SMALL SIGNAL COMPLEMENTARY PRE-BIASED DUAL TRANSISTOR

Features

- Epitaxial Planar Die Construction
- Built-In Biasing Resistors
- Surface Mount Package Suited for Automated Assembly
- **"Lead Free", RoHS Compliant (Note 1)**
- **Halogen and Antimony Free "Green" Device (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

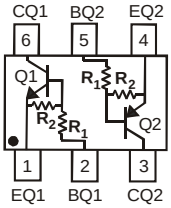
- Case: SOT363
- Case material: Molded Plastic. "Green" Molding Compound.
- Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish
- Weight: 0.006 grams (approximate)

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

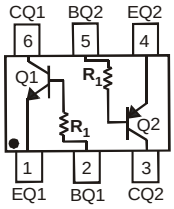
Part Number	R1 Only
DCX143TU	4.7KΩ
DCX114TU	10KΩ

SOT363

Top View



R1, R2



R1 Only

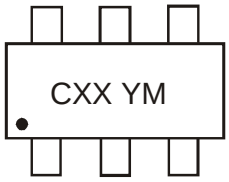
Device Schematic

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
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
DCX114YUQ-13R-F	Automotive	C14	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 purposefully added lead.
2. Diodes Inc's "Green" policy can be found on our website at http://www.diodes.com.
3. -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_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

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 (Note 5 & 6)	P_D	100	mW
Thermal Resistance, Junction to Ambient Air (Note 5)	$R_{\theta JA}$	625	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-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_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

