

**SMALL SIGNAL COMPLEMENTARY PRE-BIASED DUAL TRANSISTOR**

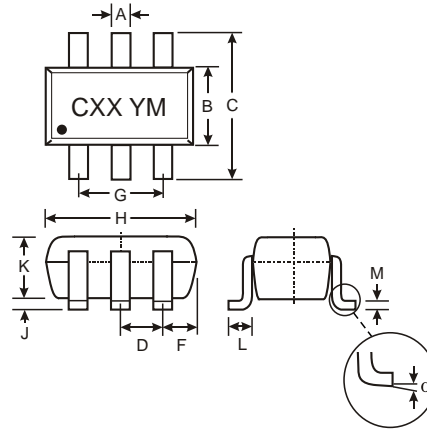
NEW PRODUCT

**Features**

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

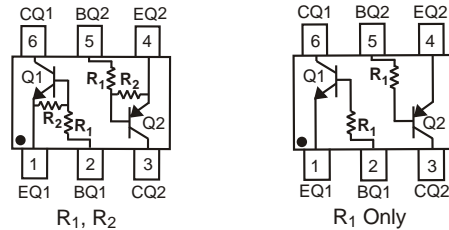
**Mechanical Data**

- Case: SOT-363
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- Terminals: Solderable per MIL-STD-202, Method 208
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- Terminal Connections: See Diagram
- Marking: Date Code and Marking Code (See Page 4)
- Ordering Information (See Page 4)
- 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
	0°	8°
All Dimensions in mm		

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



Q1: NPN Transistor  
Q2: PNP Transistor

SCHMATIC DIAGRAM

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

Characteristic	Symbol	Value	Unit
Supply Voltage, (6) to (1) and (4) to (3)	V <sub>CC</sub>	50	V
Input Voltage, (2) to (1) and (4) to (5)	V <sub>IN</sub>	-10 to +40 -10 to +40 -6 to +40 -5 to +12 -10 to +40 -5 V <sub>max</sub> -10 to +30 -5 V <sub>max</sub>	V
Output Current	I <sub>O</sub>	30 30 70 100 50 100 100 100	mA
Output Current	I <sub>C</sub> (Max)	100	mA
Power Dissipation (Total)	P <sub>d</sub>	200	mW
Thermal Resistance, Junction to Ambient Air (Note 1)	R <sub>JA</sub>	625	°C/W
Operating and Storage and Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

- Note: 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.

**Maximum Ratings PNP Section** @  $T_A = 25^\circ\text{C}$  unless otherwise specified

Characteristic	Symbol	Value	Unit
Supply Voltage, (3) 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 +5 $V_{max}$ +10 to -30 +5 $V_{max}$	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)	$R_{JA}$	625	$^\circ\text{C}/\text{W}$
Operating and Storage and Temperature Range	$T_j, T_{STG}$	-55 to +150	$^\circ\text{C}$

**Electrical Characteristics NPN Section** @  $T_A = 25^\circ\text{C}$  unless otherwise specified

Characteristic (DCX143TU & DCX114TU only)	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$BV_{CBO}$	50			V	$I_C = 50\mu\text{A}$
Collector-Emitter Breakdown Voltage	$BV_{CEO}$	50			V	$I_C = 1\text{mA}$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	5		--	V	$I_E = 50\mu\text{A}$
Collector Cutoff Current	$I_{CBO}$			0.5	$\mu\text{A}$	$V_{CB} = 50\text{V}$
Emitter Cutoff Current	$I_{EBO}$			0.5	$\mu\text{A}$	$V_{EB} = 4\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$			0.3	V	$I_C/I_B = 2.5\text{mA} / 0.25\text{mA}$ DCX143TU $I_C/I_B = 1\text{mA} / 0.1\text{mA}$ DCX114TU
DC Current Transfer Ratio	$h_{FE}$	100	250	600		$I_C = 1\text{mA}, V_{CE} = 5\text{V}$
Input Resistor ( $R_1$ ) Tolerance	$R_1$	-30		+30	%	
Gain-Bandwidth Product	$f_T$		250		MHz	$V_{CE} = 10\text{V}, I_E = -5\text{mA}, f = 100\text{MHz}$

**Electrical Characteristics NPN Section (Continued)** @ T<sub>A</sub> = 25°C unless otherwise specified

Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition
Input Voltage	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU	V <sub>I(off)</sub>	0.5 0.5 0.3 0.5 0.5 0.5	1.1 1.1		V	V <sub>CC</sub> = 5V, I <sub>O</sub> = 100μA
	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU		V <sub>I(on)</sub>		1.9 1.9		
Output Voltage	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU	V <sub>O(on)</sub>			0.1	0.3	V
Input Current	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU	I <sub>I</sub>			0.36 0.18 0.88 3.6 0.88 0.88	mA	V <sub>I</sub> = 5V
Output Current		I <sub>O(off)</sub>			0.5	μA	V <sub>CC</sub> = 50V, V <sub>I</sub> = 0V
DC Current Gain	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU	G <sub>I</sub>	56 68 68 80 30 50				V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA V <sub>O</sub> = 5V, I <sub>O</sub> = 10mA V <sub>O</sub> = 5V, I <sub>O</sub> = 10mA V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA V <sub>O</sub> = 5V, I <sub>O</sub> = 10mA
Input Resistor (R <sub>1</sub> ) Tolerance		R <sub>1</sub>	-30		+30	%	
Resistance Ratio Tolerance		R <sub>2</sub> /R <sub>1</sub>	-20		+20	%	
Gain-Bandwidth Product		f <sub>T</sub>		250		MHz	V <sub>CE</sub> = 10V, I <sub>E</sub> = 5mA, f = 100MHz

**Electrical Characteristics PNP Section** @ T<sub>A</sub> = 25°C unless otherwise specified

Characteristic (DCX143TU & DCX114TU only)	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	-50			V	I <sub>C</sub> = -50μA
Collector-Emitter Breakdown Voltage	BV <sub>CEO</sub>	-50			V	I <sub>C</sub> = -1mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	-5			V	I <sub>E</sub> = -50μA
Collector Cutoff Current	I <sub>CBO</sub>			-0.5	μA	V <sub>CB</sub> = -50V
Emitter Cutoff Current	I <sub>EBO</sub>			-0.5	μA	V <sub>EB</sub> = -4V
Collector-Emitter Saturation Voltage	V <sub>CE(sat)</sub>			-0.3	V	I <sub>C</sub> /I <sub>B</sub> = 2.5mA / 0.25mA I <sub>C</sub> /I <sub>B</sub> = 1mA / 0.1mA
DC Current Transfer Ratio	h <sub>FE</sub>	100	250	600		I <sub>C</sub> = -1mA, V <sub>CE</sub> = -5V
Input Resistor (R <sub>1</sub> ) Tolerance	R <sub>1</sub>	-30		+30	%	
Gain-Bandwidth Product	f <sub>T</sub>		250		MHz	V <sub>CE</sub> = -10V, I <sub>E</sub> = 5mA, f = 100MHz

