

**SMALL SIGNAL COMPLEMENTARY PRE-BIASED DUAL TRANSISTOR**
**Features**

- Epitaxial Planar Die Construction
- Built-In Biasing Resistors
- Surface Mount Package Suited for Automated Assembly
- **Totally Lead-Free & Fully RoHS compliant (Note 1)**
- **Halogen and Antimony Free. "Green" Device (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Part Number	R1 (NOM)	R2 (NOM)
DCX124EU	22K $\Omega$	22K $\Omega$
DCX144EU	47K $\Omega$	47K $\Omega$
DCX114YU	10K $\Omega$	47K $\Omega$
DCX123JU	2.2K $\Omega$	47K $\Omega$
DCX114EU	10K $\Omega$	10K $\Omega$
DCX143EU	4.7K $\Omega$	4.7K $\Omega$

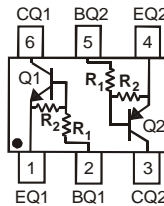
**Mechanical Data**

- 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)

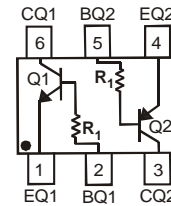
Part Number	R1 Only
DCX143TU	4.7K $\Omega$
DCX114TU	10K $\Omega$



Top View



R1, R2



R1 Only

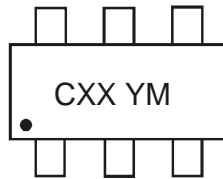
Device Schematic

**Ordering Information** (Note 3 & 4)

Product	Grade	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DCX124EU-7-F	Commercial	C17	7	8	3,000
DCX124EUQ-7-F	Automotive	C17	7	8	3,000
DCX124EUQ-13-F	Automotive	C17	13	8	10,000
DCX124EUQ-13R-F	Automotive	C17	13	8	10,000
DCX144EU-7-F	Commercial	C20	7	8	3,000
DCX144EU-7R-F	Commercial	C20	7	8	3,000
DCX144EUQ-7-F	Automotive	C20	7	8	3,000
DCX114YU-7-F	Commercial	C14	7	8	3,000
DCX114YUQ-7-F	Automotive	C14	7	8	3,000
DCX114YUQ-13-F	Automotive	C14	13	8	10,000
DCX114YUQ-13R-F	Automotive	C14	13	8	10,000
DCX123JU-7-F	Commercial	C06	7	8	3,000
DCX114EU-7-F	Commercial	C13	7	8	3,000
DCX114EUQ-7-F	Automotive	C13	7	8	3,000
DCX114EUQ-13-F	Automotive	C13	13	8	10,000
DCX143TU-7-F	Commercial	C07	7	8	3,000
DCX143EU-7-F	Commercial	C08	7	8	3,000
DCX114TU-7-F	Commercial	C12	7	8	3,000

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. Halogen and Antimony free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  3. -7R and -13R are parts rotated in the pocket tape by 180°. 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



CXX = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: X = 2010)  
 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

## Maximum Ratings NPN Section @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Supply Voltage <Pin: (6) to (1)>	V <sub>CC</sub>	50	V
Input Voltage <Pin: (2) to (1)>	V <sub>IN</sub>	DCX124EU -10 to +40 DCX144EU -10 to +40 DCX114YU -6 to +40 DCX123JU -5 to +12 DCX114EU -10 to +40 DCX143TU -5V max DCX143EU -10 to +30 DCX114TU -5V max	V
Output Current	I <sub>O</sub>	DCX124EU 30 DCX144EU 30 DCX114YU 70 DCX123JU 100 DCX114EU 50 DCX143TU 100 DCX143EU 100 DCX114TU 100	mA
Output Current	I <sub>C</sub> (Max)	100	mA

## Maximum Ratings PNP Section @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Supply Voltage <Pin: (4) to (3)>	V <sub>CC</sub>	50	V
Input Voltage <Pin: (5) to (4)>	V <sub>IN</sub>	DCX124EU +10 to -40 DCX144EU +10 to -40 DCX114YU +6 to -40 DCX123JU +5 to -12 DCX114EU +10 to -40 DCX143TU +5V max DCX143EU +10 to -30 DCX114TU +5V max	V
Output Current	I <sub>O</sub>	DCX124EU -30 DCX144EU -30 DCX114YU -70 DCX123JU -100 DCX114EU -50 DCX143TU -100 DCX143EU -100 DCX114TU -100	mA
Output Current	I <sub>C</sub> (Max)	-100	mA

**Thermal Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5 & 6)	P <sub>D</sub>	100	mW
Thermal Resistance, Junction to Ambient Air (Note 5)	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: 5. Mounted on FR4 PC Board with minimum recommended pad layout  
6. 150mW per element must not be exceeded.

**Electrical Characteristics NPN Section** @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition	
<b>R1 Only (DCX143TU &amp; DCX114TU)</b>							
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 DCX143TU I <sub>C</sub> /I <sub>B</sub> = 1mA / 0.1mA DCX114TU	
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	
<b>R1/R2 Only</b>							
Input Voltage	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU	V <sub>I(off)</sub>	0.5 0.5 0.3 0.5 0.5 0.5	1.1 1.1 - - 1.1 1.16	—	V	V <sub>CC</sub> = 5V, I <sub>O</sub> = 100μA
	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU		V <sub>I(on)</sub>	—	1.9 1.9 - - 1.9 1.99		
Output Voltage	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU	V <sub>O(on)</sub>		—	0.1	0.3	V
Input Current	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU	I <sub>I</sub>	—	—	0.36 0.18 0.88 3.6 0.88 0.88	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	DCX124EU DCX124EUQ DCX144EU DCX114YU DCX114YUQ DCX123JU DCX114EU DCX143EU	G <sub>I</sub>	56 60 68 68 80 80 30 50	—	—	—	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> = 5mA V <sub>O</sub> = 5V, I <sub>O</sub> = 10mA V <sub>O</sub> = 5V, I <sub>O</sub> = 10mA 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
Input Resistor (R <sub>1</sub> ) Tolerance	ΔR <sub>1</sub>	-30	—	+30	%	—	
Resistance Ratio Tolerance	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	

