

SMALL SIGNAL COMPLEMENTARY PRE-BIASED DUAL TRANSISTOR

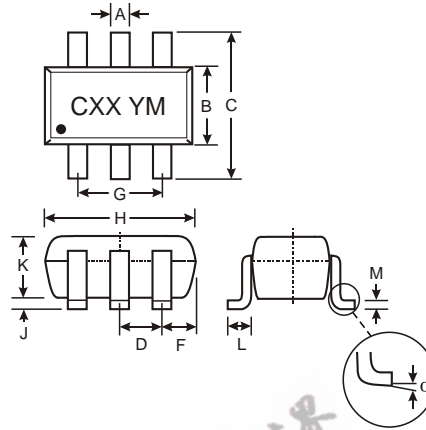
NEW PRODUCT

Features

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

Mechanical Data

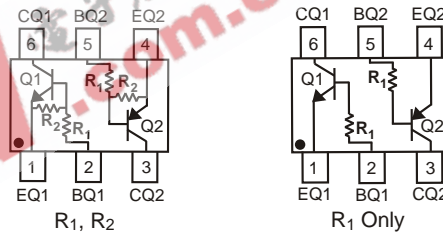
- Case: SOT-363
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- Terminals: Solderable per MIL-STD-202, Method 208
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- Terminal Connections: See Diagram
- 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 @ T_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Supply Voltage, (6) to (1) and (4) to (3)	V _{CC}	50	V
Input Voltage, (2) to (1) and (4) to (5)	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	I _O	30 30 70 100 50 100 100 100	mA
Output Current	I _C (Max)	100	mA
Power Dissipation (Total)	P _d	200	mW
Thermal Resistance, Junction to Ambient Air (Note 1)	R _{JA}	625	°C/W
Operating and Storage and Temperature Range	T _J , T _{STG}	-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	μA	$V_{CB} = 50\text{V}$
Emitter Cutoff Current	I_{EBO}			0.5	μA	$V_{EB} = 4\text{V}$
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_A = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition	
Input Voltage	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU	V _{I(off)}	0.5 0.5 0.3 0.5 0.5 0.5	1.1 1.1 1.1 1.16		V	V _{CC} = 5V, I _O = 100μA
	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU	V _{I(on)}		1.9 1.9 1.9 1.99	3.0 3.0 1.4 1.1 3.0 3.0	V	V _O = 0.3, I _O = 5mA V _O = 0.3, I _O = 2mA V _O = 0.3, I _O = 1mA V _O = 0.3, I _O = 5mA V _O = 0.3, I _O = 10mA V _O = 0.3, I _O = 20mA
Output Voltage	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU	V _{O(on)}		0.1	0.3	V	I _O /I _I = 10mA / 0.5mA I _O /I _I = 10mA / 0.5mA I _O /I _I = 5mA / 0.25mA I _O /I _I = 5mA / 0.25mA I _O /I _I = 10mA / 0.5mA I _O /I _I = 10mA / 0.5mA
Input Current	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU	I _I			0.36 0.18 0.88 3.6 0.88 0.88	mA	V _I = 5V
Output Current		I _{O(off)}			0.5	μA	V _{CC} = 50V, V _I = 0V
DC Current Gain	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU	G _I	56 68 68 80 30 50				V _O = 5V, I _O = 5mA V _O = 5V, I _O = 5mA V _O = 5V, I _O = 10mA V _O = 5V, I _O = 10mA V _O = 5V, I _O = 5mA V _O = 5V, I _O = 10mA
Input Resistor (R ₁) Tolerance		R 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 (DCX143TU & DCX114TU only)	Symbol	Min	Typ	Max	Unit	Test Condition
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 I _C /I _B = 1mA / 0.1mA DCX143TU DCX114TU
DC Current Transfer Ratio	h _{FE}	100	250	600		I _C = -1mA, V _{CE} = -5V
Input Resistor (R ₁) Tolerance	R ₁	-30		+30	%	
Gain-Bandwidth Product	f _T		250		MHz	V _{CE} = -10V, I _E = 5mA, f = 100MHz

Electrical Characteristics PNP Section (Continued) @ T_A = 25°C unless otherwise specified

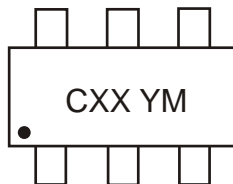
Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition
Input Voltage	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU	V _{I(off)}	-0.5 -0.5 -0.3 -0.5 -0.5 -0.5	-1.1 -1.1		V	V _{CC} = -5V, I _O = -100μA
	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU	V _{I(on)}		-1.9 -1.9 -1.1 -1.1 -1.9 -2.5	-3.0 -3.0 -1.4 -1.1 -3.0 -3.0		
Output Voltage	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU	V _{O(on)}		-0.1	-0.3	V	I _O /I _I = -10mA / -0.5mA I _O /I _I = -10mA / -0.5mA I _O /I _I = -5mA / -0.25mA I _O /I _I = -5mA / -0.25mA I _O /I _I = -10mA / -0.5mA I _O /I _I = -10mA / -0.5mA
Input Current	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU	I _I			-0.36 -0.18 -0.88 -3.6 -0.88 -0.88	mA	V _I = -5V
Output Current		I _{O(off)}			-0.5	μA	V _{CC} = 50V, V _I = 0V
DC Current Gain	DCX124EU DCX144EU DCX114YU DCX123JU DCX114EU DCX143EU	G _I	56 68 68 80 30 40				V _O = -5V, I _O = -5mA V _O = -5V, I _O = -5mA V _O = -5V, I _O = -10mA V _O = -5V, I _O = -10mA V _O = -5V, I _O = -5mA V _O = -5V, I _O = -10mA
Input Resistor (R ₁) Tolerance		R 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