**Electrical Characteristics PNP Section (Continued)** @ T<sub>A</sub> = 25°C unless otherwise specified

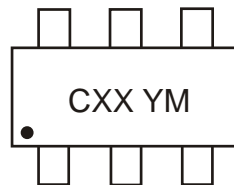
Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition
Input Voltage	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU	V <sub>I(off)</sub>	-0.5 -0.5 -0.3 -0.5 -0.5 -0.5	-1.1 -1.1			V <sub>CC</sub> = -5V, I <sub>O</sub> = -100μA
	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU	V <sub>I(on)</sub>		-1.9 -1.9	-3.0 -3.0 -1.4 -1.1 -3.0 -3.0	V	V <sub>O</sub> = -0.3, I <sub>O</sub> = -5mA V <sub>O</sub> = -0.3, I <sub>O</sub> = -2mA V <sub>O</sub> = -0.3, I <sub>O</sub> = -1mA V <sub>O</sub> = -0.3, I <sub>O</sub> = -5mA V <sub>O</sub> = -0.3, I <sub>O</sub> = -10mA V <sub>O</sub> = -0.3, I <sub>O</sub> = -20mA
Output Voltage	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU	V <sub>O(on)</sub>		-0.1	-0.3	V	I <sub>O</sub> /I <sub>I</sub> = -10mA / -0.5mA I <sub>O</sub> /I <sub>I</sub> = -10mA / -0.5mA I <sub>O</sub> /I <sub>I</sub> = -5mA / -0.25mA I <sub>O</sub> /I <sub>I</sub> = -5mA / -0.25mA I <sub>O</sub> /I <sub>I</sub> = -10mA / -0.5mA I <sub>O</sub> /I <sub>I</sub> = -10mA / -0.5mA
Input Current	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU	I <sub>I</sub>			-0.36 -0.18 -0.88 -3.6 -0.88 -0.88	mA	V <sub>I</sub> = -5V
Output Current		I <sub>O(off)</sub>			-0.5	μA	V <sub>CC</sub> = 50V, V <sub>I</sub> = 0V
DC Current Gain	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU	G <sub>I</sub>	56 68 68 80 30 40				V <sub>O</sub> = -5V, I <sub>O</sub> = -5mA V <sub>O</sub> = -5V, I <sub>O</sub> = -5mA V <sub>O</sub> = -5V, I <sub>O</sub> = -10mA V <sub>O</sub> = -5V, I <sub>O</sub> = -10mA V <sub>O</sub> = -5V, I <sub>O</sub> = -5mA V <sub>O</sub> = -5V, I <sub>O</sub> = -10mA
Input Resistor (R <sub>1</sub> ) Tolerance		R <sub>1</sub>	-30		+30	%	
Resistance Ratio Tolerance		R <sub>2</sub> /R <sub>1</sub>	-20		+20	%	
Gain-Bandwidth Product		f <sub>T</sub>		250		MHz	V <sub>CE</sub> = -10V, I <sub>E</sub> = -5mA, f = 100MHz

**Ordering Information** (Note 4)

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: 4. 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
Code	T	U	V	W	X	Y	Z

