

DDTC (R1 = R2 SERIES) E

NPN PRE-BIASED SMALL SIGNAL SURFACE MOUNT TRANSISTOR

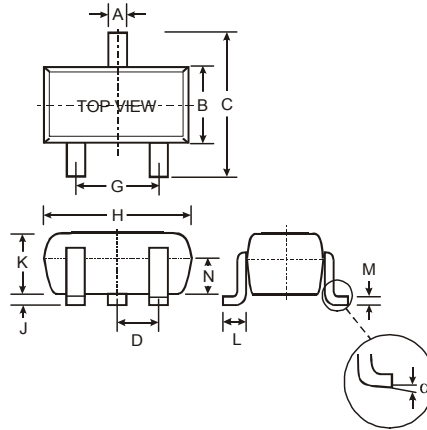
Features

- Epitaxial Planar Die Construction
- Complementary PNP Types Available (DDTA)
- Built-In Biasing Resistors, R1 = R2
- **Lead Free/RoHS Compliant (Note 1)**
- **"Green" Device (Note 3 and 4)**

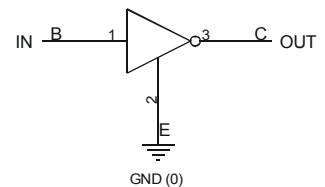
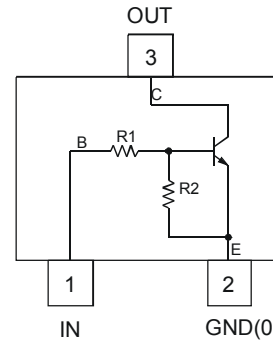
Mechanical Data

- Case: SOT-523
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture sensitivity: Level 1 per J-STD-020C
- Terminal Connections: See Diagram
- Terminals: Finish - Solderable per MIL-STD-202, Method 208
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- Marking Information: See Table Below and Page 7
- Ordering Information: See Page 7
- Weight: 0.002 grams (approximate)

P/N	R1, RN (NOM)	Marking
DDTC123EE	2.2K Ω	N04
DDTC143EE	4.7K Ω	N08
DDTC114EE	10K Ω	N13
DDTC124EE	22K Ω	N17
DDTC144EE	47K Ω	N20
DDTC115EE	100K Ω	N24



SOT-523			
Dim	Min	Max	Typ
A	0.15	0.30	0.22
B	0.75	0.85	0.80
C	1.45	1.75	1.60
D	—	—	0.50
G	0.90	1.10	1.00
H	1.50	1.70	1.60
J	0.00	0.10	0.05
K	0.60	0.80	0.75
L	0.10	0.30	0.22
M	0.10	0.20	0.12
N	0.45	0.65	0.50
α	0°	8°	—
All Dimensions in mm			



Schematic and Pin Configuration

Equivalent Inverter Circuit

Maximum Ratings @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Supply Voltage (3) to (2)	V _{CC}	50	V
Input Voltage (1) to (2)	V _{IN}	-10 to +12 -10 to +30 -10 to +40 -10 to +40 -10 to +40 -10 to +40	V
Output Current	I _O	100 100 50 30 100 20	mA
Power Dissipation	P _d	150	mW
Thermal Resistance, Junction to Ambient Air (Note 2)	R _{θJA}	833	°C/W
Operating and Storage Temperature Range	T _i , T _{STG}	-55 to +150	°C