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

PNP SECTION

NEW PRODUCT

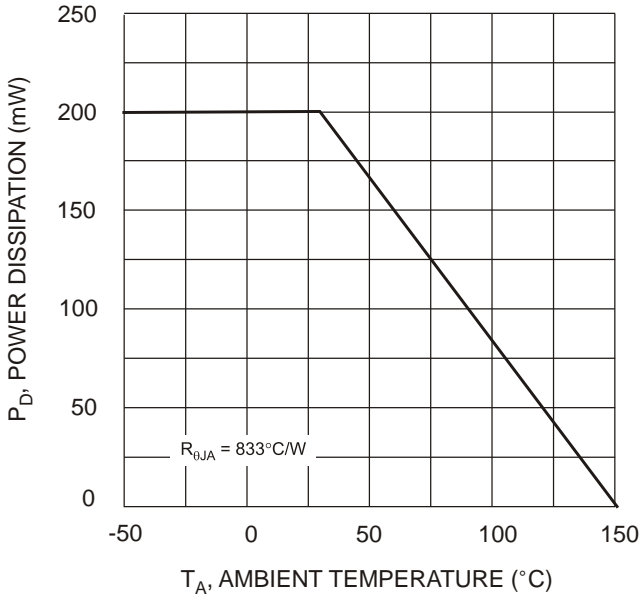


Fig. 1 Derating Curve

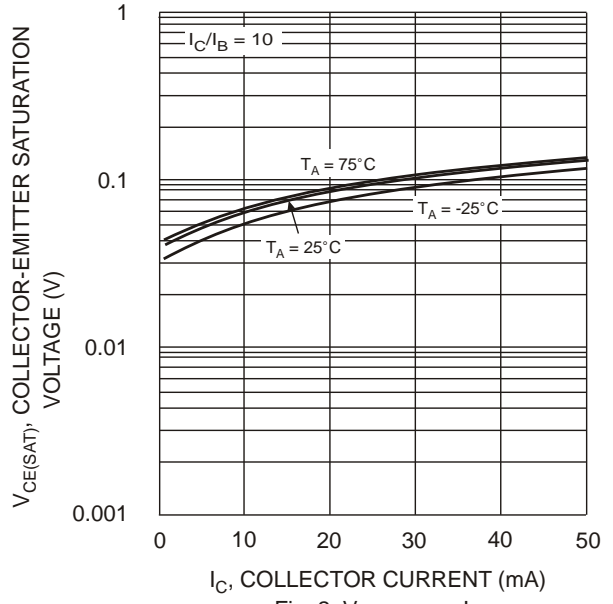


Fig. 2 $V_{CE(SAT)}$ vs. I_C

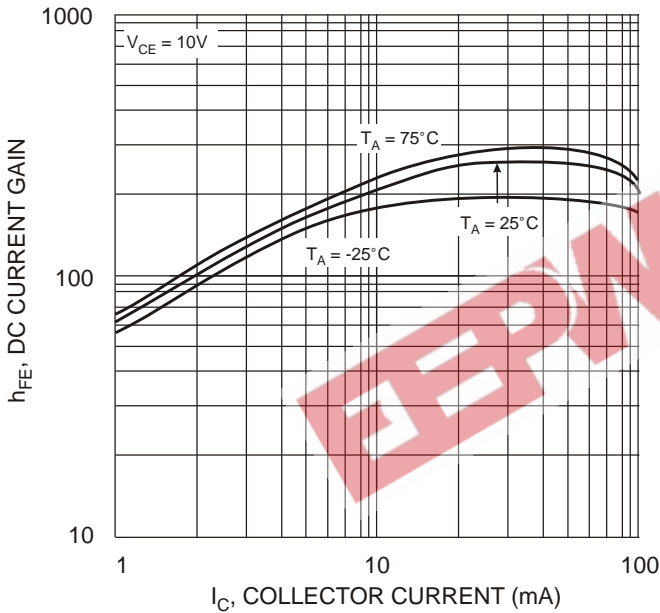


Fig. 3 DC Current Gain

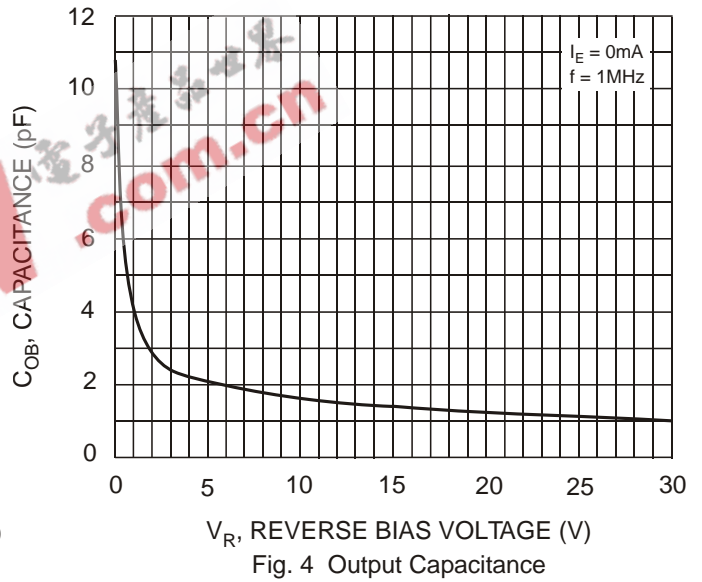


Fig. 4 Output Capacitance

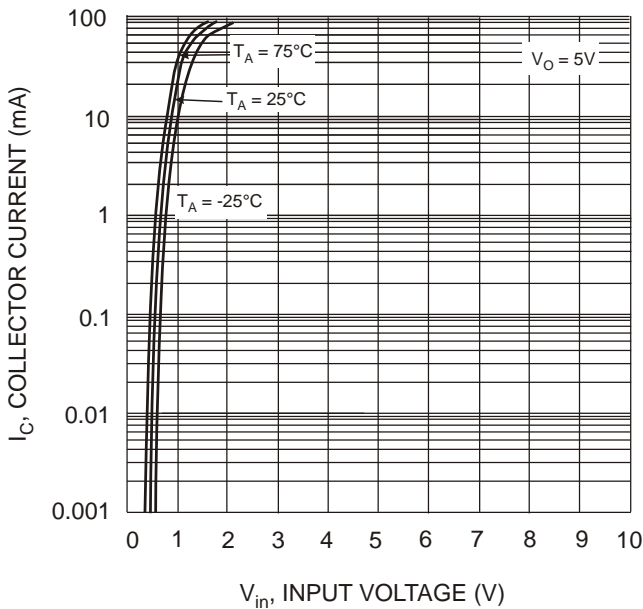