**Electrical Characteristics PNP Section** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition
<b>R1 Only (DCX143TU &amp; DCX114TU)</b>							
Collector-Base Breakdown Voltage		$BV_{CBO}$	-50	—	—	V	$I_C = -50\mu\text{A}$
Collector-Emitter Breakdown Voltage		$BV_{CEO}$	-50	—	—	V	$I_C = -1\text{mA}$
Emitter-Base Breakdown Voltage		$BV_{EBO}$	-5	—	—	V	$I_E = -50\mu\text{A}$
Collector Cutoff Current		$I_{CBO}$	—	—	-0.5	$\mu\text{A}$	$V_{CB} = -50\text{V}$
Emitter Cutoff Current		$I_{EBO}$	—	—	-0.5	$\mu\text{A}$	$V_{EB} = -4\text{V}$
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	—	—	-0.3	V	$I_C/I_B = 2.5\text{mA} / 0.25\text{mA}$ DCX143TU $I_C/I_B = 1\text{mA} / 0.1\text{mA}$ DCX114TU
DC Current Transfer Ratio		$h_{FE}$	100	250	600	—	$I_C = -1\text{mA}$ , $V_{CE} = -5\text{V}$
Input Resistor ( $R_1$ ) Tolerance		$\Delta R_1$	-30	—	+30	%	—
Gain-Bandwidth Product		$f_T$	—	250	—	MHz	$V_{CE} = -10\text{V}$ , $I_E = 5\text{mA}$ , $f = 100\text{MHz}$
<b>R1/R2 Only</b>							
Input Voltage	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU	$V_{I(off)}$	-0.5 -0.5 -0.3 -0.5 -0.5 -0.5	-1.1 -1.1 - - -1.1 -1.16	—	V	$V_{CC} = -5\text{V}$ , $I_O = -100\mu\text{A}$
	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU		$V_{I(on)}$	—	-1.9 -1.9 - - -1.9 -2.5		
Output Voltage	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU	$V_{O(on)}$		—	-0.1	-0.3	V
Input Current	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU		$I_I$	—	—	-0.36 -0.18 -0.88 -3.6 -0.88 -0.88	mA
Output Current		$I_{O(off)}$		—	—	-0.5	$\mu\text{A}$
DC Current Gain	DCX124EU DCX124EUQ DCX144EU DCX114YU DCX114YUQ DCX123JU DCX114EU DCX143EU	$G_I$	56 60 68 68 80 80 30 40	—	—	—	$V_O = -5\text{V}$ , $I_O = -5\text{mA}$ $V_O = -5\text{V}$ , $I_O = -5\text{mA}$ $V_O = -5\text{V}$ , $I_O = -5\text{mA}$ $V_O = -5\text{V}$ , $I_O = -10\text{mA}$ $V_O = -5\text{V}$ , $I_O = -10\text{mA}$ $V_O = -5\text{V}$ , $I_O = -10\text{mA}$ $V_O = -5\text{V}$ , $I_O = -5\text{mA}$ $V_O = -5\text{V}$ , $I_O = -10\text{mA}$
Input Resistor ( $R_1$ ) Tolerance			$\Delta R_1$	-30	—	+30	%
Resistance Ratio Tolerance		$R_2/R_1$	-20	—	+20	%	—
Gain-Bandwidth Product		$f_T$	—	250	—	MHz	$V_{CE} = -10\text{V}$ , $I_E = -5\text{mA}$ , $f = 100\text{MHz}$

