DDTC (R1-ONLY SERIES) E

NPN PRE-BIASED SMALL SIGNAL SURFACE MOUNT TRANSISTOR

Features

- Epitaxial Planar Die Construction
- Complementary PNP Types Available (DDTA)
- Built-In Biasing Resistor, R1 Only
- **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)**

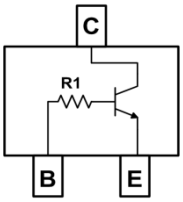
Part Number	R1 (NOM)	Marking
DDTC113TE	1kΩ	N01
DDTC123TE	2.2kΩ	N03
DDTC143TE	4.7kΩ	N07
DDTC114TE	10kΩ	N12
DDTC124TE	22kΩ	N16
DDTC144TE	47kΩ	N19
DDTC115TE	100kΩ	N23
DDTC125TE	200kΩ	N25

Mechanical Data

- Case: SOT523
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.002 grams (Approximate)

SOT523

Top View



Device Schematic – Top View

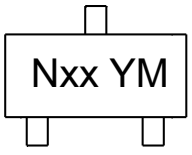
Ordering Information (Note 5)

Part Number	Compliance	Reel Size (inches)	Tape Width (mm)	Quantity Per Reel
DDTC113TE-7-F	AEC-Q101	7	8	3,000
DDTC123TE-7-F	AEC-Q101	7	8	3,000
DDTC143TE-7-F	AEC-Q101	7	8	3,000
DDTC114TE-7-F	AEC-Q101	7	8	3,000
DDTC124TE-7-F	AEC-Q101	7	8	3,000
DDTC124TEQ-7-F	Automotive	7	8	3,000
DDTC144TE-7-F	AEC-Q101	7	8	3,000
DDTC115TE-7-F	AEC-Q101	7	8	3,000
DDTC125TE-7-F	AEC-Q101	7	8	3,000

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ 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 https://www.diodes.com/quality/.
5. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information

SOT523



Nxx = Product Type Marking Code (See Table in Features)
YM = Date Code Marking
Y or $\overline{Y}$ = Year (ex: F = 2018)
M or $\overline{M}$ = Month (ex: 9 = September)

Date Code Key

Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Code	F	G	H	I	J	K	L	M	N	O

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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Absolute Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	50	V
Collector-Emitter Voltage	V_{CEO}	50	V
Emitter-Base Voltage	V_{EBO}	5	V
Collector Current	$I_{C(MAX)}$	100	mA

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 6)	$R_{\theta JA}$	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
Collector-Base Breakdown Voltage	BV_{CBO}	50	—	—	V	I_C = 50µA
Collector-Emitter Breakdown Voltage	BV_{CEO}	50	—	—	V	I_C = 1mA
Emitter-Base Breakdown Voltage	BV_{EBO}	5	—	—	V	I_E = 50µA
Collector Cutoff Current	I_{CBO}	—	—	0.5	µA	V_{CB} = 50V
Emitter Cutoff Current	I_{EBO}	—	—	0.5	µA	V_{EB} = 4V
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	—	—	0.3	V	I_C/I_B = 10mA/1mA DDTC113TE I_C/I_B = 5mA/0.5mA DDTC123TE I_C/I_B = 2.5mA/0.25mA DDTC143TE I_C/I_B = 1mA/0.1mA DDTC114TE I_C/I_B = 5mA/0.5mA DDTC124TE I_C/I_B = 2.5mA/0.25mA DDTC144TE I_C/I_B = 1mA/0.1mA DDTC115TE I_C/I_B = 0.5mA/0.05mA DDTC125TE
DC Current Transfer Ratio	h_{FE}	100	250	600	—	I_C = 1mA, V_{CE} = 5V
Input Resistor (R_1) Tolerance	ΔR_1	-30	—	+30	%	—
Gain-Bandwidth Product (Note 7)	f_T	—	250	—	MHz	V_{CE} = 10V, I_E = -5mA, f = 100MHz

Notes: 6. Mounted on FR-4 PC Board with minimum recommended pad layout.
7. Transistor only.

