

**NPN PRE-BIASED SMALL SIGNAL DUAL SURFACE MOUNT TRANSISTOR**
**Features**

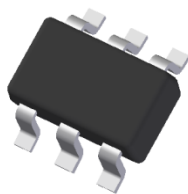
- Epitaxial Planar Die Construction
- Complementary PNP Types Available (DDA)
- Built-In Biasing Resistors
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable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

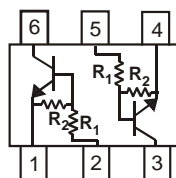
**Mechanical Data**

- 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 @3
- Weight: 0.006 grams (Approximate)

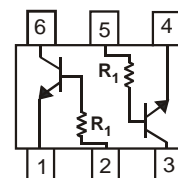
Part Number	R1 Only
DDC113TU	1KΩ
DDC143TU	4.7KΩ
DDC114TU	10KΩ

**SOT363**


Top View



R1, R2



R1 Only

Device Schematic

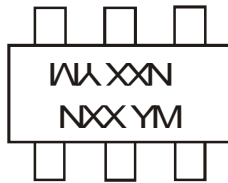
**Ordering Information** (Notes 4 & 5)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DDC124EU-7-F	AEC-Q101	N17	7	8	3,000
DDC124EUQ-7-F	Automotive	N17	7	8	3,000
DDC144EU-7-F	AEC-Q101	N20	7	8	3,000
DDC114YU-7-F	AEC-Q101	N14	7	8	3,000
DDC114YUQ-7-F	Automotive	N14	7	8	3,000
DDC114YUQ-13-F	Automotive	N14	13	8	10,000
DDC123JU-7-F	AEC-Q101	N06	7	8	3,000
DDC114EU-7-F	AEC-Q101	N13	7	8	3,000
DDC114EUQ-7-F	Automotive	N13	7	8	3,000
DDC114EUQ-13-F	Automotive	N13	13	8	10,000
DDC113TU-7-F	AEC-Q101	N01	7	8	3,000
DDC143TU-7-F	AEC-Q101	N07	7	8	3,000
DDC114TU-7-F	AEC-Q101	N12	7	8	3,000
DDC114TUQ-7-F	Automotive	N12	7	8	3,000
DDC143ZU-7-F	AEC-Q101	N03	7	8	3,000
DDC115EU-7-F	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) compliant.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) 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/product\\_compliance\\_definitions/](http://www.diodes.com/quality/product_compliance_definitions/).
  5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information

SOT363



NXX = Product Type Marking Code  
See Page 1 Diagrams  
YM = Date Code Marking  
Y = Year (ex: T = 2006)  
M = Month (ex: 9 = September)

### Date Code Key

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Code	X	Y	Z	A	B	C	D	E	F	G	H	
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		V <sub>CC</sub>	50	V
Input Voltage	DDC124EU	V <sub>IN</sub>	-10 to +40	V
	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>C(MAX)</sub>	100	mA

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

Characteristic	Symbol	Value	Unit
Power Dissipation (Notes 6 & 7)	P <sub>D</sub>	200	mW
Thermal Resistance, Junction to Ambient Air (Note 6)	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: 6. Mounted on FR4 PC Board with minimum recommended pad layout.  
7. 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	f <sub>T</sub>	—	250	—	MHz	V <sub>CE</sub> = 10V, I <sub>E</sub> = -5mA, f = 100MHz

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition	
Input Voltage	V <sub>I(off)</sub>	DDC124EU	0.5	1.1	—	V	V <sub>CC</sub> = 5V, I <sub>O</sub> = 100μA
		DDC144EU	0.5	1.1			
DDC114YU		0.3	—				
DDC123JU		0.5	—				
DDC114EU		0.5	1.1				
DDC143ZU		0.5	—				
DDC115EU		0.5	—				
Input Voltage	V <sub>I(on)</sub>	DDC124EU	—	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
		DDC144EU	—	1.9	3.0		
		DDC114YU	—	—	1.4		
		DDC123JU	—	—	1.1		
		DDC114EU	—	1.9	3.0		
		DDC143ZU	—	—	1.3		
		DDC115EU	—	—	3		
Output Voltage	V <sub>O(on)</sub>	—	0.1	0.3	V	I <sub>O</sub> /I <sub>I</sub> = 10mA / 0.5mA I <sub>O</sub> /I <sub>I</sub> = 10mA / 0.5mA I <sub>O</sub> /I <sub>I</sub> = 5mA / 0.25mA I <sub>O</sub> /I <sub>I</sub> = 5mA / 0.25mA I <sub>O</sub> /I <sub>I</sub> = 10mA / 0.5mA I <sub>O</sub> /I <sub>I</sub> = 5mA / 0.25mA I <sub>O</sub> /I <sub>I</sub> = 10mA / 0.5mA	
Input Current	I <sub>I</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>I</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	f <sub>T</sub>	—	250	—	MHz	V <sub>CE</sub> = 10V, I <sub>E</sub> = 5mA, f = 100MHz	

