

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

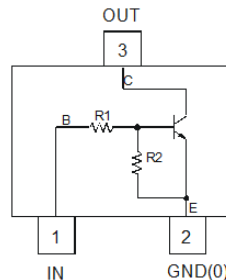
- Case: SOT523
- Case Material: Molded Plastic, "Green" Molding Compound
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per
MIL-STD-202, Method 208 (E3)
- Weight: 0.002 grams (Approximate)

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

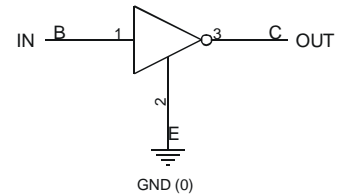
SOT523



Top View



Device Schematic



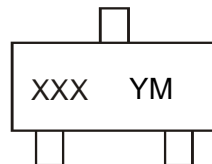
Equivalent Inverter Circuit

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

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_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Supply Voltage <Pin: (3) to (2)>		V _{CC}	50	V
Input Voltage <Pin: (1) to (2)>	DDTC123EE	V _{IN}	-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 _O	100	mA
	DDTC143EE		100	
	DDTC114EE		50	
	DDTC124EE		30	
	DDTC144EE		100	
	DDTC115EE		20	
Output Current		I _C (Max)	100	mA

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

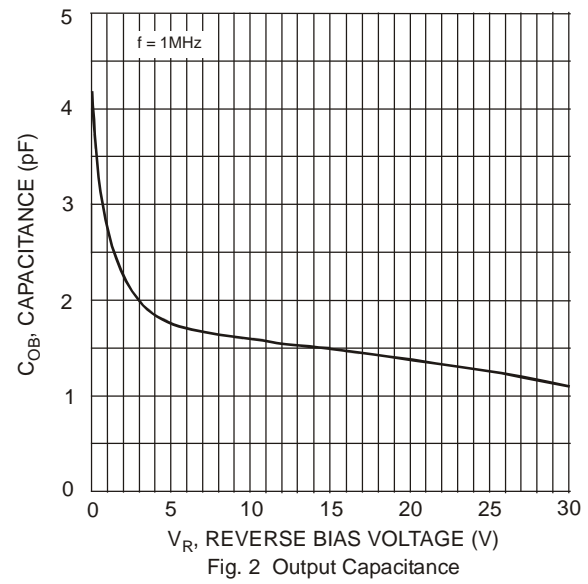
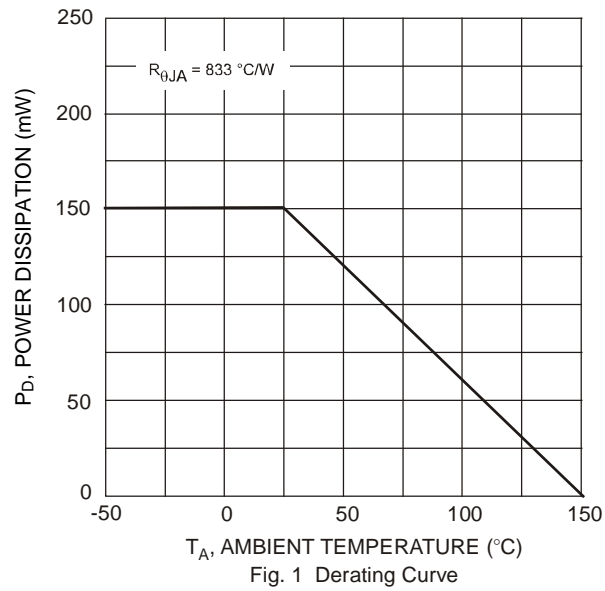
Characteristic	Symbol	Value	Unit
Power Dissipation (Notes 5 & 6)	P _D	150	mW
Thermal Resistance, Junction to Ambient Air (Note 5)	R _{θJA}	833	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

