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)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

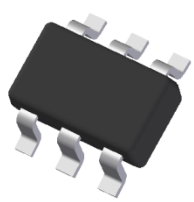
Mechanical Data

- Package: SOT363
- Package 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)

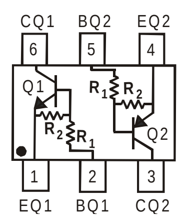
Part Number	R1(NOM)	R2(NOM)
DCX124EU	22kΩ	22kΩ
DCX144EU	47kΩ	47kΩ
DCX114YU	10kΩ	47kΩ
DCX123JU	2.2kΩ	47kΩ
DCX114EU	10kΩ	10kΩ
DCX143EU	4.7kΩ	4.7kΩ
DCX143ZU	4.7kΩ	47kΩ
DCX115EU	100kΩ	100kΩ

Part Number	R1 Only
DCX143TU	4.7kΩ
DCX114TU	10kΩ

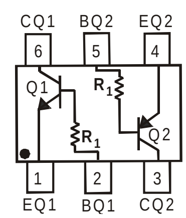
SOT363



Top View



R1, R2



R1 Only

Device Schematic

Ordering Information (Notes 4, 5)

Product	Status	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
DCX124EU-7-F	Active	Standard	C17	7	8	3,000
DCX124EUQ-7-F	NRND (Use ACX124EUQ)	Automotive	C17	7	8	3,000
DCX124EUQ-13-F	NRND (Use ACX124EUQ)	Automotive	C17	13	8	10,000
DCX124EUQ-13R-F	NRND (Use ACX124EUQ)	Automotive	C17	13	8	10,000
DCX144EU-7-F	Active	Standard	C20	7	8	3,000
DCX144EU-7R-F	Active	Standard	C20	7	8	3,000
DCX144EUQ-7-F	Active	Automotive	C20	7	8	3,000
DCX144EUQ-7R-F	Active	Automotive	C20	7	8	3,000
DCX114YU-7-F	Active	Standard	C14	7	8	3,000
DCX114YU-7R-F	Active	Standard	C14	7	8	3,000
DCX114YUQ-7-F	NRND (Use ACX114YUQ)	Automotive	C14	7	8	3,000
DCX114YUQ-13-F	NRND (Use ACX114YUQ)	Automotive	C14	13	8	10,000
DCX114YUQ-13R-F	NRND (Use ACX114YUQ)	Automotive	C14	13	8	10,000
DCX123JU-7-F	Active	Standard	C06	7	8	3,000
DCX123JUQ-7-F	Active	Automotive	C06	7	8	3,000
DCX114EU-7-F	Active	Standard	C13	7	8	3,000
DCX114EU-13R-F	Active	Standard	C13	13	8	10,000

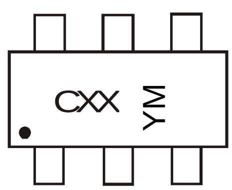
Ordering Information (Notes 4, 5) (continued)

Product	Status	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
DCX114EUQ-7-F	NRND (Use ACX114EUQ)	Automotive	C13	7	8	3,000
DCX114EUQ-13-F	NRND (Use ACX114EUQ)	Automotive	C13	13	8	10,000
DCX114EUQ-13R-F	NRND (Use ACX114EUQ)	Automotive	C13	13	8	10,000
DCX143TU-7-F	Active	Standard	C07	7	8	3,000
DCX143EU-7-F	Active	Standard	C08	7	8	3,000
DCX114TU-7-F	Active	Standard	C12	7	8	3,000
DCX143ZU-7-F	Active	Standard	C02	7	8	3,000
DCX115EU-7-F	Active	Standard	C01	7	8	3,000

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ 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. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.
5. NRND = Not Recommended for New Design.

Marking Information

SOT363



CXX = Product Type Marking Code
YM = Date Code Marking
Y or $\overline{Y}$= Year (ex: I = 2021)
M = Month (ex: D = December)

Date Code Key

Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Code	H	I	J	K	L	M	N	O	P	R	S	T

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	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		-10 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

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)	$R_{\theta JA}$	625	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Notes: 6. Mounted on FR-4 PC Board with minimum recommended pad layout.
7. 150mW per element must not be exceeded.

