

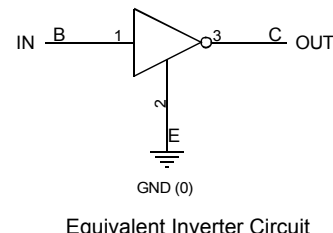
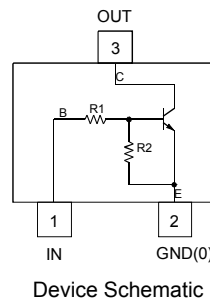
**NPN PRE-BIASED SMALL SIGNAL SURFACE MOUNT TRANSISTOR**
**Features**

- 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**
- **PPAP Capable (Note 4)**

**Mechanical Data**

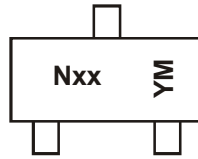
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208  $\text{e3}$
- Weight: 0.008 grams (approximate)

Part Number	R1 (NOM)	R2 (NOM)
DDTC113ZCA	1K $\Omega$	10K $\Omega$
DDTC123YCA	2.2K $\Omega$	10K $\Omega$
DDTC123JCA	2.2K $\Omega$	47K $\Omega$
DDTC143XCA	4.7K $\Omega$	10K $\Omega$
DDTC143FCA	4.7K $\Omega$	22K $\Omega$
DDTC143ZCA	4.7K $\Omega$	47K $\Omega$
DDTC114YCA	10K $\Omega$	47K $\Omega$
DDTC114WCA	10K $\Omega$	4.7K $\Omega$
DDTC124XCA	22K $\Omega$	47K $\Omega$
DDTC144VCA	47K $\Omega$	10K $\Omega$
DDTC144WCA	47K $\Omega$	22K $\Omega$


**Ordering Information** (Notes 3 & 4)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DDTC113ZCA-7-F	AEC-Q101	N02	7	8	3,000
DDTC123YCA-7-F	AEC-Q101	N05	7	8	3,000
DDTC123JCA-7-F	AEC-Q101	N06	7	8	3,000
DDTC143XCA-7-F	AEC-Q101	N09	7	8	3,000
DDTC143FCA-7-F	AEC-Q101	N10	7	8	3,000
DDTC143ZCA-7-F	AEC-Q101	N11	7	8	3,000
DDTC143ZCAQ-7-F	Automotive	N11	7	8	3,000
DDTC143ZCAQ-13-F	Automotive	N11	13	8	10,000
DDTC114YCA-7-F	AEC-Q101	N14	7	8	3,000
DDTC114YCAQ-7-F	Automotive	N14	7	8	3,000
DDTC114YCAQ-13-F	Automotive	N14	13	8	10,000
DDTC114WCA-7-F	AEC-Q101	N15	7	8	3,000
DDTC124XCA-7-F	AEC-Q101	N18	7	8	3,000
DDTC144VCA-7-F	AEC-Q101	N21	7	8	3,000
DDTC144WCA-7-F	AEC-Q101	N22	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](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. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to [http://www.diodes.com/quality/product\\_compliance\\_definitions/](http://www.diodes.com/quality/product_compliance_definitions/).
  5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

**Marking Information**


Nxx = Product Type Marking Code (See Table Above)  
 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	2013	2014	2015	2016	2017
Code	N	P	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E
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)>	V <sub>IN</sub>	DDTC113ZCA	-5 to +10
		DDTC123YCA	-5 to +12
		DDTC123JCA	-5 to +12
		DDTC143XCA	-7 to +20
		DDTC143FCA	-6 to +30
		DDTC143ZCA	-5 to +30
		DDTC114YCA	-6 to +40
		DDTC114WCA	-10 to +30
		DDTC124XCA	-10 to +40
		DDTC144VCA	-15 to +40
DDTC144WCA	-10 to +40		
Output Current	I <sub>O</sub>	DDTC113ZCA	100
		DDTC123YCA	100
		DDTC123JCA	100
		DDTC143XCA	100
		DDTC143FCA	100
		DDTC143ZCA	100
		DDTC114YCA	70
		DDTC114WCA	100
		DDTC124XCA	50
		DDTC144VCA	30
DDTC144WCA	30		
Output Current	I <sub>C(MAX)</sub>	100	mA

