NPN PRE-BIASED SMALL SIGNAL DUAL SURFACE MOUNT TRANSISTOR

Features

- Epitaxial Planar Die Construction
- Complementary PNP Types Available (DDA)
- Built-In Biasing Resistors
- **"Lead Free", RoHS Compliant (Note 1)**
- **Halogen and Antimony Free "Green" Device (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

- Case: SOT363
- Case material: Molded Plastic. "Green" Molding Compound.
- Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish
- Weight: 0.006 grams (approximate)

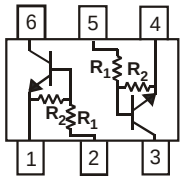
Part Number	R1 (NOM)	R2 (NOM)
DDC124EU	22KΩ	22KΩ
DDC144EU	47KΩ	47KΩ
DDC114YU	10KΩ	47KΩ
DDC123JU	2.2KΩ	47KΩ
DDC114EU	10KΩ	10KΩ

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

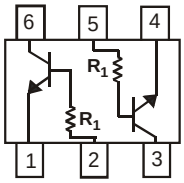
SOT363



Top View



R1, R2



R1 Only

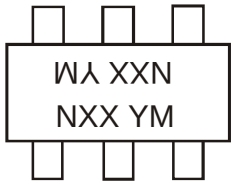
Device Schematic

Ordering Information (Note 3 & 4)

Product	Grade	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DDC124EU-7-F	Commercial	N17	7	8	3,000
DDC124EUQ-7-F	Automotive	N17	7	8	3,000
DDC124EUQ-13-F	Automotive	N17	13	8	10,000
DDC144EU-7-F	Commercial	N20	7	8	3,000
DDC114YU-7-F	Commercial	N14	7	8	3,000
DDC114YUQ-7-F	Automotive	N14	7	8	3,000
DDC123JU-7-F	Commercial	N06	7	8	3,000
DDC114EU-7-F	Commercial	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	Commercial	N01	7	8	3,000
DDC143TU-7-F	Commercial	N07	7	8	3,000
DDC114TU-7-F	Commercial	N12	7	8	3,000
DDC114TUQ-7-F	Automotive	N12	7	8	3,000

Notes:
1. No purposefully added lead.
2. Diodes Inc's "Green" policy can be found on our website at http://www.diodes.com.
3. For packaging details, go to our website at http://www.diodes.com.
4. Products with Q-suffix are automotive grade. Automotive products are electrical and thermal the same as the commercial, except where specified.

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

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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	
	DDC114TU		-5V max	
Output Current		$I_{C(MAX)}$	100	mA

Thermal Characteristics @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P_D	150	mW
Thermal Resistance, Junction to Ambient Air (Note 5)	$R_{\theta JA}$	833	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Notes: 5. Mounted on FR4 PC Board with minimum recommended pad layout

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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 6)	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	DDC124EU DDC144EU DDC114YU DDC123JU DDC114EU	$V_{I(off)}$	0.5 0.5 0.3 0.5 0.5	1.1 1.1 — — 1.1	—	V	V_{CC} = 5V, I_O = 100μA
	DDC124EU DDC144EU DDC114YU DDC123JU DDC114EU	$V_{I(on)}$	—	1.9 1.9 — — 1.9	3.0 3.0 1.4 1.1 3.0		V_O = 0.3, I_O = 5mA V_O = 0.3, I_O = 2mA V_O = 0.3, I_O = 1mA V_O = 0.3, I_O = 5mA V_O = 0.3, I_O = 10mA
Output Voltage	DDC124EU DDC144EU DDC114YU DDC123JU DDC114EU	$V_{O(on)}$	—	0.1	0.3	V	I_O/I_I = 10mA / 0.5mA I_O/I_I = 10mA / 0.5mA I_O/I_I = 5mA / 0.25mA I_O/I_I = 5mA / 0.25mA I_O/I_I = 10mA / 0.5mA
Input Current	DDC124EU DDC144EU DDC114YU DDC123JU DDC114EU	I_I	—	—	0.36 0.18 0.88 3.6 0.88	mA	V_I = 5V
Output Current		$I_{O(off)}$	—	—	0.5	μA	V_{CC} = 50V, V_I = 0V
DC Current Gain	DDC124EU DDC144EU DDC114YU DDC114YUQ DDC123JU DDC114EU	G_I	56 68 68 80 80 30	—	—	—	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
Input Resistor (R_1) Tolerance		ΔR_1	-30	—	+30	%	—
Resistance Ratio Tolerance		R_2/R_1	-20	—	+20	%	—
Gain-Bandwidth Product (Note 6)		f_T	—	250	—	MHz	V_{CE} = 10V, I_E = 5mA, f = 100MHz

