# ADTC144WCAQ

**NPN PRE-BIASED SMALL SIGNAL SURFACE MOUNT TRANSISTOR**

## Features

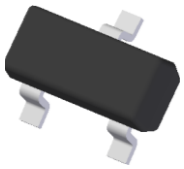
- Epitaxial Planar Die Construction
- Complementary PNP Types Available (ADTA)
- Built-In Biasing Resistors, R1 ≠ R2
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP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

## Mechanical Data

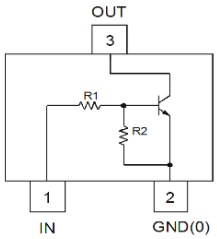
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.008 grams (Approximate)

| R1 (NOM) | R2 (NOM) |
|---|---|
| 47kΩ | 22kΩ |

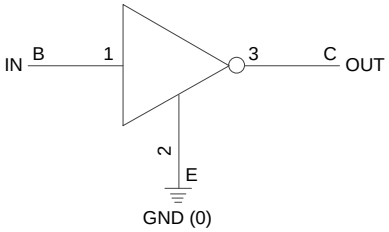
SOT23



Top View




Device Schematic




Equivalent Inverter Circuit

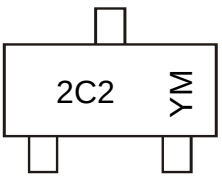
## Ordering Information (Note 5)

| 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 = 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 |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## 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.


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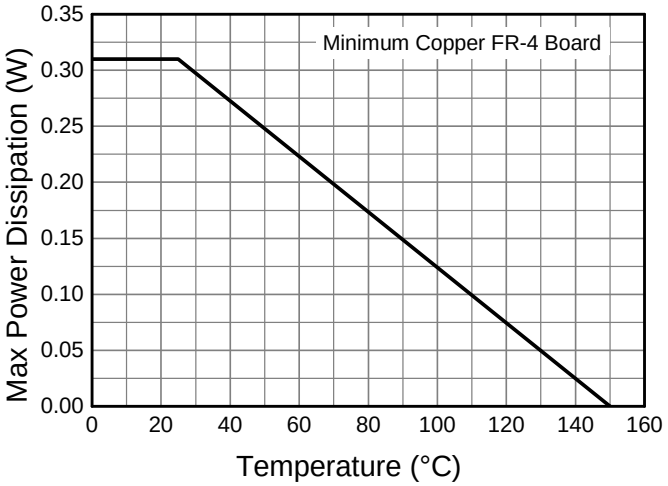
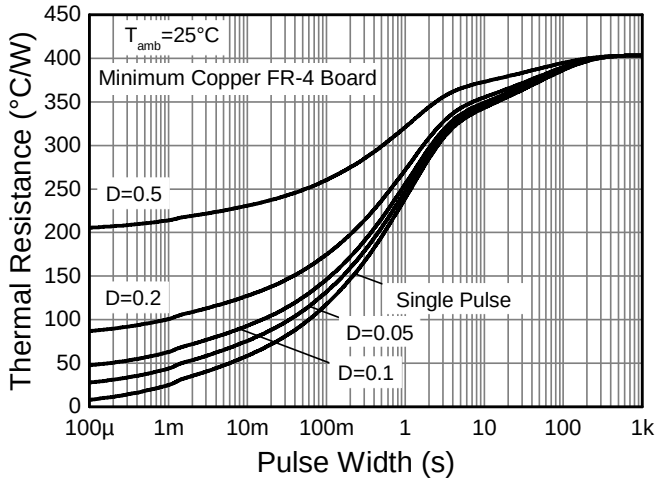
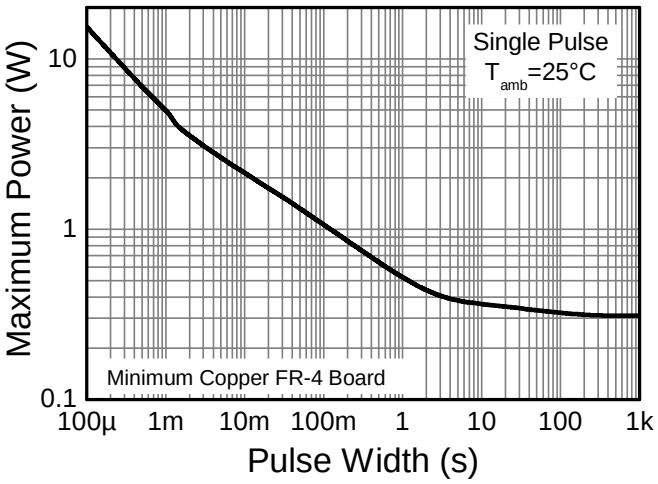
## Thermal Characteristics and Derating Information




