

NPN PRE-BIASED SMALL SIGNAL DUAL SURFACE MOUNT TRANSISTOR
Features

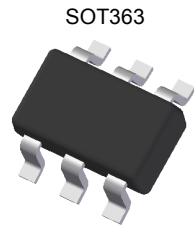
- Epitaxial Planar Die Construction
- Complementary PNP Types Available (DDA)
- Built-In Biasing Resistors
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note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

Part Number	R1 (NOM)	R2 (NOM)
DDC124EU	22K Ω	22K Ω
DDC144EU	47K Ω	47K Ω
DDC114YU	10K Ω	47K Ω
DDC123JU	2.2K Ω	47K Ω
DDC114EU	10K Ω	10K Ω

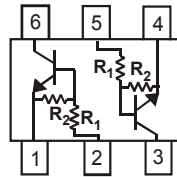
Mechanical Data

- 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 **e3**
- Weight: 0.006 grams (approximate)

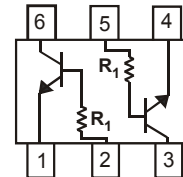
Part Number	R1 Only
DDC113TU	1K Ω
DDC143TU	4.7K Ω
DDC114TU	10K Ω



Top View



R1, R2



R1 Only

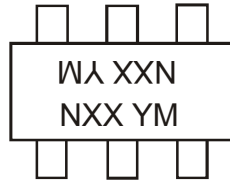
Device Schematic

Ordering Information (Notes 3 & 4)

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

- 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 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/.
 5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



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
Code	X	Y	Z	A	B	C	D	E

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		V _{CC}	50	V
Input Voltage	DDC124EU	V _{IN}	-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	
Output Current		I _{C(MAX)}	100	mA

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

Characteristic	Symbol	Value	Unit
Power Dissipation (Notes 6 & 7)	P _D	200	mW
Thermal Resistance, Junction to Ambient Air (Note 6)	R _{θJA}	625	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-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_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 7)	f _T	—	250	—	MHz	V _{CE} = 10V, I _E = -5mA, f = 100MHz

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Input Voltage	V _{I(off)}	0.5	1.1	—	V	V _{CC} = 5V, I _O = 100μA
		0.5	1.1	—		
Input Voltage	V _{I(on)}	0.3	—	—	V	V _O = 0.3, I _O = 5mA
		0.5	—	—		
Input Voltage	V _{I(on)}	0.5	—	—	V	V _O = 0.3, I _O = 2mA
		0.5	—	—		
Input Voltage	V _{I(on)}	—	1.9	3.0	V	V _O = 0.3, I _O = 1mA
		—	1.9	3.0		
Input Voltage	V _{I(on)}	—	—	1.4	V	V _O = 0.3, I _O = 5mA
		—	—	1.1		
Input Voltage	V _{I(on)}	—	1.9	3.0	V	V _O = 0.3, I _O = 10mA
		—	1.9	3.0		
Output Voltage	V _{O(on)}	—	0.1	0.3	V	I _O /I _I = 10mA / 0.5mA
		—	0.1	0.3		
Output Voltage	V _{O(on)}	—	0.1	0.3	V	I _O /I _I = 10mA / 0.5mA
		—	0.1	0.3		
Output Voltage	V _{O(on)}	—	0.1	0.3	V	I _O /I _I = 5mA / 0.25mA
		—	0.1	0.3		
Output Voltage	V _{O(on)}	—	0.1	0.3	V	I _O /I _I = 5mA / 0.25mA
		—	0.1	0.3		
Output Voltage	V _{O(on)}	—	0.1	0.3	V	I _O /I _I = 10mA / 0.5mA
		—	0.1	0.3		
Input Current	I _I	—	—	0.36	mA	V _I = 5V
		—	—	0.18		
Input Current	I _I	—	—	0.88	mA	V _I = 5V
		—	—	0.88		
Input Current	I _I	—	—	3.6	mA	V _I = 5V
		—	—	0.88		
Output Current	I _{O(off)}	—	—	0.5	μA	V _{CC} = 50V, V _I = 0V
		—	—	0.5		
DC Current Gain	G _I	56	—	—	—	V _O = 5V, I _O = 5mA
		68	—	—		
DC Current Gain	G _I	68	—	—	—	V _O = 5V, I _O = 5mA
		68	—	—		
DC Current Gain	G _I	80	—	—	—	V _O = 5V, I _O = 10mA
		80	—	—		
DC Current Gain	G _I	80	—	—	—	V _O = 5V, I _O = 5mA
		30	—	—		
DC Current Gain	G _I	80	—	—	—	V _O = 5V, I _O = 10mA
		30	—	—		
DC Current Gain	G _I	30	—	—	—	V _O = 5V, I _O = 5mA
		30	—	—		
Input Resistor (R ₁) Tolerance	ΔR ₁	-30	—	+30	%	—
Resistance Ratio Tolerance	R ₂ /R ₁	-20	—	+20	%	—
Gain-Bandwidth Product (Note 7)	f _T	—	250	—	MHz	V _{CE} = 10V, I _E = 5mA, f = 100MHz

