NPN PRE-BIASED 500mA SURFACE-MOUNT TRANSISTOR

Features

- Epitaxial Planar Die Construction
- Complementary PNP Types Available (DDTB)
- Built-in Biasing Resistors
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

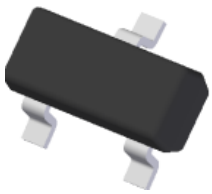
Mechanical Data

- Package: SOT23
- Package 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)

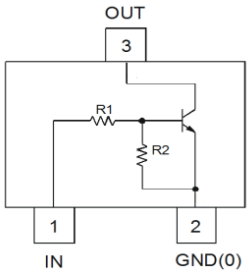
P/N	R1 (NOM)	R2 (NOM)
DDTD113EC	1kΩ	1kΩ
DDTD123EC	2.2kΩ	2.2kΩ
DDTD143EC	4.7kΩ	4.7kΩ
DDTD114EC	10kΩ	10kΩ
DDTD122JC	0.22kΩ	4.7kΩ
DDTD113ZC	1kΩ	10kΩ

P/N	R1 (NOM)	R2 (NOM)
DDTD123YC	2.2kΩ	10kΩ
DDTD133HC	3.3kΩ	10kΩ
DDTD123TC	2.2kΩ	OPEN
DDTD143TC	4.7kΩ	OPEN
DDTD114TC	10kΩ	OPEN
DDTD114GC	0	10kΩ

SOT23



Top View



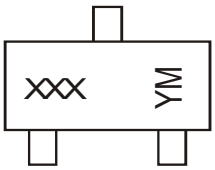
Device Schematic

Ordering Information (Note 4)

Orderable Part Number	Status	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
						Qty.	Carrier
DDTD113EC-7-F	Active	SOT23	N60	7	8	3,000	Reel
DDTD123EC-7-F	Active	SOT23	N61	7	8	3,000	Reel
DDTD143EC-7-F	Obsolete	SOT23	N62	7	8	3,000	Reel
DDTD114EC-7-F	Active	SOT23	N63	7	8	3,000	Reel
DDTD122JC-7-F	Obsolete	SOT23	N64	7	8	3,000	Reel
DDTD113ZC-7-F	Active	SOT23	N65	7	8	3,000	Reel
DDTD123YC-7-F	Active	SOT23	N66	7	8	3,000	Reel
DDTD133HC-7-F	Obsolete	SOT23	N67	7	8	3,000	Reel
DDTD123TC-7-F	Active	SOT23	N69	7	8	3,000	Reel
DDTD143TC-7-F	Obsolete	SOT23	N70	7	8	3,000	Reel
DDTD114TC-7-F	Obsolete	SOT23	N71	7	8	3,000	Reel
DDTD114GC-7-F	Obsolete	SOT23	N72	7	8	3,000	Reel

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. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information



XXX = Product Type Marking Code, See Table Above
YM = Date Code Marking
Y = Year (ex: M = 2025)
M = Month (ex: 9 = September)

Date Code Key

Year	2005	-	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Code	S	-	M	N	P	R	S	T	U	V	W	X

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)>	DDTD113EC DDTD123EC DDTD143EC DDTD114EC DDTD122JC DDTD113ZC DDTD123YC DDTD133HC	V_{IN}	-10 to +10 -10 to +12 -10 to +30 -10 to +40 -5 to +5 -5 to +10 -5 to +12 -6 to +20	V
Input Voltage <Pin: (2) to (1)>	DDTD123TC DDTD143TC DDTD114TC DDTD114GC	$V_{EBO\ (max)}$	5	V
Output Current		I_C	500	mA

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

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P_D	250	mW
Thermal Resistance, Junction to Ambient Air (Note 5)	$R_{\theta JA}$	500	°C/W
Thermal Resistance, Junction to Case (Note 5)	$R_{\theta JC}$	118.5	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Note: 5. Mounted on FR4 PC board with recommended pad layout.