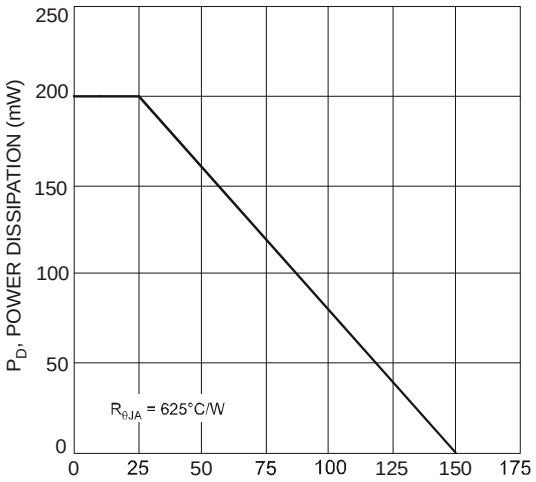


Fig. 1 Power Derating Curve

Typical Curves – DCX123JU PNP Section

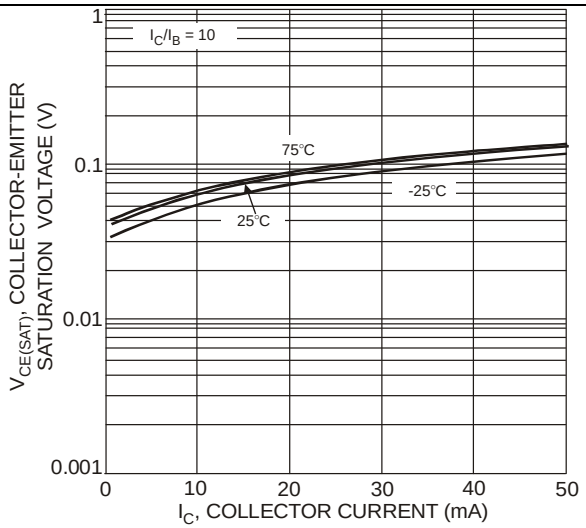


Fig. 2 Typical $V_{CE(SAT)}$ vs. I_C

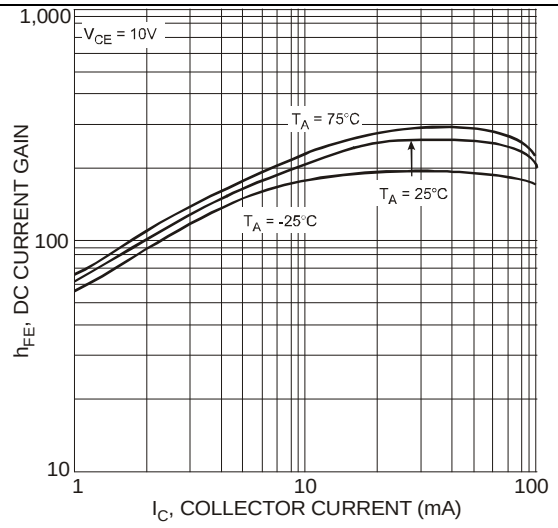


Fig. 3 Typical DC Current Gain

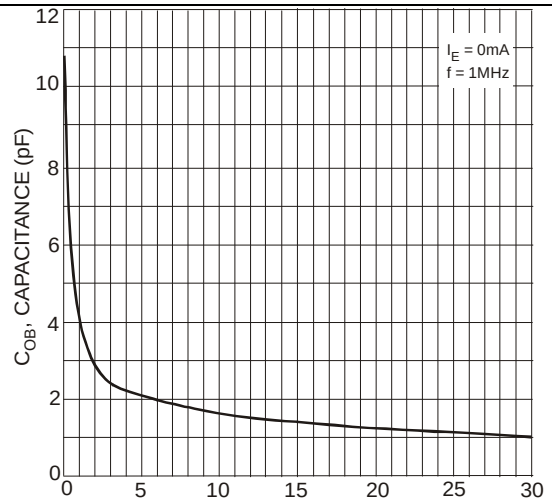


Fig. 4 Typical Output Capacitance

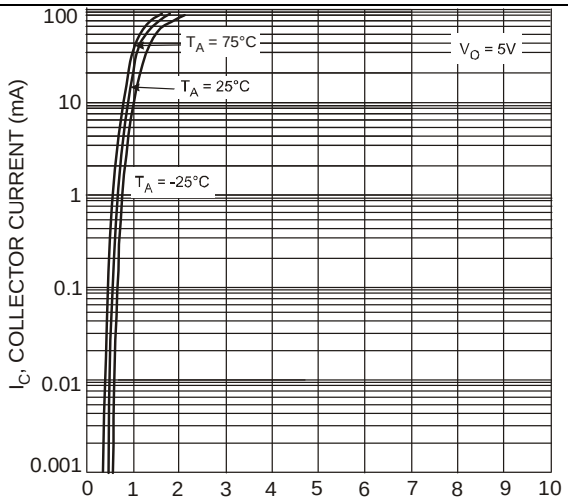


Fig. 5 Typical Collector Current vs. Input Voltage

Typical Curves – DCX123JU PNP Section (cont.)

