DCX (xxxx) U

SMALL SIGNAL COMPLEMENTARY PRE-BIASED DUAL TRANSISTOR

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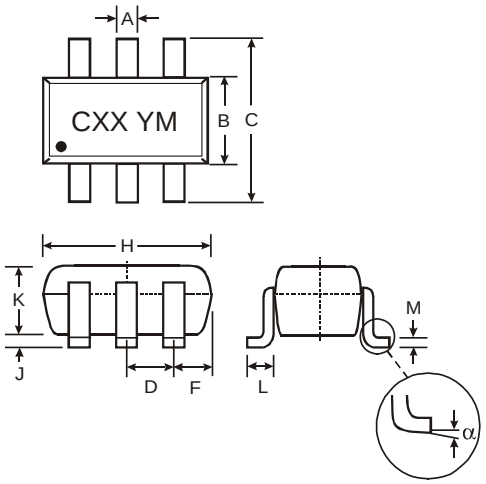
Features

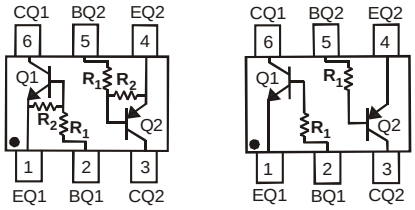
- Epitaxial Planar Die Construction
- Built-In Biasing Resistors
- Surface Mount Package Suited for Automated Assembly
- **Lead Free/RoHS Compliant (Note 3)**
- **"Green" Device (Note 4 and 5)**

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
α	0°	8°
All Dimensions in mm		



SCHEMATIC DIAGRAM

Q1: NPN Transistor
Q2: PNP Transistor

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

Maximum Ratings NPN Section @T_A = 25°C unless otherwise specified

Characteristic		Symbol	Value	Unit
Supply Voltage, (6) to (1)		V_{CC}	50	V
Input Voltage, (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	All	I_C (Max)	100	mA
Power Dissipation (Total)	(Note 2)	P_D	200	mW
Thermal Resistance, Junction to Ambient Air	(Note 1)	$R_{\theta JA}$	625	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-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.
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_2O_3 Fire Retardants.

Maximum Ratings PNP Section @T_A = 25°C unless otherwise specified

Characteristic		Symbol	Value	Unit
Supply Voltage, (4) to (3)		V_{CC}	50	V
Input Voltage, (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	All	I_C (Max)	-100	mA
Power Dissipation (Total)	(Page 1: Note 2)	P_D	200	mW
Thermal Resistance, Junction to Ambient Air	(Page 1: Note 1)	$R_{\theta JA}$	625	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

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
	DCX144EU		68				V_O = 5V, I_O = 5mA
	DCX114YU		68				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
	DCX144EU		68				V_O = -5V, I_O = -5mA
	DCX114YU		68				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

