

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

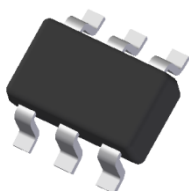
- Epitaxial Planar Die Construction
- Built-In Biasing Resistors
- Surface Mount Package Suited for Automated Assembly
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

Part Number	R1(NOM)	R2(NOM)
DCX124EU	22kΩ	22kΩ
DCX144EU	47kΩ	47kΩ
DCX114YU	10kΩ	47kΩ
DCX123JU	2.2kΩ	47kΩ
DCX114EU	10kΩ	10kΩ
DCX143EU	4.7kΩ	4.7kΩ
DCX143ZU	4.7kΩ	47kΩ
DCX115EU	100kΩ	100kΩ

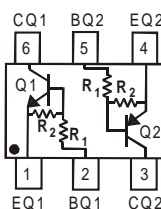
**Mechanical Data**

- 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)

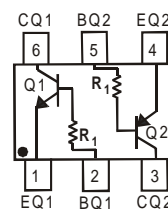
Part Number	R1 Only
DCX143TU	4.7kΩ
DCX114TU	10kΩ

**SOT363**


Top View



R1, R2



R1 Only

Device Schematic

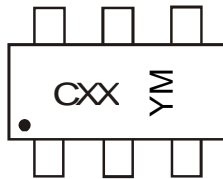
**Ordering Information** (Notes 4 & 5)

Product	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
DCX124EU-7-F	AEC-Q101	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	AEC-Q101	C20	7	8	3,000
DCX144EU-7R-F	AEC-Q101	C20	7	8	3,000
DCX144EUQ-7-F	Automotive	C20	7	8	3,000
DCX114YU-7-F	AEC-Q101	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	AEC-Q101	C06	7	8	3,000
DCX123JUQ-7-F	Automotive	C06	7	8	3,000
DCX114EU-7-F	AEC-Q101	C13	7	8	3,000
DCX114EU-13R-F	AEC-Q101	C13	13	8	10,000
DCX114EUQ-7-F	Automotive	C13	7	8	3,000
DCX114EUQ-13-F	Automotive	C13	13	8	10,000
DCX114EUQ-13R-F	Automotive	C13	13	8	10,000
DCX143TU-7-F	AEC-Q101	C07	7	8	3,000
DCX143EU-7-F	AEC-Q101	C08	7	8	3,000
DCX114TU-7-F	AEC-Q101	C12	7	8	3,000
DCX143ZU-7-F	AEC-Q101	C02	7	8	3,000
DCX115EU-7-F	AEC-Q101	C01	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. -7R and -13R are parts rotated in the pocket tape by +180°. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information

### SOT363



CXX = Product Type Marking Code  
YM = Date Code Marking  
Y = Year (ex: D = 2016)  
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 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>	-10 to +40 -10 to +40 -6 to +40 -5 to +12 -10 to +40 -5V Max -10 to +30 -5V Max -10 to +30 -10 to +40	V
Output Current	I <sub>O</sub>	30 30 70 100 50 100 100 100 100 20	mA
Output Current	I <sub>C</sub> (Max)	100	mA

### Absolute 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)>	DCX124EU	V <sub>IN</sub>	+10 to -40	V
	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	
	DCX143ZU		+5 to -30	
	DCX115EU		+10 to -40	
Output Current	DCX124EU	I <sub>O</sub>	-30	mA
	DCX144EU		-30	
	DCX114YU		-70	
	DCX123JU		-100	
	DCX114EU		-50	
	DCX143TU		-100	
	DCX143EU		-100	
	DCX114TU		-100	
	DCX143ZU		-100	
	DCX115EU		-20	
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 (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.

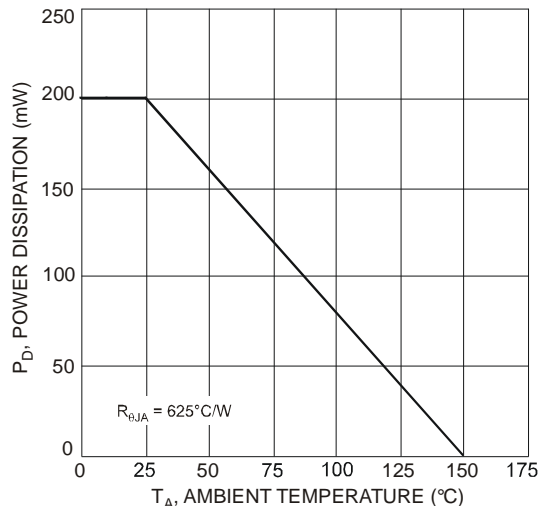
# Electrical Characteristics NPN Section (@T<sub>A</sub> = +25°C, unless otherwise specified.)