**Typical Curves – Total Device**

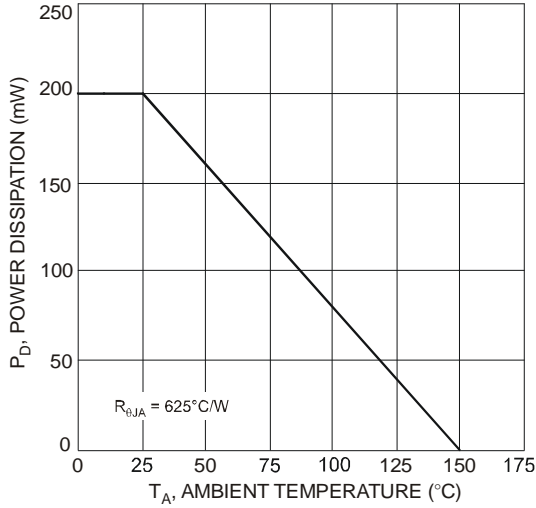


Fig. 1 Power Derating Curve

**Typical Curves – DCX123JU PNP Section**

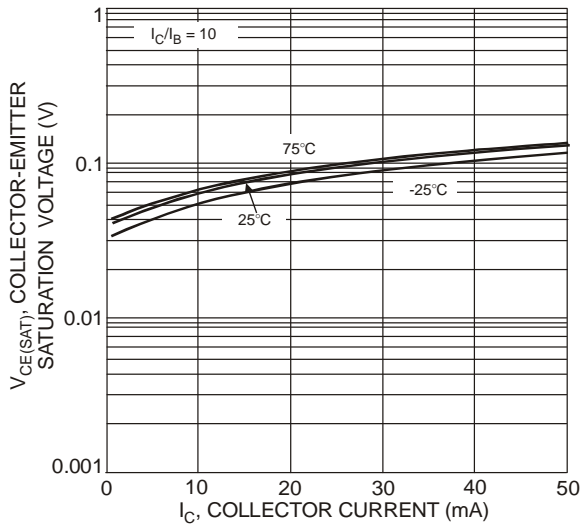


Fig. 2 Typical  $V_{CE(SAT)}$  vs.  $I_C$

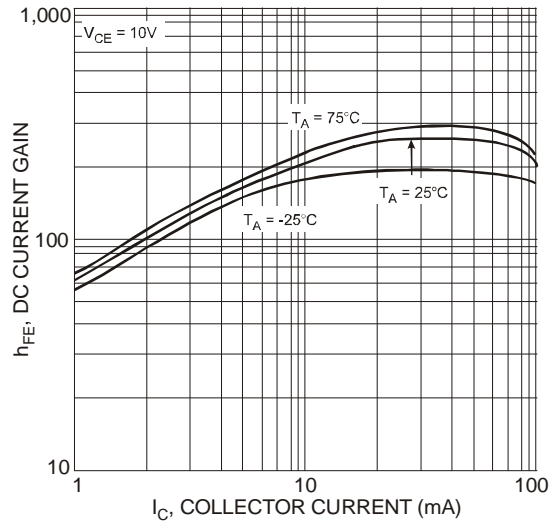


Fig. 3 Typical DC Current Gain

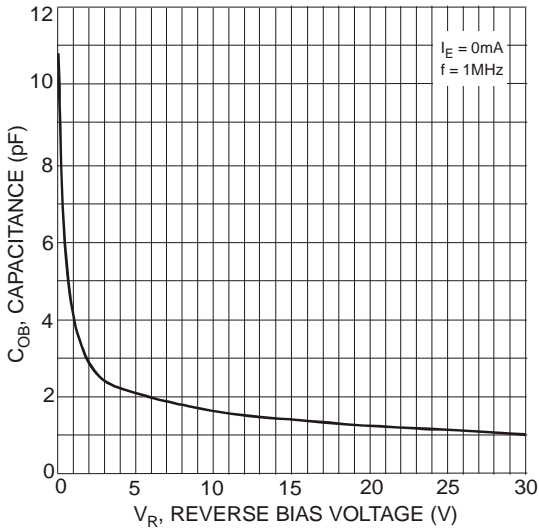


Fig. 4 Typical Output Capacitance

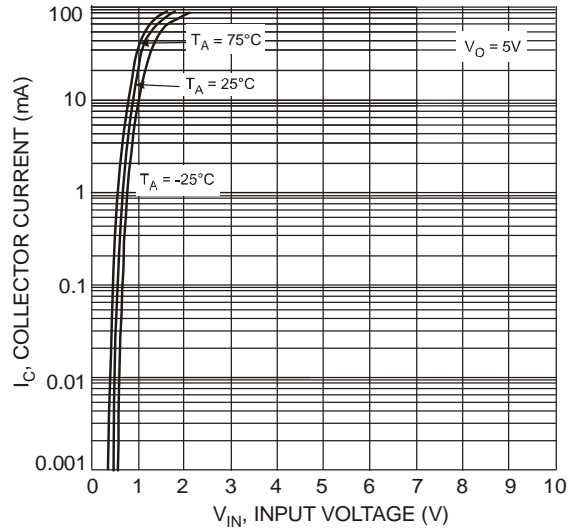


Fig. 5 Typical Collector Current vs. Input Voltage

**Typical Curves – DCX123JU PNP Section (cont.)**

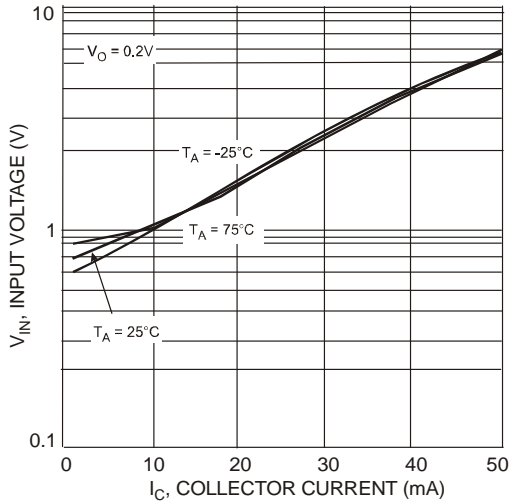


Fig. 6 Typical Input Voltage vs. Collector Current