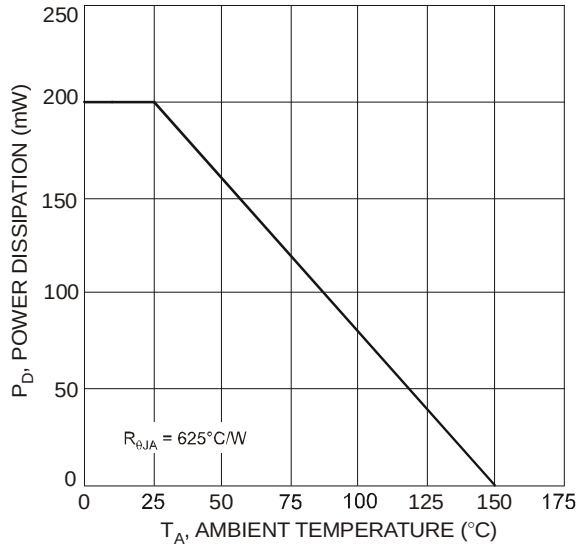


Fig. 1 Power Derating Curve

Typical Curves – DCX123JU PNP Section

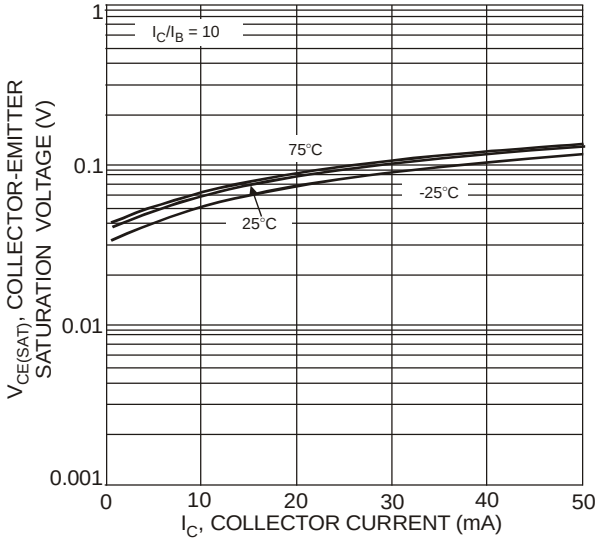


Fig. 2 Typical $V_{CE(SAT)}$ vs. I_C

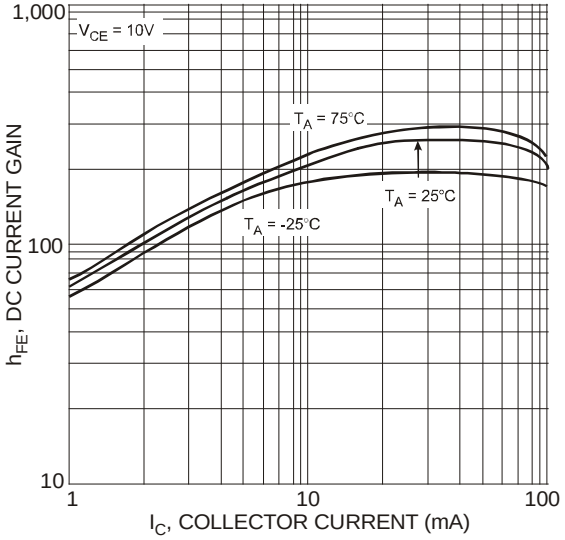


Fig. 3 Typical DC Current Gain

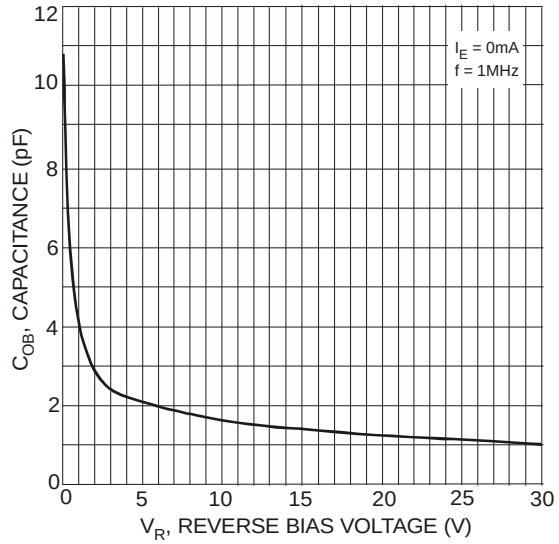


Fig. 4 Typical Output Capacitance

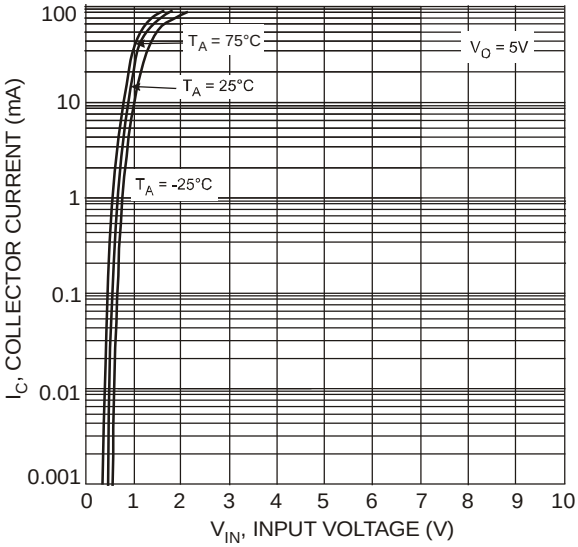


Fig. 5 Typical Collector Current vs. Input Voltage

Typical Curves – DCX123JU PNP Section (Continued)

