# DDTC (R1 = R2 SERIES) KA

## NPN PRE-BIASED SMALL SIGNAL SC-59 SURFACE MOUNT TRANSISTOR

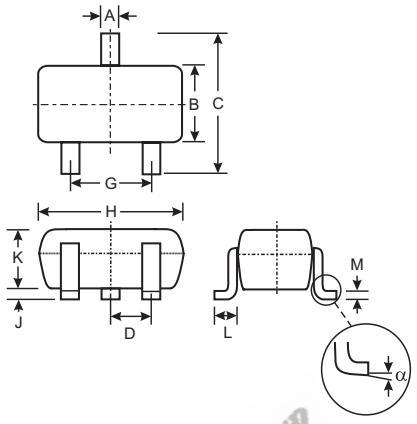
Lead-free Green

## 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**

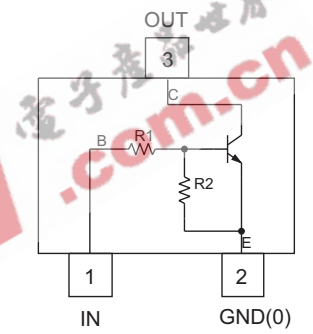
## Mechanical Data

- 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: Date Code and Type Code (See Table Below & Page 2)
- Ordering Information (See Page 2)
- Weight: 0.008 grams (approximate)

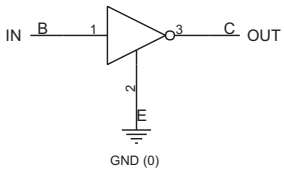



| SC-59 | | |
|---|---|---|
| **Dim** | **Min** | **Max** |
| **A** | 0.35 | 0.50 |
| **B** | 1.50 | 1.70 |
| **C** | 2.70 | 3.00 |
| **D** | 0.95 | |
| **G** | 1.90 | |
| **H** | 2.90 | 3.10 |
| **J** | 0.013 | 0.10 |
| **K** | 1.00 | 1.30 |
| **L** | 0.35 | 0.55 |
| **M** | 0.10 | 0.20 |
| α | 0° |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

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




Schematic and Pin Configuration




Equivalent Inverter Circuit

## Maximum Ratings @ $T_A$ = 25°C unless otherwise specified

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Supply Voltage, (3) to (2) | | $V_{CC}$ | 50 | V |
| Input Voltage, (1) to (2) | DDTC123EKA<br>DDTC143EKA<br>DDTC114EKA<br>DDTC124EKA<br>DDTC144EKA<br>DDTC115EKA | $V_{IN}$ | -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 | DDTC123EKA<br>DDTC143EKA<br>DDTC114EKA<br>DDTC124EKA<br>DDTC144EKA<br>DDTC115EKA | $I_O$ | 100<br>100<br>50<br>30<br>100<br>20 | mA |
| Output Current | All | $I_C$ (Max) | 100 | mA |
| Power Dissipation | | $P_d$ | 200 | mW |
| Thermal Resistance, Junction to Ambient Air (Note 1) | | $R_{\theta JA}$ | 625 | °C/W |
| Operating and Storage and Temperature Range | | $T_j$, $T_{STG}$ | -55 to +150 | °C |

Note: 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.
4. Product manufactured with Date Code 0609 (week 9, 2006) and newer are built with Green Molding Compound. Product manufactured prior to Date Code 0609 are built with Non-Green Molding Compound and may contain Halogens or Sb2O3 Fire Retardants.