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

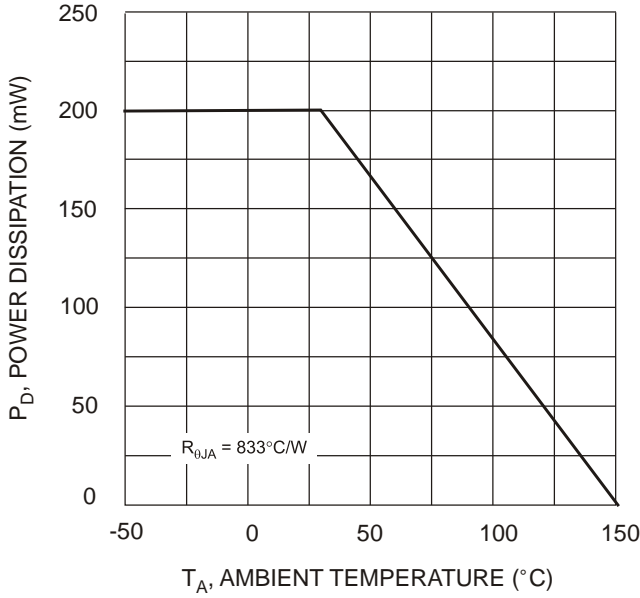


Fig. 1 Derating Curve

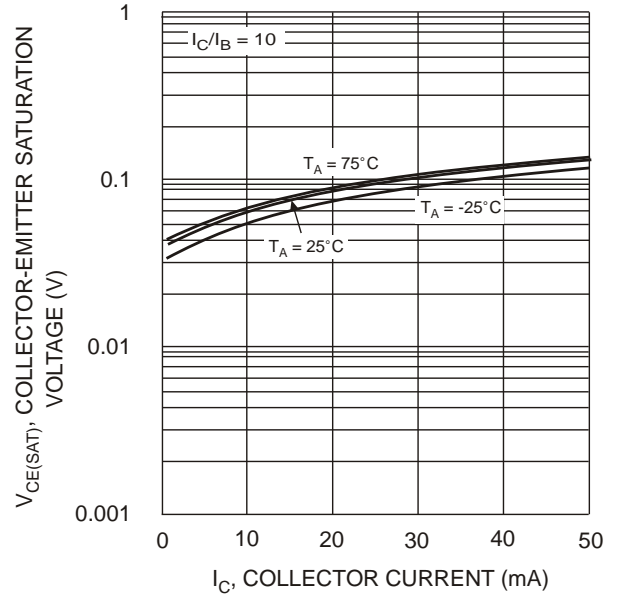


Fig. 2  $V_{CE(SAT)}$  vs.  $I_C$

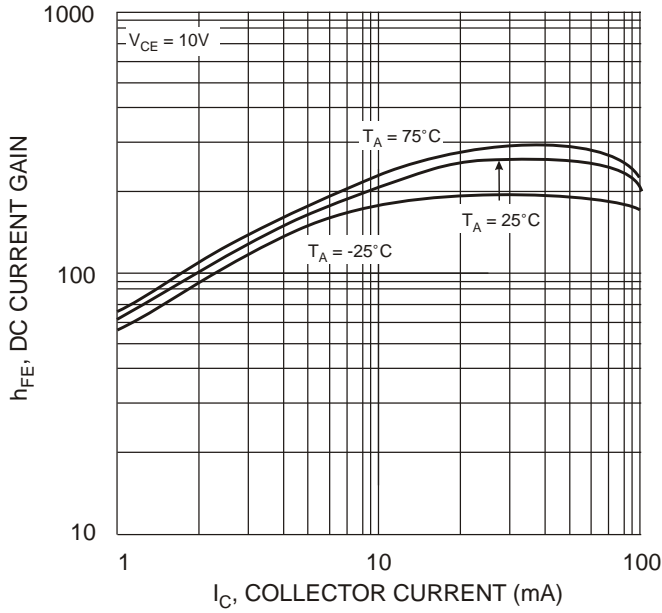


Fig. 3 DC Current Gain

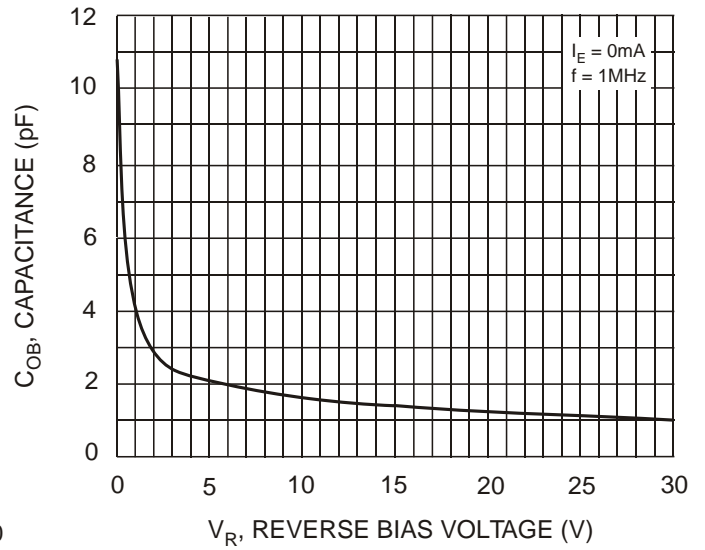


Fig. 4 Output Capacitance

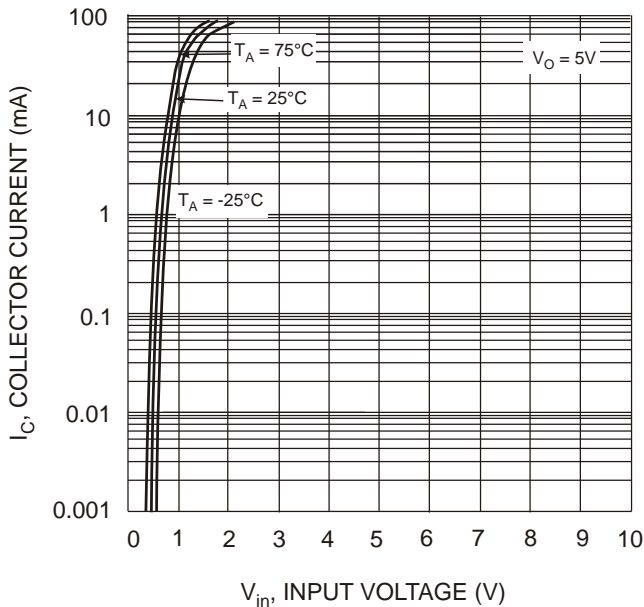


Fig. 5 Collector Current Vs. Input Voltage

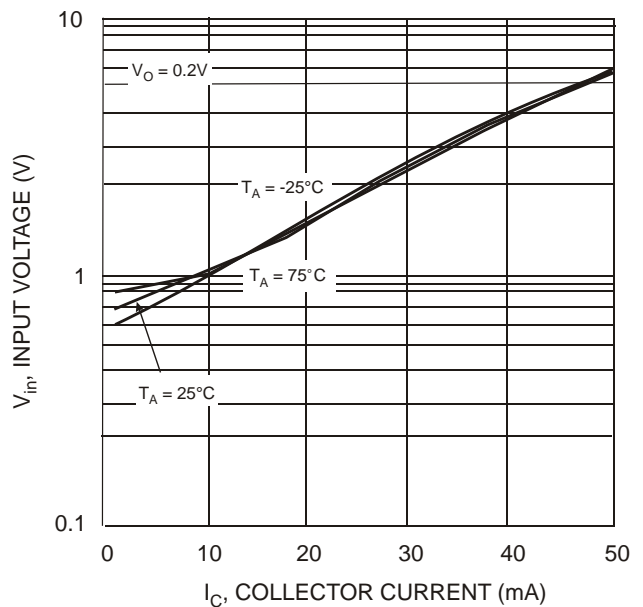