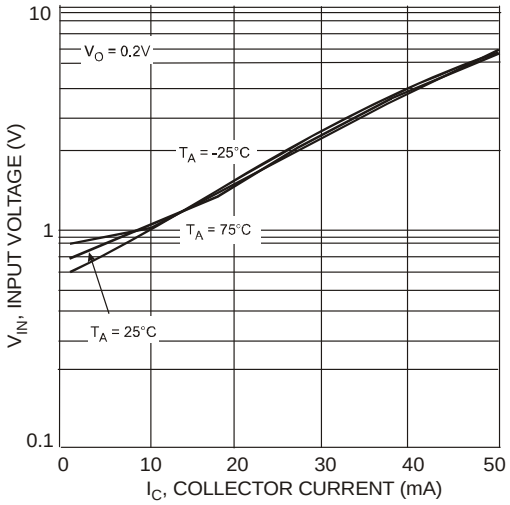


Fig. 6 Typical Input Voltage vs. Collector Current

Typical Curves – DCX123JU NPN Section

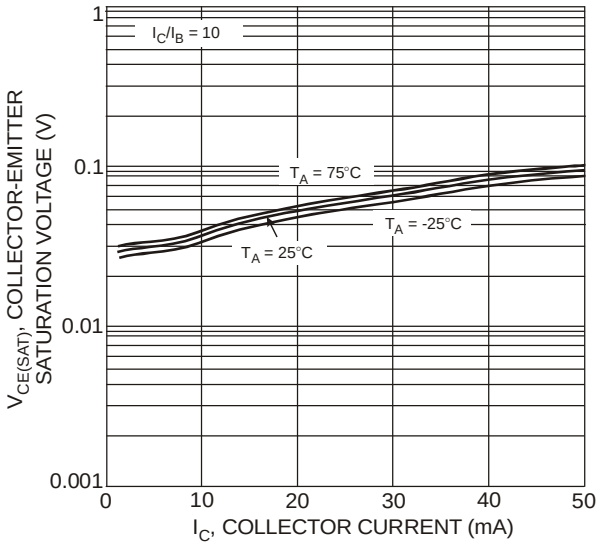


Fig. 7 Typical $V_{CE(SAT)}$ vs. I_C

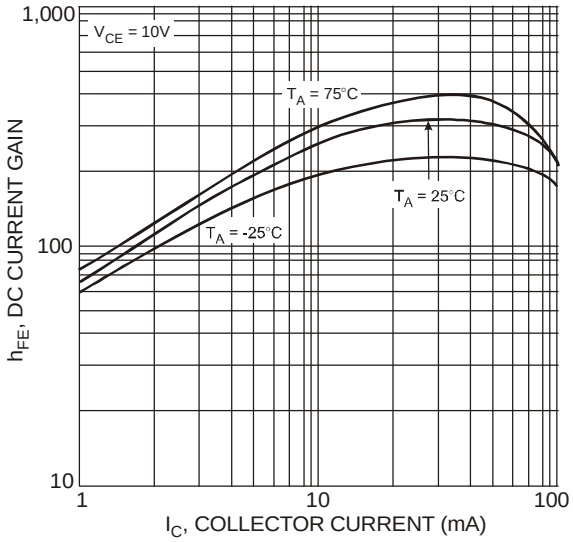


Fig. 8 Typical DC Current Gain

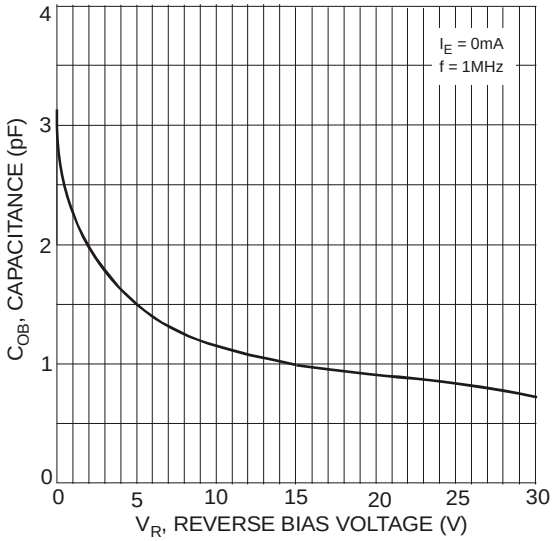


Fig. 9 Typical Output Capacitance

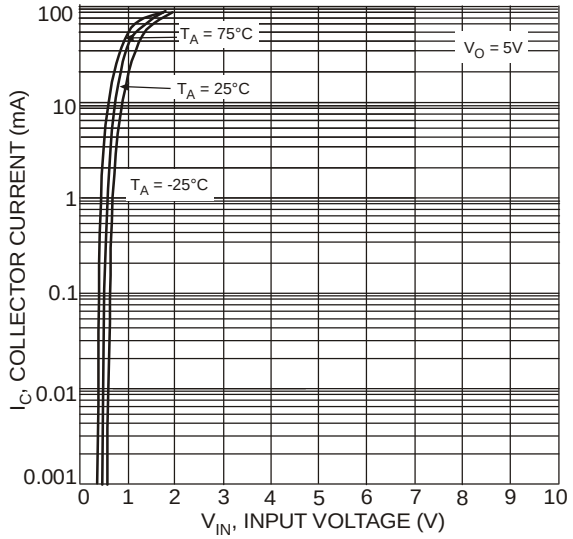


Fig. 10 Typical Collector Current vs. Input Voltage

Typical Curves – DCX123JU NPN Section (cont.)

