

**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

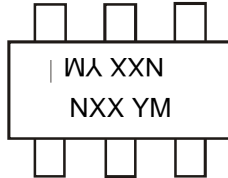
**Ordering Information** (Notes 4, 5 & 6)

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<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Supply Voltage, <Pin: (6) to (1) and (3) to (4)>	V <sub>CC</sub>	50	V
Input Voltage, <Pin: (2) to (1) and (5) to (4)>	V <sub>IN</sub>	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
Output Current	I <sub>O</sub>	DDC124EU	30
		DDC144EU	30
		DDC114YU	70
		DDC123JU	100
		DDC114EU	50
		DDC113TU	100
		DDC143TU	100
		DDC114TU	100
		DDC143ZU	100
DDC115EU	20		
Output Current	I <sub>C(MAX)</sub>	100	mA

## Thermal Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation (Notes 7 & 8)	P <sub>D</sub>	200	mW
Thermal Resistance, Junction to Ambient Air (Note 7)	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: 7. Mounted on FR-4 PC Board with minimum recommended pad layout.  
 8. 150mW per element must not be exceeded.

**Electrical Characteristics** (@T<sub>A</sub> = +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 <sub>CBO</sub>	50	—	—	V	I <sub>C</sub> = 50μA
Collector-Emitter Breakdown Voltage	BV <sub>CEO</sub>	50	—	—	V	I <sub>C</sub> = 1mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	5	—	—	V	I <sub>E</sub> = 50μA
Collector Cutoff Current	I <sub>CBO</sub>	—	—	0.5	μA	V <sub>CB</sub> = 50V
Emitter Cutoff Current	I <sub>EBO</sub>	—	—	0.5	μA	V <sub>EB</sub> = 4V
Collector-Emitter Saturation Voltage	V <sub>CE(SAT)</sub>	—	—	0.3	V	I <sub>C</sub> /I <sub>B</sub> = 2.5mA / 0.25mA DDC143TU I <sub>C</sub> /I <sub>B</sub> = 1mA / 0.1mA DDC114TU I <sub>C</sub> /I <sub>B</sub> = 10mA / 1mA DDC113TU
DC Current Transfer Ratio	h <sub>FE</sub>	100	250	600	—	I <sub>C</sub> = 1mA, V <sub>CE</sub> = 5V
Input Resistor (R <sub>1</sub> ) Tolerance	ΔR <sub>1</sub>	-30	—	+30	%	—
Gain-Bandwidth Product (Note 9)	f <sub>T</sub>	—	250	—	MHz	V <sub>CE</sub> = 10V, I <sub>E</sub> = -5mA, f = 100MHz

**Electrical Characteristics** (@T<sub>A</sub> = +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 <sub>L(OFF)</sub>	0.5	1.1	—	V	V <sub>CC</sub> = 5V, I <sub>O</sub> = 100μA
		0.5	1.1	—		
Input Voltage	V <sub>L(ON)</sub>	—	1.9	3.0	V	V <sub>O</sub> = 0.3V, I <sub>O</sub> = 5mA V <sub>O</sub> = 0.3V, I <sub>O</sub> = 2mA V <sub>O</sub> = 0.3V, I <sub>O</sub> = 1mA V <sub>O</sub> = 0.3V, I <sub>O</sub> = 5mA V <sub>O</sub> = 0.3V, I <sub>O</sub> = 10mA V <sub>O</sub> = 0.3V, I <sub>O</sub> = 5mA V <sub>O</sub> = 0.3V, I <sub>O</sub> = 1mA
		—	1.9	3.0		
Output Voltage	V <sub>O(ON)</sub>	—	0.1	0.3	V	I <sub>O</sub> /I <sub>L</sub> = 10mA / 0.5mA I <sub>O</sub> /I <sub>L</sub> = 10mA / 0.5mA I <sub>O</sub> /I <sub>L</sub> = 5mA / 0.25mA I <sub>O</sub> /I <sub>L</sub> = 5mA / 0.25mA I <sub>O</sub> /I <sub>L</sub> = 10mA / 0.5mA I <sub>O</sub> /I <sub>L</sub> = 5mA / 0.25mA I <sub>O</sub> /I <sub>L</sub> = 10mA / 0.5mA
		—	0.1	0.3		
Input Current	I <sub>L</sub>	—	—	0.36 0.18 0.88 3.6 0.88 1.8 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	G <sub>L</sub>	56 68 68 80 80 30 80 82	—	—	—	V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA V <sub>O</sub> = 5V, I <sub>O</sub> = 10mA V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA V <sub>O</sub> = 5V, I <sub>O</sub> = 10mA V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA V <sub>O</sub> = 5V, I <sub>O</sub> = 10mA 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 Tolerance	Δ(R <sub>2</sub> /R <sub>1</sub> )	-20	—	+20	%	—
Gain-Bandwidth Product (Note 9)	f <sub>T</sub>	—	250	—	MHz	V <sub>CE</sub> = 10V, I <sub>E</sub> = 5mA, f = 100MHz