Fig. 6 Input Voltage vs. Collector Current

NPN SECTION

NEW PRODUCT

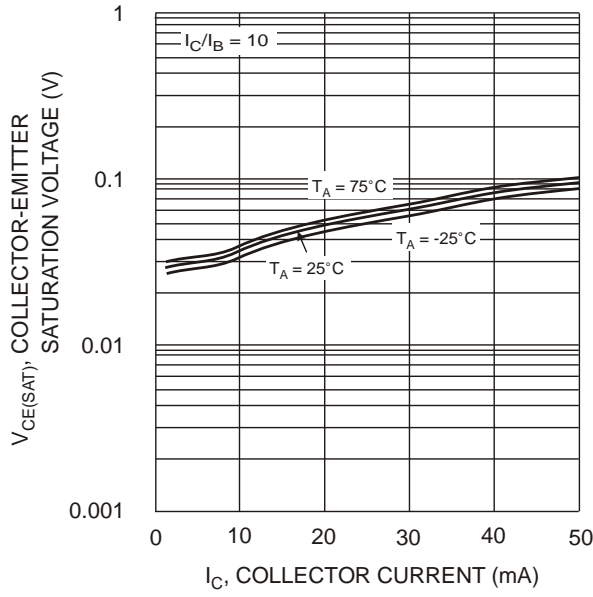


Fig. 7  $V_{CE(SAT)}$  vs.  $I_C$

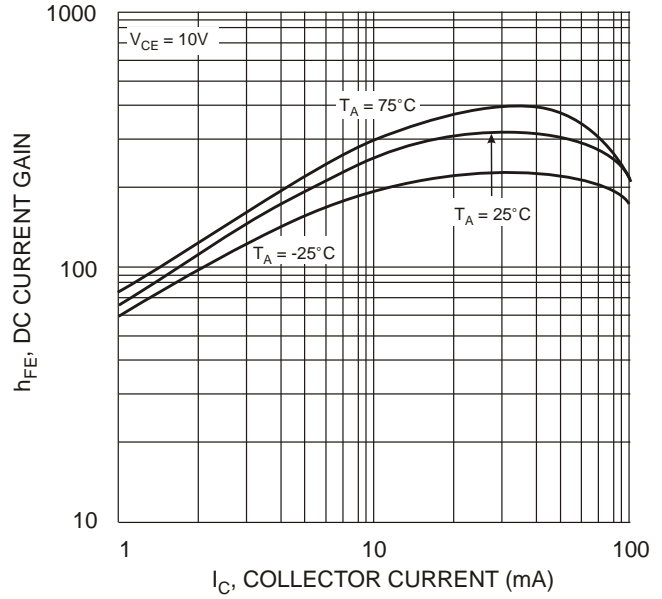


Fig. 8 DC Current Gain

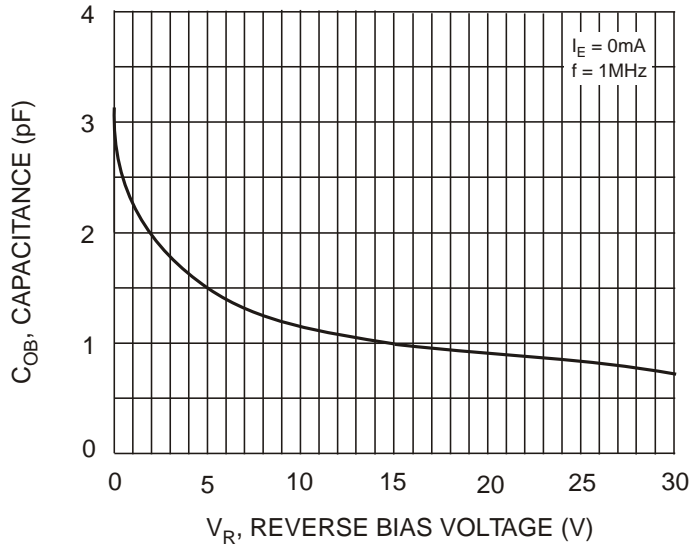


Fig. 9 Output Capacitance

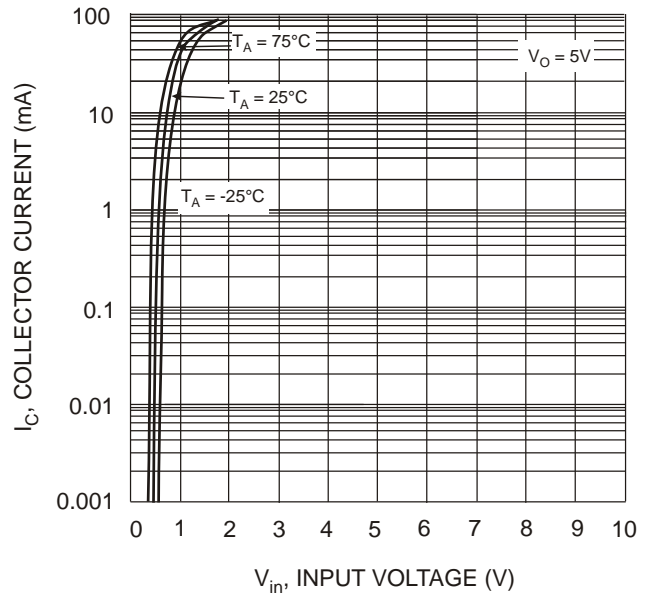


Fig. 10 Collector Current Vs. Input Voltage

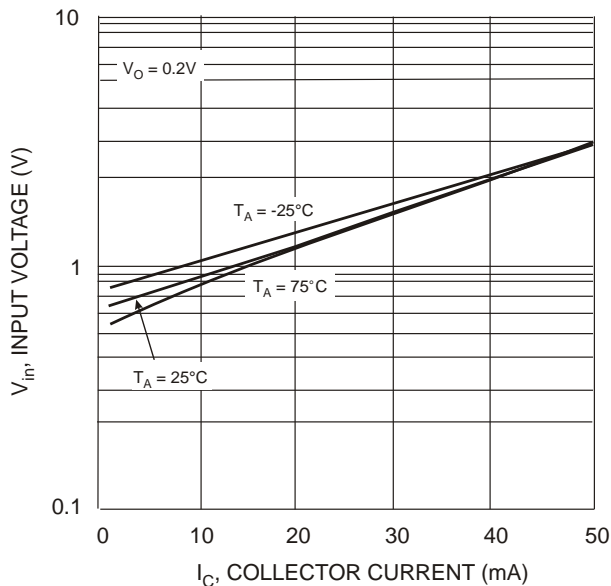


Fig. 11 Input Voltage vs. Collector Current

PNP SECTION

NEW PRODUCT

