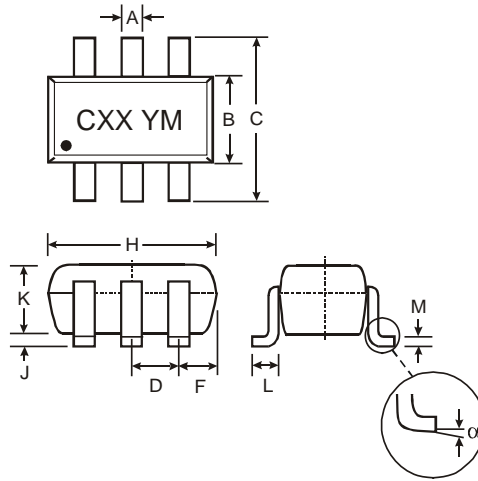


**Features**

- Epitaxial Planar Die Construction
- Built-In Biasing Resistors
- Surface Mount Package Suited for Automated Assembly
- **Lead Free/RoHS Compliant (Note 3)**
- **"Green" Device (Note 4 and 5)**

**Mechanical Data**

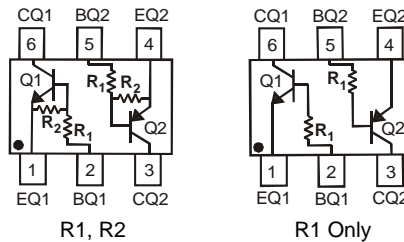
- Case: SOT-363
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminals: Solderable per MIL-STD-202, Method 208
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- Terminal Connections: See Diagram
- Marking Information: See Page 11
- Ordering Information: See Page 11
- Weight: 0.006 grams (approximate)



SOT-363		
Dim	Min	Max
A	0.10	0.30
B	1.15	1.35
C	2.00	2.20
D	0.65 Nominal	
F	0.30	0.40
H	1.80	2.20
J	—	0.10
K	0.90	1.00
L	0.25	0.40
M	0.10	0.25
$\alpha$	0°	8°

All Dimensions in mm

P/N	R1	R2	MARKING
DCX124EU	22K $\Omega$	22K $\Omega$	C17
DCX144EU	47K $\Omega$	47K $\Omega$	C20
DCX114YU	10K $\Omega$	47K $\Omega$	C14
DCX123JU	2.2K $\Omega$	47K $\Omega$	C06
DCX114EU	10K $\Omega$	10K $\Omega$	C13
DCX143TU	4.7K $\Omega$	-	C07
DCX143EU	4.7K $\Omega$	4.7K $\Omega$	C08
DCX114TU	10K $\Omega$	-	C12



Q1: NPN Transistor  
Q2: PNP Transistor

SCHEMATIC DIAGRAM

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

Characteristic	Symbol	Value	Unit	
Supply Voltage, (6) to (1)	V <sub>CC</sub>	50	V	
Input Voltage, (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	
Output Current	I <sub>O</sub>	DCX124EU	30	
		DCX144EU	30	
		DCX114YU	70	
		DCX123JU	100	
		DCX114EU	50	
		DCX143TU	100	
		DCX143EU	100	
Output Current	All	I <sub>C</sub> (Max)	100	mA
Power Dissipation (Total)	(Note 2)	P <sub>D</sub>	200	mW
Thermal Resistance, Junction to Ambient Air	(Note 1)	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:
1. Mounted on FR4 PC Board with recommended pad layout at <http://www.diodes.com/datasheets/ap02001.pdf>.
  2. 150mW per element must not be exceeded.
  3. No purposefully added lead.
  4. Diodes Inc.'s "Green" policy can be found on our website at [http://www.diodes.com/products/lead\\_free/index.php](http://www.diodes.com/products/lead_free/index.php).
  5. Product manufactured with Date Code UO (week 40, 2007) and newer are built with Green Molding Compound. Product manufactured prior to Date Code UO are built with Non-Green Molding Compound and may contain Halogens or Sb<sub>2</sub>O<sub>3</sub> Fire Retardants.

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

Characteristic	Symbol	Value	Unit
Supply Voltage, (4) to (3)	V <sub>CC</sub>	50	V
Input Voltage, (5) to (4)	V <sub>IN</sub>	+10 to -40 +10 to -40 +6 to -40 +5 to -12 +10 to -40 +5V max +10 to -30 +5V max	V
Output Current	I <sub>O</sub>	-30 -30 -70 -100 -50 -100 -100 -100	mA
Output Current	I <sub>C</sub> (Max)	-100	mA
Power Dissipation (Total)	P <sub>D</sub>	200	mW
Thermal Resistance, Junction to Ambient Air	R <sub>θJA</sub>	625	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

## Electrical Characteristics NPN 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	$V_{I(off)}$	0.5	1.1	—	V	$V_{CC} = 5\text{V}$ , $I_O = 100\mu\text{A}$
	DCX144EU		0.5	1.1			
DCX114YU	0.3		—				
DCX123JU	0.5		—				
DCX114EU	0.5		1.1				
DCX143EU	0.5		1.16				
Input Voltage	DCX124EU	$V_{I(on)}$	—	1.9	3.0	V	$V_O = 0.3$ , $I_O = 5\text{mA}$
	DCX144EU		—	1.9	3.0		$V_O = 0.3$ , $I_O = 2\text{mA}$
	DCX114YU		—	—	1.4		$V_O = 0.3$ , $I_O = 1\text{mA}$
	DCX123JU		—	—	1.1		$V_O = 0.3$ , $I_O = 5\text{mA}$
	DCX114EU		—	1.9	3.0		$V_O = 0.3$ , $I_O = 10\text{mA}$
	DCX143EU		—	1.99	3.0		$V_O = 0.3$ , $I_O = 20\text{mA}$
Output Voltage	DCX124EU	$V_{O(on)}$	—	0.1	0.3	V	$I_O/I_I = 10\text{mA} / 0.5\text{mA}$
	DCX144EU		—	0.1	0.3		$I_O/I_I = 10\text{mA} / 0.5\text{mA}$
	DCX114YU		—	0.1	0.3		$I_O/I_I = 5\text{mA} / 0.25\text{mA}$
	DCX123JU		—	0.1	0.3		$I_O/I_I = 5\text{mA} / 0.25\text{mA}$
	DCX114EU		—	0.1	0.3		$I_O/I_I = 10\text{mA} / 0.5\text{mA}$
	DCX143EU		—	0.1	0.3		$I_O/I_I = 10\text{mA} / 0.5\text{mA}$
Input Current	DCX124EU	$I_I$	—	—	0.36	mA	$V_I = 5\text{V}$
	DCX144EU		—	—	0.18		
	DCX114YU		—	—	0.88		
	DCX123JU		—	—	3.6		
	DCX114EU		—	—	0.88		
	DCX143EU		—	—	0.88		
Output Current		$I_{O(off)}$	—	—	0.5	$\mu\text{A}$	$V_{CC} = 50\text{V}$ , $V_I = 0\text{V}$
DC Current Gain	DCX124EU	$G_I$	56	—	—	—	$V_O = 5\text{V}$ , $I_O = 5\text{mA}$
	DCX144EU		68	—	—		$V_O = 5\text{V}$ , $I_O = 5\text{mA}$
	DCX114YU		68	—	—		$V_O = 5\text{V}$ , $I_O = 10\text{mA}$
	DCX123JU		80	—	—		$V_O = 5\text{V}$ , $I_O = 10\text{mA}$
	DCX114EU		30	—	—		$V_O = 5\text{V}$ , $I_O = 5\text{mA}$
	DCX143EU		50	—	—		$V_O = 5\text{V}$ , $I_O = 10\text{mA}$
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	$V_{CE} = 10\text{V}$ , $I_E = 5\text{mA}$ , $f = 100\text{MHz}$