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	V <sub>I(OFF)</sub>	0.5	1.1	—	V <sub>CC</sub> = 5V, I <sub>O</sub> = 100μA
	DCX144EU		0.5	1.1		
	DCX114YU		0.3	—		
	DCX123JU		0.5	—		
	DCX114EU		0.5	1.1		
	DCX143EU		0.5	1.16		
	DCX143ZU		0.5	—		
	DCX115EU		0.5	—		
	DCX124EU	V <sub>I(ON)</sub>	—	1.9	3.0	V <sub>O</sub> = 0.3V, I <sub>O</sub> = 5mA
	DCX144EU			1.9	3.0	V <sub>O</sub> = 0.3V, I <sub>O</sub> = 2mA
	DCX114YU			—	1.4	V <sub>O</sub> = 0.3V, I <sub>O</sub> = 1mA
	DCX123JU			—	1.1	V <sub>O</sub> = 0.3V, I <sub>O</sub> = 5mA
	DCX114EU			1.9	3.0	V <sub>O</sub> = 0.3V, I <sub>O</sub> = 10mA
	DCX143EU			1.99	3.0	V <sub>O</sub> = 0.3V, I <sub>O</sub> = 20mA
	DCX143ZU			—	1.3	V <sub>O</sub> = 0.3V, I <sub>O</sub> = 5mA
	DCX115EU			—	3	V <sub>O</sub> = 0.3V, I <sub>O</sub> = 1mA
Output Voltage	DCX124EU	V <sub>O(ON)</sub>	—	0.1	0.3	I <sub>O</sub> /I <sub>I</sub> = 10mA / 0.5mA
	DCX144EU					I <sub>O</sub> /I <sub>I</sub> = 10mA / 0.5mA
	DCX114YU					I <sub>O</sub> /I <sub>I</sub> = 5mA / 0.25mA
	DCX123JU					I <sub>O</sub> /I <sub>I</sub> = 5mA / 0.25mA
	DCX114EU					I <sub>O</sub> /I <sub>I</sub> = 10mA / 0.5mA
	DCX143EU					I <sub>O</sub> /I <sub>I</sub> = 10mA / 0.5mA
	DCX143ZU					I <sub>O</sub> /I <sub>I</sub> = 5mA / 0.25mA
	DCX115EU					I <sub>O</sub> /I <sub>I</sub> = 10mA / 0.5mA
Input Current	DCX124EU	I <sub>I</sub>	—	—	0.36	V <sub>I</sub> = 5V
	DCX144EU					
	DCX114YU					
	DCX123JU					
	DCX114EU					
	DCX143EU					
	DCX143ZU					
	DCX115EU					
Output Current	I <sub>O(OFF)</sub>	—	—	0.5	μA	V <sub>CC</sub> = 50V, V <sub>I</sub> = 0V
DC Current Gain	DCX124EU	G <sub>I</sub>	—	—	—	V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA
	DCX124EUQ					V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA
	DCX144EU					V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA
	DCX114YU					V <sub>O</sub> = 5V, I <sub>O</sub> = 10mA
	DCX114YUQ					V <sub>O</sub> = 5V, I <sub>O</sub> = 10mA
	DCX123JU					V <sub>O</sub> = 5V, I <sub>O</sub> = 10mA
	DCX114EU					V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA
	DCX143EU					V <sub>O</sub> = 5V, I <sub>O</sub> = 10mA
	DCX143ZU					V <sub>O</sub> = 5V, I <sub>O</sub> = 10mA
	DCX115EU					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	ΔR <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

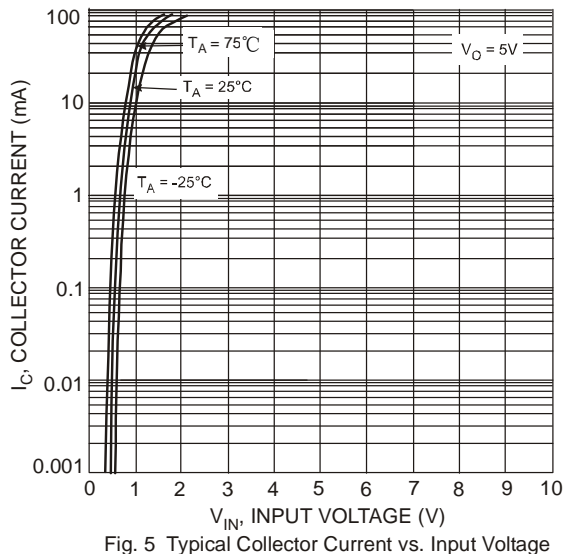
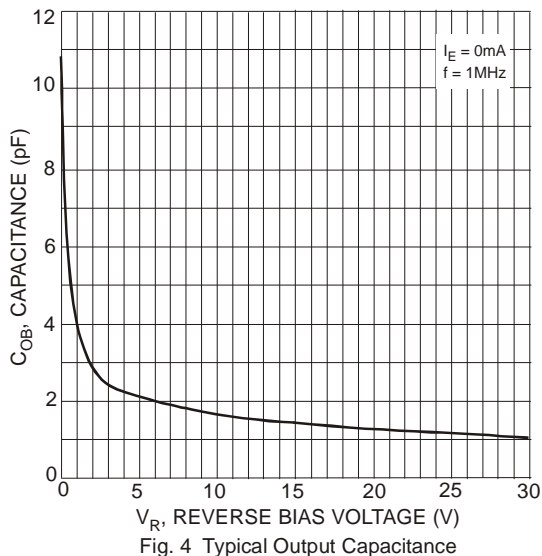
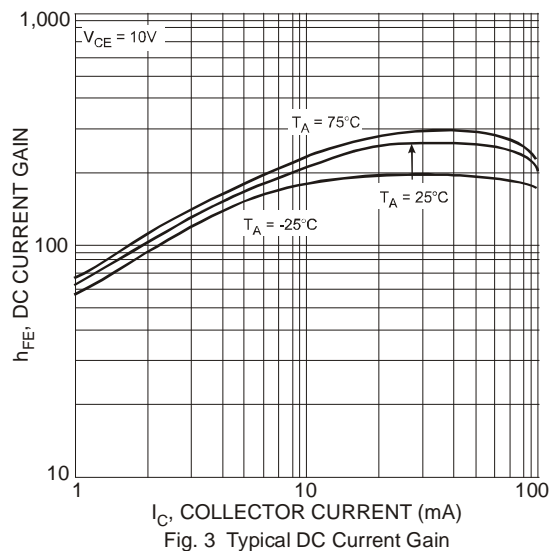
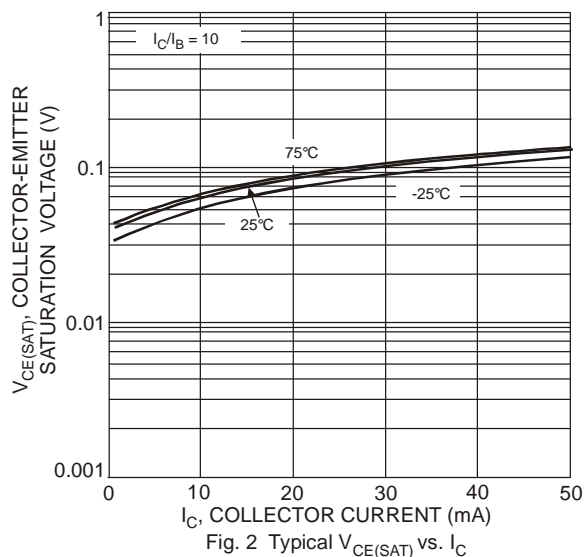
# Electrical Characteristics PNP Section (@T<sub>A</sub> = +25°C, unless otherwise specified.)

