

## COMPLEMENTARY NPN/PNP PRE-BIASED SMALL SIGNAL SC-74R DUAL SURFACE MOUNT TRANSISTOR

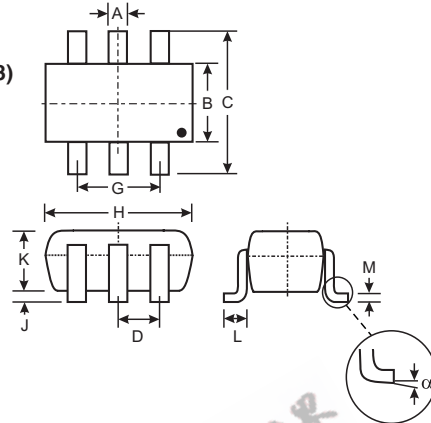
NEW PRODUCT

### Features

- Epitaxial Planar Die Construction
- Built-In Biasing Resistors
- Available in Lead Free/RoHS Compliant Version (Note 3)

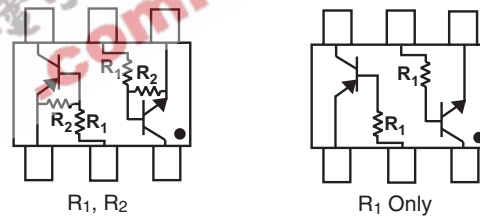
### Mechanical Data

- Case: SC-74R (Note 4)
- 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
- Also Available in Lead Free Plating (Matte Tin Finish annealed over Copper leadframe). Please see Ordering Information, Note 5, on Page 3
- Terminal Connections: See Diagram
- Marking: Date Code and Marking Code (See Diagrams & Page 4)
- Ordering Information (See Page 3)
- Weight: 0.015 grams (approximate)



SC-74R (Note 4)			
Dim	Min	Max	Typ
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	0.95		
G	1.90		
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
α	0°	8°	—
All Dimensions in mm			

P/N	R1	R2	MARKING
DCX124EK	22KΩ	22KΩ	C17
DCX144EK	47KΩ	47KΩ	C20
DCX114YK	10KΩ	47KΩ	C14
DCX123JK	2.2KΩ	47KΩ	C06
DCX114EK	10KΩ	10KΩ	C13
DCX143TK	4.7KΩ	-	C07
DCX114TK	10KΩ	-	C12



SCHMATIC DIAGRAM

### Maximum Ratings NPN Section @ T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Supply Voltage, (3) to (1)	V <sub>CC</sub>	50	V
Input Voltage, (2) to (1)	V <sub>IN</sub>	-10 to +40 -10 to +40 -6 to +40 -5 to +12 -10 to +40 -5 V <sub>max</sub> -5 V <sub>max</sub>	V
Output Current	I <sub>O</sub>	30 30 70 100 50 100 100	mA
Output Current	I <sub>C</sub> (Max)	100	mA
Power Dissipation (Total) (Note 2)	P <sub>d</sub>	300	mW
Thermal Resistance, Junction to Ambient Air (Note 1)	R <sub>θJA</sub>	417	°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. 200mW per element must not be exceeded.
  3. No purposefully added lead.
  4. SC-74R and SOT-26 have identical dimensions and the only difference is the location of the pin one indicator. Please see the individual device datasheets for exact details regarding the location of the pin one indicator.

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

Characteristic	Symbol	Value	Unit
Supply Voltage, (3) to (1)	V <sub>CC</sub>	50	V
Input Voltage, (2) to (1) DCX124EK DCX144EK DCX114YK DCX123JK DCX114EK DCX143TK DCX114TK	V <sub>IN</sub>	+10 to -40 +10 to -40 +6 to -40 +5 to -12 +10 to -40 +5 V <sub>max</sub> +5 V <sub>max</sub>	V
Output Current DCX124EK DCX144EK DCX114YK DCX123JK DCX114EK DCX143TK DCX114TK	I <sub>O</sub>	-30 -30 -70 -100 -50 -100 -100	mA
Output Current All	I <sub>C</sub> (Max)	-100	mA
Power Dissipation (Total) (Note 2)	P <sub>d</sub>	300	mW
Thermal Resistance, Junction to Ambient Air (Note 1)	R <sub>θJA</sub>	833	°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. 200mW per element must not be exceeded.

