DDTC (R1 = R2 SERIES) CA

NPN PRE-BIASED SMALL SIGNAL SURFACE MOUNT TRANSISTOR

Features

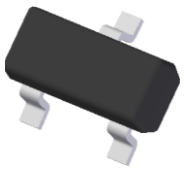
- Epitaxial Planar Die Construction
- Complementary PNP Types Available (DDTA)
- Built-In Biasing Resistors, R1 = R2
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

Mechanical Data

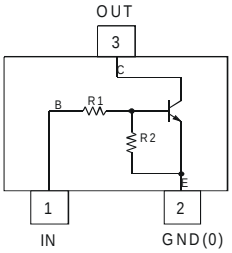
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.008 grams (Approximate)

Part Number	R1, R2 (NOM)
DDTC123ECA	2.2kΩ
DDTC143ECA	4.7kΩ
DDTC114ECA	10kΩ
DDTC124ECA	22kΩ
DDTC144ECA	47kΩ
DDTC115ECA	100kΩ

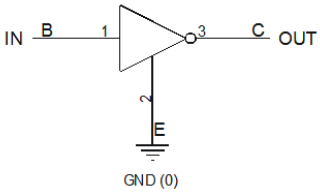
SOT23



Top View



Device Schematic



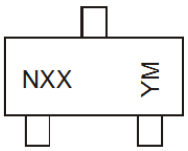
Equivalent Inverter Circuit

Ordering Information (Notes 4, 5 & 6)

Part Number	Status	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity Per Reel
DDTC123ECA-7-F	Active	AEC-Q101	N04	7	8	3,000
DDTC123ECAQ-7-F	Active	Automotive	N04	7	8	3,000
DDTC143ECA-7-F	Active	AEC-Q101	N08	7	8	3,000
DDTC143ECA-13-F	Active	AEC-Q101	N08	13	8	10,000
DDTC114ECA-7-F	Active	AEC-Q101	N13	7	8	3,000
DDTC114ECAQ-7-F	NRND (Use ADTC114ECAQ)	Automotive	N13	7	8	3,000
DDTC114ECAQ-13-F	NRND (Use ADTC114ECAQ)	Automotive	N13	13	8	10,000
DDTC124ECA-7-F	Active	AEC-Q101	N17	7	8	3,000
DDTC144ECA-7-F	Active	AEC-Q101	N20	7	8	3,000
DDTC144ECAQ-7-F	Active	Automotive	N20	7	8	3,000
DDTC144ECAQ-13-F	Active	Automotive	N20	13	8	10,000
DDTC115ECA-7-F	Active	AEC-Q101	N24	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/.
6. NRND = Not Recommended for New Design.

Marking Information



NXX = Product Type Marking Code, See Ordering Information
YM = Date Code Marking
Y = Year (ex: F = 2018)
M = Month (ex: 9 = September)

Date Code Key

Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Code	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U

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)>	DDTC123ECA DDTC143ECA DDTC114ECA DDTC124ECA DDTC144ECA DDTC115ECA	V_{IN}	-10 to +12 -10 to +30 -10 to +40 -10 to +40 -10 to +40 -10 to +40	V
Output Current	DDTC123ECA DDTC143ECA DDTC114ECA DDTC124ECA DDTC144ECA DDTC115ECA	I_O	100 100 50 30 30 20	mA
Output Current		I_C (Max)	100	mA

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

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 7)	P_D	200	mW
Thermal Resistance, Junction to Ambient Air (Note 7)	$R_{\theta JA}$	625	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Note: 7. Mounted on FR4 PC Board with minimum recommended pad layout

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

Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition
Input Voltage		$V_{I(off)}$	0.5	1.1	—	V	V_{CC} = 5V, I_O = 100µA
		$V_{I(on)}$	—	1.9	3		V_O = 0.3V, I_O = 20mA, DDTC123ECA V_O = 0.3V, I_O = 20mA, DDTC143ECA V_O = 0.3V, I_O = 10mA, DDTC114ECA V_O = 0.3V, I_O = 5mA, DDTC124ECA V_O = 0.3V, I_O = 2mA, DDTC144ECA V_O = 0.3V, I_O = 1mA, DDTC115ECA
Output Voltage		$V_{O(on)}$	—	0.1	0.3	V	I_O/I_I = 10mA/0.5mA, DDTC123ECA I_O/I_I = 10mA/0.5mA, DDTC143ECA I_O/I_I = 10mA/0.5mA, DDTC114ECA I_O/I_I = 10mA/0.5mA, DDTC124ECA I_O/I_I = 10mA/0.5mA, DDTC144ECA I_O/I_I = 5mA/0.25mA, DDTC115ECA
Input Current	DDTC123ECA DDTC143ECA DDTC114ECA DDTC124ECA DDTC144ECA DDTC115ECA	I_I	—	—	3.8 1.8 0.88 0.36 0.18 0.15	mA	V_I = 5V
Output Current		$I_{O(off)}$	—	—	0.5	µA	V_{CC} = 50V, V_I = 0V
DC Current Gain	DDTC123ECA DDTC143ECA DDTC114ECA DDTC114ECAQ DDTC124ECA DDTC144ECA DDTC144ECAQ DDTC115ECA	G_I	20 20 30 35 56 68 80 82	—	—	—	V_O = 5V, I_O = 20mA V_O = 5V, I_O = 10mA V_O = 5V, I_O = 5mA V_O = 5V, I_O = 5mA V_O = 5V, I_O = 5mA V_O = 5V, I_O = 5mA V_O = 5V, I_O = 5mA V_O = 5V, I_O = 5mA
Input Resistor Tolerance		ΔR_1	-30	—	+30	%	—
Resistance Ratio Tolerance		$\Delta R_2/R_1$	0.8	1	1.2	%	—
Gain-Bandwidth Product (Note 8)		f_T	—	250	—	MHz	V_{CE} = 10V, I_E = 5mA, f = 100MHz