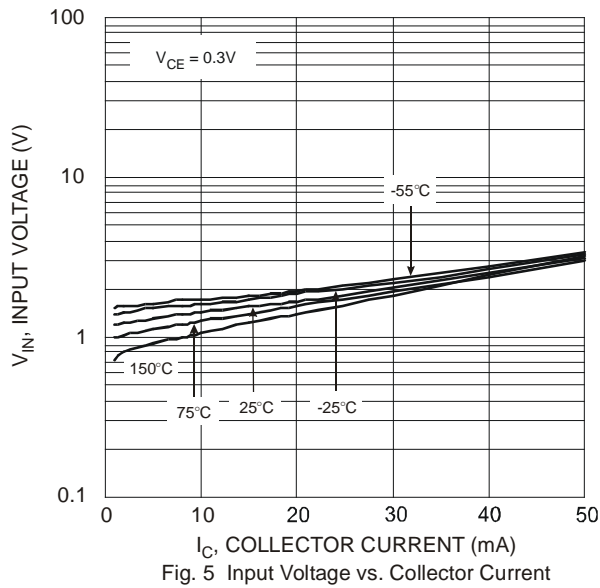
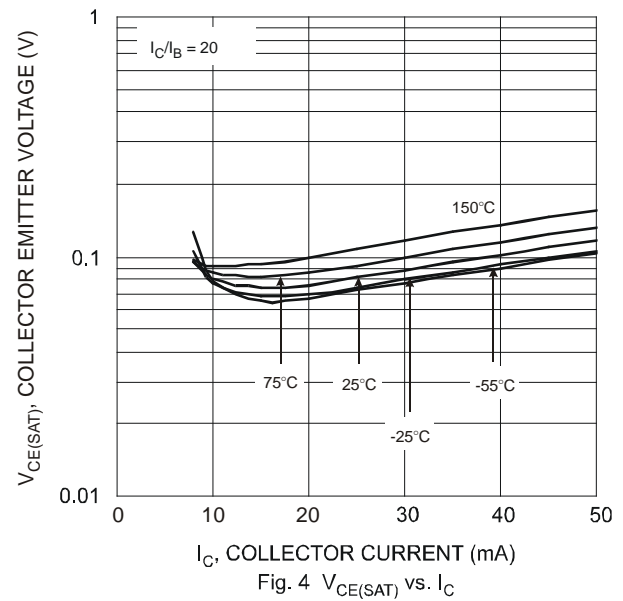
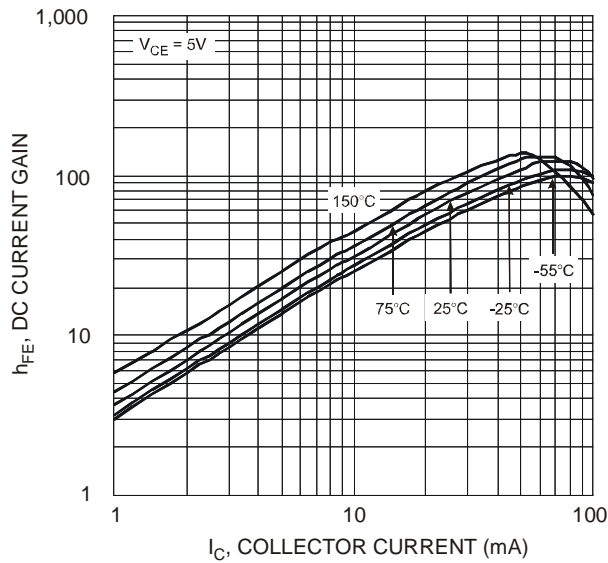
Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition
Input Voltage		V _{I(OFF)} (Note 7)	0.5	1.1	—	V	V _{CC} = 5V, I _O = 100μA
		V _{I(ON)} (Note 8)	—	1.9	3		V _O = 0.3V, I _O = 20mA, DDTC123EE V _O = 0.3V, I _O = 20mA, DDTC143EE V _O = 0.3V, I _O = 10mA, DDTC114EE V _O = 0.3V, I _O = 5mA, DDTC124EE V _O = 0.3V, I _O = 2mA, DDTC144EE V _O = 0.3V, I _O = 1mA, DDTC115EE
Output Voltage		V _{O(ON)}	—	0.1	0.3	V	I _O /I _I = 10mA/0.5mA, DDTC123EE I _O /I _I = 10mA/0.5mA, DDTC143EE I _O /I _I = 10mA/0.5mA, DDTC114EE I _O /I _I = 10mA/0.5mA, DDTC124EE I _O /I _I = 10mA/0.5mA, DDTC144EE I _O /I _I = 5mA/0.25mA, DDTC115EE
Input Current	DDTC123EE DDTC143EE DDTC114EE DDTC124EE DDTC144EE DDTC115EE	I _I	—	—	3.8 1.8 0.88 0.36 0.18 0.15	mA	V _I = 5V
Output Current		I _{O(OFF)}	—	—	0.5	μA	V _{CC} = 50V, V _I = 0V
DC Current Gain	DDTC123EE	G _I	20	—	—	—	V _O = 5V, I _O = 20mA
	DDTC143EE		20				V _O = 5V, I _O = 10mA
	DDTC114EE		30				V _O = 5V, I _O = 5mA
	DDTC124EE		56				V _O = 5V, I _O = 5mA
	DDTC144EE		68				V _O = 5V, I _O = 5mA
	DDTC115EE		82				V _O = 5V, I _O = 5mA
Input Resistor Tolerance		ΔR ₁	-30	—	+30	%	—
Resistance Ratio Tolerance		ΔR ₂ /R ₁	0.8	1	1.2	%	—
Gain-Bandwidth Product (Note 9)		f _T	—	250	—	MHz	V _{CE} = -10V, I _E = 5mA, f = 100MHz