**Typical Curves – DDC123JU One Section** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

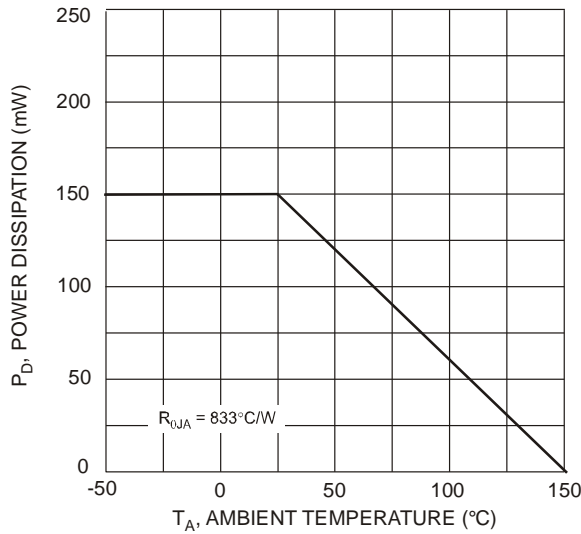


Fig. 1 Derating Curve

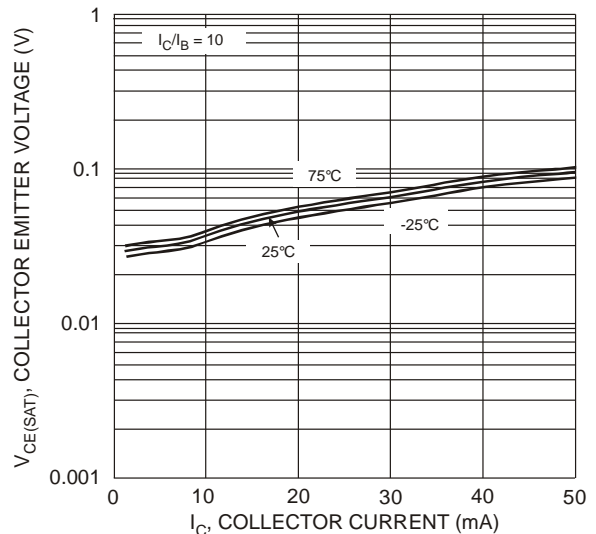


Fig. 2  $V_{CE(SAT)}$  vs.  $I_C$

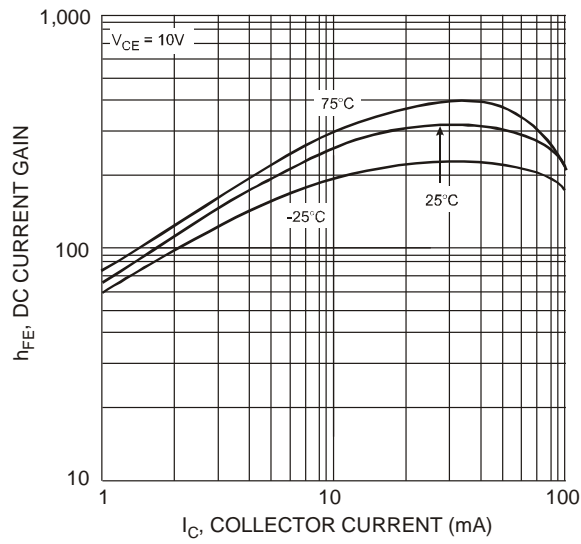


Fig. 3 DC Current Gain