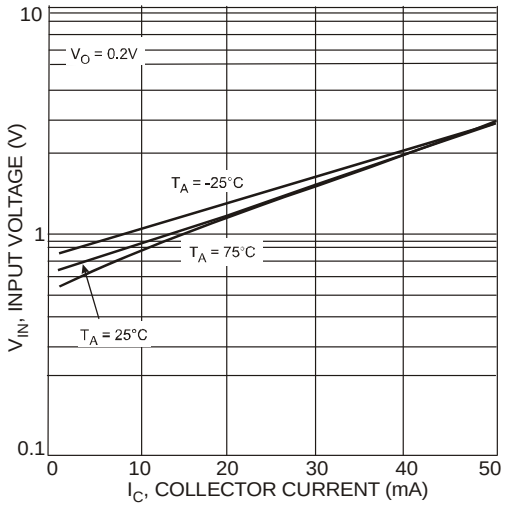


Fig. 11 Typical Input Voltage vs. Collector Current

Typical Curves – DCX143EU PNP Section

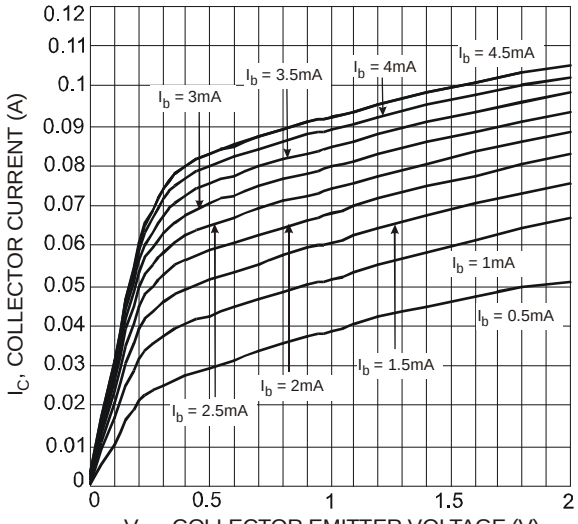


Fig. 12 Typical V_{CE} vs. I_C

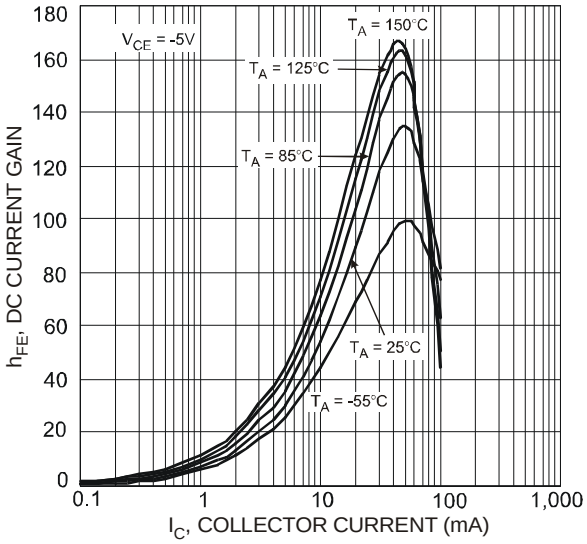


Fig. 13 Typical DC Current Gain

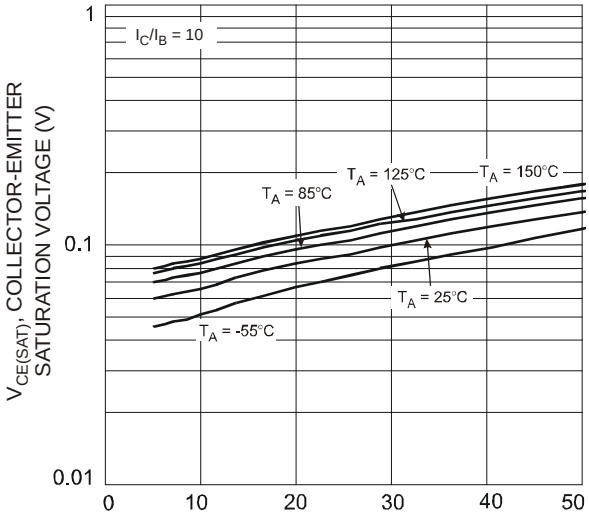


Fig. 14 Typical $V_{CE(SAT)}$ vs. I_C

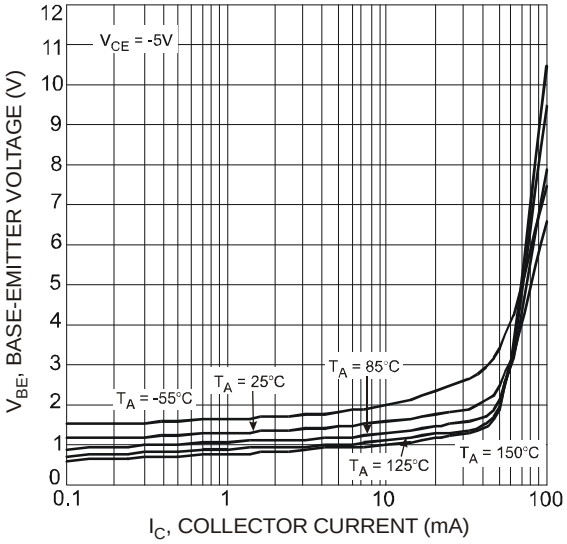


Fig. 15 Typical V_{BE} vs. I_C

Typical Curves – DCX143EU PNP Section (cont.)