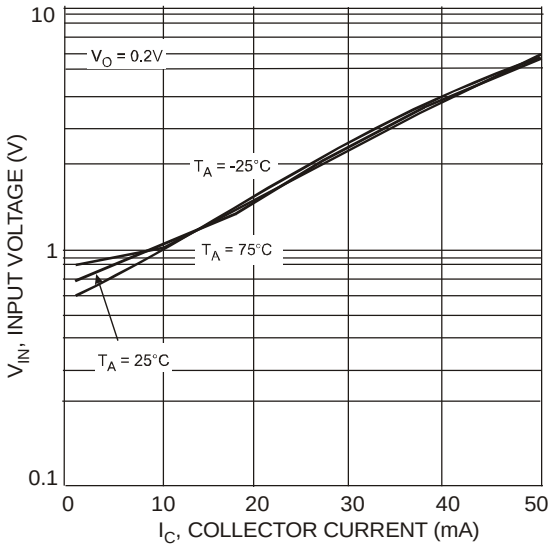


Fig. 6 Typical Input Voltage vs. Collector Current

Typical Curves – DCX123JU NPN Section

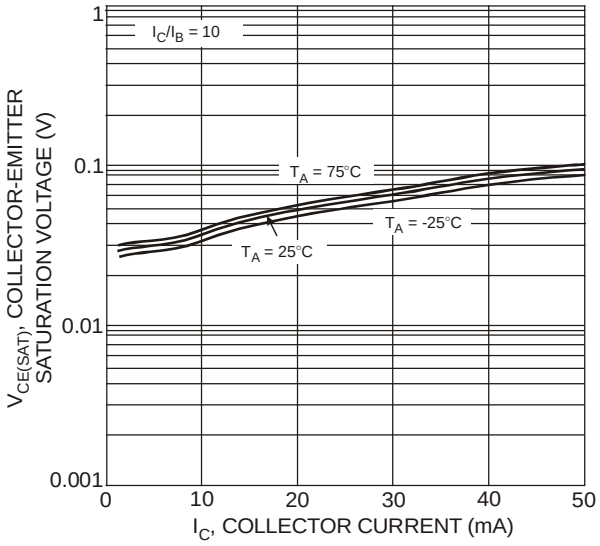


Fig. 7 Typical $V_{CE(SAT)}$ vs. I_C

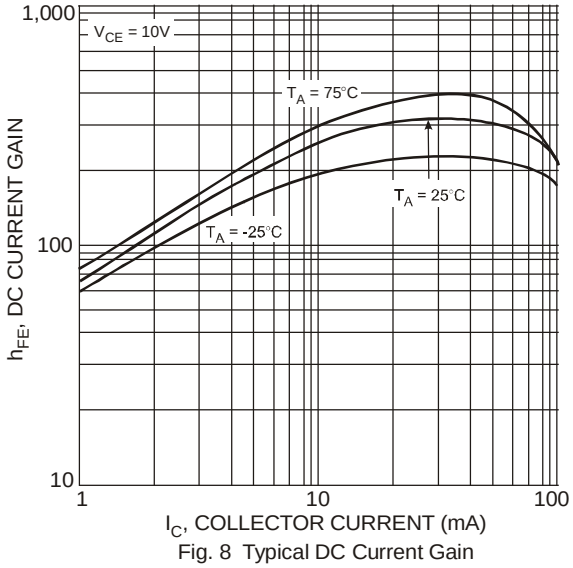


Fig. 8 Typical DC Current Gain

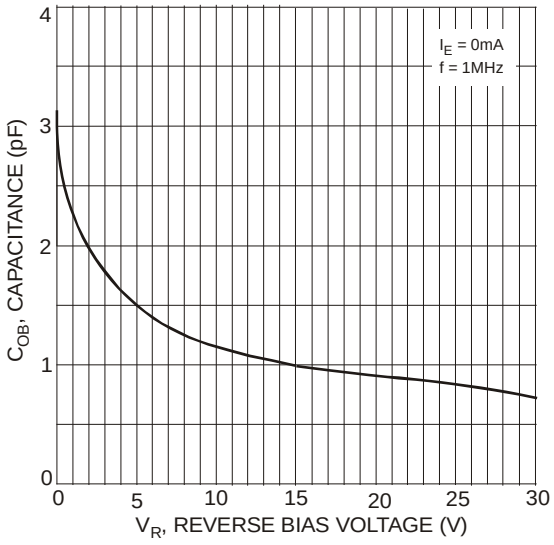


Fig. 9 Typical Output Capacitance

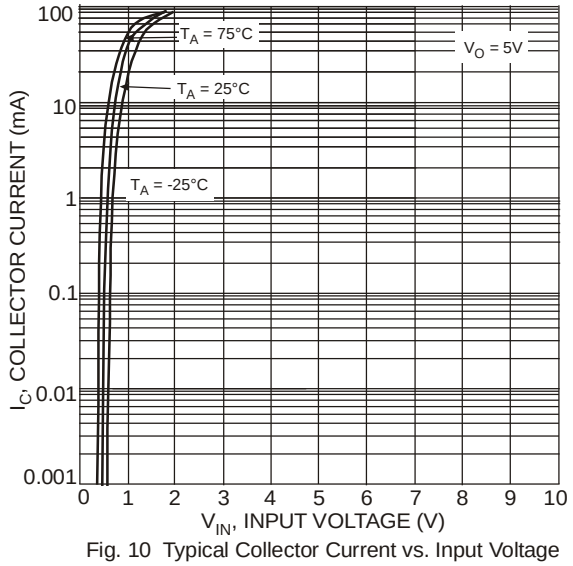


Fig. 10 Typical Collector Current vs. Input Voltage

Typical Curves – DCX123JU NPN Section (Continued)

