DIODES
INCORPORATED

Lead-free Green

## NPN PRE-BIASED SMALL SIGNAL SURFACE MOUNT TRANSISTOR

Features

- Epitaxial Planar Die Construction
- Complementary PNP Types Available (ADTA)
- 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
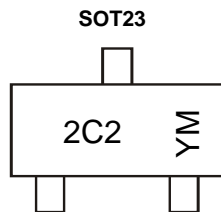- Weight: 0.008 grams (Approximate)

R1 (NOM)	R2 (NOM)
47kΩ	22kΩ

SOT23

Top View

Device Schematic

Equivalent Inverter Circuit
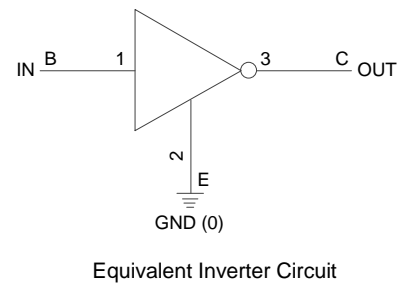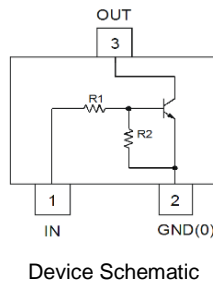
Ordering Information (Note 5)

Part Number	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity Per Reel
ADTC144WCAQ-7	Automotive	2C2	7	8	3,000
ADTC144WCAQ-13	Automotive	2C2	13	8	10,000

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. Refer to https://www.diodes.com/quality/product-compliance-definitions/.
5. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information

SOT23

2C2   YM

2C2 = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: E = 2017)
M = Month (ex: 9 = September)

Date Code Key

Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Code	E	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

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)>	V_{IN}	-10 to +40	V
Output Current	I_O	30	mA
Output Current	I_C (Max)	100	mA

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

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 6)	P_D	310	mW
Thermal Resistance, Junction to Ambient Air (Note 6)	$R_{\theta JA}$	403	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Note: 6. Mounted on FR-4 PC Board with minimum recommended pad layout.

