

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	22K Ω	22K Ω
DCX144EU	47K Ω	47K Ω
DCX114YU	10K Ω	47K Ω
DCX123JU	2.2K Ω	47K Ω
DCX114EU	10K Ω	10K Ω
DCX143EU	4.7K Ω	4.7K Ω
DCX143ZU	4.7K Ω	47K Ω
DCX115EU	100K Ω	100K Ω

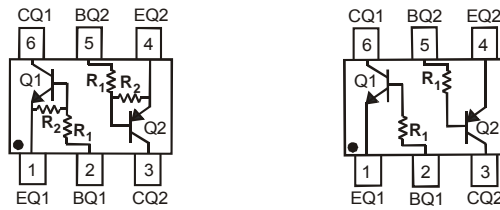
Mechanical Data

- 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 (e3)
- Weight: 0.006 grams (Approximate)

Part Number	R1 Only
DCX143TU	4.7K Ω
DCX114TU	10K Ω



Top View



R1, R2

R1 Only

Device Schematic

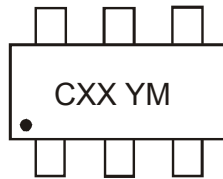
Ordering Information (Notes 4 & 5)

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 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/.
 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: X = 2010)
 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_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Supply Voltage <Pin: (6) to (1)>	V _{CC}	50	V
Input Voltage <Pin: (2) to (1)>	V _{IN}	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
		DCX143ZU	-10 to +30
DCX115EU	-10 to +40		
Output Current	I _O	DCX124EU	30
		DCX144EU	30
		DCX114YU	70
		DCX123JU	100
		DCX114EU	50
		DCX143TU	100
		DCX143EU	100
		DCX114TU	100
		DCX143ZU	100
DCX115EU	20		
Output Current	I _C (Max)	100	mA

Absolute Maximum Ratings PNP Section (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Supply Voltage <Pin: (4) to (3)>		V _{CC}	50	V
Input Voltage <Pin: (5) to (4)>	DCX124EU	V _{IN}	+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 _O	-30	mA
	DCX144EU		-30	
	DCX114YU		-70	
	DCX123JU		-100	
	DCX114EU		-50	
	DCX143TU		-100	
	DCX143EU		-100	
	DCX114TU		-100	
	DCX143ZU		-100	
DCX115EU	-20			
Output Current		I _C (Max)	-100	mA

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation (Notes 6 & 7)	P _D	200	mW
Thermal Resistance, Junction to Ambient Air (Note 6)	R _{θJA}	+625	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-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_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition	
R1 Only (DCX143TU & DCX114TU)								
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 DCX143TU I _C /I _B = 1mA / 0.1mA DCX114TU	
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		f _T	—	250	—	MHz	V _{CE} = 10V, I _E = -5mA, f = 100MHz	
R1/R2 Only								
Input Voltage	DCX124EU	V _{I(off)}	0.5	1.1	—	V	V _{CC} = 5V, I _O = 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 _{I(on)}	—	1.9	3.0	V	V _O = 0.3V, I _O = 5mA	
	DCX144EU			1.9	3.0		V _O = 0.3V, I _O = 2mA	
	DCX114YU			—	1.4		V _O = 0.3V, I _O = 1mA	
	DCX123JU			—	1.1		V _O = 0.3V, I _O = 5mA	
	DCX114EU			1.9	3.0		V _O = 0.3V, I _O = 10mA	
	DCX143EU			1.99	3.0		V _O = 0.3V, I _O = 20mA	
DCX143ZU	—			1.3	V _O = 0.3V, I _O = 5mA			
DCX115EU	—	3	V _O = 0.3V, I _O = 1mA					
Output Voltage	DCX124EU	V _{O(on)}	—	0.1	0.3	V	I _O /I _I = 10mA / 0.5mA	
	DCX144EU						I _O /I _I = 10mA / 0.5mA	
	DCX114YU						I _O /I _I = 5mA / 0.25mA	
	DCX123JU						I _O /I _I = 5mA / 0.25mA	
	DCX114EU						I _O /I _I = 10mA / 0.5mA	
	DCX143EU						I _O /I _I = 10mA / 0.5mA	
	DCX143ZU						I _O /I _I = 5mA / 0.25mA	
	DCX115EU						I _O /I _I = 10mA / 0.5mA	
Input Current	DCX124EU	I _I	—	—	0.36	mA	V _I = 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 _{O(off)}	—	—	0.5	μA	V _{CC} = 50V, V _I = 0V	
DC Current Gain	DCX124EU	G _I	56	—	—	—	V _O = 5V, I _O = 5mA	
	DCX124EUQ						60	V _O = 5V, I _O = 5mA
	DCX144EU						68	V _O = 5V, I _O = 5mA
	DCX114YU						68	V _O = 5V, I _O = 10mA
	DCX114YUQ						80	V _O = 5V, I _O = 10mA
	DCX123JU						80	V _O = 5V, I _O = 10mA
	DCX114EU						30	V _O = 5V, I _O = 5mA
	DCX143EU						50	V _O = 5V, I _O = 10mA
	DCX143ZU						80	V _O = 5V, I _O = 10mA
DCX115EU	82	V _O = 5V, I _O = 5mA						
Input Resistor (R ₁) Tolerance		ΔR ₁	-30	—	+30	%	—	
Resistance Ratio Tolerance		ΔR ₂ /R ₁	-20	—	+20	%	—	
Gain-Bandwidth Product		f _T	—	250	—	MHz	V _{CE} = 10V, I _E = 5mA, f = 100MHz	