**Typical Curves – DCX123JU NPN Section**

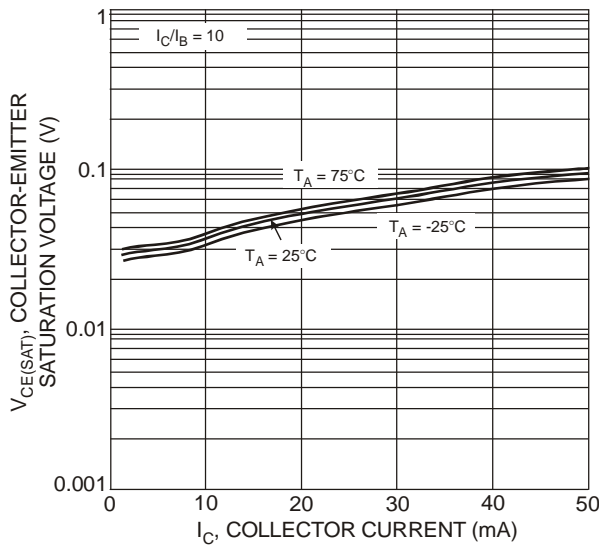


Fig. 7 Typical  $V_{CE(SAT)}$  vs.  $I_C$

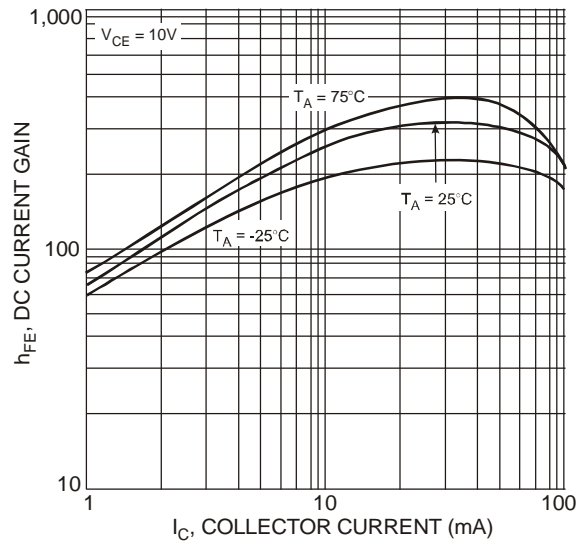


Fig. 8 Typical DC Current Gain

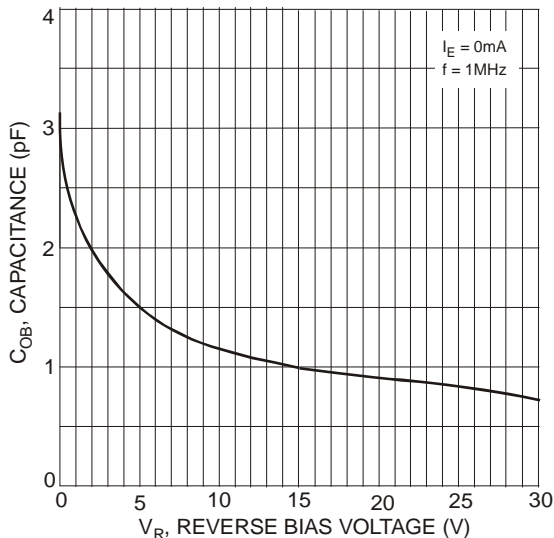


Fig. 9 Typical Output Capacitance

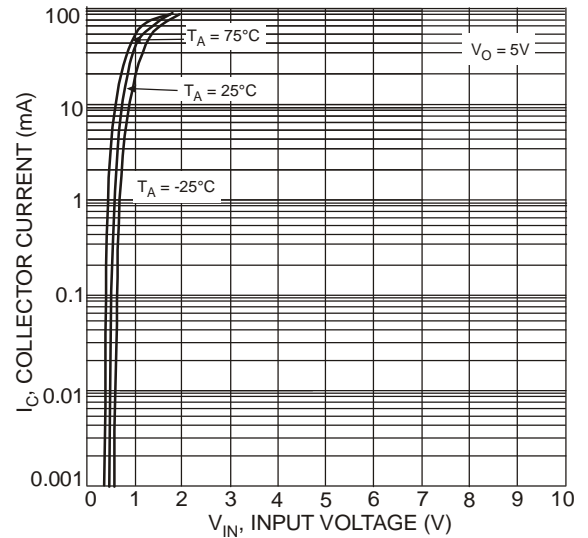


Fig. 10 Typical Collector Current vs. Input Voltage

**Typical Curves – DCX123JU NPN Section (cont.)**

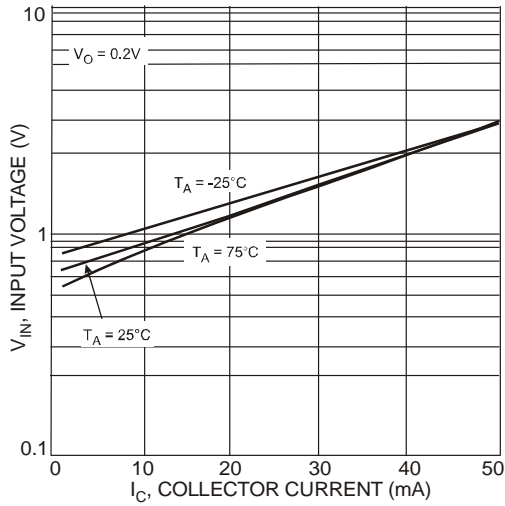


Fig. 11 Typical Input Voltage vs. Collector Current

**Typical Curves – DCX143EU PNP Section**

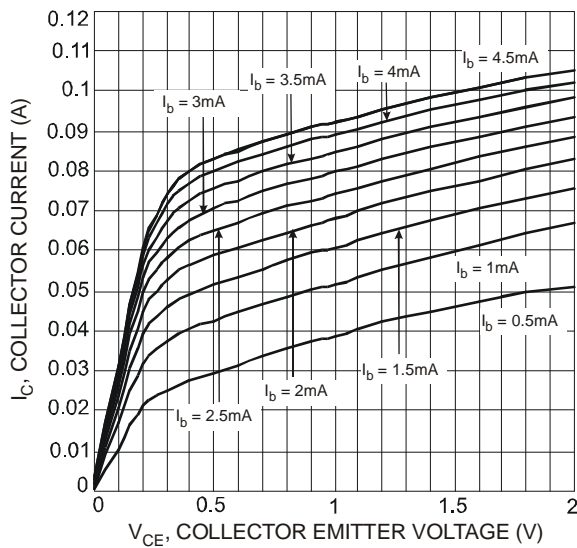


