

**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 $\Omega$

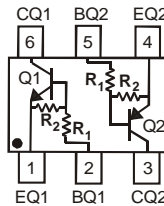
**Mechanical Data**

- 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	3.0 3.0 1.4 1.1 3.0 3.0		
Output Voltage	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU	V <sub>O(on)</sub>	—	0.1	0.3	V	I <sub>O</sub> /I <sub>I</sub> = 10mA / 0.5mA I <sub>O</sub> /I <sub>I</sub> = 10mA / 0.5mA I <sub>O</sub> /I <sub>I</sub> = 5mA / 0.25mA I <sub>O</sub> /I <sub>I</sub> = 5mA / 0.25mA I <sub>O</sub> /I <sub>I</sub> = 10mA / 0.5mA I <sub>O</sub> /I <sub>I</sub> = 10mA / 0.5mA
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<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 <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 -2.5	-3.0 -3.0 -1.4 -1.1 -3.0 -3.0	V	V <sub>O</sub> = -0.3, I <sub>O</sub> = -5mA V <sub>O</sub> = -0.3, I <sub>O</sub> = -2mA V <sub>O</sub> = -0.3, I <sub>O</sub> = -1mA V <sub>O</sub> = -0.3, I <sub>O</sub> = -5mA V <sub>O</sub> = -0.3, I <sub>O</sub> = -10mA V <sub>O</sub> = -0.3, I <sub>O</sub> = -20mA
Output Voltage	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU	V <sub>O(on)</sub>	—	-0.1	-0.3	V	I <sub>O</sub> /I <sub>I</sub> = -10mA / -0.5mA I <sub>O</sub> /I <sub>I</sub> = -10mA / -0.5mA I <sub>O</sub> /I <sub>I</sub> = -5mA / -0.25mA I <sub>O</sub> /I <sub>I</sub> = -5mA / -0.25mA I <sub>O</sub> /I <sub>I</sub> = -10mA / -0.5mA I <sub>O</sub> /I <sub>I</sub> = -10mA / -0.5mA
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 40	—	—	—	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