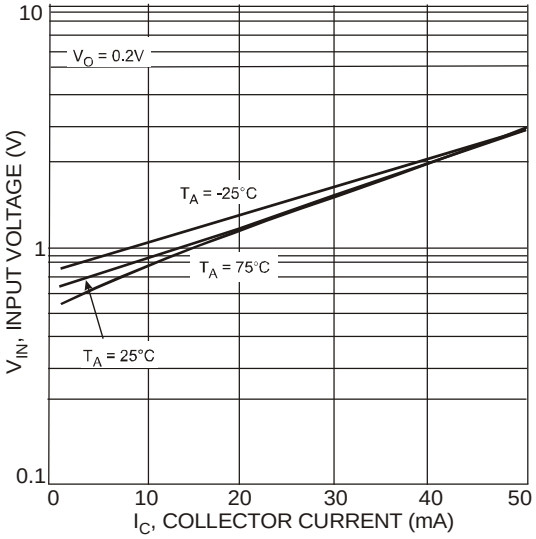


Fig. 11 Typical Input Voltage vs. Collector Current

Typical Curves – DCX143EU PNP Section

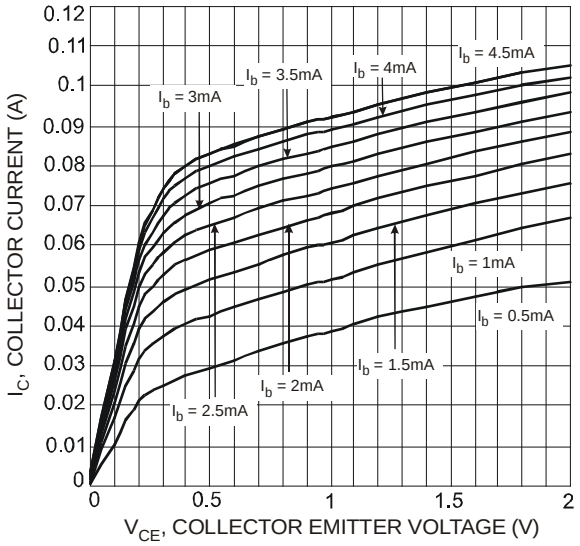


Fig. 12 Typical V_{CE} vs. I_C

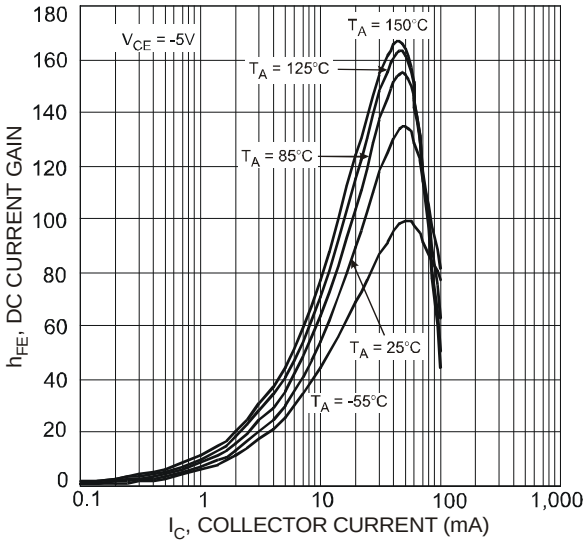


Fig. 13 Typical DC Current Gain

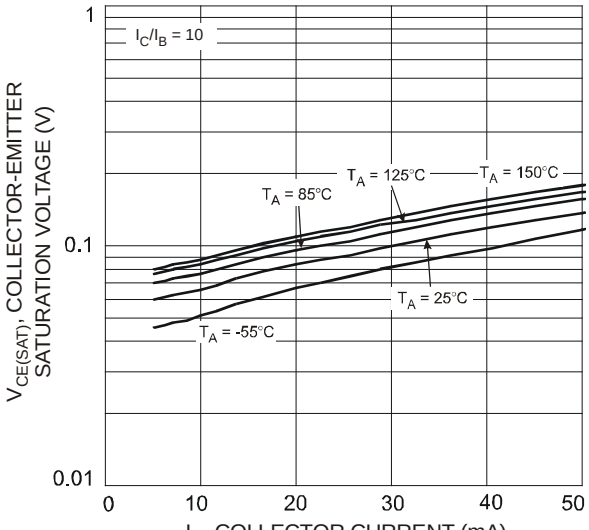


Fig. 14 Typical $V_{CE(SAT)}$ vs. I_C

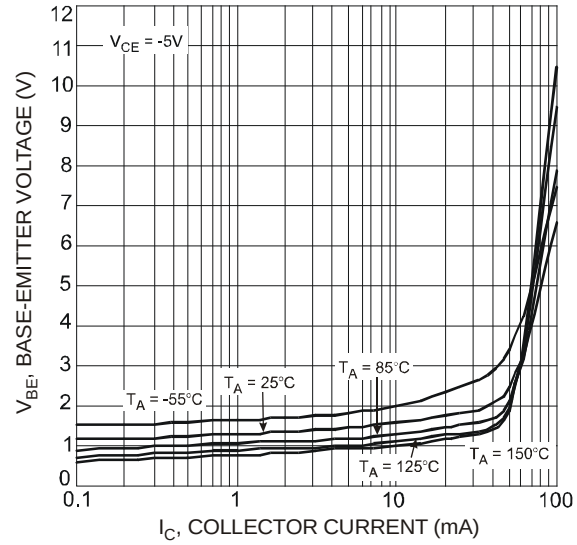


Fig. 15 Typical V_{BE} vs. I_C

Typical Curves – DCX143EU PNP Section (Continued)