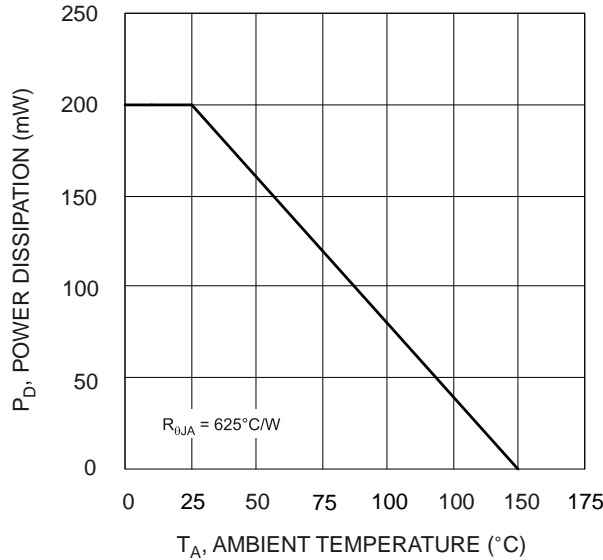


Fig. 12 Power Derating Curve

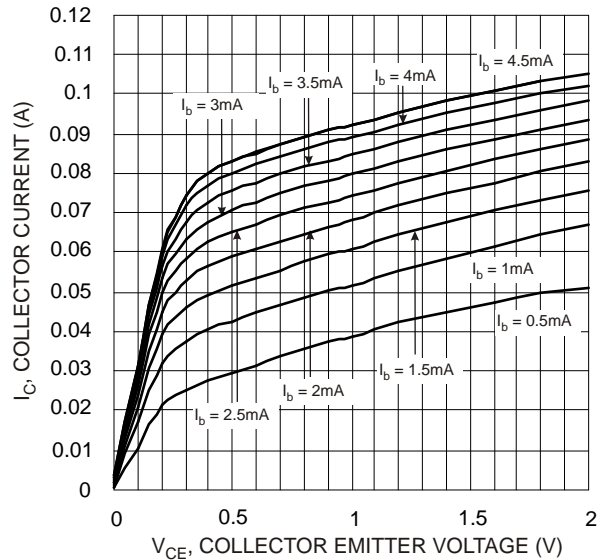


Fig. 13  $V_{CE}$  vs  $I_C$

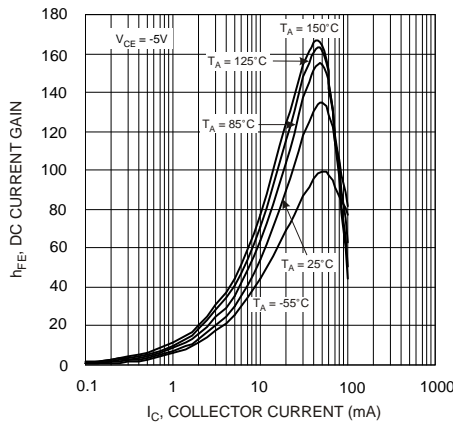


Fig. 14 DC Current Gain

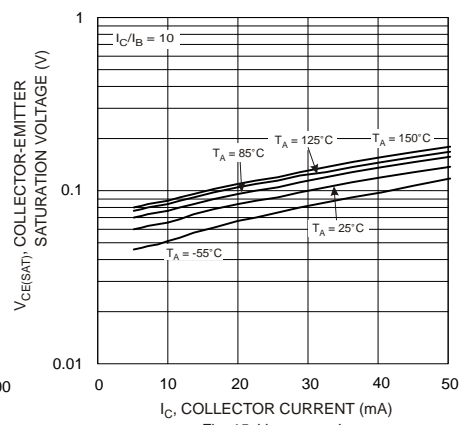


Fig. 15  $V_{CE(SAT)}$  vs  $I_C$

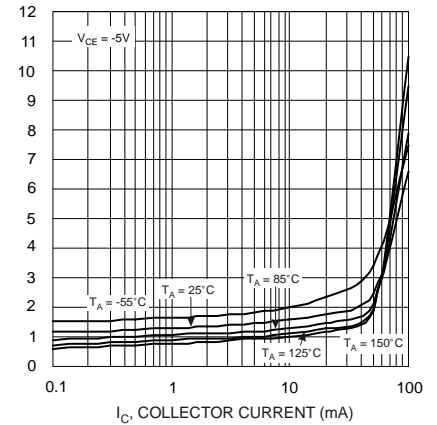


Fig. 16  $V_{BE}$  vs  $I_C$

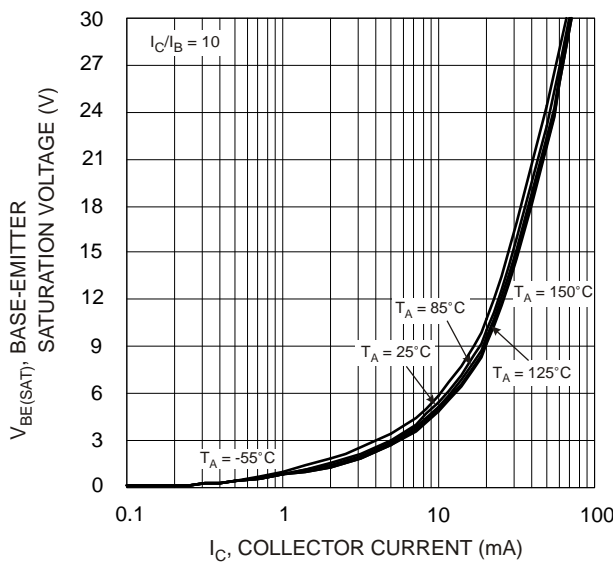


Fig. 17  $V_{BE(SAT)}$  vs  $I_C$

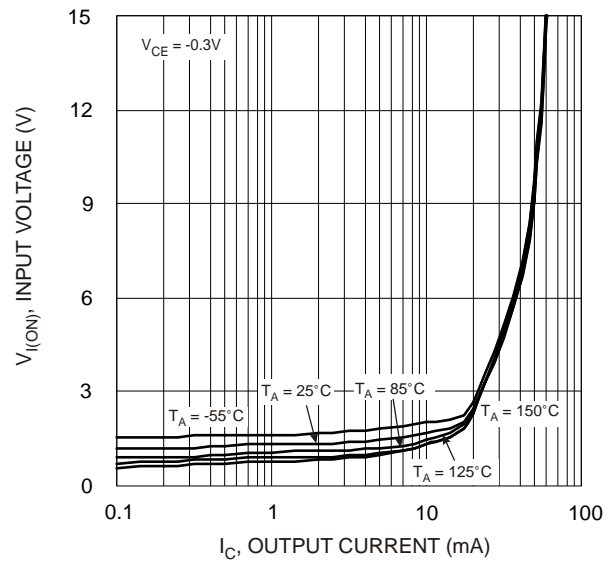