**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.)**

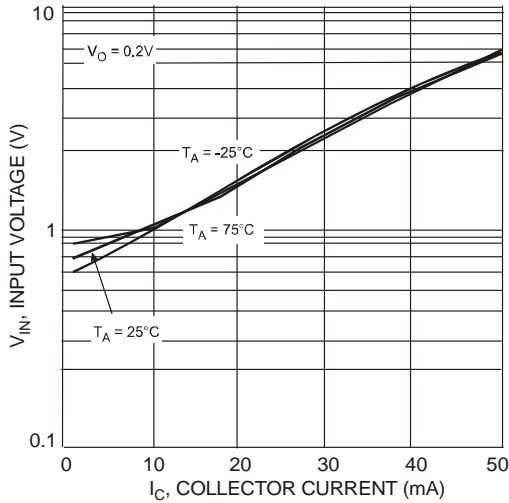


Fig. 6 Typical Input Voltage vs. Collector Current

**Typical Curves – DCX123JU NPN Section**



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



Fig. 8 Typical DC Current Gain

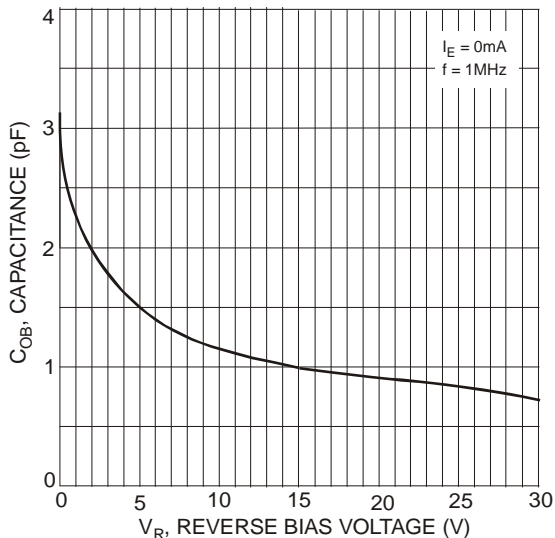


Fig. 9 Typical Output Capacitance



Fig. 10 Typical Collector Current vs. Input Voltage

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

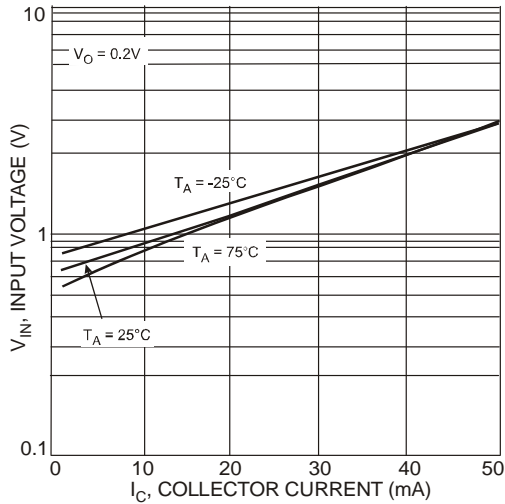


Fig. 11 Typical Input Voltage vs. Collector Current

**Typical Curves – DCX143EU PNP Section**

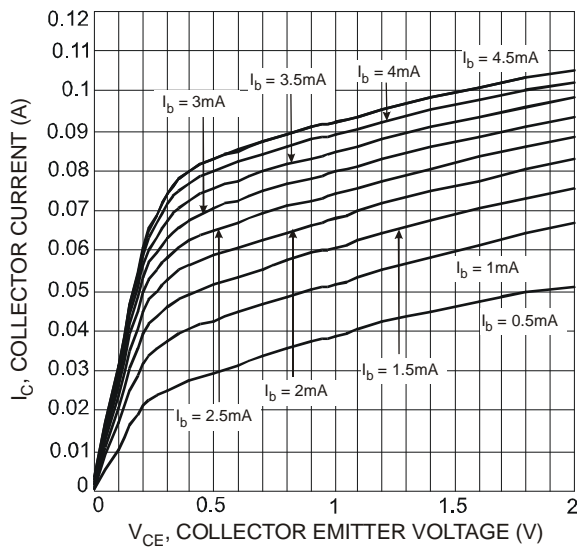


