Lead-free Green

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)**

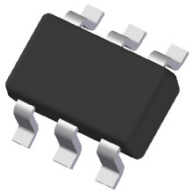
Part Number	R1 (NOM)	R2 (NOM)
DCX124EU	22KΩ	22KΩ
DCX144EU	47KΩ	47KΩ
DCX114YU	10KΩ	47KΩ
DCX123JU	2.2KΩ	47KΩ
DCX114EU	10KΩ	10KΩ
DCX143EU	4.7KΩ	4.7KΩ

Mechanical Data

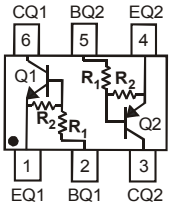
- Case: SOT363
- Case Material: Molded Plastic, "Green" Molding Compound
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.006 grams (approximate)

Part Number	R1 Only
DCX143TU	4.7KΩ
DCX114TU	10KΩ

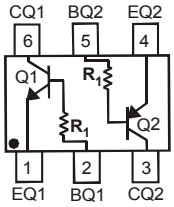
SOT363



Top View



R1, R2



R1 Only

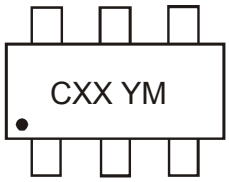
Device Schematic

Ordering Information (Notes 3 & 4)

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

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



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

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)>	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143TU DCX143EU DCX114TU	V_{IN}	-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	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143TU DCX143EU DCX114TU	I_O	30 30 70 100 50 100 100 100	mA
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 DCX144EU DCX114YU DCX123JU DCX114EU DCX143TU DCX143EU DCX114TU	V_{IN}	+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	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143TU DCX143EU DCX114TU	I_O	-30 -30 -70 -100 -50 -100 -100 -100	mA
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)	$R_{\theta JA}$	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			
	DCX124EU	$V_{I(on)}$	—	1.9	3.0		V_O = 0.3, I_O = 5mA
	DCX144EU			1.9	3.0		V_O = 0.3, I_O = 2mA
	DCX114YU			-	1.4		V_O = 0.3, I_O = 1mA
	DCX123JU			-	1.1		V_O = 0.3, I_O = 5mA
	DCX114EU			1.9	3.0		V_O = 0.3, I_O = 10mA
	DCX143EU			1.99	3.0		V_O = 0.3, I_O = 20mA
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
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		
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
Input Resistor (R_1) Tolerance		ΔR_1	-30	—	+30	%	—
Resistance Ratio Tolerance		R_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			
	DCX124EU	$V_{I(on)}$	—	-1.9	-3.0		V_O = -0.3, I_O = -5mA
	DCX144EU			-1.9	-3.0		V_O = -0.3, I_O = -2mA
	DCX114YU			-	-1.4		V_O = -0.3, I_O = -1mA
	DCX123JU			-	-1.1		V_O = -0.3, I_O = -5mA
	DCX114EU			-1.9	-3.0		V_O = -0.3, I_O = -10mA
	DCX143EU			-2.5	-3.0		V_O = -0.3, I_O = -20mA
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
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		
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		40				V_O = -5V, I_O = -10mA
Input Resistor (R_1) Tolerance		ΔR_1	-30	—	+30	%	—
Resistance Ratio Tolerance		R_2/R_1	-20	—	+20	%	—
Gain-Bandwidth Product		f_T	—	250	—	MHz	V_{CE} = -10V, I_E = -5mA, f = 100MHz