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

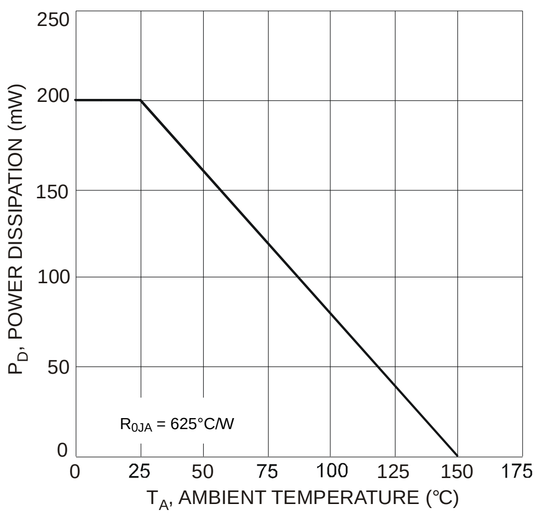


Fig. 1 Power Derating Curve

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_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 DCX124EUQ	G_I	56 60	—	—	—	V_O = 5V, I_O = 5mA V_O = 5V, I_O = 5mA
	DCX144EU		68				V_O = 5V, I_O = 5mA
	DCX114YU DCX114YUQ		68 80				V_O = 5V, I_O = 10mA 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		$\Delta R_2/R_1$	-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			
	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			-2.5	-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 DCX124EUQ	G_I	56 60	—	—	—	V_O = -5V, I_O = -5mA V_O = -5V, I_O = -5mA
	DCX144EU		68				V_O = -5V, I_O = -5mA
	DCX114YU DCX114YUQ		68 80				V_O = -5V, I_O = -10mA 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
	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		$\Delta R_2/R_1$	-20	—	+20	%	—
Gain-Bandwidth Product		f_T	—	250	—	MHz	V_{CE} = -10V, I_E = -5mA, f = 100MHz