Thermal Characteristics and Derating Information

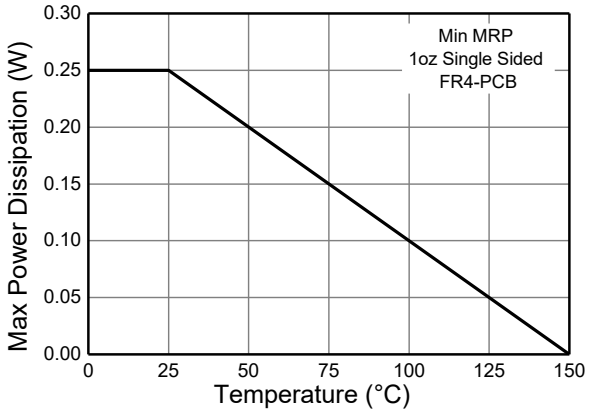


Figure 1. Derating Curve

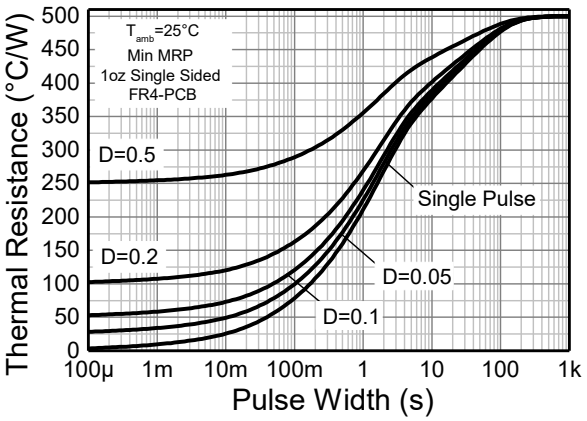


Figure 2. Transient Thermal Impedance

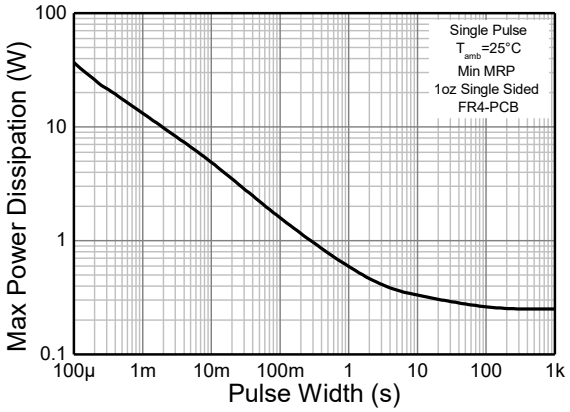


Figure 3. Pulse Power Dissipation

Electrical Characteristics – R1, R2 Types (@ T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition
Input Voltage	DDTD113EC DDTD123EC DDTD143EC DDTD114EC DDTD122JC DDTD113ZC DDTD123YC DDTD133HC	$V_{I(off)}$	0.5 0.5 0.5 0.5 0.5 0.3 0.3 0.3	—	—	V	V_{CC} = 5V, I_O = 100µA
	DDTD113EC DDTD123EC DDTD143EC DDTD114EC DDTD122JC DDTD113ZC DDTD123YC DDTD133HC	$V_{I(on)}$	—	—	3.0 3.0 3.0 3.0 3.0 2.0 2.0 2.0	V	V_O = 0.3V, I_O = 20mA V_O = 0.3V, I_O = 20mA V_O = 0.3V, I_O = 20mA V_O = 0.3V, I_O = 10mA V_O = 0.3V, I_O = 30mA V_O = 0.3V, I_O = 20mA V_O = 0.3V, I_O = 20mA V_O = 0.3V, I_O = 20mA
Output Voltage		$V_{O(on)}$	—	—	0.3V	V	I_O/I_I = 50mA/2.5mA
Input Current	DDTD113EC DDTD123EC DDTD143EC DDTD114EC DDTD122JC DDTD113ZC DDTD123YC DDTD133HC	I_I	—	—	7.2 3.8 1.8 0.88 28 7.2 3.6 2.4	mA	V_I = 5V
Output Current		$I_{O(off)}$	—	—	0.5	µA	V_{CC} = 50V, V_I = 0
DC Current Gain	DDTD113EC DDTD123EC DDTD143EC DDTD114EC DDTD122JC DDTD113ZC DDTD123YC DDTD133HC	G_I	33 39 47 56 47 56 56 56	—	—	—	V_O = 5V, I_O = 50mA
Gain-Bandwidth Product (Note 6)		f_T	—	200	—	MHz	V_{CE} = 10V, I_E = 5mA, f = 100MHz