Fig. 12 Typical  $V_{CE}$  vs.  $I_C$

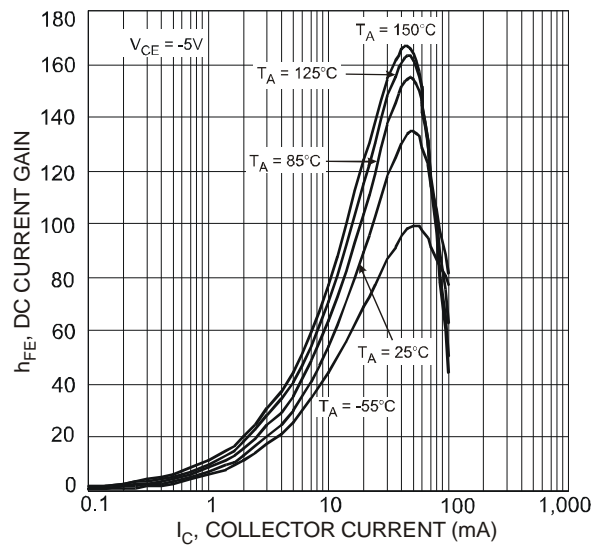


Fig. 13 Typical DC Current Gain



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

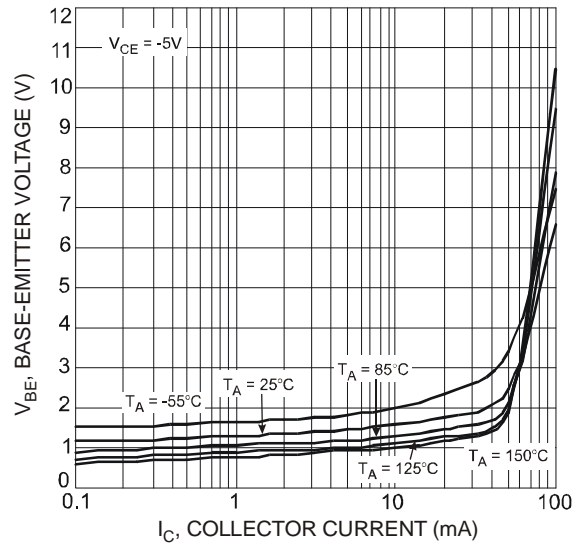


Fig. 15 Typical  $V_{BE}$  vs.  $I_C$

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



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

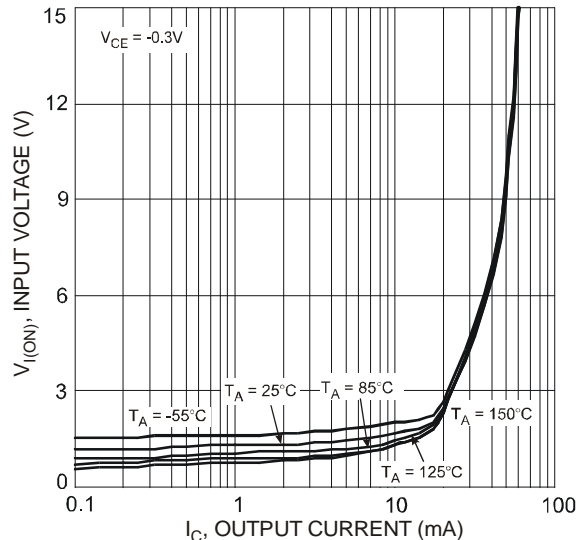


Fig. 17 Typical  $V_{I(ON)}$  vs.  $I_C$

**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.  $I_C$

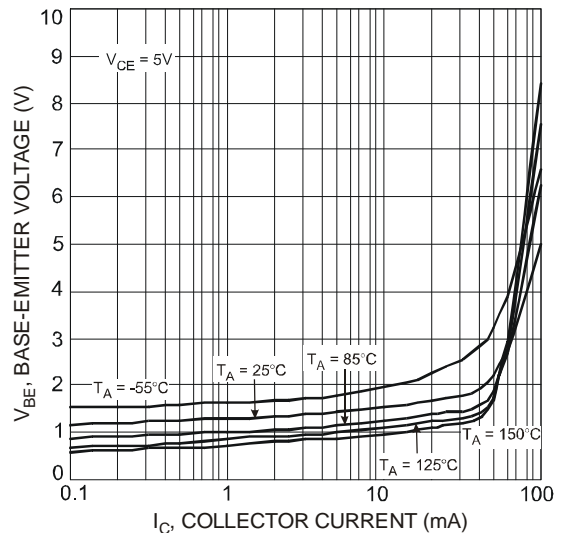


Fig. 21 Typical  $V_{BE}$  vs.  $I_C$



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