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

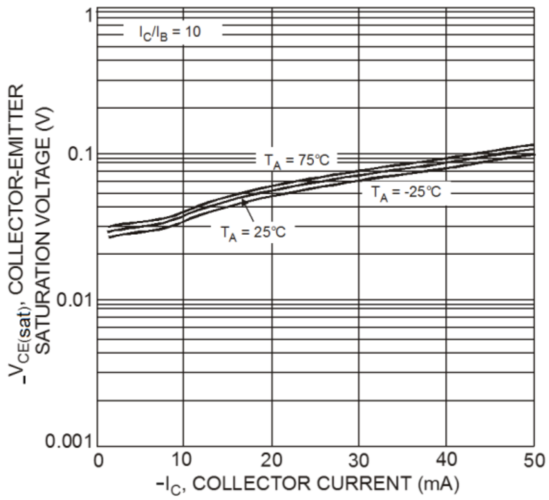


Fig. 24 Typical $V_{CE(sat)}$ vs. I_C

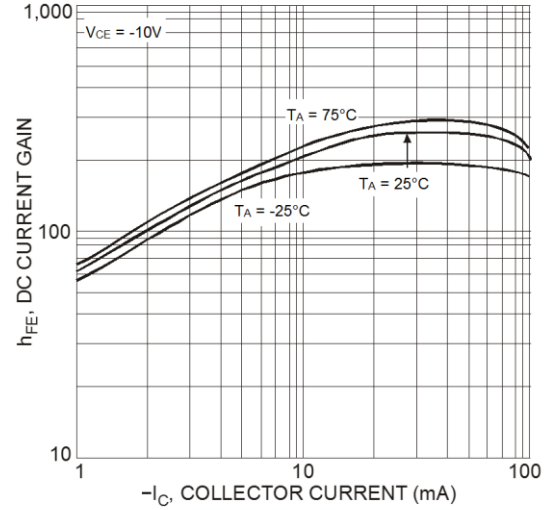


Fig. 3 Typical DC Current Gain

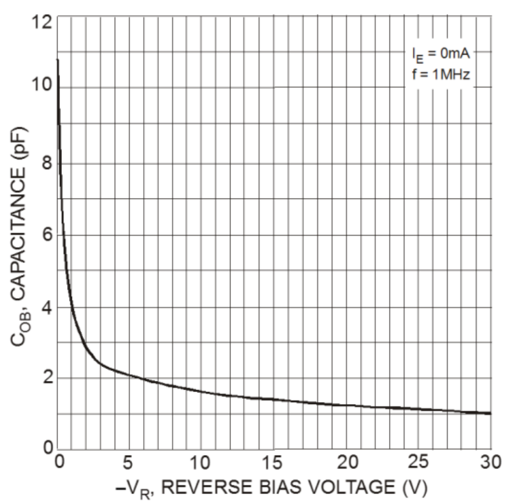


Fig. 4 Typical Output Capacitance

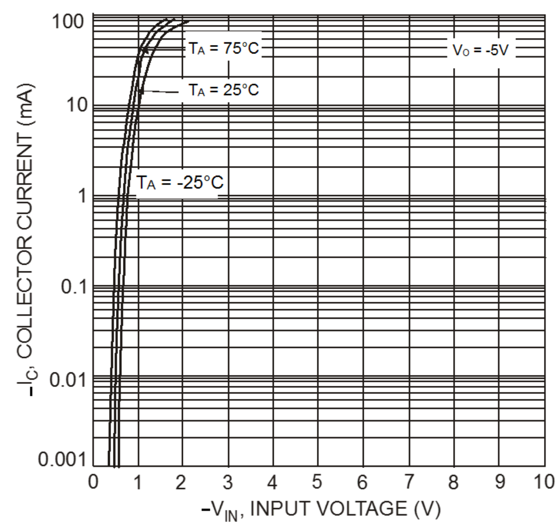


Fig. 5 Typical Collector Current vs. Input Voltage

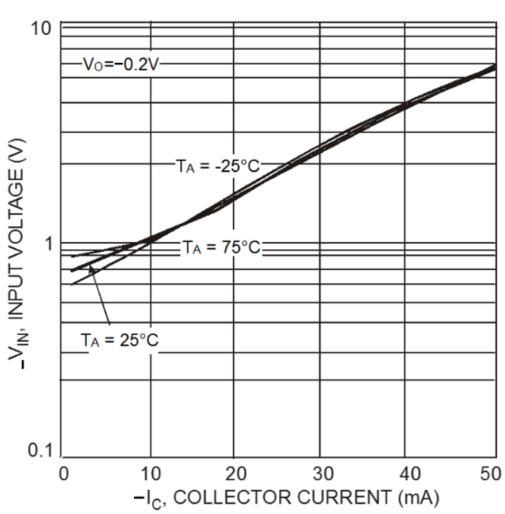


Fig. 6 Typical Input Voltage vs. Collector Current

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

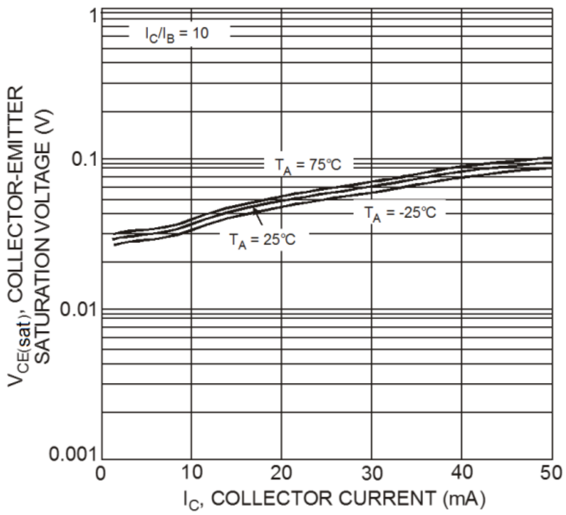