Note: 7. Transistor - For Reference Only

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

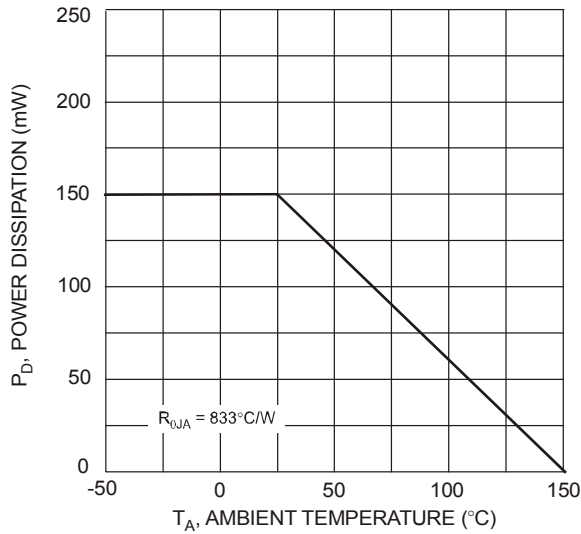


Fig. 1 Derating Curve

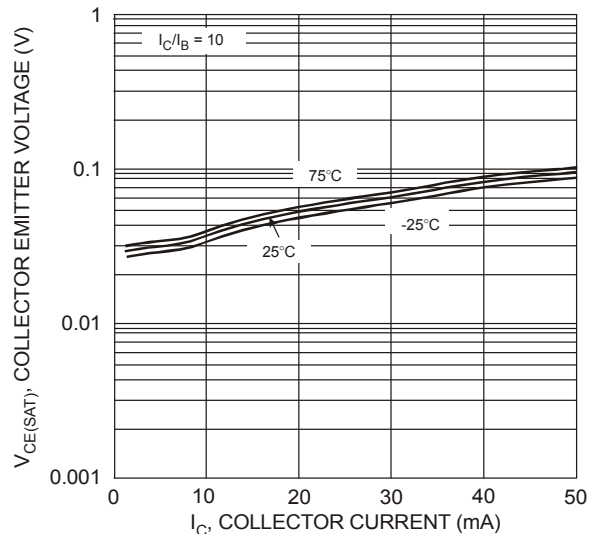


Fig. 2 $V_{CE(SAT)}$ vs. I_C

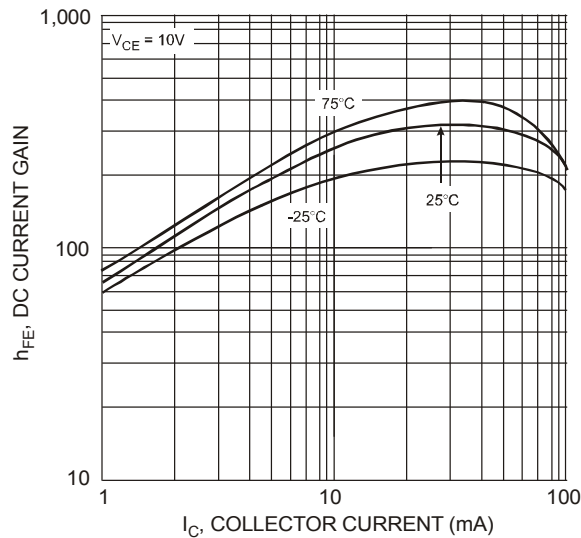


Fig. 3 DC Current Gain