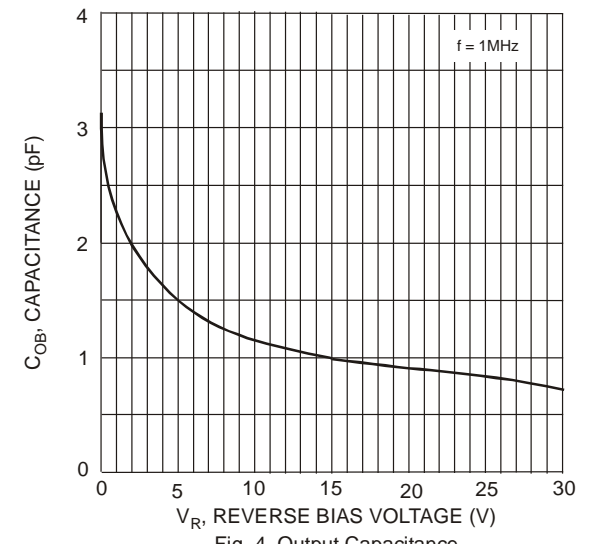


Fig. 4 Output Capacitance

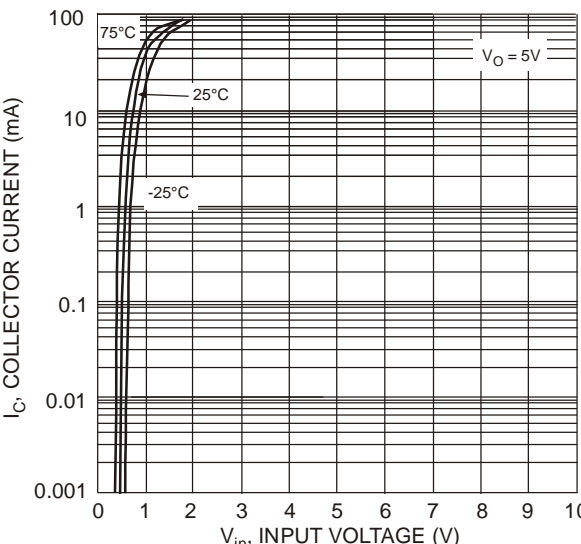


Fig. 5 Collector Current vs. Input Voltage

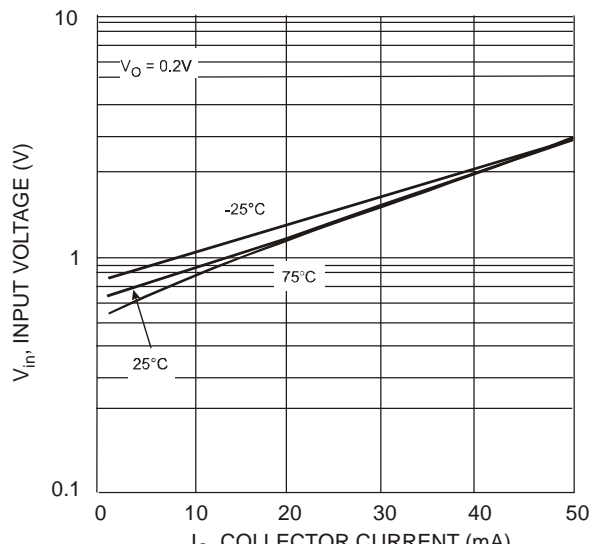


Fig. 6 Input Voltage vs. Collector Current

**Typical Curves – DDC114YU One Section (@T<sub>A</sub> = +25°C, unless otherwise specified.)