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

Characteristic (DCX143TK & DCX114TK 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 DCX143TK I <sub>C</sub> /I <sub>B</sub> = 1mA / 0.1mA DCX114TK
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	ΔR <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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Input Voltage	V <sub>I(off)</sub>	0.5	1.16	—	V	V <sub>CC</sub> = 5V, I <sub>O</sub> = 100μA
		0.5	1.1	—		
Input Voltage	V <sub>I(on)</sub>	—	—	—	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
		—	1.65	3.0		
Output Voltage	V <sub>O(on)</sub>	—	—	—	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
		—	0.1	0.3		
Input Current	I <sub>I</sub>	—	—	—	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	G <sub>I</sub>	80	—	—	—	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
		68	—	—		
Input Resistor (R <sub>1</sub> ) Tolerance	ΔR <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

\* Transistor - For Reference Only  
DS30350 Rev. 5 - 2

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

Characteristic (DCX143TK & DCX114TK 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	$I_C/I_B = 2.5\text{mA} / 0.25\text{mA}$ DCX143TK $I_C/I_B = 1\text{mA} / 0.1\text{mA}$ DCX114TK
DC Current Transfer Ratio	$h_{FE}$	100	250	600	—	$I_C = -1\text{mA}, V_{CE} = -5\text{V}$
Input Resistor ( $R_1$ ) Tolerance	$\Delta R_1$	-30	—	+30	%	—
Gain-Bandwidth Product*	$f_T$	—	250	—	MHz	$V_{CE} = -10\text{V}, I_E = 5\text{mA}, f = 100\text{MHz}$

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Input Voltage	DCX124EK DCX144EK DCX114YK DCX123JK DCX114EK	-0.5 -0.5 -0.3 — -0.5 -0.5	-1.16 -1.1 — — — -1.1	—	V	$V_{CC} = -5\text{V}, I_O = -100\mu\text{A}$
	DCX124EK DCX144EK DCX114YK DCX123JK DCX114EK	—	-1.9 -1.9 — — -1.9	-3.0 -3.0 -1.4 -1.1 -3.0	V	$V_O = -0.3, I_O = -5\text{mA}$ $V_O = -0.3, I_O = -2\text{mA}$ $V_O = -0.3, I_O = -1\text{mA}$ $V_O = -0.3, I_O = -5\text{mA}$ $V_O = -0.3, I_O = -10\text{mA}$
Output Voltage	DCX124EK DCX144EK DCX114YK DCX123JK DCX114EK	—	-0.1	-0.3	V	$I_O/I_I = -10\text{mA} / -0.5\text{mA}$ $I_O/I_I = -10\text{mA} / -0.5\text{mA}$ $I_O/I_I = -5\text{mA} / -0.25\text{mA}$ $I_O/I_I = -5\text{mA} / -0.25\text{mA}$ $I_O/I_I = -10\text{mA} / -0.5\text{mA}$
Input Current	DCX124EK DCX144EK DCX114YK DCX123JK DCX114EK	—	—	-0.36 -0.18 -0.88 -3.6 -0.88	mA	$V_I = -5\text{V}$
Output Current	$I_{O(off)}$	—	—	-0.5	$\mu\text{A}$	$V_{CC} = 50\text{V}, V_I = 0\text{V}$
DC Current Gain	DCX124EK DCX144EK DCX114YK DCX123JK DCX114EK	80 68 68 80 30	—	—	—	$V_O = -5\text{V}, I_O = -5\text{mA}$ $V_O = -5\text{V}, I_O = -5\text{mA}$ $V_O = -5\text{V}, I_O = -10\text{mA}$ $V_O = -5\text{V}, I_O = -10\text{mA}$ $V_O = -5\text{V}, I_O = -5\text{mA}$
Input Resistor ( $R_1$ ) Tolerance	$\Delta R_1$	-30	—	+30	%	—
Resistance Ratio Tolerance	$R_2/R_1$	-20	—	+20	%	—
Gain-Bandwidth Product*	$f_T$	—	250	—	MHz	$V_{CE} = -10\text{V}, I_E = -5\text{mA}, f = 100\text{MHz}$