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

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 6)	P <sub>D</sub>	200	mW
Thermal Resistance, Junction to Ambient Air (Note 6)	R <sub>θJA</sub>	625	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

Notes: 6. Mounted on FR4 PC Board with minimum recommended pad layout

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

Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition	
Input Voltage	DDTC113ZCA DDTC123YCA DDTC123JCA DDTC143XCA DDTC143FCA DDTC143ZCA DDTC114YCA DDTC114WCA DDTC124XCA DDTC144VCA DDTC144WCA	V <sub>I(OFF)</sub>	0.3 0.3 0.5 0.3 0.3 0.5 0.3 0.8 0.4 1.0 0.8	—	—	—	V	V <sub>CC</sub> = 5V, I <sub>O</sub> = 100μA
	DDTC113ZCA DDTC123YCA DDTC123JCA DDTC143XCA DDTC143FCA DDTC143ZCA DDTC114YCA DDTC114WCA DDTC124XCA DDTC144VCA DDTC144WCA	V <sub>I(ON)</sub>	—	—	3.0 3.0 1.1 2.5 1.3 1.3 1.4 3.0 2.5 5.0 4.0	—	V	V <sub>O</sub> = 0.3V, I <sub>O</sub> = 20mA V <sub>O</sub> = 0.3V, I <sub>O</sub> = 20mA V <sub>O</sub> = 0.3V, I <sub>O</sub> = 5mA V <sub>O</sub> = 0.3V, I <sub>O</sub> = 20mA V <sub>O</sub> = 0.3V, I <sub>O</sub> = 3mA V <sub>O</sub> = 0.3V, I <sub>O</sub> = 5mA V <sub>O</sub> = 0.3V, I <sub>O</sub> = 1mA V <sub>O</sub> = 0.3V, I <sub>O</sub> = 2mA V <sub>O</sub> = 0.3V, I <sub>O</sub> = 2mA V <sub>O</sub> = 0.3V, I <sub>O</sub> = 2mA V <sub>O</sub> = 0.3V, I <sub>O</sub> = 2mA
Output Voltage		V <sub>O(ON)</sub>	—	0.1	0.3	V	I <sub>O</sub> /I <sub>I</sub> = 5mA/0.25mA DDTC123JCA I <sub>O</sub> /I <sub>I</sub> = 5mA/0.25mA DDTC143ZCA I <sub>O</sub> /I <sub>I</sub> = 5mA/0.25mA DDTC114YCA I <sub>O</sub> /I <sub>I</sub> = 10mA/0.5mA All Others	
Input Current	DDTC113ZCA DDTC123YCA DDTC123JCA DDTC143XCA DDTC143FCA DDTC143ZCA DDTC114YCA DDTC114WCA DDTC124XCA DDTC144VCA DDTC144WCA	I <sub>I</sub>	—	—	7.2 3.8 3.6 1.8 1.8 1.8 0.88 0.88 0.36 0.16 0.16	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	DDTC113ZCA DDTC123YCA DDTC123JCA DDTC143XCA DDTC143FCA DDTC143ZCA DDTC114YCA DDTC114YCAQ DDTC114WCA DDTC124XCA DDTC144VCA DDTC144WCA	G <sub>I</sub>	33 33 80 30 68 80 68 80 24 68 33 56	—	—	—	V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA V <sub>O</sub> = 5V, I <sub>O</sub> = 10mA V <sub>O</sub> = 5V, I <sub>O</sub> = 10mA V <sub>O</sub> = 5V, I <sub>O</sub> = 10mA V <sub>O</sub> = 5V, I <sub>O</sub> = 10mA 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> = 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	
Input Resistor Tolerance		ΔR <sub>1</sub>	-30	—	+30	%	—	
Resistance Ratio Tolerance		ΔR <sub>2</sub> /R <sub>1</sub>	-20	—	+20	%	—	
Gain-Bandwidth Product (Note 7)		f <sub>T</sub>	—	250	—	MHz	V <sub>CE</sub> = 10V, I <sub>E</sub> = 5mA, f = 100MHz	