Fig. 5 Collector Current Vs. Input Voltage

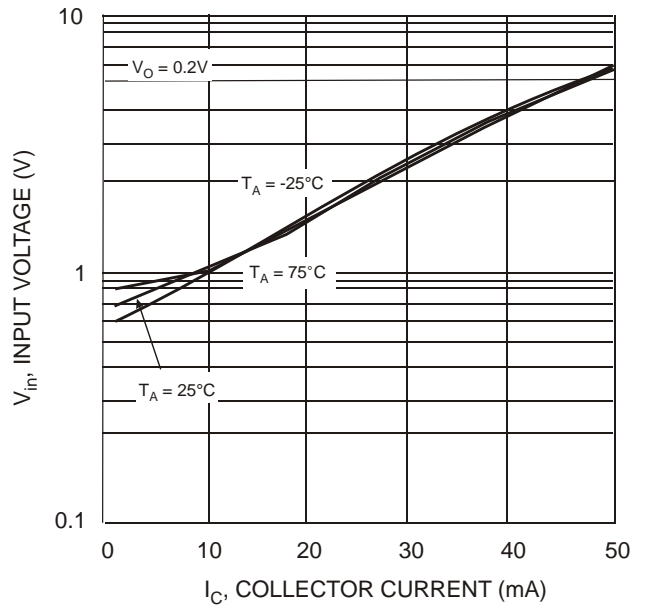


Fig. 6 Input Voltage vs. Collector Current

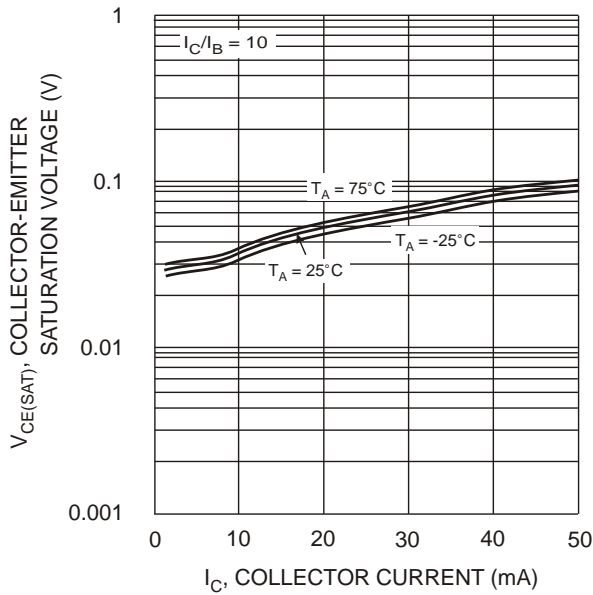


Fig. 7 $V_{CE(SAT)}$ vs. I_C

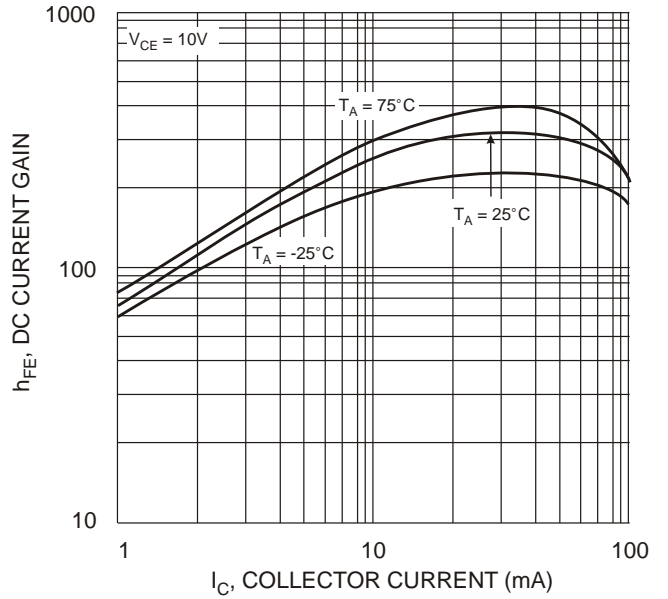


Fig. 8 DC Current Gain

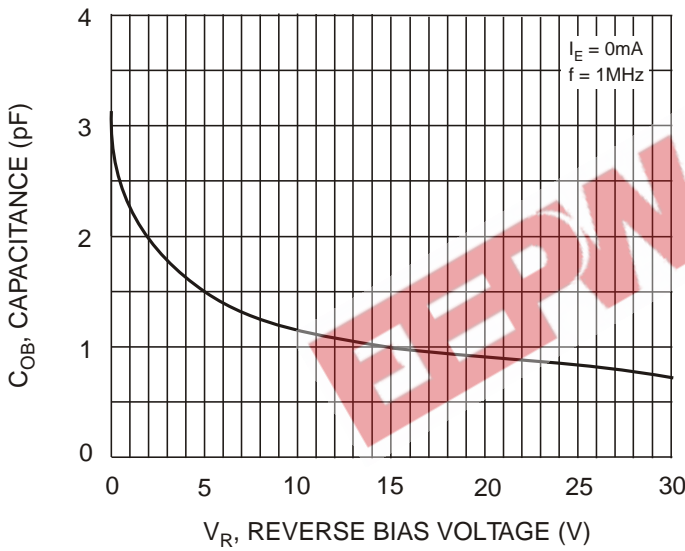


Fig. 9 Output Capacitance

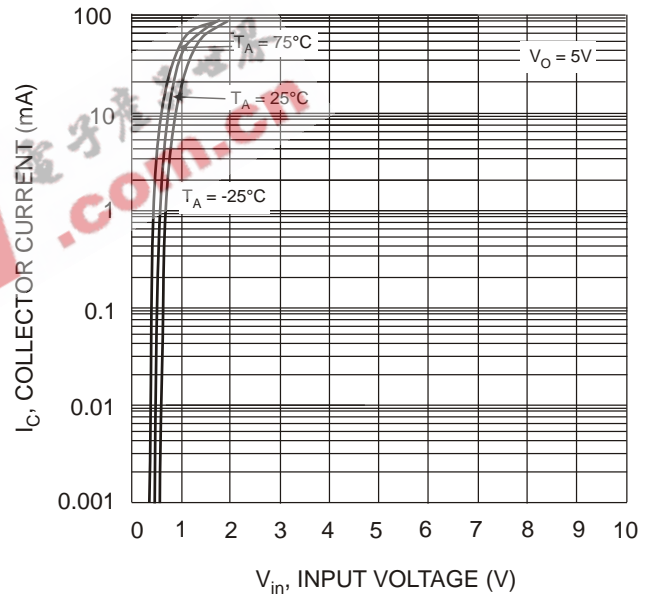