- Notes:
5. Mounted on FR-4 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



Typical Electrical Characteristics – DDTC143EE

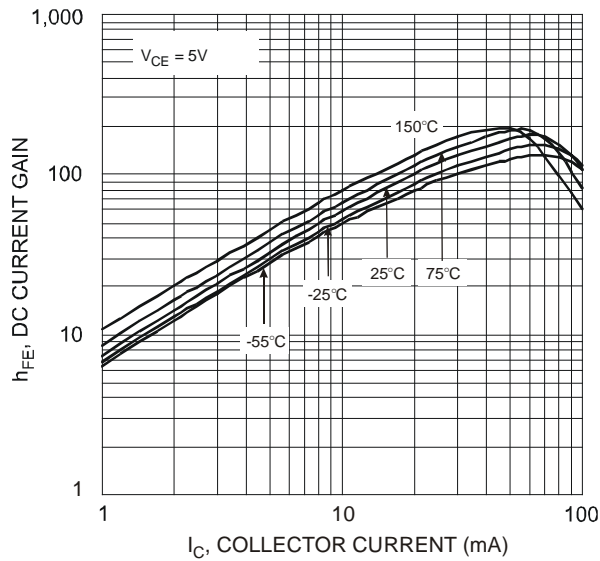


Fig. 6 Typical DC Current Gain vs. Collector Current

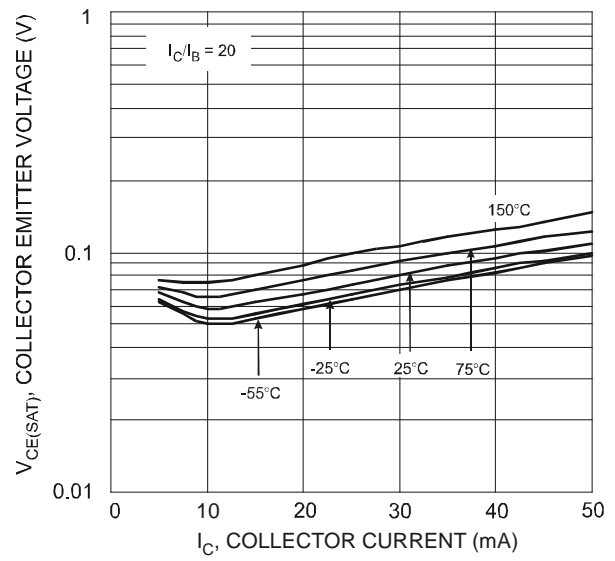


Fig. 7 $V_{CE(SAT)}$ vs. I_C

