DDTC (R1≠R2 SERIES) E

NPN PRE-BIASED SMALL SIGNAL SURFACE MOUNT TRANSISTOR

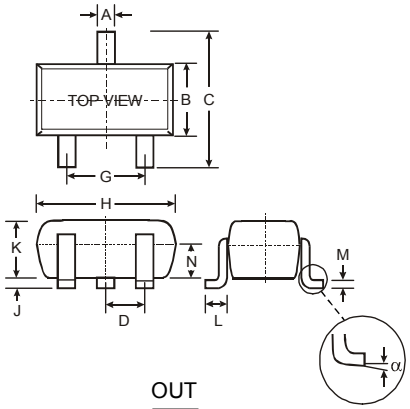
Features

- Epitaxial Planar Die Construction
- Complementary PNP Types Available (DDTA)
- Built-In Biasing Resistors, R1≠R2
- **Lead Free/RoHS Compliant (Note 2)**
- **"Green" Device (Note 3 and 4)**

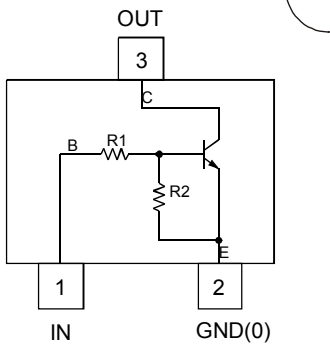
Mechanical Data

- Case: SOT-523
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- Terminals: Solderable per MIL-STD-202, Method 208
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe)
- Terminal Connections: See Diagram
- Marking & Date Code Information: See Table Below & Page 4
- Ordering Information: See Page 4
- Weight: 0.002 grams (approximate)

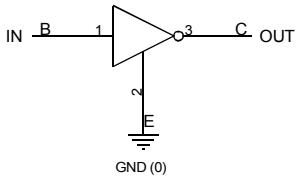
P/N	R1 (NOM)	R2 (NOM)	Marking
DDTC113ZE	1KΩ	10KΩ	N02
DDTC123YE	2.2KΩ	10KΩ	N05
DDTC123JE	2.2KΩ	47KΩ	N06
DDTC143XE	4.7KΩ	10KΩ	N09
DDTC143FE	4.7KΩ	22KΩ	N10
DDTC143ZE	4.7KΩ	47KΩ	N11
DDTC114YE	10KΩ	47KΩ|	N14
DDTC114WE	10KΩ	4.7KΩ	N15
DDTC124XE	22KΩ	47KΩ	N18
DDTC144VE	47KΩ	10KΩ	N21
DDTC144WE	47KΩ	22KΩ	N22



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)	DDTC113ZE	V_{IN}	-5 to +10	V
	DDTC123YE		-5 to +12	
	DDTC123JE		-5 to +12	
	DDTC143XE		-7 to +20	
	DDTC143FE		-6 to +30	
	DDTC143ZE		-5 to +30	
	DDTC114YE		-6 to +40	
	DDTC114WE		-10 to +30	
	DDTC124XE		-10 to +40	
	DDTC144VE		-15 to +40	
	DDTC144WE		-10 to +40	
Output Current	DDTC113ZE	I_O	100	mA
	DDTC123YE		100	
	DDTC123JE		100	
	DDTC143XE		100	
	DDTC143FE		100	
	DDTC143ZE		100	
	DDTC114YE		70	
	DDTC114WE		100	
	DDTC124XE		50	
	DDTC144VE		30	
	DDTC144WE		30	
Output Current	All	I_C (Max)	100	mA