Electrical Characteristics PNP Section (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition		
R1 Only (DCX143TU & DCX114TU)								
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 DCX143TU I _C /I _B = 1mA / 0.1mA DCX114TU		
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	f _T	—	250	—	MHz	V _{CE} = -10V, I _E = 5mA, f = 100MHz		
R1/R2 Only								
Input Voltage	DCX124EU	V _{I(off)}	-0.5	-1.1	—	V	V _{CC} = -5V, I _O = -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 _{I(on)}	—	-1.9	-3.0	V	V _O = -0.3V, I _O = -5mA	
	DCX144EU		—	-1.9	-3.0			
	DCX114YU		—	—	-1.4			
	DCX123JU		—	—	-1.1			
	DCX114EU		—	-1.9	-3.0			
	DCX143EU		—	-2.5	-3.0			
	DCX143ZU		—	—	-1.3			
	DCX115EU		—	—	-3			
Output Voltage	DCX124EU	V _{O(on)}	—	-0.1	-0.3	V	I _O /I _I = -10mA / -0.5mA	
	DCX144EU						I _O /I _I = -10mA / -0.5mA	
	DCX114YU						I _O /I _I = -5mA / -0.25mA	
	DCX123JU						I _O /I _I = -5mA / -0.25mA	
	DCX114EU						I _O /I _I = -10mA / -0.5mA	
	DCX143EU						I _O /I _I = -10mA / -0.5mA	
	DCX143ZU						I _O /I _I = -5mA / -0.25mA	
	DCX115EU						I _O /I _I = -10mA / -0.5mA	
Input Current	DCX124EU	I _I	—	—	—	mA	V _I = -5V	
	DCX144EU							-0.36
	DCX114YU							-0.18
	DCX123JU							-0.88
	DCX114EU							-3.6
	DCX143EU							-0.88
	DCX143ZU							-0.88
	DCX115EU							-1.8
Output Current	I _{O(off)}	—	—	-0.5	μA	V _{CC} = 50V, V _I = 0V		
DC Current Gain	DCX124EU	G _I	—	—	—	—	V _O = -5V, I _O = -5mA	
	DCX124EUQ						56	V _O = -5V, I _O = -5mA
	DCX144EU						60	V _O = -5V, I _O = -5mA
	DCX114YU						68	V _O = -5V, I _O = -5mA
	DCX114YUQ						68	V _O = -5V, I _O = -10mA
	DCX123JU						80	V _O = -5V, I _O = -10mA
	DCX114EU						80	V _O = -5V, I _O = -10mA
	DCX143EU						30	V _O = -5V, I _O = -5mA
	DCX143ZU						40	V _O = -5V, I _O = -10mA
DCX115EU	80	V _O = -5V, I _O = -10mA						
DCX115EU	82	V _O = -5V, I _O = -5mA						
Input Resistor (R ₁) Tolerance	ΔR ₁	-30	—	+30	%	—		
Resistance Ratio Tolerance	ΔR ₂ /R ₁	-20	—	+20	%	—		
Gain-Bandwidth Product	f _T	—	250	—	MHz	V _{CE} = -10V, I _E = -5mA, f = 100MHz		

Typical Curves – Total Device

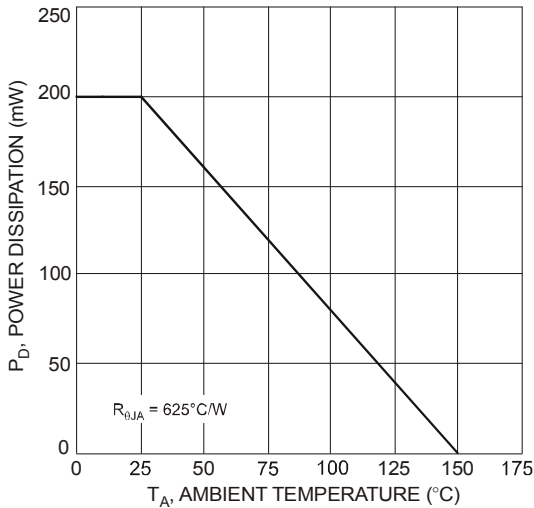


Fig. 1 Power Derating Curve

Typical Curves – DCX123JU PNP Section (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