## Electrical Characteristics @ $T_A = 25°C$ unless otherwise specified

| Characteristic | | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|---|
| Input Voltage | | $V_{I(off)}$ | 0.5 | 1.1 | — | V | $V_{CC}$ = 5V, $I_O$ = 100μA |
| | | $V_{I(on)}$ | — | 1.9 | 3 | | $V_O$ = 0.3V, $I_O$ = 20mA, DDTC123EKA<br>$V_O$ = 0.3V, $I_O$ = 20mA, DDTC143EKA<br>$V_O$ = 0.3V, $I_O$ = 10mA, DDTC114EKA<br>$V_O$ = 0.3V, $I_O$ = 5mA, DDTC124EKA<br>$V_O$ = 0.3V, $I_O$ = 2mA, DDTC144EKA<br>$V_O$ = 0.3V, $I_O$ = 1mA, DDTC115EKA |
| Output Voltage | | $V_{O(on)}$ | — | 0.1 | 0.3 | V | $I_O/I_I$ =10mA/0.5mA, DDTC123EKA<br>$I_O/I_I$ =10mA/0.5mA, DDTC143EKA<br>$I_O/I_I$ =10mA/0.5mA, DDTC114EKA<br>$I_O/I_I$ =10mA/0.5mA, DDTC124EKA<br>$I_O/I_I$ =10mA/0.5mA, DDTC144EKA<br>$I_O/I_I$ =5mA/0.25mA, DDTC115EKA |
| Input Current | DDTC123EKA<br>DDTC143EKA<br>DDTC114EKA<br>DDTC124EKA<br>DDTC144EKA<br>DDTC115EKA | $I_I$ | — | — | 3.8<br>1.8<br>0.88<br>0.36<br>0.18<br>0.15 | mA | $V_I$ = 5V |
| Output Current | | $I_{O(off)}$ | — | — | 0.5 | μA | $V_{CC}$ = 50V, $V_I$ = 0V |
| DC Current Gain | DDTC123EKA<br>DDTC143EKA<br>DDTC114EKA<br>DDTC124EKA<br>DDTC144EKA<br>DDTC115EKA | $G_I$ | 20<br>20<br>30<br>56<br>68<br>82 | — | — | — | $V_O$ = 5V, $I_O$ = 20mA<br>$V_O$ = 5V, $I_O$ = 10mA<br>$V_O$ = 5V, $I_O$ = 5mA<br>$V_O$ = 5V, $I_O$ = 5mA<br>$V_O$ = 5V, $I_O$ = 5mA<br>$V_O$ = 5V, $I_O$ = 5mA |
| Input Resistor ($R_1$) Tolerance | | $\Delta R_1$ | -30 | — | +30 | % | — |
| Resistance Ratio | | $R_2/R_1$ | 0.8 | 1 | 1.2 | — | — |
| Gain-Bandwidth Product* | | $f_T$ | — | 250 | — | MHz | $V_{CE}$ = 10V, $I_E$ = 5mA,<br>f = 100MHz |

* Transistor - For Reference Only

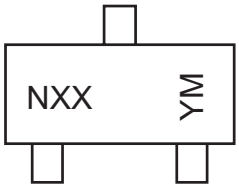
## Ordering Information (Note 4 & 5)

| 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: 4. Product manufactured with Date Code 0609 (week 9, 2006) and newer are built with Green Molding Compound. Product manufactured prior to Date Code 0609 are built with Non-Green Molding Compound and may contain Halogens or Sb2O3 Fire Retardants.