Fig. 10 Collector Current Vs. Input Voltage

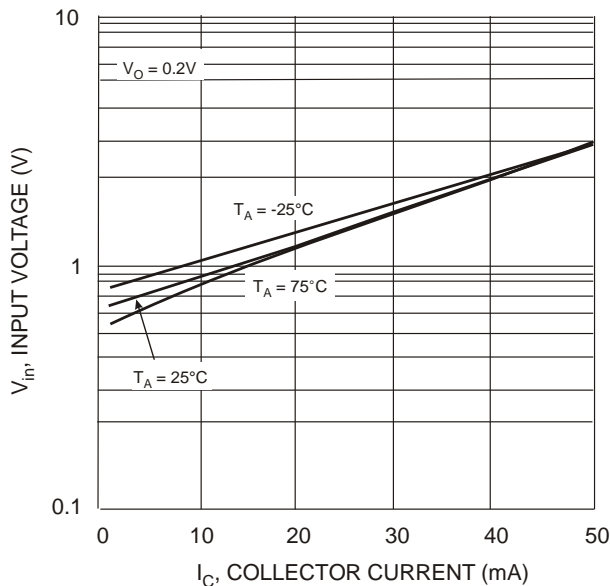


Fig. 11 Input Voltage vs. Collector Current

PNP SECTION

NEW PRODUCT

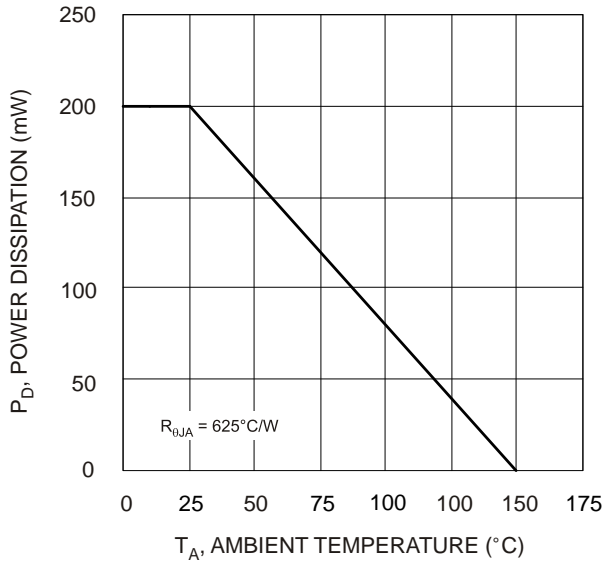


Fig. 12 Power Derating Curve

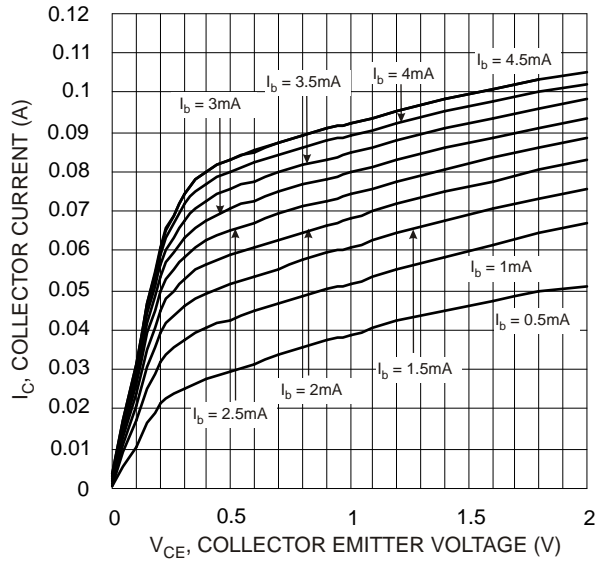


Fig. 13 V_{CE} vs I_C

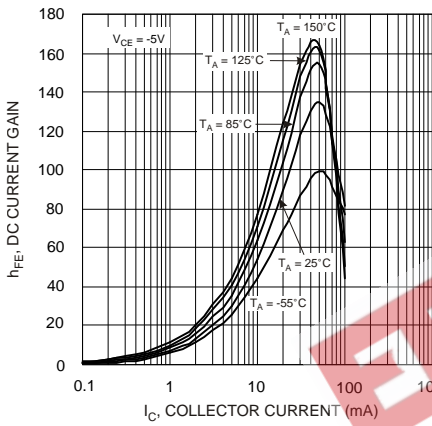


Fig. 14 DC Current Gain

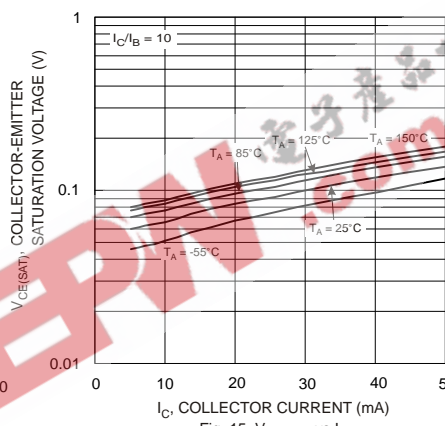


