

NPN PRE-BIASED SMALL SIGNAL DUAL SURFACE MOUNT TRANSISTOR
Features

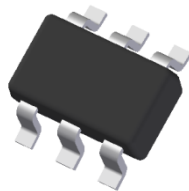
- Epitaxial Planar Die Construction
- Complementary PNP Types Available (DDA)
- Built-In Biasing Resistors
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

| Part Number | R1 (NOM) | R2 (NOM) |
|-------------|----------|----------|
| DDC124EU | 22kΩ | 22kΩ |
| DDC144EU | 47kΩ | 47kΩ |
| DDC114YU | 10kΩ | 47kΩ |
| DDC123JU | 2.2kΩ | 47kΩ |
| DDC114EU | 10kΩ | 10kΩ |
| DDC143ZU | 4.7kΩ | 47kΩ |
| DDC115EU | 100kΩ | 100kΩ |

Mechanical Data

- Case: SOT363
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208
- Weight: 0.006 grams (Approximate)

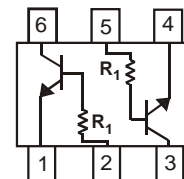
| Part Number | R1 Only |
|-------------|---------|
| DDC113TU | 1kΩ |
| DDC143TU | 4.7kΩ |
| DDC114TU | 10kΩ |

SOT363


Top View



R1, R2



R1 Only

Device Schematic

Ordering Information (Notes 4, 5 & 6)

| Product | Status | Compliance | Marking | Reel Size (inches) | Tape Width (mm) | Quantity per Reel |
|----------------|----------------------|------------|---------|--------------------|-----------------|-------------------|
| DDC124EU-7-F | Active | AEC-Q101 | N17 | 7 | 8 | 3,000 |
| DDC124EUQ-7-F | NRND (Use ADC124EUQ) | Automotive | N17 | 7 | 8 | 3,000 |
| DDC144EU-7-F | Active | AEC-Q101 | N20 | 7 | 8 | 3,000 |
| DDC114YU-7-F | Active | AEC-Q101 | N14 | 7 | 8 | 3,000 |
| DDC114YUQ-7-F | NRND (Use ADC114YUQ) | Automotive | N14 | 7 | 8 | 3,000 |
| DDC114YUQ-13-F | NRND (Use ADC114YUQ) | Automotive | N14 | 13 | 8 | 10,000 |
| DDC123JU-7-F | Active | AEC-Q101 | N06 | 7 | 8 | 3,000 |
| DDC114EU-7-F | Active | AEC-Q101 | N13 | 7 | 8 | 3,000 |
| DDC114EUQ-7-F | NRND (Use ADC114EUQ) | Automotive | N13 | 7 | 8 | 3,000 |
| DDC114EUQ-13-F | NRND (Use ADC114EUQ) | Automotive | N13 | 13 | 8 | 10,000 |
| DDC113TU-7-F | Active | AEC-Q101 | N01 | 7 | 8 | 3,000 |
| DDC143TU-7-F | Active | AEC-Q101 | N07 | 7 | 8 | 3,000 |
| DDC114TU-7-F | Active | AEC-Q101 | N12 | 7 | 8 | 3,000 |
| DDC114TUQ-7-F | Active | Automotive | N12 | 7 | 8 | 3,000 |
| DDC143ZU-7-F | Active | AEC-Q101 | N03 | 7 | 8 | 3,000 |
| DDC115EU-7-F | Active | AEC-Q101 | N02 | 7 | 8 | 3,000 |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 4. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to <http://www.diodes.com/quality/>.
 5. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.
 6. NRND = Not Recommended for New Design.

Marking Information

SOT363



NXX = Product Type Marking Code (See Ordering Information)
 YM = Date Code Marking
 Y = Year (ex: F = 2018)
 M = Month (ex: 9 = September)

