DDTC (R1 = R2 SERIES) E

NPN PRE-BIASED SMALL SIGNAL SOT-523 SURFACE MOUNT TRANSISTOR

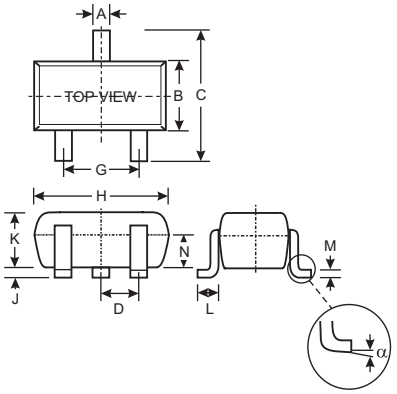
Features

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

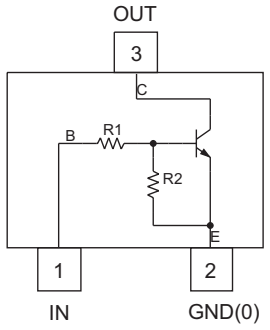
Mechanical Data

- 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 & Type Code Information: See Table Below and Last Page
- Ordering Information: See Last Page
- Weight: 0.002 grams (approximate)

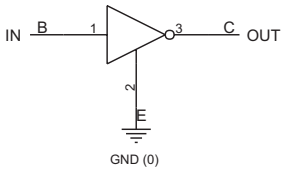
P/N	R1, R2 (NOM)	MARKING
DDTC123EE	2.2KΩ	N04
DDTC143EE	4.7KΩ	N08
DDTC114EE	10KΩ	N13
DDTC124EE	22KΩ	N17
DDTC144EE	47KΩ	N20
DDTC115EE	100KΩ	N24



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)	DDTC123EE DDTC143EE DDTC114EE DDTC124EE DDTC144EE DDTC115EE	V_{IN}	-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	I_O	100 100 50 30 100 20	mA
Power Dissipation		P_d	150	mW
Thermal Resistance, Junction to Ambient Air (Note 2)		$R_{\theta JA}$	833	°C/W
Operating and Storage and Temperature Range		T_j, T_{STG}	-55 to +150	°C

Note: 1. No purposefully added lead.
2. Mounted on FR4 PC Board with recommended pad layout at http://www.diodes.com/datasheets/ap02001.pdf.

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	$V_{CC} = 5V$, $I_O = 100\mu A$
		$V_{I(on)}$	—	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	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 DDTC143EE DDTC114EE DDTC124EE DDTC144EE DDTC115EE	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

