

## COMPLEMENTARY SILICON POWER TRANSISTORS

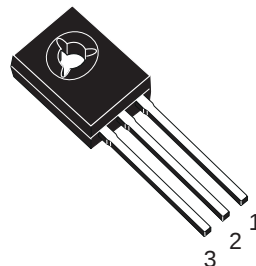
- STMicroelectronics PREFERRED SALESTYPE
- COMPLEMENTARY PNP - NPN DEVICES

### DESCRIPTION

The BD433, BD435, and BD437 are silicon epitaxial-base NPN power transistors in Jedec SOT-32 plastic package, intended for use in medium power linear and switching applications.

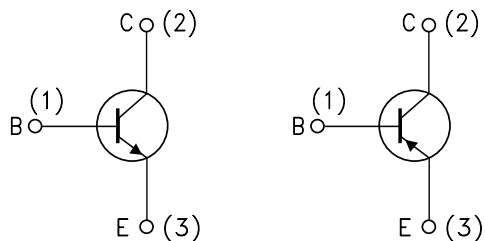
The BD433 is especially suitable for use in car-radio output stages.

The complementary PNP types are BD434, BD436, and BD438 respectively.



SOT-32

### INTERNAL SCHEMATIC DIAGRAM



SC06960

SC08810

### ABSOLUTE MAXIMUM RATINGS

| Symbol           | Parameter                                       | Value      |       |       |       | Unit |
|------------------|-------------------------------------------------|------------|-------|-------|-------|------|
|                  |                                                 | NPN        | BD433 | BD435 | BD437 |      |
|                  | PNP                                             | BD434      | BD436 | BD438 |       |      |
| V <sub>CBO</sub> | Collector-Base Voltage (I <sub>E</sub> = 0)     | 22         | 32    | 45    | V     |      |
| V <sub>CES</sub> | Collector-Emitter Voltage (V <sub>BE</sub> = 0) | 22         | 32    | 45    | V     |      |
| V <sub>CEO</sub> | Collector-Emitter Voltage (I <sub>B</sub> = 0)  | 22         | 32    | 45    | V     |      |
| V <sub>EBO</sub> | Emitter-Base Voltage (I <sub>C</sub> = 0)       | 5          |       |       | V     |      |
| I <sub>C</sub>   | Collector Current                               | 4          |       |       | A     |      |
| I <sub>CM</sub>  | Collector Peak Current (t ≤ 10 ms)              | 7          |       |       | A     |      |
| I <sub>B</sub>   | Base Current                                    | 1          |       |       | A     |      |
| P <sub>tot</sub> | Total Dissipation at T <sub>c</sub> ≤ 25 °C     | 36         |       |       | W     |      |
| T <sub>stg</sub> | Storage Temperature                             | -65 to 150 |       |       | °C    |      |
| T <sub>j</sub>   | Max. Operating Junction Temperature             | 150        |       |       | °C    |      |

For PNP types voltage and current values are negative.

## BD433 BD434 BD435 BD436 BD437 BD438

### THERMAL DATA

|                       |                                     |     |     |      |
|-----------------------|-------------------------------------|-----|-----|------|
| R <sub>thj-case</sub> | Thermal Resistance Junction-case    | Max | 3.5 | °C/W |
| R <sub>thj-amb</sub>  | Thermal Resistance Junction-ambient | Max | 100 | °C/W |

