

# DDTC (R1 = R2 SERIES) KA

## NPN PRE-BIASED SMALL SIGNAL SURFACE MOUNT TRANSISTOR

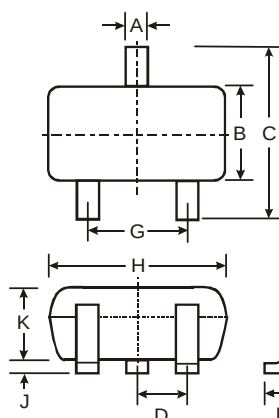
### Features

- Epitaxial Planar Die Construction
- Complementary PNP Types Available (DDTA)
- Built-In Biasing Resistors, R1 = R2
- **Lead Free/RoHS Compliant (Note 2)**
- "Green" Device, Note 3 and 4

### Mechanical Data

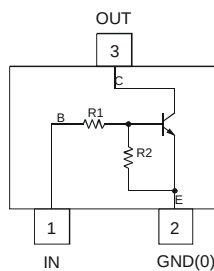
- Case: SC-59
- Case Material: Molded Plastic, "Green" Molding Compound, Note 4. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- Terminals: Solderable per MIL-STD-202, Method 208
- Lead Free Plating (Matte Tin Finish annealed over Copper leadframe).
- Terminal Connections: See Diagram
- Marking Information: See Table Below & Page 4)
- Ordering Information: See Page 4
- Weight: 0.008 grams (approximate)

| P/N        | R1, R2 (NOM)  | Type Code |
|------------|---------------|-----------|
| DDTC123EKA | 2.2K $\Omega$ | N04       |
| DDTC143EKA | 4.7K $\Omega$ | N08       |
| DDTC114EKA | 10K $\Omega$  | N13       |
| DDTC124EKA | 22K $\Omega$  | N17       |
| DDTC144EKA | 47K $\Omega$  | N20       |
| DDTC115EKA | 100K $\Omega$ | N24       |

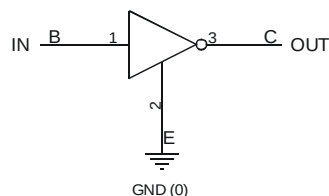


| SC-59    |       |      |
|----------|-------|------|
| Dim      | Min   | Max  |
| A        | 0.35  | 0.50 |
| B        | 1.50  | 1.70 |
| C        | 2.70  | 3.00 |
| D        | 0.95  |      |
| G        | 1.90  |      |
| H        | 2.90  | 3.10 |
| J        | 0.013 | 0.10 |
| K        | 1.00  | 1.30 |
| L        | 0.35  | 0.55 |
| M        | 0.10  | 0.20 |
| $\alpha$ | 0°    | 8°   |

All Dimensions in mm



Schematic and Pin Configuration



Equivalent Inverter Circuit

### Maximum Ratings @T<sub>A</sub> = 25°C unless otherwise specified

| Characteristic                                       | Symbol                            | Value                                                                            | Unit |
|------------------------------------------------------|-----------------------------------|----------------------------------------------------------------------------------|------|
| Supply Voltage, (3) to (2)                           | V <sub>CC</sub>                   | 50                                                                               | V    |
| Input Voltage, (1) to (2)                            | V <sub>IN</sub>                   | -10 to +12<br>-10 to +30<br>-10 to +40<br>-10 to +40<br>-10 to +40<br>-10 to +40 | V    |
| Output Current                                       | I <sub>O</sub>                    | 100<br>100<br>50<br>30<br>100<br>20                                              | mA   |
| Output Current All                                   | I <sub>C</sub> (Max)              | 100                                                                              | mA   |
| Power Dissipation                                    | P <sub>d</sub>                    | 200                                                                              | mW   |
| Thermal Resistance, Junction to Ambient Air (Note 1) | R <sub>θJA</sub>                  | 625                                                                              | °C/W |
| Operating and Storage Temperature Range              | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150                                                                      | °C   |

- Notes:
1. Mounted on FR4 PC Board with recommended pad layout at <http://www.diodes.com/datasheets/ap02001.pdf>.
  2. No purposefully added lead.
  3. Diodes Inc.'s "Green" policy can be found on our website at [http://www.diodes.com/products/lead\\_free/index.php](http://www.diodes.com/products/lead_free/index.php).
  4. Product manufactured with Date Code 0627 (week 27, 2006) and newer are built with Green Molding Compound. Product manufactured prior to Date Code 0627 are built with Non-Green Molding Compound and may contain Halogens or Sb2O3 Fire Retardants.