Fig. 15 $V_{CE(SAT)}$ vs I_C

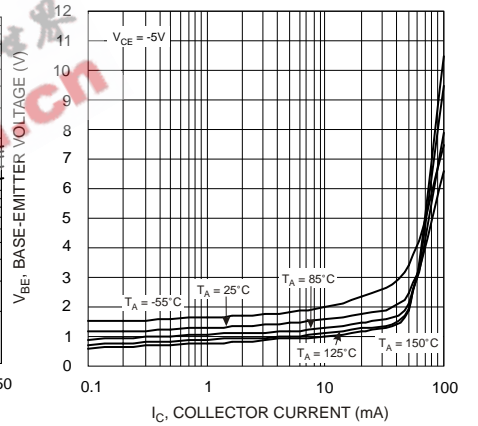


Fig. 16 V_{BE} vs I_C

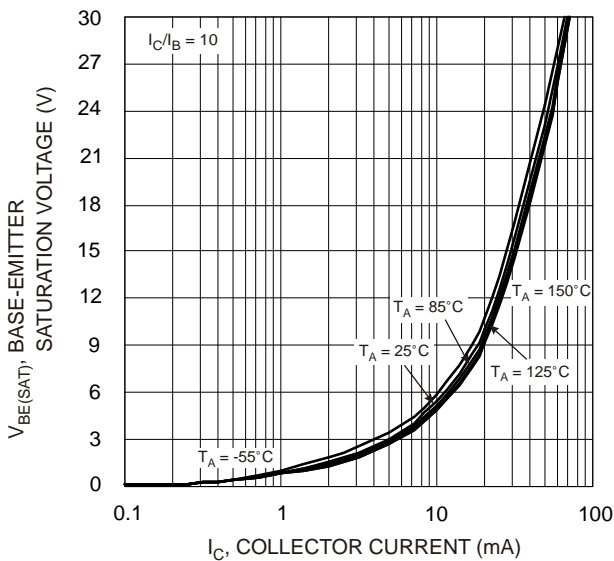


Fig. 17 $V_{BE(SAT)}$ vs I_C

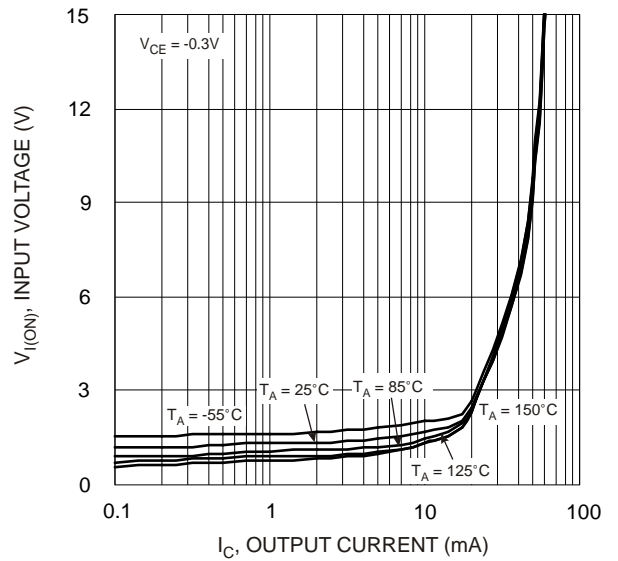


Fig. 18 $V_{I(ON)}$ vs I_C

NPN SECTION

NEW PRODUCT

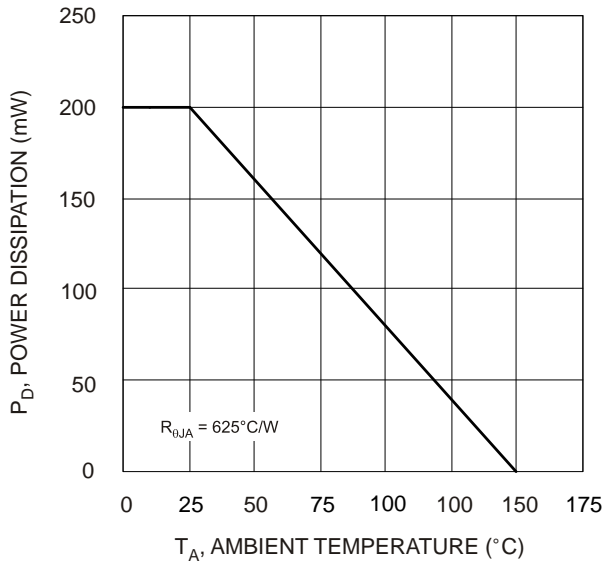


Fig. 19 Power Derating Curve

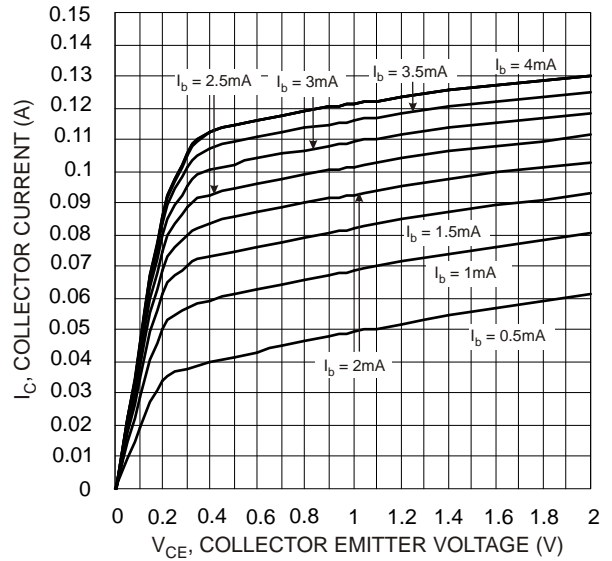


Fig. 20 V_{CE} vs I_C