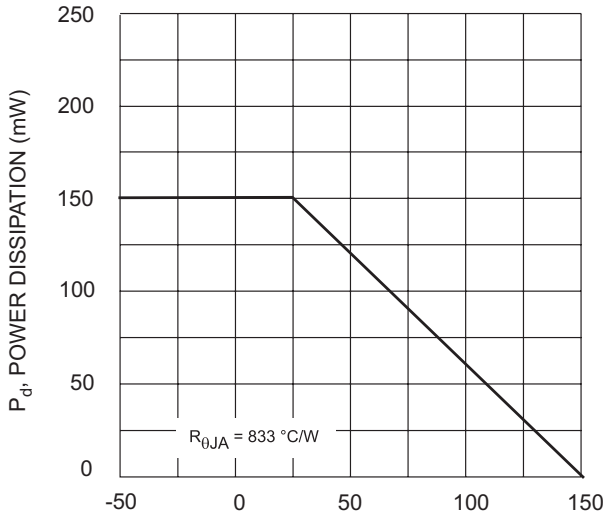


Fig. 1 Derating Curve

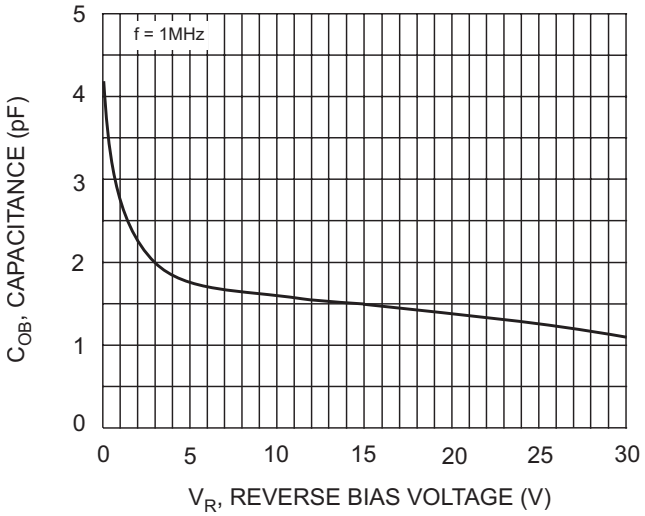


Fig. 2 Output Capacitance

Typical Curves - DDTC123EE

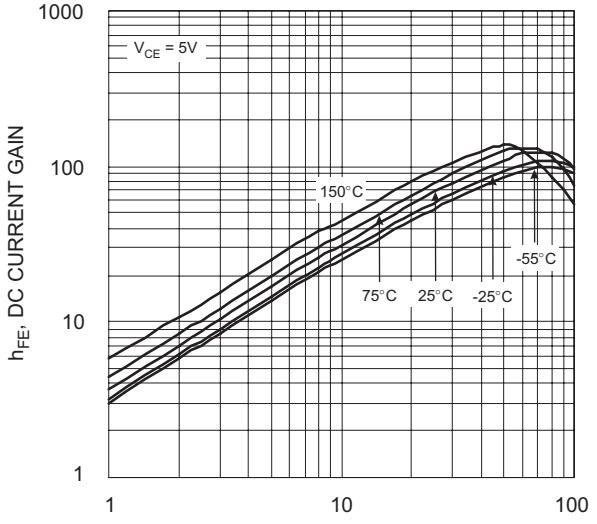


Fig. 3 Typical DC Current Gain vs. Collector Current

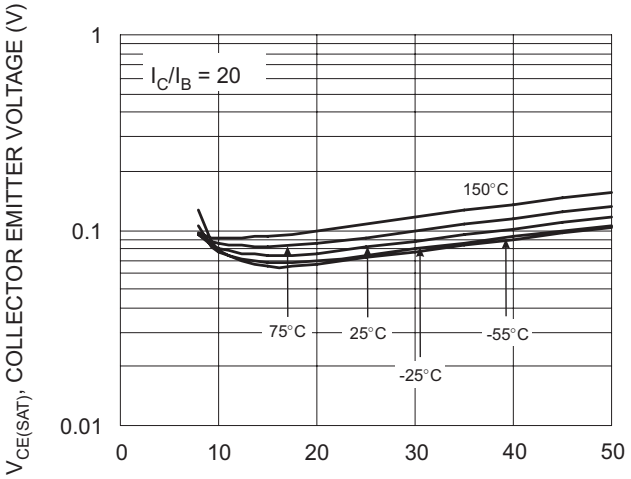


Fig. 4 $V_{CE(SAT)}$ vs. I_C

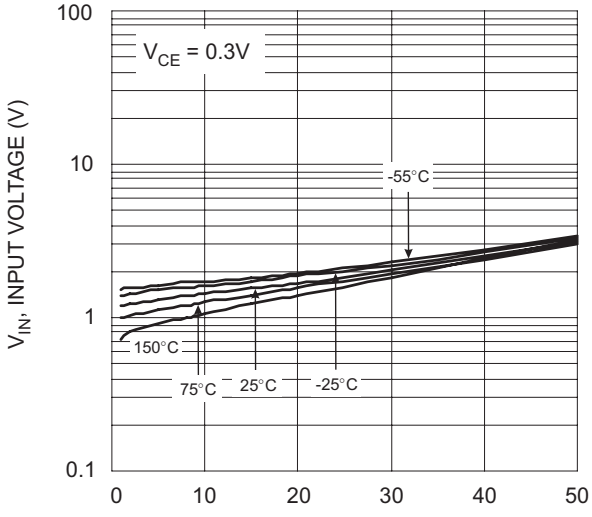


Fig. 5 Input Voltage vs. Collector Current

Typical Curves - DDTC143EE

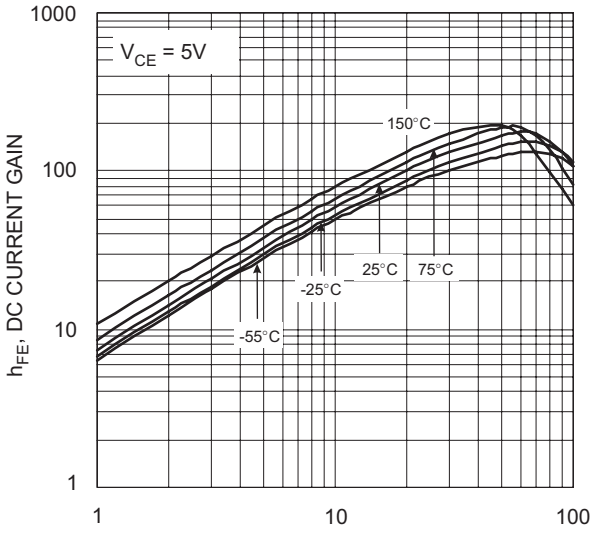


Fig. 6 Typical DC Current Gain vs Collector Current

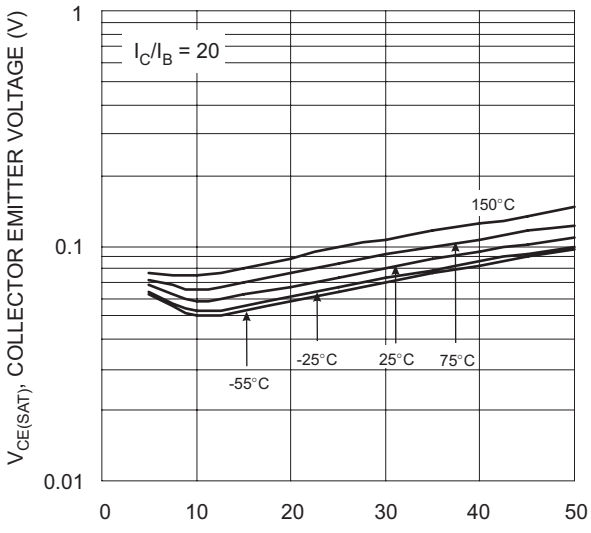


Fig. 7 $V_{CE(SAT)}$ vs. I_C