Notes: 6. Transistor - For Reference Only

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Typical Curves – DDC123JU One Section

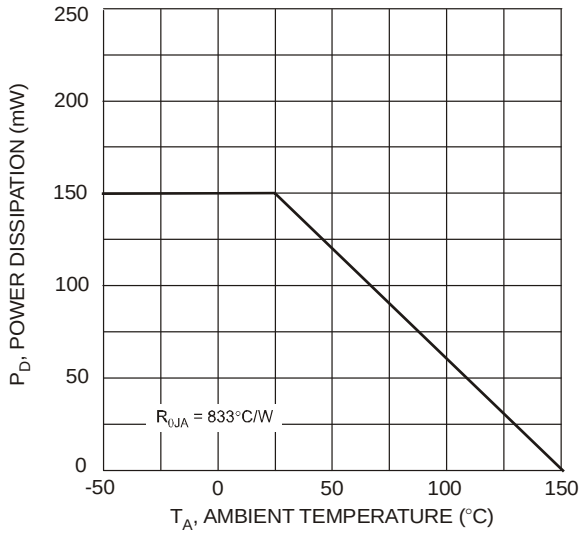


Fig. 1 Derating Curve

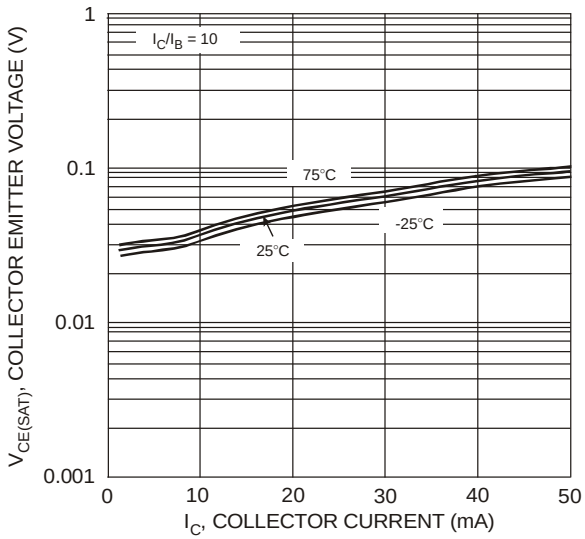