Fig. 18  $V_{I(ON)}$  vs  $I_C$

NPN SECTION

NEW PRODUCT

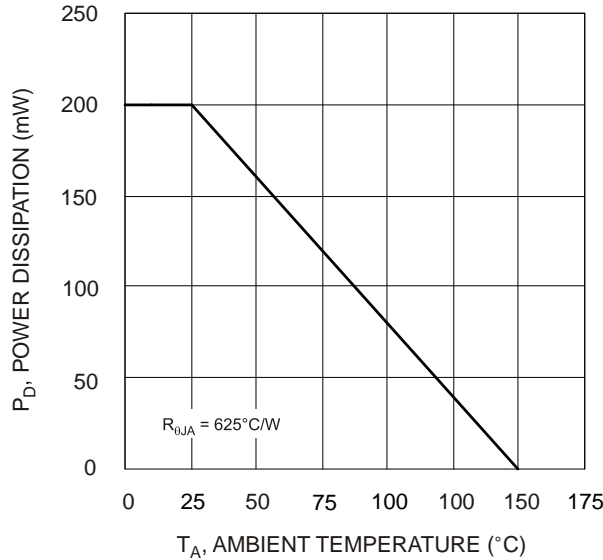


Fig. 19 Power Derating Curve

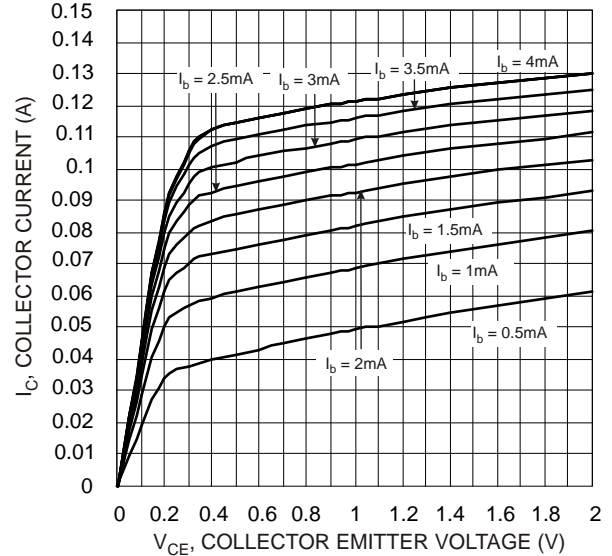


Fig. 20  $V_{CE}$  vs  $I_C$

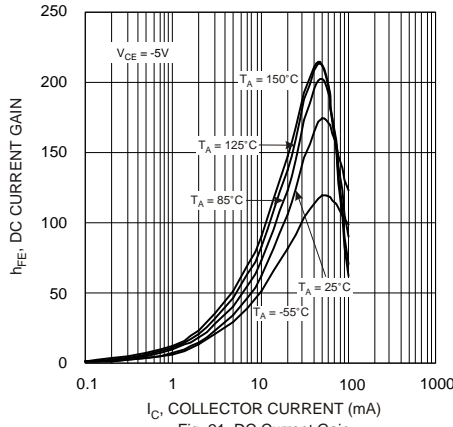


Fig. 21 DC Current Gain

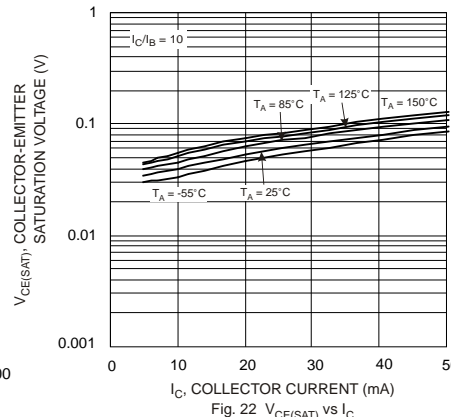


Fig. 22  $V_{CE(SAT)}$  vs  $I_C$

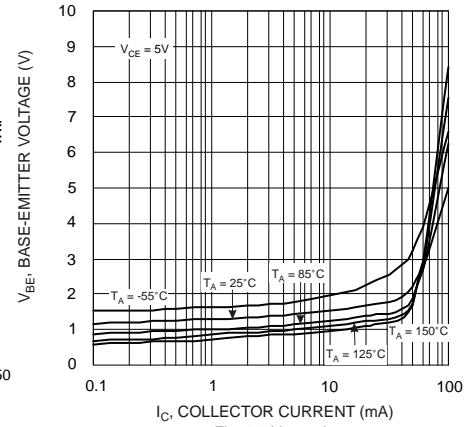


Fig. 23  $V_{BE}$  vs  $I_C$

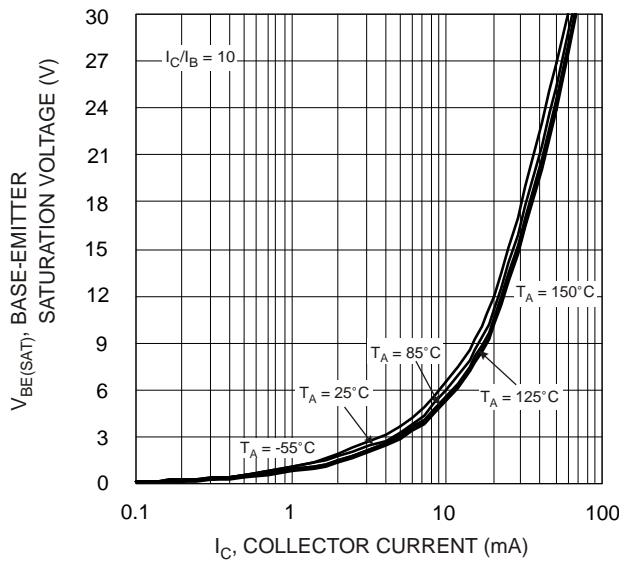


Fig. 24  $V_{BE(SAT)}$  vs  $I_C$