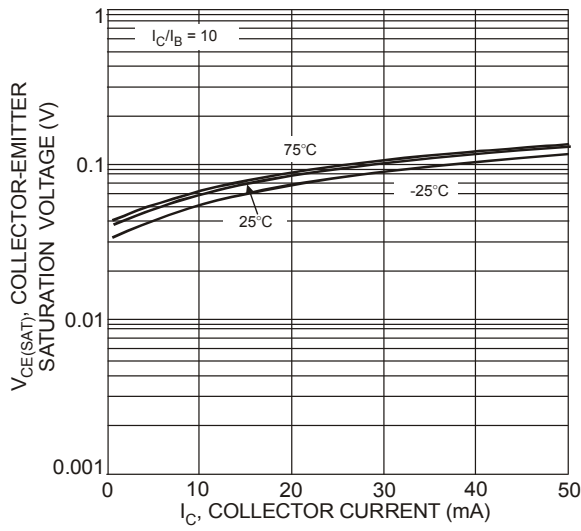


Fig. 2 Typical $V_{CE(SAT)}$ vs. I_C

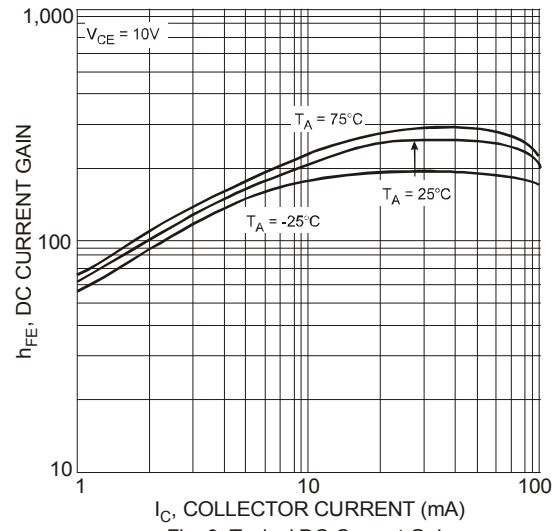


Fig. 3 Typical DC Current Gain

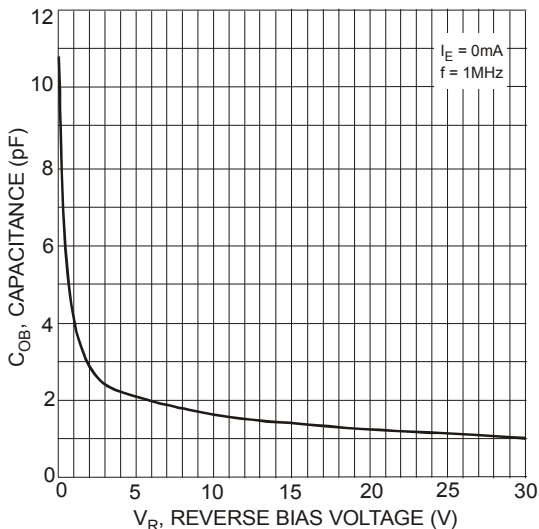


Fig. 4 Typical Output Capacitance

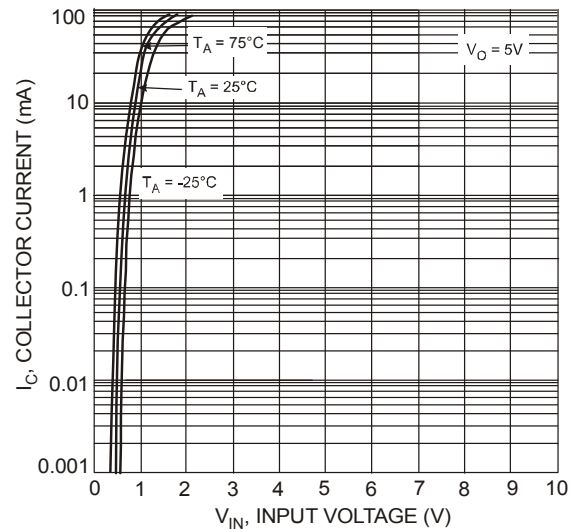


Fig. 5 Typical Collector Current vs. Input Voltage

Typical Curves – DCX123JU PNP Section (cont.)

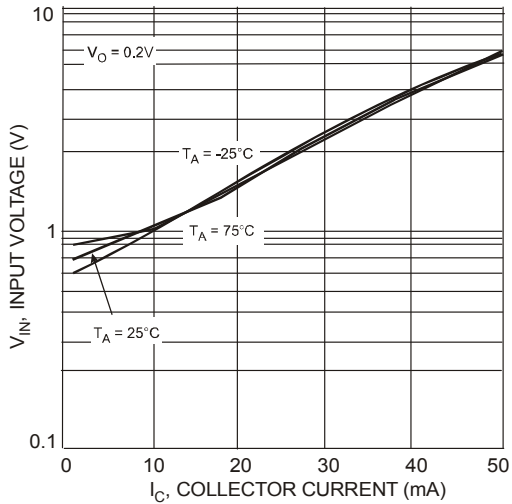


Fig. 6 Typical Input Voltage vs. Collector Current

Typical Curves – DCX123JU NPN Section (@T_A = +25°C, unless otherwise specified.)