Note: 8. Transistor - For Reference Only

Typical Characteristics – DDTC143ECA (@T_A = +25°C, unless otherwise specified.)

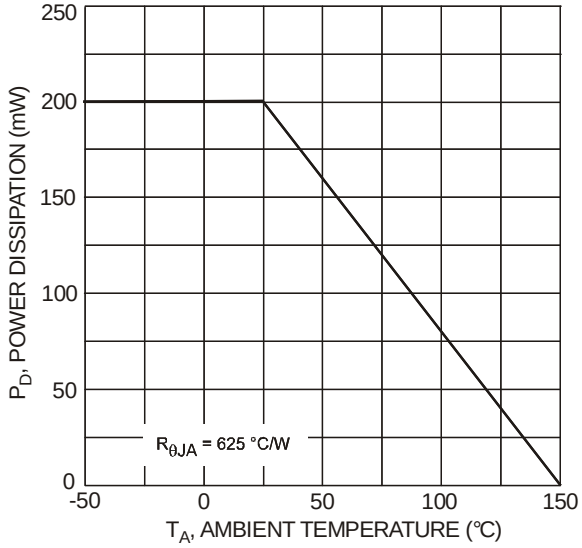


Fig. 1 Power Dissipation vs. Ambient Temperature

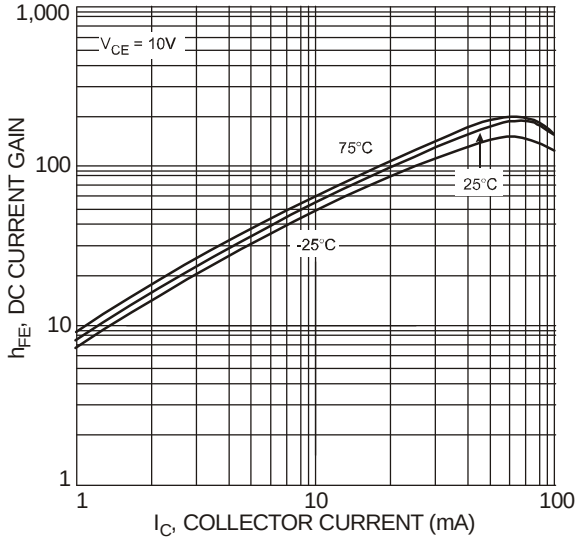


Fig. 2 Typical DC Current Gain vs. Collector Current

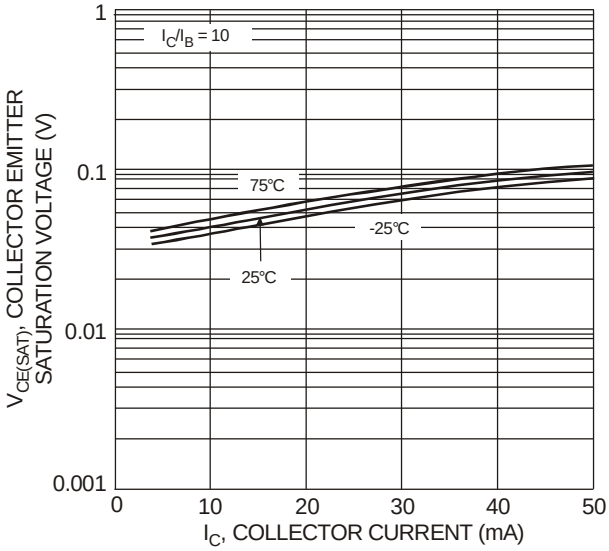


Fig. 3 Typical Collector Emitter Saturation Voltage vs. Collector Current

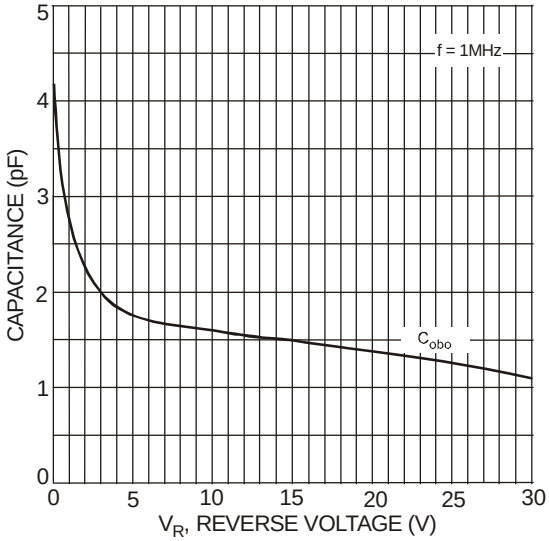


Fig. 4 Typical Capacitance Characteristics