## 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	$V_{I(off)}$	-0.5	-1.1	—	V	$V_{CC} = -5\text{V}$ , $I_O = -100\mu\text{A}$
	DCX144EU		-0.5	-1.1			
	DCX114YU		-0.3	—			
	DCX123JU		-0.5	—			
	DCX114EU		-0.5	-1.1			
	DCX143EU		-0.5	-1.16			
Input Voltage	DCX124EU	$V_{I(on)}$	—	-1.9	-3.0	V	$V_O = -0.3$ , $I_O = -5\text{mA}$
	DCX144EU		—	-1.9	-3.0		$V_O = -0.3$ , $I_O = -2\text{mA}$
	DCX114YU		—	—	-1.4		$V_O = -0.3$ , $I_O = -1\text{mA}$
	DCX123JU		—	—	-1.1		$V_O = -0.3$ , $I_O = -5\text{mA}$
	DCX114EU		—	-1.9	-3.0		$V_O = -0.3$ , $I_O = -10\text{mA}$
	DCX143EU		—	-2.5	-3.0		$V_O = -0.3$ , $I_O = -20\text{mA}$
Output Voltage	DCX124EU	$V_{O(on)}$	—	-0.1	-0.3	V	$I_O/I_I = -10\text{mA} / -0.5\text{mA}$
	DCX144EU		—	-0.1	-0.3		$I_O/I_I = -10\text{mA} / -0.5\text{mA}$
	DCX114YU		—	-0.1	-0.3		$I_O/I_I = -5\text{mA} / -0.25\text{mA}$
	DCX123JU		—	-0.1	-0.3		$I_O/I_I = -5\text{mA} / -0.25\text{mA}$
	DCX114EU		—	-0.1	-0.3		$I_O/I_I = -10\text{mA} / -0.5\text{mA}$
	DCX143EU		—	-0.1	-0.3		$I_O/I_I = -10\text{mA} / -0.5\text{mA}$
Input Current	DCX124EU	$I_I$	—	—	-0.36	mA	$V_I = -5\text{V}$
	DCX144EU		—	—	-0.18		
	DCX114YU		—	—	-0.88		
	DCX123JU		—	—	-3.6		
	DCX114EU		—	—	-0.88		
	DCX143EU		—	—	-0.88		
Output Current	$I_{O(off)}$	—	—	-0.5	$\mu\text{A}$	$V_{CC} = 50\text{V}$ , $V_I = 0\text{V}$	
DC Current Gain	DCX124EU	$G_I$	56	—	—	—	$V_O = -5\text{V}$ , $I_O = -5\text{mA}$
	DCX144EU		68	—	—		$V_O = -5\text{V}$ , $I_O = -5\text{mA}$
	DCX114YU		68	—	—		$V_O = -5\text{V}$ , $I_O = -10\text{mA}$
	DCX123JU		80	—	—		$V_O = -5\text{V}$ , $I_O = -10\text{mA}$
	DCX114EU		30	—	—		$V_O = -5\text{V}$ , $I_O = -5\text{mA}$
	DCX143EU		40	—	—		$V_O = -5\text{V}$ , $I_O = -10\text{mA}$
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**