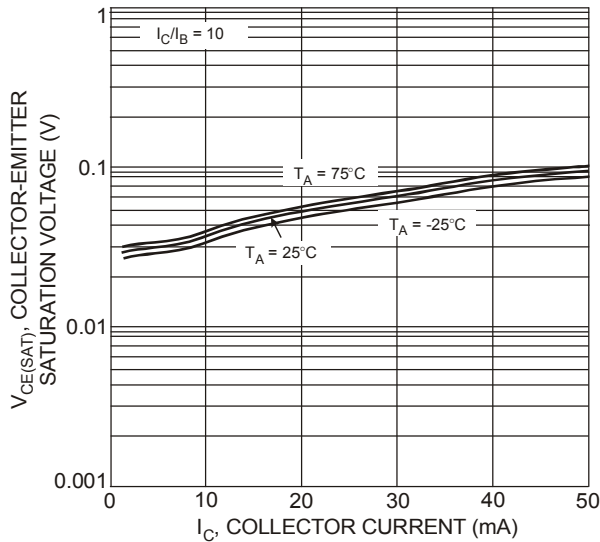


Fig. 7 Typical V_{CE(SAT)} vs. I_C

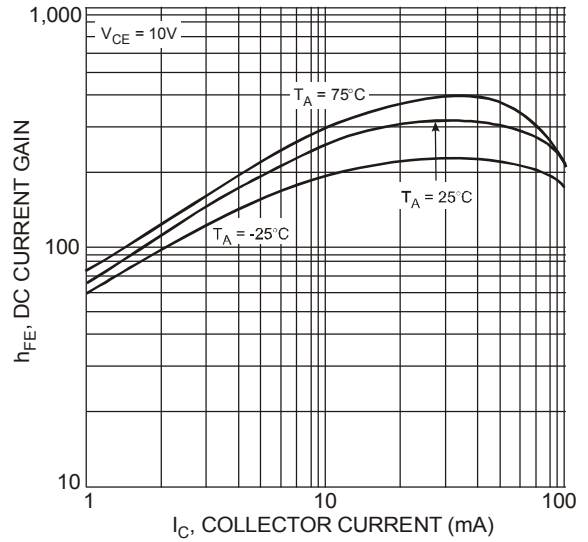


Fig. 8 Typical DC Current Gain

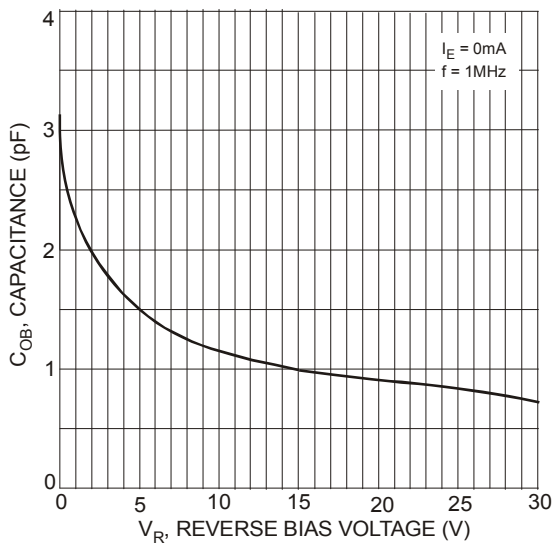


Fig. 9 Typical Output Capacitance

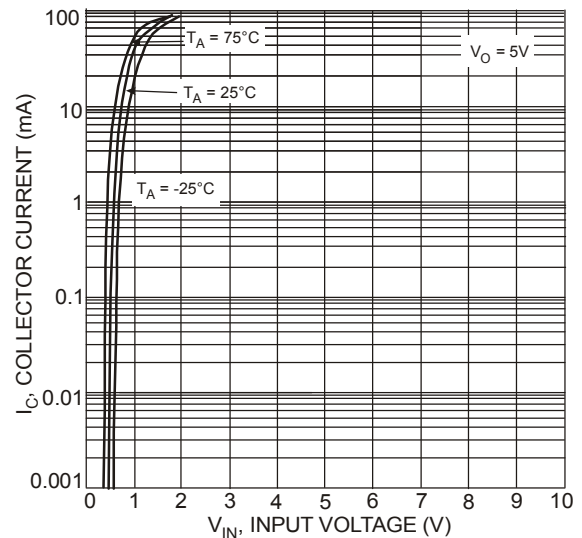


Fig. 10 Typical Collector Current vs. Input Voltage

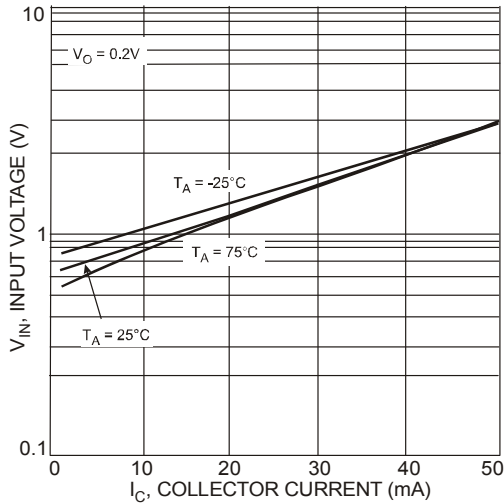


Fig. 11 Typical Input Voltage vs. Collector Current

Typical Curves – DCX143EU PNP Section (@T_A = +25°C, unless otherwise specified.)