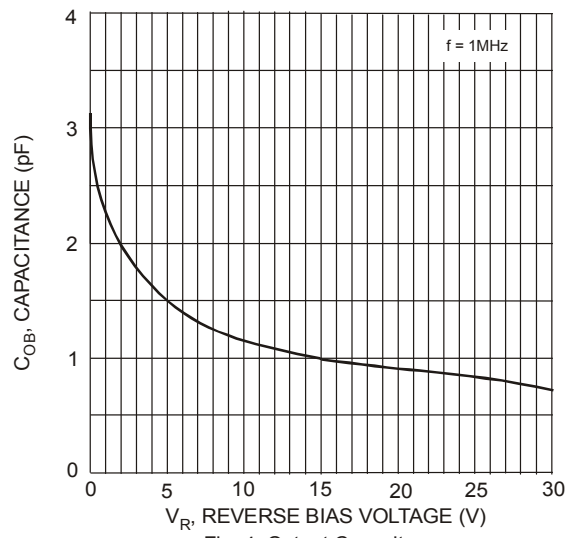


Fig. 4 Output Capacitance

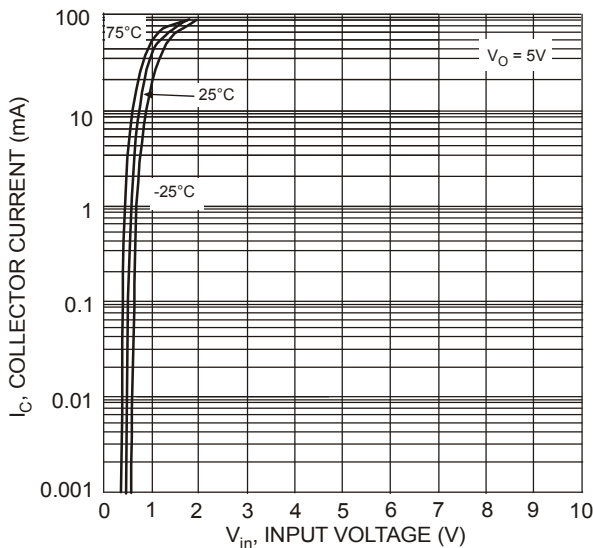


Fig. 5 Collector Current vs. Input Voltage

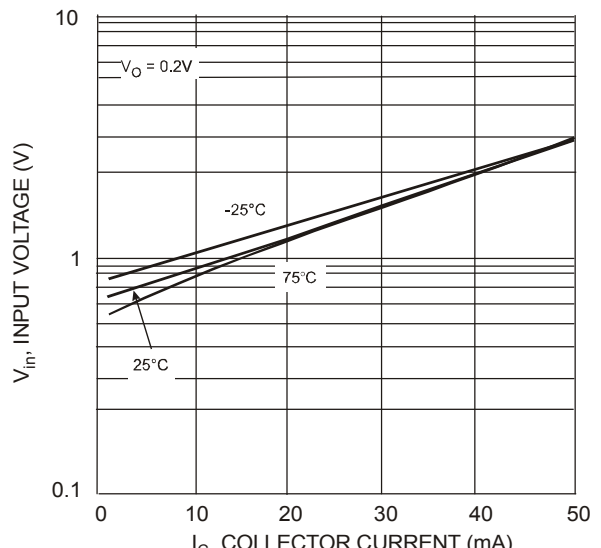


Fig. 6 Input Voltage vs. Collector Current

Typical Curves – DDC114YU One Section (@T_A = +25°C, unless otherwise specified.)