Fig. 2 $V_{CE(SAT)}$ vs. I_C

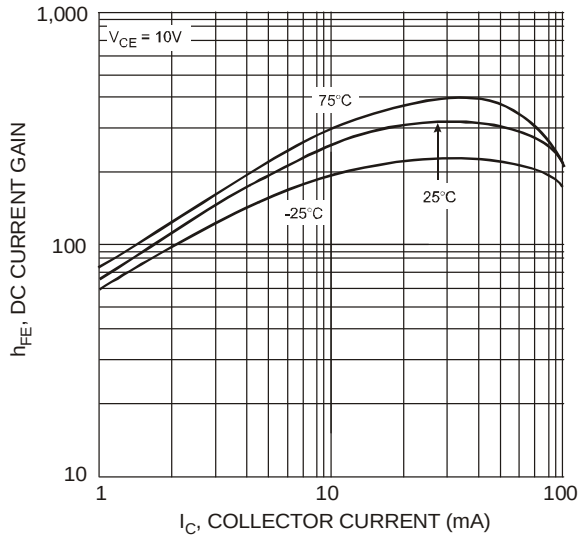


Fig. 3 DC Current Gain

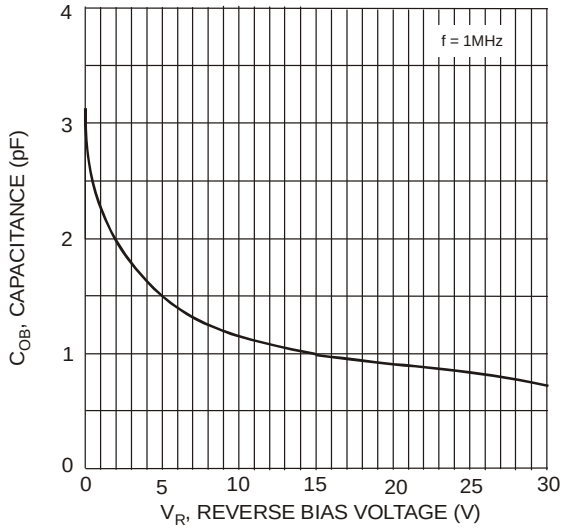


Fig. 4 Output Capacitance

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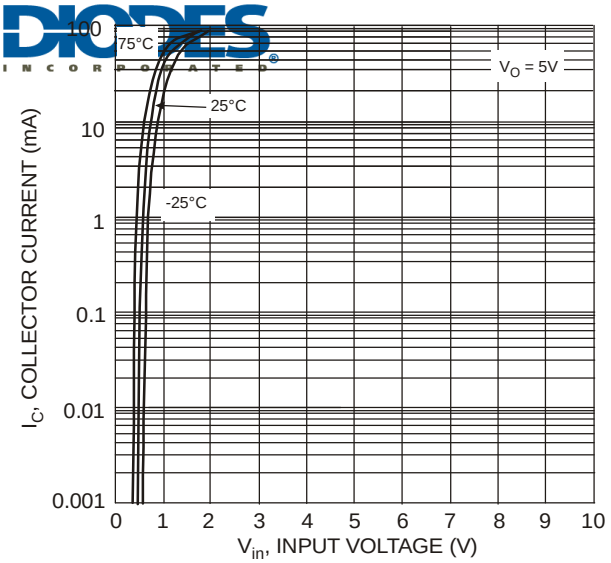