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	V <sub>I(OFF)</sub>	-0.5	-1.1	—	V	V <sub>CC</sub> = -5V, I <sub>O</sub> = -100μA
	DCX144EU		-0.5	-1.1			
	DCX114YU		-0.3	—			
	DCX123JU		-0.5	—			
	DCX114EU		-0.5	-1.1			
	DCX143EU		-0.5	-1.16			
	DCX143ZU		-0.5	—			
	DCX115EU		-0.5	—			
	DCX124EU	V <sub>I(ON)</sub>	—	-1.9	-3.0		V <sub>O</sub> = -0.3V, I <sub>O</sub> = -5mA
	DCX144EU		—	-1.9	-3.0		V <sub>O</sub> = -0.3V, I <sub>O</sub> = -2mA
	DCX114YU		—	—	-1.4		V <sub>O</sub> = -0.3V, I <sub>O</sub> = -1mA
	DCX123JU		—	—	-1.1		V <sub>O</sub> = -0.3V, I <sub>O</sub> = -5mA
	DCX114EU		—	-1.9	-3.0		V <sub>O</sub> = -0.3V, I <sub>O</sub> = -10mA
	DCX143EU		—	-2.5	-3.0		V <sub>O</sub> = -0.3V, I <sub>O</sub> = -20mA
	DCX143ZU		—	—	-1.3		V <sub>O</sub> = -0.3V, I <sub>O</sub> = -5mA
	DCX115EU		—	—	-3		V <sub>O</sub> = -0.3V, I <sub>O</sub> = -1mA
Output Voltage	DCX124EU	V <sub>O(ON)</sub>	—	-0.1	-0.3	V	I <sub>O</sub> /I <sub>I</sub> = -10mA / -0.5mA
	DCX144EU						I <sub>O</sub> /I <sub>I</sub> = -10mA / -0.5mA
	DCX114YU						I <sub>O</sub> /I <sub>I</sub> = -5mA / -0.25mA
	DCX123JU						I <sub>O</sub> /I <sub>I</sub> = -5mA / -0.25mA
	DCX114EU						I <sub>O</sub> /I <sub>I</sub> = -10mA / -0.5mA
	DCX143EU						I <sub>O</sub> /I <sub>I</sub> = -10mA / -0.5mA
	DCX143ZU						I <sub>O</sub> /I <sub>I</sub> = -5mA / -0.25mA
	DCX115EU						I <sub>O</sub> /I <sub>I</sub> = -10mA / -0.5mA
Input Current	DCX124EU	I <sub>I</sub>	—	—	-0.36	mA	V <sub>I</sub> = -5V
	DCX144EU				-0.18		
	DCX114YU				-0.88		
	DCX123JU				-3.6		
	DCX114EU				-0.88		
	DCX143EU				-0.88		
	DCX143ZU				-1.8		
	DCX115EU				-0.15		
Output Current		I <sub>O(OFF)</sub>	—	—	-0.5	μA	V <sub>CC</sub> = 50V, V <sub>I</sub> = 0V
DC Current Gain	DCX124EU	G <sub>I</sub>	56	—	—	—	V <sub>O</sub> = -5V, I <sub>O</sub> = -5mA
	DCX124EUQ		60				V <sub>O</sub> = -5V, I <sub>O</sub> = -5mA
	DCX144EU		68				V <sub>O</sub> = -5V, I <sub>O</sub> = -5mA
	DCX114YU		68				V <sub>O</sub> = -5V, I <sub>O</sub> = -10mA
	DCX114YUQ		80				V <sub>O</sub> = -5V, I <sub>O</sub> = -10mA
	DCX123JU		80				V <sub>O</sub> = -5V, I <sub>O</sub> = -10mA
	DCX114EU		30				V <sub>O</sub> = -5V, I <sub>O</sub> = -5mA
	DCX143EU		40				V <sub>O</sub> = -5V, I <sub>O</sub> = -10mA
	DCX143ZU		80				V <sub>O</sub> = -5V, I <sub>O</sub> = -10mA
	DCX115EU		82				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		ΔR <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 – Total Device