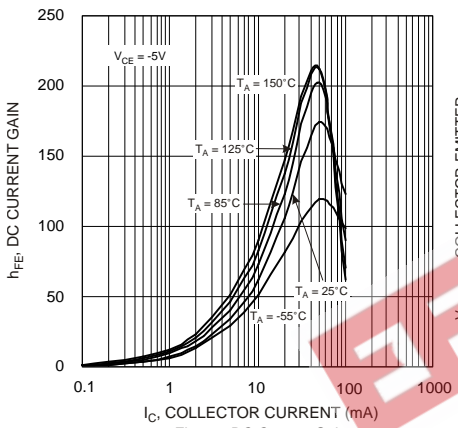


Fig. 21 DC Current Gain

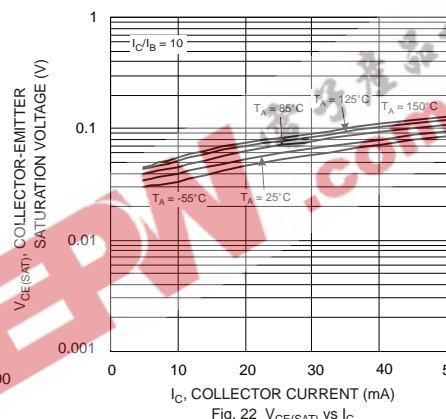


Fig. 22 $V_{CE(SAT)}$ vs I_C

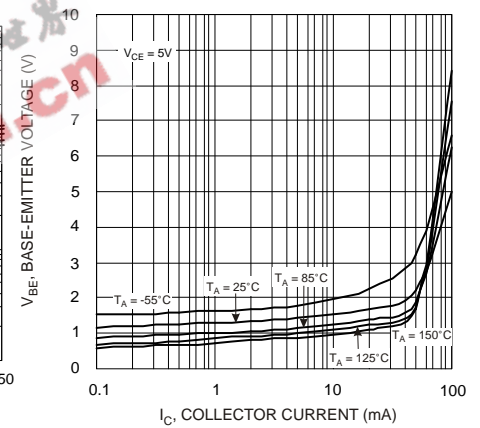


Fig. 23 V_{BE} vs I_C

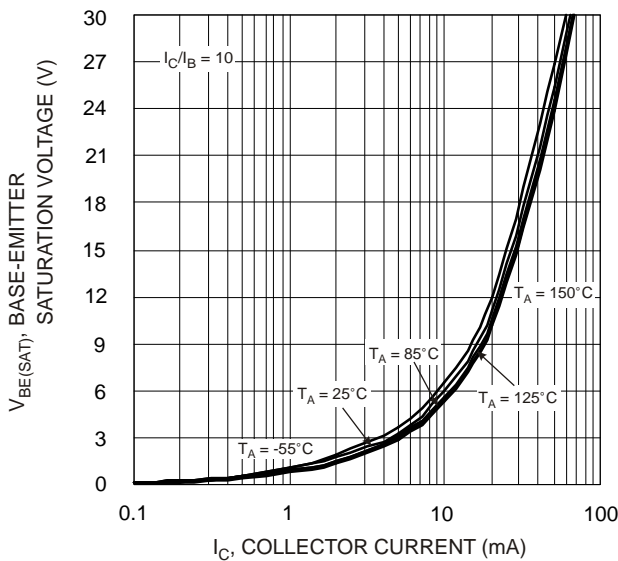


Fig. 24 $V_{BE(SAT)}$ vs I_C

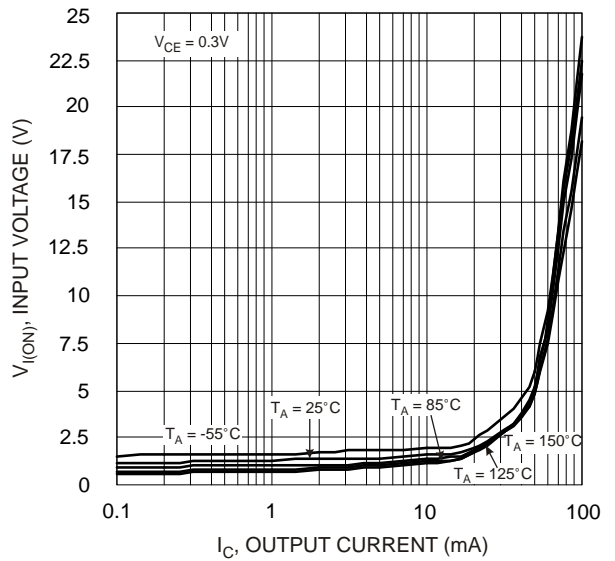


Fig. 25 $V_{(ON)}$ vs I_C

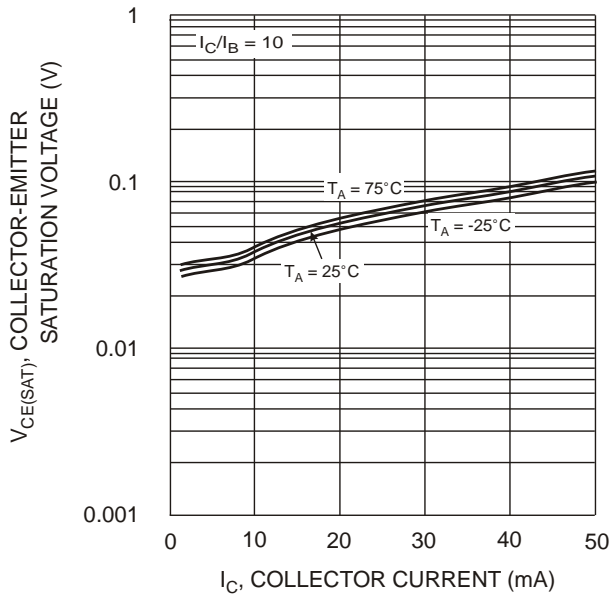