Typical Curves – Total Device

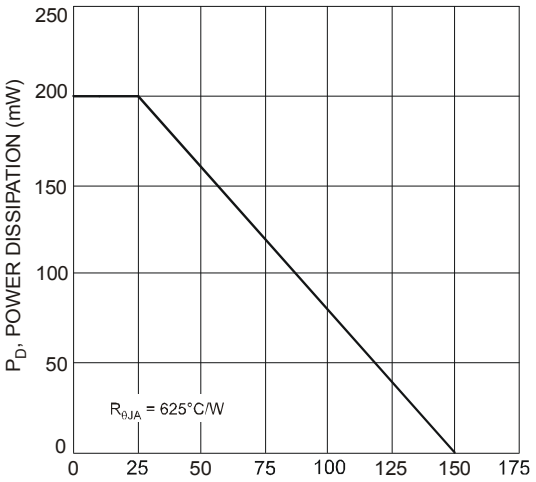


Fig. 1 Power Derating Curve

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

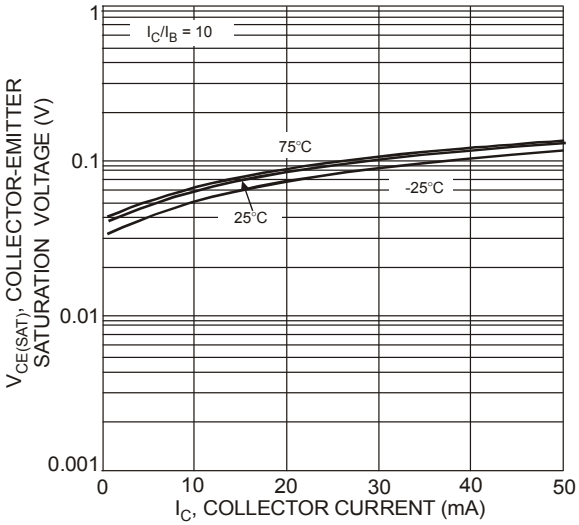


Fig. 2 Typical $V_{CE(SAT)}$ vs. I_C

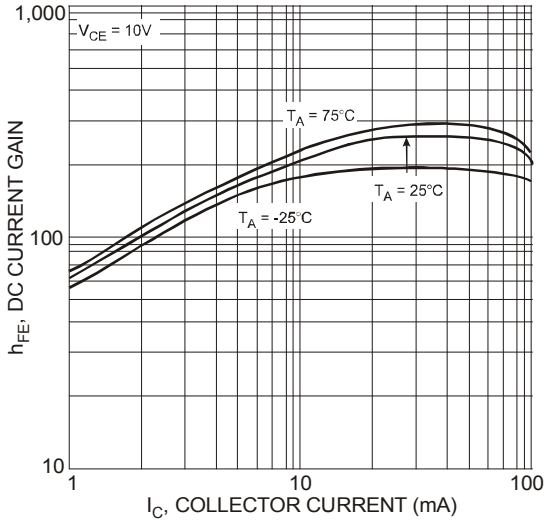


Fig. 3 Typical DC Current Gain

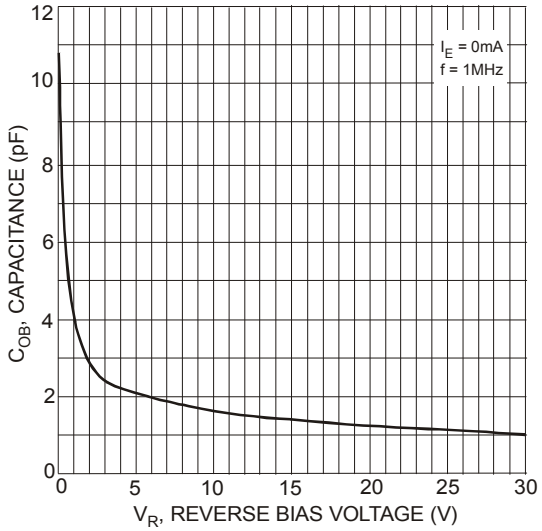


Fig. 4 Typical Output Capacitance

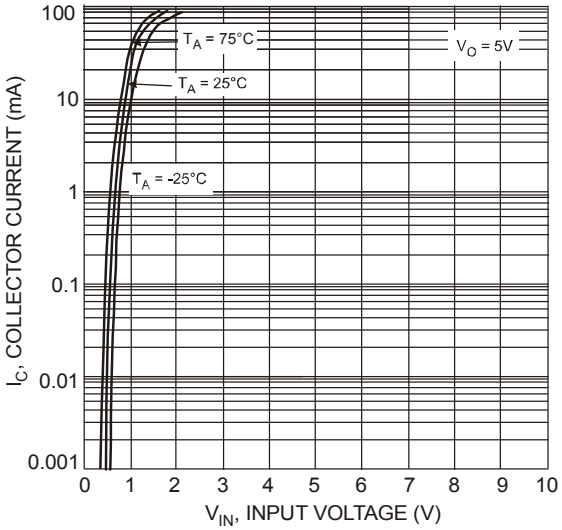


Fig. 5 Typical Collector Current vs. Input Voltage

Typical Curves – DCX123JU PNP Section (cont.)