## Typical Curves – DCX123JU PNP Section (@T<sub>A</sub> = +25°C, unless otherwise specified.)



## Typical Curves – DCX123JU PNP Section (Cont.)

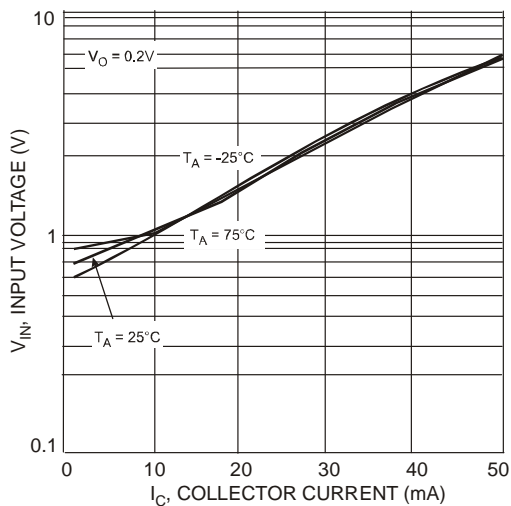


Fig. 6 Typical Input Voltage vs. Collector Current

## Typical Curves – DCX123JU NPN Section (@ $T_A = +25^\circ C$ , unless otherwise specified.)

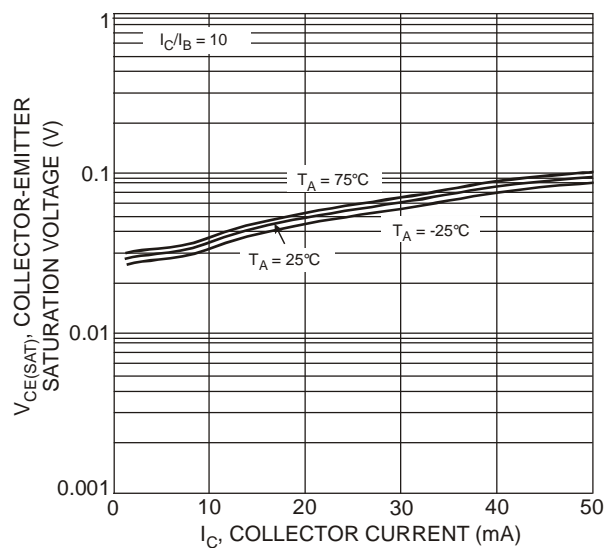


Fig. 7 Typical  $V_{CE(SAT)}$  vs.  $I_C$