Note: 9. Transistor - For Reference Only.

**Typical Curves – DDC123JU** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

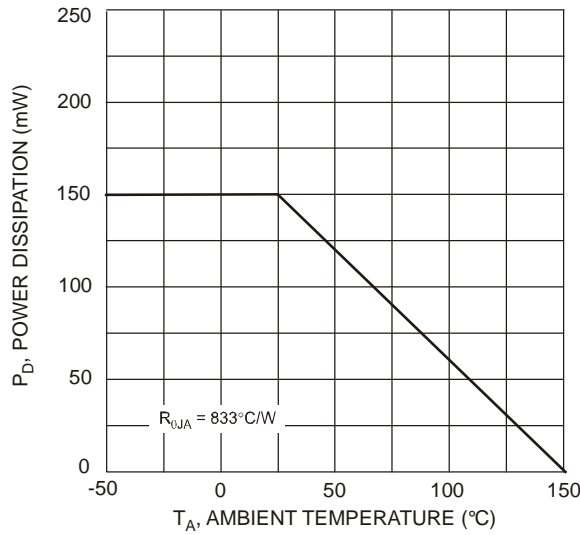


Fig. 1 Derating Curve

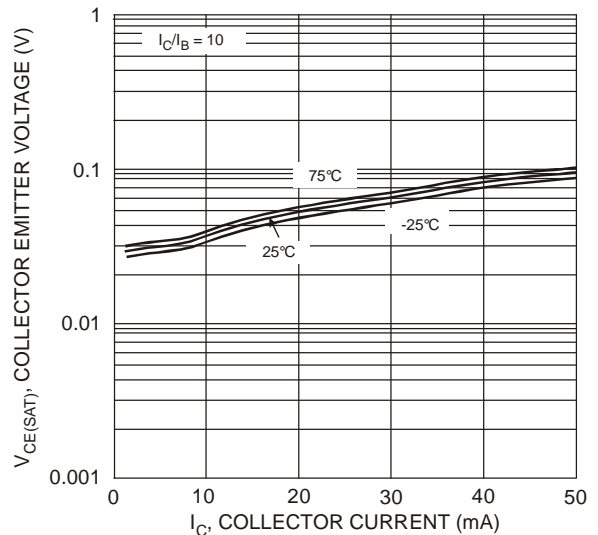


Fig. 2  $V_{CE(SAT)}$  vs.  $I_C$

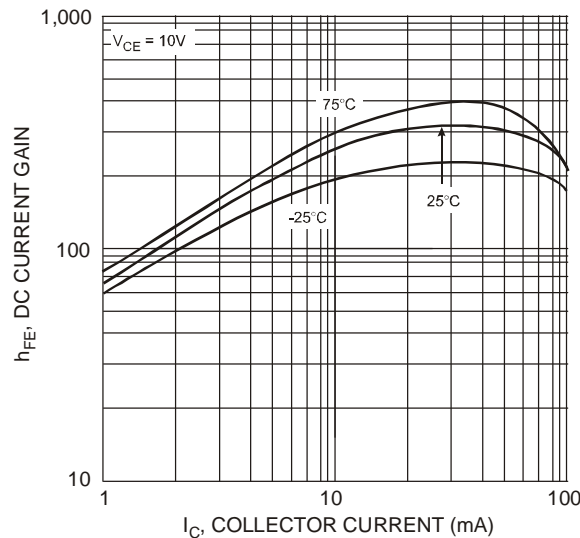


Fig. 3 DC Current Gain

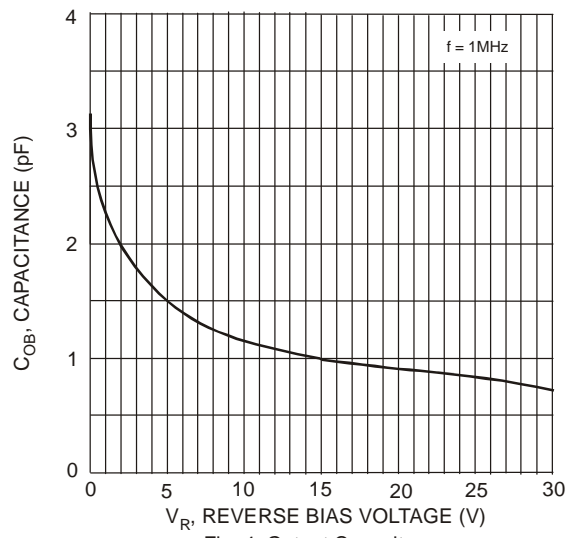


Fig. 4 Output Capacitance