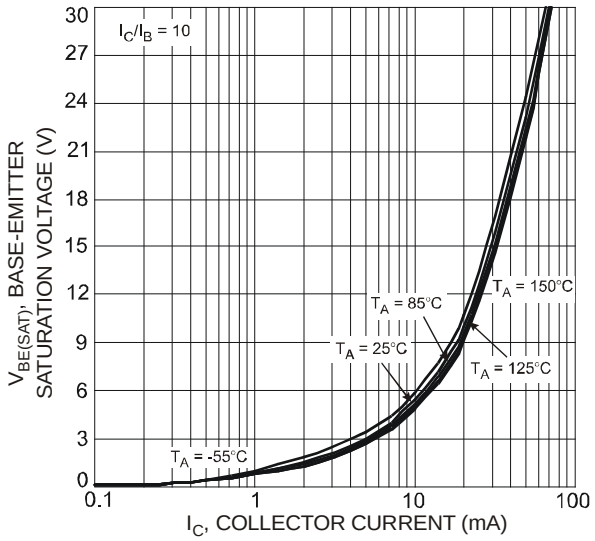


Fig. 16 Typical $V_{BE(SAT)}$ vs. I_C

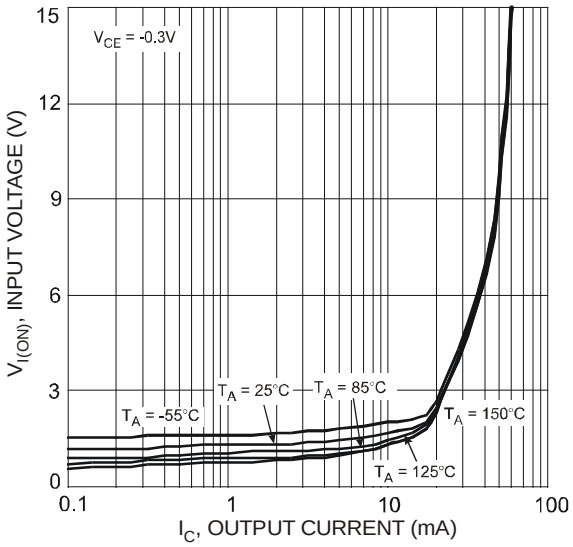


Fig. 17 Typical $V_{I(ON)}$ vs. I_C

Typical Curves – DCX143EU NPN Section

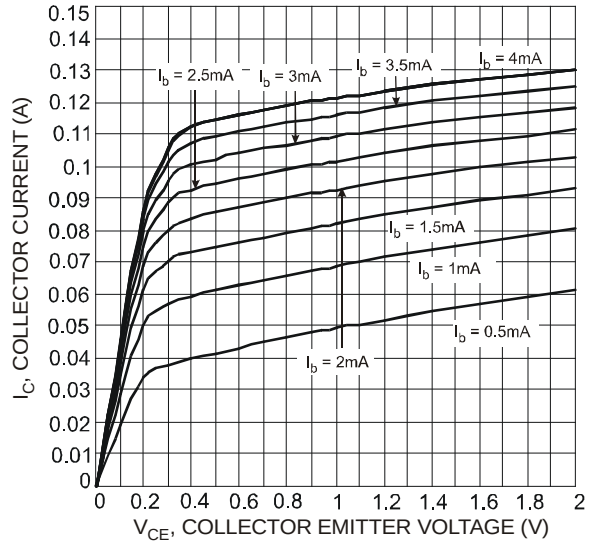


Fig. 18 Typical V_{CE} vs. I_C

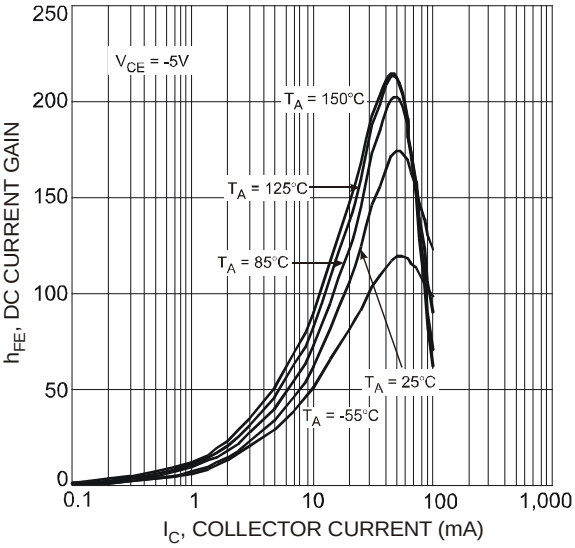


Fig. 19 Typical DC Current Gain

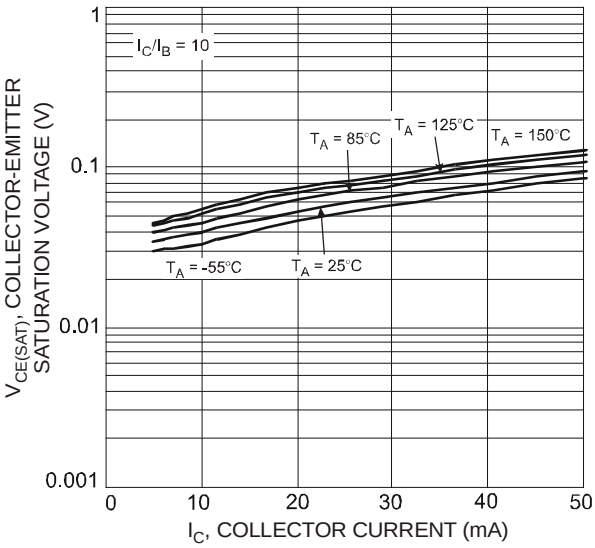


Fig. 20 Typical $V_{CE(SAT)}$ vs. I_C

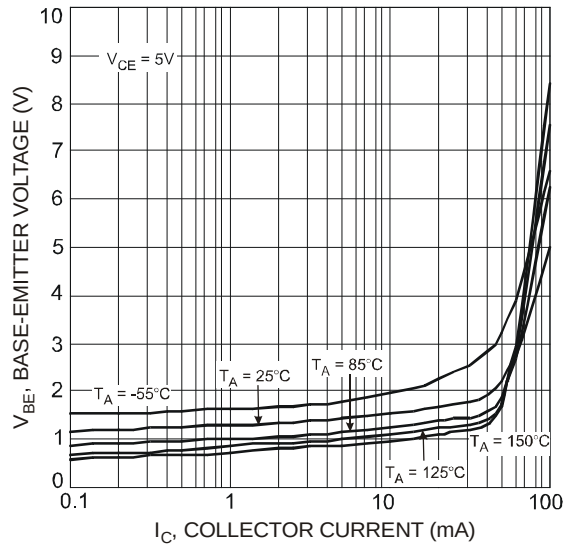


Fig. 21 Typical V_{BE} vs. I_C

Typical Curves – DCX143EU NPN Section (Continued)

