



# DDTC (LO-R1) E

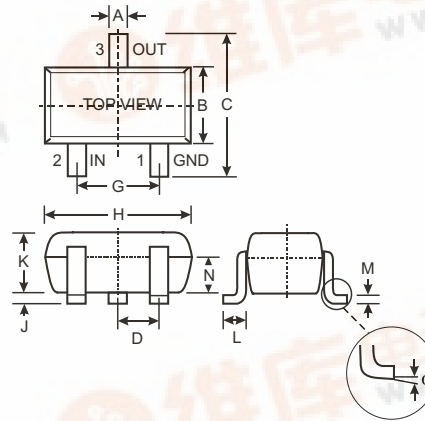
## NPN PRE-BIASED 100 mA SOT-523 SURFACE MOUNT TRANSISTOR

### Features

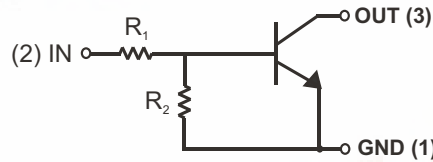
- Epitaxial Planar Die Construction
- Complementary PNP Types Available (DDTA)
- Built-In Biasing Resistors
- Lead Free Device

### Mechanical Data

- Case: SOT-523, Molded Plastic
- Case material - UL Flammability Rating 94V-0
- Moisture sensitivity: Level 1 per J-STD-020A
- Terminals: Finish - Matte Tin (Note 1)  
Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Marking: Date Code and Marking Code  
(See Diagrams & Page 2)
- Weight: 0.002 grams (approx.)
- Ordering Information (See Page 2)



| SOT-523              |      |      |      |
|----------------------|------|------|------|
| Dim                  | Min  | Max  | Typ  |
| A                    | 0.15 | 0.30 | 0.22 |
| B                    | 0.75 | 0.85 | 0.80 |
| C                    | 1.45 | 1.75 | 1.60 |
| D                    | —    | —    | 0.50 |
| G                    | 0.90 | 1.10 | 1.00 |
| H                    | 1.50 | 1.70 | 1.60 |
| J                    | 0.00 | 0.10 | 0.05 |
| K                    | 0.60 | 0.80 | 0.75 |
| L                    | 0.10 | 0.30 | 0.22 |
| M                    | 0.10 | 0.20 | 0.12 |
| N                    | 0.45 | 0.65 | 0.50 |
| $\alpha$             | 0°   | 8°   | —    |
| All Dimensions in mm |      |      |      |



| P/N       | R1 (NOM)       | R2 (NOM)     | MARKING |
|-----------|----------------|--------------|---------|
| DDTC122LE | 0.22K $\Omega$ | 10K $\Omega$ | N81     |
| DDTC142JE | 0.47K $\Omega$ | 10K $\Omega$ | N82     |
| DDTC122TE | 0.22K $\Omega$ | OPEN         | N83     |
| DDTC142TE | 0.47K $\Omega$ | OPEN         | N84     |

### Maximum Ratings @ $T_A = 25^\circ\text{C}$ unless otherwise specified

| Characteristic                                       | Symbol                  | Value       | Unit               |
|------------------------------------------------------|-------------------------|-------------|--------------------|
| Supply Voltage, (3) to (1)                           | $V_{CC}$                | 50          | V                  |
| Input Voltage, (2) to (1)                            | $V_{IN}$                | -5 to +6    | V                  |
| Input Voltage, (1) to (2)                            | $V_{EBO} \text{ (MAX)}$ | 5           | V                  |
| Output Current                                       | $I_C$                   | 100         | mA                 |
| Power Dissipation (Note 2)                           | $P_d$                   | 150         | mW                 |
| Thermal Resistance, Junction to Ambient Air (Note 2) | $R_{\theta JA}$         | 625         | $^\circ\text{C/W}$ |
| Operating and Storage and Temperature Range          | $T_j, T_{STG}$          | -55 to +150 | $^\circ\text{C}$   |

Note: 1. If lead-bearing terminal plating is required, please contact your Diodes Inc. sales representative for availability and minimum order details.  
2. Mounted on FR4 PC Board with recommended pad layout at <http://www.diodes.com/datasheets/ap02001.pdf>.

**Electrical Characteristics** @  $T_A = 25^\circ\text{C}$  unless otherwise specified

**R1, R2 Types**

| Characteristic          |                        | Symbol       | Min        | Typ | Max        | Unit    | Test Condition                                       |
|-------------------------|------------------------|--------------|------------|-----|------------|---------|------------------------------------------------------|
| Input Voltage           | DDTC122LE<br>DDTC142JE | $V_{I(off)}$ | 0.3<br>0.3 | —   | —          | V       | $V_{CC} = 5V, I_O = 100\mu A$                        |
|                         | DDTC122LE<br>DDTC142JE | $V_{I(on)}$  | —          | —   | 2.0<br>2.0 | V       | $V_O = 0.3V, I_O = 20mA$<br>$V_O = 0.3V, I_O = 20mA$ |
| Output Voltage          |                        | $V_{O(on)}$  | —          | —   | 0.3V       | V       | $I_O/I_I = 5mA/0.25mA$                               |
| Input Current           | DDTC122LE<br>DDTC142JE | $I_I$        | —          | —   | 28<br>13   | mA      | $V_I = 5V$                                           |
| Output Current          |                        | $I_{O(off)}$ | —          | —   | 0.5        | $\mu A$ | $V_{CC} = 50V, V_I = 0V$                             |
| DC Current Gain         | DDTC122LE<br>DDTC142JE | $G_I$        | 56<br>56   | —   | —          | —       | $V_O = 5V, I_O = 10mA$                               |
| Gain-Bandwidth Product* |                        | $f_T$        | —          | 200 | —          | MHz     | $V_{CE} = 10V, I_E = 5mA,$<br>$f = 100MHz$           |