Fig. 5 Collector Current vs. Input Voltage

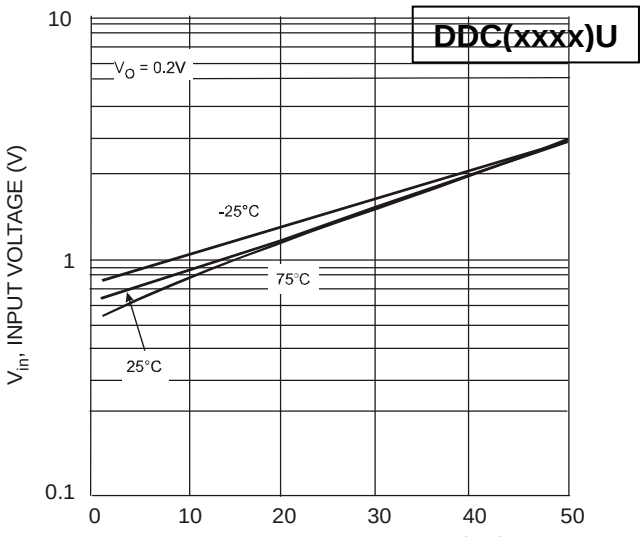


Fig. 6 Input Voltage vs. Collector Current

Typical Curves – DDC114YU One Section

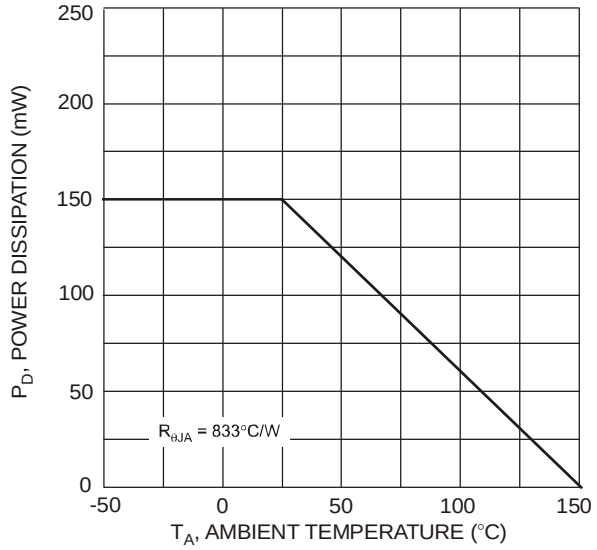


Fig. 1 Derating Curve

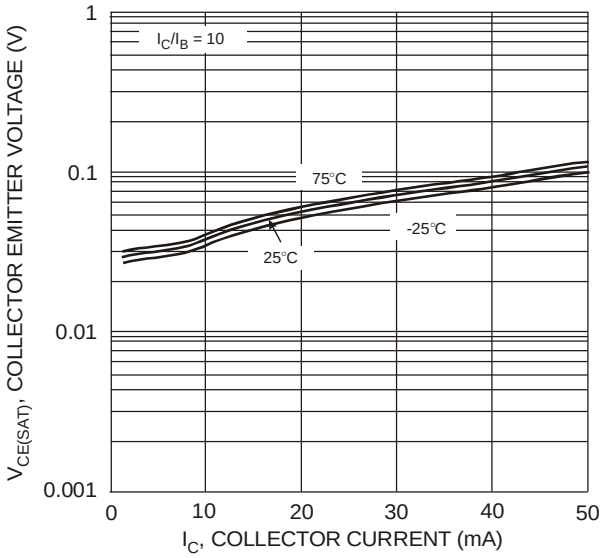


Fig. 2 $V_{CE(SAT)}$ vs. I_C

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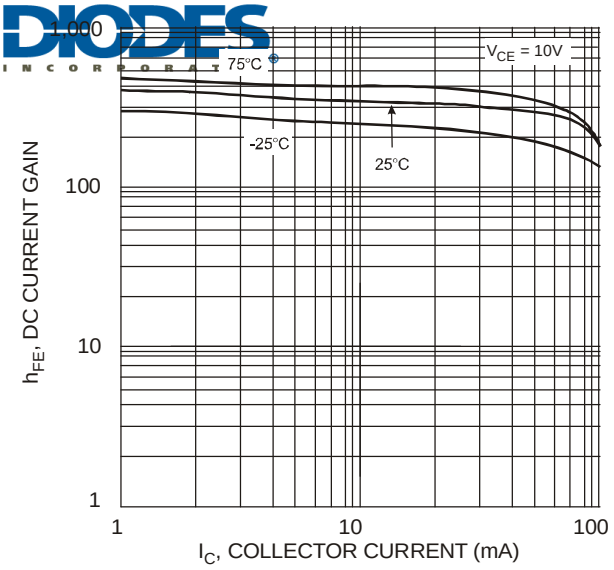