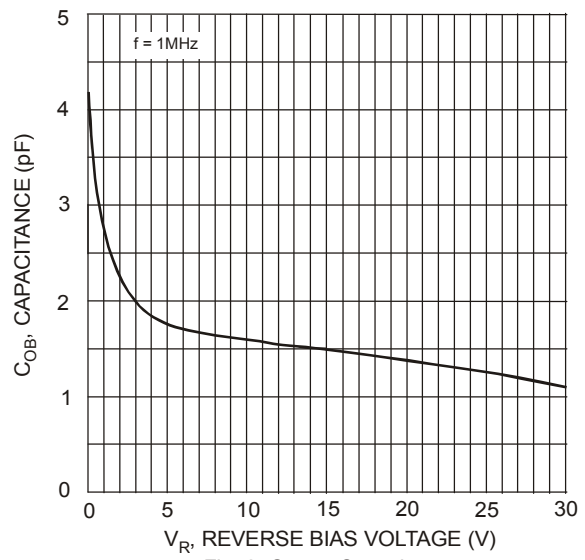
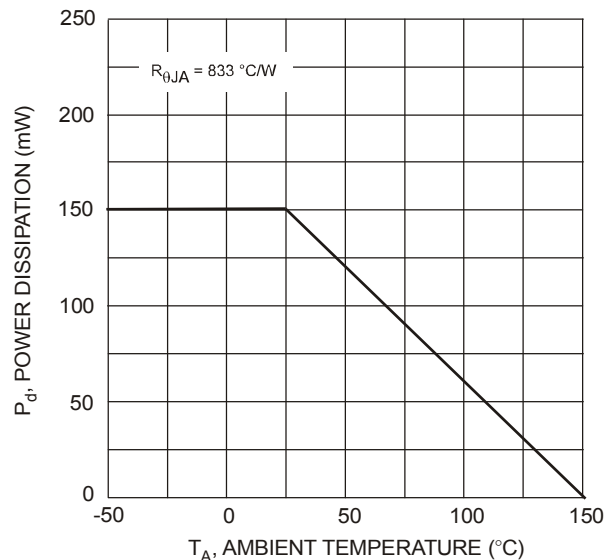
- Notes:
1. No purposefully added lead.
 2. Mounted on FR4 PC Board with recommended pad layout at <http://www.diodes.com/datasheets/ap02001.pdf>.
 3. Diodes Inc.'s "Green" policy can be found on our website at http://www.diodes.com/products/lead_free/index.php.
 4. Product manufactured with Date Code UO (week 40, 2007) and newer are built with Green Molding Compound. Product manufactured prior to Date Code UO are built with Non-Green Molding Compound and may contain Halogens or Sb2O3 Fire Retardants.

Electrical Characteristics @T_A = 25°C unless otherwise specified

Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition
Input Voltage		V _{I(off)}	0.5	1.1	—	V	V _{CC} = 5V, I _O = 100mA
		V _{I(on)}	—	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		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		G _I	20 20 30 56 68 82	—	—	—	V _O = 5V, I _O = 20mA V _O = 5V, I _O = 10mA V _O = 5V, I _O = 5mA V _O = 5V, I _O = 5mA V _O = 5V, I _O = 5mA V _O = 5V, I _O = 5mA
Input Resistor (R ₁) Tolerance		ΔR ₁	-30	—	+30	%	—
Resistance Ratio		R ₂ /R ₁	0.8	1	1.2	—	—
Gain-Bandwidth Product*		f _T	—	250	—	MHz	V _{CE} = 10V, I _E = 5mA, f = 100MHz