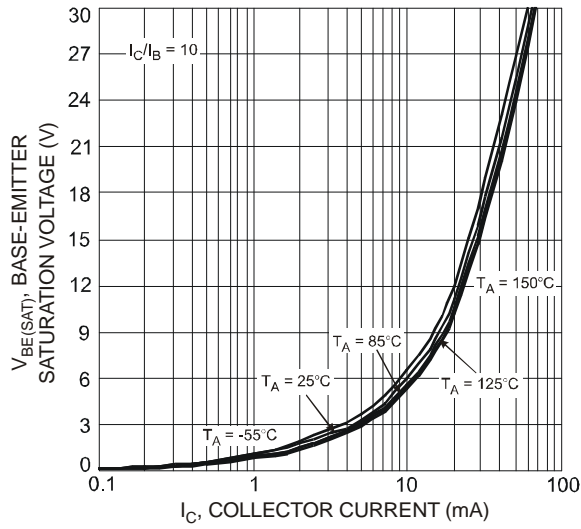


Fig. 22 Typical  $V_{BE(SAT)}$  vs.  $I_C$



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

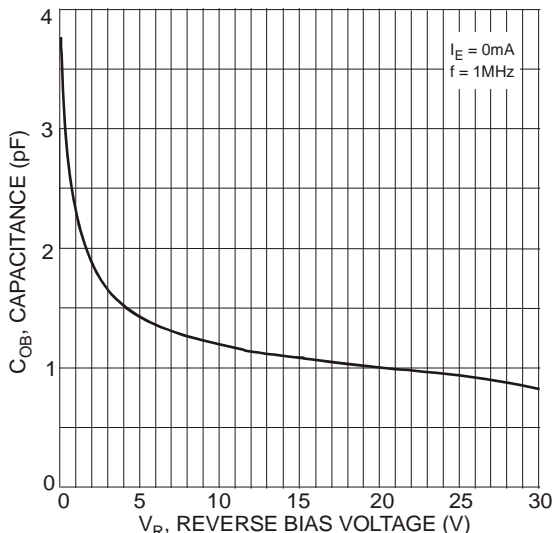


Fig. 26 Typical Output Capacitance



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**

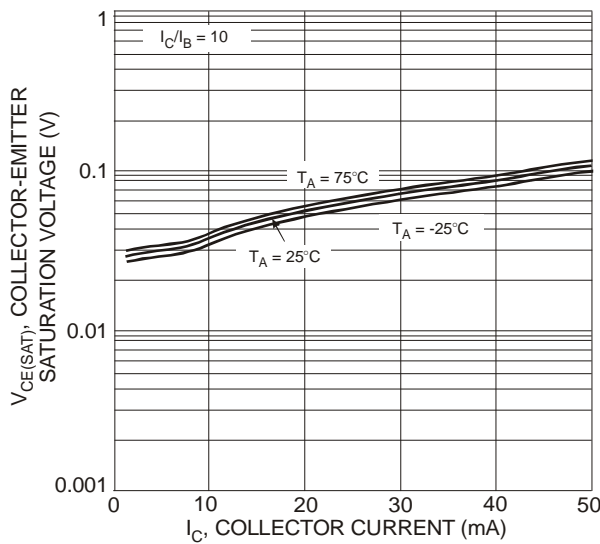


Fig. 29 Typical  $V_{CE(SAT)}$  vs.  $I_C$

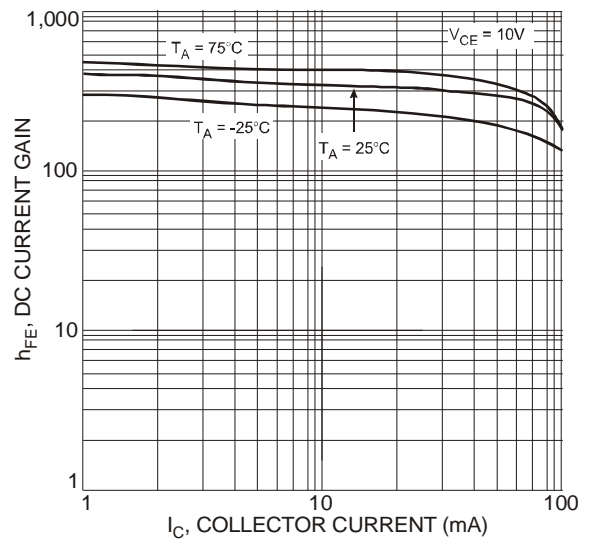


Fig. 30 Typical DC Current Gain



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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2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

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