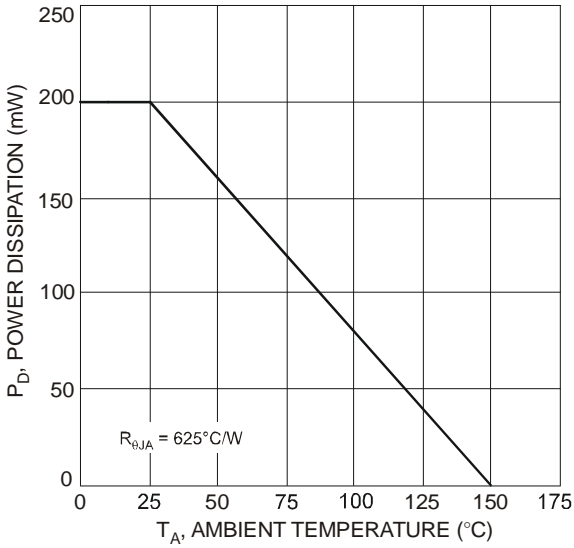


Fig. 1 Power Derating Curve

**Typical Curves – DCX123JU PNP Section**

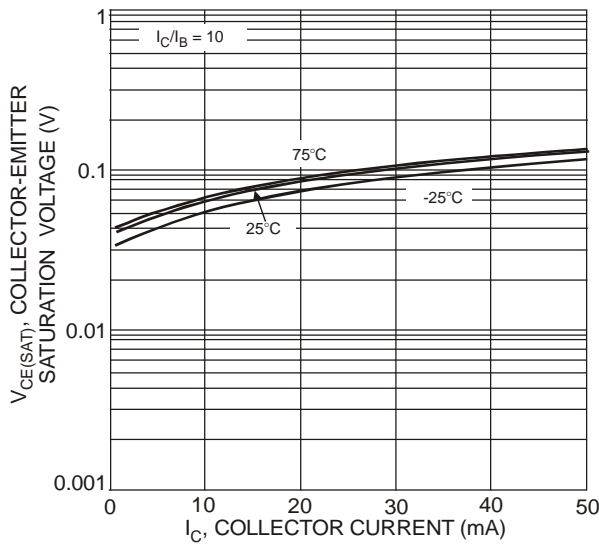


Fig. 2 Typical  $V_{CE(SAT)}$  vs.  $I_C$

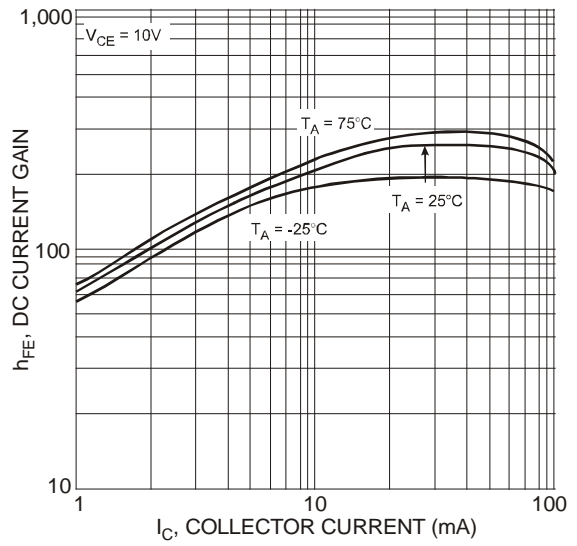


Fig. 3 Typical DC Current Gain

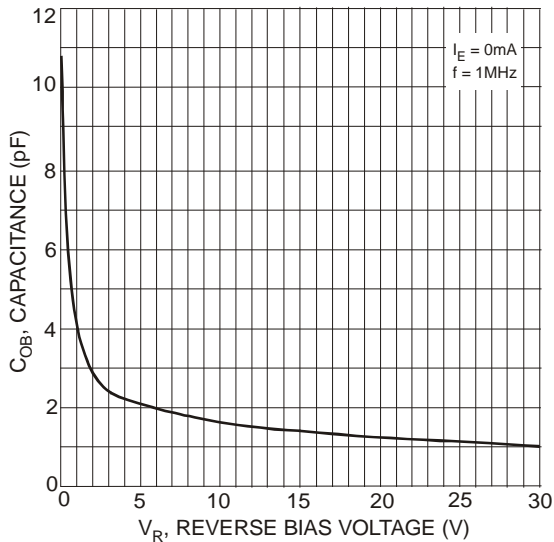


Fig. 4 Typical Output Capacitance

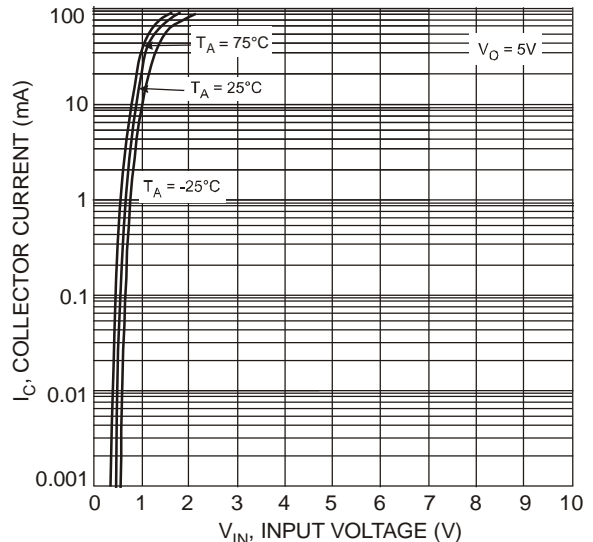


Fig. 5 Typical Collector Current vs. Input Voltage

**Typical Curves – DCX123JU PNP Section (Continued)**

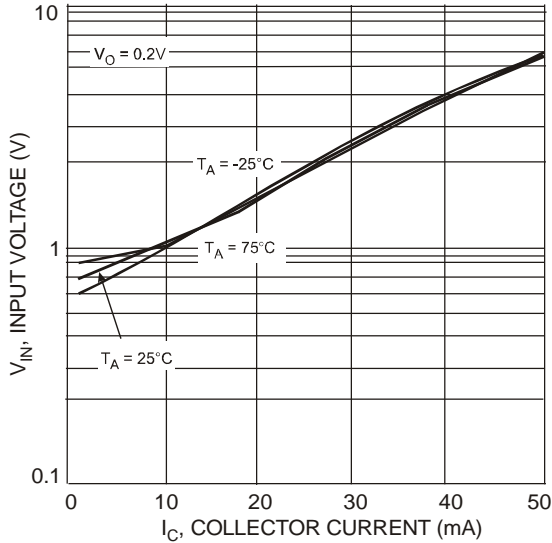


Fig. 6 Typical Input Voltage vs. Collector Current

**Typical Curves – DCX123JU NPN Section**

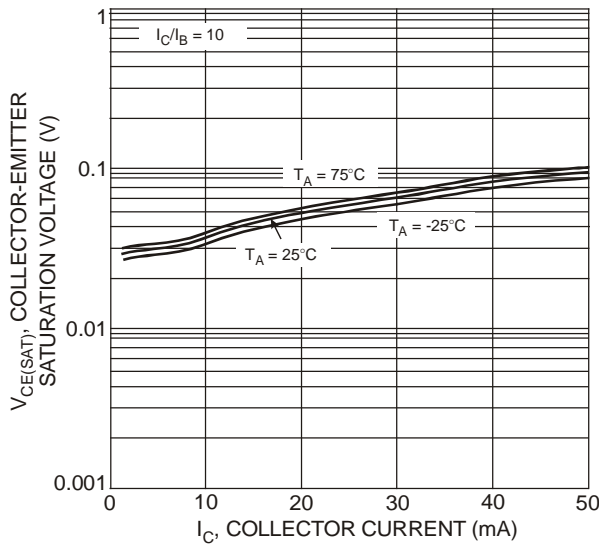


Fig. 7 Typical  $V_{CE(SAT)}$  vs.  $I_C$