ADTC144WCAQ
Document number: DS39209 Rev. 1 - 2

Thermal Characteristics and Derating Information

Derating Curve

Transient Thermal Impedance

Pulse Power Dissipation

ADTC144WCAQ
Document number: DS39209 Rev. 1 - 2
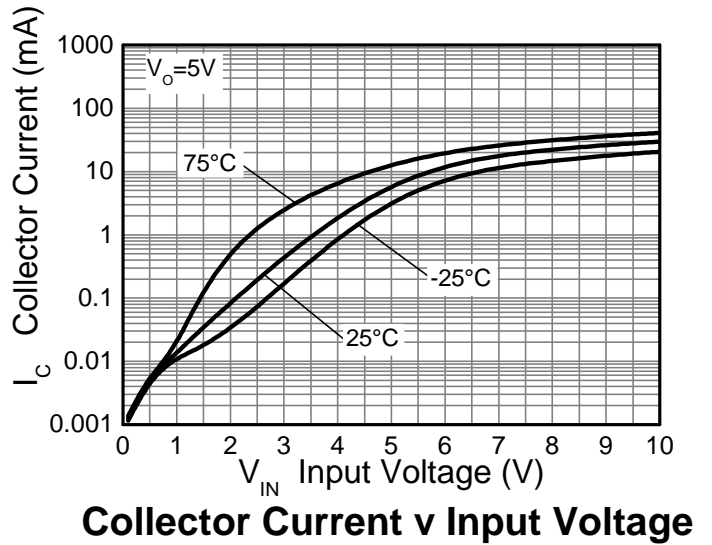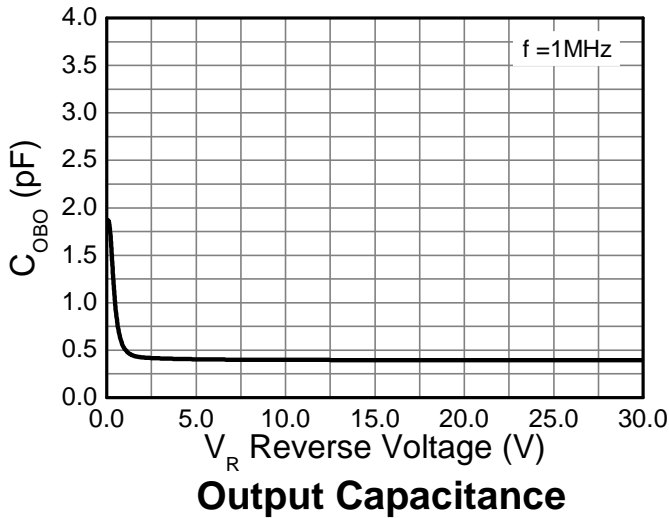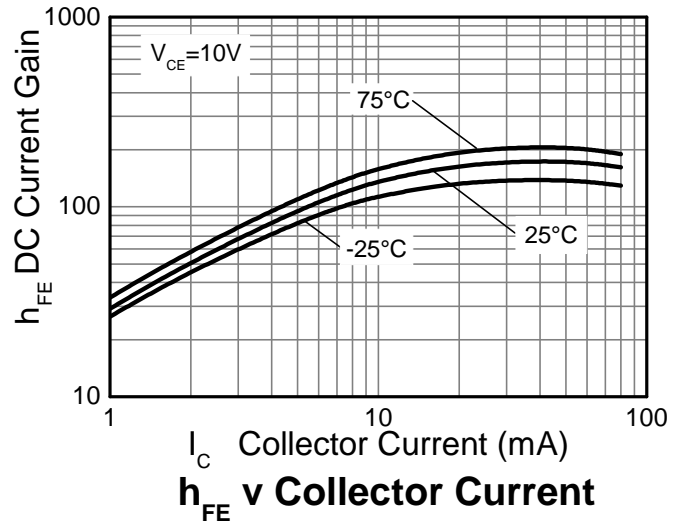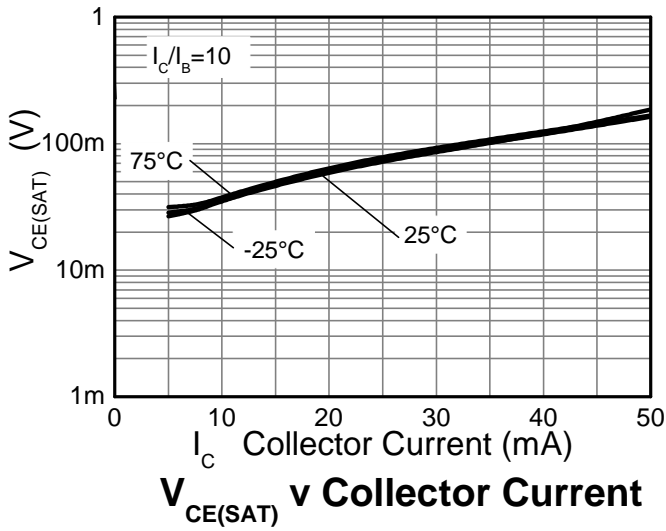
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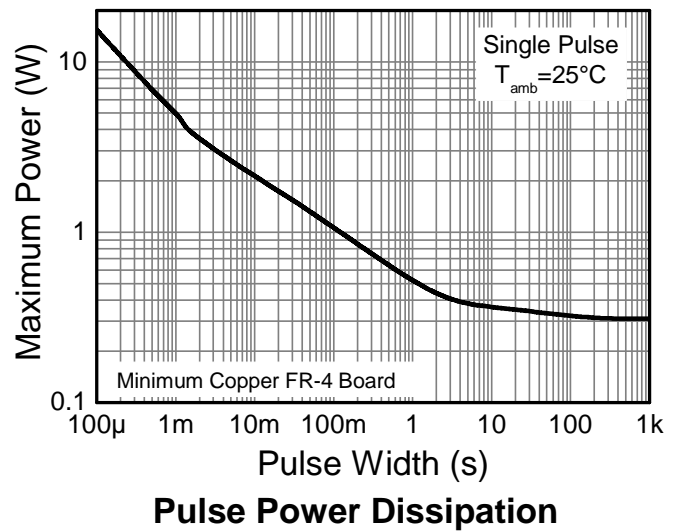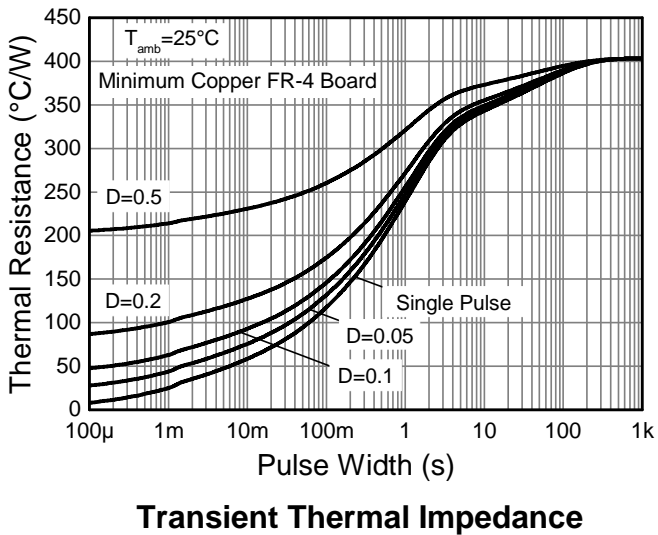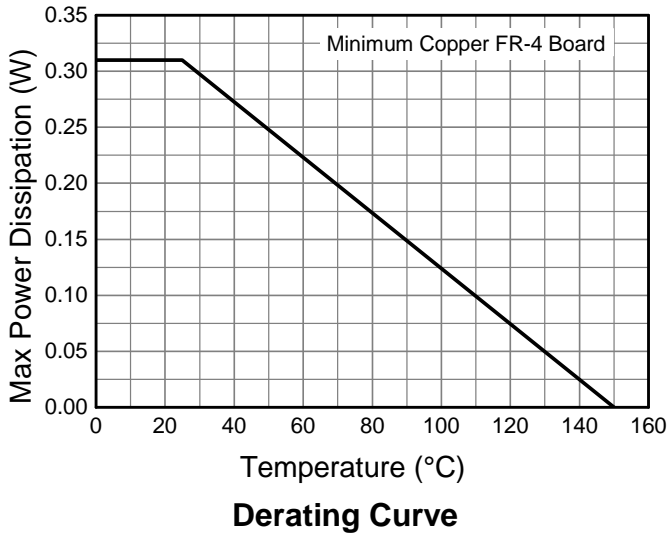
Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Input Voltage	$V_{I(OFF)}$ (Note 7)	0.8	—	—	V	V_{CC} = 5V, I_O = 100µA
	$V_{I(ON)}$ (Note 8)	—	—	4		V_O = 0.3V, I_O = 2mA
Output Voltage	$V_{O(ON)}$	—	0.1	0.3	V	I_O/I_I = 10mA/0.5mA
Input Current	I_I	—	—	0.16	mA	V_I = 5V
Output Current	$I_{O(OFF)}$	—	—	0.5	µA	V_{CC} = 50V, V_I = 0V
DC Current Gain	G_I	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 (Note 9)	f_T	—	250	—	MHz	V_{CE} = 10V, I_E = 5mA, f = 100MHz