Note: 7. Transistor - For Reference Only

**Typical Curves – DDTC123JCA** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

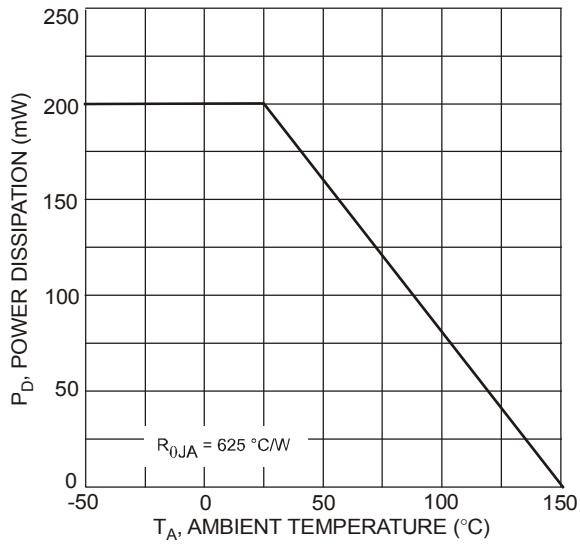


Fig. 1 Power Dissipation vs. Ambient Temperature

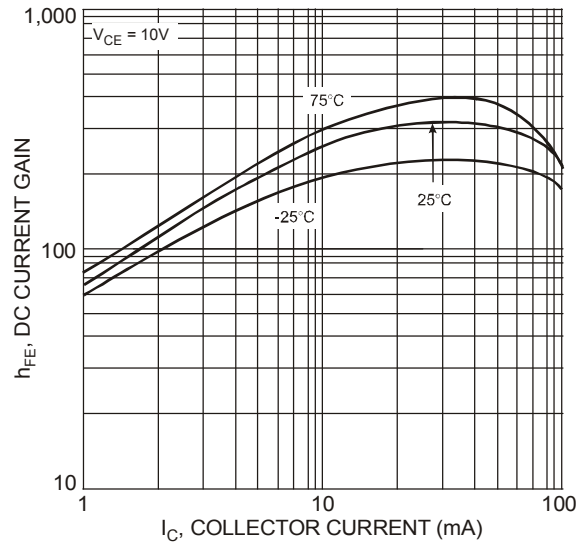


Fig. 2 Typical DC Current Gain vs. Collector Current

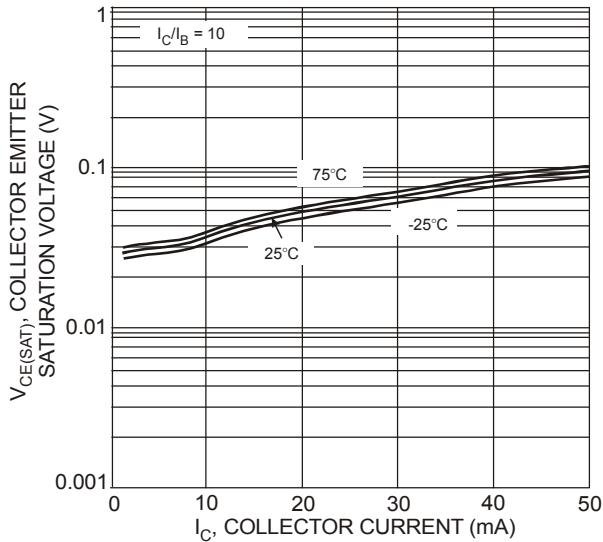


Fig. 3 Typical Collector Emitter Saturation Voltage vs. Collector Current

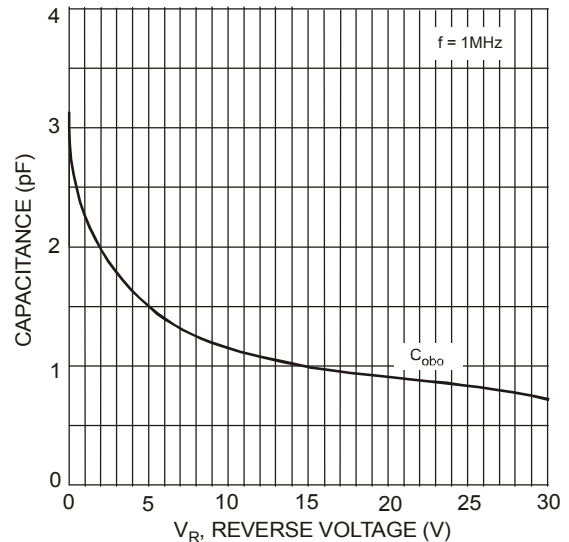


Fig. 4 Typical Capacitance Characteristics