**Derating Curve**




**Transient Thermal Impedance**




**Pulse Power Dissipation**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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 | $\Delta R_1$ | -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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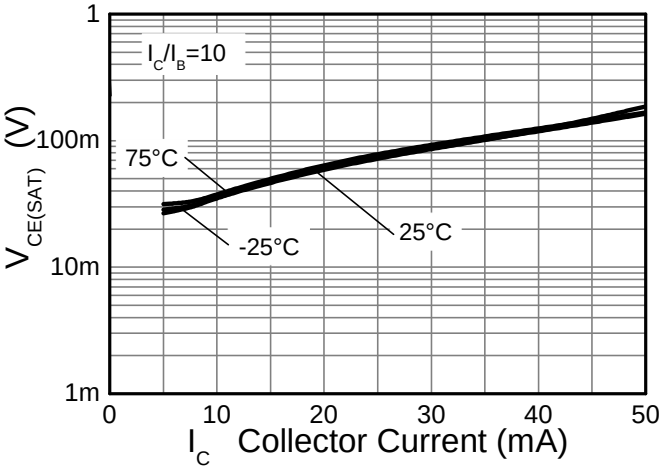
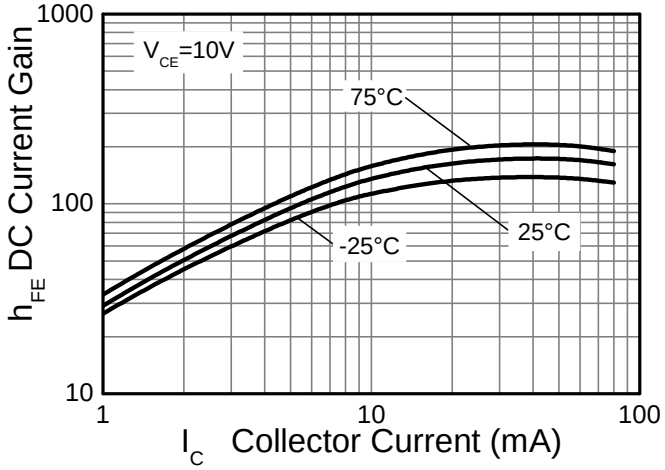
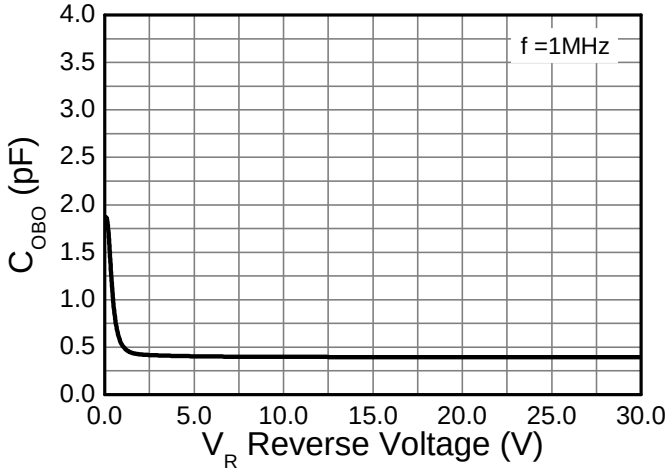
## Typical Characteristics (@$T_A$ = +25°C, unless otherwise specified.)