\* Transistor - For Reference Only

**Electrical Characteristics** @  $T_A = 25^\circ\text{C}$  unless otherwise specified

**R1-Only**

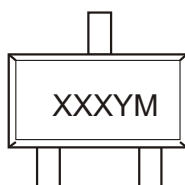
| Characteristic                       |                        | Symbol        | Min        | Typ        | Max        | Unit    | Test Condition                              |
|--------------------------------------|------------------------|---------------|------------|------------|------------|---------|---------------------------------------------|
| Collector-Base Breakdown Voltage     |                        | $BV_{CBO}$    | 50         | —          | —          | V       | $I_C = 50\mu A$                             |
| Collector-Emitter Breakdown Voltage  |                        | $BV_{CEO}$    | 40         | —          | —          | V       | $I_C = 1mA$                                 |
| Emitter-Base Breakdown Voltage       | DDTC122TE<br>DDTC142TE | $BV_{EBO}$    | 5          | —          | —          | V       | $I_E = 50\mu A$<br>$I_E = 50\mu A$          |
| Collector Cutoff Current             |                        | $I_{CBO}$     | —          | —          | 0.5        | $\mu A$ | $V_{CB} = 50V$                              |
| Emitter Cutoff Current               | DDTC122TE<br>DDTC142TE | $I_{EBO}$     | —<br>—     | —          | 0.5<br>0.5 | $\mu A$ | $V_{EB} = 4V$                               |
| Collector-Emitter Saturation Voltage |                        | $V_{CE(sat)}$ | —          | —          | 0.3        | V       | $I_C = 5mA, I_B = 0.25mA$                   |
| DC Current Transfer Ratio            | DDTC122TE<br>DDTC142TE | $h_{FE}$      | 100<br>100 | 250<br>250 | 600<br>600 | —       | $I_C = 1mA, V_{CE} = 5V$                    |
| Gain-Bandwidth Product*              |                        | $f_T$         | —          | 200        | —          | MHz     | $V_{CE} = 10V, I_E = -5mA,$<br>$f = 100MHz$ |

\* Transistor - For Reference Only

**Ordering Information** (Note 3)

| Device      | Packaging | Shipping         |
|-------------|-----------|------------------|
| DDTC122LE-7 | SOT-523   | 3000/Tape & Reel |
| DDTC142JE-7 | SOT-523   | 3000/Tape & Reel |
| DDTC122TE-7 | SOT-523   | 3000/Tape & Reel |
| DDTC142TE-7 | SOT-523   | 3000/Tape & Reel |

Notes: 1. If lead-bearing terminal plating is required, please contact your Diodes Inc. sales representative for availability and minimum order details.  
 3. For Packaging Details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

**Marking Information**


XXX = Product Type Marking Code (See Page 1)  
 YM = Date Code Marking  
 Y = Year ex: P = 2003  
 M = Month ex: 9 = September

Date Code Key

| Year | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|------|------|------|------|------|------|------|------|------|
| Code | N    | P    | R    | S    | T    | U    | V    | W    |

| Month | Jan | Feb | March | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------|-----|-----|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code  | 1   | 2   | 3     | 4   | 5   | 6   | 7   | 8   | 9   | O   | N   | D   |

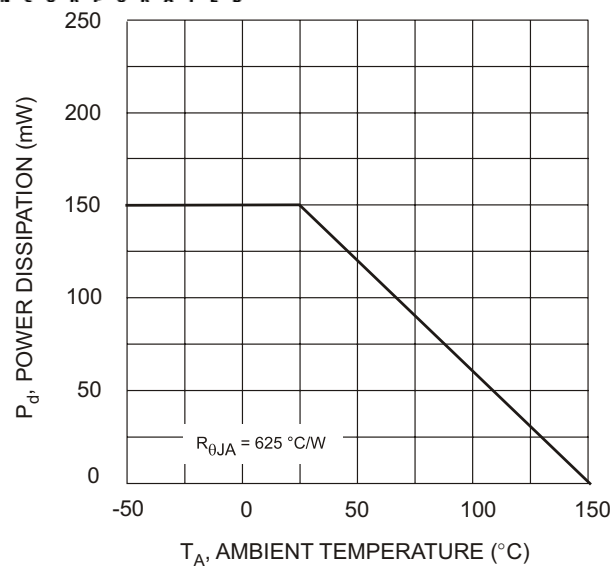


Fig. 1 Power Derating Curve