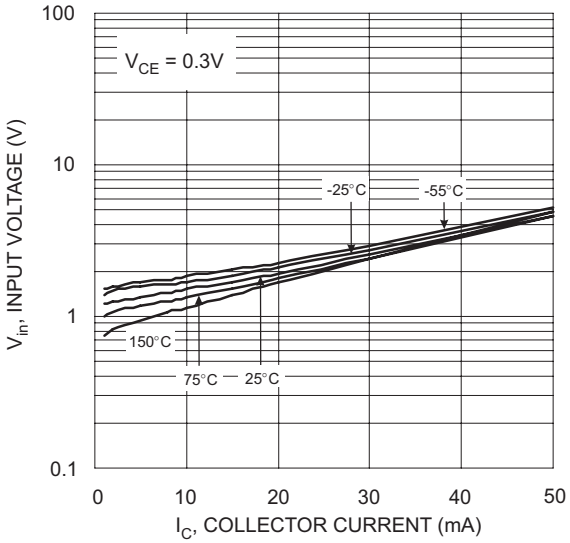


Fig. 8 Input Voltage vs. Collector Current

Typical Curves - DDTC114EE

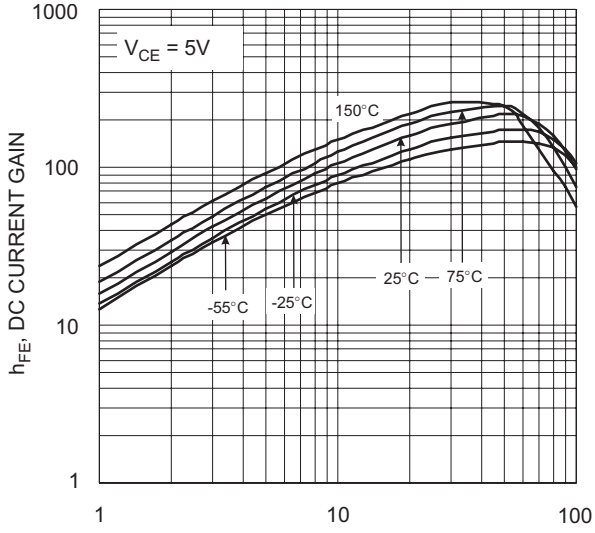


Fig. 9 Typical DC Current Gain vs Collector Current

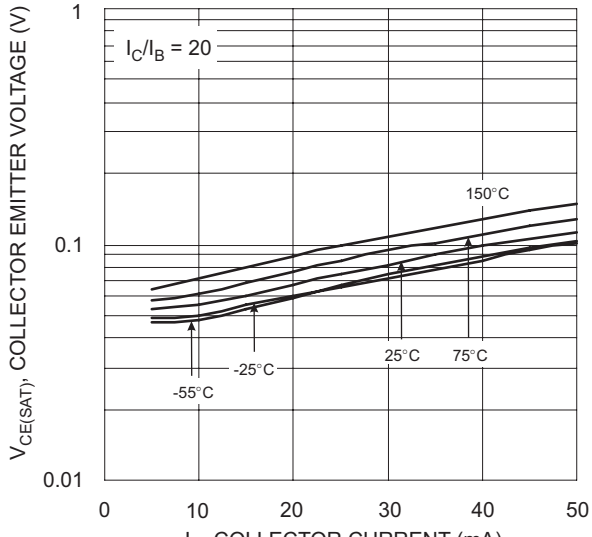


Fig. 10 $V_{CE(SAT)}$ vs. I_C

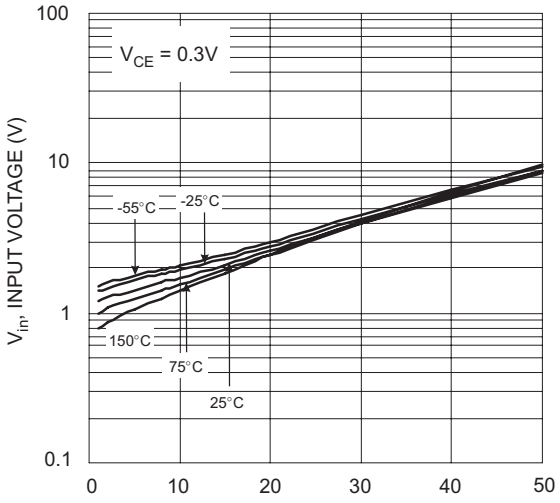


Fig. 11 Input Voltage vs. Collector Current

Typical Curves - DDTC124EE

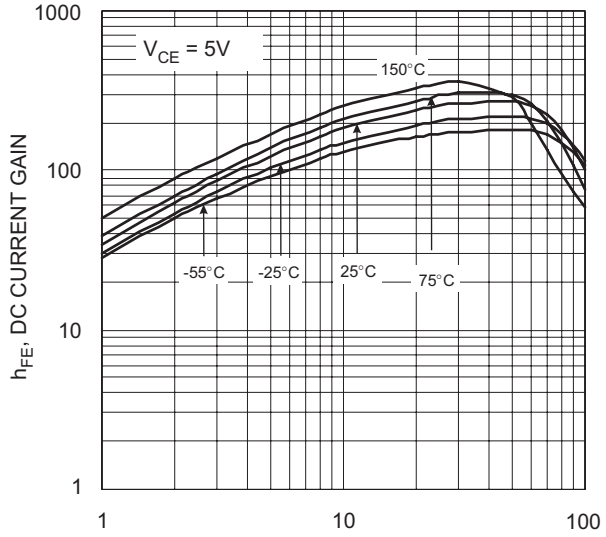


Fig. 12 Typical DC Current Gain vs Collector Current

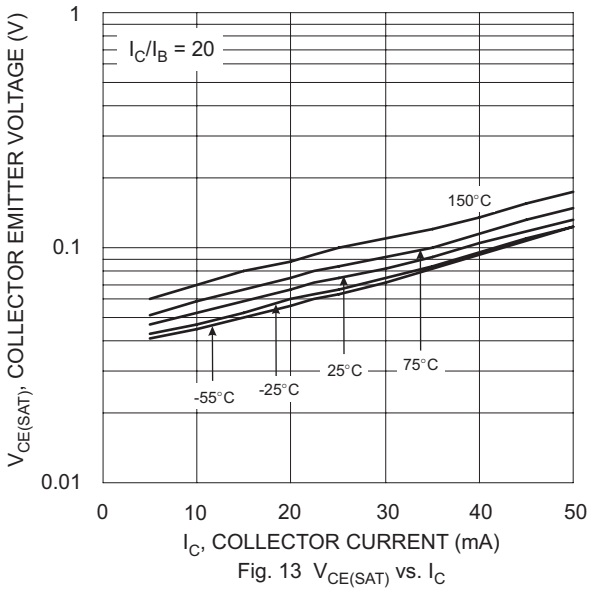


Fig. 13 $V_{CE(SAT)}$ vs. I_C

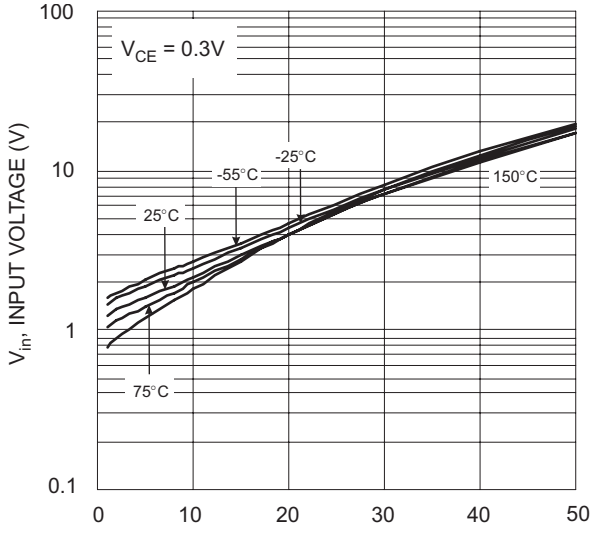


