



## 5302D

## NPN SILICON TRANSISTOR

### HIGH VOLTAGE NPN TRANSISTOR WITH DIODE

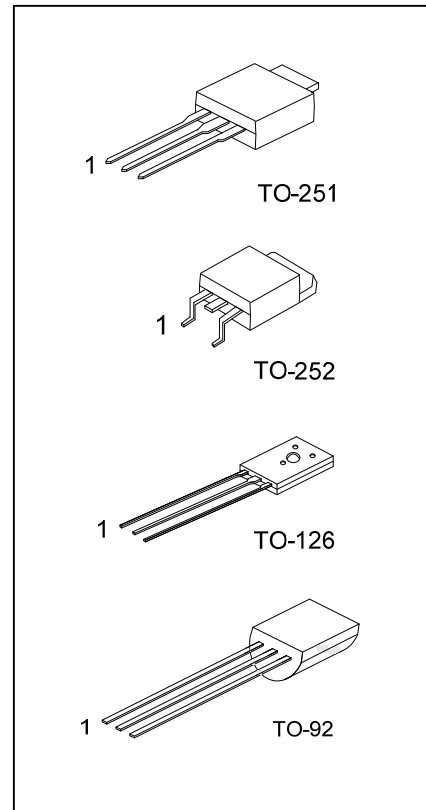
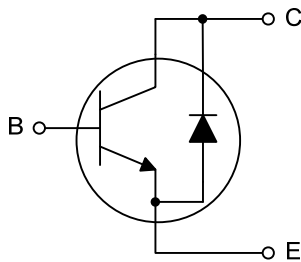
#### DESCRIPTION

The UTC **5302D** are series of NPN silicon planar transistor with diode and its suited to be used in power amplifier applications.

#### FEATURES

- \* Internal free-wheeling diode
- \* Makes efficient anti-saturation operation
- \* Low variable storage-time spread
- \* Low base drive
- \* Very suitable for half bridge light ballast application

#### SYMBOL



#### ORDERING INFORMATION

| Ordering Number |              | Package | Pin Assignment |   |   | Packing   |
|-----------------|--------------|---------|----------------|---|---|-----------|
| Lead Free       | Halogen Free |         | 1              | 2 | 3 |           |
| 5302DL-T60-K    | 5302DG-T60-K | TO-126  | B              | C | E | Bulk      |
| 5302DL-T92-B    | 5302DG-T92-B | TO-92   | E              | C | B | Tape Box  |
| 5302DL-T92-K    | 5302DG-T92-K | TO-92   | E              | C | B | Bulk      |
| 5302DL-T92-R    | 5302DG-T92-R | TO-92   | E              | C | B | Tape Reel |
| 5302DL-TM3-T    | 5302DG-TM3-T | TO-251  | B              | C | E | Tube      |
| 5302DL-TN3-R    | 5302DG-TN3-R | TO-252  | B              | C | E | Tape Reel |
| 5302DL-TN3-T    | 5302DG-TN3-T | TO-252  | B              | C | E | Tube      |

|   |  |
|---|--|
| <p>5302DL-T60-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Lead Free</p> | <p>(1) B: Tape Box, K: Bulk, T: Tube, R: Tape Reel</p> <p>(2) T60: TO-126, T92: TO-92, TM3: TO-251, TN3: TO-252</p> <p>(3) G: Halogen Free, L: Lead Free</p> |
|---|--|

■ ABSOLUTE MAXIMUM RATING ( $T_A=25^{\circ}\text{C}$ , unless otherwise specified)