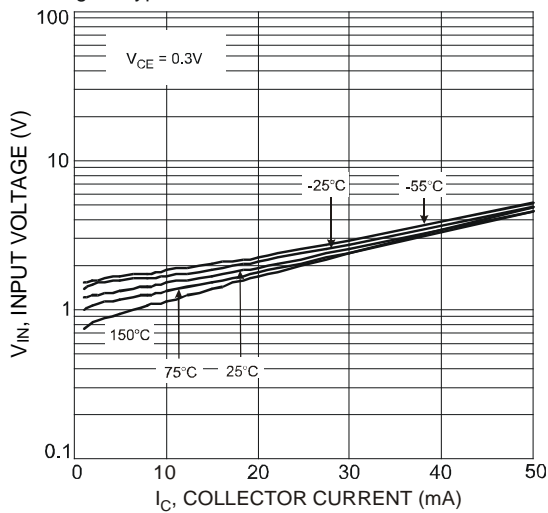
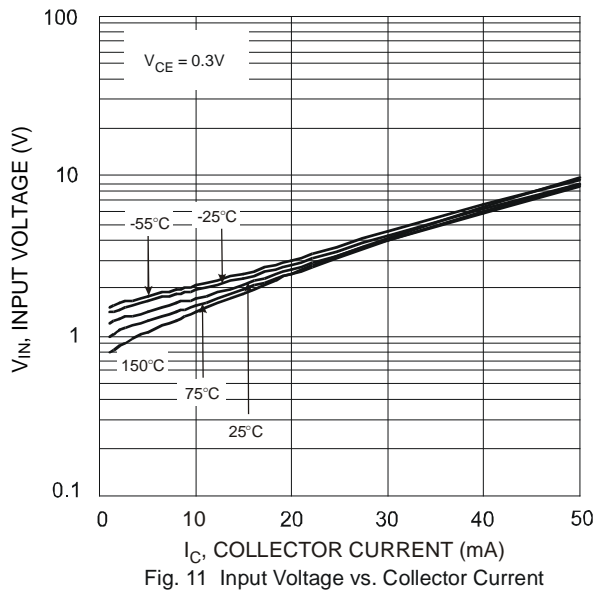
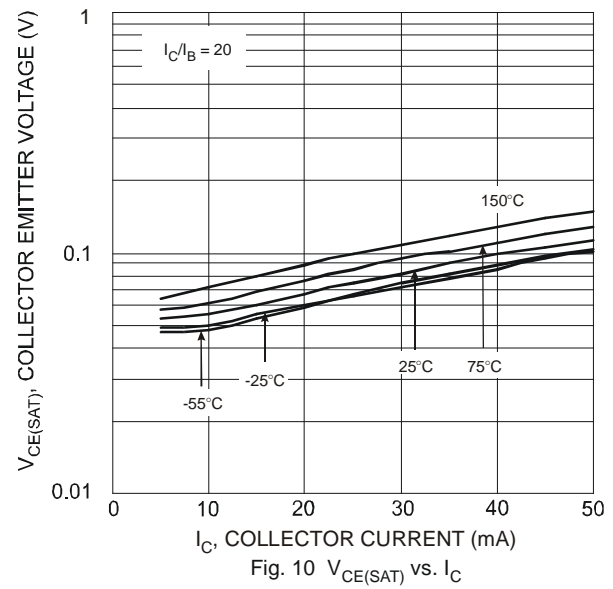
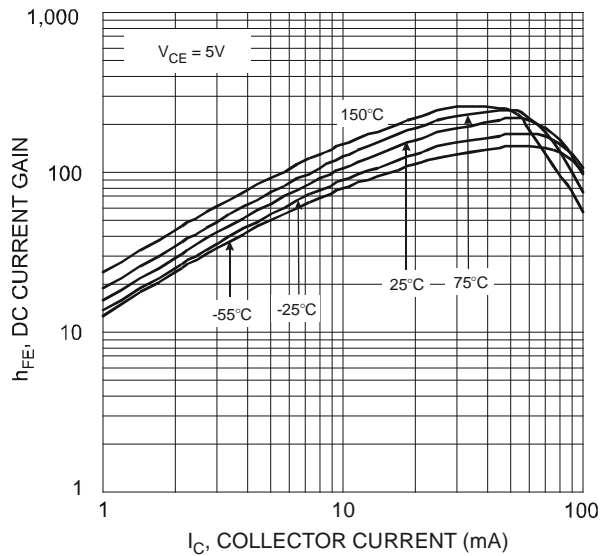
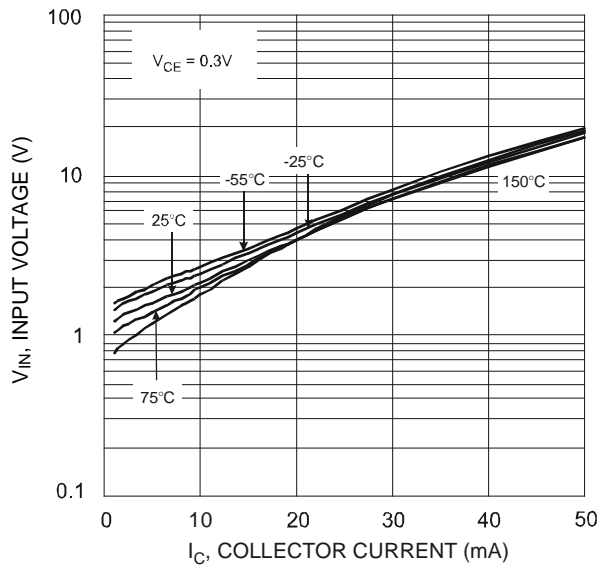
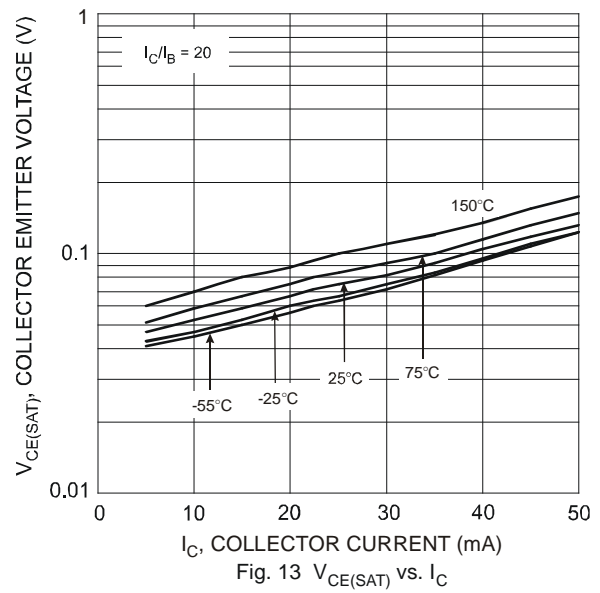
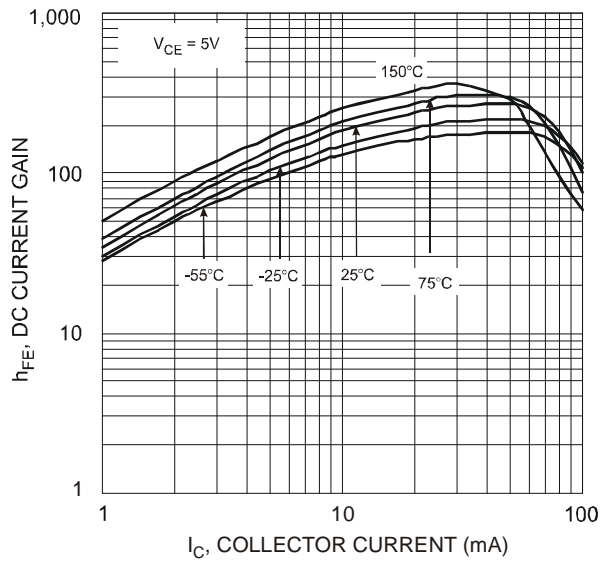


