DDTC (R1≠R2 SERIES) CA

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

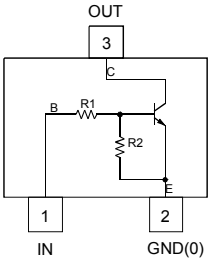
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.008 grams (approximate)

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

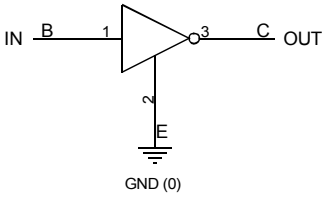
SOT23



Top View



Device Schematic



Equivalent Inverter Circuit

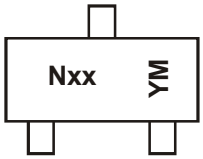
Ordering Information (Notes 3 & 4)

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 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/.
5. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

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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_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)>	DDTC113ZCA	V_{IN}	-5 to +10	V
	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	DDTC113ZCA	I_O	100	mA
	DDTC123YCA		100	
	DDTC123JCA		100	
	DDTC143XCA		100	
	DDTC143FCA		100	
	DDTC143ZCA		100	
	DDTC114YCA		70	
	DDTC114WCA		100	
	DDTC124XCA		50	
	DDTC144VCA		30	
	DDTC144WCA		30	
Output Current	All	$I_{C(MAX)}$	100	mA

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

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 6)	P_D	200	mW
Thermal Resistance, Junction to Ambient Air (Note 6)	$R_{\theta JA}$	625	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

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

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

Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition
	DDTC113ZCA	$V_{I(OFF)}$	0.3	—	—		V_{CC} = 5V, I_O = 100μA
	DDTC123YCA		0.3				
	DDTC123JCA		0.5				
	DDTC143XCA		0.3				
	DDTC143FCA		0.3				
	DDTC143ZCA		0.5				
	DDTC114YCA		0.3				
	DDTC114WCA		0.8				
	DDTC124XCA		0.4				
	DDTC144VCA		1.0				
	DDTC144WCA		0.8				
Input Voltage	DDTC113ZCA	$V_{I(ON)}$	—	—	3.0	V	V_O = 0.3V, I_O = 20mA
	DDTC123YCA				3.0		V_O = 0.3V, I_O = 20mA
	DDTC123JCA				1.1		V_O = 0.3V, I_O = 5mA
	DDTC143XCA				2.5		V_O = 0.3V, I_O = 20mA
	DDTC143FCA				1.3		V_O = 0.3V, I_O = 3mA
	DDTC143ZCA				1.3		V_O = 0.3V, I_O = 5mA
	DDTC114YCA				1.4		V_O = 0.3V, I_O = 1mA
	DDTC114WCA				3.0		V_O = 0.3V, I_O = 2mA
	DDTC124XCA				2.5		V_O = 0.3V, I_O = 2mA
	DDTC144VCA				5.0		V_O = 0.3V, I_O = 2mA
	DDTC144WCA				4.0		V_O = 0.3V, I_O = 2mA
Output Voltage		$V_{O(ON)}$	—	0.1	0.3	V	I_O/I_I = 5mA/0.25mA DDTC123JCA I_O/I_I = 5mA/0.25mA DDTC143ZCA I_O/I_I = 5mA/0.25mA DDTC114YCA I_O/I_I = 10mA/0.5mA All Others
Input Current	DDTC113ZCA	I_I	—	—	7.2	mA	V_I = 5V
	DDTC123YCA				3.8		
	DDTC123JCA				3.6		
	DDTC143XCA				1.8		
	DDTC143FCA				1.8		
	DDTC143ZCA				1.8		
	DDTC114YCA				0.88		
	DDTC114WCA				0.88		
	DDTC124XCA				0.36		
	DDTC144VCA				0.16		
	DDTC144WCA				0.16		
Output Current		$I_{O(OFF)}$	—	—	0.5	μA	V_{CC} = 50V, V_I = 0V
DC Current Gain	DDTC113ZCA	G_I	33	—	—	—	V_O = 5V, I_O = 5mA
	DDTC123YCA		33				V_O = 5V, I_O = 10mA
	DDTC123JCA		80				V_O = 5V, I_O = 10mA
	DDTC143XCA		30				V_O = 5V, I_O = 10mA
	DDTC143FCA		68				V_O = 5V, I_O = 10mA
	DDTC143ZCA		80				V_O = 5V, I_O = 10mA
	DDTC114YCA		68				V_O = 5V, I_O = 5mA
	DDTC114YCAQ		80				V_O = 5V, I_O = 5mA
	DDTC114WCA		24				V_O = 5V, I_O = 10mA
	DDTC124XCA		68				V_O = 5V, I_O = 5mA
	DDTC144VCA		33				V_O = 5V, I_O = 5mA
	DDTC144WCA		56				V_O = 5V, I_O = 5mA
Input Resistor Tolerance		ΔR_1	-30	—	+30	%	—
Resistance Ratio Tolerance		$\Delta R_2/R_1$	-20	—	+20	%	—
Gain-Bandwidth Produc (Note 7)		f_T	—	250	—	MHz	V_{CE} = 10V, I_E = 5mA, f = 100MHz