\* Transistor - For Reference Only

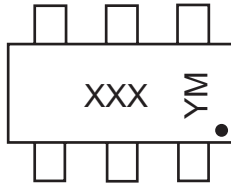
**Ordering Information** (Note 5)

Device	Packaging	Shipping
DCX124EK-7	SC-74R	3000/Tape & Reel
DCX144EK-7	SC-74R	3000/Tape & Reel
DCX114YK-7	SC-74R	3000/Tape & Reel
DCX123JK-7	SC-74R	3000/Tape & Reel
DCX114EK-7	SC-74R	3000/Tape & Reel
DCX143TK-7	SC-74R	3000/Tape & Reel
DCX114TK-7	SC-74R	3000/Tape & Reel

Notes: 5. For Packaging Details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

6. For Lead Free/RoHS Compliant version part numbers, please add "-F" suffix to the part numbers above. Example: DCX114TK-7-F.

**Marking Information**



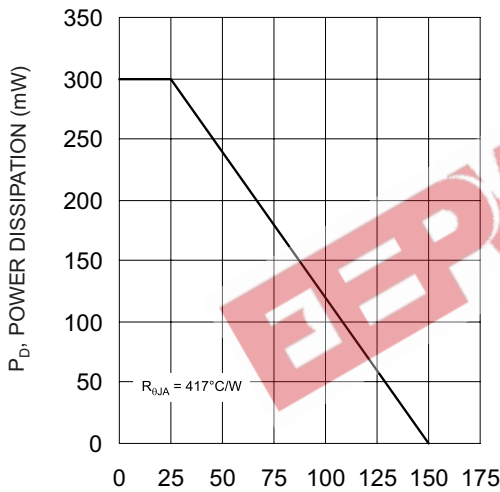
XXX = Product Type Marking Code  
See Sheet 1 Diagrams  
YM = Date Code Marking  
Y = Year ex: T = 2006  
M = Month ex: 9 = September

Date Code Key

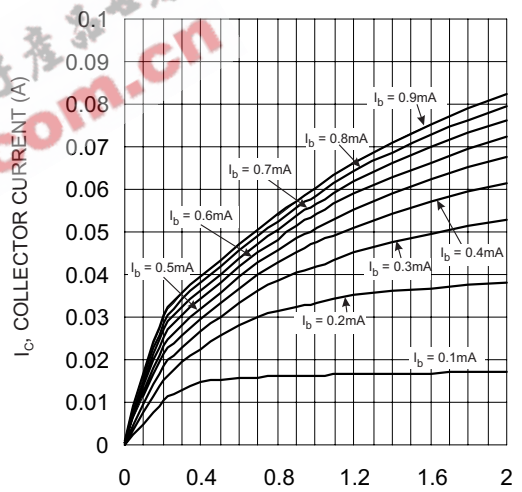
Year	2006	2007	2008	2009
Code	T	U	V	W

Month	Jan	Feb	March	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

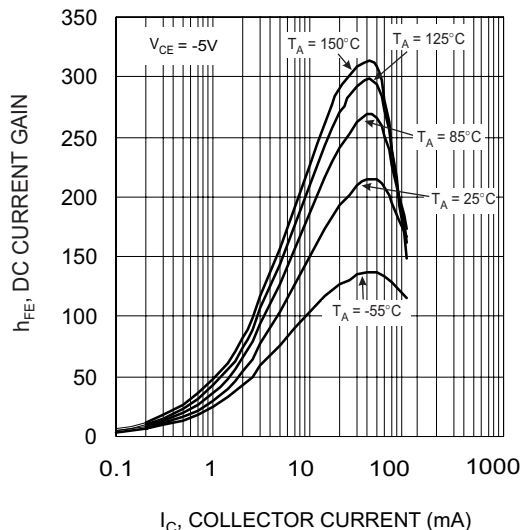
**TYPICAL CURVES - DCX124EK  
PNP SECTION**