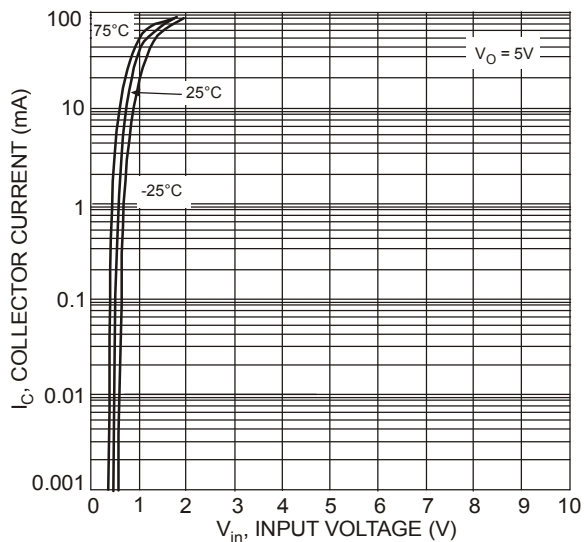


Fig. 5 Collector Current vs. Input Voltage

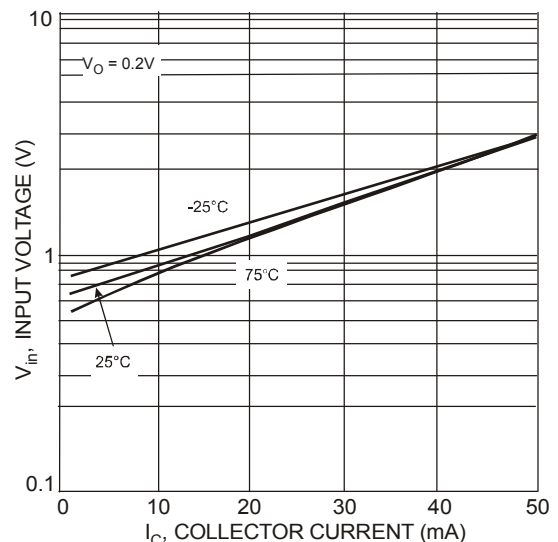
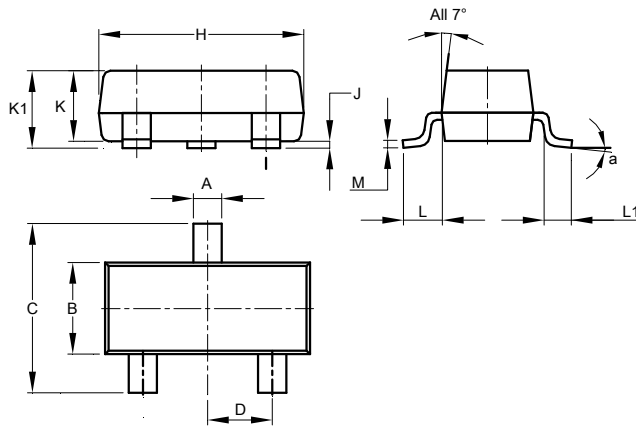


Fig. 6 Input Voltage vs. Collector Current

## Package Outline Dimensions

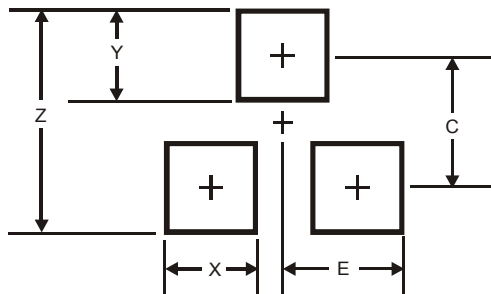
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	8°		
All Dimensions in mm			

## Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



Dimensions	Value (in mm)
Z	2.9
X	0.8
Y	0.9
C	2.0
E	1.35

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