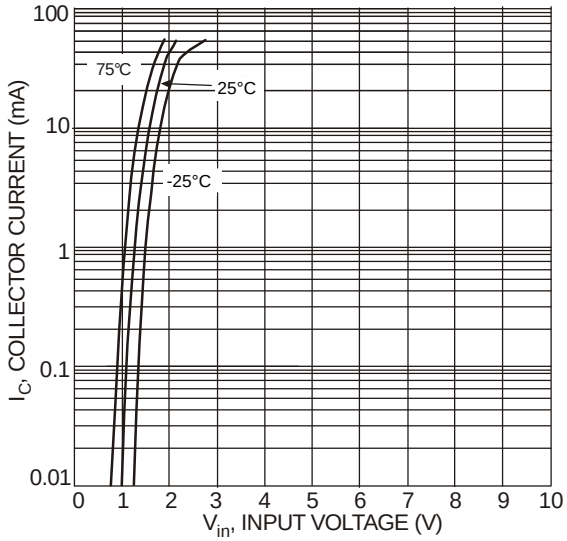


Fig. 5 Collector Current vs. Input Voltage

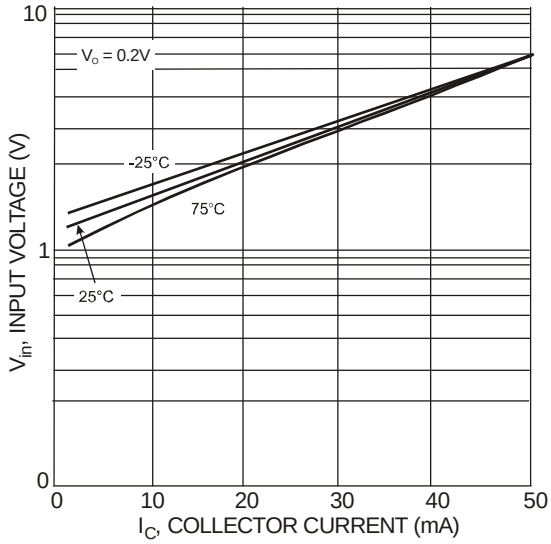
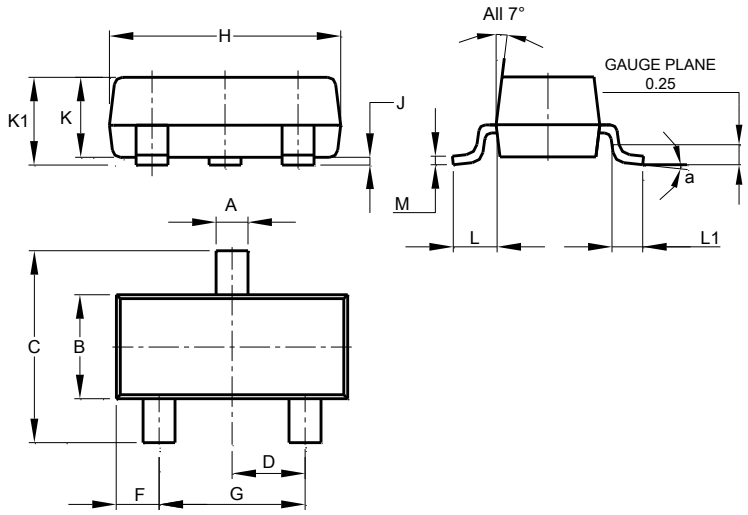


Fig. 6 Input Voltage vs. Collector Current

Package Outline Dimensions

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

SOT23

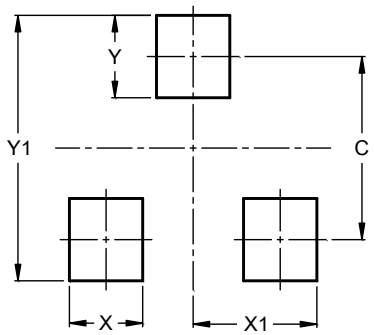


SOT23			
Dim	**Min**	**Max**	**Typ**
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

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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