Fig. 26 $V_{CE(SAT)}$ vs. I_C

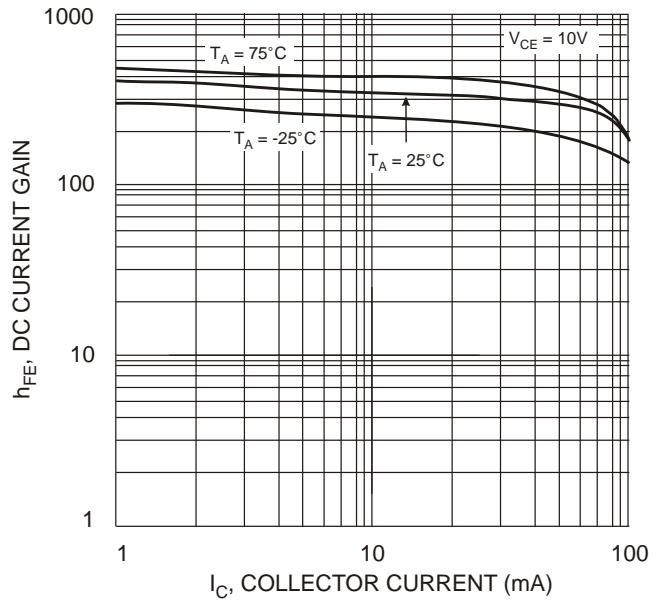


Fig. 27 DC Current Gain

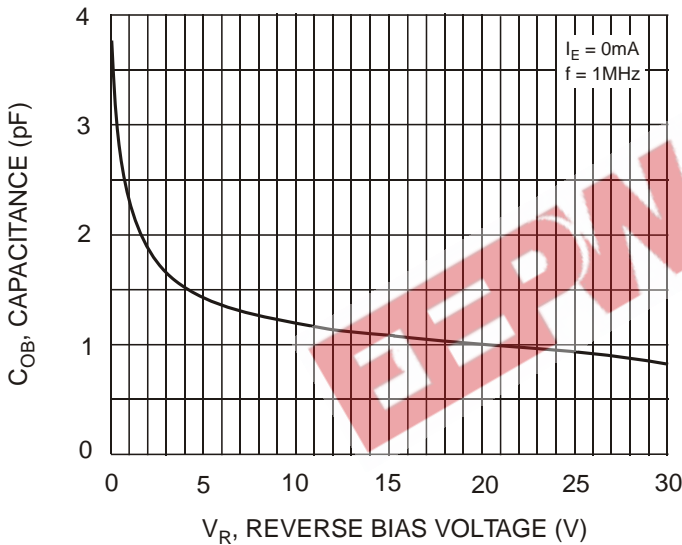


Fig. 28 Output Capacitance

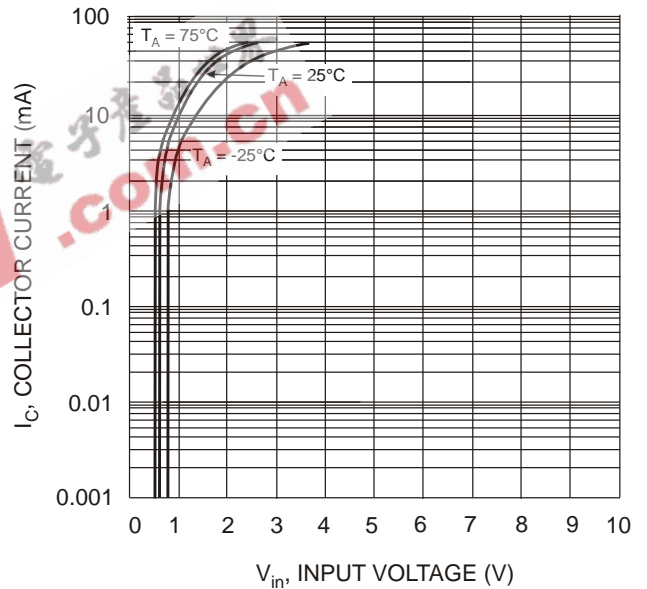


Fig. 29 Collector Current Vs. Input Voltage

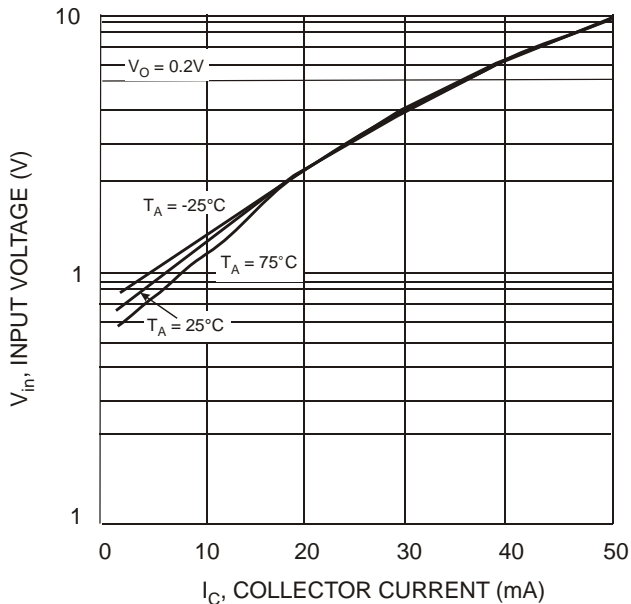


Fig. 30 Input Voltage vs. Collector Current

NPN SECTION

NEW PRODUCT

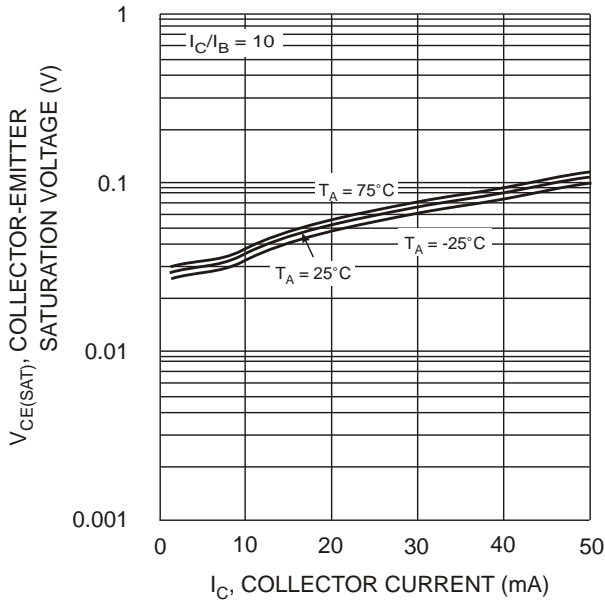