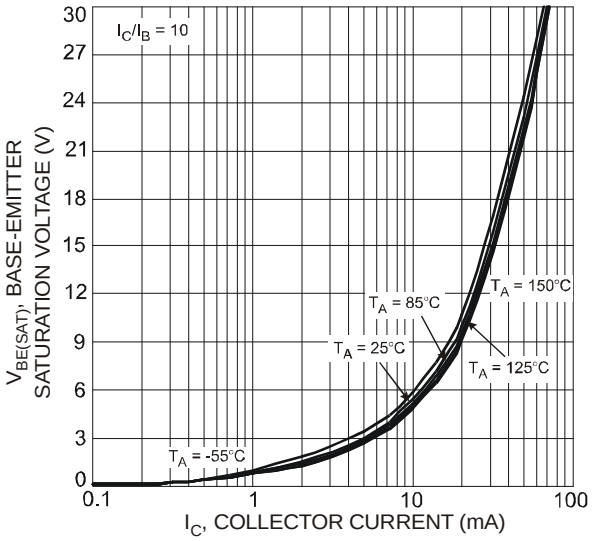


Fig. 16 Typical $V_{BE(SAT)}$ vs. I_C

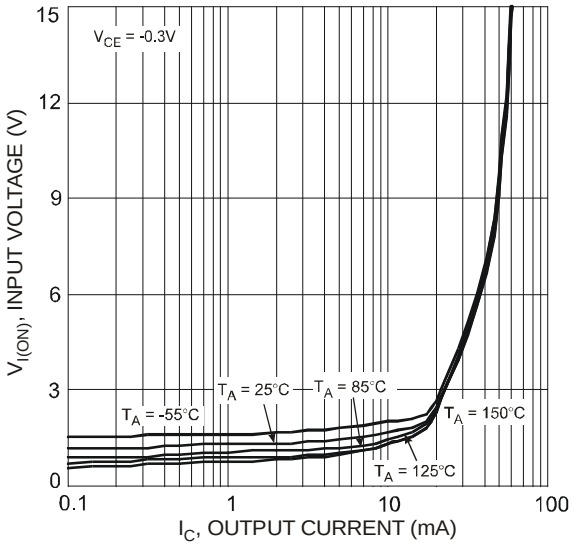


Fig. 17 Typical $V_{I(ON)}$ vs. I_C

Typical Curves – DCX143EU NPN Section

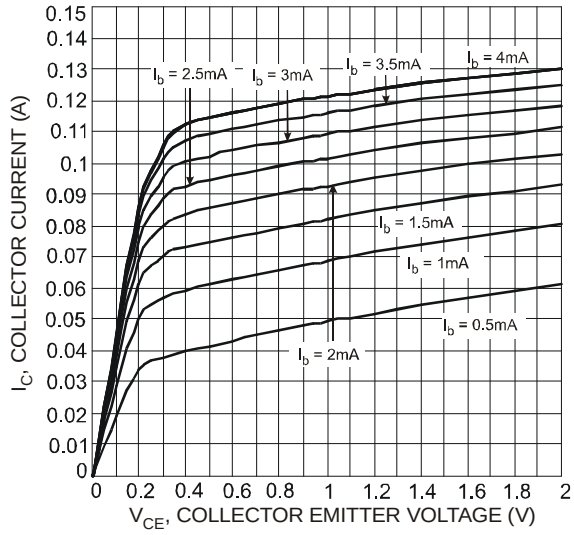


Fig. 18 Typical V_{CE} vs. I_C

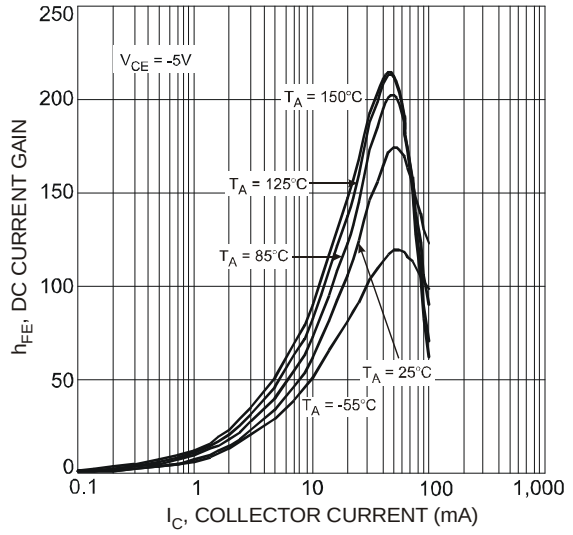


Fig. 19 Typical DC Current Gain

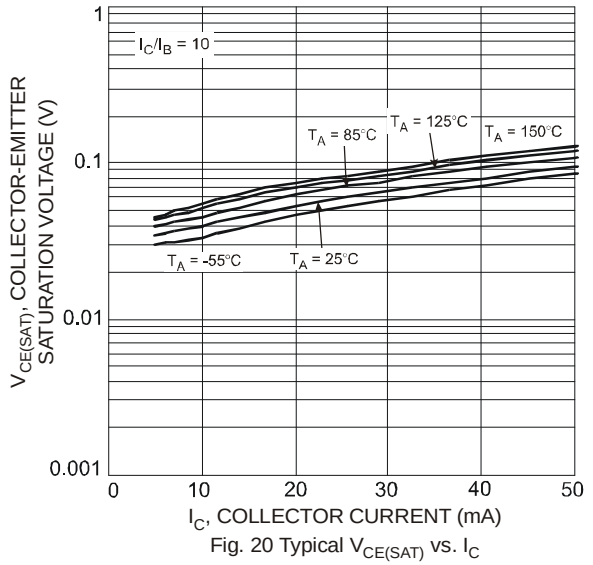


Fig. 20 Typical $V_{CE(SAT)}$ vs. I_C

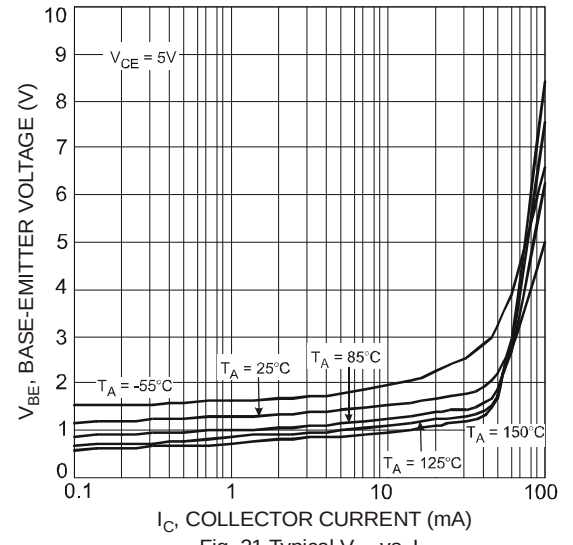


Fig. 21 Typical V_{BE} vs. I_C

Typical Curves – DCX143EU NPN Section (cont.)