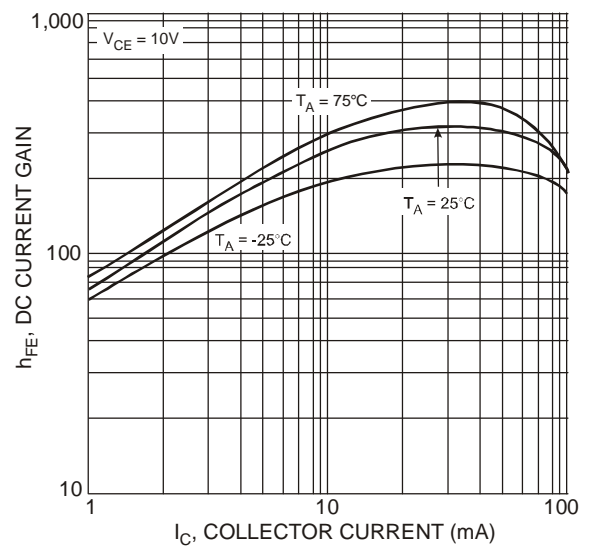


Fig. 8 Typical DC Current Gain

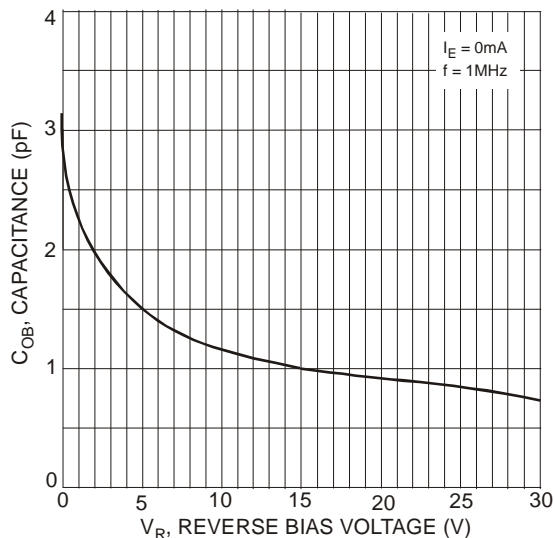


Fig. 9 Typical Output Capacitance

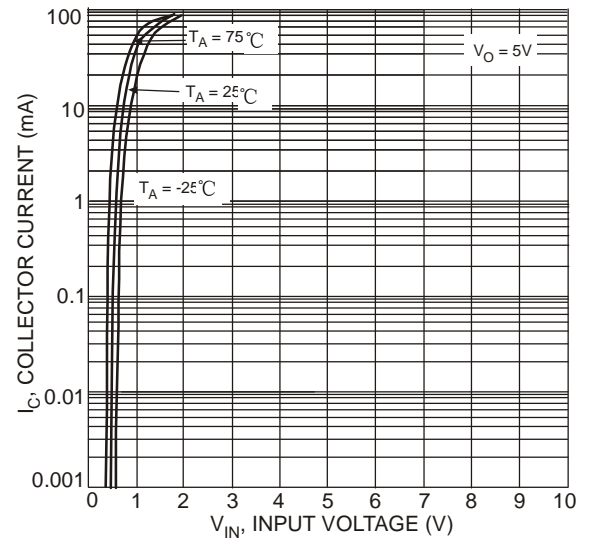
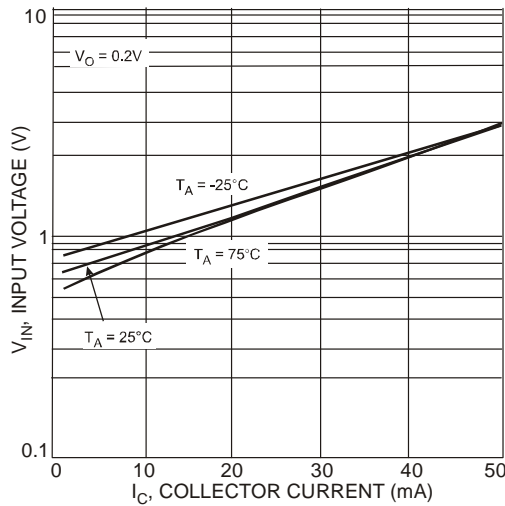
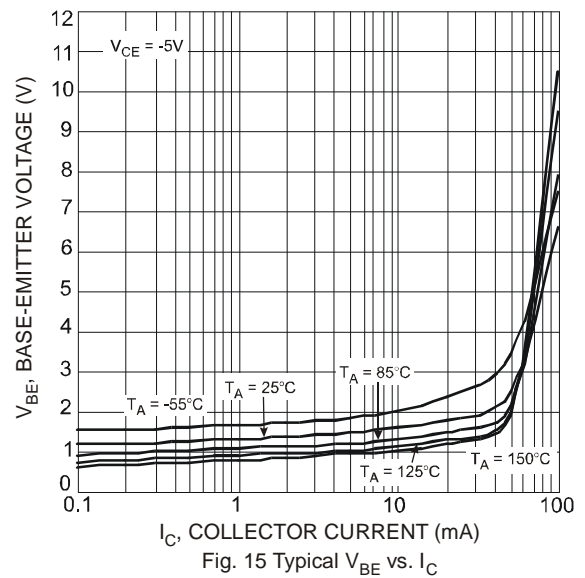
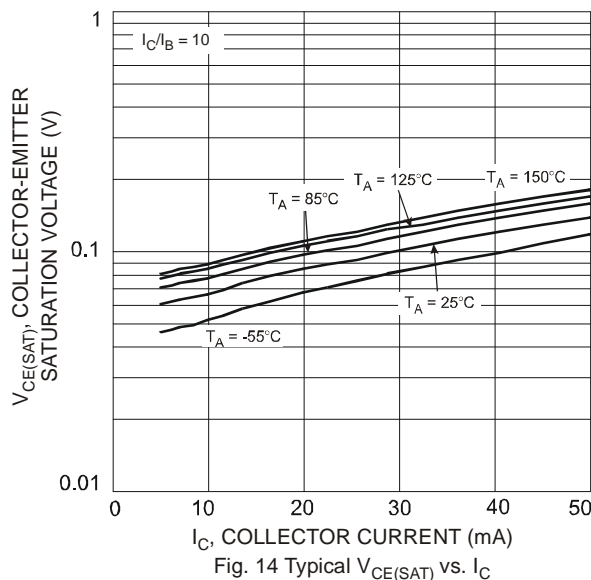
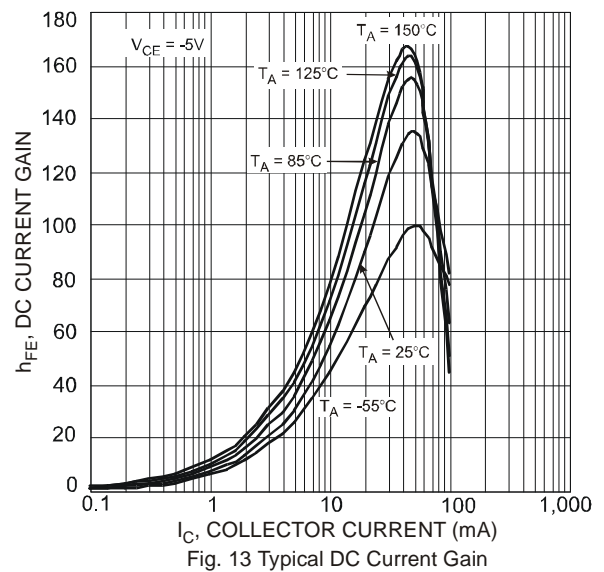
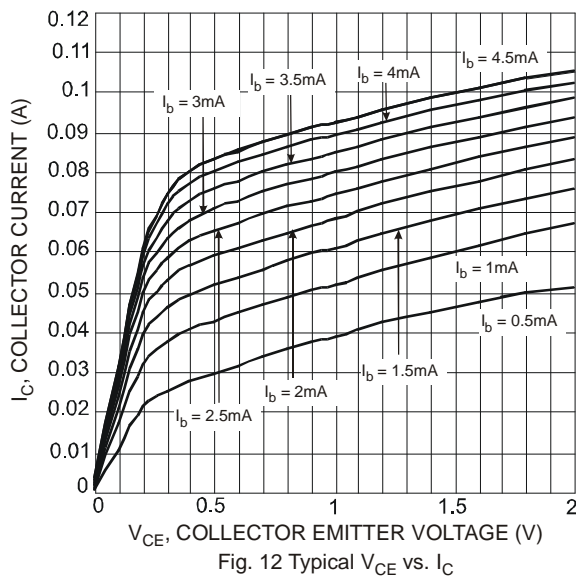