Date Code Key

| Year | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 |
|------|------|------|------|------|------|------|------|------|------|------|------|
| Code | F | G | H | I | J | K | L | M | N | O | P |

| 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 |

Absolute Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|--|---------------------|--|------|
| Supply Voltage, <Pin: (6) to (1) and (3) to (4)> | V _{CC} | 50 | V |
| Input Voltage, <Pin: (2) to (1) and (5) to (4)> | V _{IN} | DDC124EU -10 to +40 DDC144EU -10 to +40 DDC114YU -6 to +40 DDC123JU -5 to +12 DDC114EU -10 to +40 DDC113TU -5V max DDC143TU -5V max DDC114TU -5V max DDC143ZU -5 to +30 DDC115EU -10 to +40 | V |
| Output Current | I _O | DDC124EU 30 DDC144EU 30 DDC114YU 70 DDC123JU 100 DDC114EU 50 DDC113TU 100 DDC143TU 100 DDC114TU 100 DDC143ZU 100 DDC115EU 20 | mA |
| Output Current | I _{C(MAX)} | 100 | mA |

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Notes 7 & 8) | P _D | 200 | mW |
| Thermal Resistance, Junction to Ambient Air (Note 7) | R _{θJA} | 625 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +150 | °C |

Notes: 7. Mounted on FR-4 PC Board with minimum recommended pad layout.
 8. 150mW per element must not be exceeded.

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

For R1 only Devices: DDC113TU & DDC143TU & DDC114TU

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|----------------------|-----|-----|-----|------|---|
| Collector-Base Breakdown Voltage | BV _{CBO} | 50 | — | — | V | I _C = 50μA |
| Collector-Emitter Breakdown Voltage | BV _{CEO} | 50 | — | — | V | I _C = 1mA |
| Emitter-Base Breakdown Voltage | BV _{EBO} | 5 | — | — | V | I _E = 50μA |
| Collector Cutoff Current | I _{CBO} | — | — | 0.5 | μA | V _{CB} = 50V |
| Emitter Cutoff Current | I _{EBO} | — | — | 0.5 | μA | V _{EB} = 4V |
| Collector-Emitter Saturation Voltage | V _{CE(SAT)} | — | — | 0.3 | V | I _C /I _B = 2.5mA / 0.25mA DDC143TU I _C /I _B = 1mA / 0.1mA DDC114TU I _C /I _B = 10mA / 1mA DDC113TU |
| DC Current Transfer Ratio | h _{FE} | 100 | 250 | 600 | — | I _C = 1mA, V _{CE} = 5V |
| Input Resistor (R ₁) Tolerance | ΔR ₁ | -30 | — | +30 | % | — |
| Gain-Bandwidth Product (Note 9) | f _T | — | 250 | — | MHz | V _{CE} = 10V, I _E = -5mA, f = 100MHz |

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

For R1, R2 Devices: DDC124EU& DDC144EU& DDC114YU& DDC123JU& DDC114EU& DDC143ZU& DDC115EU

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|------------------------------------|--|-----|--|------|---|
| Input Voltage | V _{L(OFF)} | 0.5 | 1.1 | — | V | V _{CC} = 5V, I _O = 100μA |
| | | 0.5 | 1.1 | — | | |
| Input Voltage | V _{L(ON)} | — | 1.9 | 3.0 | V | V _O = 0.3V, I _O = 5mA V _O = 0.3V, I _O = 2mA V _O = 0.3V, I _O = 1mA V _O = 0.3V, I _O = 5mA V _O = 0.3V, I _O = 10mA V _O = 0.3V, I _O = 5mA V _O = 0.3V, I _O = 1mA |
| | | — | 1.9 | 3.0 | | |
| Output Voltage | V _{O(ON)} | — | 0.1 | 0.3 | V | I _O /I _L = 10mA / 0.5mA I _O /I _L = 10mA / 0.5mA I _O /I _L = 5mA / 0.25mA I _O /I _L = 5mA / 0.25mA I _O /I _L = 10mA / 0.5mA I _O /I _L = 5mA / 0.25mA I _O /I _L = 10mA / 0.5mA |
| | | — | 0.1 | 0.3 | | |
| Input Current | I _L | — | — | 0.36 0.18 0.88 3.6 0.88 1.8 0.15 | mA | V _I = 5V |
| Output Current | I _{O(OFF)} | — | — | 0.5 | μA | V _{CC} = 50V, V _I = 0V |
| DC Current Gain | G _L | 56 68 68 80 80 30 80 82 | — | — | — | V _O = 5V, I _O = 5mA V _O = 5V, I _O = 5mA V _O = 5V, I _O = 10mA V _O = 5V, I _O = 5mA V _O = 5V, I _O = 10mA V _O = 5V, I _O = 5mA V _O = 5V, I _O = 10mA V _O = 5V, I _O = 5mA |
| Input Resistor (R ₁) Tolerance | ΔR ₁ | -30 | — | +30 | % | — |
| Resistance Ratio Tolerance | Δ(R ₂ /R ₁) | -20 | — | +20 | % | — |
| Gain-Bandwidth Product (Note 9) | f _T | — | 250 | — | MHz | V _{CE} = 10V, I _E = 5mA, f = 100MHz |

Note: 9. Transistor - For Reference Only.