Note: 7. Transistor - For Reference Only

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Typical Curves – DDTC123JCA (@T_A = +25°C, unless otherwise specified.)

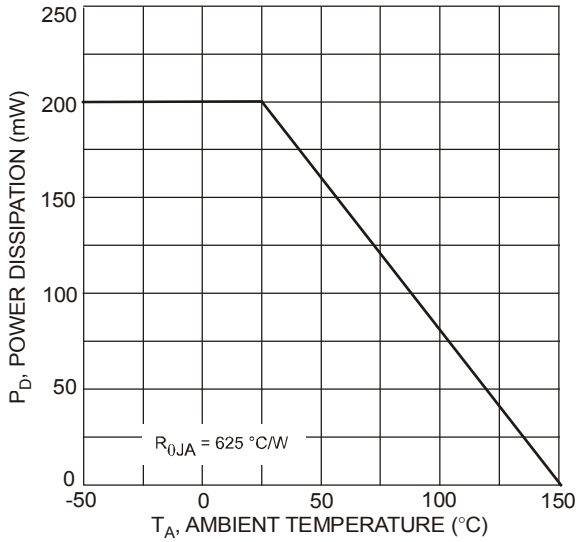


Fig. 1 Power Dissipation vs. Ambient Temperature

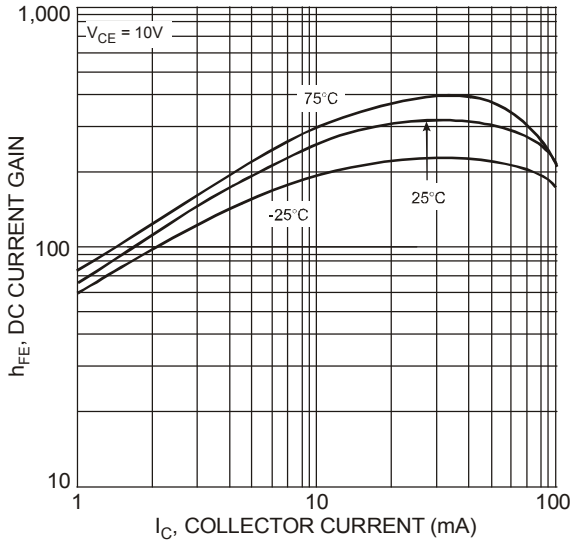


Fig. 2 Typical DC Current Gain vs. Collector Current

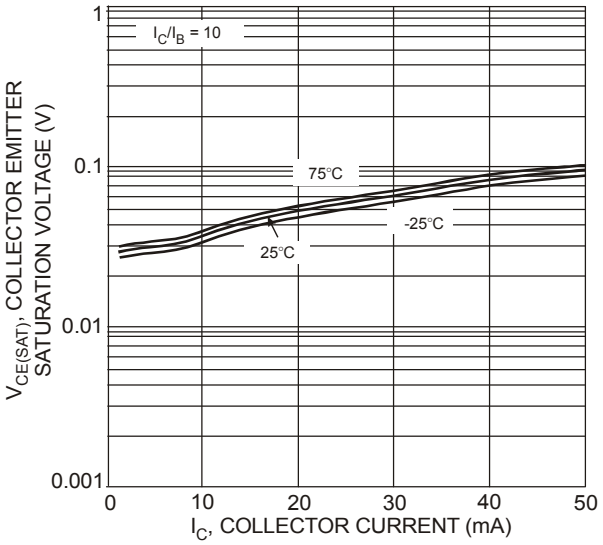


Fig. 3 Typical Collector Emitter Saturation Voltage vs. Collector Current

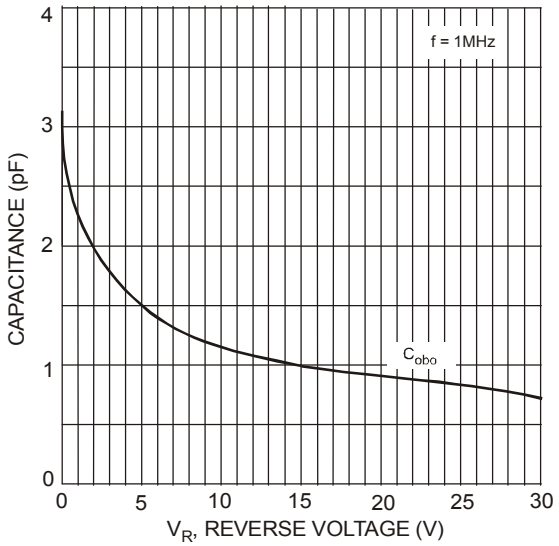