Fig. 10 Typical Collector Current vs. Input Voltage

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



**Typical Curves – DCX143EU PNP Section (@T<sub>A</sub> = +25°C, unless otherwise specified.)**





# Typical Curves – DCX143EU PNP Section (Cont.)

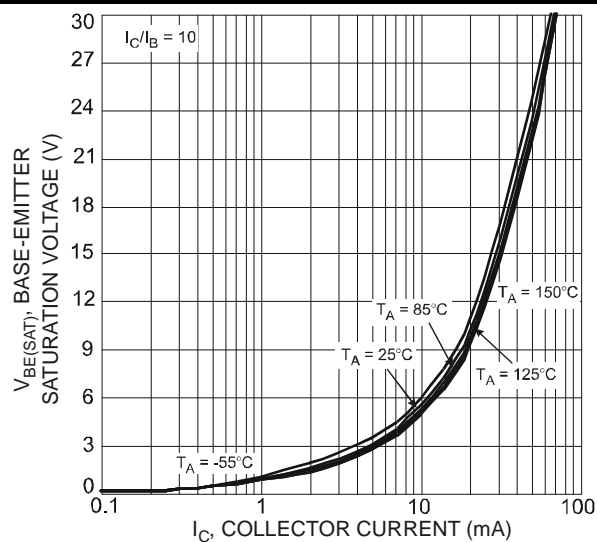


Fig. 16 Typical  $V_{BE(SAT)}$  vs.  $I_C$

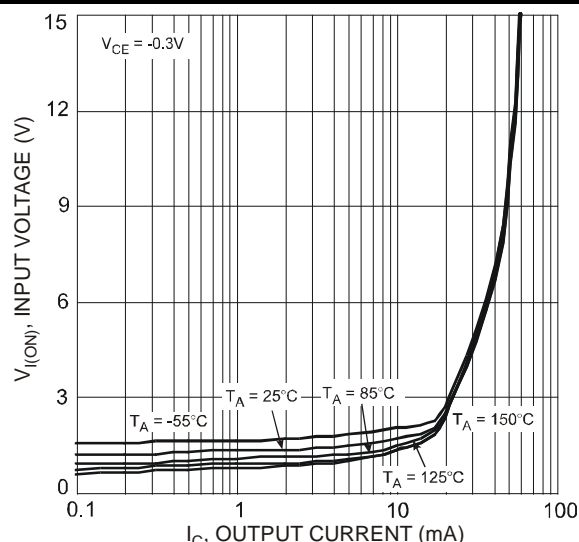


Fig. 17 Typical  $V_{I(ON)}$  vs.  $I_C$

# Typical Curves – DCX143EU NPN Section (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

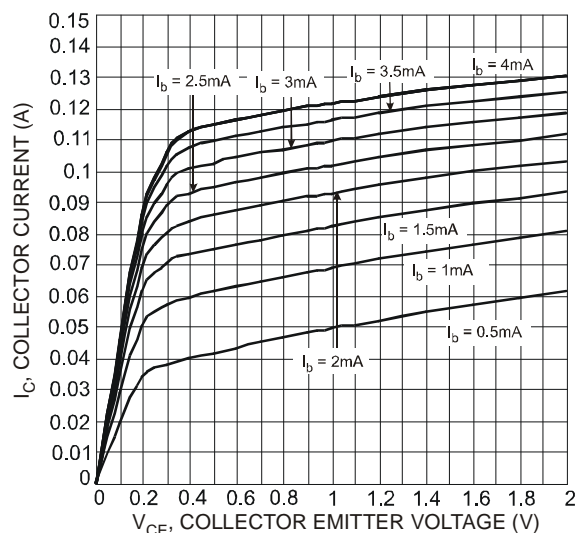