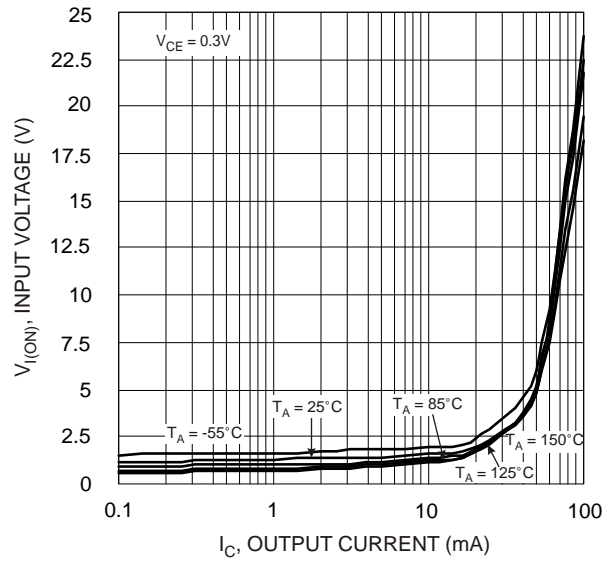


Fig. 25  $V_{I(ON)}$  vs  $I_C$



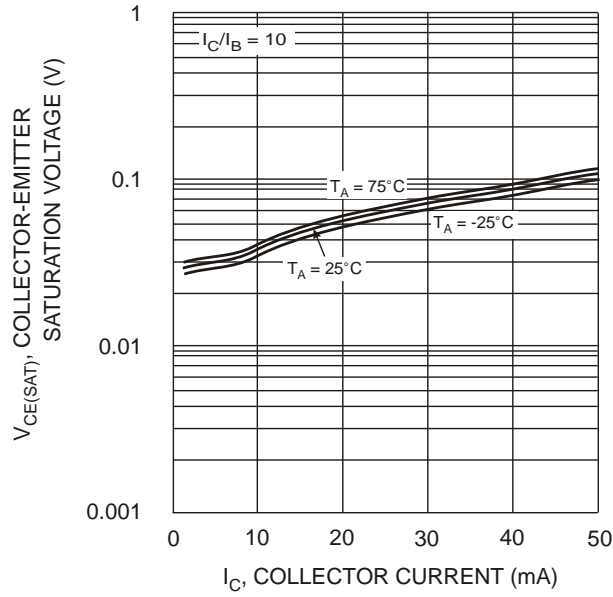


Fig. 26  $V_{CE(SAT)}$  vs.  $I_C$

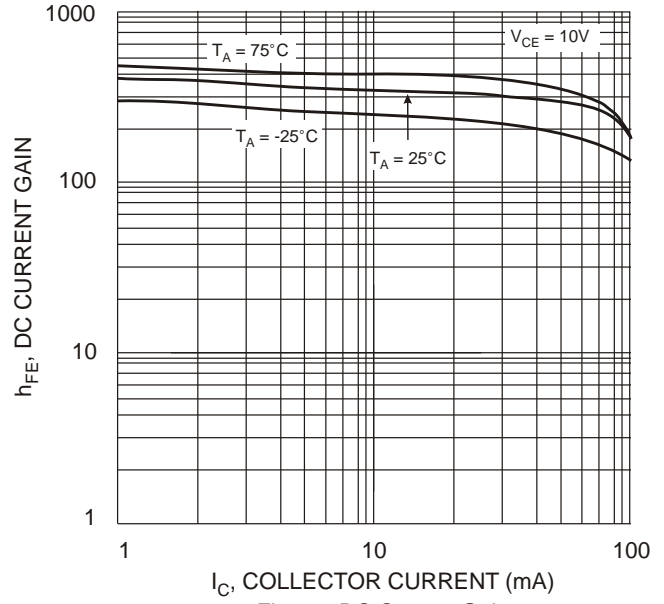


Fig. 27 DC Current Gain

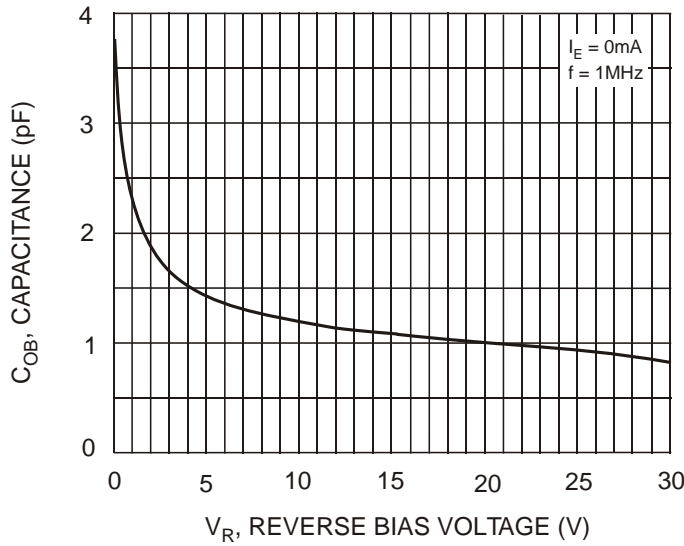


Fig. 28 Output Capacitance

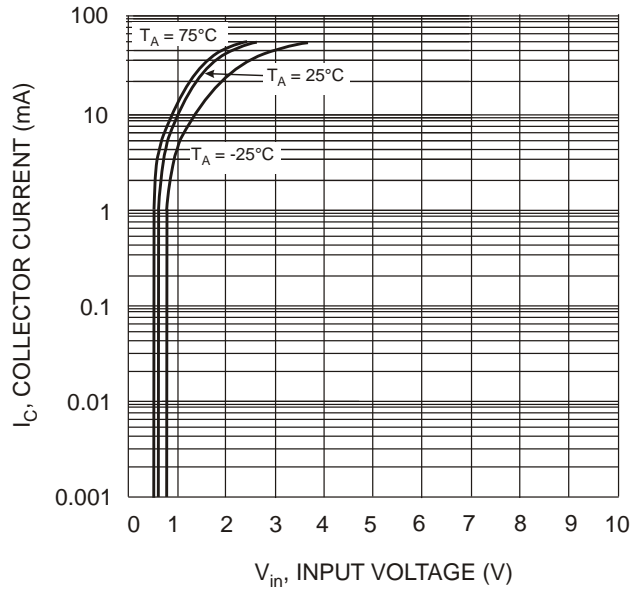


Fig. 29 Collector Current Vs. Input Voltage

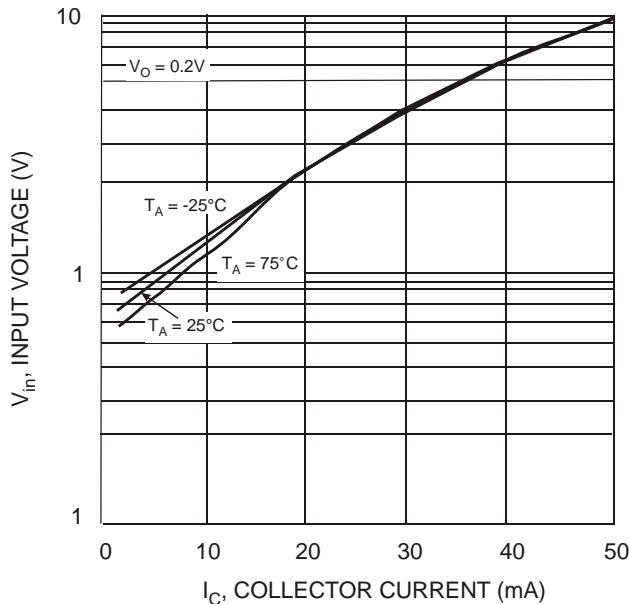


Fig. 30 Input Voltage vs. Collector Current