Fig. 14 Input Voltage vs. Collector Current

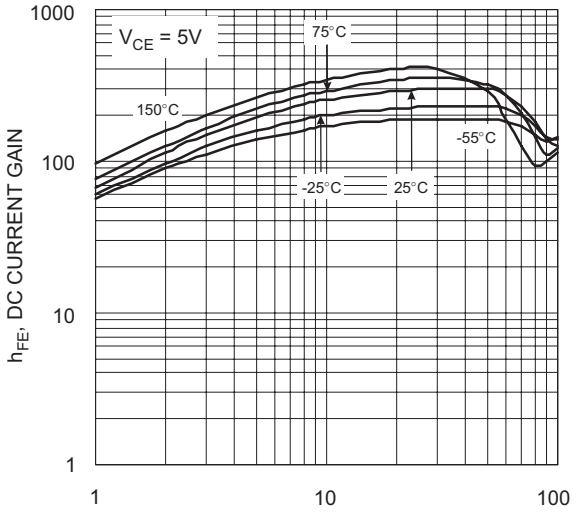


Fig. 15 Typical DC Current Gain vs Collector Current

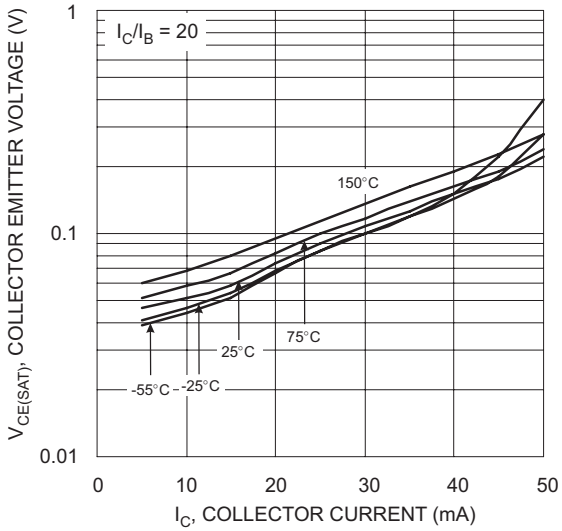


Fig. 16 $V_{CE(SAT)}$ vs. I_C

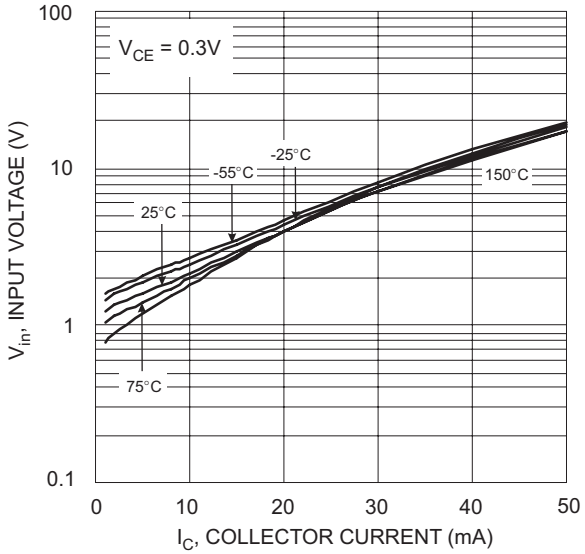


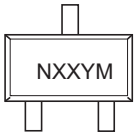
Fig. 16 Input Voltage vs. Collector Current

Ordering Information (Note 3)

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: 3. 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

IMPORTANT NOTICE

Diodes Incorporated and its subsidiaries reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to any product herein. Diodes Incorporated does not assume any liability arising out of the application or use of any product described herein; neither does it convey any license under its patent rights, nor the rights of others. The user of products in such applications shall assume all risks of such use and will agree to hold Diodes Incorporated and all the companies whose products are represented on our website, harmless against all damages.

LIFE SUPPORT

Diodes Incorporated products are not authorized for use as critical components in life support devices or systems without the expressed written approval of the President of Diodes Incorporated.