

## COMPLEMENTARY SILICON POWER TRANSISTORS

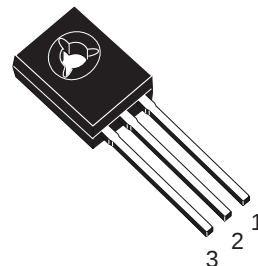
- STMicroelectronics PREFERRED SALESTYPE
- COMPLEMENTARY PNP - NPN DEVICES

### 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.

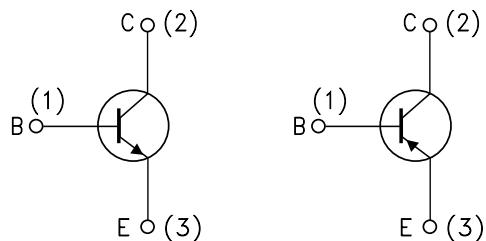
The BD433 is especially suitable for use in car-radio output stages.

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 |

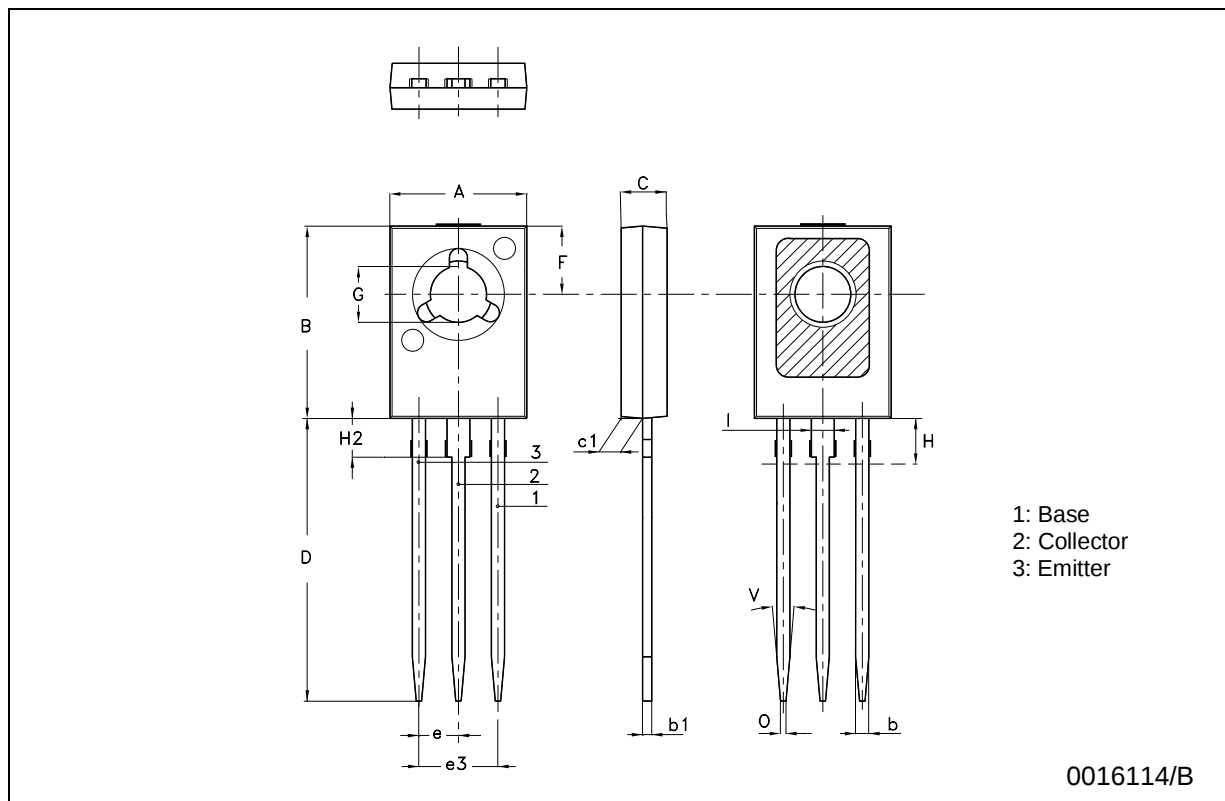
### ELECTRICAL CHARACTERISTICS (T<sub>case</sub> = 25 °C unless otherwise specified)

| 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><br>for <b>BD435/436</b><br>for <b>BD437/438</b>          | V <sub>CB</sub> = 22 V<br>V <sub>CB</sub> = 32 V<br>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><br>for <b>BD435/436</b><br>for <b>BD437/438</b>          | V <sub>CE</sub> = 22 V<br>V <sub>CE</sub> = 32 V<br>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                                                       | 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                                                          | 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                                | 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><br>I <sub>C</sub> = 500 mA<br>I <sub>C</sub> = 2 A | 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><br>V <sub>CE</sub> = 1 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> | 40<br>40<br>30<br>85<br><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°   |       |



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