Fig. 12 Typical  $V_{CE}$  vs.  $I_C$

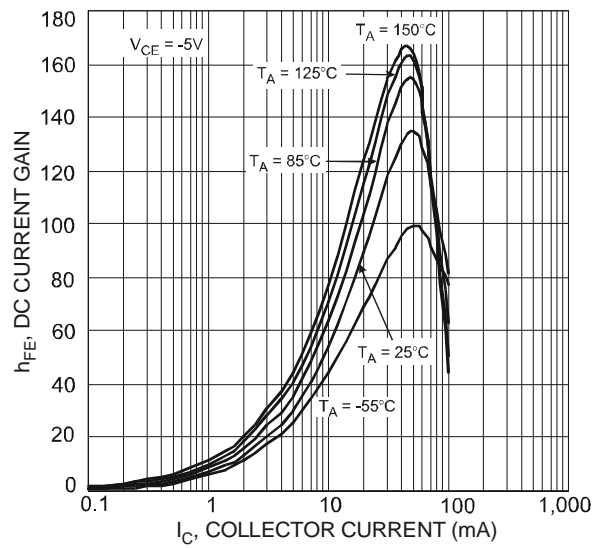


Fig. 13 Typical DC Current Gain

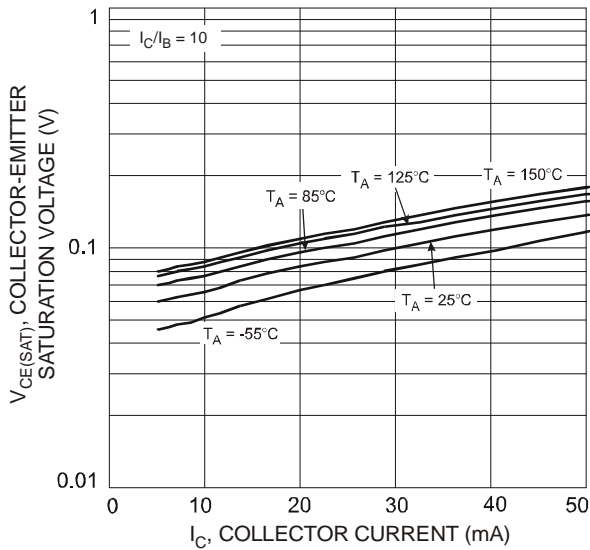


Fig. 14 Typical  $V_{CE(SAT)}$  vs.  $I_C$

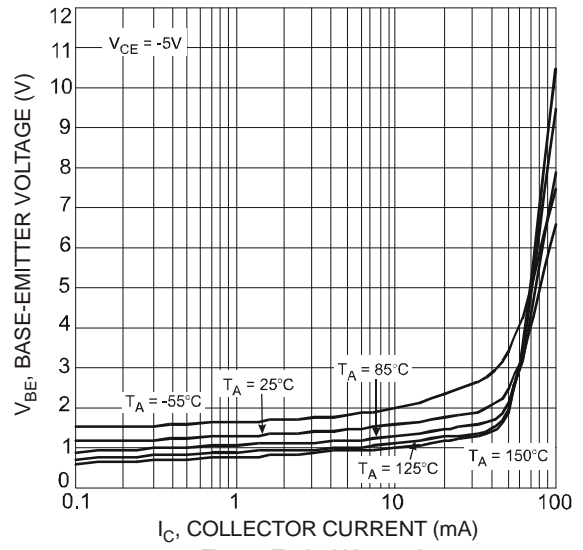


Fig. 15 Typical  $V_{BE}$  vs.  $I_C$

**Typical Curves – DCX143EU PNP Section (cont.)**

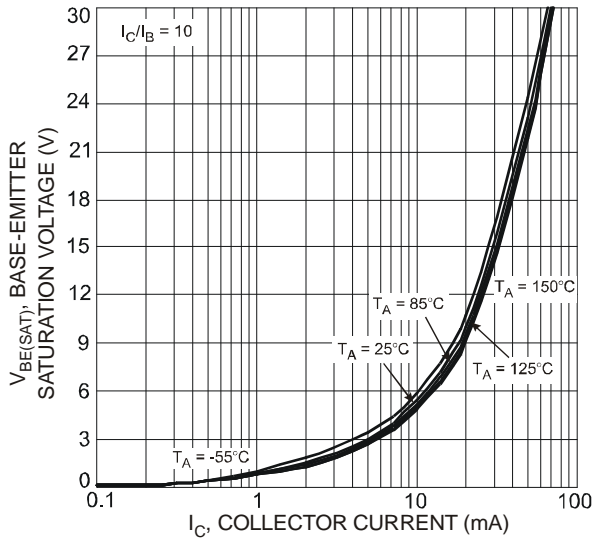


Fig. 16 Typical  $V_{BE(SAT)}$  vs.  $I_C$

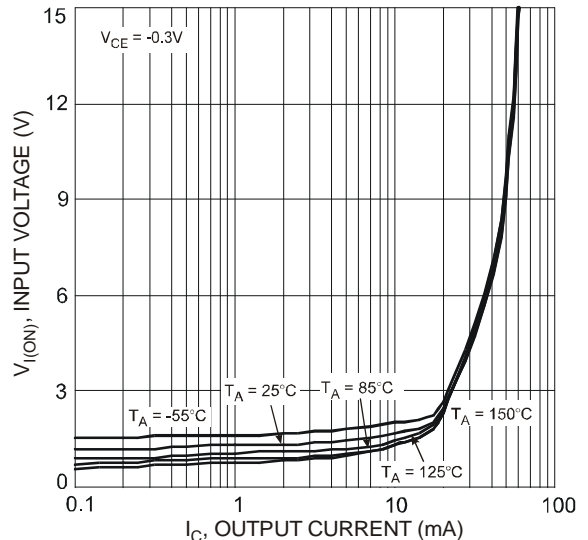


Fig. 17 Typical  $V_{I(ON)}$  vs.  $I_C$

**Typical Curves – DCX143EU NPN Section**

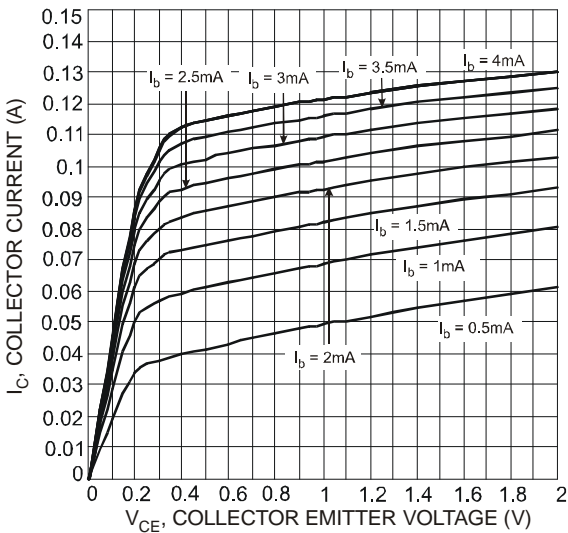