* Transistor – For Reference Only

Electrical Characteristics @T_A = 25°C unless otherwise specified



Typical Curves – DDTC123EE

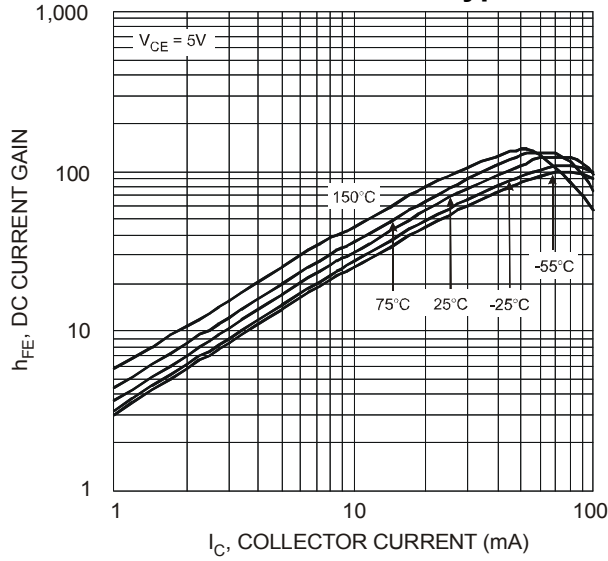


Fig. 3 Typical DC Current Gain vs. Collector Current

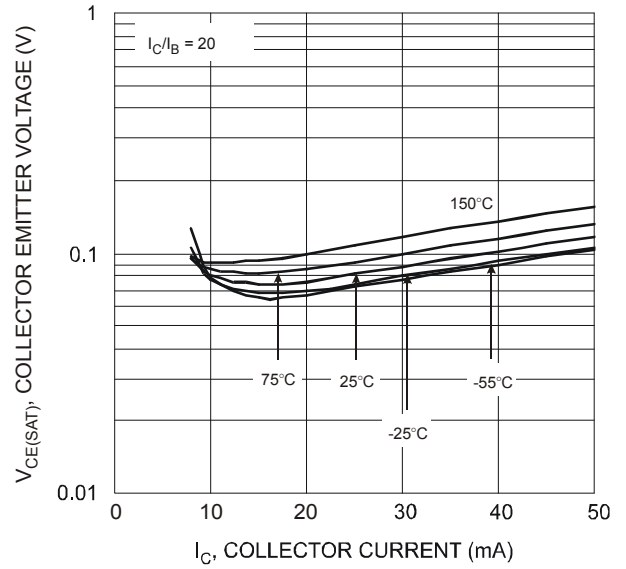


Fig. 4 $V_{CE(SAT)}$ vs. I_C

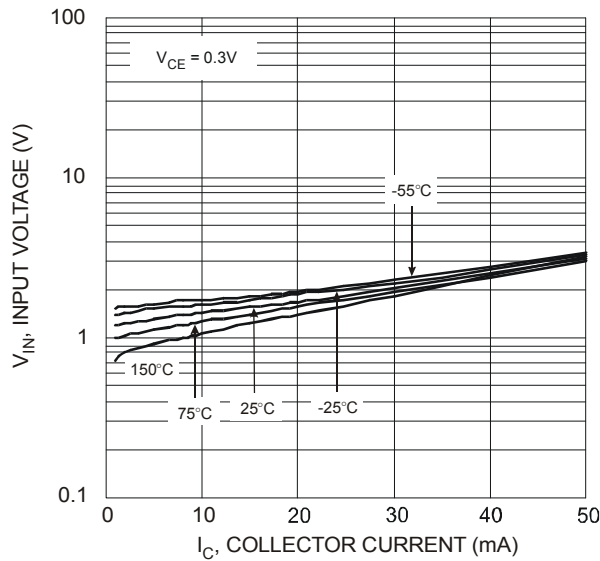


Fig. 5 Input Voltage vs. Collector Current

Typical Curves – DDTC143EE

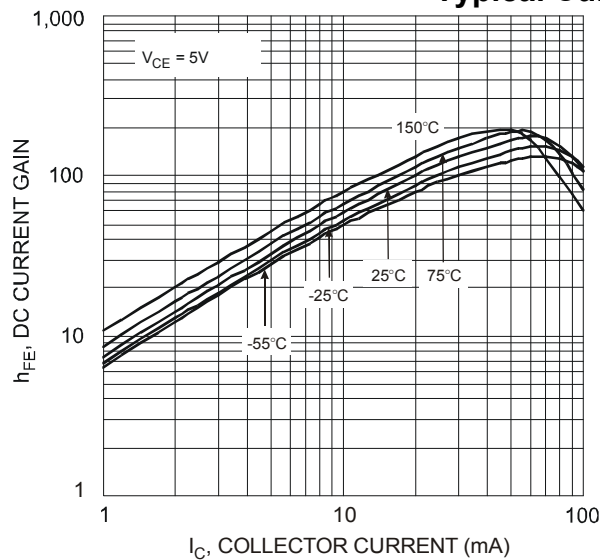


Fig. 6 Typical DC Current Gain vs. Collector Current

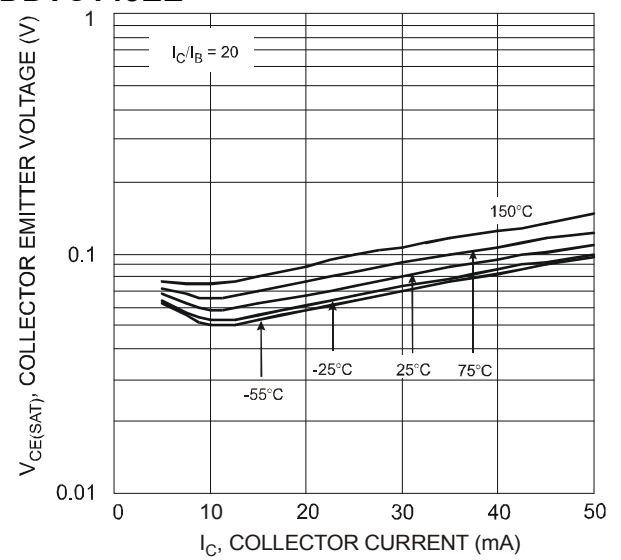