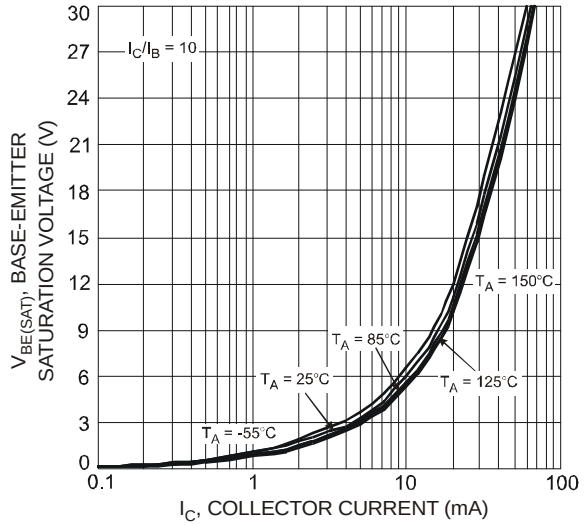


Fig. 22 Typical $V_{BE(SAT)}$ vs. I_C

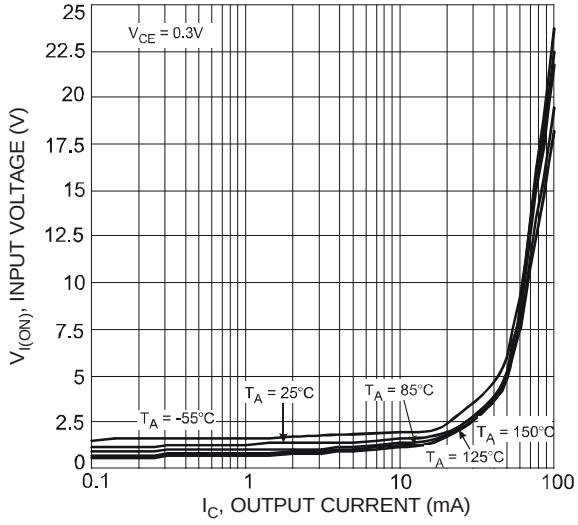


Fig. 23 Typical $V_{I(ON)}$ vs. I_C

Typical Curves – DCX114TU PNP Section

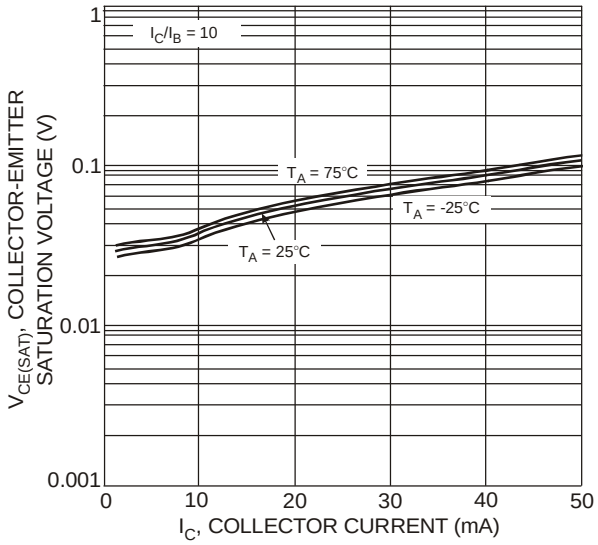


Fig. 24 Typical $V_{CE(SAT)}$ vs. I_C

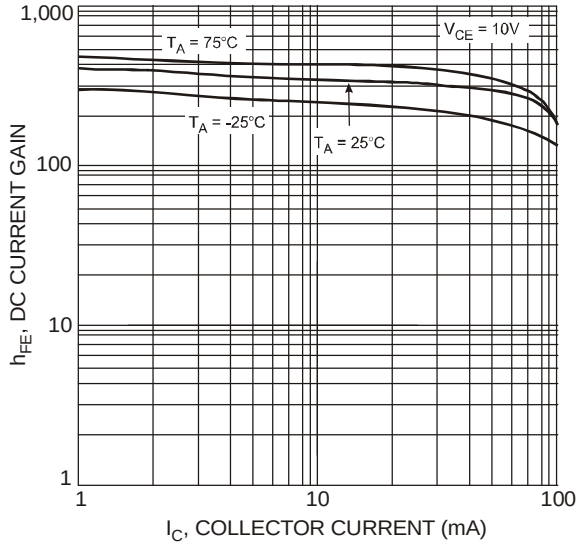


Fig. 25 Typical DC Current Gain

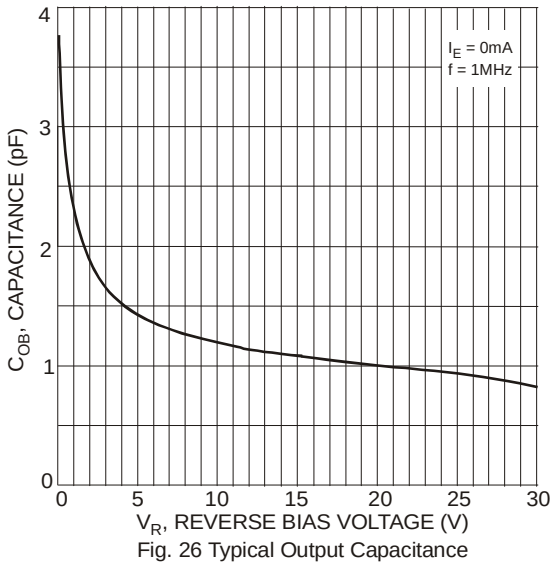


Fig. 26 Typical Output Capacitance

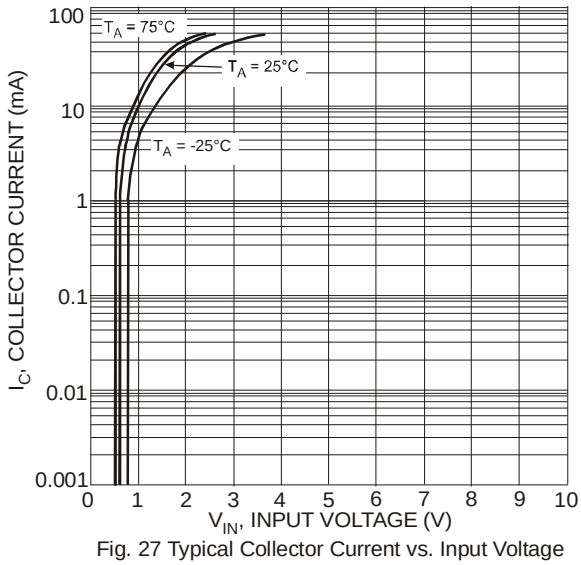


Fig. 27 Typical Collector Current vs. Input Voltage

Typical Curves – DCX114TU PNP Section (cont.)