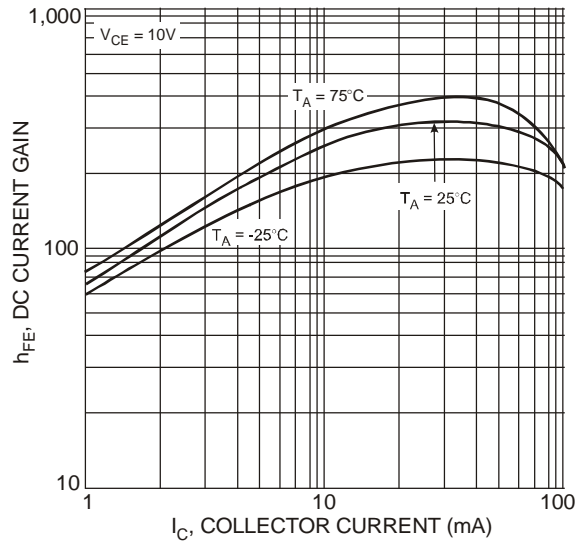


Fig. 8 Typical DC Current Gain

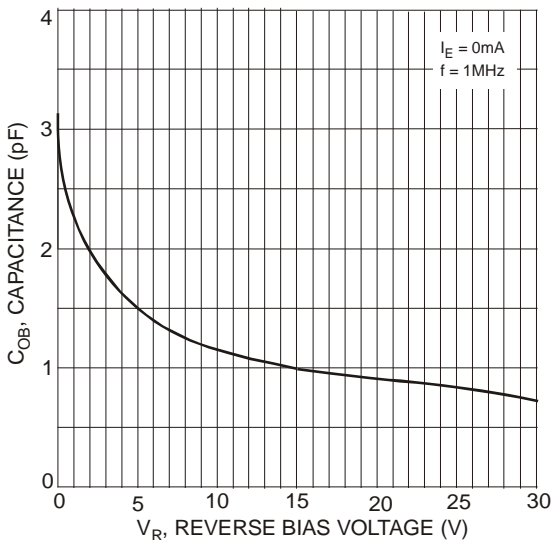


Fig. 9 Typical Output Capacitance

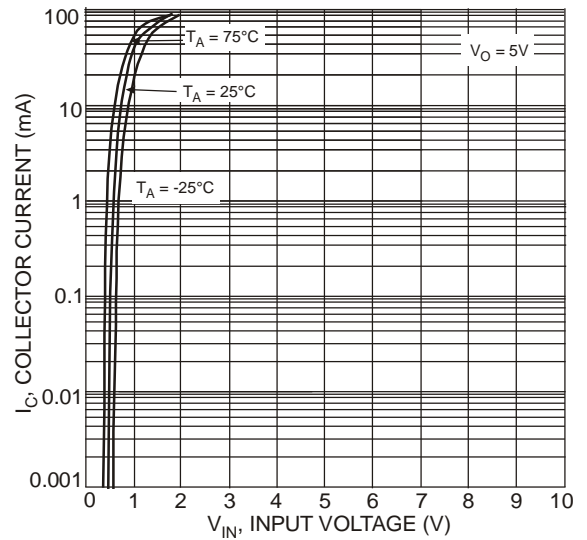


Fig. 10 Typical Collector Current vs. Input Voltage

**Typical Curves – DCX123JU NPN Section (Continued)**

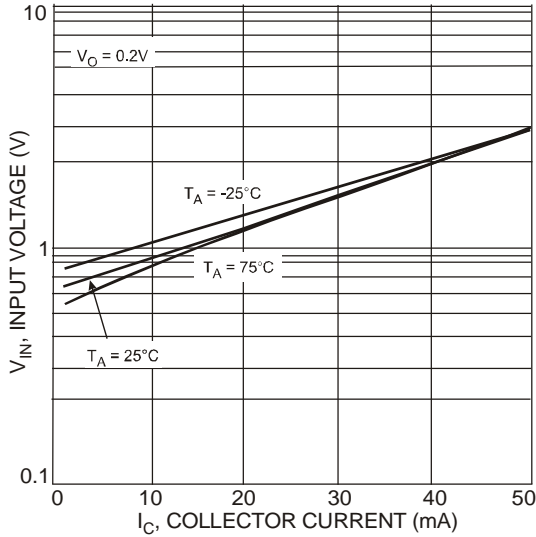


Fig. 11 Typical Input Voltage vs. Collector Current

**Typical Curves – DCX143EU PNP Section**

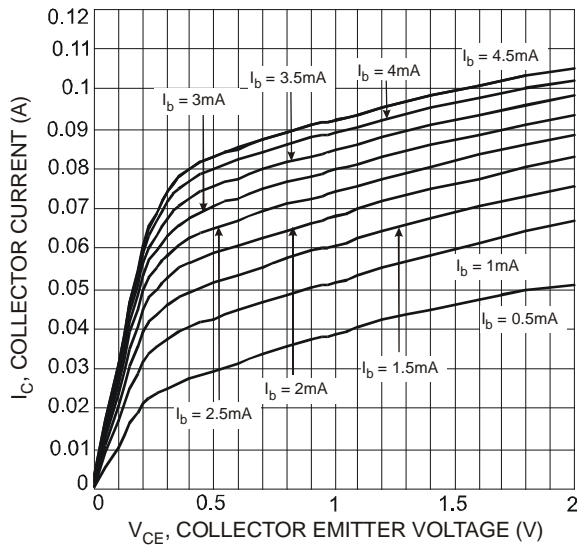


Fig. 12 Typical  $V_{CE}$  vs.  $I_C$

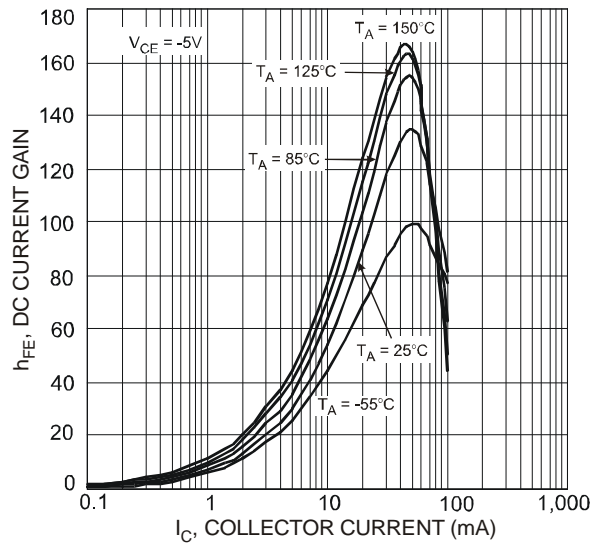


Fig. 13 Typical DC Current Gain

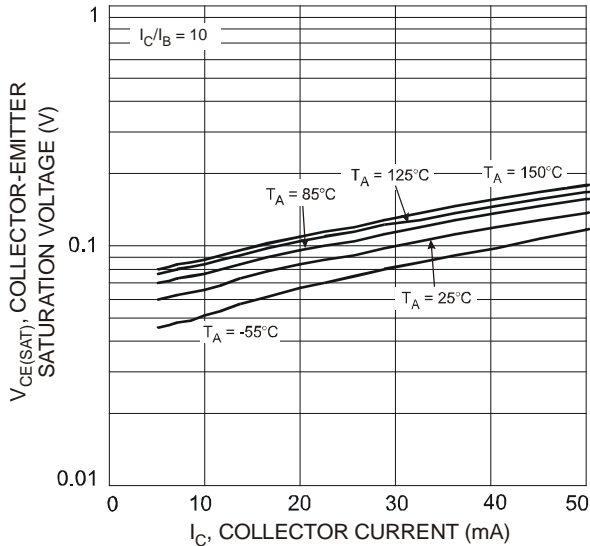


Fig. 14 Typical  $V_{CE(SAT)}$  vs.  $I_C$

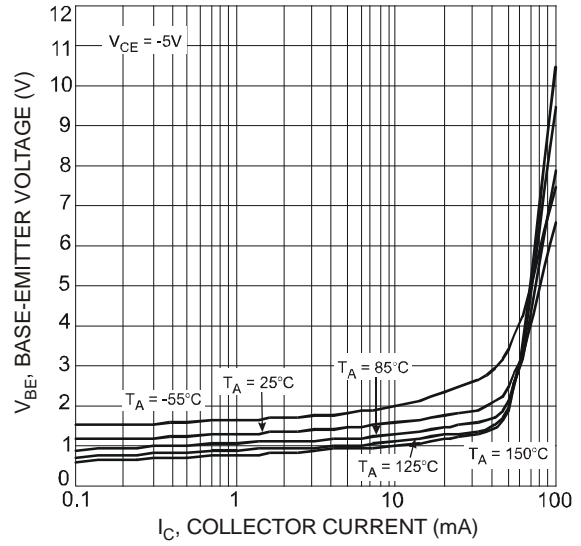