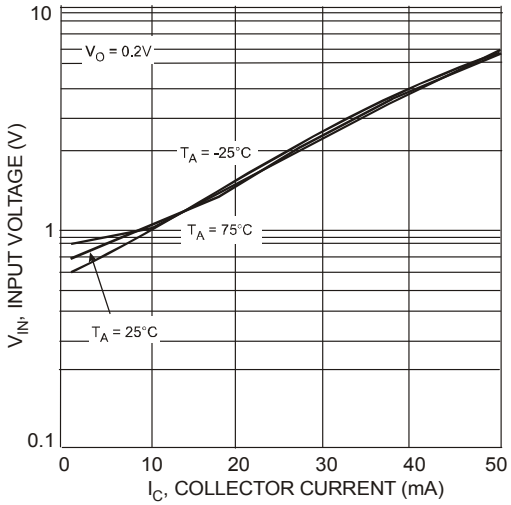


Fig. 6 Typical Input Voltage vs. Collector Current

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

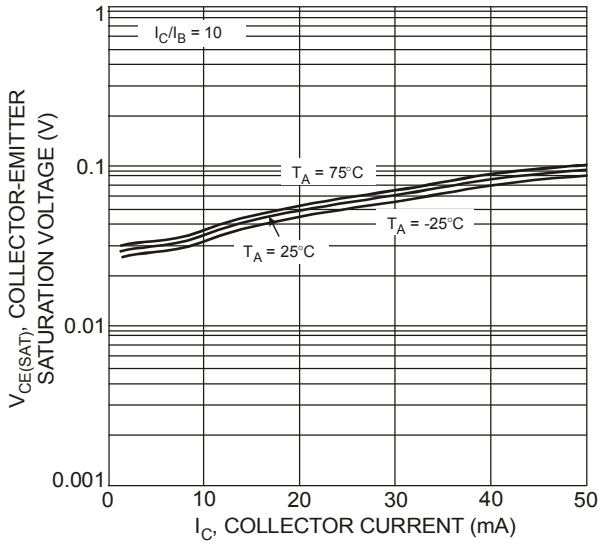


Fig. 7 Typical $V_{CE(SAT)}$ vs. I_C

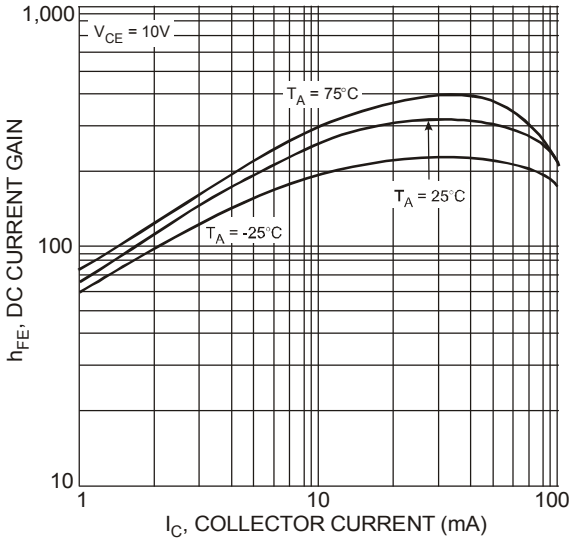


Fig. 8 Typical DC Current Gain

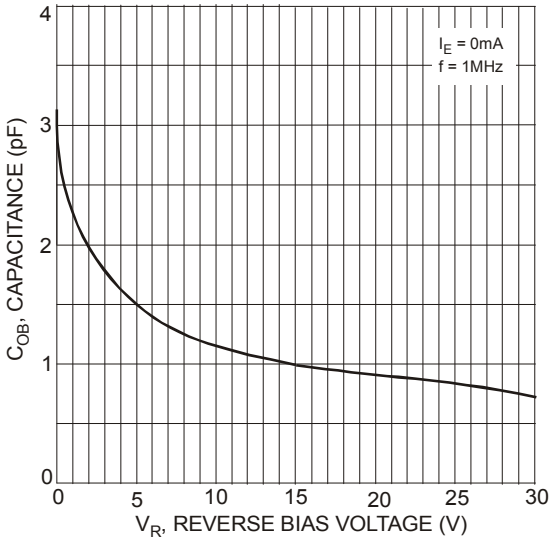


Fig. 9 Typical Output Capacitance

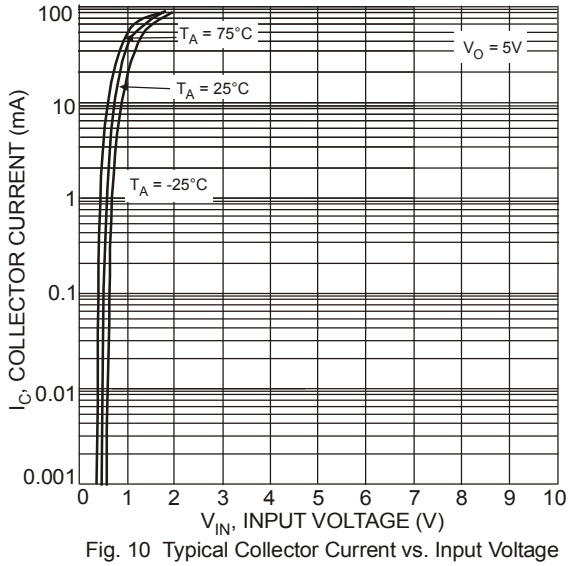


Fig. 10 Typical Collector Current vs. Input Voltage

Typical Curves – DCX123JU NPN Section (cont.)