Typical Curves – DDC123JU (@T_A = +25°C, unless otherwise specified.)

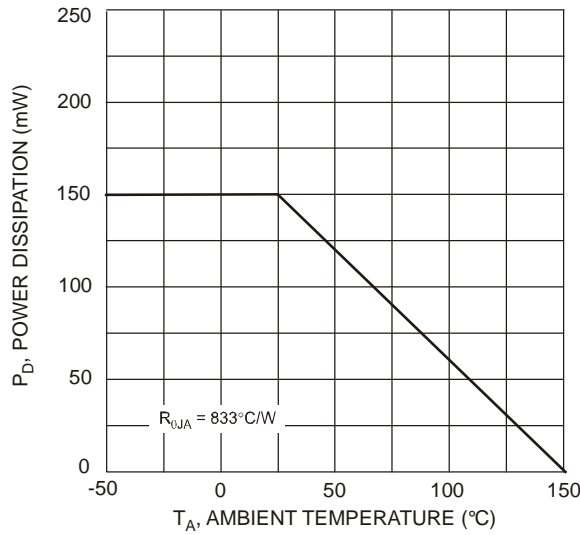


Fig. 1 Derating Curve

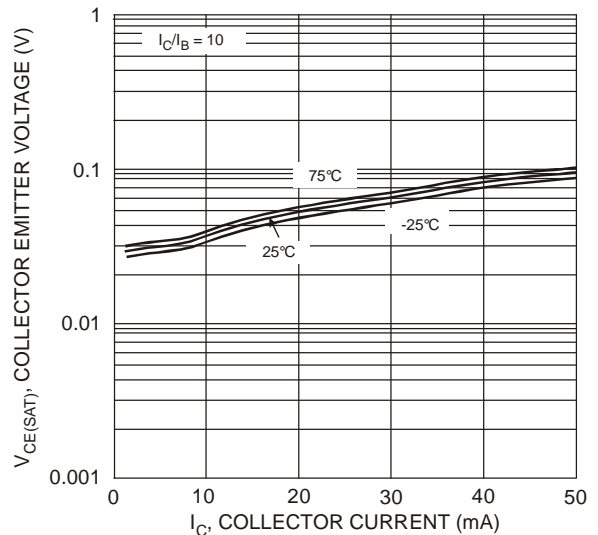


Fig. 2 V_{CE(SAT)} vs. I_C

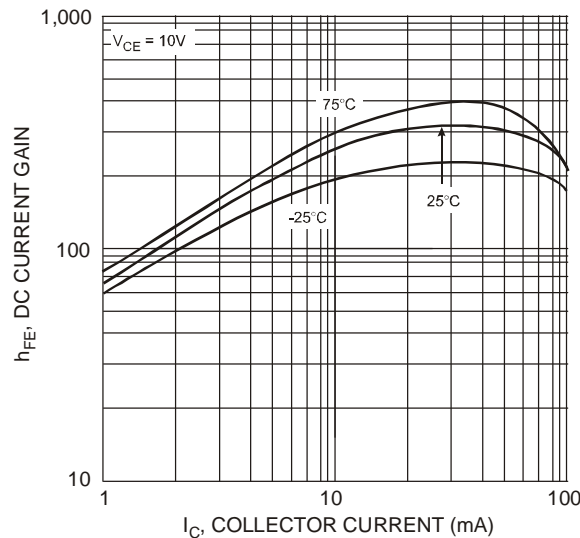


Fig. 3 DC Current Gain

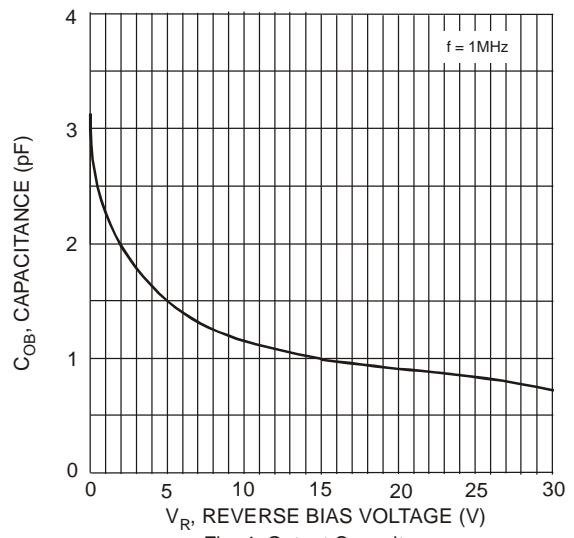


Fig. 4 Output Capacitance

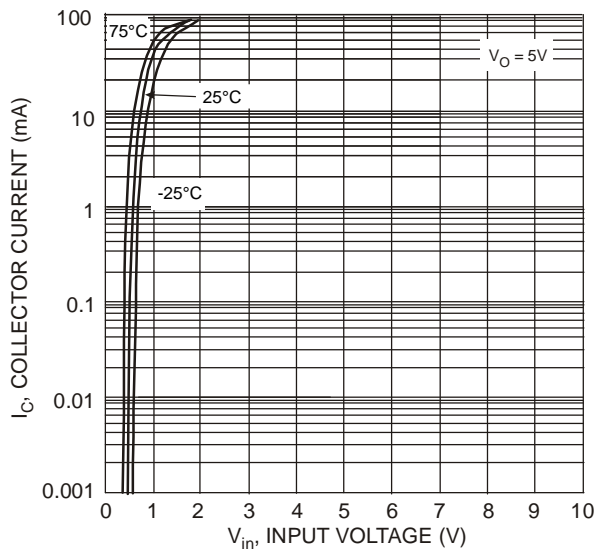


Fig. 5 Collector Current vs. Input Voltage

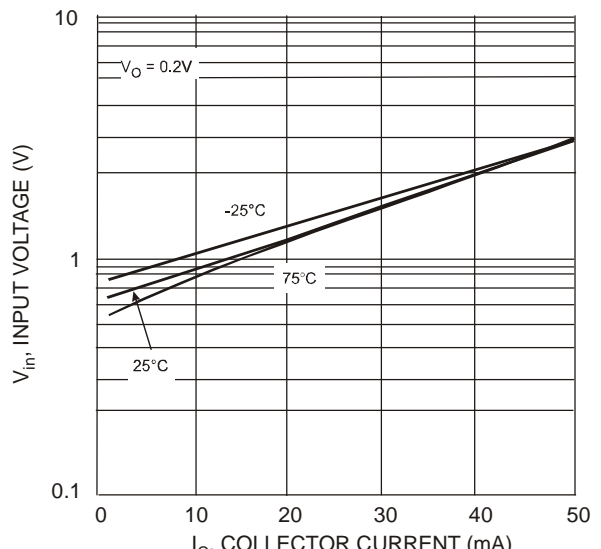


Fig. 6 Input Voltage vs. Collector Current

Typical Curves – DDC114YU (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