Fig. 15 Typical  $V_{BE}$  vs.  $I_C$

**Typical Curves – DCX143EU PNP Section (Continued)**

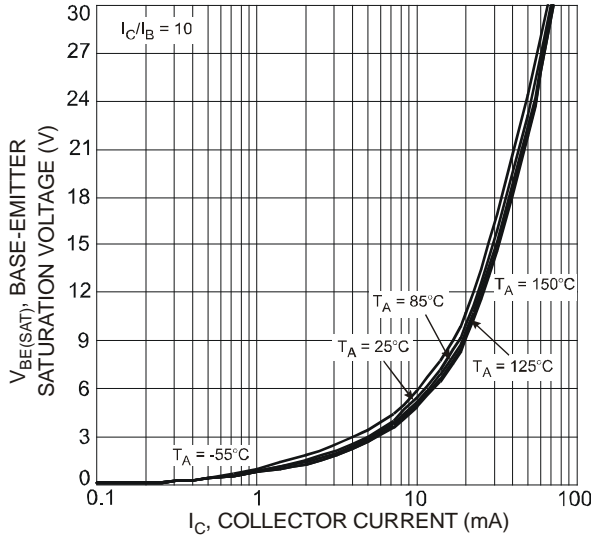


Fig. 16 Typical  $V_{BE(SAT)}$  vs.  $I_C$

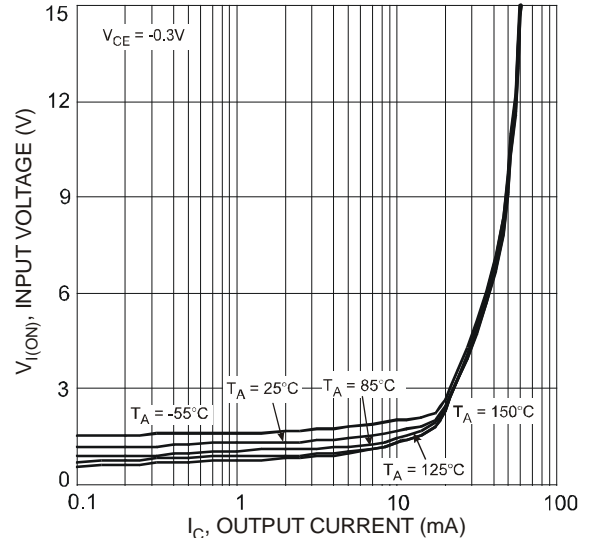


Fig. 17 Typical  $V_{I(ON)}$  vs.  $I_C$

**Typical Curves – DCX143EU NPN Section**

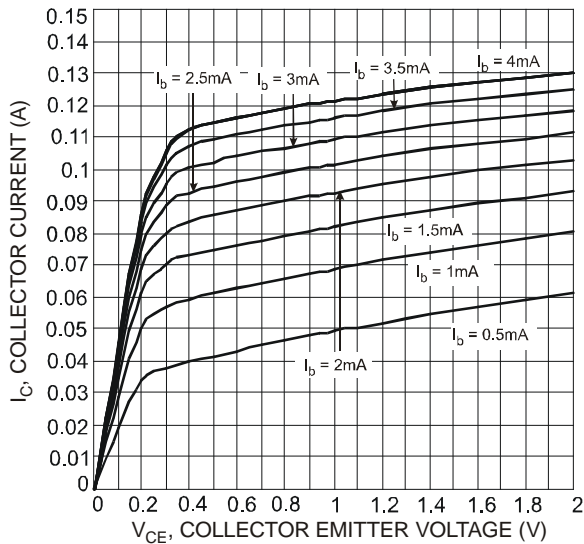


Fig. 18 Typical  $V_{CE}$  vs.  $I_C$

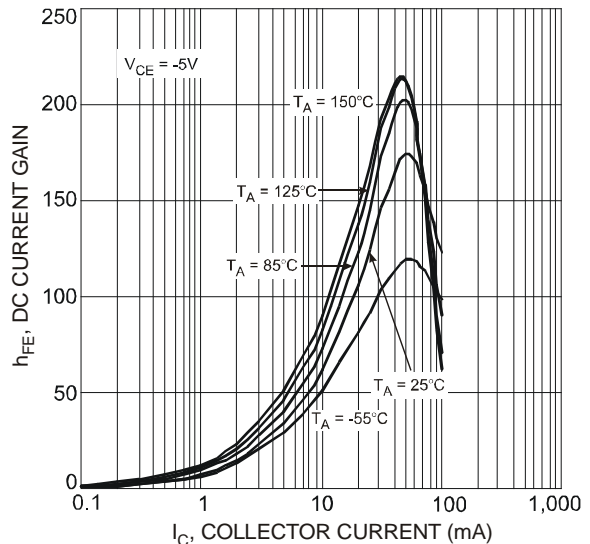


Fig. 19 Typical DC Current Gain

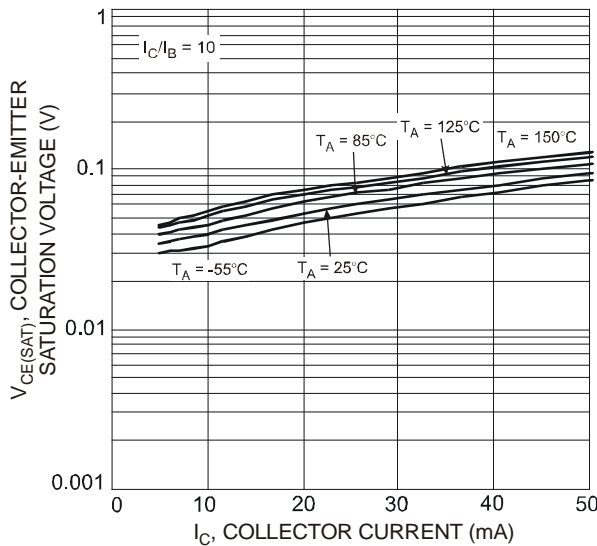


Fig. 20 Typical  $V_{CE(SAT)}$  vs.  $I_C$

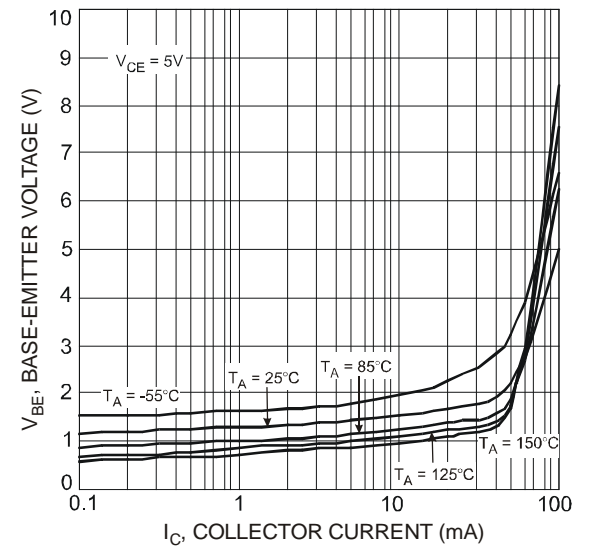


Fig. 21 Typical  $V_{BE}$  vs.  $I_C$



**Typical Curves – DCX143EU NPN Section (Continued)**

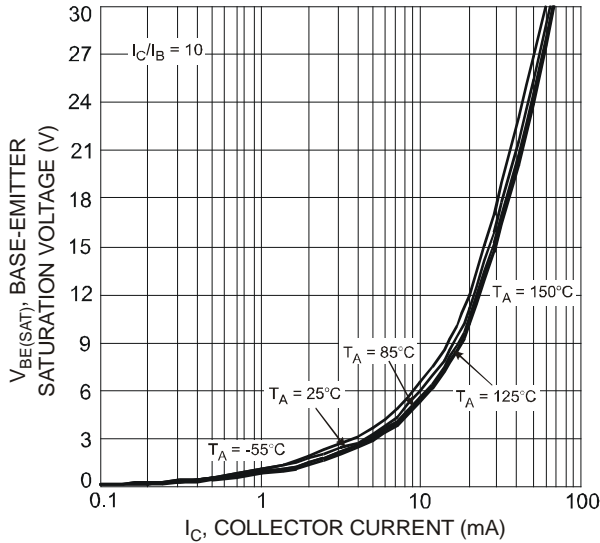