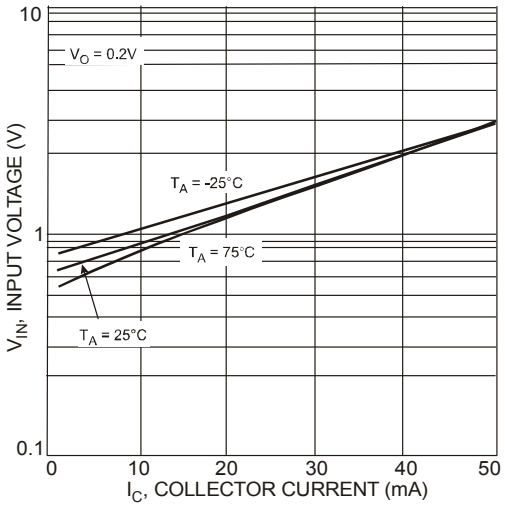


Fig. 11 Typical Input Voltage vs. Collector Current

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

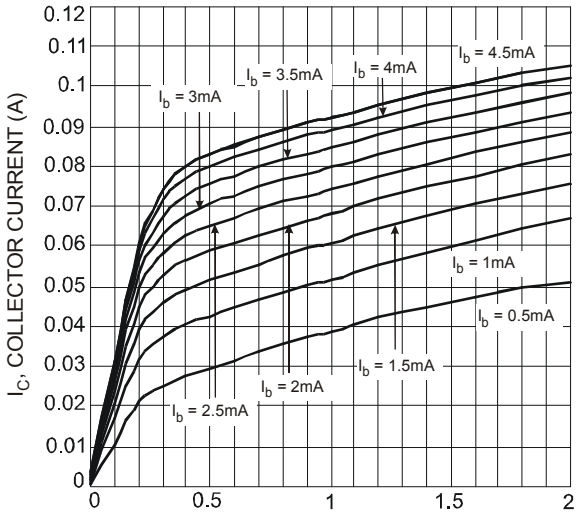


Fig. 12 Typical V_{CE} vs. I_C

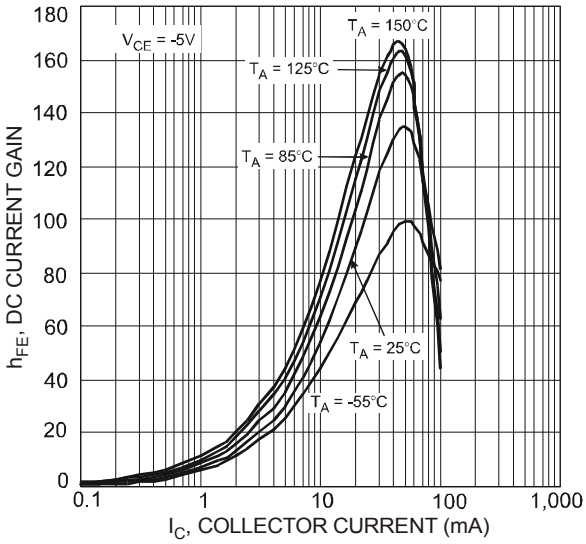


Fig. 13 Typical DC Current Gain

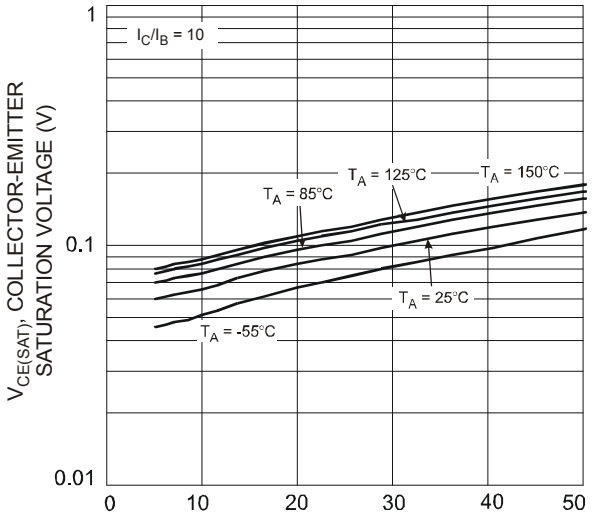


Fig. 14 Typical $V_{CE(SAT)}$ vs. I_C

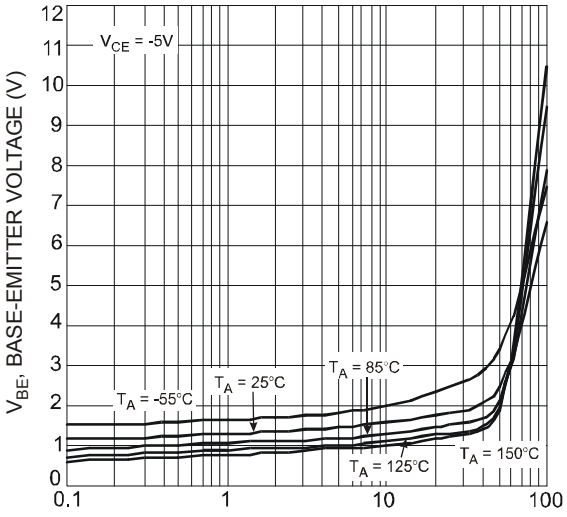


Fig. 15 Typical V_{BE} vs. I_C

Typical Curves – DCX143EU PNP Section (cont.)