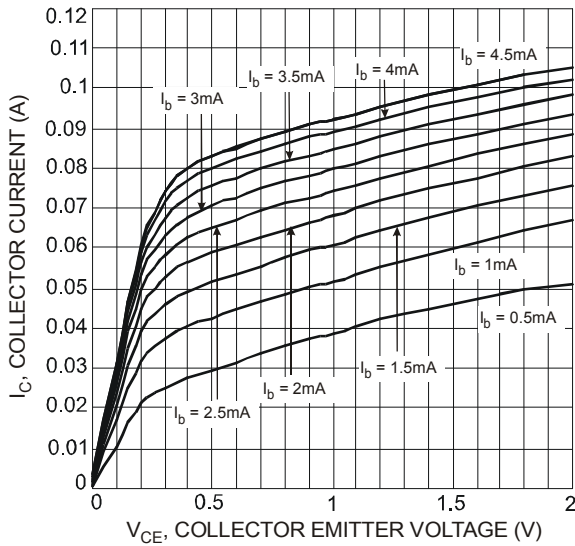


Fig. 12 Typical V_{CE} vs. I_C

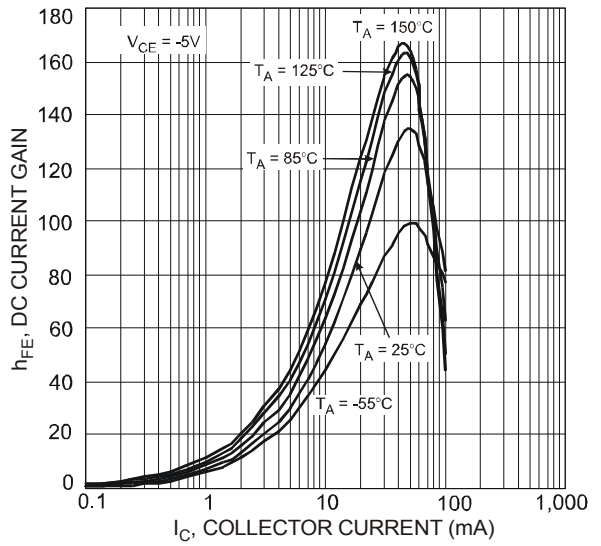


Fig. 13 Typical DC Current Gain

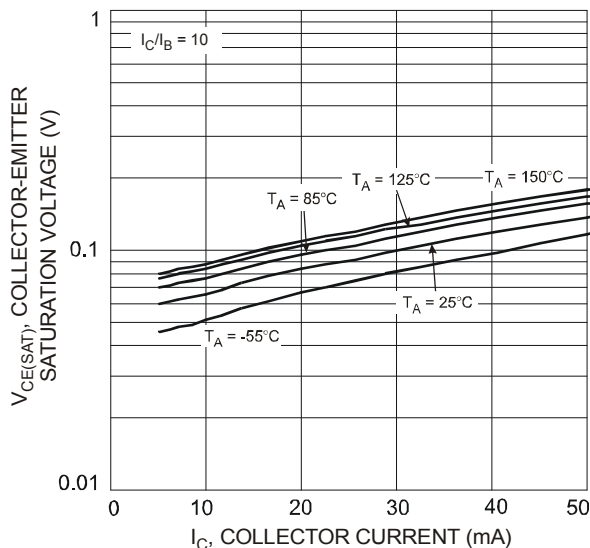


Fig. 14 Typical V_{CE(SAT)} vs. I_C

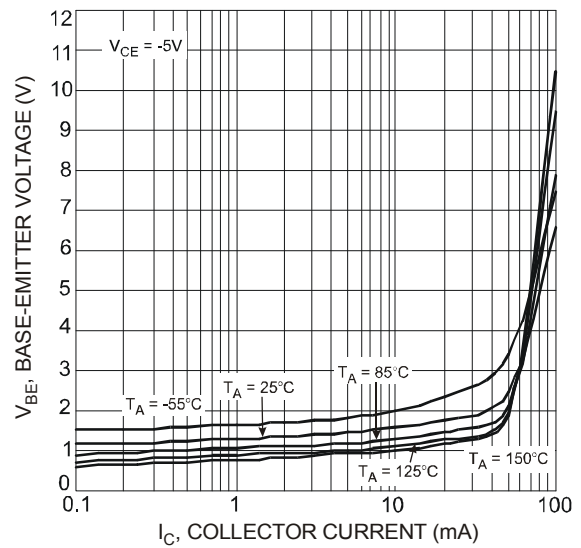


Fig. 15 Typical V_{BE} vs. I_C

Typical Curves – DCX143EU PNP Section (cont.)