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 |

## TYPICAL CURVES - DDTC143EKA

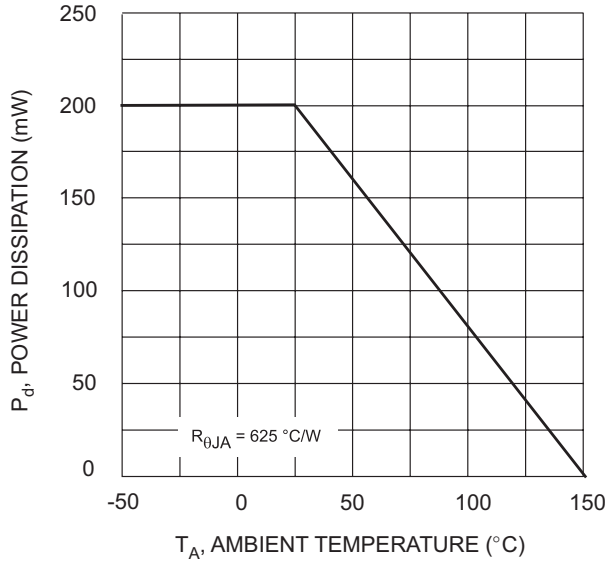


Fig. 1 Derating Curve

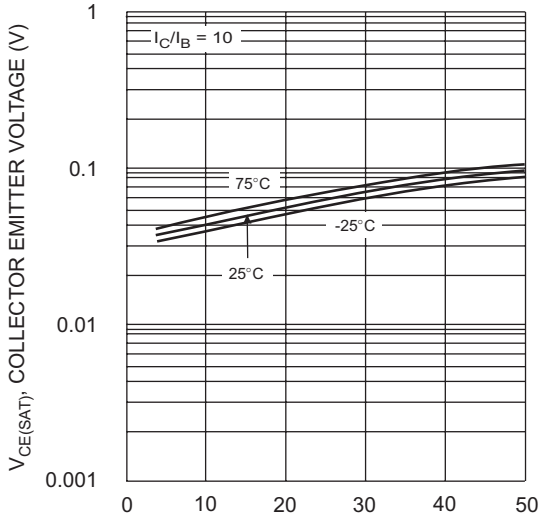


Fig. 2 $V_{CE(SAT)}$ vs. $I_C$

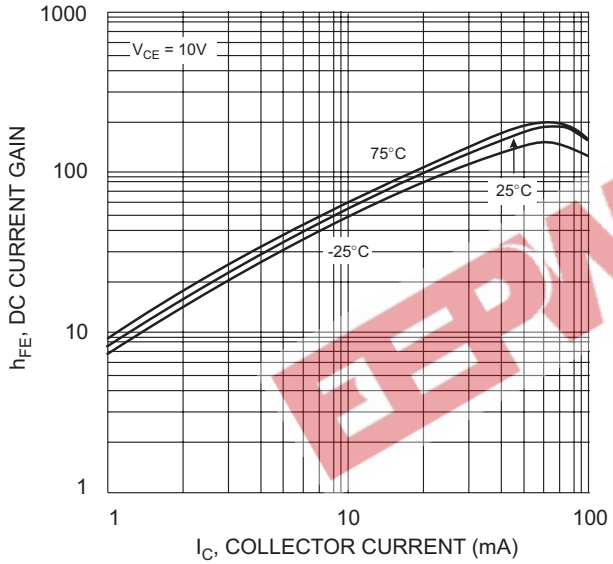


Fig. 3 DC CURRENT GAIN

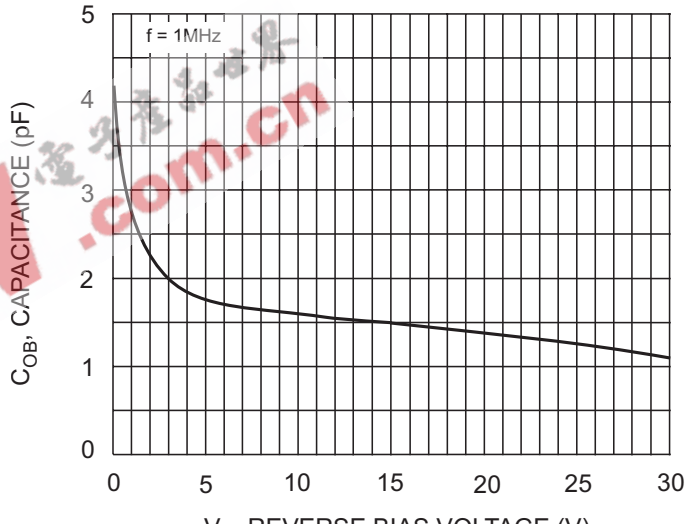


Fig. 4 Output Capacitance

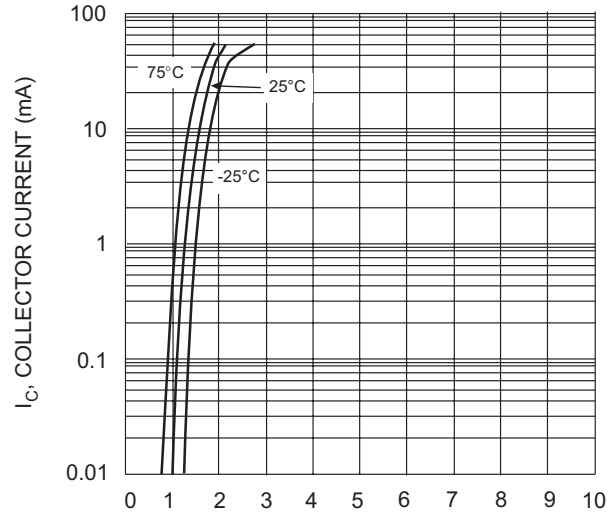


Fig. 5 Collector Current Vs. Input Voltage

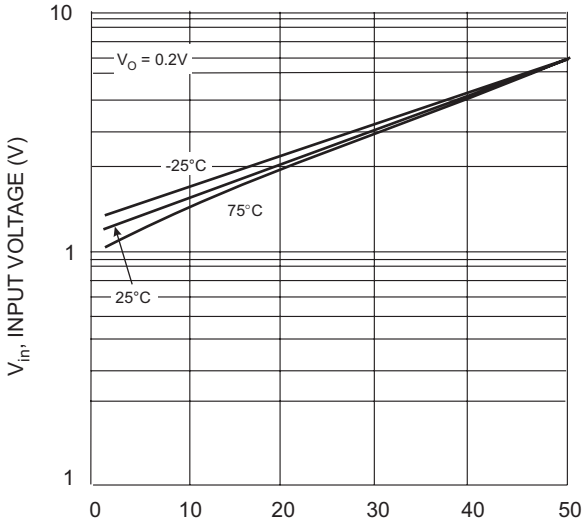


Fig. 6 Input Voltage vs. Collector Current

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