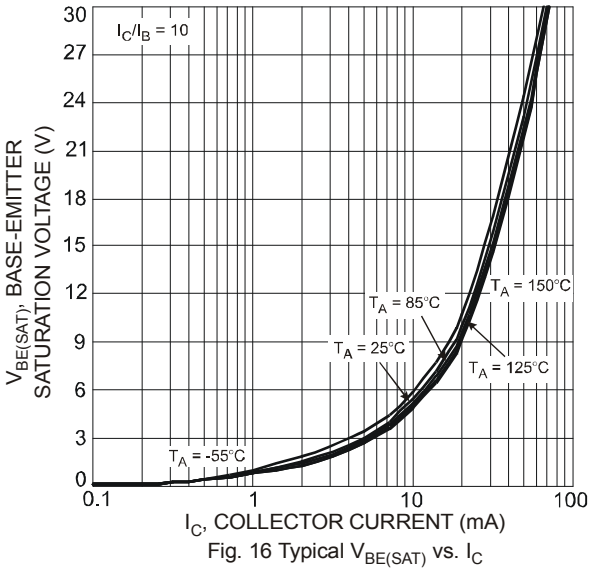


Fig. 16 Typical $V_{BE(SAT)}$ vs. I_C

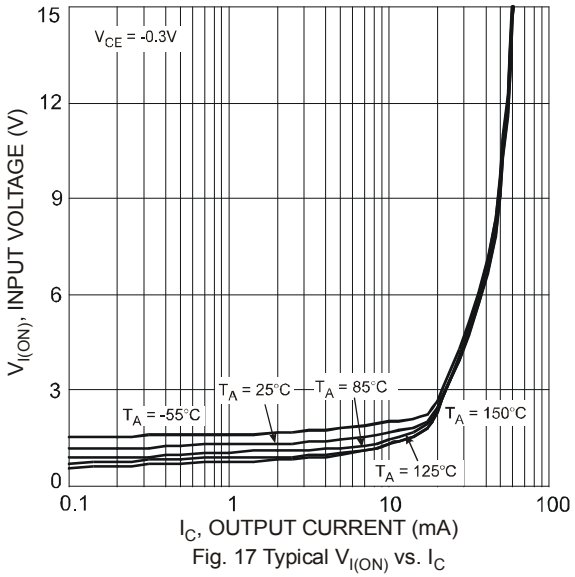


Fig. 17 Typical $V_{I(ON)}$ vs. I_C

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

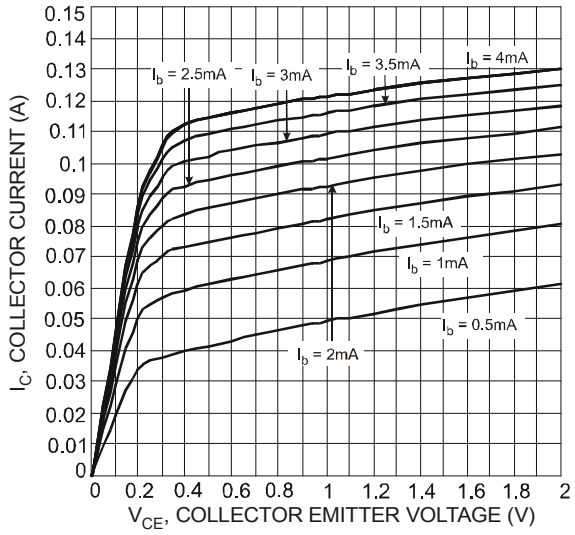


Fig. 18 Typical V_{CE} vs. I_C

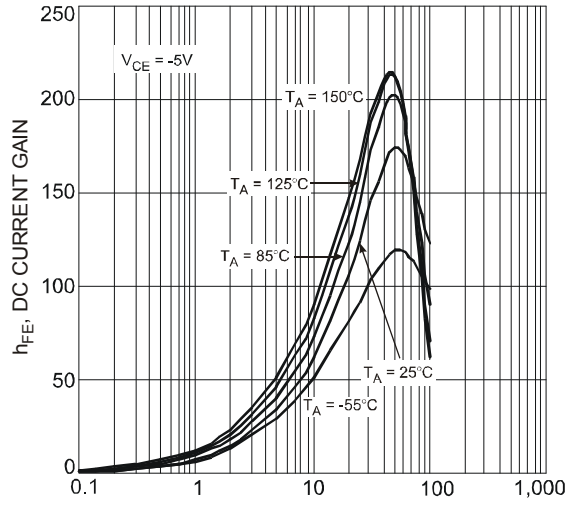


Fig. 19 Typical DC Current Gain

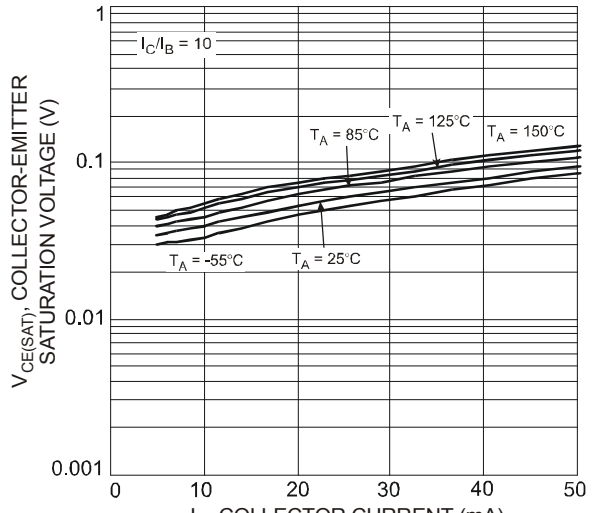


Fig. 20 Typical $V_{CE(SAT)}$ vs. I_C

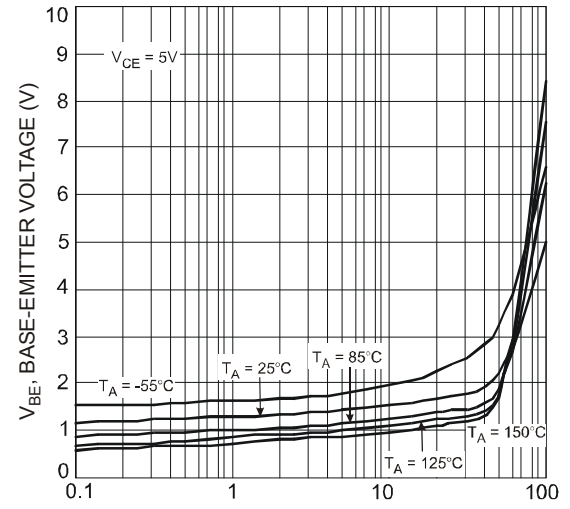


Fig. 21 Typical V_{BE} vs. I_C

Typical Curves – DCX143EU NPN Section (cont.)