$T_A$ , AMBIENT TEMPERATURE ( $^{\circ}C$ )  
Fig. 1 Power Derating Curve

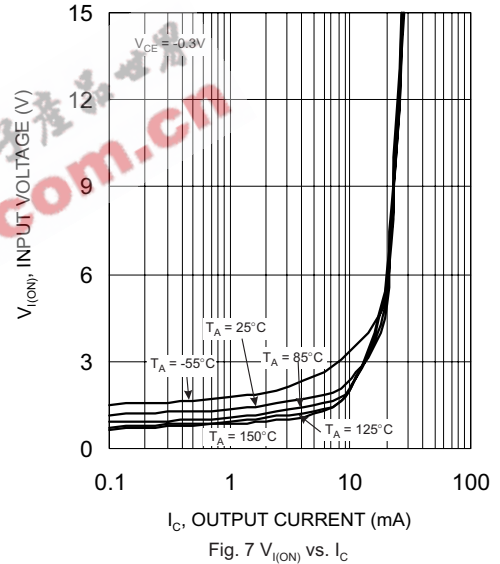
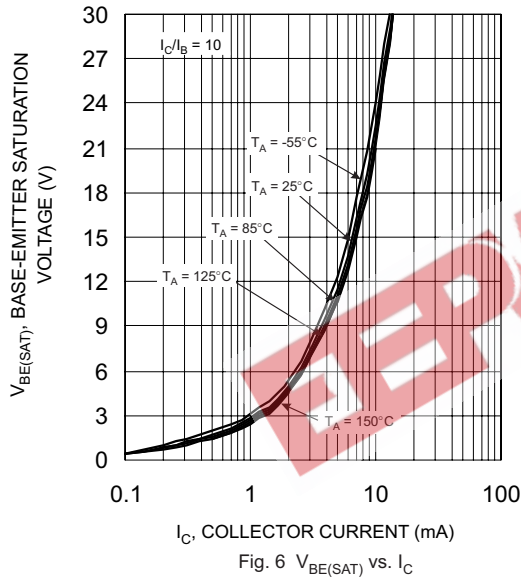
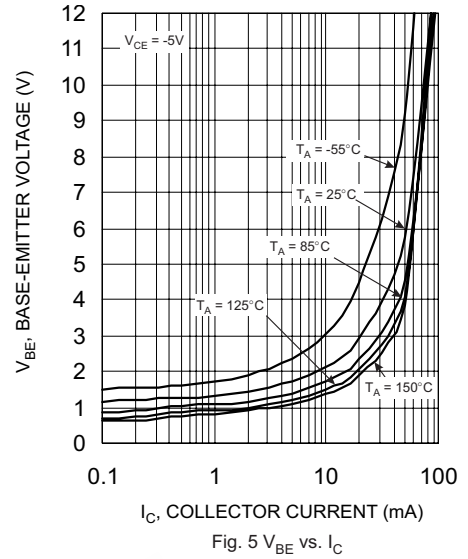
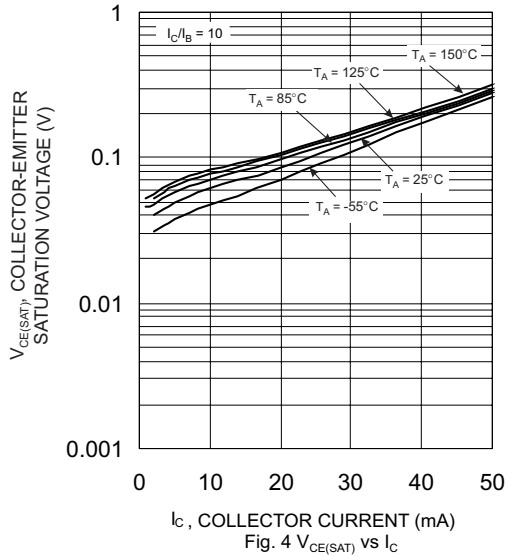