Typical Curves – DDC124EU (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

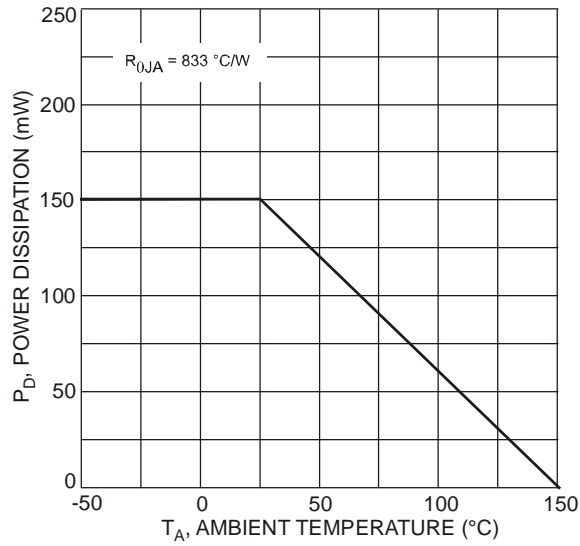


Fig.13 Power Dissipation vs. Ambient Temperature

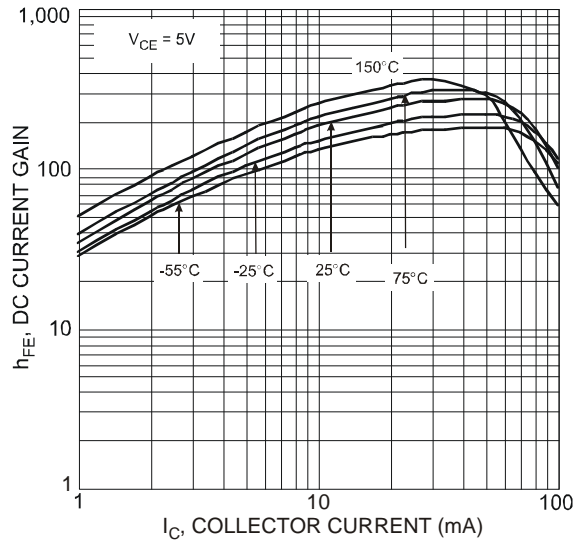


Fig.14 Typical DC Current Gain vs. Collector Current

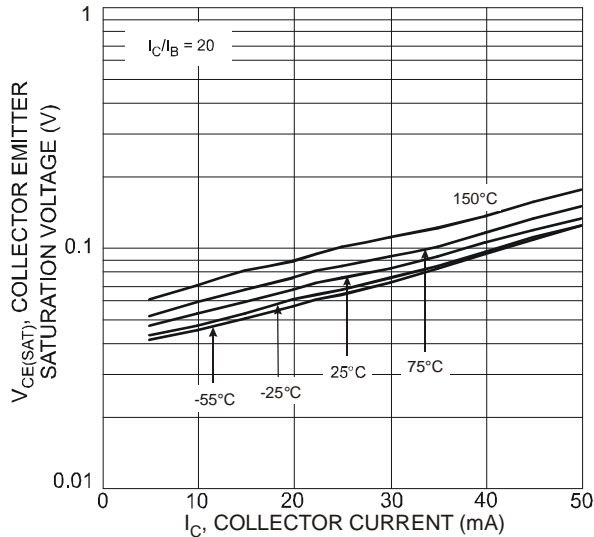


Fig.15 Collector Emitter Saturation Voltage vs. Collector Current

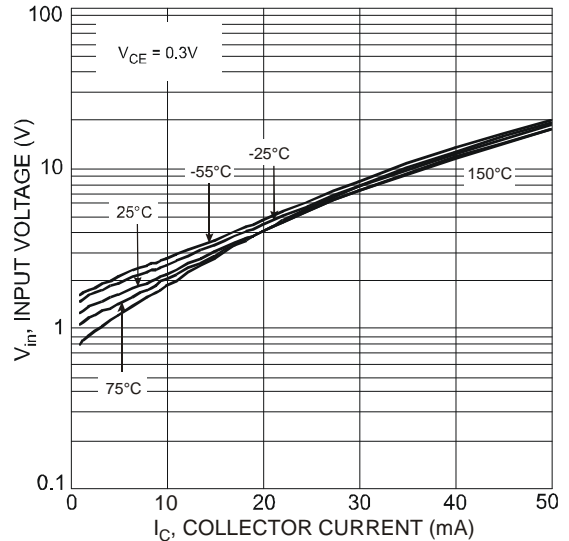


Fig.16 Input Voltage vs. Collector Current

Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT363



| SOT363 | | | |
|-----------------------------|-----------|------|-------|
| Dim | Min | Max | Typ |
| A1 | 0.00 | 0.10 | 0.05 |
| A2 | 0.90 | 1.00 | 0.95 |
| b | 0.10 | 0.30 | 0.25 |
| c | 0.10 | 0.22 | 0.11 |
| D | 1.80 | 2.20 | 2.15 |
| E | 2.00 | 2.20 | 2.10 |
| E1 | 1.15 | 1.35 | 1.30 |
| e | 0.650 BSC | | |
| F | 0.40 | 0.45 | 0.425 |
| L | 0.25 | 0.40 | 0.30 |
| a | 0° | 8° | -- |
| All Dimensions in mm | | | |

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT363



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 0.650 |
| G | 1.300 |
| X | 0.420 |
| Y | 0.600 |
| Y1 | 2.500 |

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Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.