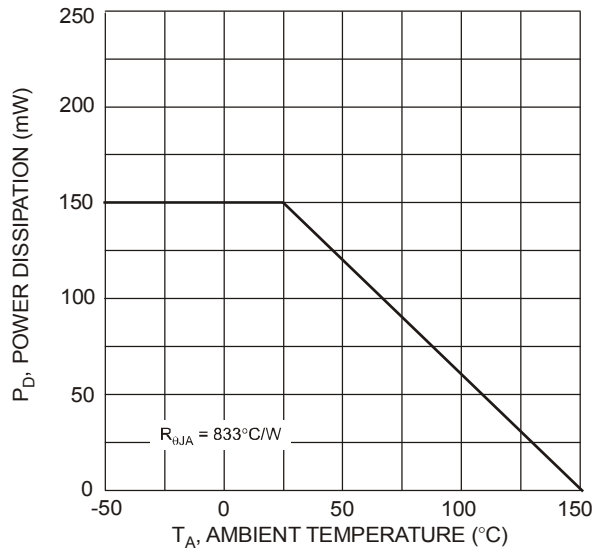


Fig. 1 Derating Curve

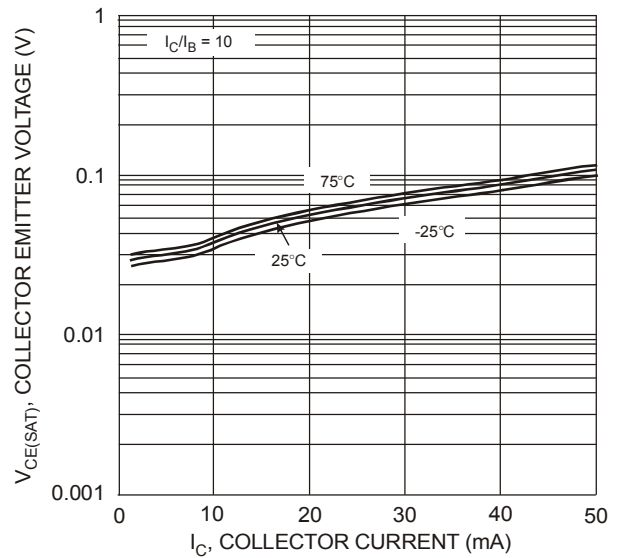


Fig. 2 $V_{CE(SAT)}$ vs. I_C

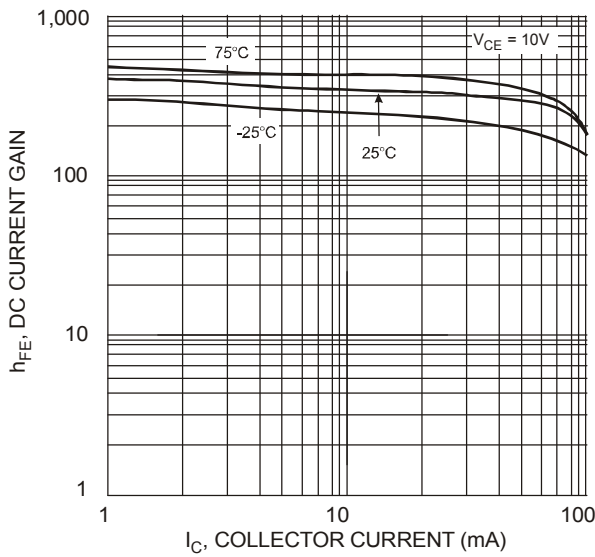


Fig. 3 DC Current Gain

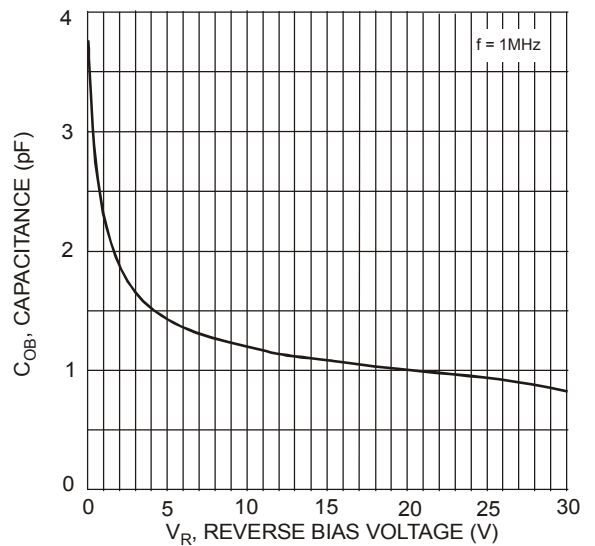


Fig. 4 Output Capacitance