Fig. 22 Typical  $V_{BE(SAT)}$  vs.  $I_C$

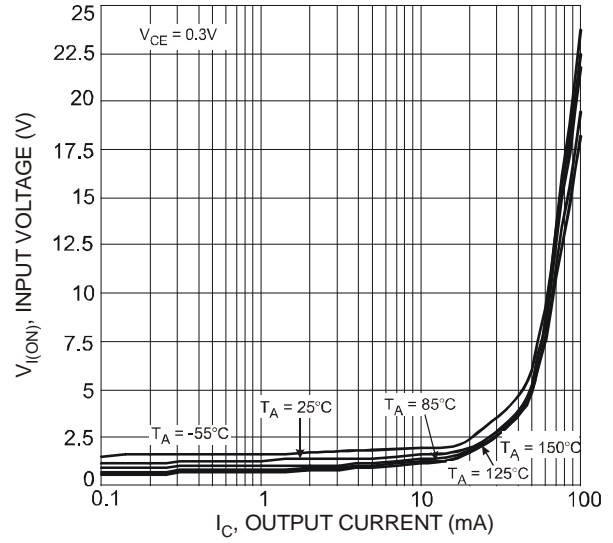


Fig. 23 Typical  $V_{I(ON)}$  vs.  $I_C$

**Typical Curves – DCX114TU PNP Section**

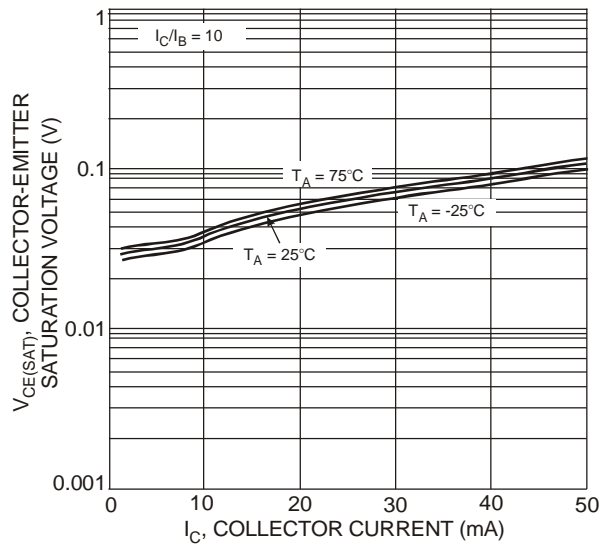


Fig. 24 Typical  $V_{CE(SAT)}$  vs.  $I_C$

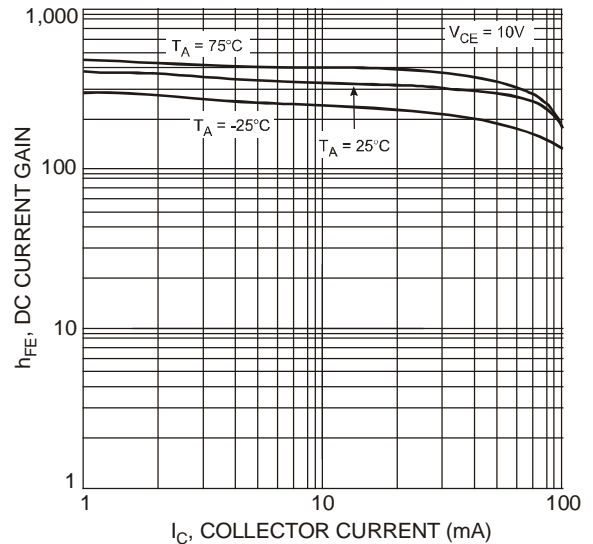


Fig. 25 Typical DC Current Gain

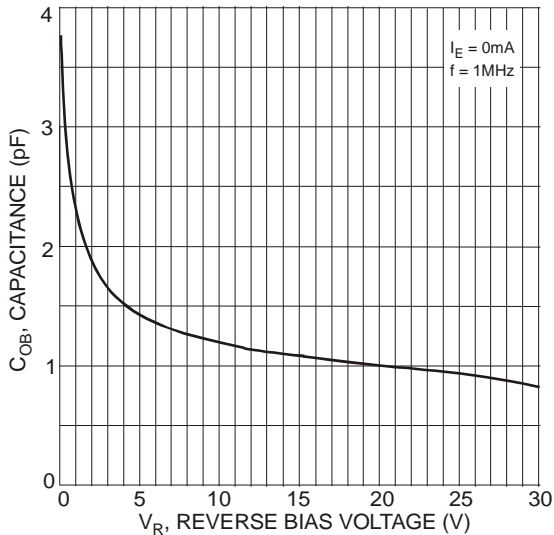


Fig. 26 Typical Output Capacitance

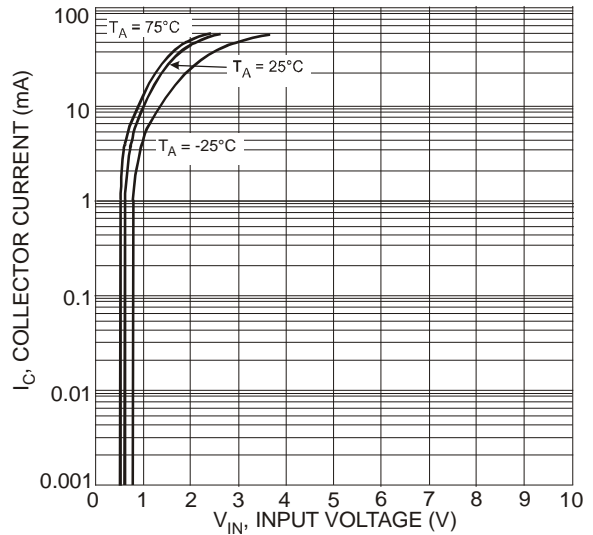


Fig. 27 Typical Collector Current vs. Input Voltage

**Typical Curves – DCX114TU PNP Section (Continued)**

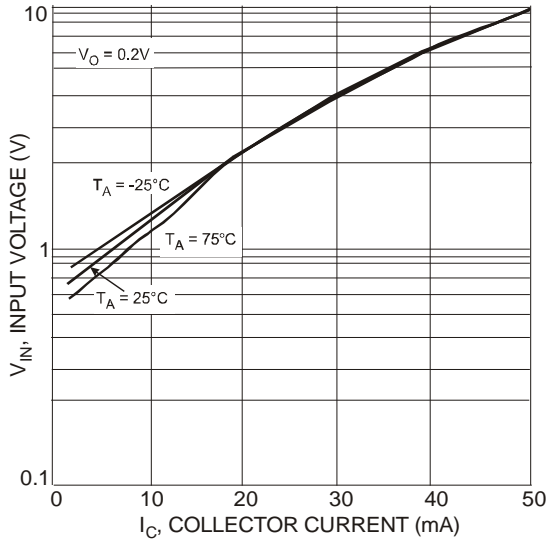


Fig. 28 Typical Input Voltage vs. Collector Current