Fig. 18 Typical  $V_{CE}$  vs.  $I_C$

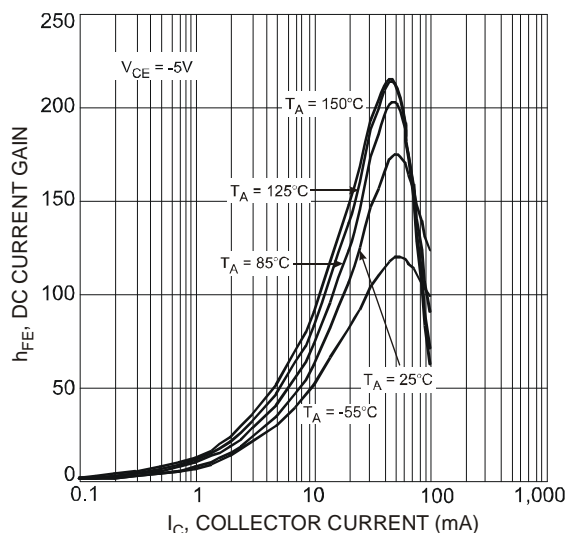


Fig. 19 Typical DC Current Gain

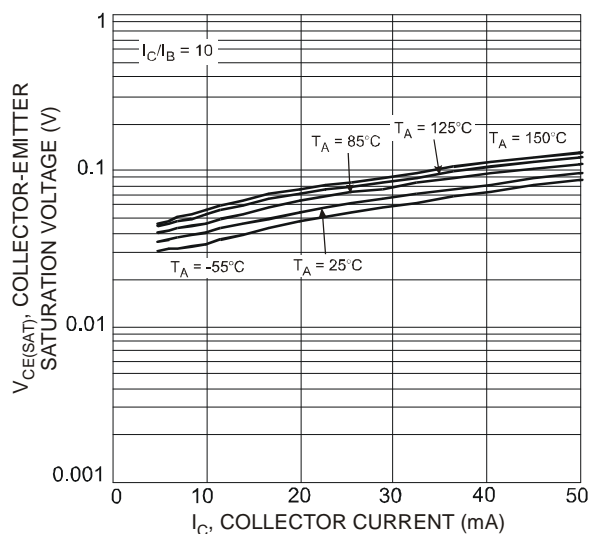


Fig. 20 Typical  $V_{CE(SAT)}$  vs.  $I_C$

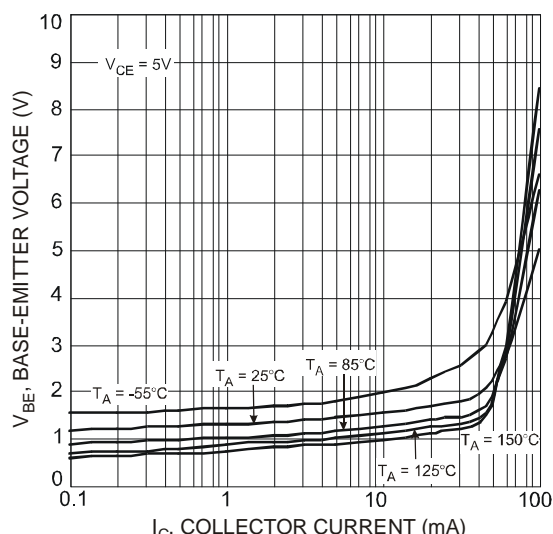
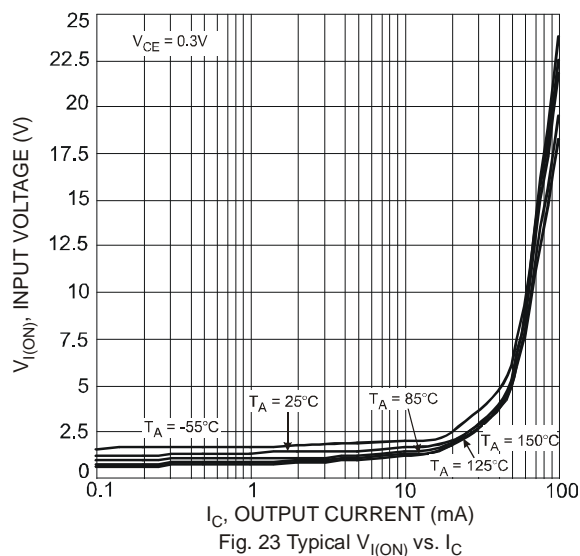
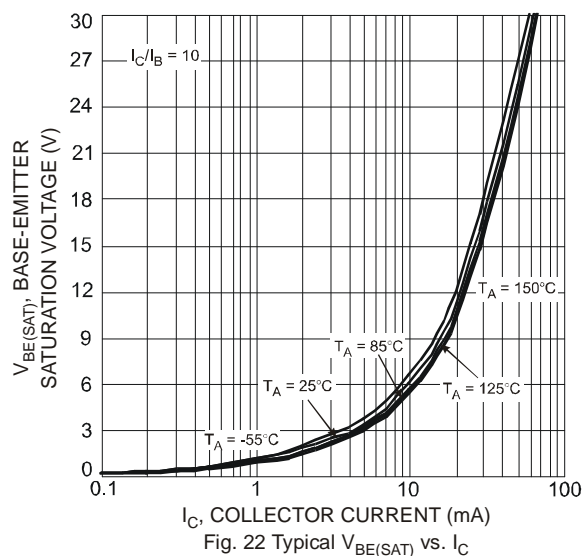
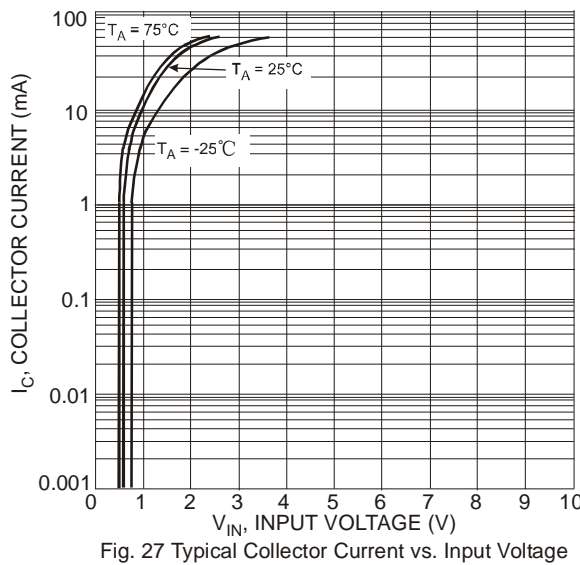
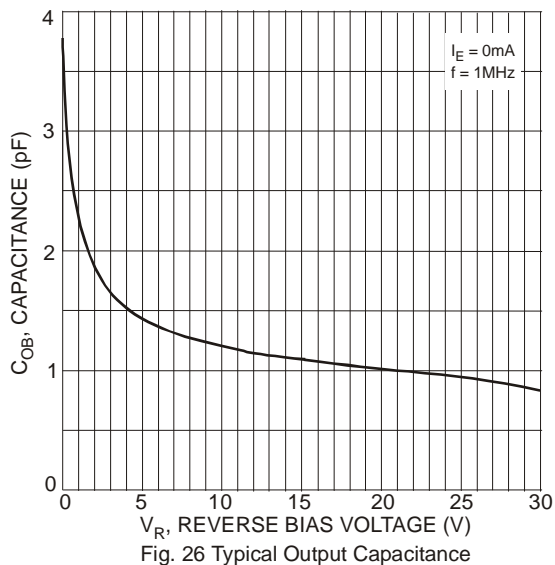
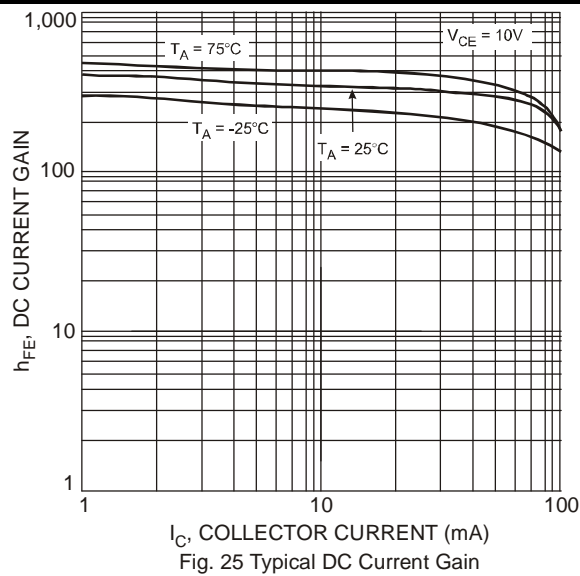
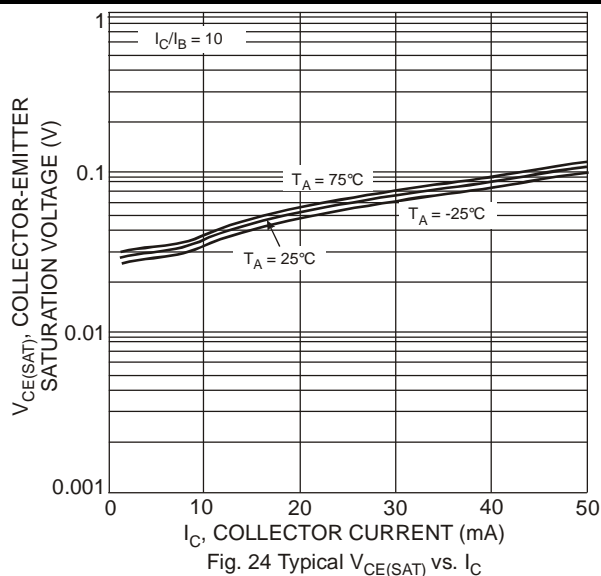