Fig. 4 Typical Capacitance Characteristics

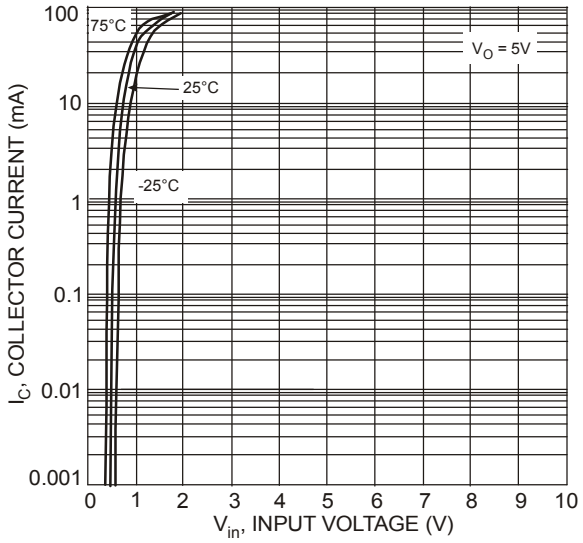


Fig. 5 Collector Current vs. Input Voltage

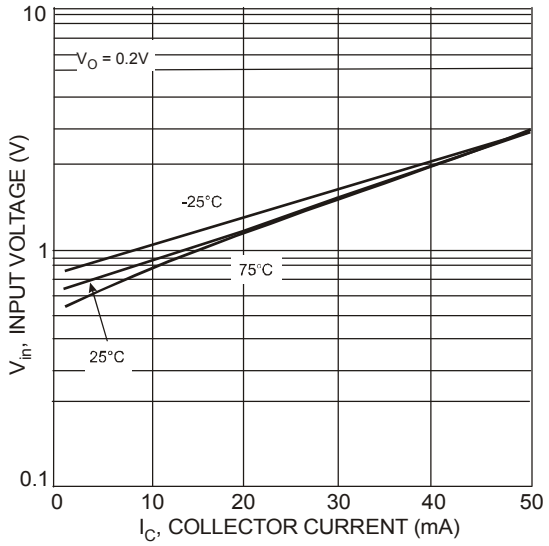
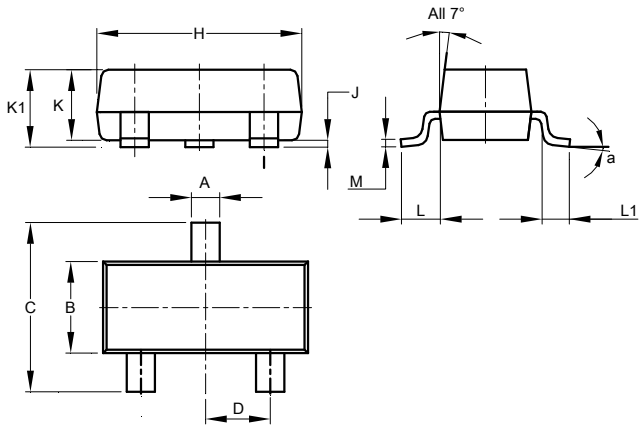


Fig. 6 Input Voltage vs. Collector Current

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Package Outline Dimensions

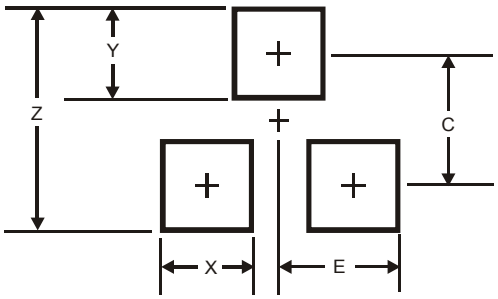
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



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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