**Typical Curves – DCX114TU NPN Section**

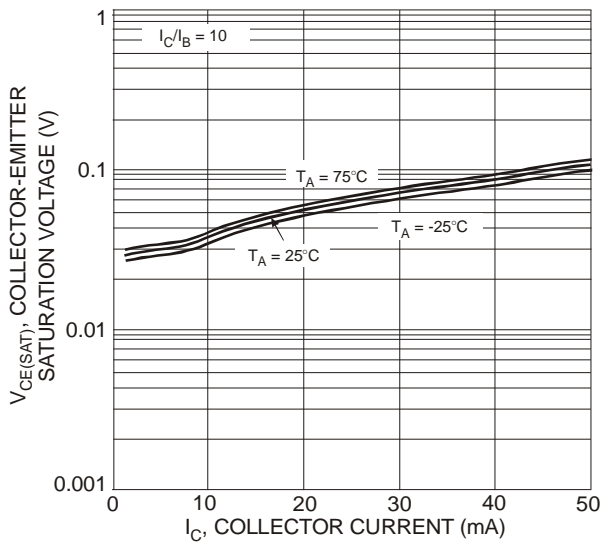


Fig. 29 Typical  $V_{CE(SAT)}$  vs.  $I_C$

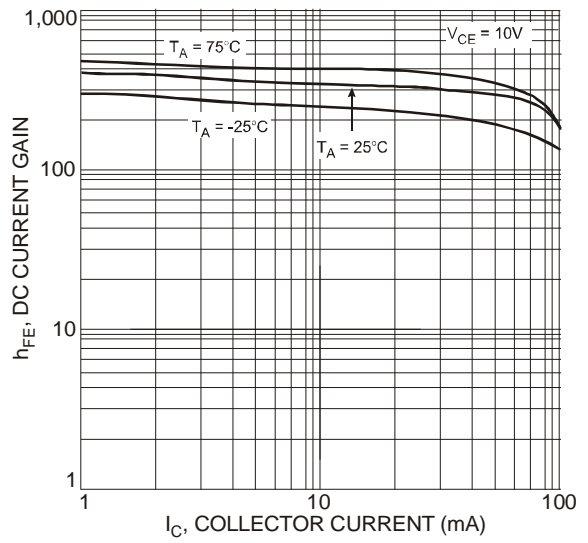


Fig. 30 Typical DC Current Gain

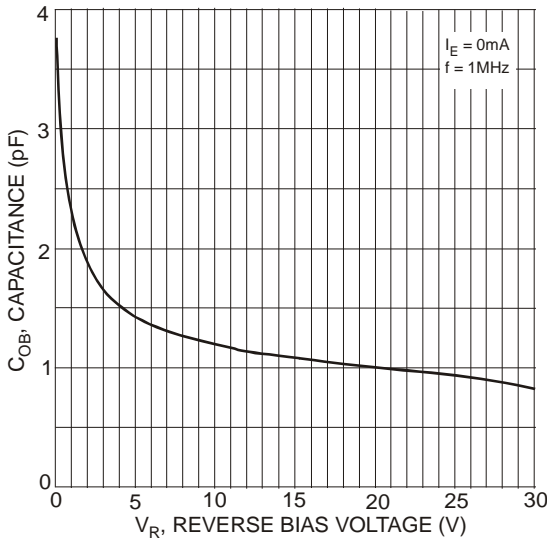


Fig. 31 Typical Output Capacitance

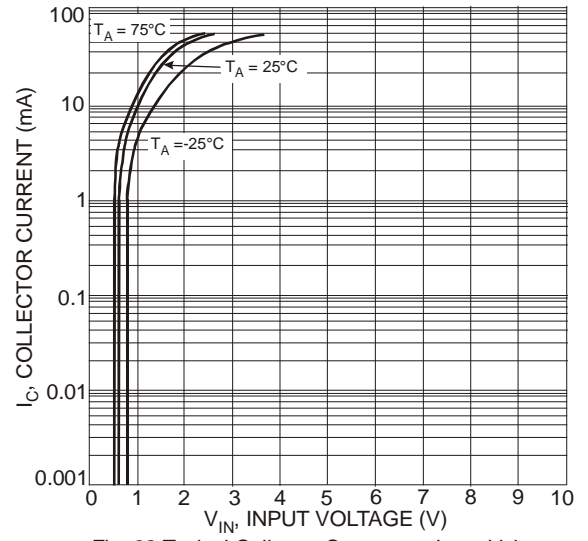


Fig. 32 Typical Collector Current vs. Input Voltage

## Typical Curves – DCX114TU NPN Section (Continued)

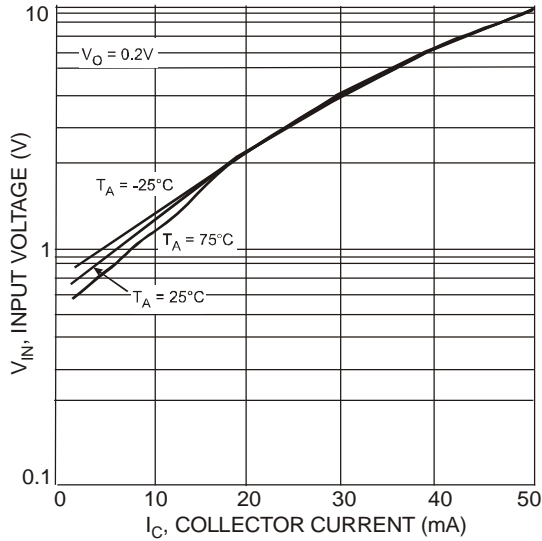


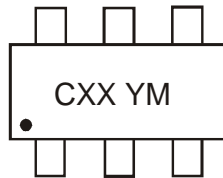
Fig. 33 Typical Input Voltage vs. Collector Current

## Ordering Information (Note 6)

Device	Packaging	Shipping
DCX124EU-7-F	SOT-363	3000/Tape & Reel
DCX144EU-7-F	SOT-363	3000/Tape & Reel
DCX114YU-7-F	SOT-363	3000/Tape & Reel
DCX123JU-7-F	SOT-363	3000/Tape & Reel
DCX114EU-7-F	SOT-363	3000/Tape & Reel
DCX143TU-7-F	SOT-363	3000/Tape & Reel
DCX143EU-7-F	SOT-363	3000/Tape & Reel
DCX114TU-7-F	SOT-363	3000/Tape & Reel

Notes: 6. For packaging details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

## Marking Information



CXX = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year ex: T = 2006  
 M = Month ex: 9 = September

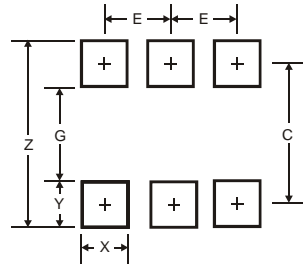
### Date Code Key

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Code	T	U	V	W	X	Y	Z	A	B	C

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

## Suggested Pad Layout



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

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