## Electrical Characteristics @T<sub>A</sub> = 25°C unless otherwise specified

| Characteristic                             |                                                                                  | Symbol                         | Min                              | Typ | Max                                        | Unit | Test Condition                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------------|----------------------------------------------------------------------------------|--------------------------------|----------------------------------|-----|--------------------------------------------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input Voltage                              |                                                                                  | V <sub>I(off)</sub>            | 0.5                              | 1.1 | —                                          | V    | V <sub>CC</sub> = 5V, I <sub>O</sub> = 100μA                                                                                                                                                                                                                                                                                                                      |
|                                            |                                                                                  | V <sub>I(on)</sub>             | —                                | 1.9 | 3                                          |      | V <sub>O</sub> = 0.3V, I <sub>O</sub> = 20mA, DDTC123EKA<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 20mA, DDTC143EKA<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 10mA, DDTC114EKA<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 5mA, DDTC124EKA<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 2mA, DDTC144EKA<br>V <sub>O</sub> = 0.3V, I <sub>O</sub> = 1mA, DDTC115EKA |
| Output Voltage                             |                                                                                  | V <sub>O(on)</sub>             | —                                | 0.1 | 0.3                                        | V    | I <sub>O</sub> /I <sub>I</sub> = 10mA/0.5mA, DDTC123EKA<br>I <sub>O</sub> /I <sub>I</sub> = 10mA/0.5mA, DDTC143EKA<br>I <sub>O</sub> /I <sub>I</sub> = 10mA/0.5mA, DDTC114EKA<br>I <sub>O</sub> /I <sub>I</sub> = 10mA/0.5mA, DDTC124EKA<br>I <sub>O</sub> /I <sub>I</sub> = 10mA/0.5mA, DDTC144EKA<br>I <sub>O</sub> /I <sub>I</sub> = 5mA/0.25mA, DDTC115EKA    |
| Input Current                              | DDTC123EKA<br>DDTC143EKA<br>DDTC114EKA<br>DDTC124EKA<br>DDTC144EKA<br>DDTC115EKA | I <sub>I</sub>                 | —                                | —   | 3.8<br>1.8<br>0.88<br>0.36<br>0.18<br>0.15 | mA   | V <sub>I</sub> = 5V                                                                                                                                                                                                                                                                                                                                               |
| Output Current                             |                                                                                  | I <sub>O(off)</sub>            | —                                | —   | 0.5                                        | μA   | V <sub>CC</sub> = 50V, V <sub>I</sub> = 0V                                                                                                                                                                                                                                                                                                                        |
| DC Current Gain                            | DDTC123EKA<br>DDTC143EKA<br>DDTC114EKA<br>DDTC124EKA<br>DDTC144EKA<br>DDTC115EKA | G <sub>I</sub>                 | 20<br>20<br>30<br>56<br>68<br>82 | —   | —                                          | —    | V <sub>O</sub> = 5V, I <sub>O</sub> = 20mA<br>V <sub>O</sub> = 5V, I <sub>O</sub> = 10mA<br>V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA<br>V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA<br>V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA<br>V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA                                                                                      |
| Input Resistor (R <sub>1</sub> ) Tolerance |                                                                                  | ΔR <sub>1</sub>                | -30                              | —   | +30                                        | %    | —                                                                                                                                                                                                                                                                                                                                                                 |
| Resistance Ratio                           |                                                                                  | R <sub>2</sub> /R <sub>1</sub> | 0.8                              | 1   | 1.2                                        | —    | —                                                                                                                                                                                                                                                                                                                                                                 |
| Gain-Bandwidth Product*                    |                                                                                  | f <sub>T</sub>                 | —                                | 250 | —                                          | MHz  | V <sub>CE</sub> = 10V, I <sub>E</sub> = 5mA,<br>f = 100MHz                                                                                                                                                                                                                                                                                                        |