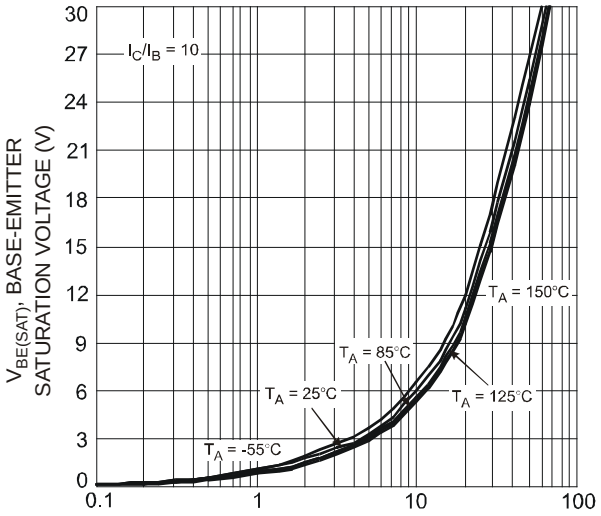


Fig. 22 Typical $V_{BE(SAT)}$ vs. I_C

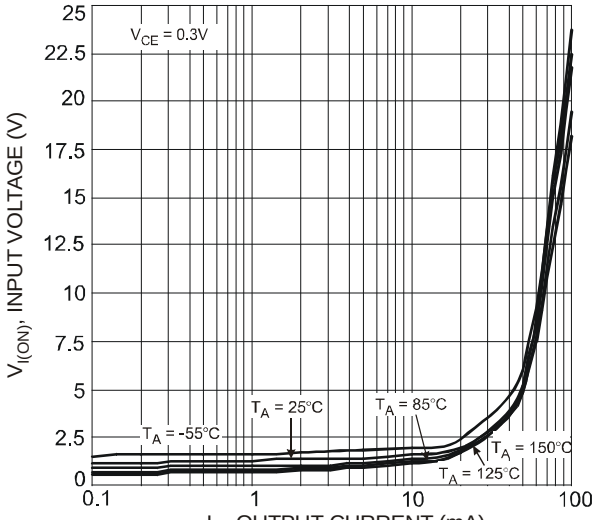


Fig. 23 Typical $V_{I(ON)}$ vs. I_C

Typical Curves – DCX114TU PNP Section

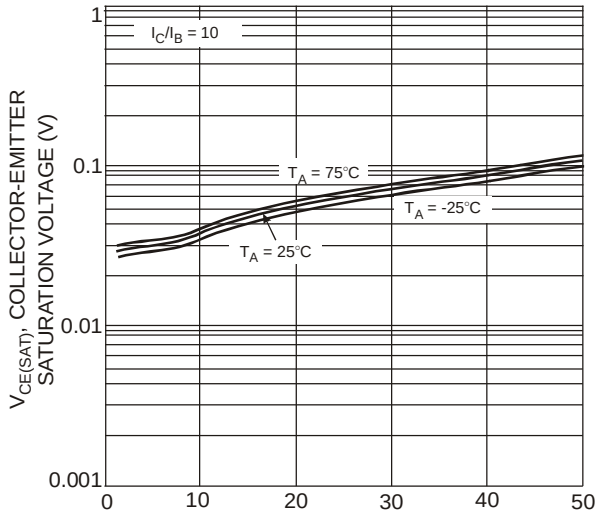


Fig. 24 Typical $V_{CE(SAT)}$ vs. I_C

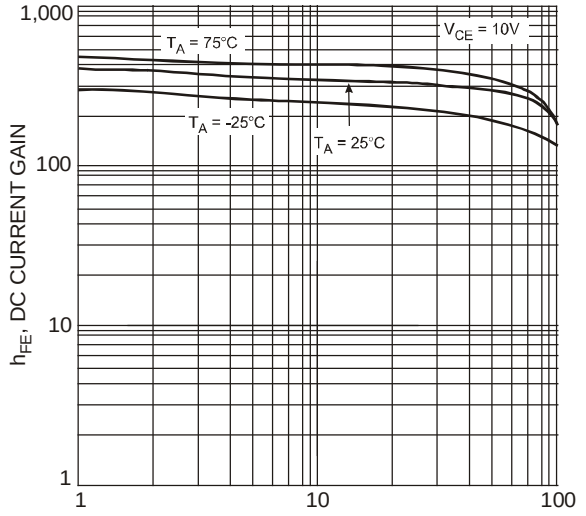


Fig. 25 Typical DC Current Gain

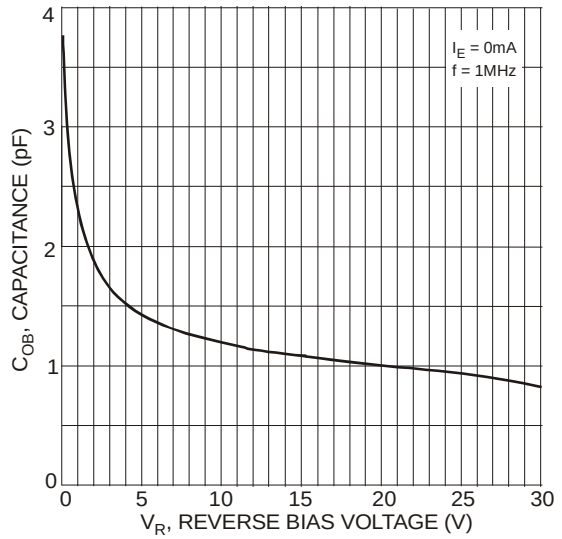


Fig. 26 Typical Output Capacitance

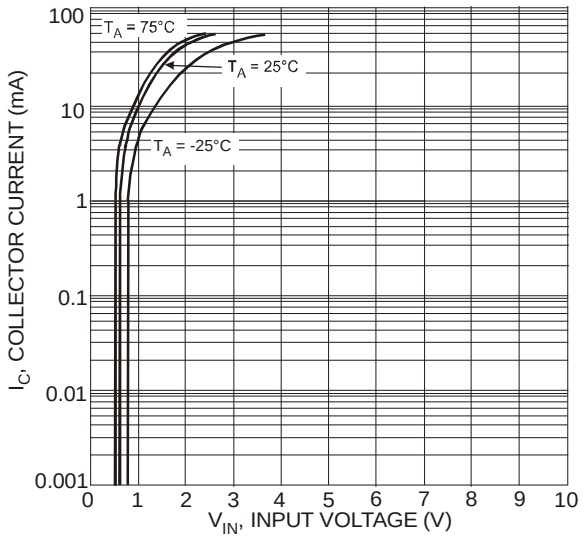


Fig. 27 Typical Collector Current vs. Input Voltage

Typical Curves – DCX114TU PNP Section (Continued)