Electrical Characteristics – R1- Only, R2- Only Types (@ 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}	40	—	—	V	I_C = 1mA
Emitter-Base Breakdown Voltage	DDTD123TC DDTD143TC DDTD114TC DDTD114GC	BV_{EBO}	5	—	—	V	I_E = 50µA I_E = 50µA I_E = 50µA I_E = 720µA
Collector Cutoff Current		I_{CBO}	—	—	0.5	µA	V_{CB} = 50V
Emitter Cutoff Current	DDTD123TC DDTD143TC DDTD114TC DDTD114GC	I_{EBO}	— — — 300	—	0.5 0.5 0.5 580	µA	V_{EB} = 4V
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	—	—	0.3	V	I_C = 50mA, I_B = 2.5mA
DC Current Transfer Ratio	DDTD123TC DDTD143TC DDTD114TC DDTD114GC	h_{FE}	100 100 100 56	250 250 250 —	600 600 600 —	—	I_C = 5mA, V_{CE} = 5V
Gain-Bandwidth Product (Note 6)		f_T	—	200	—	MHz	V_{CE} = 10V, I_E = 5mA, f = 100MHz

Note: 6. Transistor – For Reference Only.

Package Outline Dimensions

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

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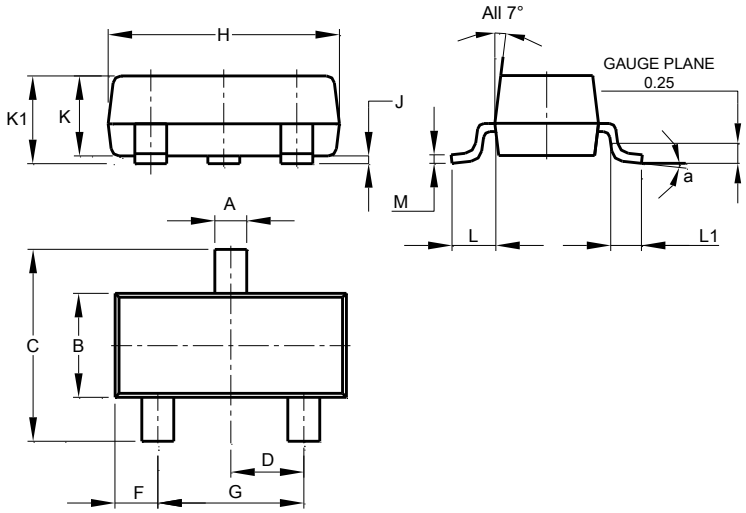
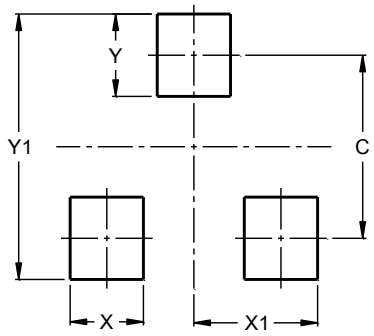


SOT23			
Dim	**Min**	**Max**	**Typ**
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

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

SOT23



Dimensions	Value (in mm)
C	2.0
X	0.8
X1	1.35
Y	0.9
Y1	2.9

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