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Typical Curves – DDTC114TE

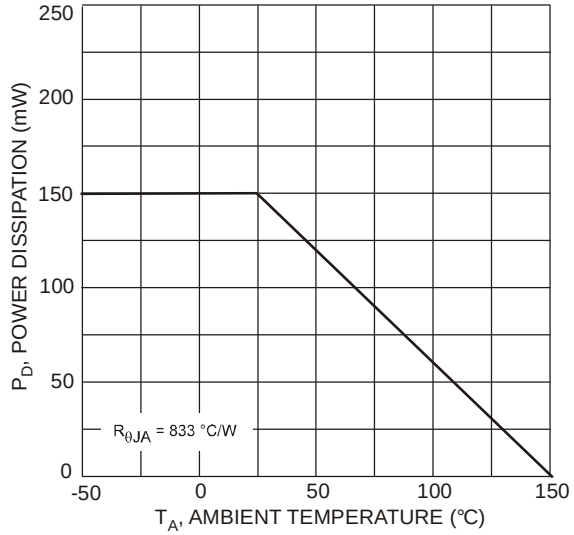

Fig. 1 Power Dissipation vs. Ambient Temperature

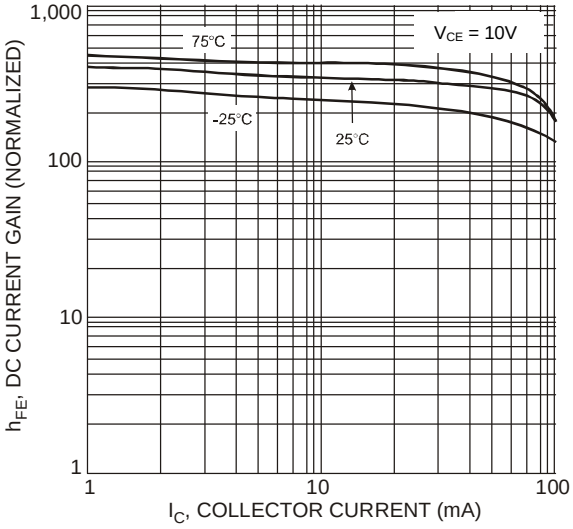

Fig. 2 Typical DC Current Gain vs. Collector Current

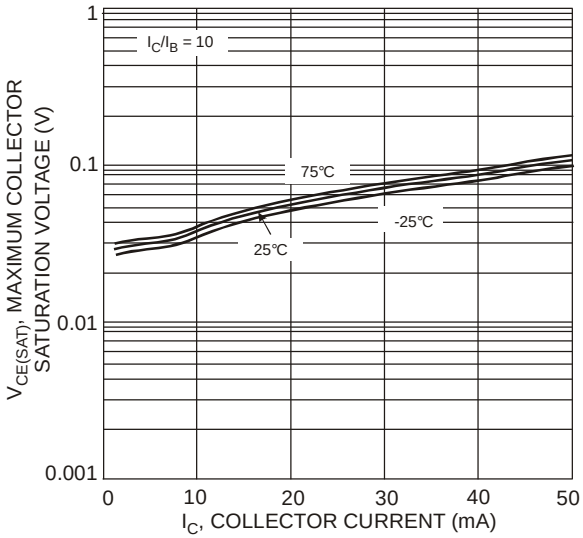

Fig. 3 Typical Collector Emitter Saturation Voltage vs. Collector Current

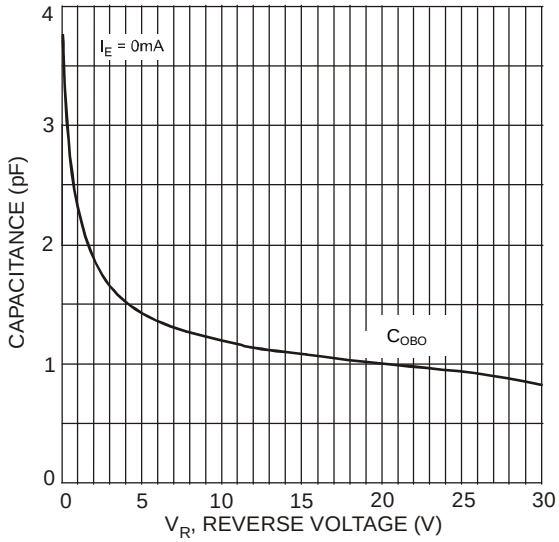

Fig. 4 Typical Capacitance Characteristics

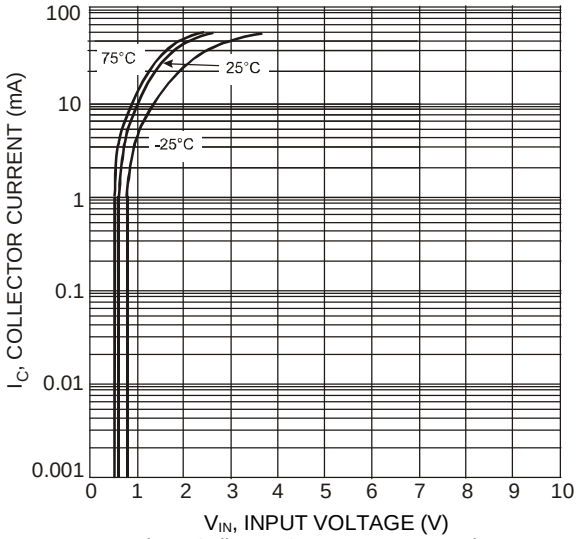

Fig. 5 Collector Current vs. Input Voltage

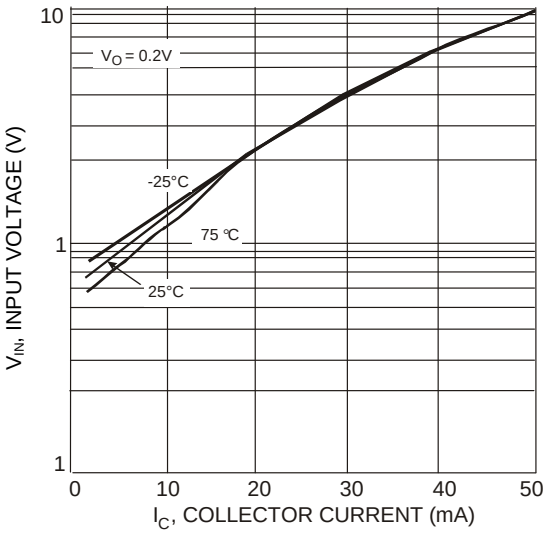

Fig. 6 Input Voltage vs. Collector Current