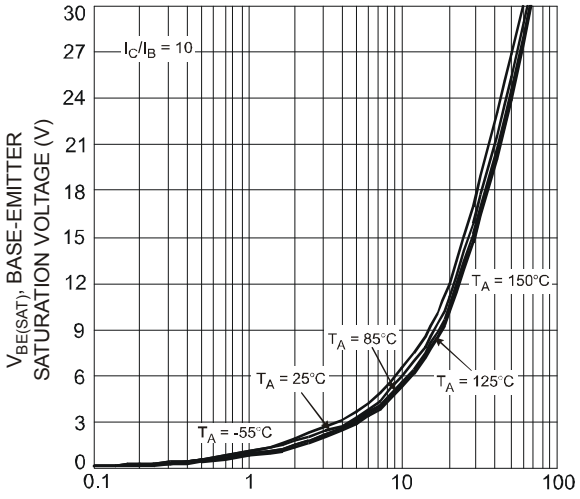


Fig. 22 Typical $V_{BE(SAT)}$ vs. I_C

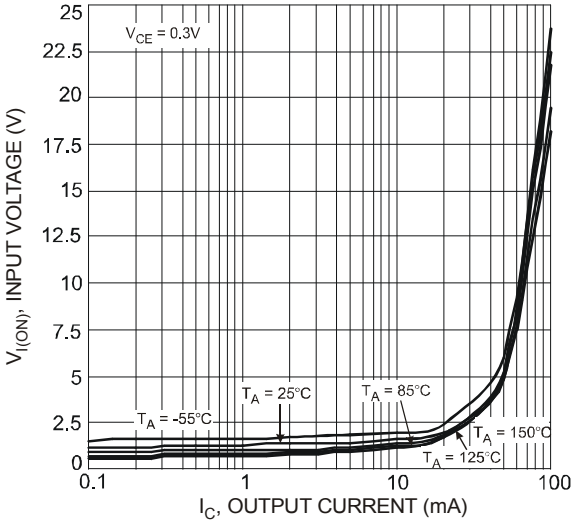


Fig. 23 Typical $V_{I(ON)}$ vs. I_C

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

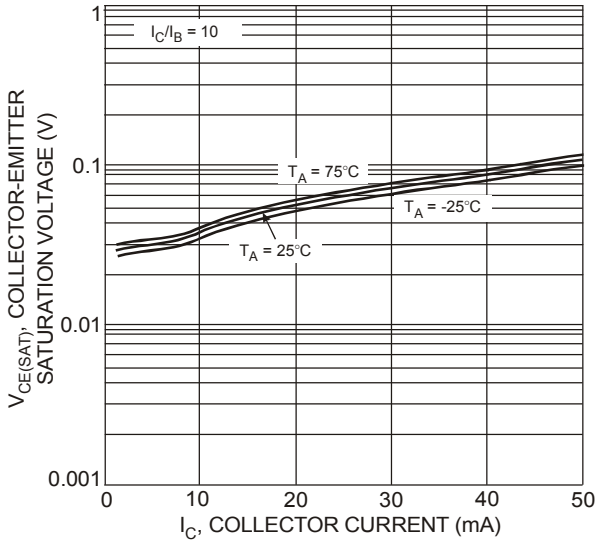


Fig. 24 Typical $V_{CE(SAT)}$ vs. I_C

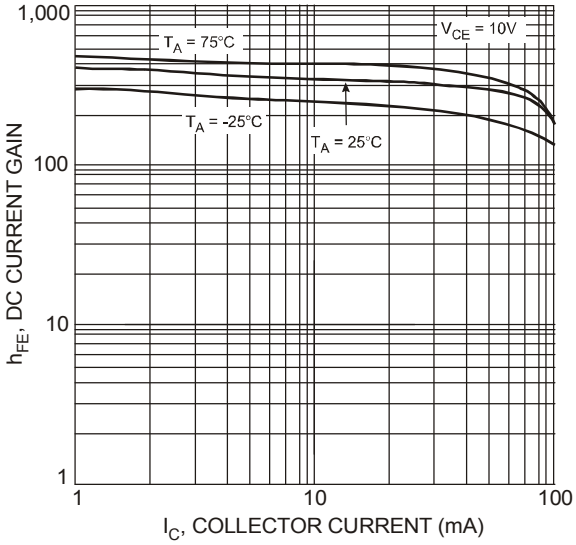


Fig. 25 Typical DC Current Gain

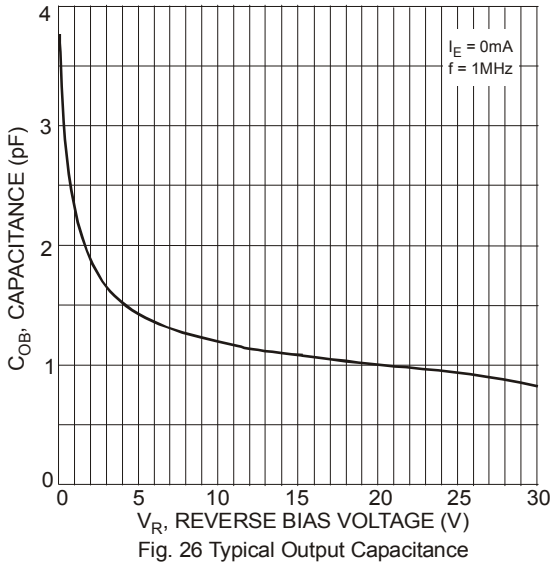


Fig. 26 Typical Output Capacitance

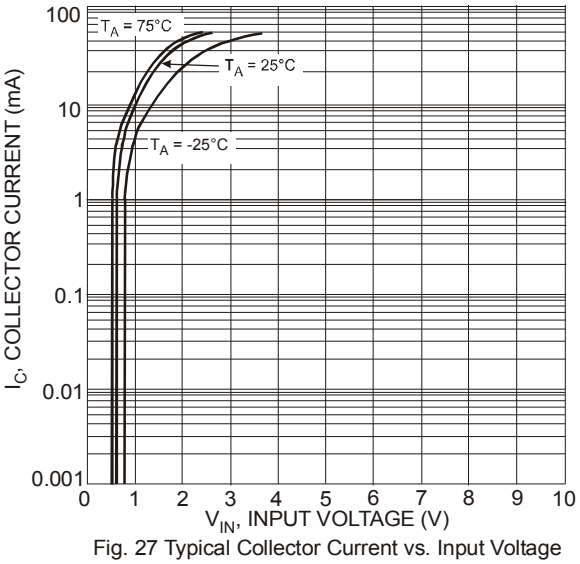


Fig. 27 Typical Collector Current vs. Input Voltage

Typical Curves – DCX114TU PNP Section (cont.)