Fig. 7 $V_{CE(SAT)}$ vs. I_C

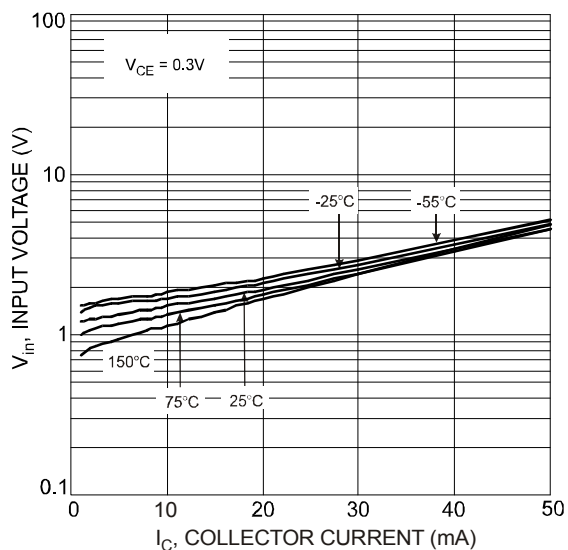


Fig. 8 Input Voltage vs. Collector Current

Typical Curves – DDTC114EE

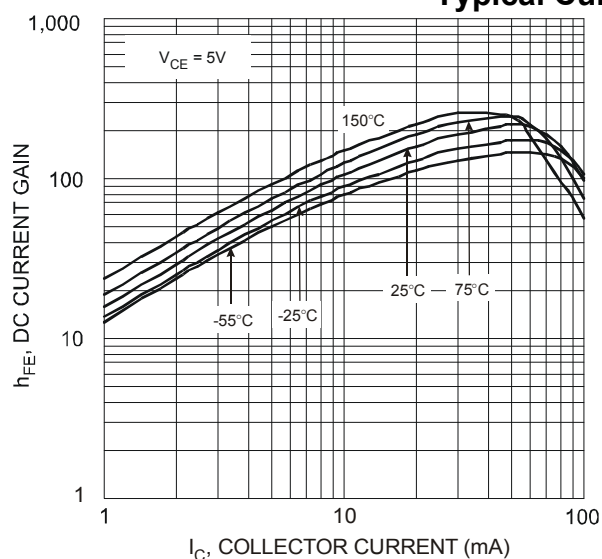


Fig. 9 Typical DC Current Gain vs. Collector Current

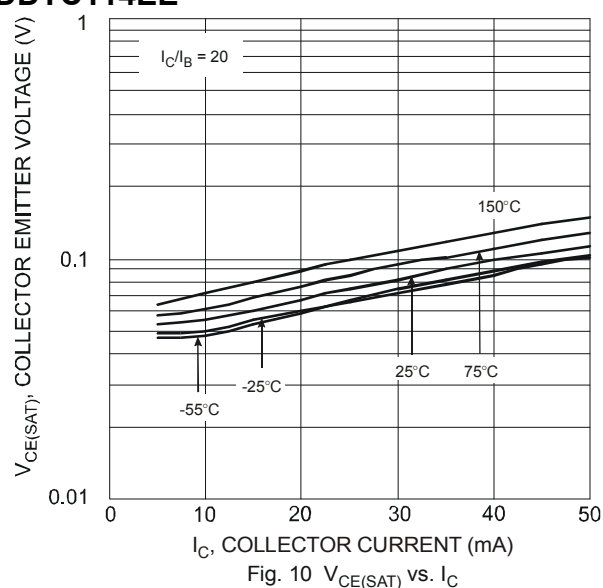


Fig. 10 $V_{CE(SAT)}$ vs. I_C

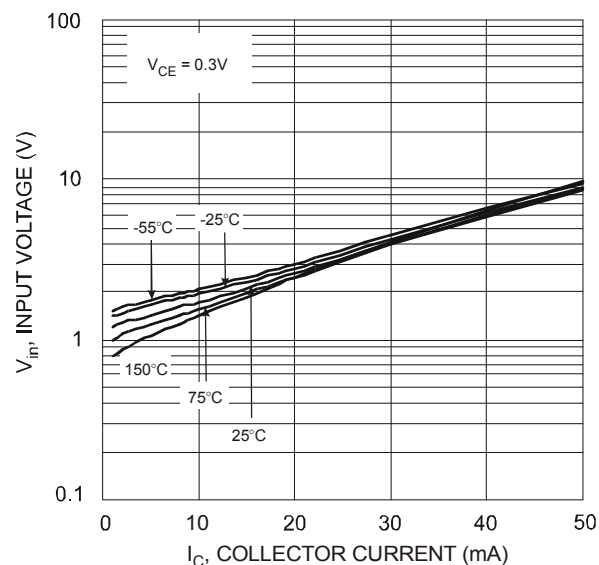


Fig. 11 Input Voltage vs. Collector Current

Typical Curves – DDTC124EE

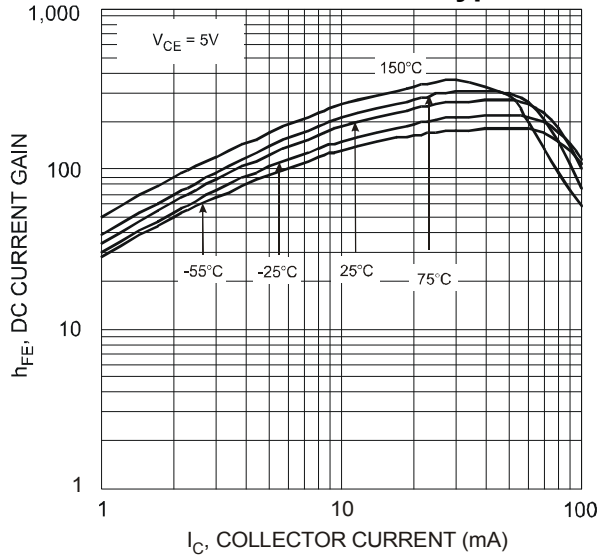


Fig. 12 Typical DC Current Gain vs. Collector Current

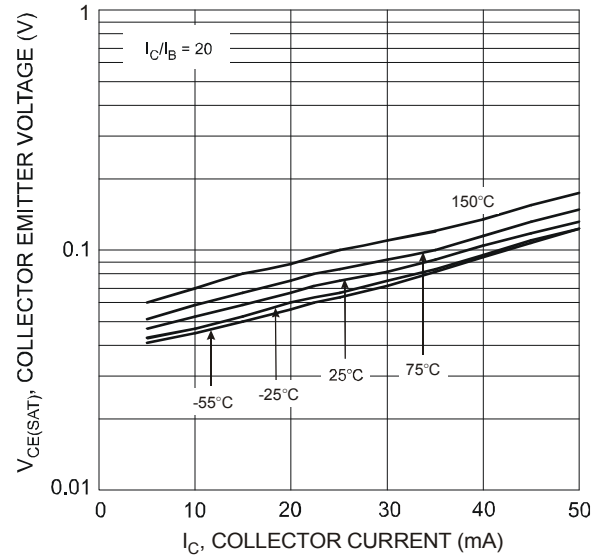