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Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

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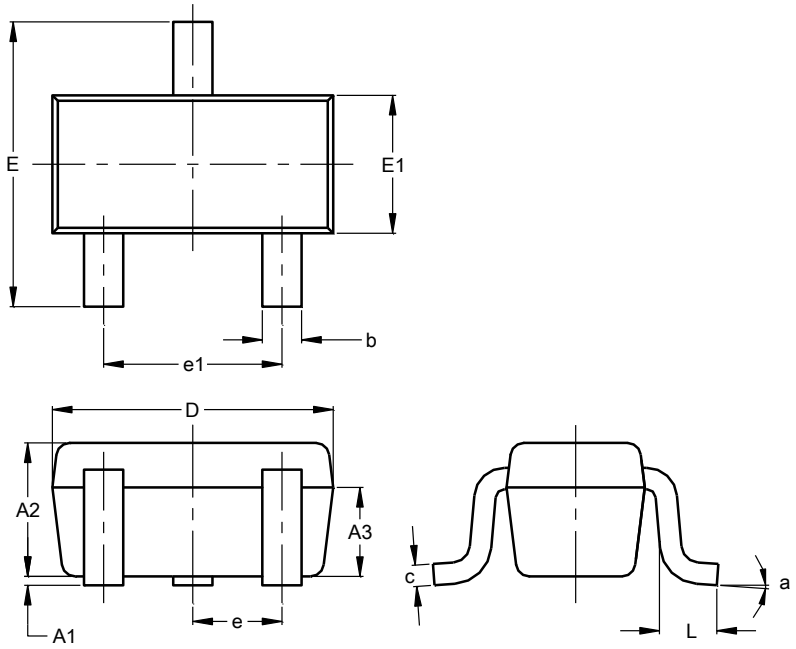
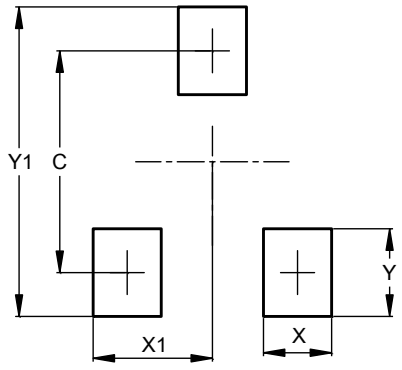


SOT523			
Dim	**Min**	**Max**	**Typ**
A1	0.00	0.10	0.05
A2	0.60	0.80	0.75
A3	0.45	0.65	0.50
b	0.15	0.30	0.22
c	0.10	0.20	0.12
D	1.50	1.70	1.60
E	1.45	1.75	1.60
E1	0.75	0.85	0.80
e	0.50 BSC		
e1	0.90	1.10	1.00
L	0.20	0.40	0.33
a	0°	--	8°
All Dimensions in mm			

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

SOT523



Dimensions	Value (in mm)
C	1.29
X	0.40
X1	0.70
Y	0.51
Y1	1.80

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