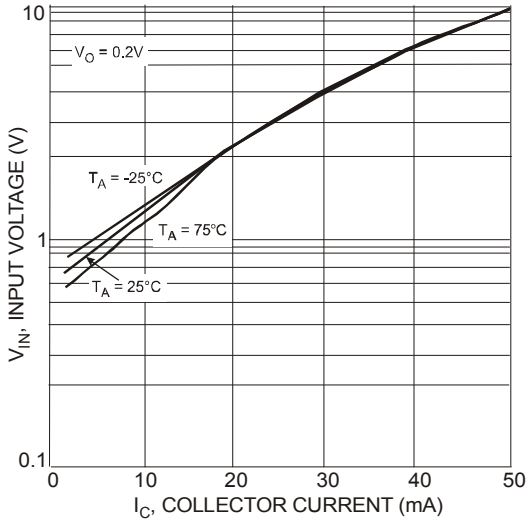


Fig. 28 Typical Input Voltage vs. Collector Current

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

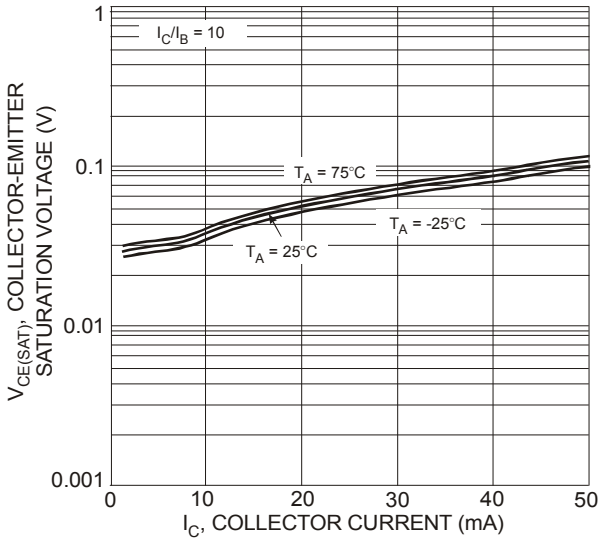


Fig. 29 Typical $V_{CE(SAT)}$ vs. I_C

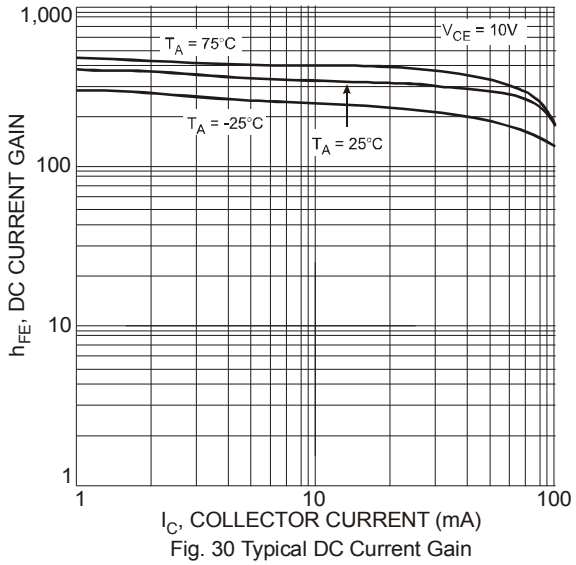


Fig. 30 Typical DC Current Gain

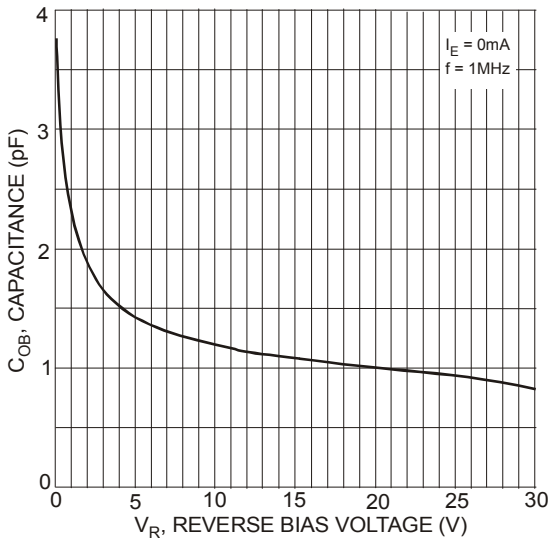


Fig. 31 Typical Output Capacitance

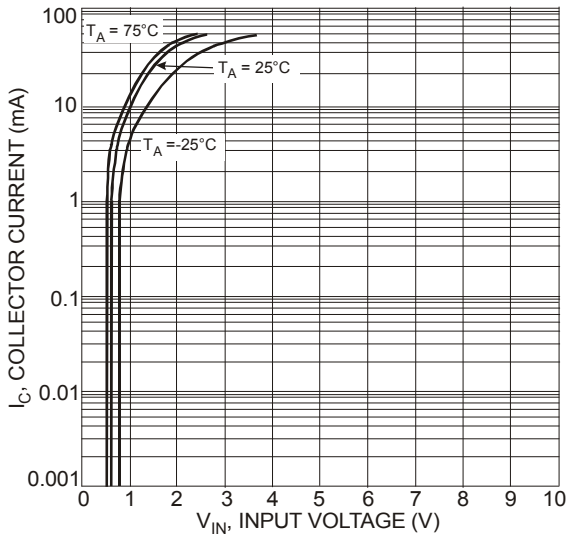