Fig. 13 $V_{CE(SAT)}$ vs. I_C

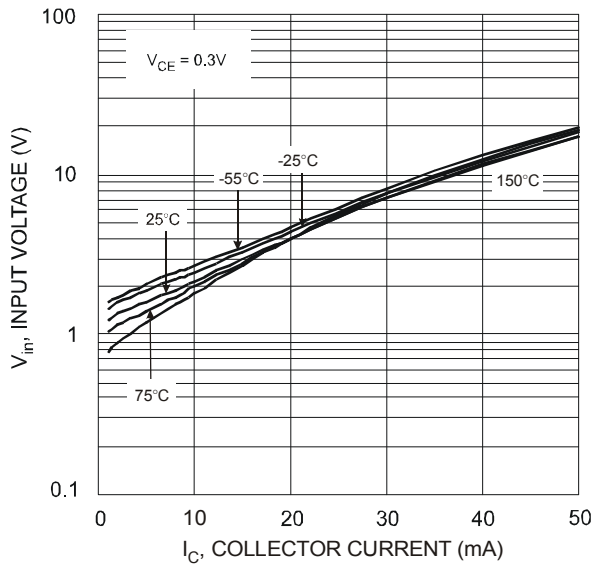


Fig. 14 Input Voltage vs. Collector Current

Typical Curves – DDTC144EE

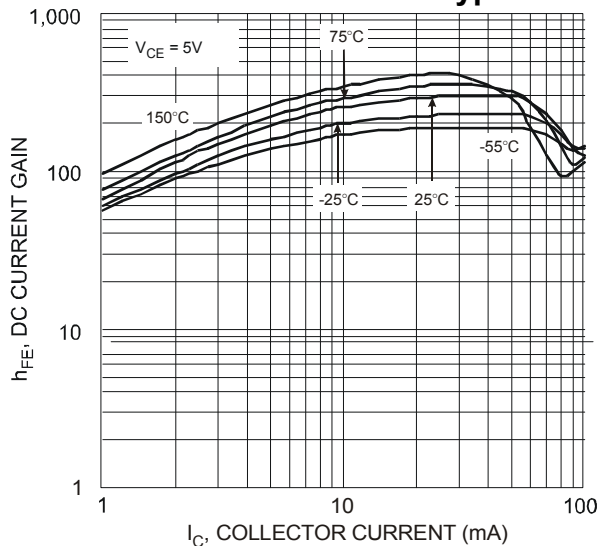


Fig. 15 Typical DC Current Gain vs. Collector Current

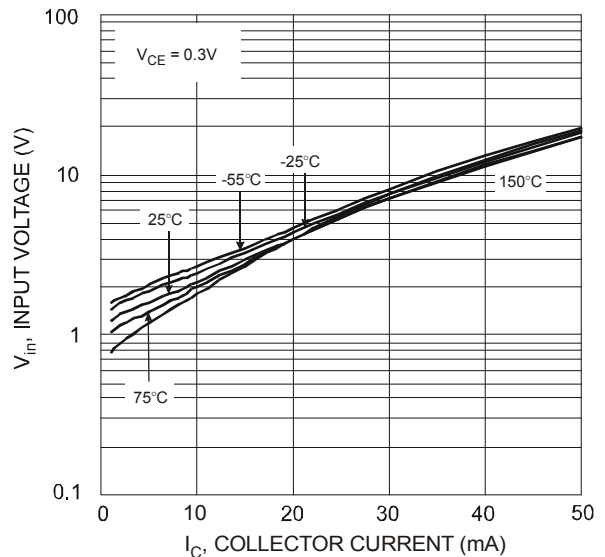
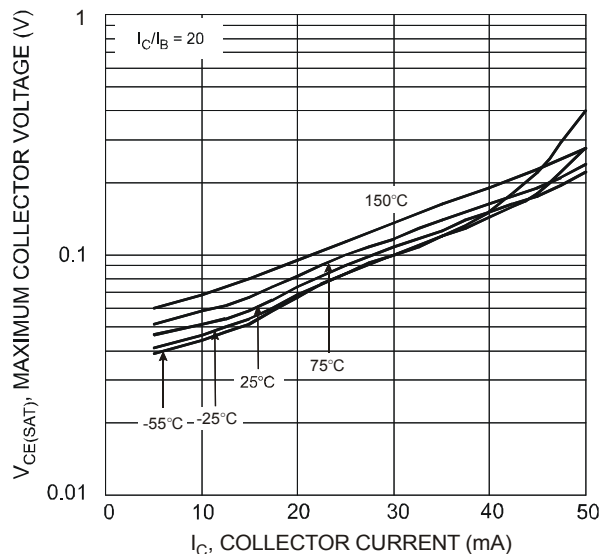


Fig. 16 Input Voltage vs. Collector Current

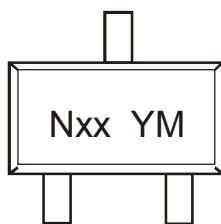


Ordering Information (Note 5)

Device	Packaging	Shipping
DDTC123EE-7-F	SOT-523	3000/Tape & Reel
DDTC143EE-7-F	SOT-523	3000/Tape & Reel
DDTC114EE-7-F	SOT-523	3000/Tape & Reel
DDTC124EE-7-F	SOT-523	3000/Tape & Reel
DDTC144EE-7-F	SOT-523	3000/Tape & Reel
DDTC115EE-7-F	SOT-523	3000/Tape & Reel

Notes: 5. For packaging details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

Marking Information



Nxx = Product Type Marking Code (See Page 1)
 YM = Date Code Marking
 Y = Year ex: T = 2006
 M = Month ex: 9 = September

Date Code Key

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Code	N	P	R	S	T	U	V	W	X	Y	Z

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

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