Fig. 3 DC Current Gain

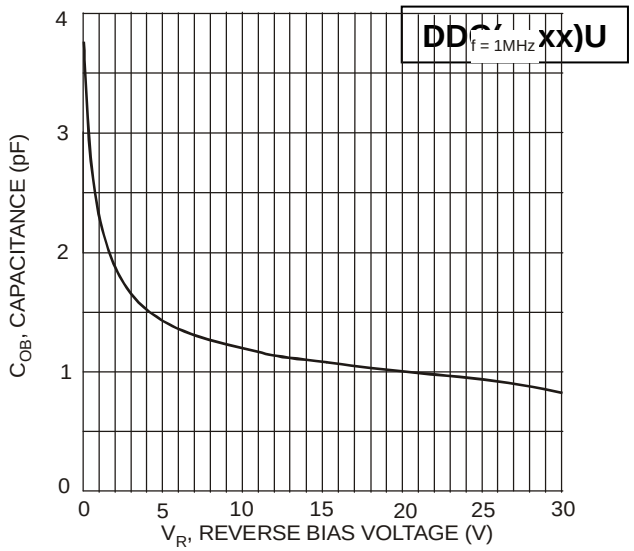


Fig. 4 Output Capacitance

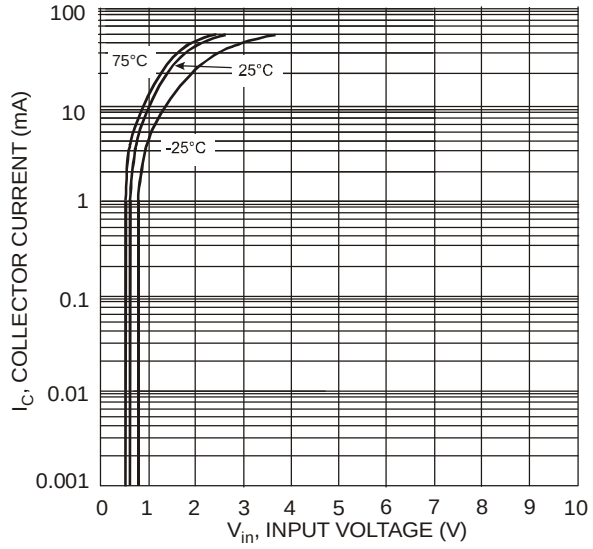


Fig. 5 Collector Current vs. Input Voltage

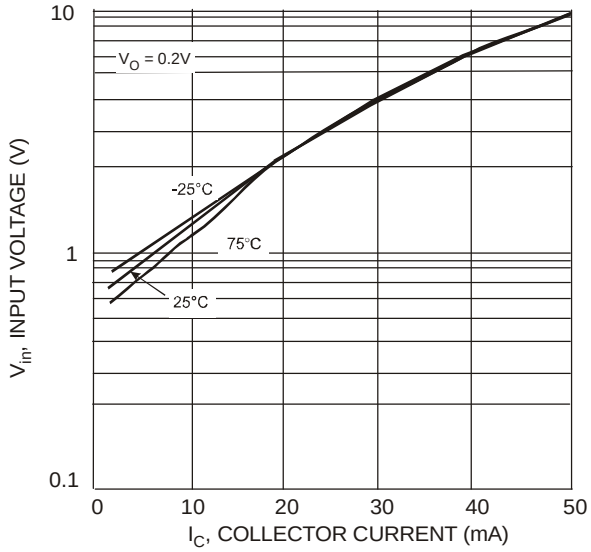


Fig. 6 Input Voltage vs. Collector Current

Typical Curves – DDC124EU One Section

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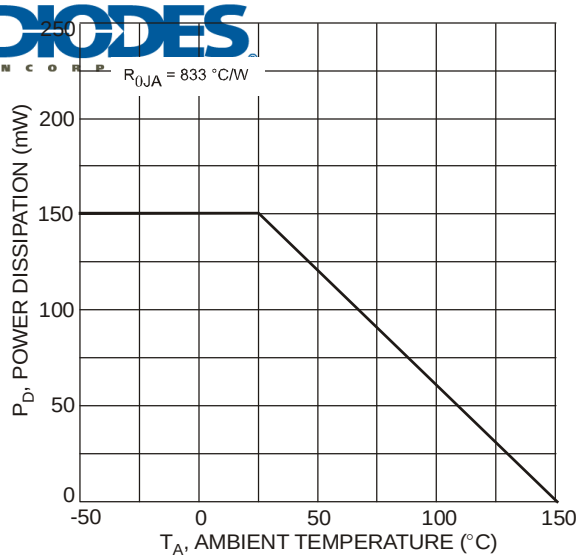