Fig. 18 Typical  $V_{CE}$  vs.  $I_C$

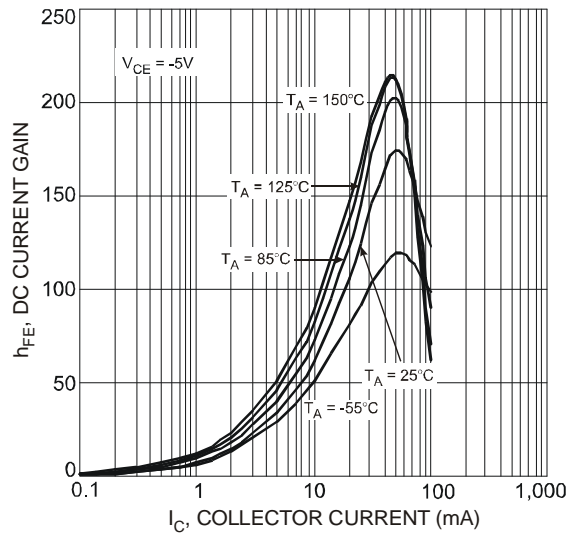


Fig. 19 Typical DC Current Gain

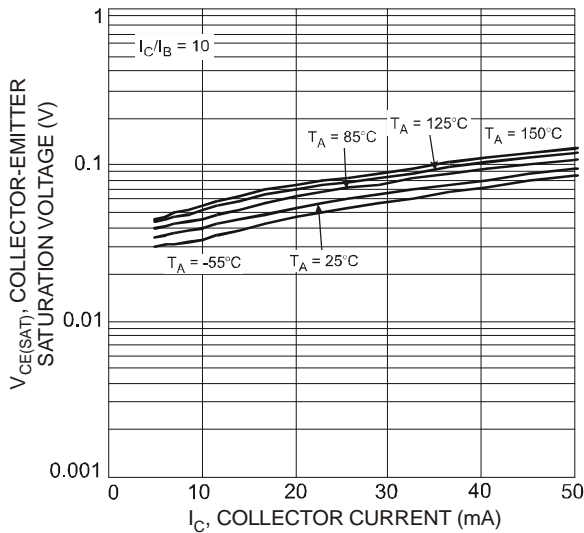


Fig. 20 Typical  $V_{CE(SAT)}$  vs.  $I_C$

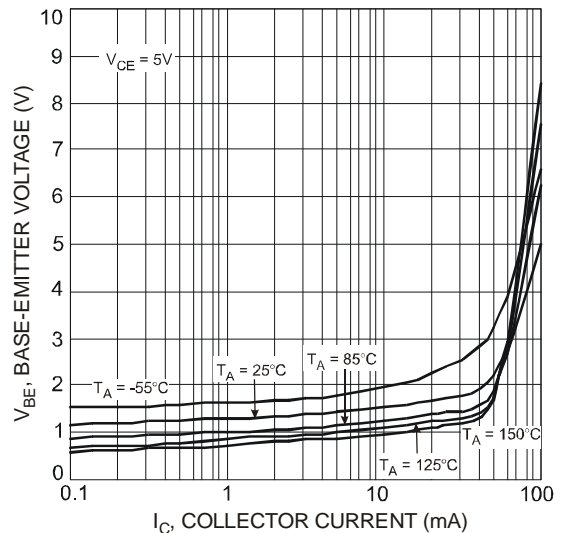


Fig. 21 Typical  $V_{BE}$  vs.  $I_C$



**Typical Curves – DCX143EU NPN Section (cont.)**

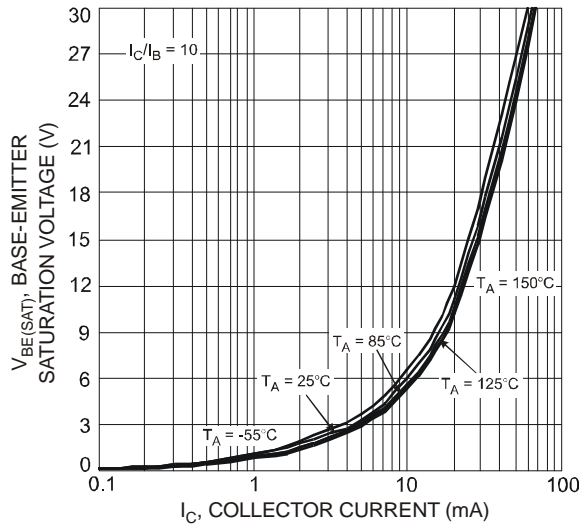


Fig. 22 Typical  $V_{BE(SAT)}$  vs.  $I_C$

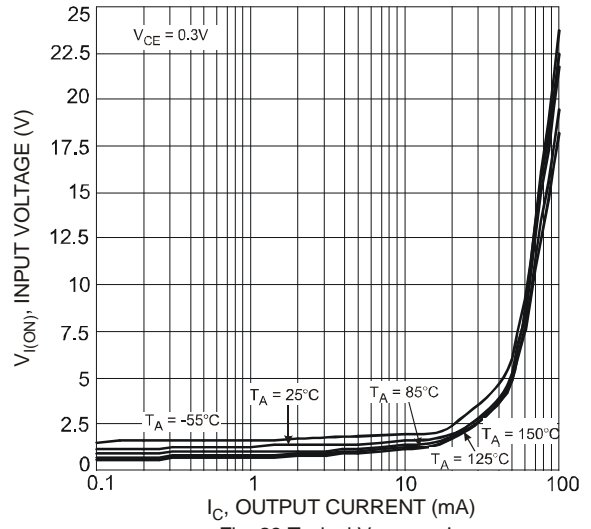


Fig. 23 Typical  $V_{I(ON)}$  vs.  $I_C$

**Typical Curves – DCX114TU PNP Section**

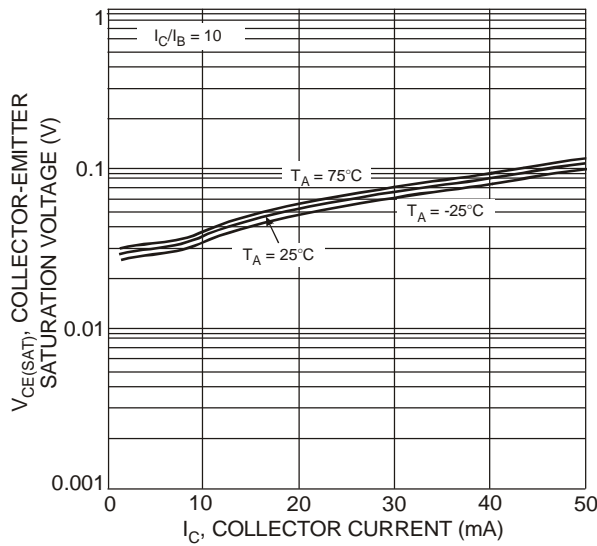