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

Thermal Characteristics @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Power Dissipation	P_d	150	mW
Thermal Resistance, Junction to Ambient Air (Note 1)	$R_{\theta JA}$	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	DDTC113ZE	$V_{I(off)}$	0.3	—	—	V	V_{CC} = 5V, I_O = 100μA
	DDTC123YE		0.3				
	DDTC123JE		0.5				
	DDTC143XE		0.3				
	DDTC143FE		0.3				
	DDTC143ZE		0.5				
	DDTC114YE		0.3				
	DDTC114WE		0.8				
	DDTC124XE		0.4				
	DDTC144VE		1.0				
	DDTC144WE		0.8				
	DDTC113ZE	$V_{I(on)}$	—	—	3.0		V_O = 0.3V, I_O = 20mA
	DDTC123YE				3.0		V_O = 0.3V, I_O = 20mA
	DDTC123JE				1.1		V_O = 0.3V, I_O = 5mA
	DDTC143XE				2.5		V_O = 0.3V, I_O = 20mA
	DDTC143FE				1.3		V_O = 0.3V, I_O = 3mA
	DDTC143ZE				1.3		V_O = 0.3V, I_O = 5mA
	DDTC114YE				1.4		V_O = 0.3V, I_O = 1mA
	DDTC114WE				3.0		V_O = 0.3V, I_O = 2mA
	DDTC124XE				2.5		V_O = 0.3V, I_O = 2mA
	DDTC144VE				5.0		V_O = 0.3V, I_O = 2mA
	DDTC144WE				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 DDTC123JE I_O/I_I = 5mA/0.25mA DDTC143ZE I_O/I_I = 5mA/0.25mA DDTC114YE I_O/I_I = 10mA/0.5mA All Others
Input Current	DDTC113ZE	I_I	—	—	7.2	mA	V_I = 5V
	DDTC123YE				3.8		
	DDTC123JE				3.6		
	DDTC143XE				1.8		
	DDTC143FE				1.8		
	DDTC143ZE				1.8		
	DDTC114YE				0.88		
	DDTC114WE				0.88		
	DDTC124XE				0.36		
	DDTC144VE				0.16		
	DDTC144WE				0.16		
Output Current		$I_{O(off)}$	—	—	0.5	μA	V_{CC} = 50V, V_I = 0V
DC Current Gain	DDTC113ZE	G_I	33	—	—	—	V_O = 5V, I_O = 5mA
	DDTC123YE		33				V_O = 5V, I_O = 10mA
	DDTC123JE		80				V_O = 5V, I_O = 10mA
	DDTC143XE		30				V_O = 5V, I_O = 10mA
	DDTC143FE		68				V_O = 5V, I_O = 10mA
	DDTC143ZE		80				V_O = 5V, I_O = 10mA
	DDTC114YE		68				V_O = 5V, I_O = 5mA
	DDTC114WE		24				V_O = 5V, I_O = 10mA
	DDTC124XE		68				V_O = 5V, I_O = 5mA
	DDTC144VE		33				V_O = 5V, I_O = 5mA
	DDTC144WE		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 Product*		f_T	—	250	—	MHz	V_{CE} = 10V, I_E = 5mA, f = 100MHz