Fig. 8 Input Voltage vs. Collector Current

Typical Electrical Characteristics – DDTC114EE



Typical Electrical Characteristics – DDT124EE



Typical Electrical Characteristics – DDTC144EE

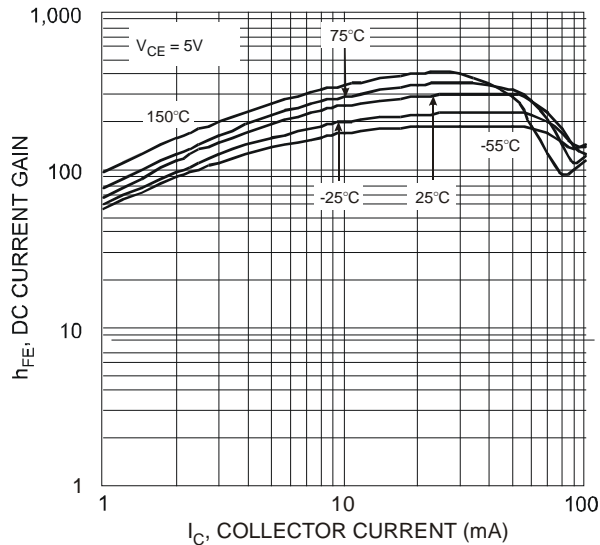


Fig. 15 Typical DC Current Gain vs. Collector Current

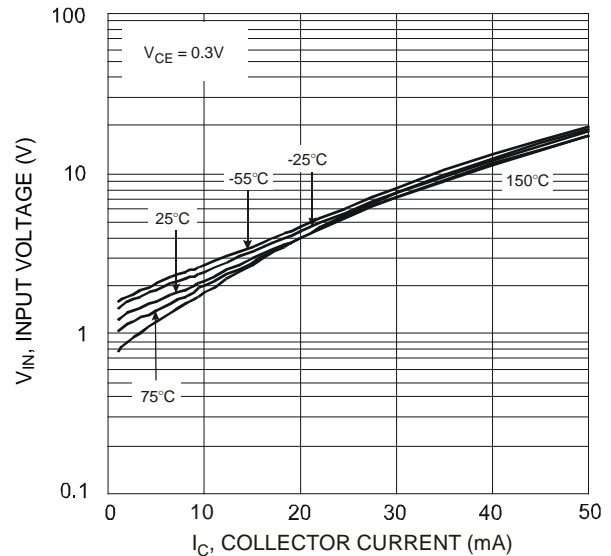


Fig. 16 Input Voltage vs. Collector Current

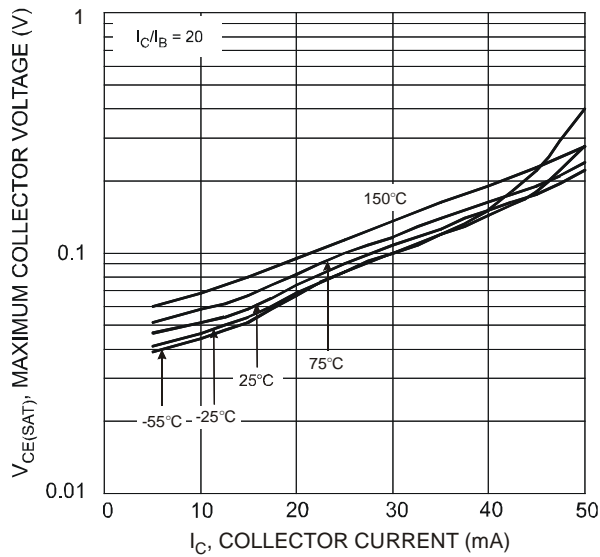
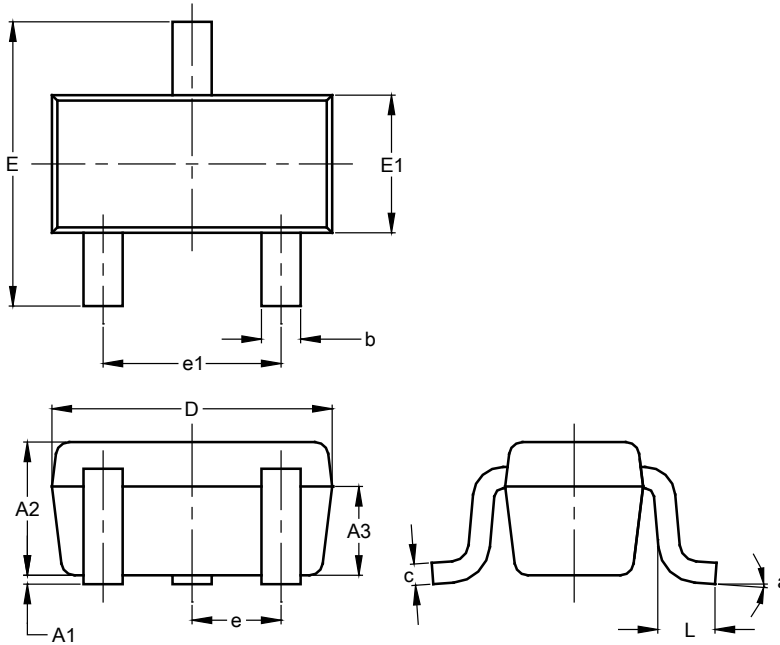


Fig. 17 $V_{CE(SAT)}$ vs. I_C

Package Outline Dimensions

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

SOT523

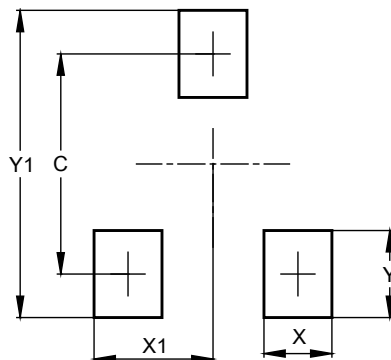


SOT523			
Dim	Min	Max	Typ
A1	0.00	0.10	0.05
A2	0.60	0.80	0.75
A3	0.45	0.65	0.50
b	0.15	0.30	0.22
c	0.10	0.20	0.12
D	1.50	1.70	1.60
E	1.45	1.75	1.60
E1	0.75	0.85	0.80
e	0.50 BSC		
e1	0.90	1.10	1.00
L	0.20	0.40	0.33
a	0°	--	8°
All Dimensions in mm			

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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