\* Transistor - For Reference Only

## Typical Curves – DDTC143EKA

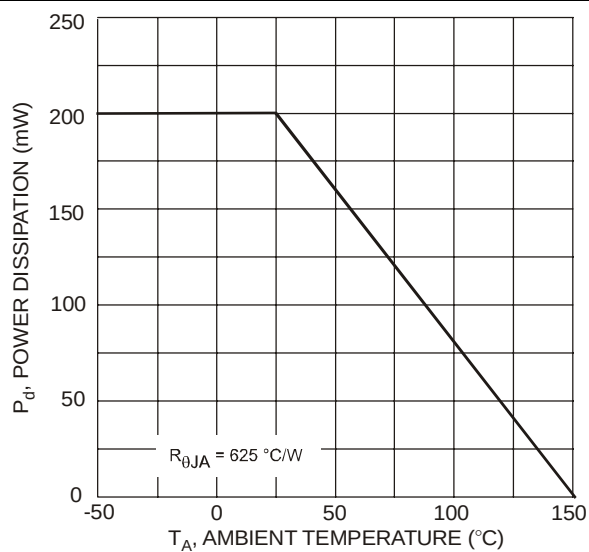


Fig. 1 Derating Curve

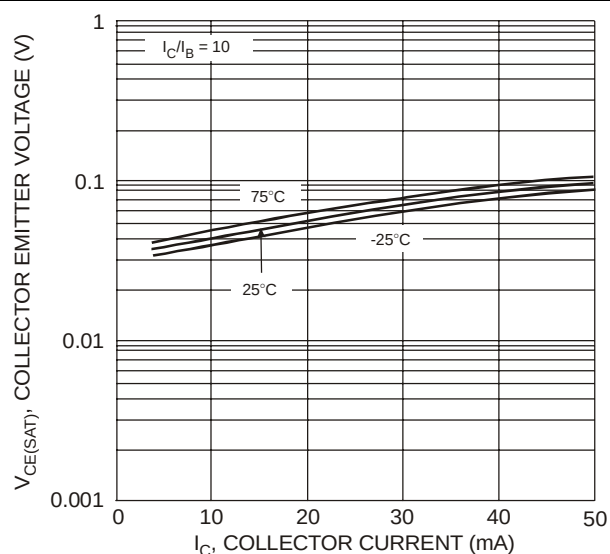


Fig. 2  $V_{CE(SAT)}$  vs.  $I_C$

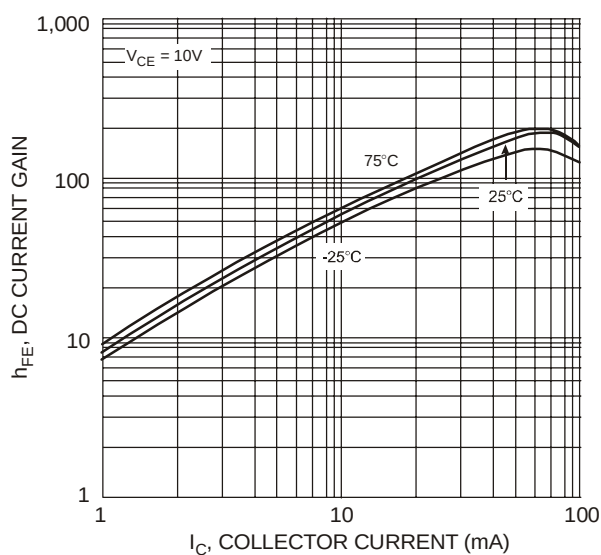


Fig. 3 DC Current Gain

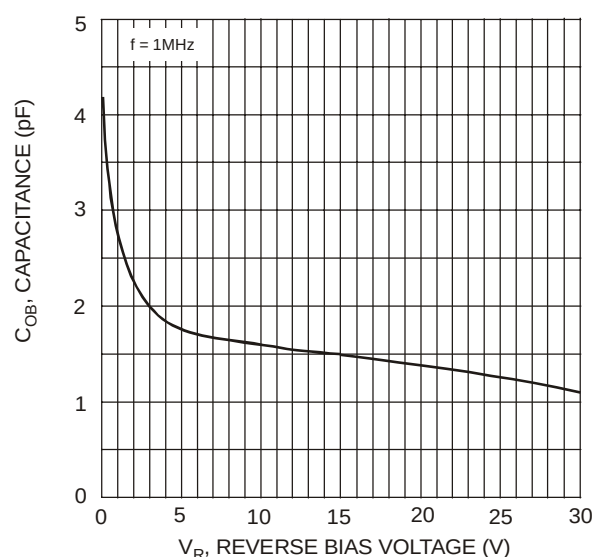


Fig. 4 Output Capacitance

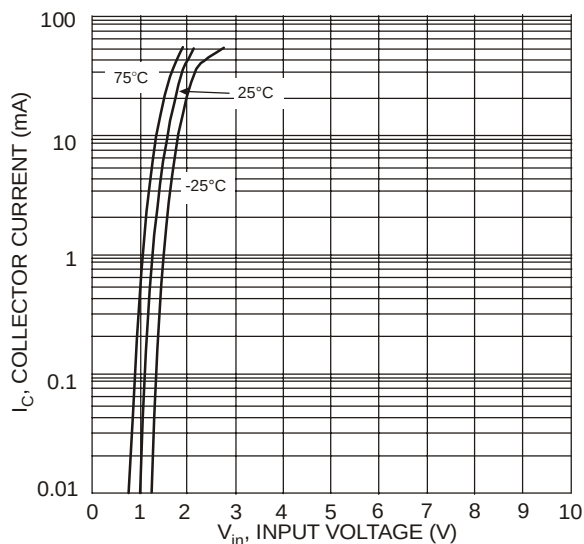


Fig. 5 Collector Current vs. Input Voltage

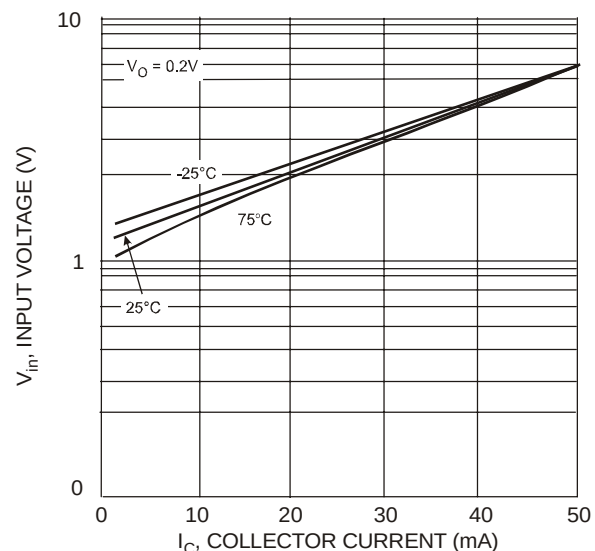


Fig. 6 Input Voltage vs. Collector Current

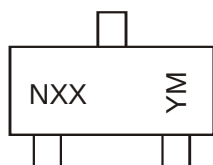


## Ordering Information (Note 4 & 5)

| Device         | Packaging | Shipping         |
|----------------|-----------|------------------|
| DDTC123EKA-7-F | SC-59     | 3000/Tape & Reel |
| DDTC143EKA-7-F | SC-59     | 3000/Tape & Reel |
| DDTC114EKA-7-F | SC-59     | 3000/Tape & Reel |
| DDTC124EKA-7-F | SC-59     | 3000/Tape & Reel |
| DDTC144EKA-7-F | SC-59     | 3000/Tape & Reel |
| DDTC115EKA-7-F | SC-59     | 3000/Tape & Reel |

Notes: 5. For packaging details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

## Marking Information



NXX = Product Type Marking Code, See Table on Page 1  
 YM = Date Code Marking  
 Y = Year ex: T = 2006  
 M = Month ex: 9 = September

### Date Code Key

| Year | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|------|------|------|------|------|------|------|------|------|------|------|------|
| Code | N    | P    | R    | S    | T    | U    | V    | W    | X    | Y    | Z    |

| 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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