Fig. 1 Power Dissipation vs. Ambient Temeprature

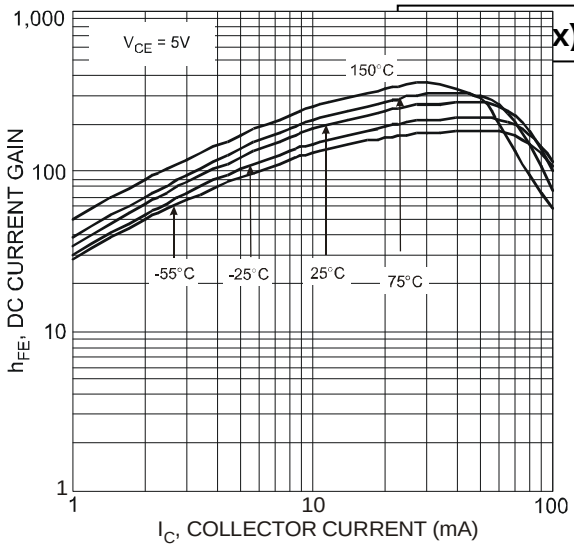


Fig. 2 Typical DC Current Gain vs. Collector Current

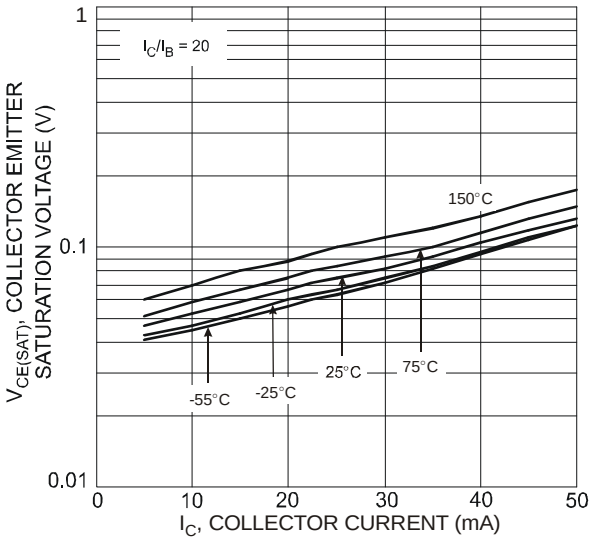


Fig. 3 Collector Emitter Saturation Voltage vs. Collector Current

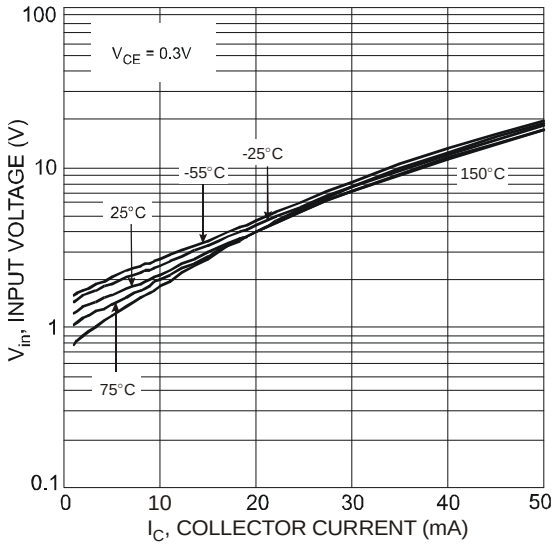
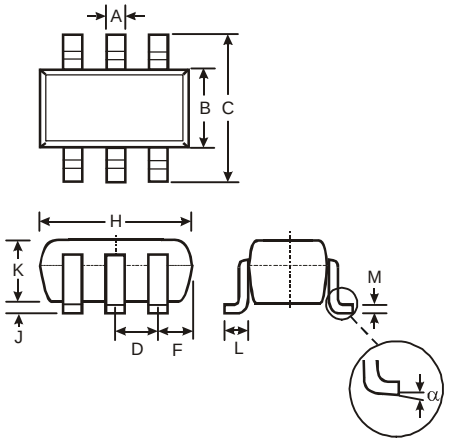


Fig. 4 Input Voltage vs. Collector Current

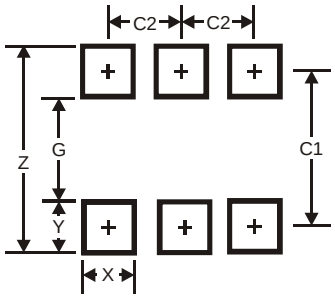
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Package Outline Dimensions



SOT363		
Dim	**Min**	**Max**
A	0.10	0.30
B	1.15	1.35
C	2.00	2.20
D	0.65 Typ	
F	0.40	0.45
H	1.80	2.20
J	0	0.10
K	0.90	1.00
L	0.25	0.40
M	0.10	0.22
α	0°	8°
All Dimensions in mm		

Suggested Pad Layout



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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