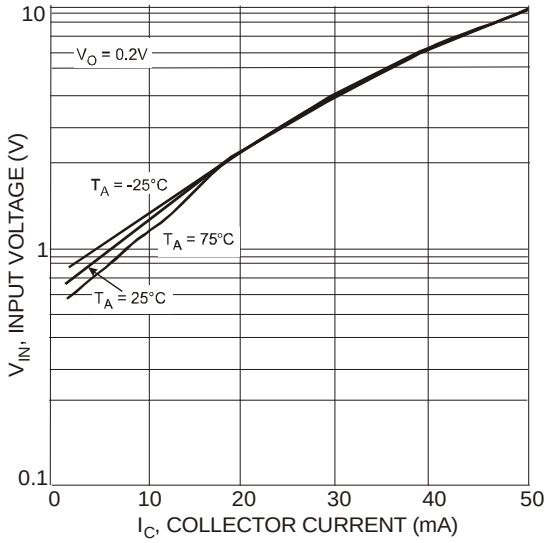


Fig. 28 Typical Input Voltage vs. Collector Current

Typical Curves – DCX114TU NPN Section

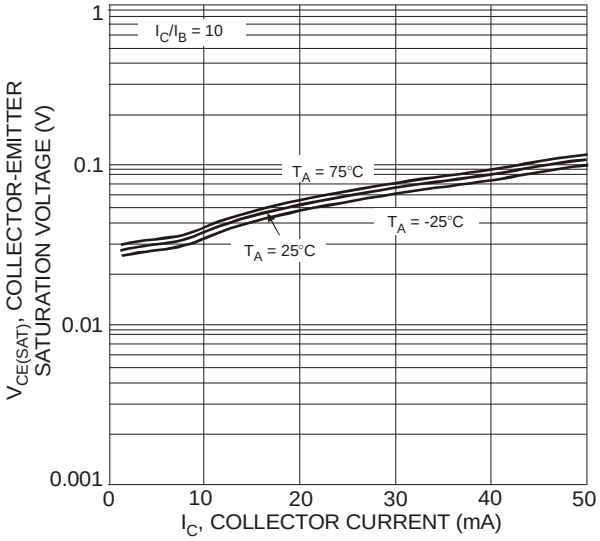


Fig. 29 Typical $V_{CE(SAT)}$ vs. I_C

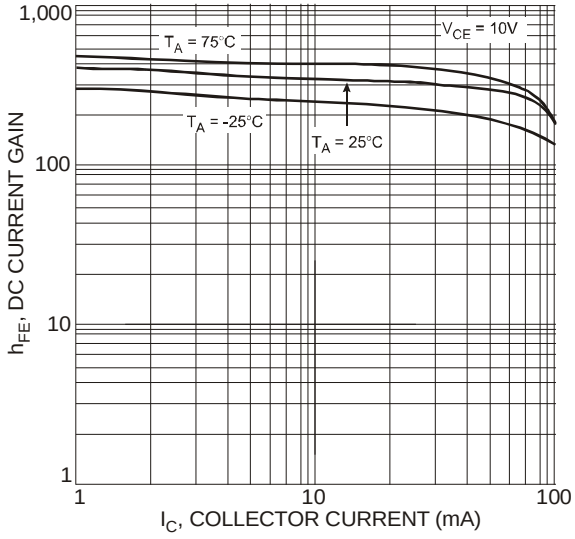


Fig. 30 Typical DC Current Gain

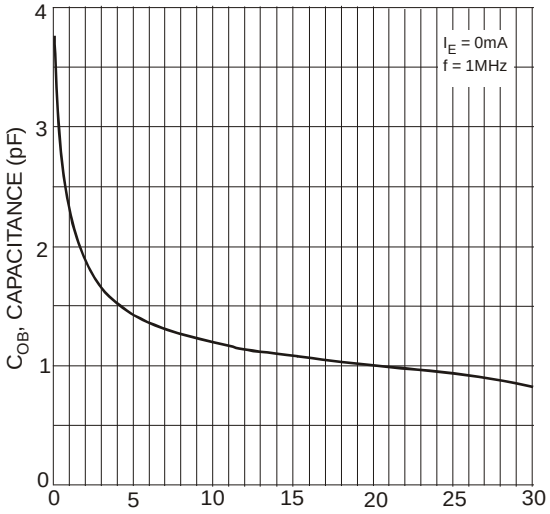


Fig. 31 Typical Output Capacitance

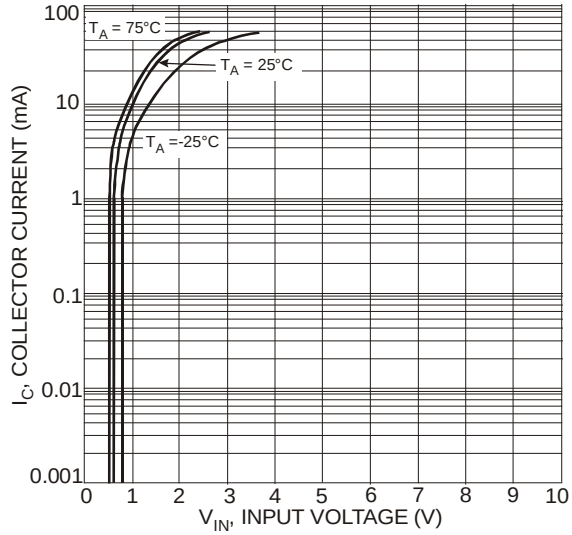


Fig. 32 Typical Collector Current vs. Input Voltage