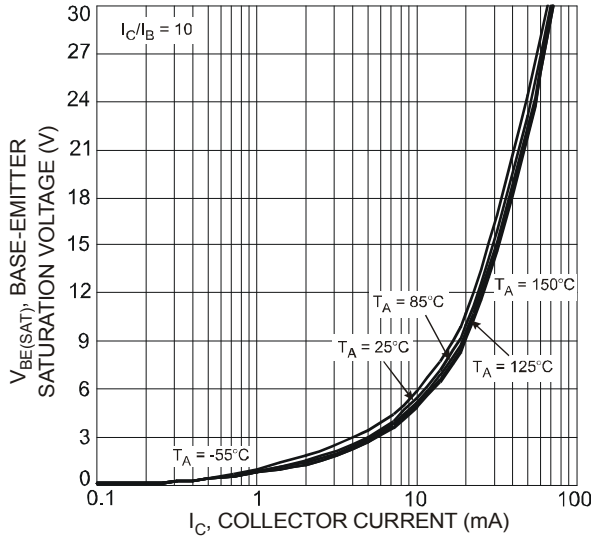


Fig. 16 Typical $V_{BE(SAT)}$ vs. I_C

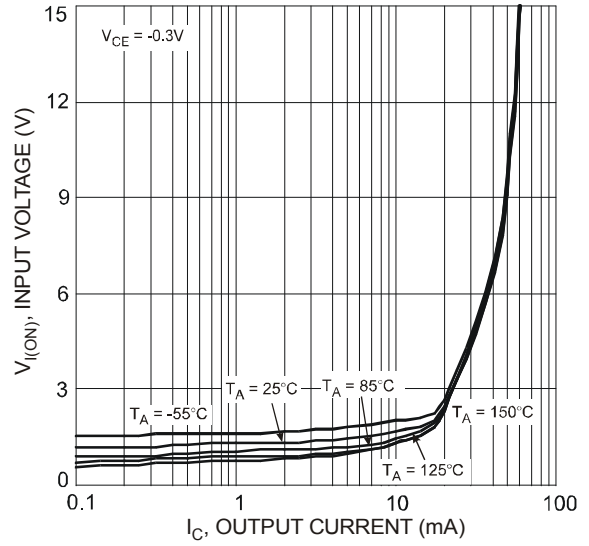


Fig. 17 Typical $V_{I(ON)}$ vs. I_C

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

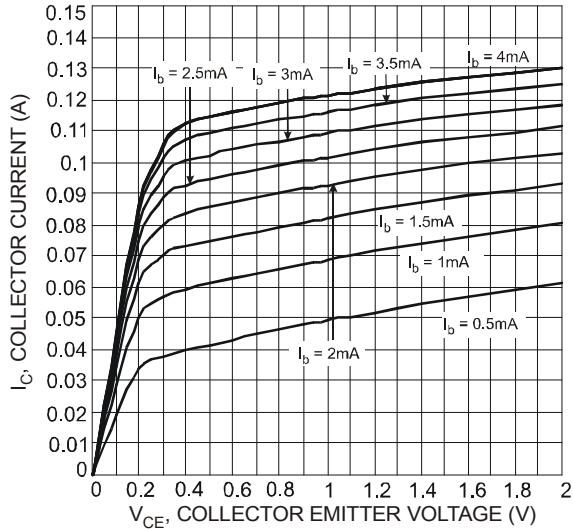


Fig. 18 Typical V_{CE} vs. I_C

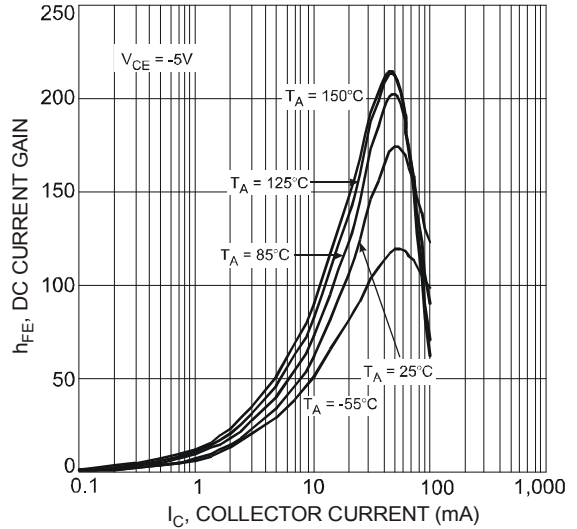


Fig. 19 Typical DC Current Gain

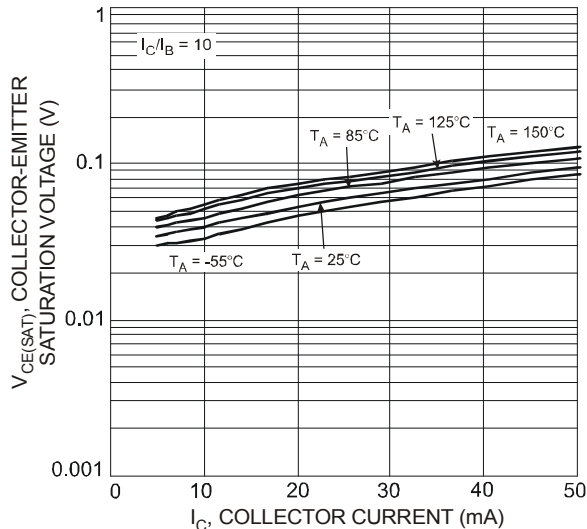


Fig. 20 Typical $V_{CE(SAT)}$ vs. I_C

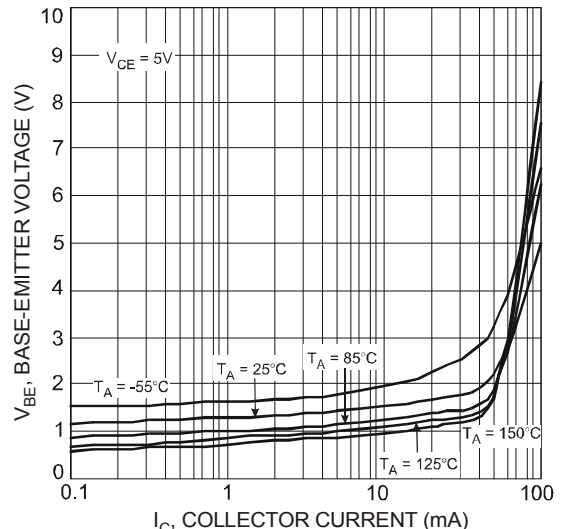


Fig. 21 Typical V_{BE} vs. I_C

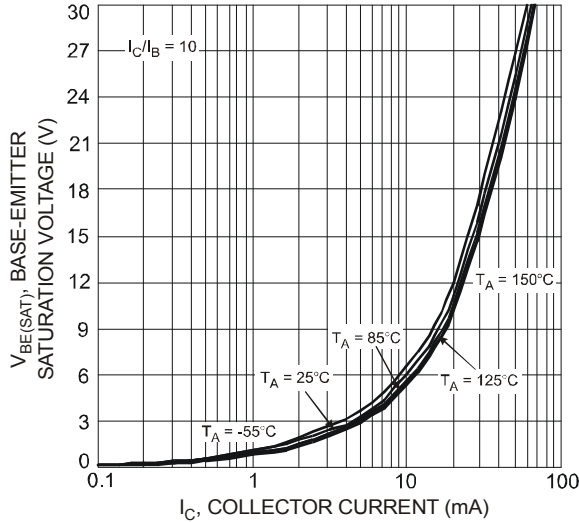


Fig. 22 Typical $V_{BE(SAT)}$ vs. I_C

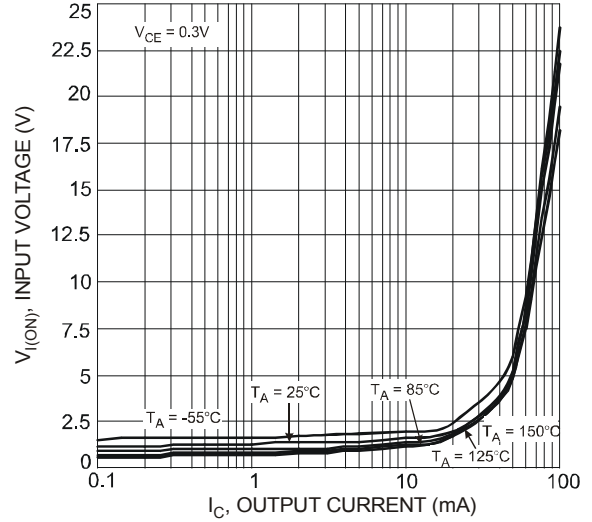