Fig. 24 Typical  $V_{CE(SAT)}$  vs.  $I_C$

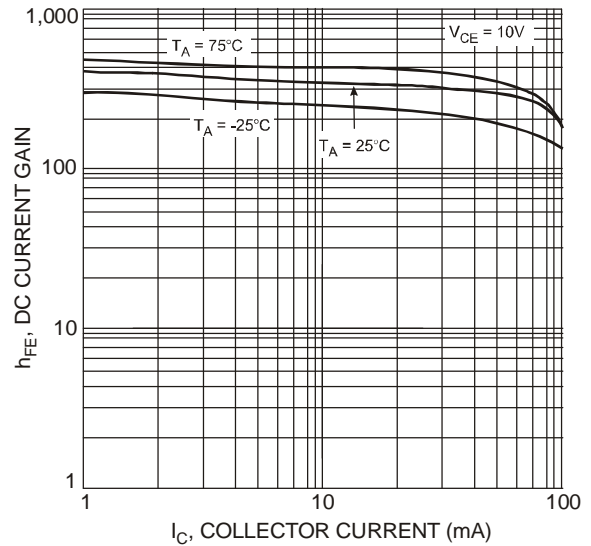


Fig. 25 Typical DC Current Gain

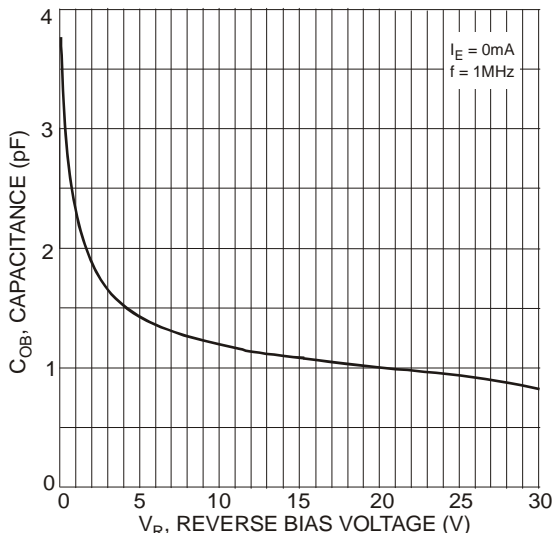


Fig. 26 Typical Output Capacitance

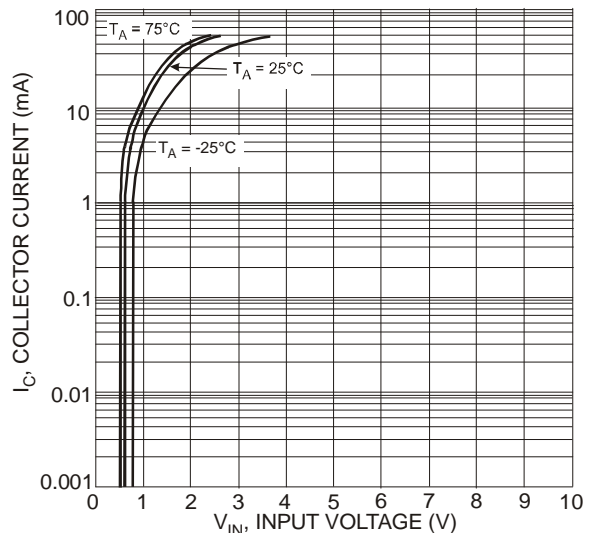


Fig. 27 Typical Collector Current vs. Input Voltage

**Typical Curves – DCX114TU PNP Section (cont.)**

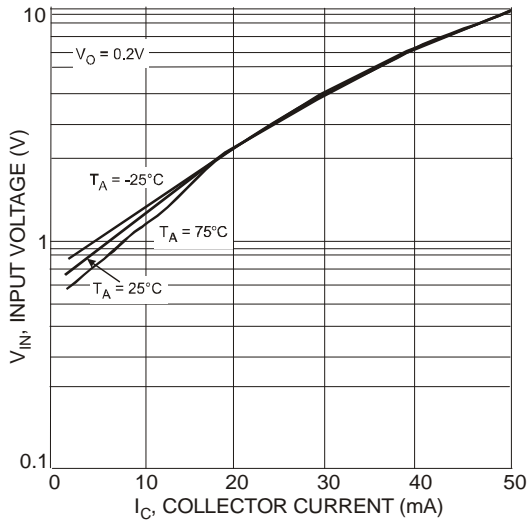


Fig. 28 Typical Input Voltage vs. Collector Current

**Typical Curves – DCX114TU NPN Section**

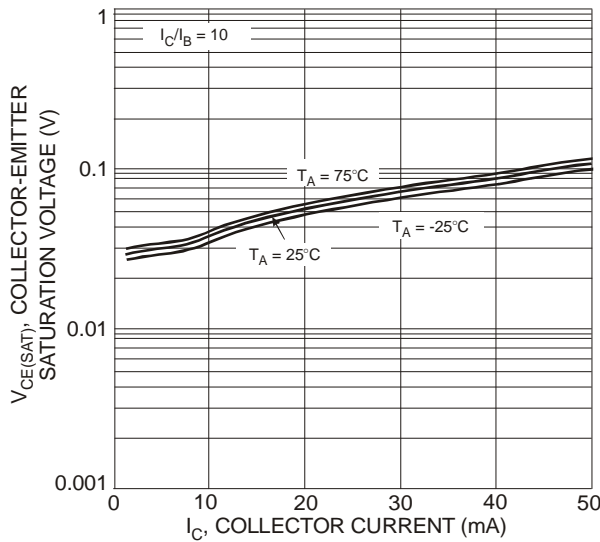


Fig. 29 Typical  $V_{CE(SAT)}$  vs.  $I_C$

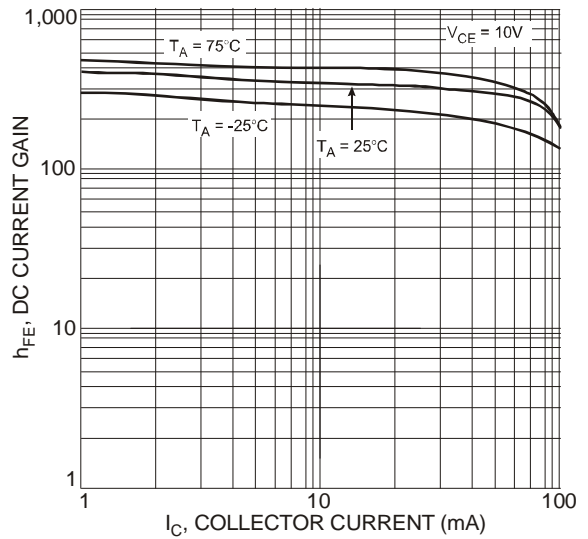