Notes: 7. Guarantees that the device will be switched OFF if the Input Voltage is less than 0.8V.
8. Guarantees that the device will be switched ON if the Input Voltage is more than 4V.
9. Transistor - For Reference Only.

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Document number: DS39209 Rev. 1 - 2

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

$V_{CE(SAT)}$ v Collector Current

h_{FE} v Collector Current

Output Capacitance

Collector Current v Input Voltage

Input Voltage v Collector Current

ADTC144WCAQ
Document number: DS39209 Rev. 1 - 2

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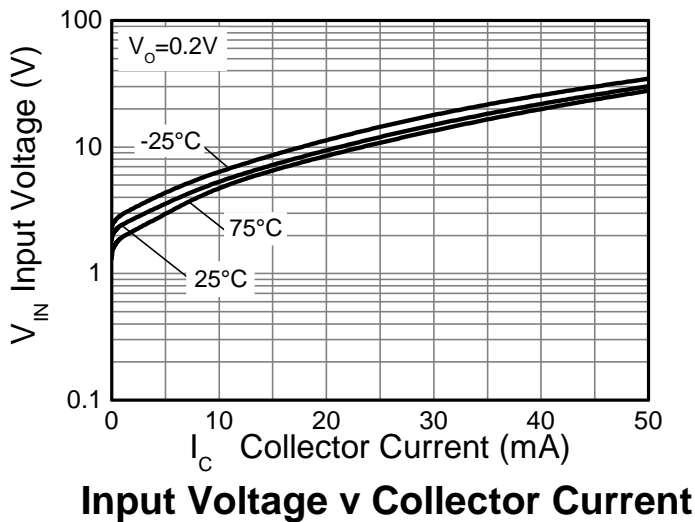
Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.
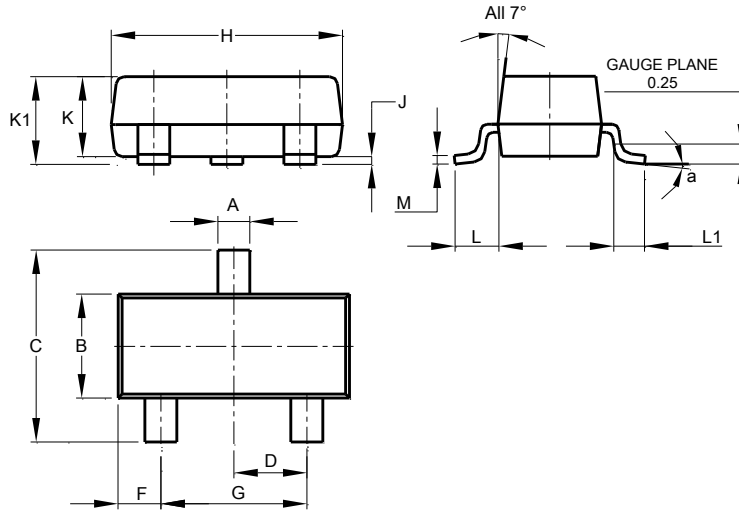
SOT23

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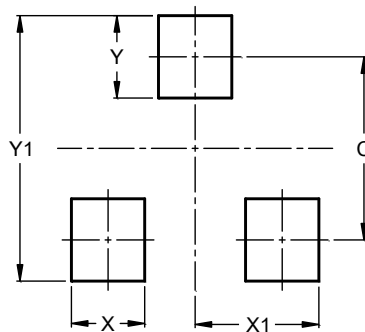
Dimensions	Value (in mm)
C	2.0
X	0.8
X1	1.35
Y	0.9
Y1	2.9

ADTC144WCAQ
Document number: DS39209 Rev. 1 - 2

September 2017
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