* Transistor – For Reference Only

TYPICAL CURVES – DDTC123JE

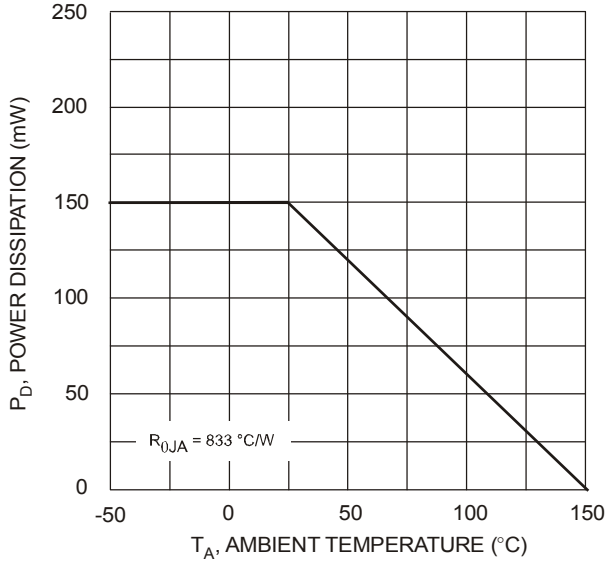


Fig. 1 Derating Curve

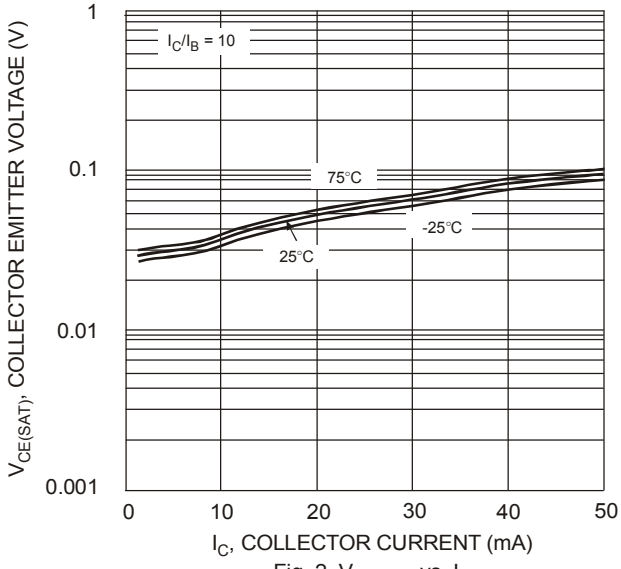


Fig. 2 $V_{CE(SAT)}$ vs. I_C

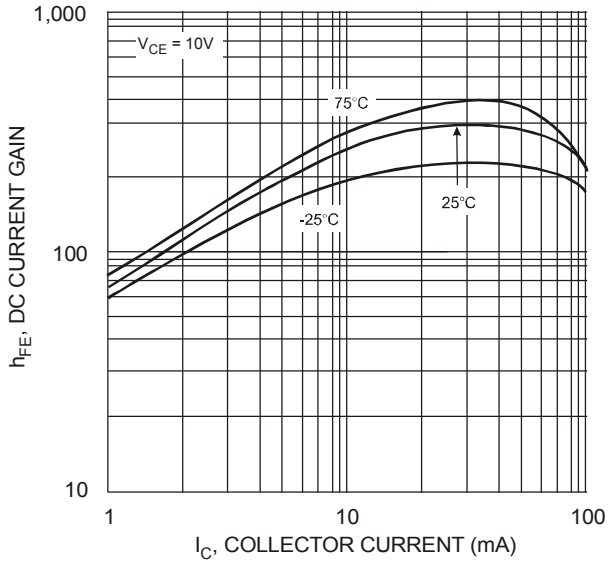


Fig. 3 DC Current Gain

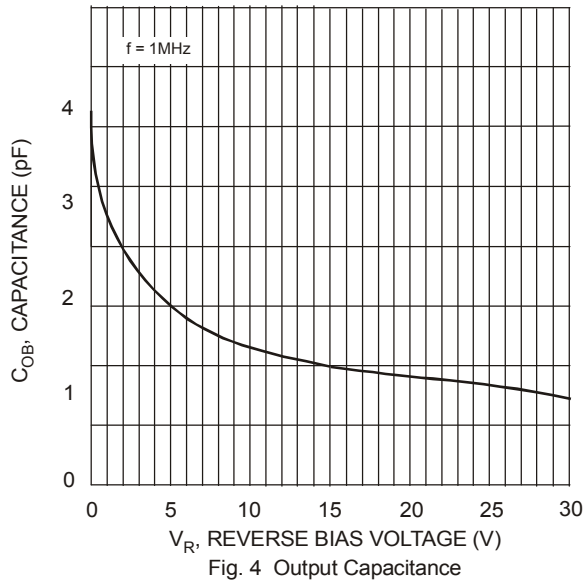


Fig. 4 Output Capacitance

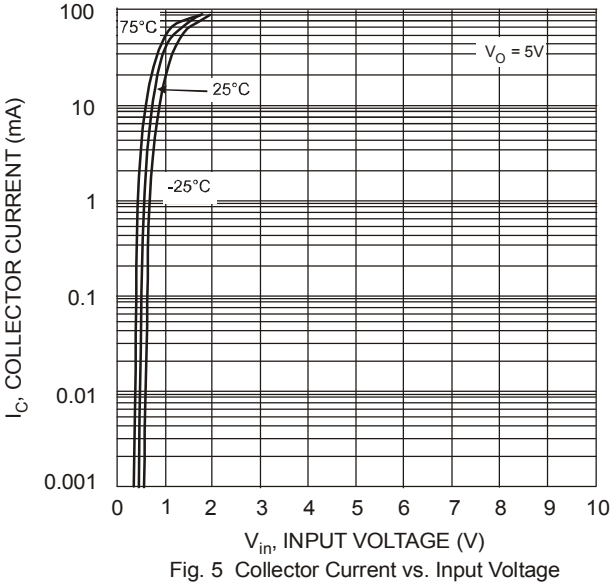


Fig. 5 Collector Current vs. Input Voltage

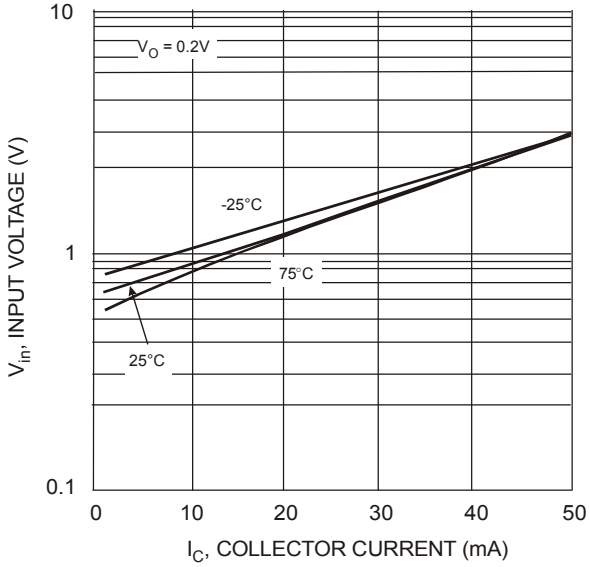


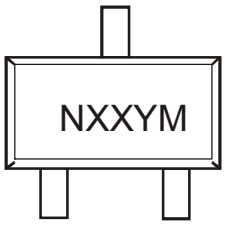
Fig. 6 Input Voltage vs. Collector Current

Ordering Information (Note 5)

Device	Packaging	Shipping
DDTC113ZE-7-F	SOT-523	3000/Tape & Reel
DDTC123YE-7-F	SOT-523	3000/Tape & Reel
DDTC123JE-7-F	SOT-523	3000/Tape & Reel
DDTC143XE-7-F	SOT-523	3000/Tape & Reel
DDTC143FE-7-F	SOT-523	3000/Tape & Reel
DDTC143ZE-7-F	SOT-523	3000/Tape & Reel
DDTC114YE-7-F	SOT-523	3000/Tape & Reel
DDTC114WE-7-F	SOT-523	3000/Tape & Reel
DDTC124XE-7-F	SOT-523	3000/Tape & Reel
DDTC144VE-7-F	SOT-523	3000/Tape & Reel
DDTC144WE-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, e.g. N02 = DDTC113ZE)
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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