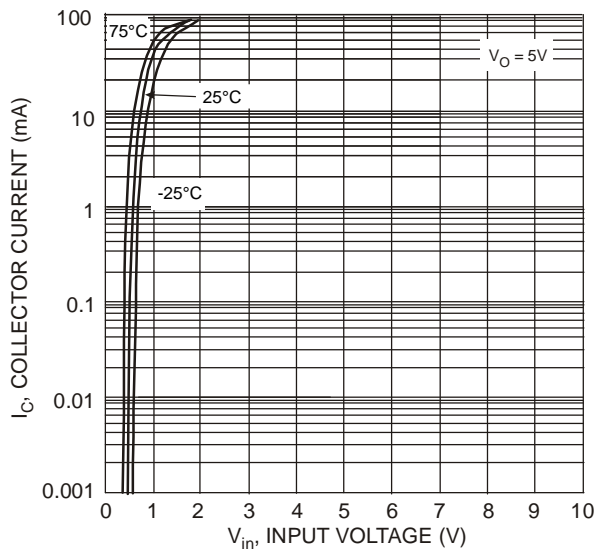


Fig. 5 Collector Current vs. Input Voltage

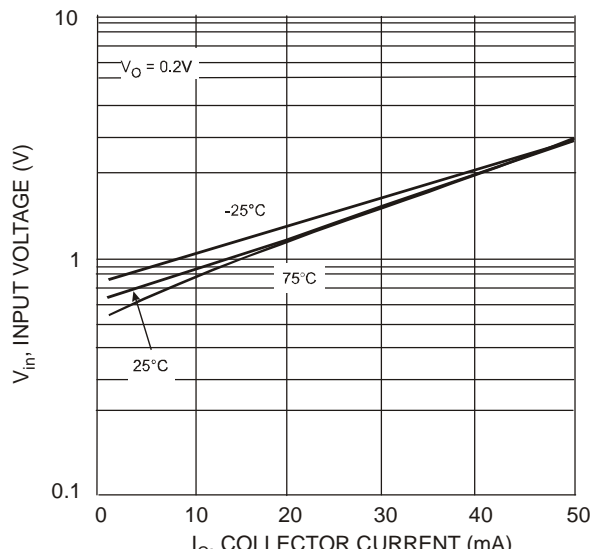


Fig. 6 Input Voltage vs. Collector Current

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



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

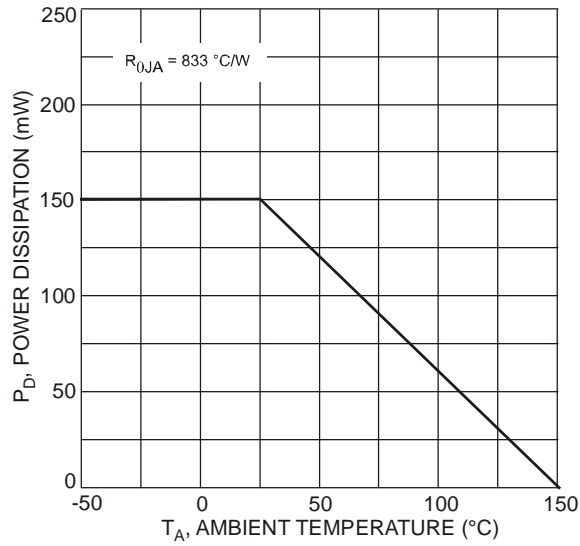


Fig.13 Power Dissipation vs. Ambient Temperature

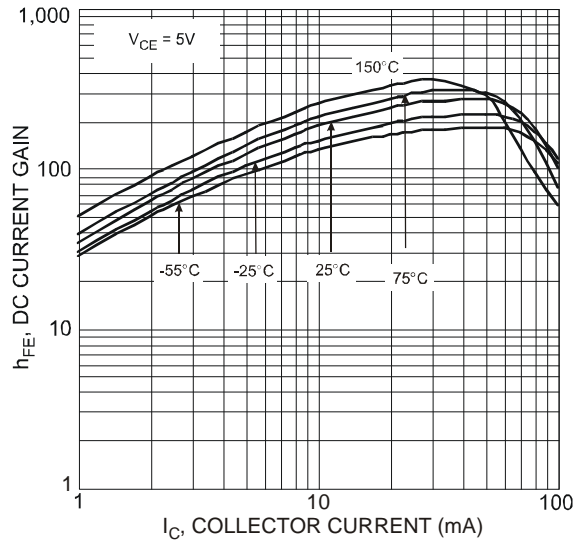