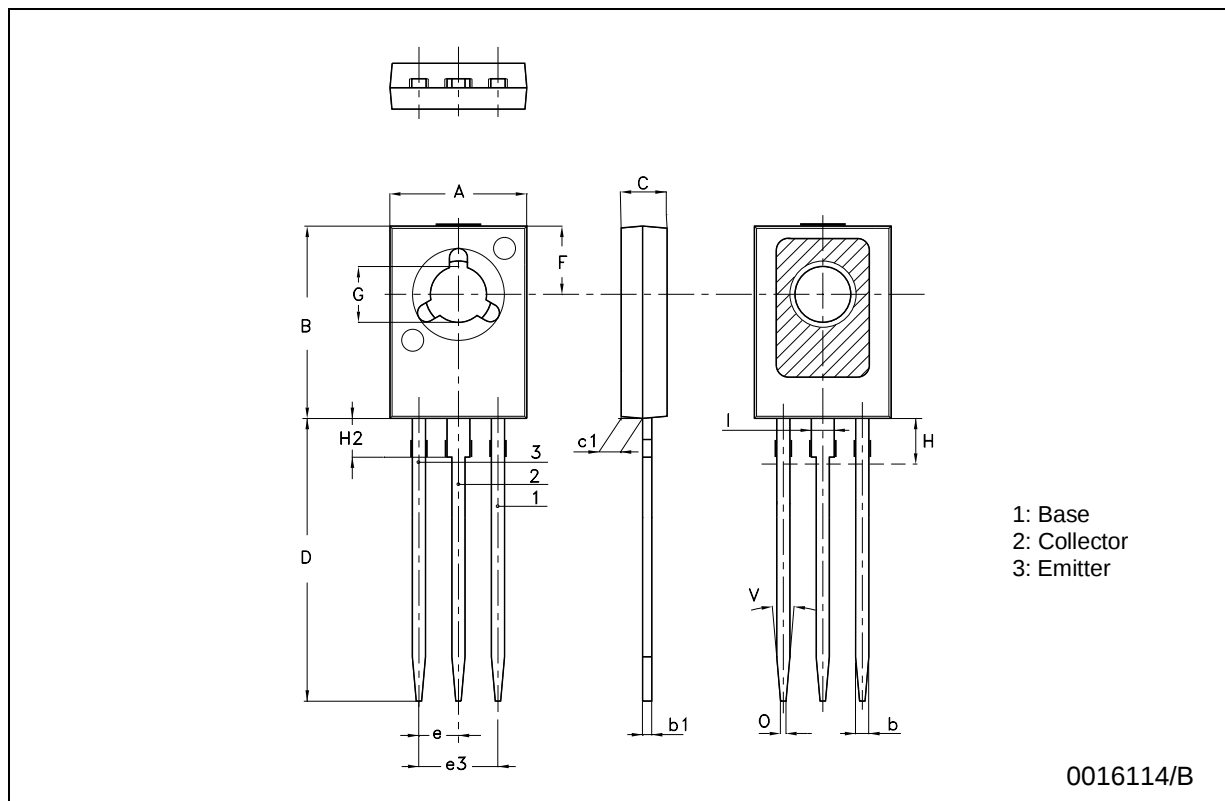
### ELECTRICAL CHARACTERISTICS (T<sub>case</sub> = 25 °C unless otherwise specified)