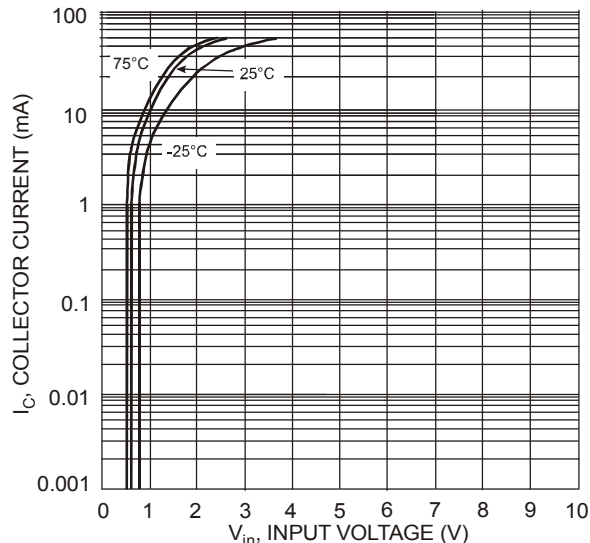


Fig. 5 Collector Current vs. Input Voltage

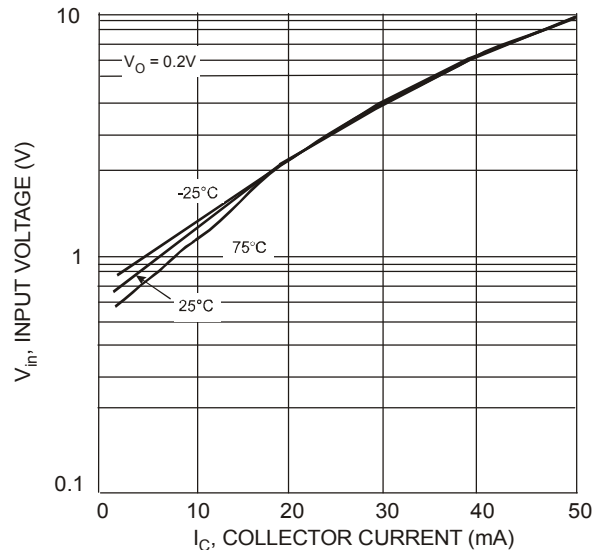


Fig. 6 Input Voltage vs. Collector Current

Typical Curves – DDC124EU One Section (@T_A = +25°C, unless otherwise specified.)