Fig. 30 Typical DC Current Gain

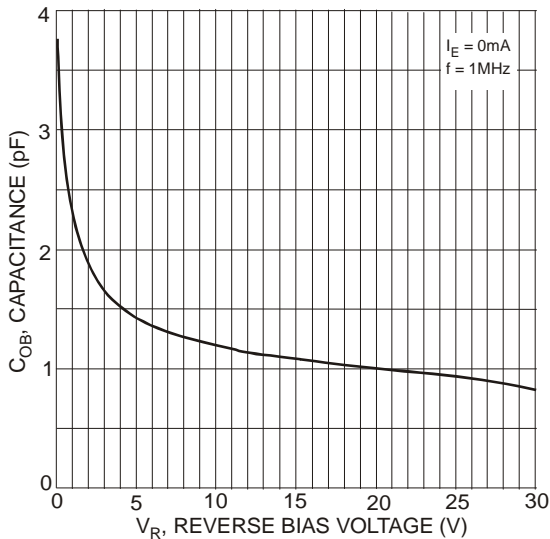


Fig. 31 Typical Output Capacitance

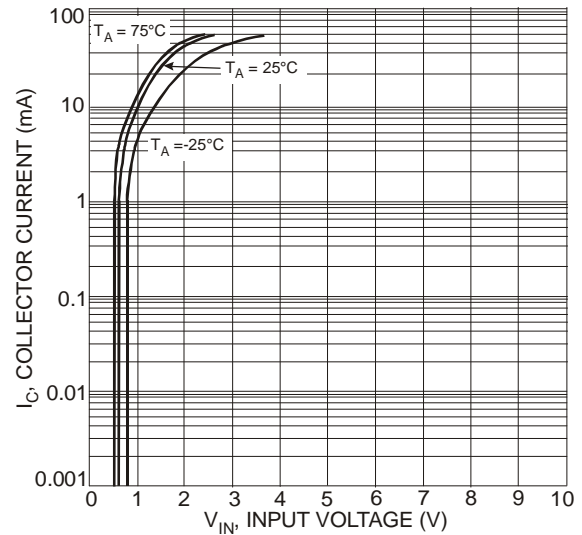


Fig. 32 Typical Collector Current vs. Input Voltage

**Typical Curves – DCX114TU NPN Section (cont.)**

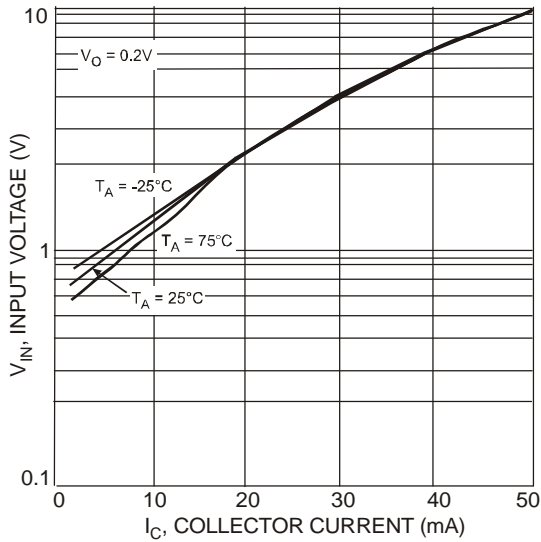
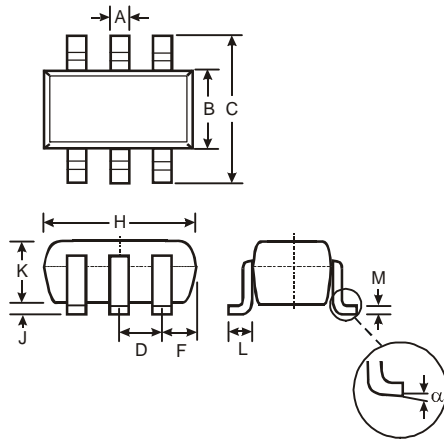


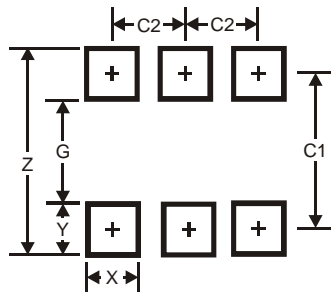
Fig. 33 Typical Input Voltage vs. Collector Current

**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
$\alpha$	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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