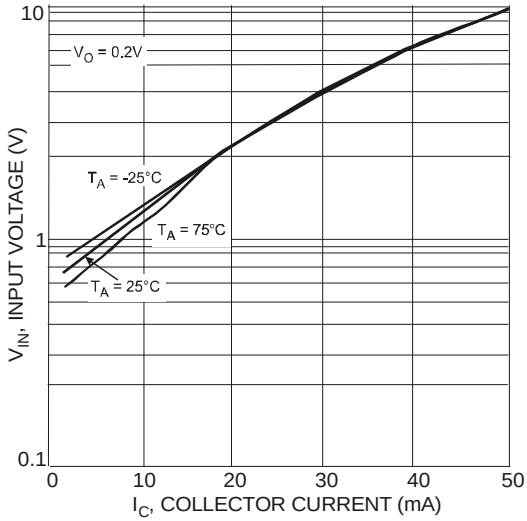


Fig. 28 Typical Input Voltage vs. Collector Current

Typical Curves – DCX114TU NPN Section

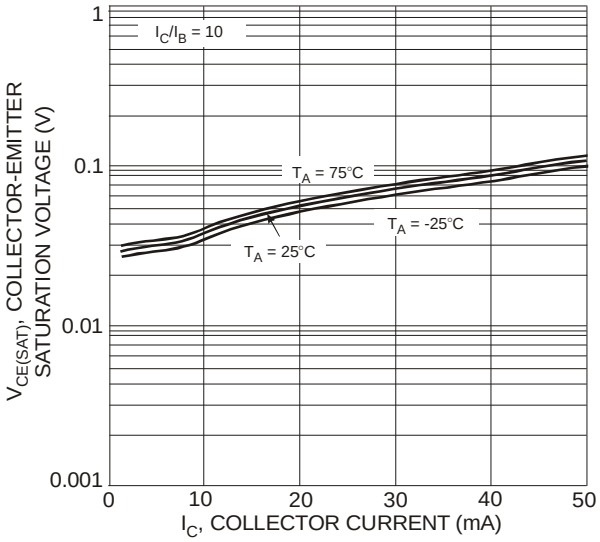


Fig. 29 Typical $V_{CE(SAT)}$ vs. I_C

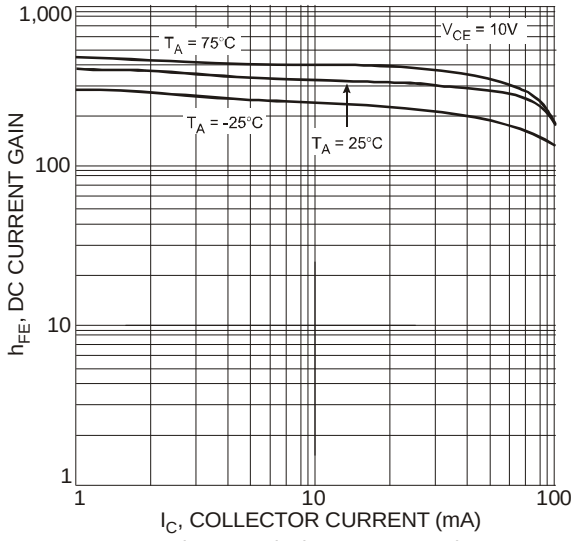


Fig. 30 Typical DC Current Gain

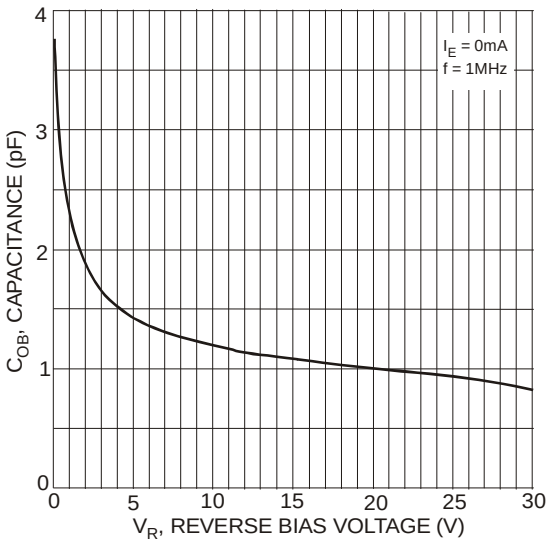


Fig. 31 Typical Output Capacitance

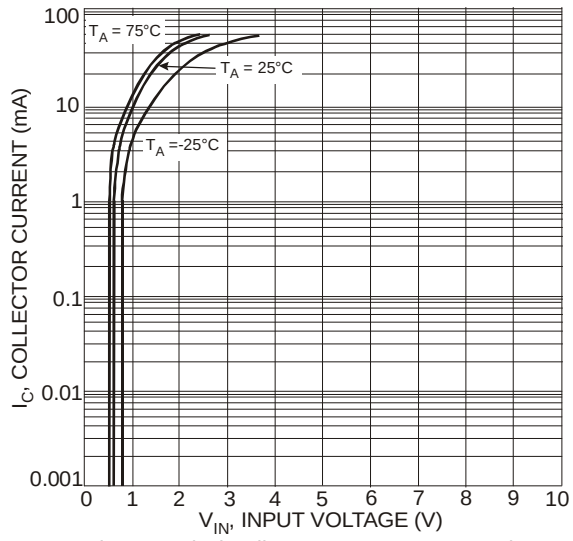