Fig. 7 Typical $V_{CE(sat)}$ vs. I_C

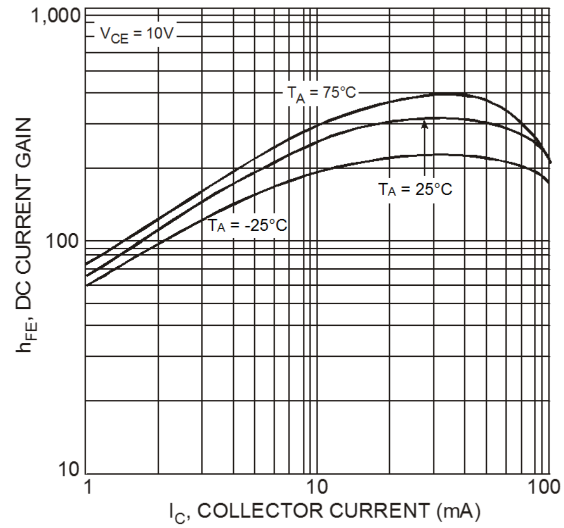


Fig. 8 Typical DC Current Gain

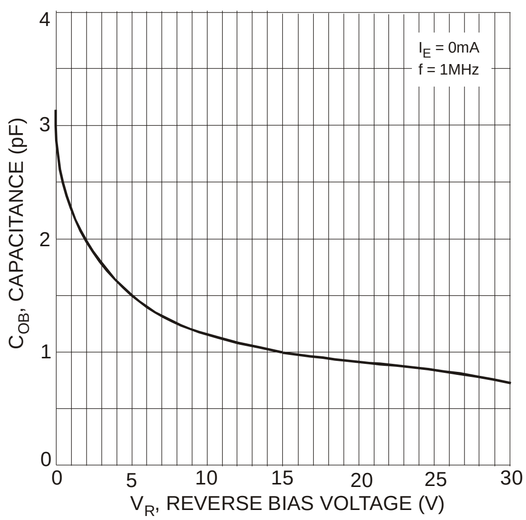


Fig. 9 Typical Output Capacitance

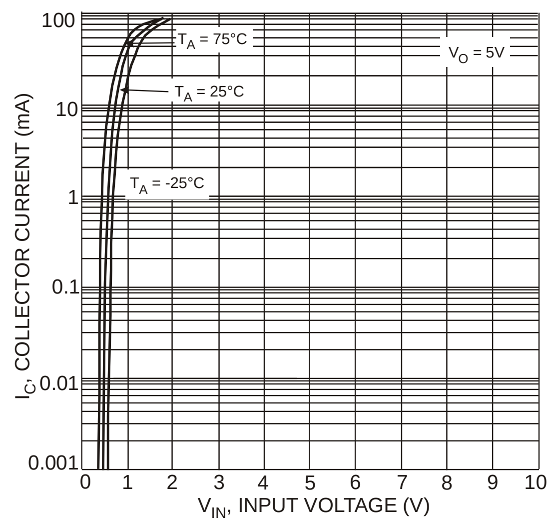


Fig. 10 Typical Collector Current vs. Input Voltage

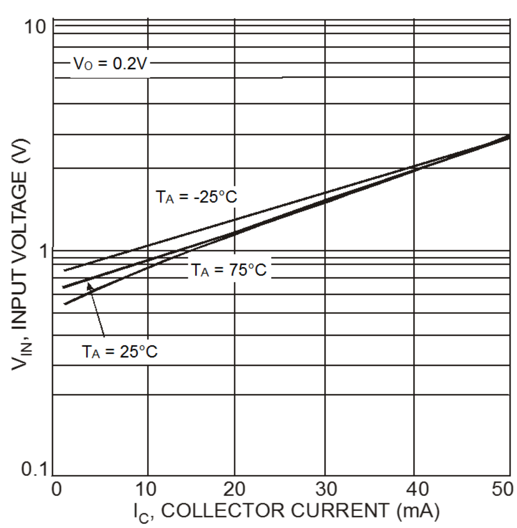


Fig. 11 Typical Input Voltage vs. Collector Current

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

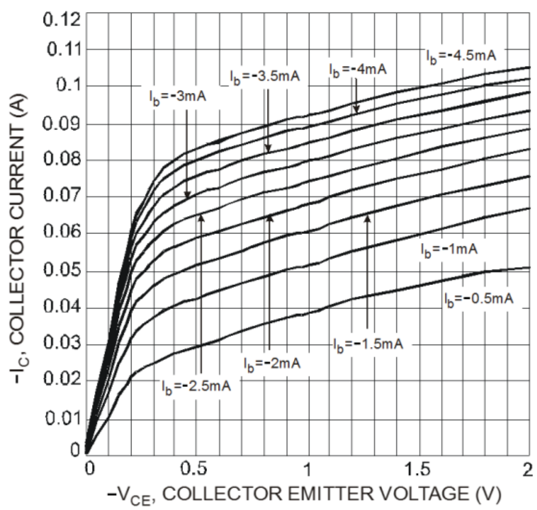


Fig. 12 Typical V_{CE} vs. I_C

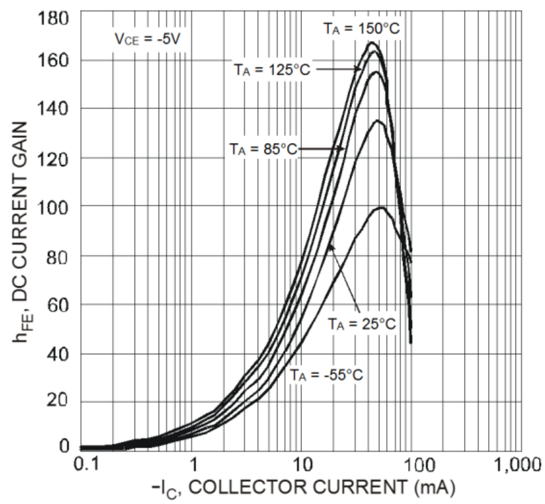


Fig. 13 Typical DC Current Gain