| Symbol                              | Parameter                                                 | Test Conditions                                                                                                                                                                                                                                                                                      | Min.                                   | Typ.                     | Max.              | Unit           |
|-------------------------------------|-----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|--------------------------|-------------------|----------------|
| I <sub>CBO</sub>                    | Collector Cut-off Current (I <sub>E</sub> = 0)            | for <b>BD433/434</b> V <sub>CB</sub> = 22 V<br>for <b>BD435/436</b> V <sub>CB</sub> = 32 V<br>for <b>BD437/438</b> V <sub>CB</sub> = 45 V                                                                                                                                                            |                                        |                          | 100<br>100<br>100 | μA<br>μA<br>μA |
| I <sub>CES</sub>                    | Collector Cut-off Current (V <sub>BE</sub> = 0)           | for <b>BD433/434</b> V <sub>CE</sub> = 22 V<br>for <b>BD435/436</b> V <sub>CE</sub> = 32 V<br>for <b>BD437/438</b> V <sub>CE</sub> = 45 V                                                                                                                                                            |                                        |                          | 100<br>100<br>100 | μA<br>μA<br>μA |
| I <sub>EBO</sub>                    | Emitter Cut-off Current (I <sub>C</sub> = 0)              | V <sub>EB</sub> = 5 V                                                                                                                                                                                                                                                                                |                                        |                          | 1                 | mA             |
| V <sub>CEO(sus)*</sub>              | Collector-Emitter Sustaining Voltage (I <sub>B</sub> = 0) | I <sub>C</sub> = 100 mA<br>for <b>BD433/434</b><br>for <b>BD435/436</b><br>for <b>BD437/438</b>                                                                                                                                                                                                      | 22<br>32<br>45                         |                          |                   | V<br>V<br>V    |
| V <sub>CE(sat)*</sub>               | Collector-Emitter Saturation Voltage                      | I <sub>C</sub> = 2 A<br>I <sub>B</sub> = 0.2 A<br>for <b>BD433/434</b><br>for <b>BD435/436</b><br>for <b>BD437/438</b>                                                                                                                                                                               |                                        | 0.2<br>0.2<br>0.2        | 0.5<br>0.5<br>0.6 | V<br>V<br>V    |
| V <sub>BE*</sub>                    | Base-Emitter Voltage                                      | I <sub>C</sub> = 10 mA<br>I <sub>C</sub> = 2 A<br>V <sub>CE</sub> = 5 V<br>V <sub>CE</sub> = 1 V<br>for <b>BD433/434</b><br>for <b>BD435/436</b><br>for <b>BD437/438</b>                                                                                                                             |                                        | 0.58                     | 1.1<br>1.1<br>1.2 | V<br>V<br>V    |
| h <sub>FE*</sub>                    | DC Current Gain                                           | I <sub>C</sub> = 10 mA<br>V <sub>CE</sub> = 5 V<br>for <b>BD433/434</b><br>for <b>BD435/436</b><br>for <b>BD437/438</b><br>I <sub>C</sub> = 500 mA<br>V <sub>CE</sub> = 1 V<br>I <sub>C</sub> = 2 A<br>V <sub>CE</sub> = 1 V<br>for <b>BD433/434</b><br>for <b>BD435/436</b><br>for <b>BD437/438</b> | 40<br>40<br>30<br>85<br>50<br>50<br>40 | 130<br>130<br>130<br>140 |                   |                |
| h <sub>FE1</sub> /h <sub>FE2*</sub> | Matched Pair                                              | I <sub>C</sub> = 500 mA V <sub>CE</sub> = 1 V                                                                                                                                                                                                                                                        |                                        |                          | 1.4               |                |
| f <sub>T</sub>                      | Transition frequency                                      | I <sub>C</sub> = 250 mA V <sub>CE</sub> = 1 V                                                                                                                                                                                                                                                        | 3                                      |                          |                   | MHz            |

\* Pulsed: Pulse duration = 300 μs, duty cycle 1.5 %

## SOT-32 (TO-126) MECHANICAL DATA

| DIM. | mm   |      |      | inch  |       |       |
|------|------|------|------|-------|-------|-------|
|      | MIN. | TYP. | MAX. | MIN.  | TYP.  | MAX.  |
| A    | 7.4  |      | 7.8  | 0.291 |       | 0.307 |
| B    | 10.5 |      | 10.8 | 0.413 |       | 0.425 |
| b    | 0.7  |      | 0.9  | 0.028 |       | 0.035 |
| b1   | 0.40 |      | 0.65 | 0.015 |       | 0.025 |
| C    | 2.4  |      | 2.7  | 0.094 |       | 0.106 |
| c1   | 1.0  |      | 1.3  | 0.039 |       | 0.051 |
| D    | 15.4 |      | 16.0 | 0.606 |       | 0.630 |
| e    |      | 2.2  |      |       | 0.087 |       |
| e3   |      | 4.4  |      |       | 0.173 |       |
| F    |      | 3.8  |      |       | 0.150 |       |
| G    | 3    |      | 3.2  | 0.118 |       | 0.126 |
| H    |      |      | 2.54 |       |       | 0.100 |
| H2   |      | 2.15 |      |       | 0.084 |       |
| I    |      | 1.27 |      |       | 0.05  |       |
| O    |      | 0.3  |      |       | 0.011 |       |
| V    |      | 10°  |      |       | 10°   |       |



Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specification mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a trademark of STMicroelectronics

© 2003 STMicroelectronics – Printed in Italy – All Rights Reserved

STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - Canada - China - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States.

<http://www.st.com>