NPN SECTION

NEW PRODUCT

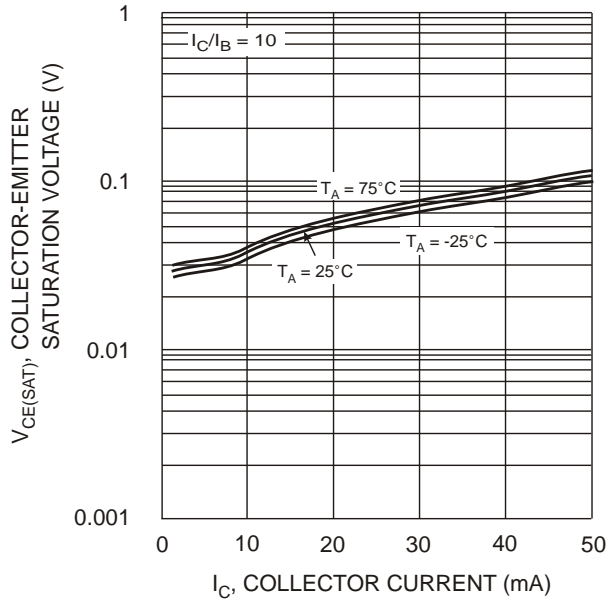


Fig. 31  $V_{CE(SAT)}$  vs.  $I_C$

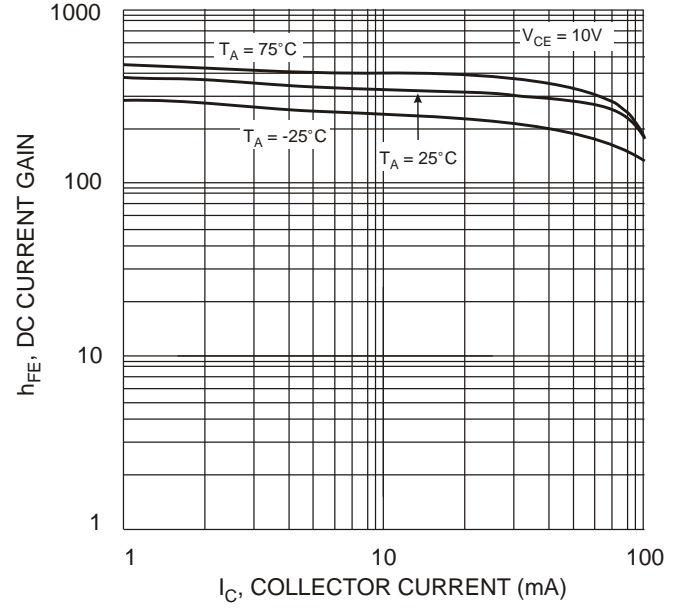


Fig. 32 DC Current Gain

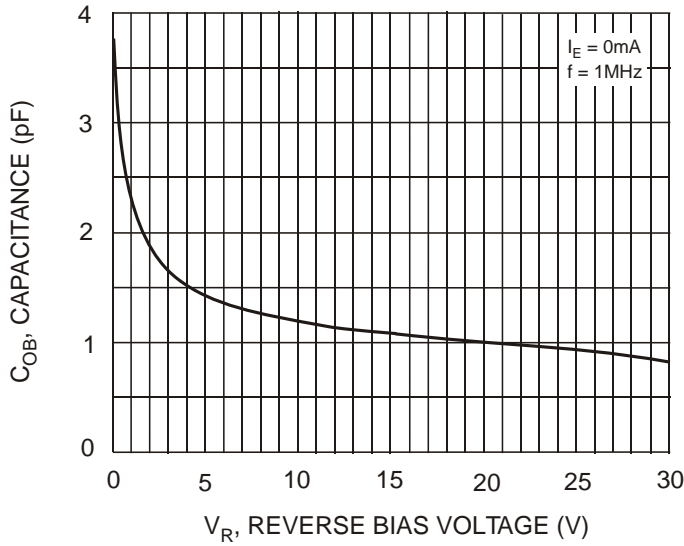


Fig. 33 Output Capacitance

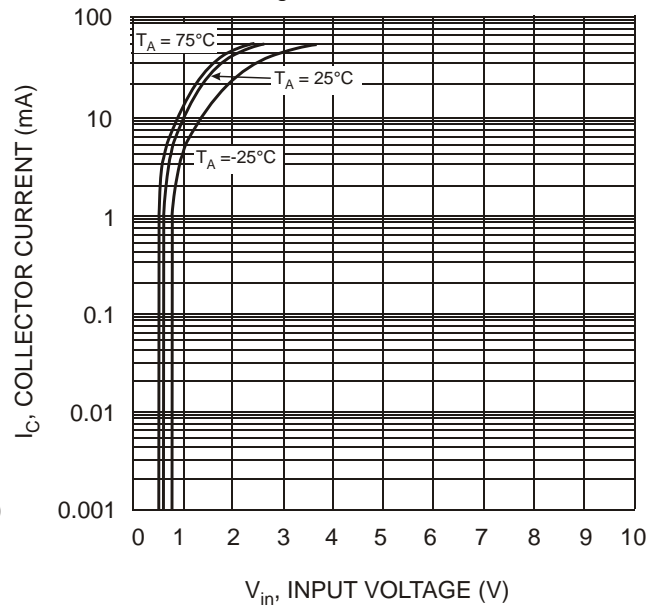


Fig. 34 Collector Current Vs. Input Voltage

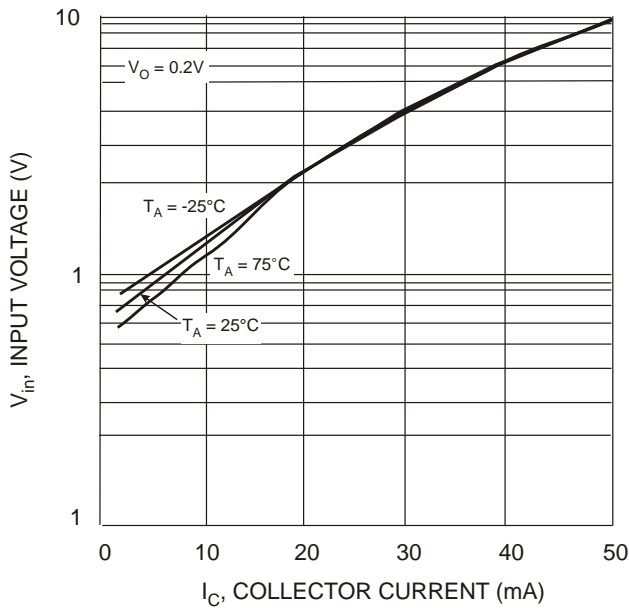


Fig. 35 Input Voltage vs. Collector Current

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