Fig. 32 Typical Collector Current vs. Input Voltage

Typical Curves – DCX114TU NPN Section (cont.)

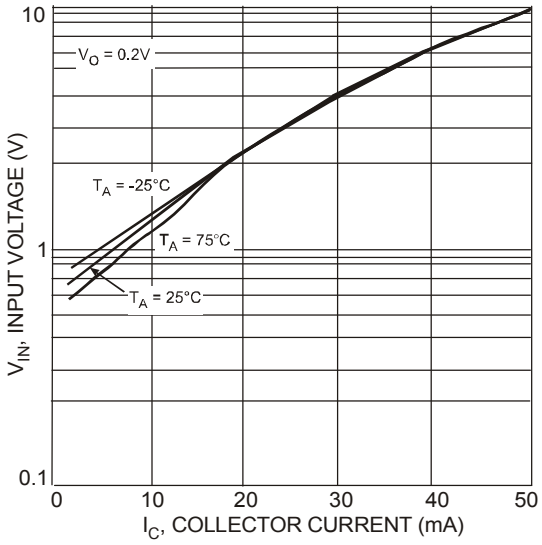
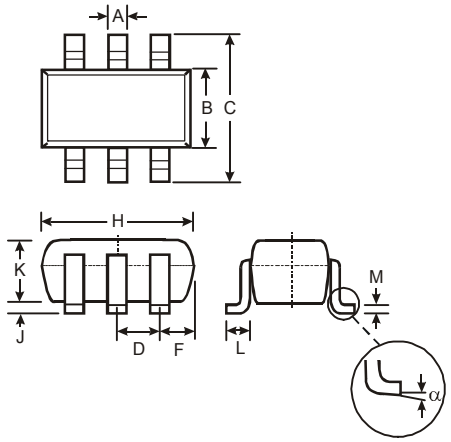


Fig. 33 Typical Input Voltage vs. Collector Current

Package Outline Dimensions

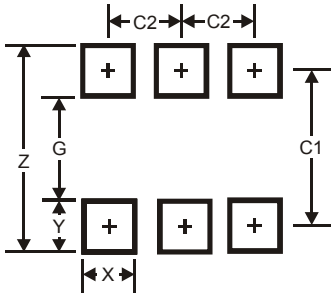
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



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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