Fig.14 Typical DC Current Gain vs. Collector Current



Fig.15 Collector Emitter Saturation Voltage vs. Collector Current

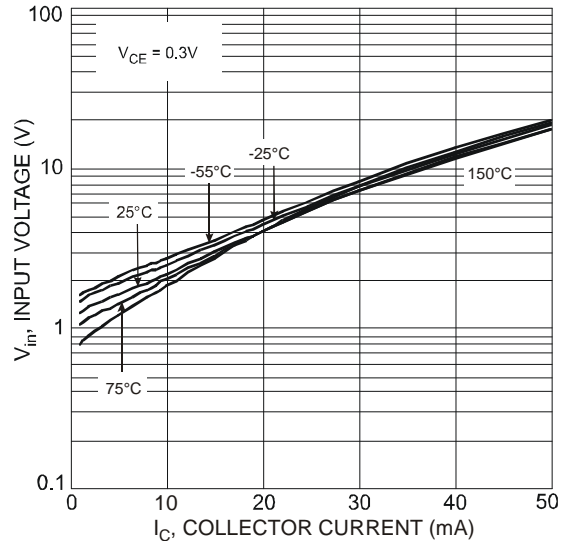


Fig.16 Input Voltage vs. Collector Current

**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°	--
<b>All Dimensions in mm</b>			

**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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