Fig. 21 Typical  $V_{BE}$  vs.  $I_C$

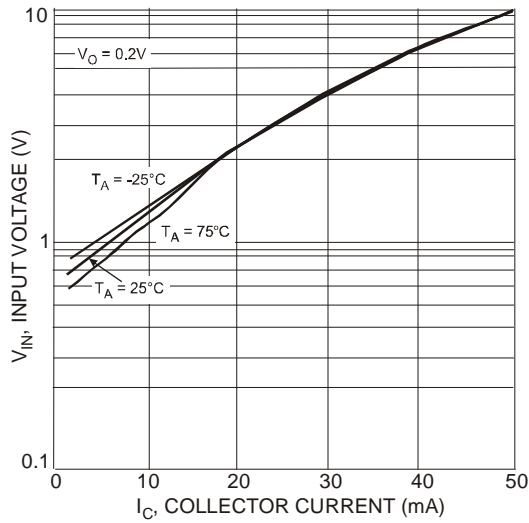
# Typical Curves – DCX143EU NPN Section (Cont.)



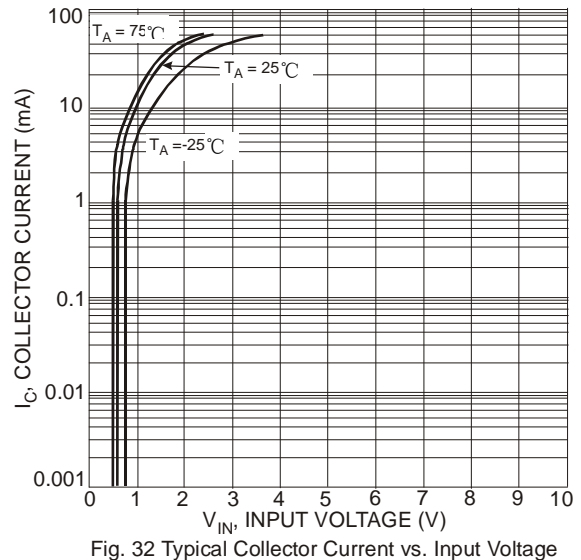
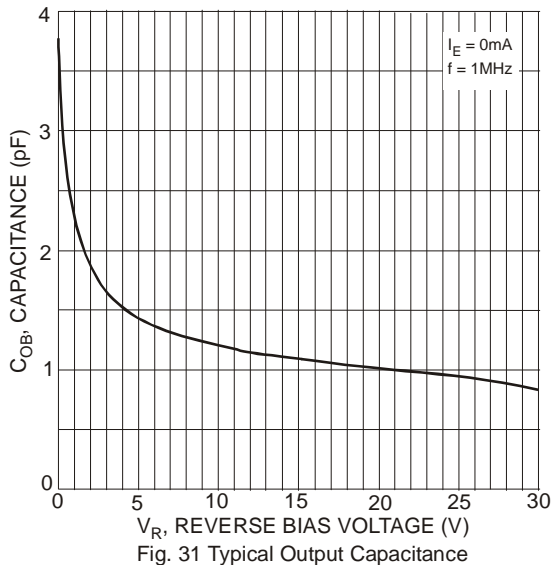
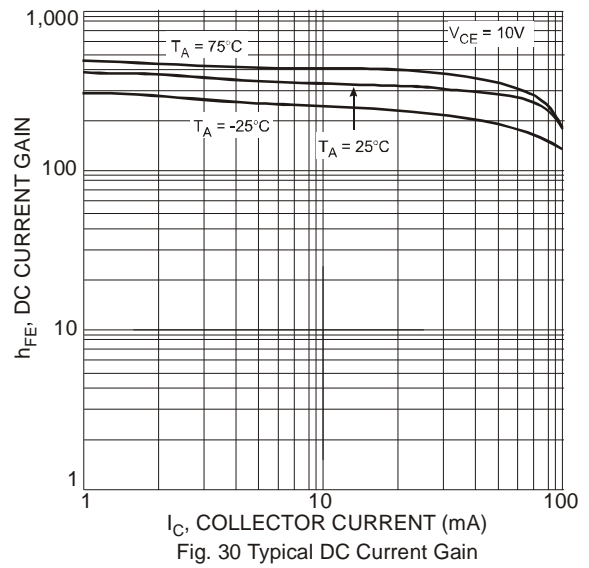
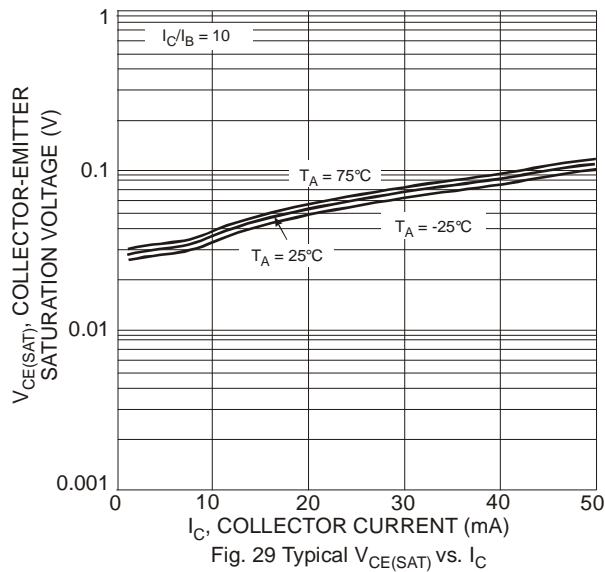
# Typical Curves – DCX114TU PNP Section (@T<sub>A</sub> = +25°C, unless otherwise specified.)



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



**Typical Curves – DCX114TU NPN Section (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)**



## Typical Curves – DCX114TU NPN Section (Cont.)

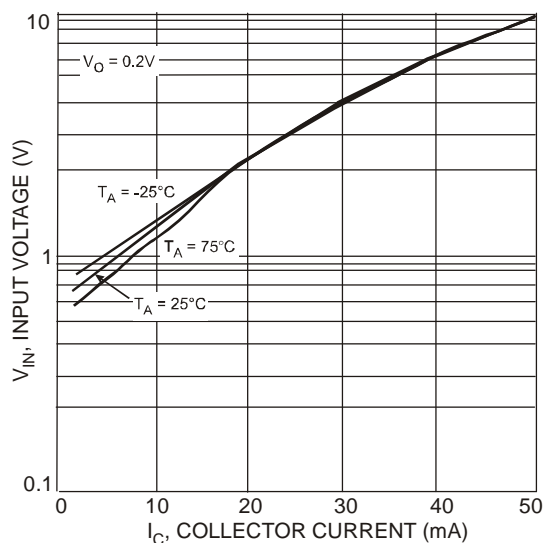
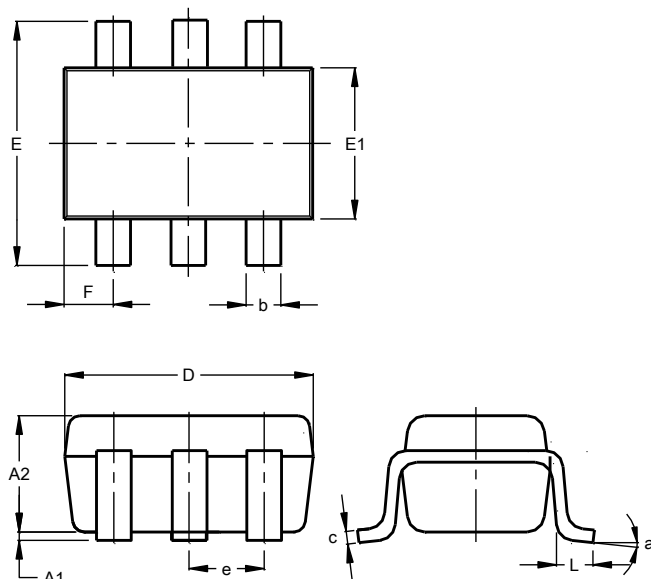


Fig. 33 Typical Input Voltage vs. Collector Current

## Package Outline Dimensions

Please see AP02001 at [http://www.diodes.com/\\_files/datasheets/ap02001.pdf](http://www.diodes.com/_files/datasheets/ap02001.pdf) for the latest version.

### SOT363

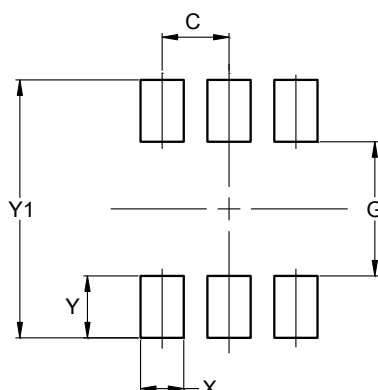


SOT363			
Dim	Min	Max	Typ
A1	0.00	0.10	0.05
A2	0.90	1.00	1.00
b	0.10	0.30	0.25
c	0.10	0.22	0.11
D	1.80	2.20	2.15
E	2.00	2.20	2.10
E1	1.15	1.35	1.30
e	0.650 BSC		
F	0.40	0.45	0.425
L	0.25	0.40	0.30
a	8°		
All Dimensions in mm			

## Suggested Pad Layout

Please see AP02001 at [http://www.diodes.com/\\_files/datasheets/ap02001.pdf](http://www.diodes.com/_files/datasheets/ap02001.pdf) for the latest version.

### SOT363



Dimensions	Value (in mm)
C	0.650
G	1.300
X	0.420
Y	0.600
Y1	2.500

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