| PARAMETER   |                | SYMBOL    | RATINGS    | UNIT               |
|---|----------------|-----------|------------|--------------------|
| Collector-Base Voltage                              |                | $V_{CB0}$ | 800        | V                  |
| Collector-Emitter Voltage                           |                | $V_{CEO}$ | 400        | V                  |
| Emitter-Base Voltage                                |                | $V_{EBO}$ | 10         | V                  |
| Collector Current                                   |                | $I_C$     | 2          | A                  |
| Collector Peak Current ( $t_P < 5\text{ms}$ )       |                | $I_{CM}$  | 4          | A                  |
| Base Current  |                | $I_B$     | 1          | A                  |
| Base Peak Current ( $t_P < 5\text{ms}$ )            |                | $I_{BM}$  | 2          | A                  |
| Power Dissipation ( $T_C \leq 25^{\circ}\text{C}$ ) | TO-126         | $P_D$     | 12.5       | W                  |
|   | TO-92          |           | 1.6        |                    |
|   | TO-251/ TO-252 |           | 25         |                    |
| Junction Temperature                                |                | $T_J$     | +150       | $^{\circ}\text{C}$ |
| Storage Temperature                                 |                | $T_{STG}$ | -65 ~ +150 | $^{\circ}\text{C}$ |

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.  
Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ THERMAL DATA

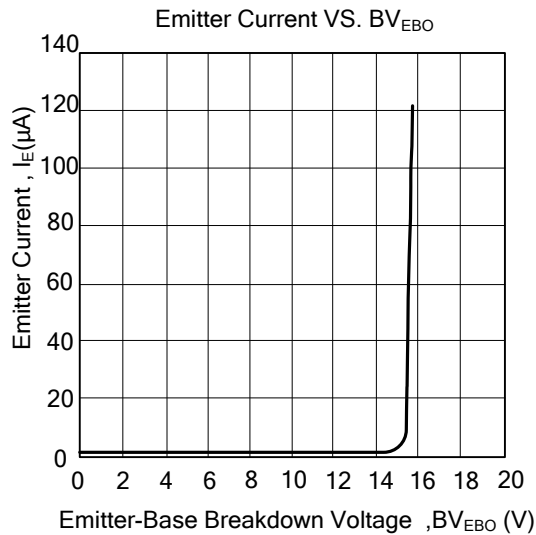
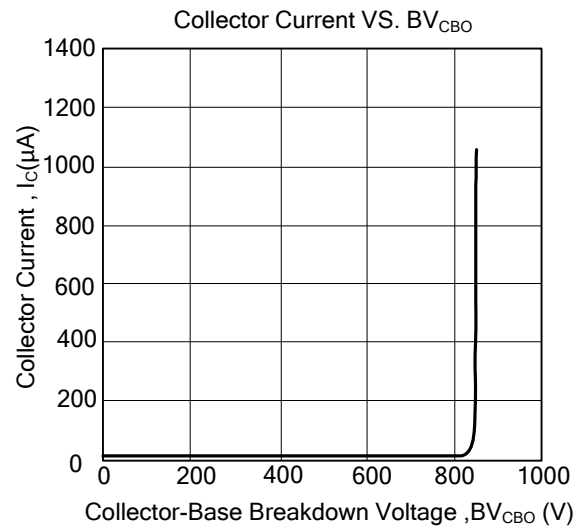
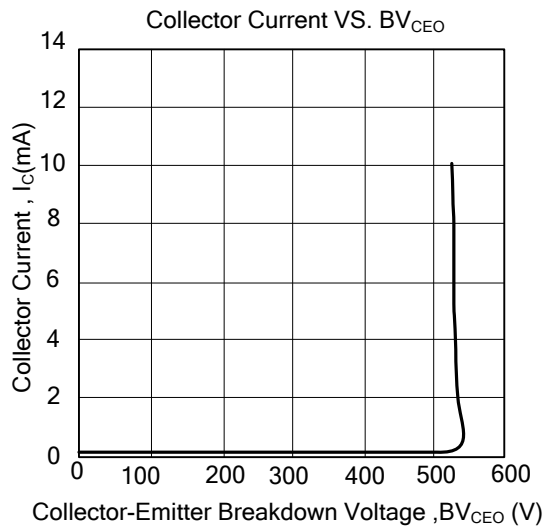
| PARAMETER           |                | SYMBOL        | RATINGS | UNIT                 |
|---------------------|----------------|---------------|---------|----------------------|
| Junction to Ambient | TO-126         | $\theta_{JA}$ | 122     | $^{\circ}\text{C/W}$ |
|                     | TO-92          |               | 160     |                      |
|                     | TO-251/ TO-252 |               | 100     |                      |
| Junction to Case    | TO-126         | $\theta_{JC}$ | 10      | $^{\circ}\text{C/W}$ |
|                     | TO-92          |               | 80      |                      |
|                     | TO-251/ TO-252 |               | 5       |                      |