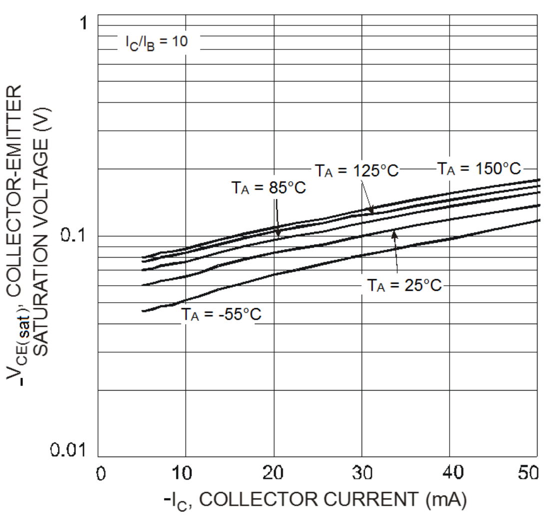


Fig. 14 Typical $V_{CE(sat)}$ vs. I_C

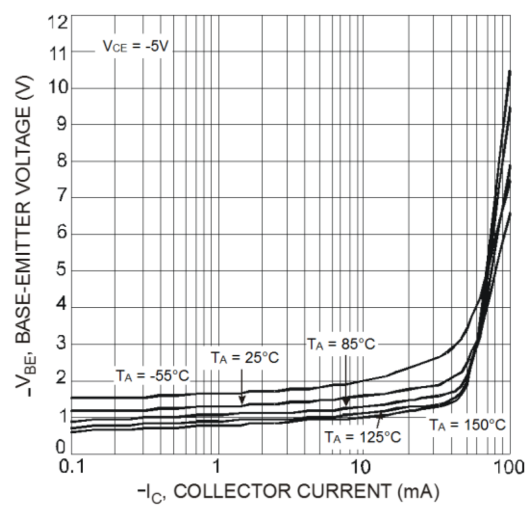


Fig. 15 Typical V_{BE} vs. I_C

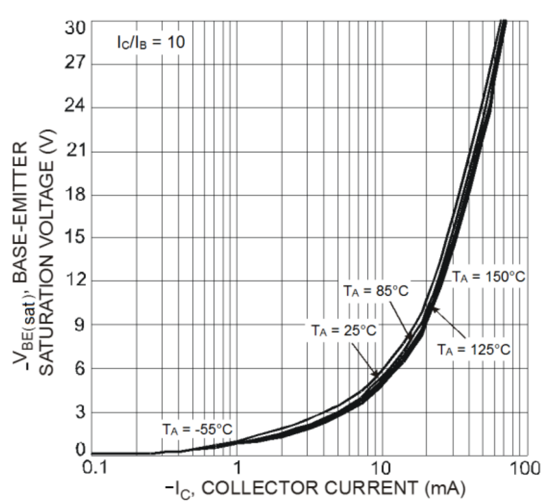


Fig. 16 Typical $V_{BE(sat)}$ vs. I_C

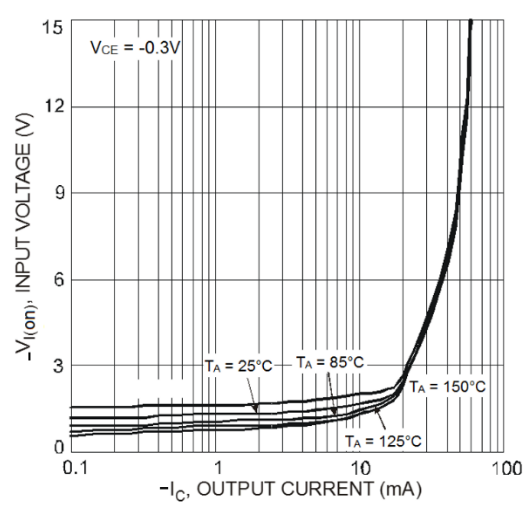


Fig. 17 Typical $V_{I(on)}$ vs. I_C

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

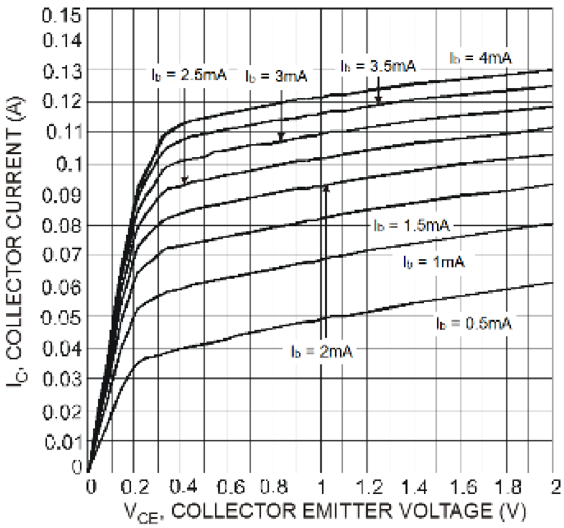


Fig. 18 Typical V_{CE} vs. I_C

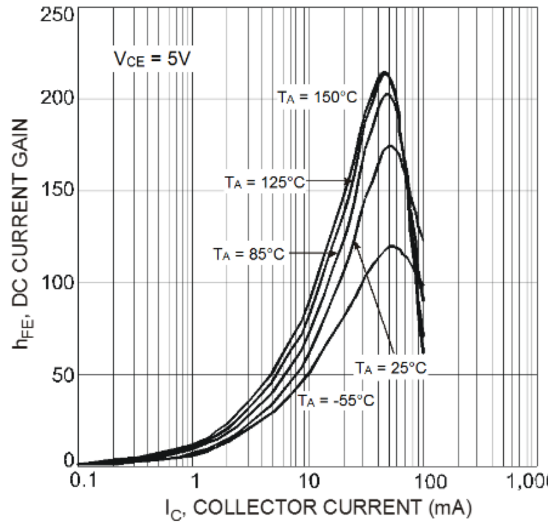


Fig. 19 Typical DC Current Gain

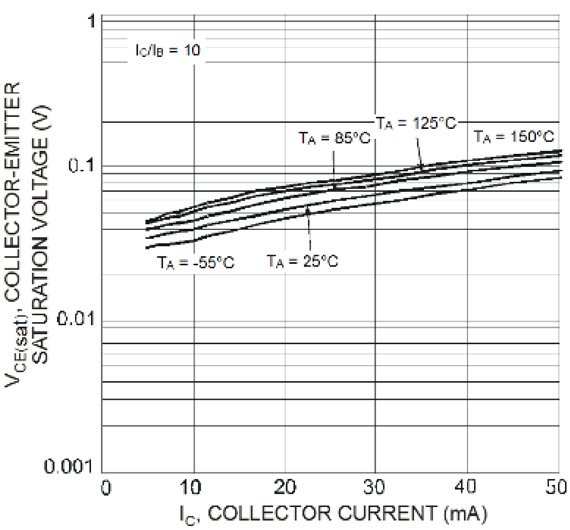


Fig. 20 Typical $V_{CE(sat)}$ vs. I_C