**

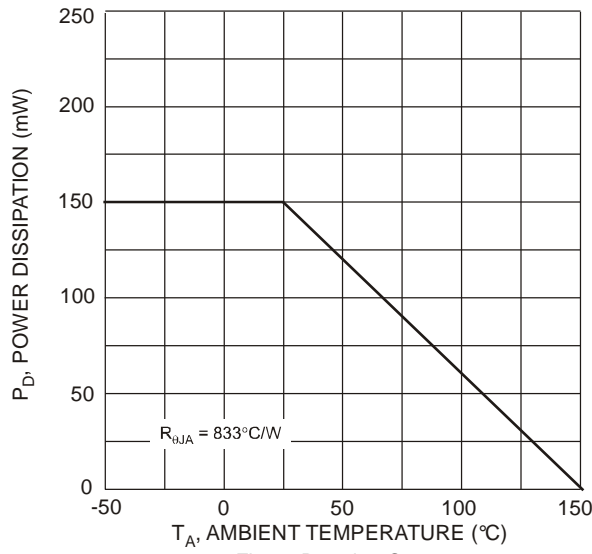


Fig. 1 Derating Curve

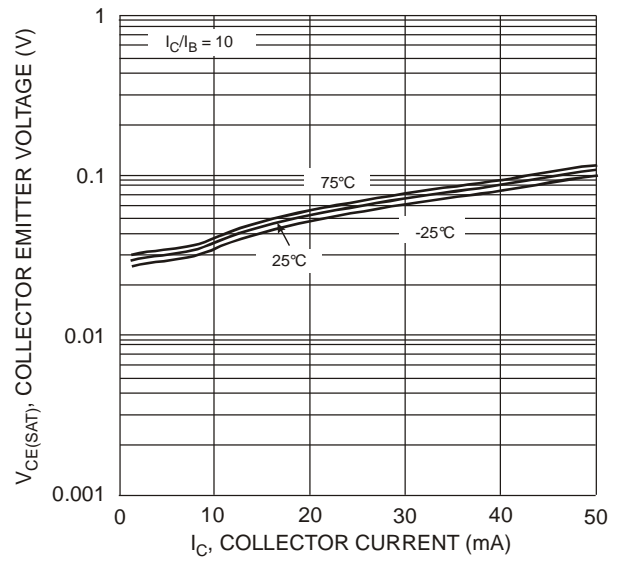


Fig. 2 V<sub>CE(SAT)</sub> vs. I<sub>C</sub>

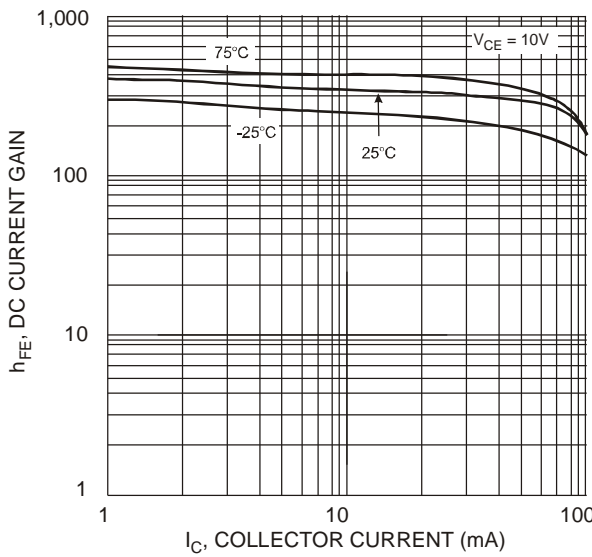


Fig. 3 DC Current Gain

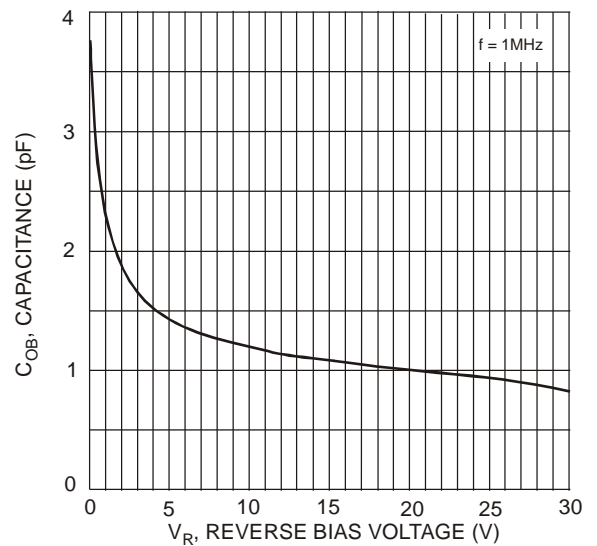