$V_{CE}$ , COLLECTOR EMITTER VOLTAGE (V)  
Fig. 2  $V_{CE}$  vs.  $I_C$

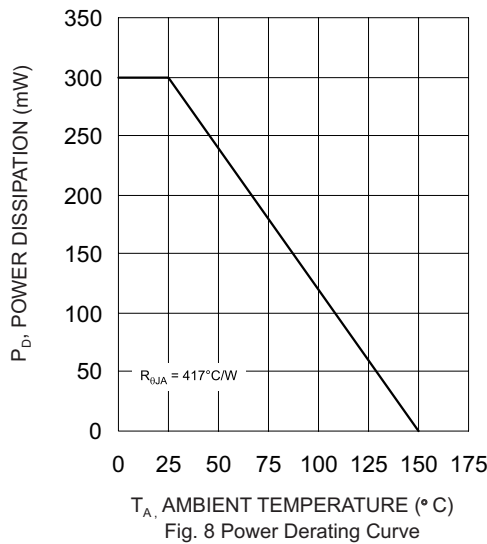


$I_C$ , COLLECTOR CURRENT (mA)  
Fig. 3 DC Current Gain

**TYPICAL CURVES - DCX124EK**  
**PNP SECTION**



**TYPICAL CURVES - DCX124EK**  
**NPN SECTION**



**TYPICAL CURVES - DCX124EK**  
**NPN SECTION**

NEW PRODUCT

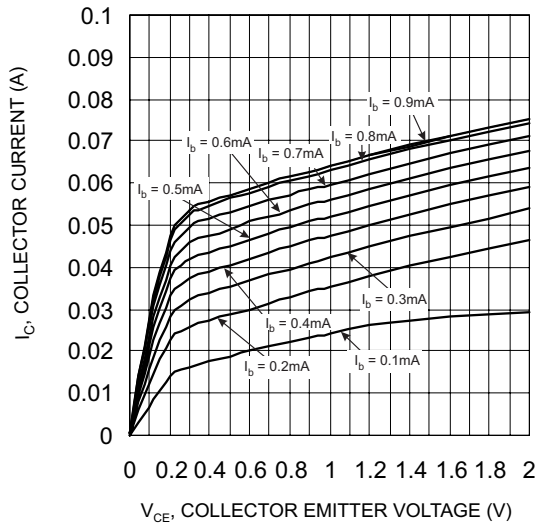


Fig. 9  $V_{CE}$  vs.  $I_C$