■ ELECTRICAL CHARACTERISTICS ( $T_A = 25^{\circ}\text{C}$ , unless otherwise specified)

| PARAMETER                            | SYMBOL         | TEST CONDITIONS                                   | MIN | TYP  | MAX | UNIT          |
|--------------------------------------|----------------|---|-----|------|-----|---------------|
| <b>OFF CHARACTERISTICS</b>           |                |   |     |      |     |               |
| Collector-Emitter Breakdown Voltage  | $BV_{CEO}$     | $I_C=10\text{mA}$ , $I_E=0$ (Note)                | 400 |      |     | V             |
| Collector-Base Breakdown Voltage     | $BV_{CBO}$     | $I_C=1\text{mA}$ , $I_B=0$                        | 800 |      |     | V             |
| Emitter-Base Breakdown Voltage       | $BV_{EBO}$     | $I_E=1\text{mA}$ , $I_C=0$                        | 10  |      |     | V             |
| Collector Cutoff Current             | $I_{CBO}$      | $V_{CB}=800\text{V}$ , $I_E=0$                    |     |      | 1   | $\mu\text{A}$ |
| Emitter Cutoff Current               | $I_{EBO}$      | $V_{EB}=9\text{V}$ , $I_C=0$                      |     |      | 1   | $\mu\text{A}$ |
| <b>ON CHARACTERISTICS</b>            |                |   |     |      |     |               |
| DC Current Gain                      | $h_{FE1}$      | $V_{CE}=5\text{V}$ , $I_C=10\text{mA}$            | 10  |      |     |               |
|                                      | $h_{FE2}$      | $V_{CE}=5\text{V}$ , $I_C=400\text{mA}$           | 10  |      | 40  |               |
|                                      | $h_{FE3}$      | $V_{CE}=5\text{V}$ , $I_C=1\text{A}$              | 5   |      |     |               |
| Collector-Emitter Saturation Voltage | $V_{CE(SAT1)}$ | $I_C=0.5\text{A}$ , $I_B=0.1\text{A}$ (Note)      |     |      | 0.5 | V             |
|                                      | $V_{CE(SAT2)}$ | $I_C=1\text{A}$ , $I_B=0.25\text{A}$ (Note)       |     | 1.1  | 1.5 |               |
| Base-Emitter Saturation Voltage      | $V_{BE(SAT1)}$ | $I_C=0.5\text{A}$ , $I_B=0.1\text{A}$ (Note)      |     |      | 1.1 | V             |
|                                      | $V_{BE(SAT2)}$ | $I_C=1\text{A}$ , $I_B=0.25\text{A}$ (Note)       |     |      | 1.2 |               |
| <b>SWITCHING CHARACTERISTICS</b>     |                |   |     |      |     |               |
| Turn On Time                         | $t_{ON}$       | $V_{CC}=250\text{V}$ , $I_C=1\text{A}$ ,          |     | 0.15 | 0.3 | $\mu\text{S}$ |
| Fall Time                            | $t_F$          | $I_{B1}=I_{B2}=0.2\text{A}$ , $t_P=25\mu\text{S}$ |     | 0.2  | 0.4 | $\mu\text{S}$ |
| Storage Time                         | $t_{STG}$      | Duty Cycle < 1%                                   |     | 0.5  | 0.9 | $\mu\text{S}$ |
| <b>DIODE</b>                         |                |   |     |      |     |               |
| Forward Voltage Drop                 | $V_F$          | $I_C=1\text{A}$                                   |     |      | 1.4 | V             |
| Fall Time                            | $t_F$          | $I_C=1\text{A}$                                   |     |      | 800 | $\mu\text{S}$ |

Note: Pulsed duration = 300 $\mu\text{S}$ , Duty cycle  $\leq 2\%$

### TYPICAL CHARACTERISTICS



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