. Collector Current

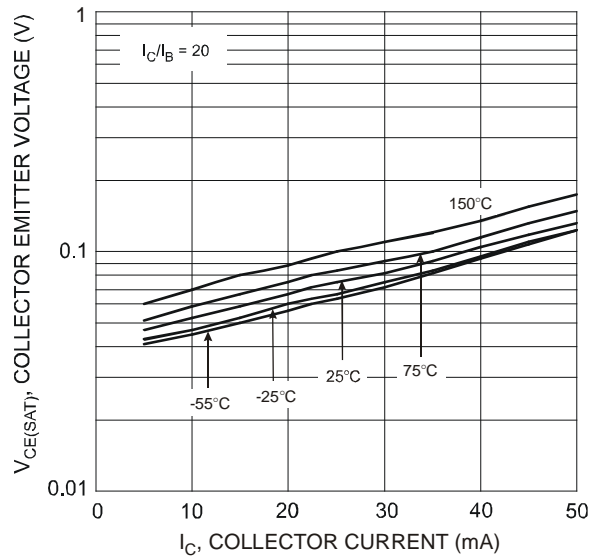


Fig. 13  $V_{CE(SAT)}$  vs.  $I_C$

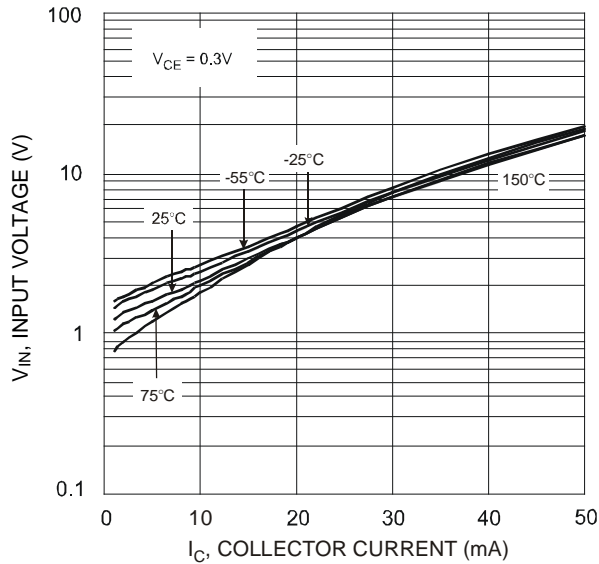


Fig. 14 Input Voltage vs. Collector Current

**Typical Electrical Characteristics – DDTC144EE**

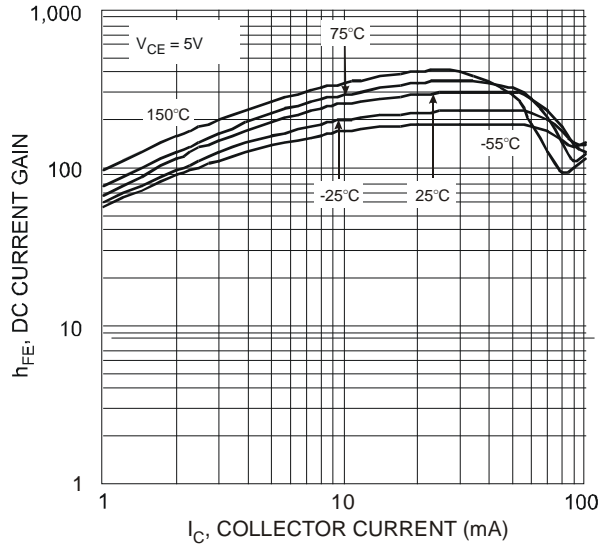


Fig. 15 Typical DC Current Gain vs. Collector Current

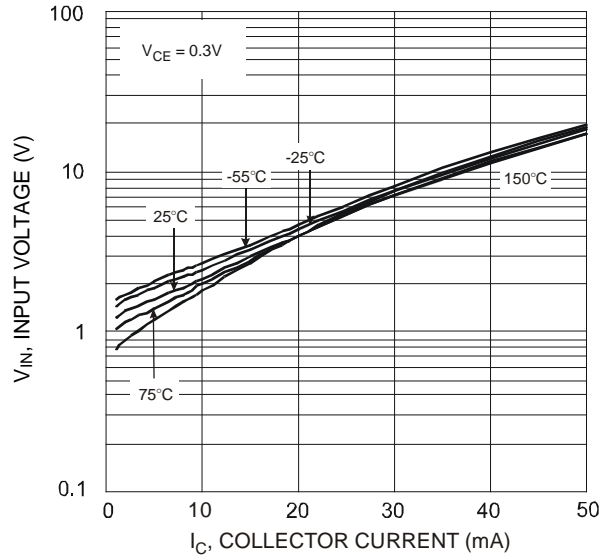


Fig. 16 Input Voltage vs. Collector Current

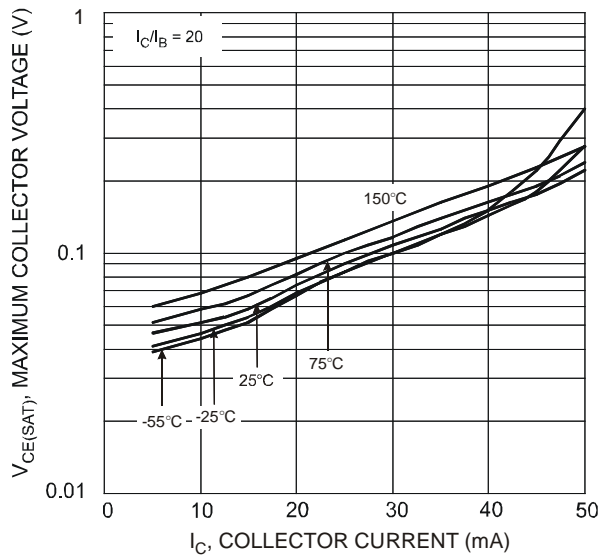
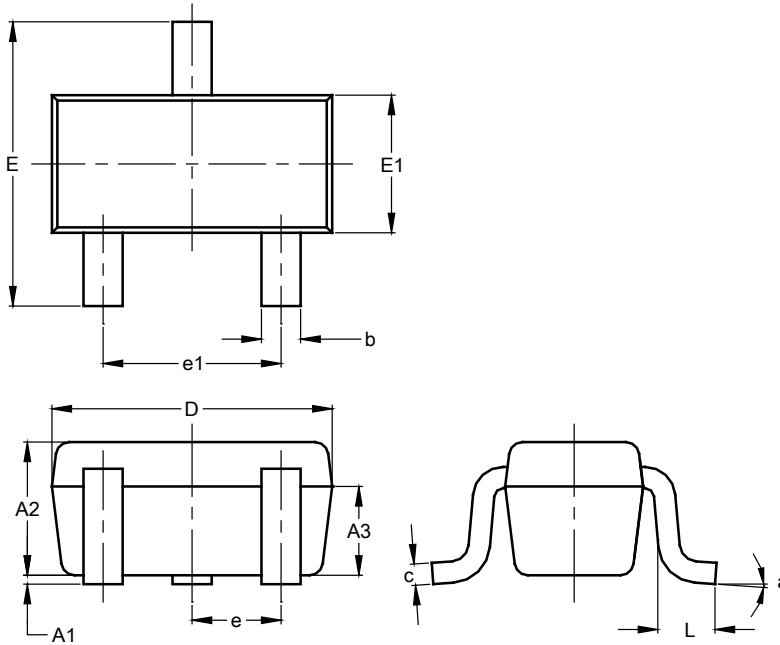


Fig. 17  $V_{CE(SAT)}$  vs.  $I_C$

**Package Outline Dimensions**

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

**SOT523**

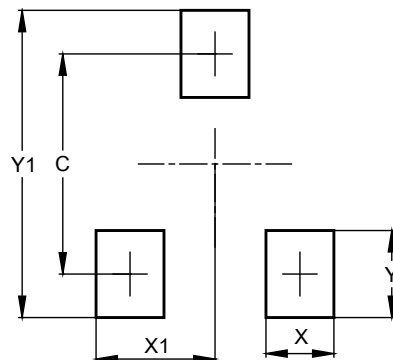


SOT523			
Dim	Min	Max	Typ
A1	0.00	0.10	0.05
A2	0.60	0.80	0.75
A3	0.45	0.65	0.50
b	0.15	0.30	0.22
c	0.10	0.20	0.12
D	1.50	1.70	1.60
E	1.45	1.75	1.60
E1	0.75	0.85	0.80
e	0.50 BSC		
e1	0.90	1.10	1.00
L	0.20	0.40	0.33
a	0°	--	8°
All Dimensions in mm			

**Suggested Pad Layout**

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

**SOT523**



Dimensions	Value (in mm)
C	1.29
X	0.40
X1	0.70
Y	0.51
Y1	1.80

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