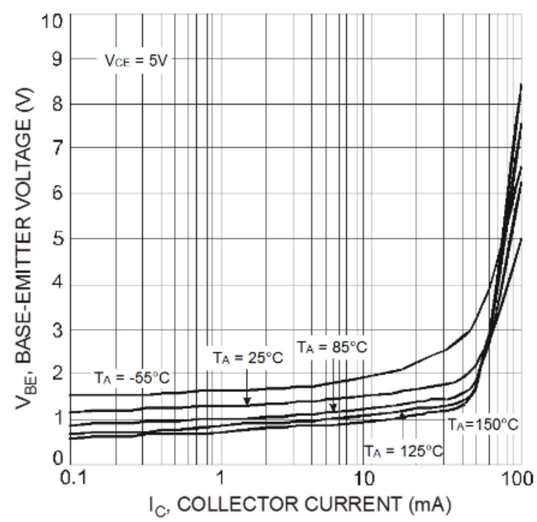


Fig. 21 Typical V_{BE} vs. I_C

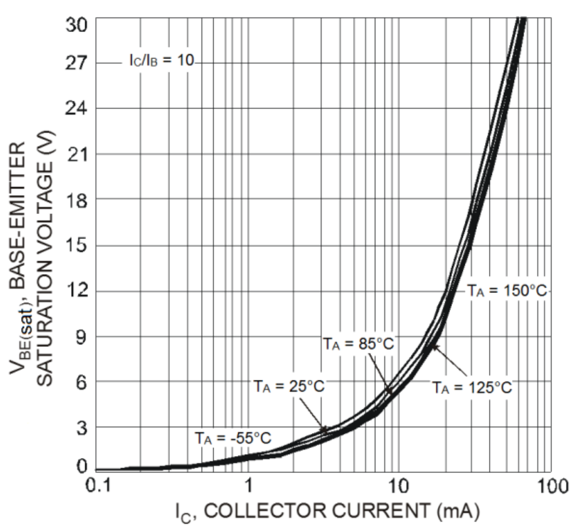


Fig. 22 Typical $V_{BE(sat)}$ vs. I_C

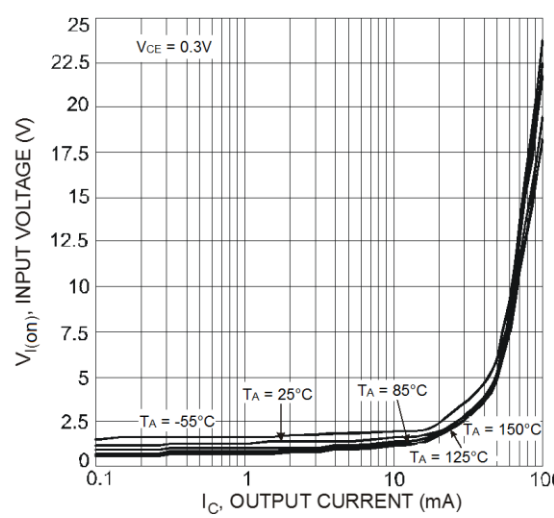


Fig. 23 Typical $V_{I(on)}$ vs. I_C

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

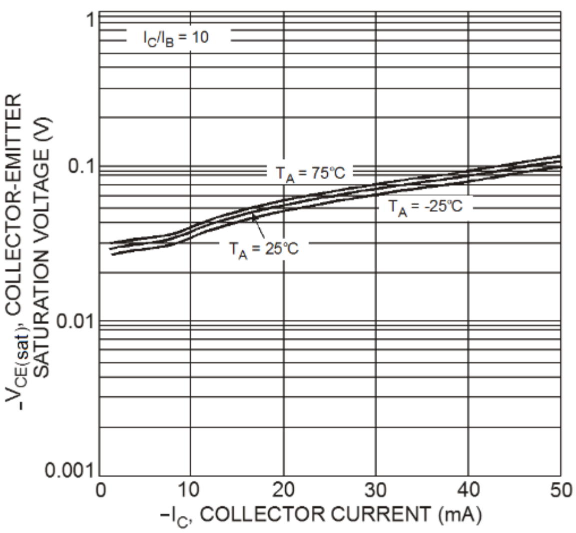


Fig. 24 Typical $V_{CE(sat)}$ vs. I_C

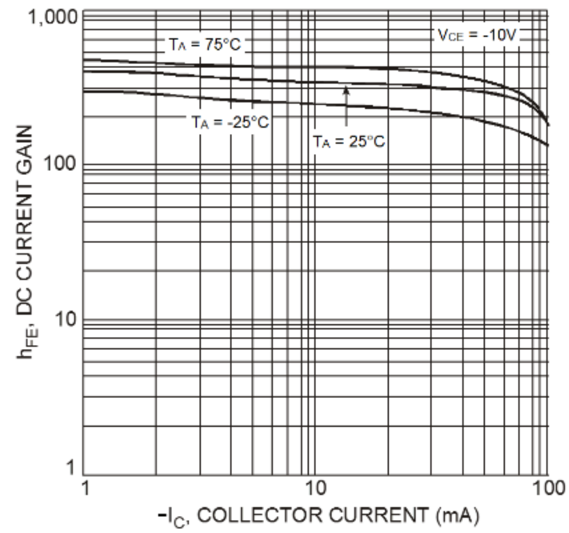


Fig. 25 Typical DC Current Gain

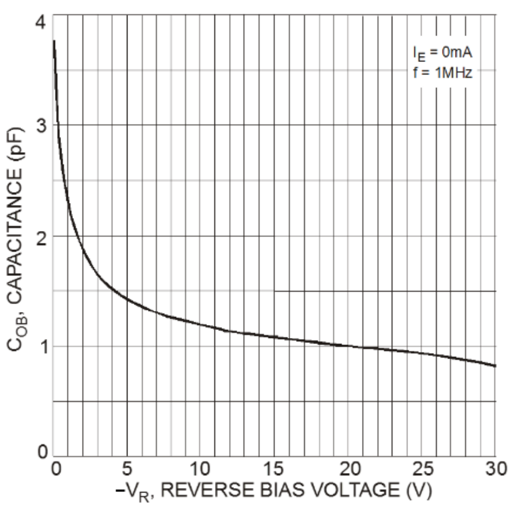


Fig. 26 Typical Output Capacitance

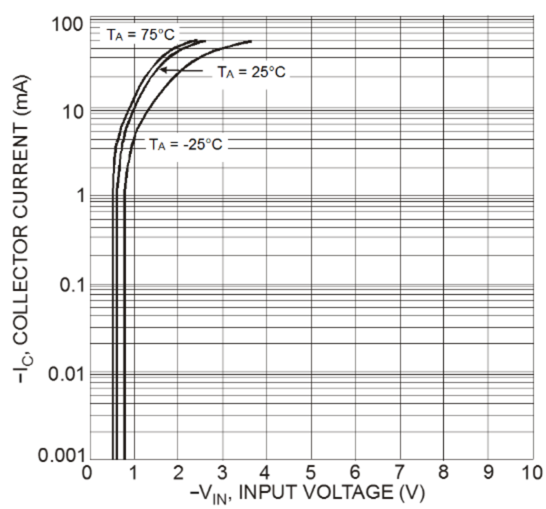