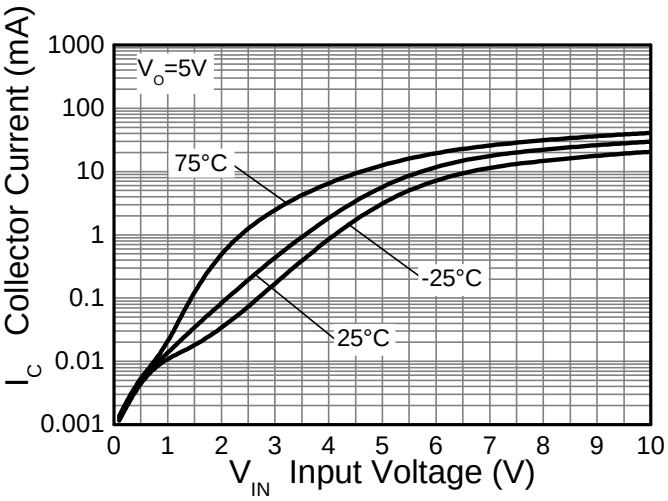

**$V_{CE(SAT)}$ v Collector Current**



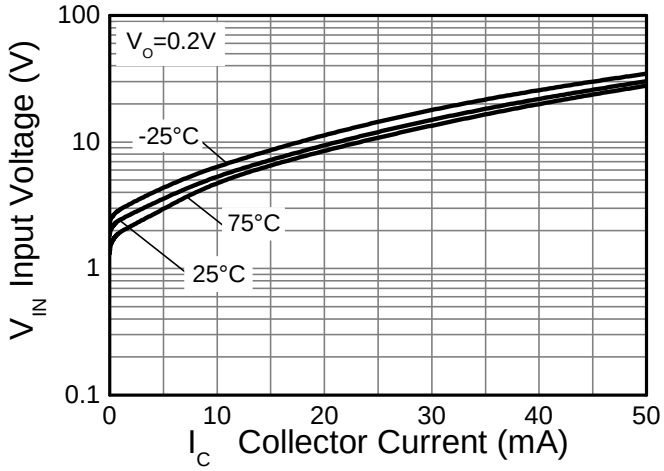

**$h_{FE}$ v Collector Current**




**Output Capacitance**




**Collector Current v Input Voltage**




**Input Voltage v Collector Current**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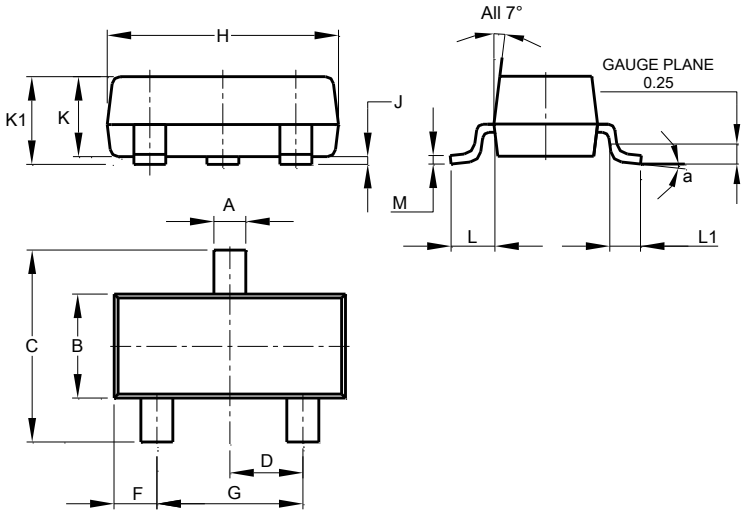
## Package Outline Dimensions

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

**SOT23**

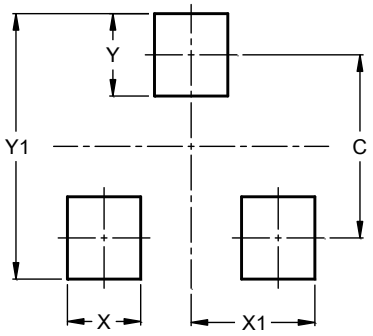



| SOT23 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 0.37 | 0.51 | 0.40 |
| **B** | 1.20 | 1.40 | 1.30 |
| **C** | 2.30 | 2.50 | 2.40 |
| **D** | 0.89 | 1.03 | 0.915 |
| **F** | 0.45 | 0.60 | 0.535 |
| **G** | 1.78 | 2.05 | 1.83 |
| **H** | 2.80 | 3.00 | 2.90 |
| **J** | 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 |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