Fig. 4 Output Capacitance

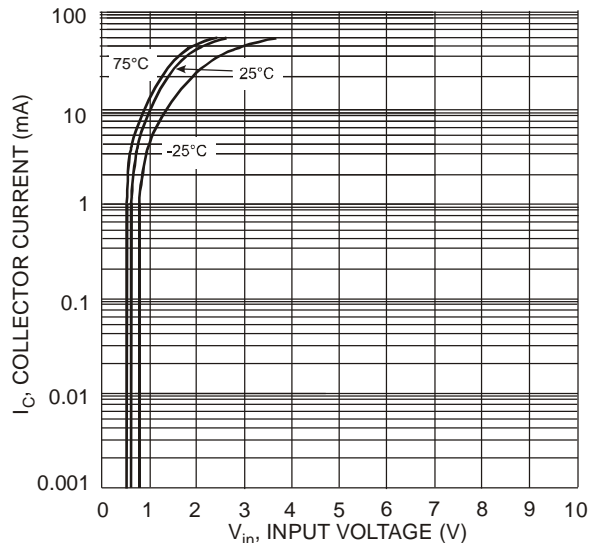


Fig. 5 Collector Current vs. Input Voltage

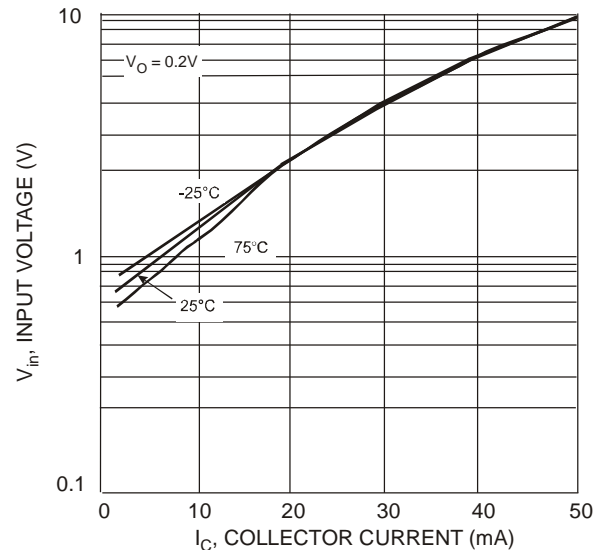
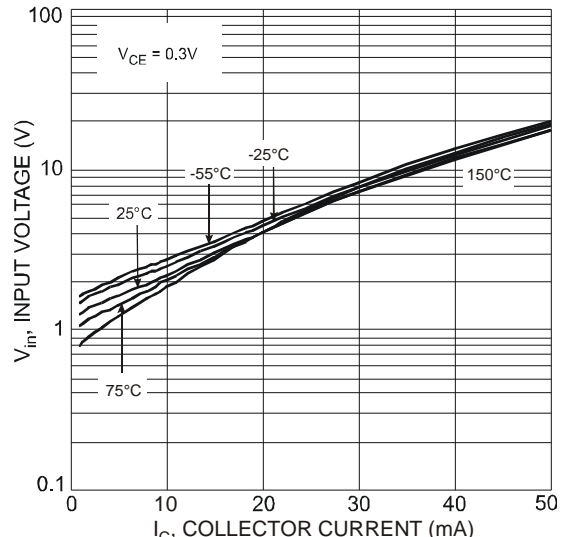
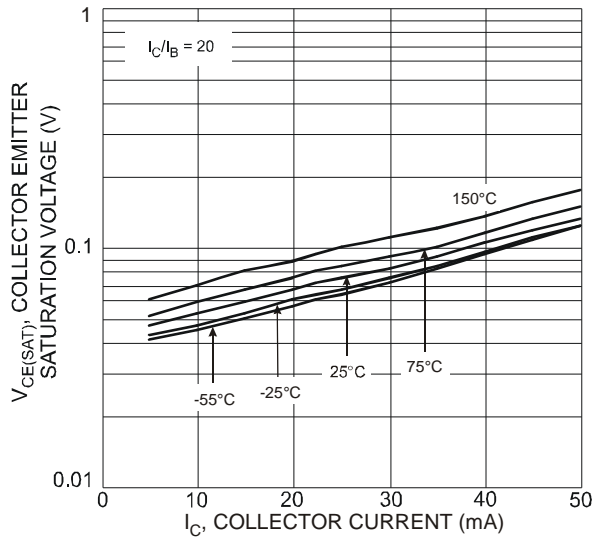
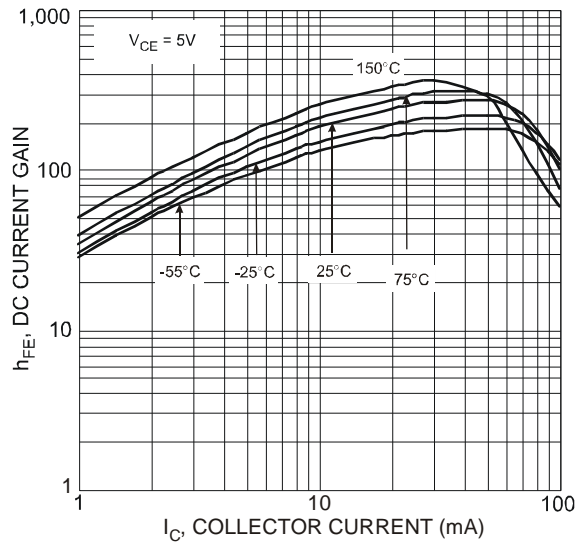
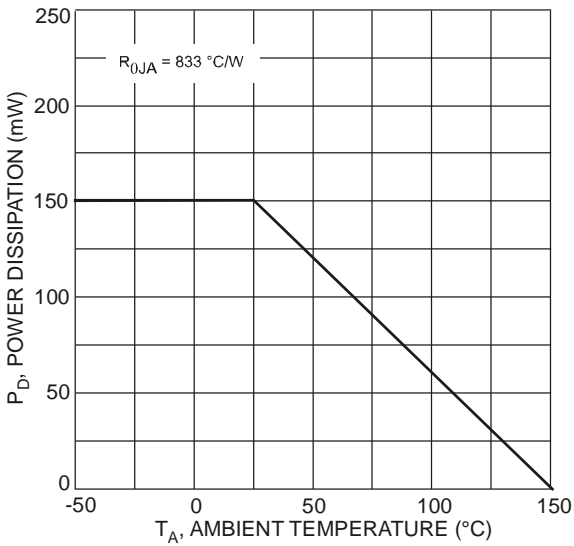