Fig. 32 Typical Collector Current vs. Input Voltage

Typical Curves – DCX114TU NPN Section (cont.)

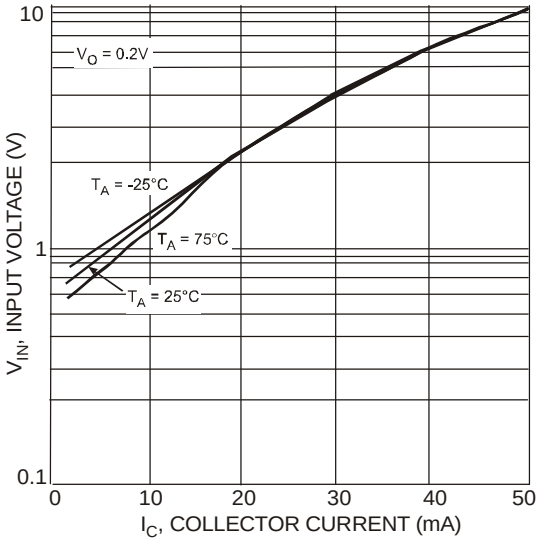
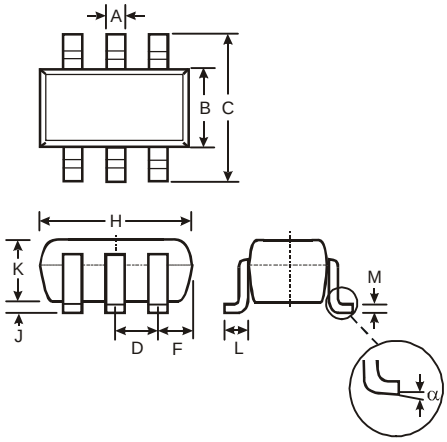


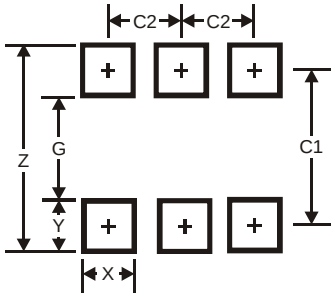
Fig. 33 Typical Input Voltage vs. Collector Current

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
α	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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