Fig. 27 Typical Collector Current vs. Input Voltage

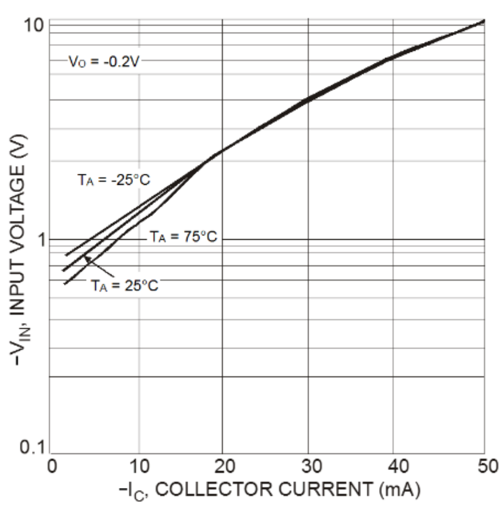


Fig. 28 Typical Input Voltage vs. Collector Current

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

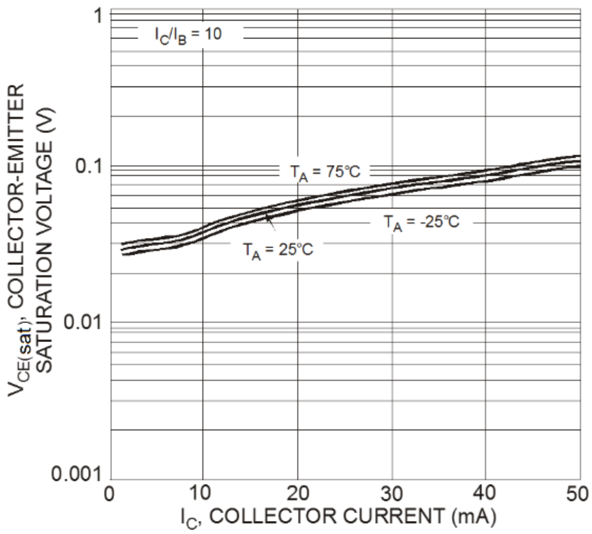


Fig. 29 Typical $V_{CE(sat)}$ vs. I_C

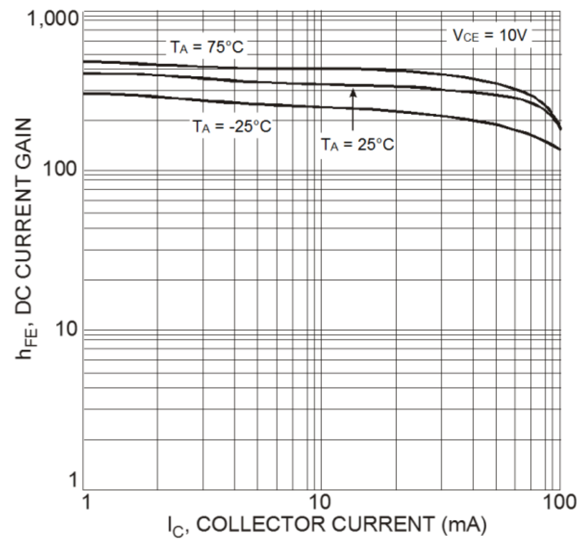


Fig. 30 Typical DC Current Gain

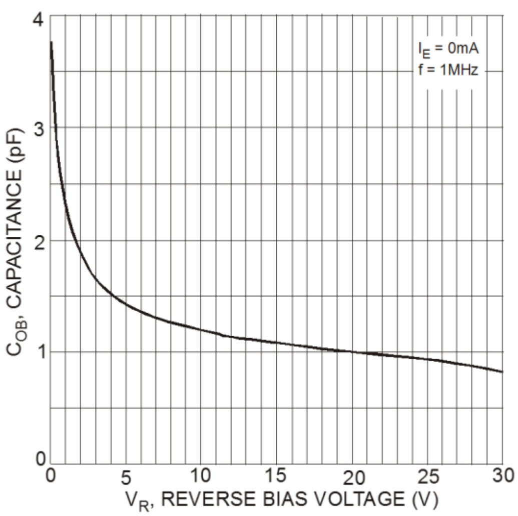


Fig. 31 Typical Output Capacitance

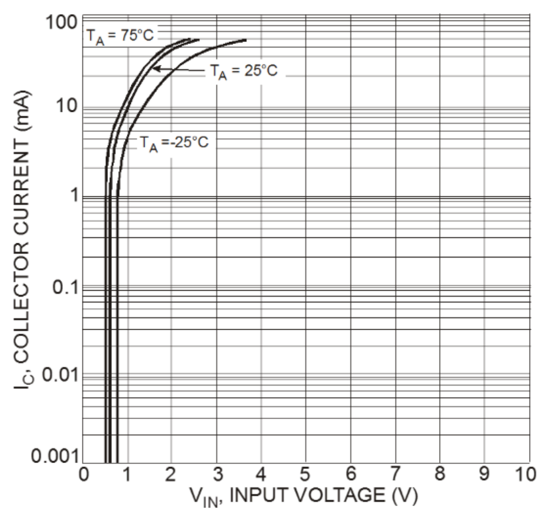


Fig. 32 Typical Collector Current vs. Input Voltage

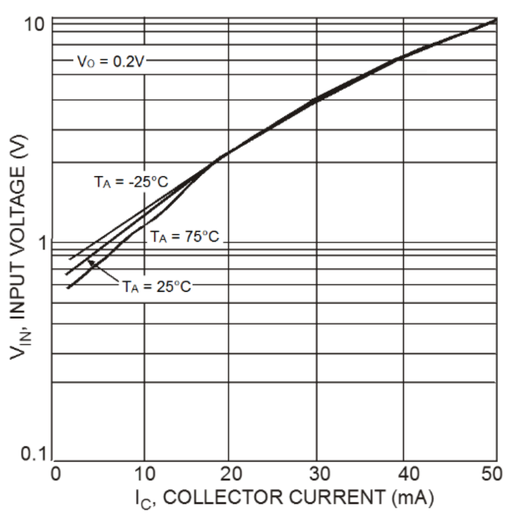