Typical Curves – DCX114TU NPN Section (Continued)

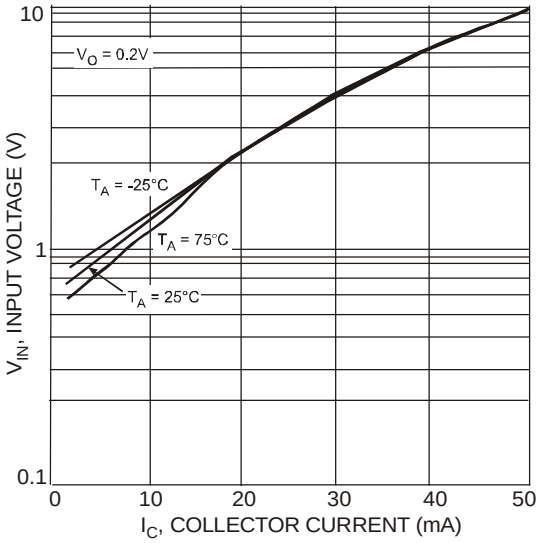


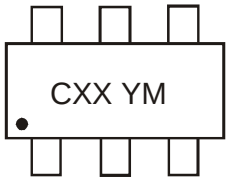
Fig. 33 Typical Input Voltage vs. Collector Current

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



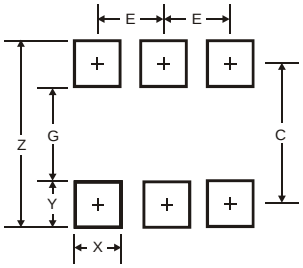
CXX = Product Type Marking Code
YM = Date Code Marking
Y = Year ex: T = 2006
M = Month ex: 9 = September

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