Fig. 23 Typical $V_{I(ON)}$ vs. I_C

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

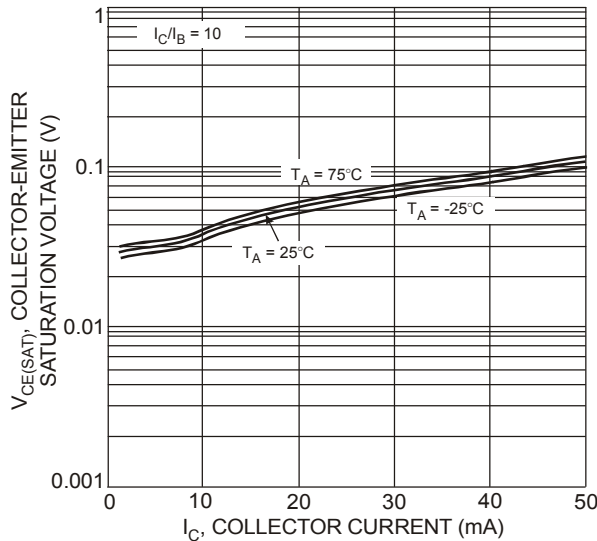


Fig. 24 Typical $V_{CE(SAT)}$ vs. I_C

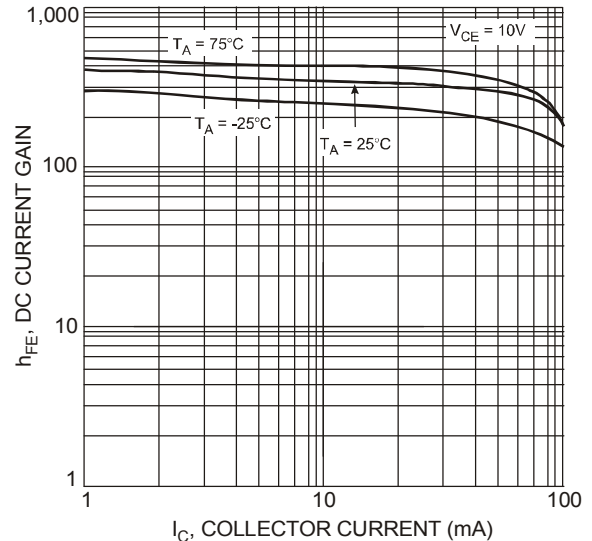


Fig. 25 Typical DC Current Gain

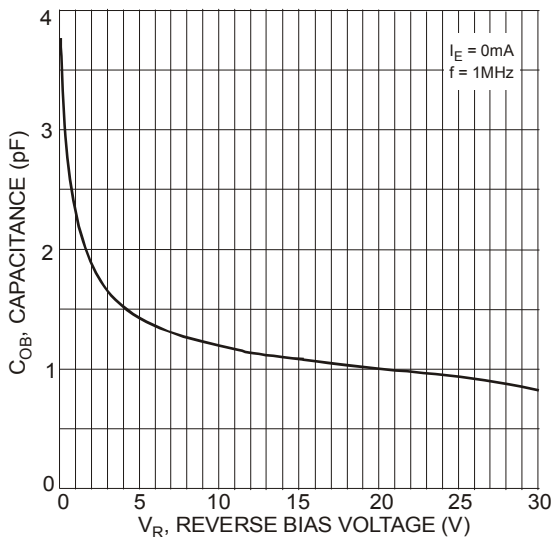


Fig. 26 Typical Output Capacitance

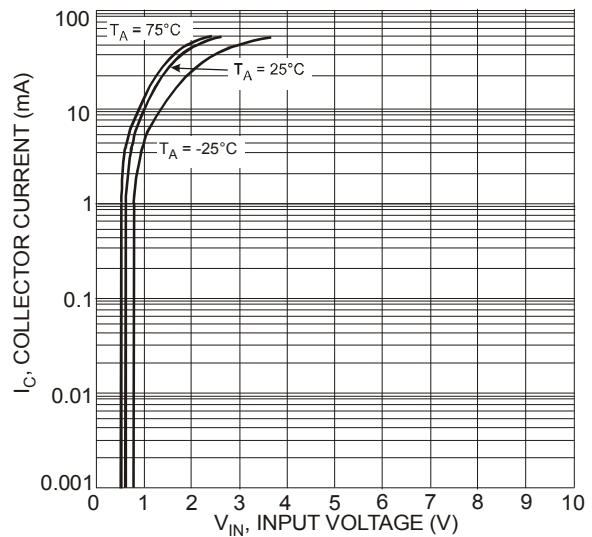


Fig. 27 Typical Collector Current vs. Input Voltage

Typical Curves – DCX114TU PNP Section (cont.)

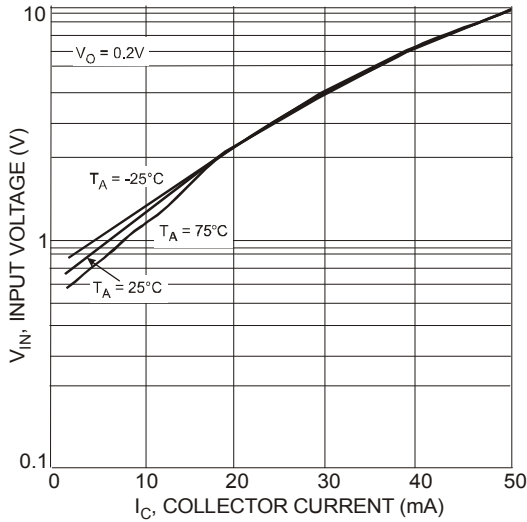


Fig. 28 Typical Input Voltage vs. Collector Current

Typical Curves – DCX114TU NPN Section (@T_A = +25°C, unless otherwise specified.)