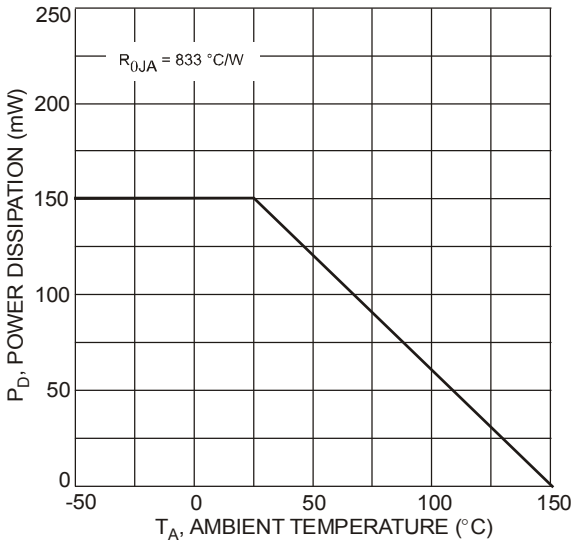


Fig. 1 Power Dissipation vs. Ambient Temperature

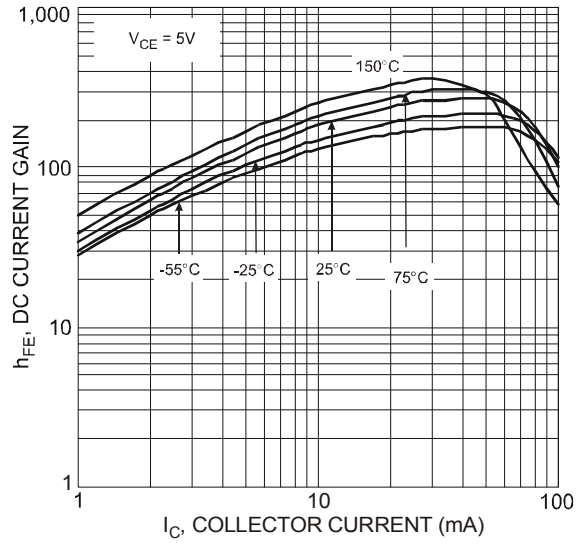


Fig. 2 Typical DC Current Gain vs. Collector Current

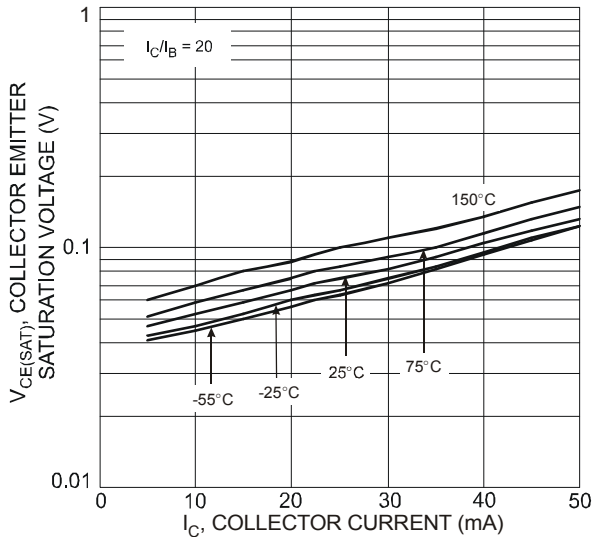


Fig. 3 Collector Emitter Saturation Voltage vs. Collector Current

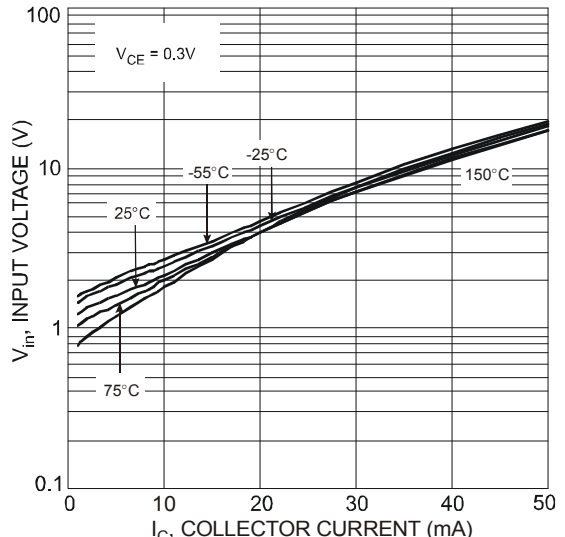
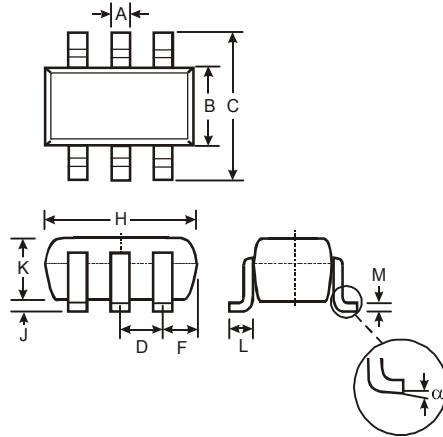


Fig. 4 Input Voltage vs. Collector Current

Package Outline Dimensions

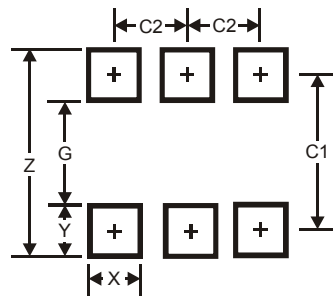
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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
α	0°	8°	-
All Dimensions in mm			

Suggested Pad Layout

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



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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