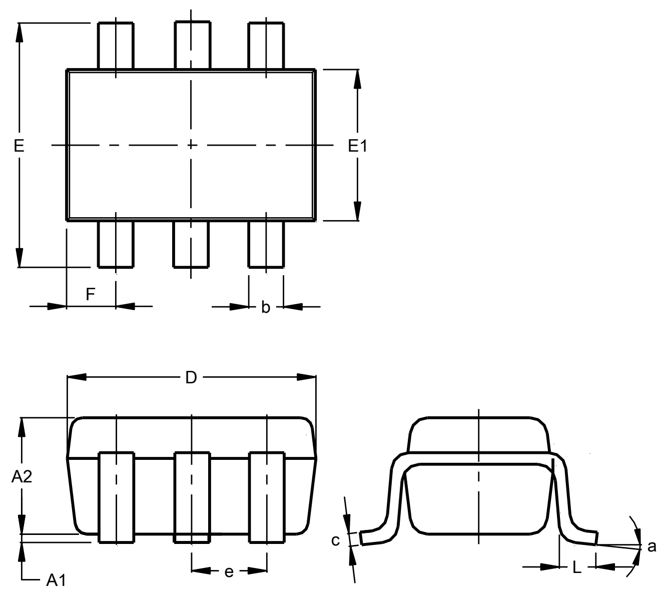


Fig. 33 Typical Input Voltage vs. Collector Current

Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

SOT363

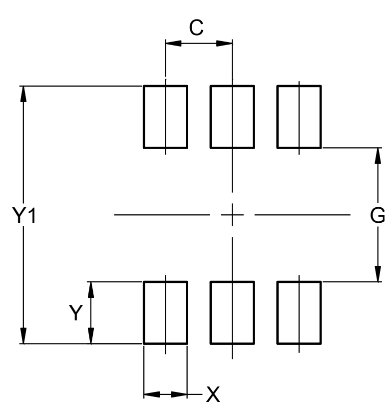


SOT363			
Dim	**Min**	**Max**	**Typ**
A1	0.00	0.10	0.05
A2	0.90	1.00	0.95
b	0.10	0.30	0.25
c	0.10	0.22	0.11
D	1.80	2.20	2.15
E	2.00	2.20	2.10
E1	1.15	1.35	1.30
e	0.650 BSC		
F	0.40	0.45	0.425
L	0.25	0.40	0.30
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

SOT363



Dimensions	**Value (in mm)**
C	0.650
G	1.300
X	0.420
Y	0.600
Y1	2.500

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