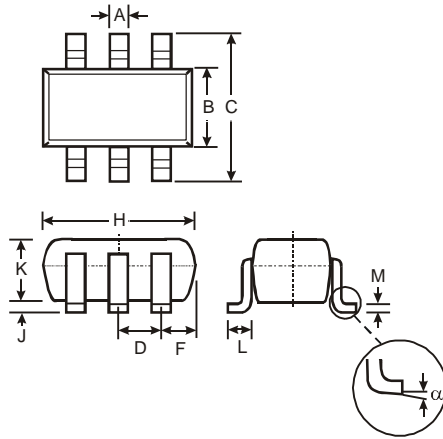
Fig. 6 Input Voltage vs. Collector Current

**Typical Curves – DDC124EU One Section (@T<sub>A</sub> = +25°C, unless otherwise specified.)**



## Package Outline Dimensions

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.

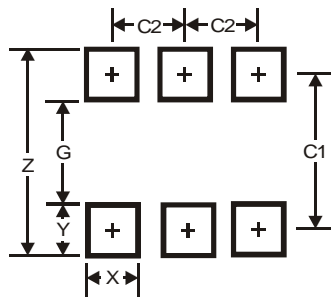


SOT363			
Dim	Min	Max	Typ
A	0.10	0.30	0.25
B	1.15	1.35	1.30
C	2.00	2.20	2.10
D	0.65 Typ		
F	0.40	0.45	0.425
H	1.80	2.20	2.15
J	0	0.10	0.05
K	0.90	1.00	1.00
L	0.25	0.40	0.30
M	0.10	0.22	0.11
$\alpha$	0°	8°	-
All Dimensions in mm			

## Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.

SOT363



Dimensions	Value (in mm)
Z	2.5
G	1.3
X	0.42
Y	0.6
C1	1.9
C2	0.65

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