Fig. 31 $V_{CE(SAT)}$ vs. I_C

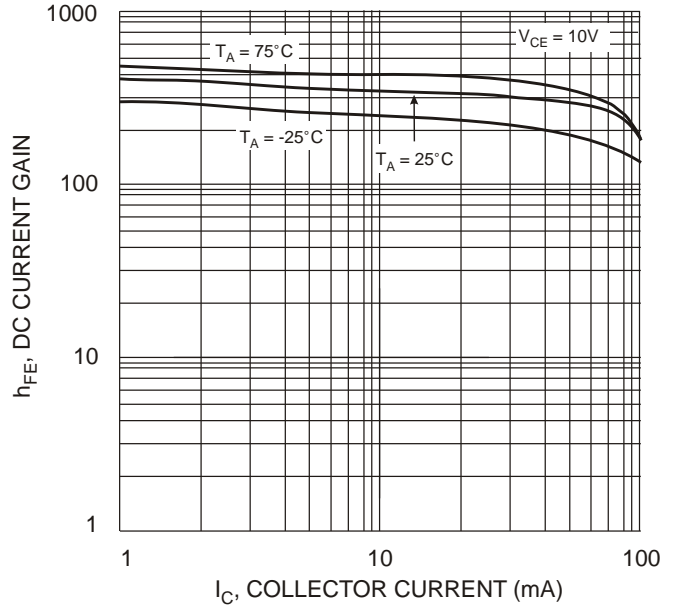


Fig. 32 DC Current Gain

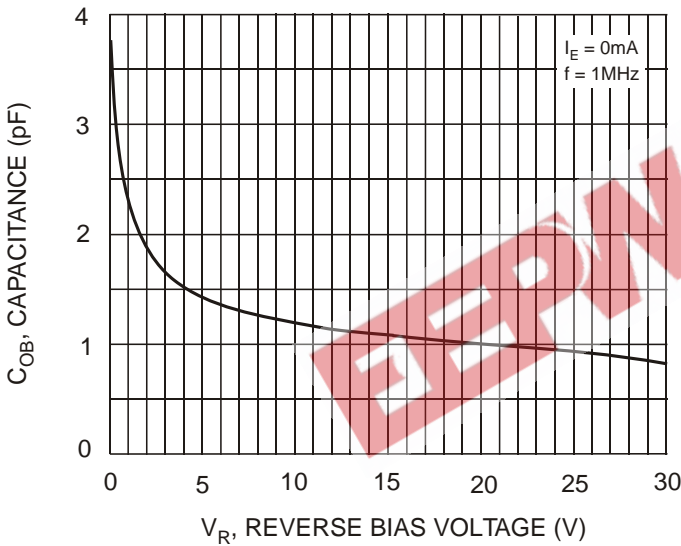


Fig. 33 Output Capacitance

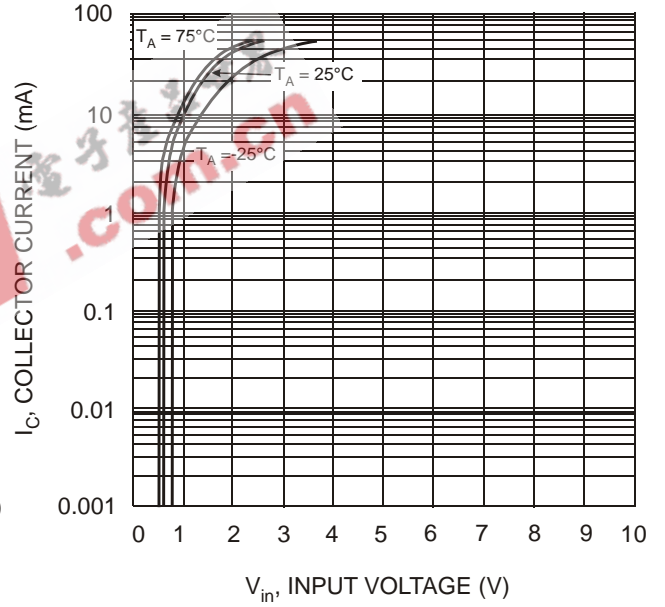


Fig. 34 Collector Current Vs. Input Voltage

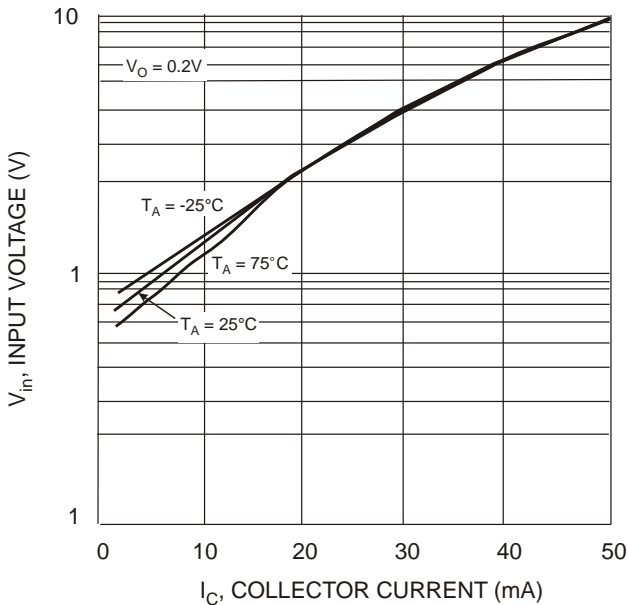


Fig. 35 Input Voltage vs. Collector Current

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