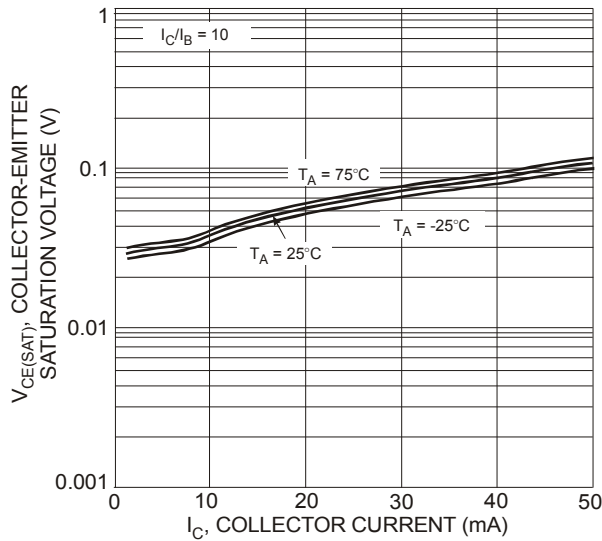


Fig. 29 Typical V_{CE(SAT)} vs. I_C

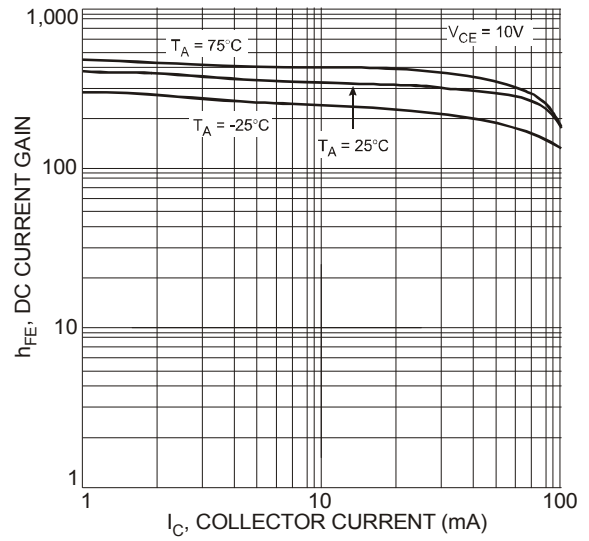


Fig. 30 Typical DC Current Gain

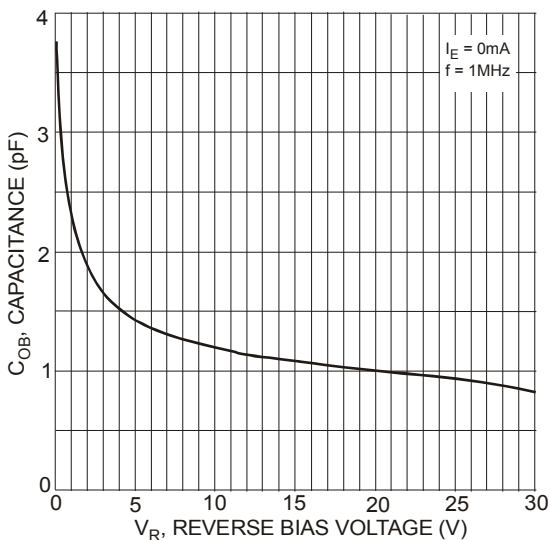


Fig. 31 Typical Output Capacitance

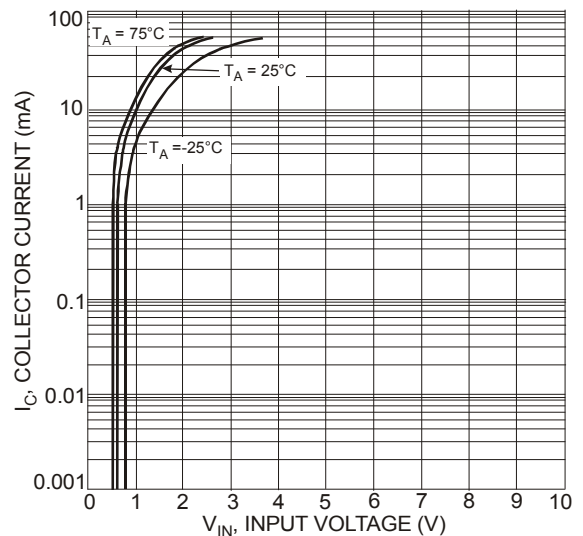


Fig. 32 Typical Collector Current vs. Input Voltage

Typical Curves – DCX114TU NPN Section (cont.)

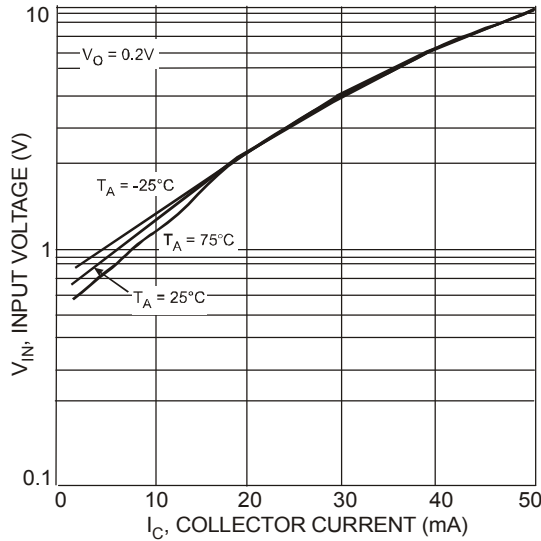
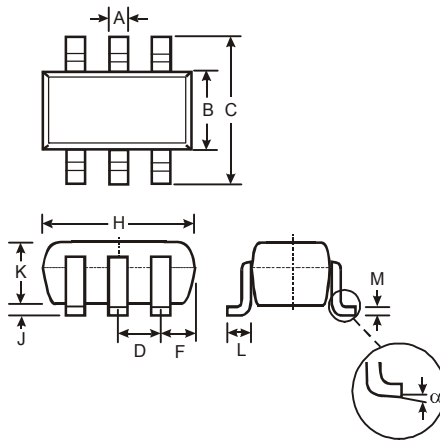


Fig. 33 Typical Input Voltage vs. Collector Current

Package Outline Dimensions

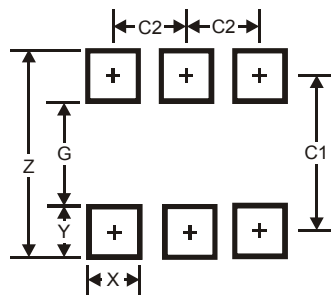
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



SOT363			
Dim	Min	Max	Typ
A	0.10	0.30	0.25
B	1.15	1.35	1.30
C	2.00	2.20	2.10
D	0.65 Typ		
F	0.40	0.45	0.425
H	1.80	2.20	2.15
J	0	0.10	0.05
K	0.90	1.00	1.00
L	0.25	0.40	0.30
M	0.10	0.22	0.11
α	0°	8°	-
All Dimensions in mm			

Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



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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