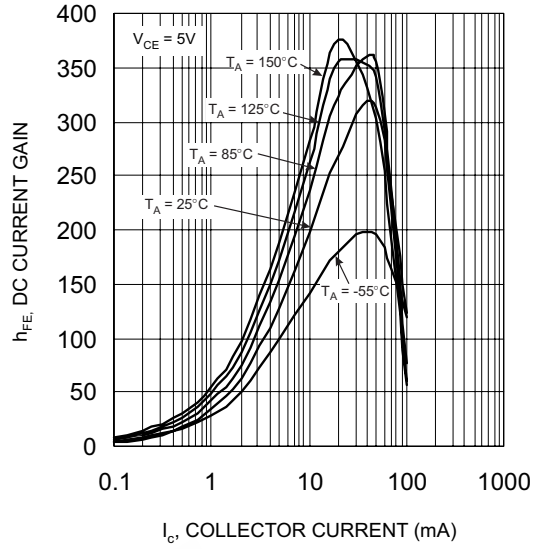


Fig. 10 DC Current Gain

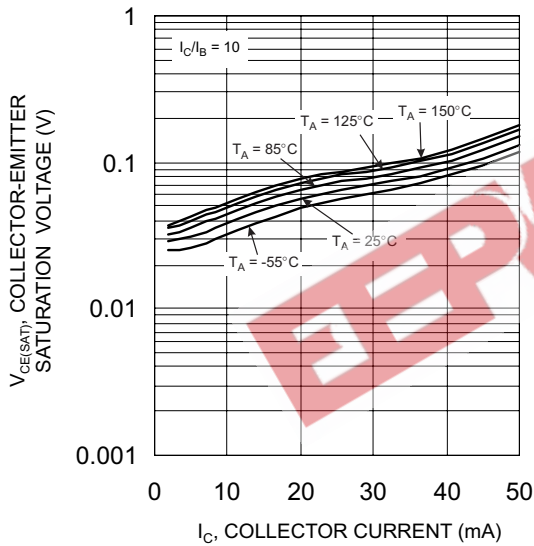


Fig. 11  $V_{CE(SAT)}$  vs.  $I_C$

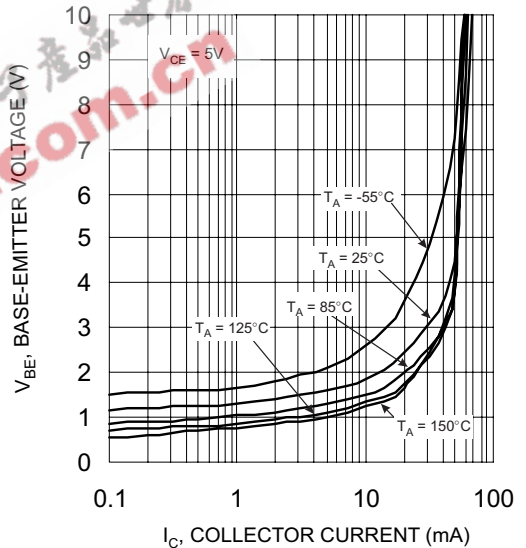


Fig. 12  $V_{BE}$  vs.  $I_C$

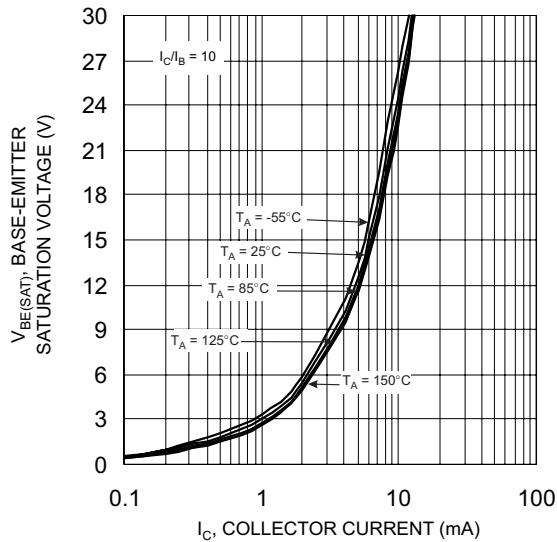


Fig. 13  $V_{BE(SAT)}$  vs.  $I_C$

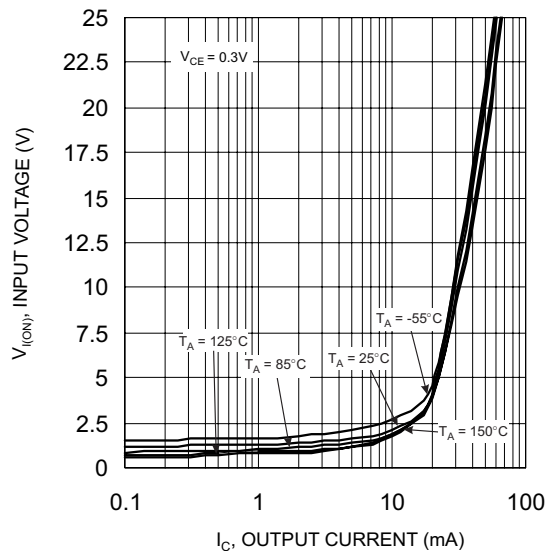


Fig. 14  $V_{I(ON)}$  vs.  $I_C$

**TYPICAL CURVES - DCX123JK  
PNP SECTION**

NEW PRODUCT

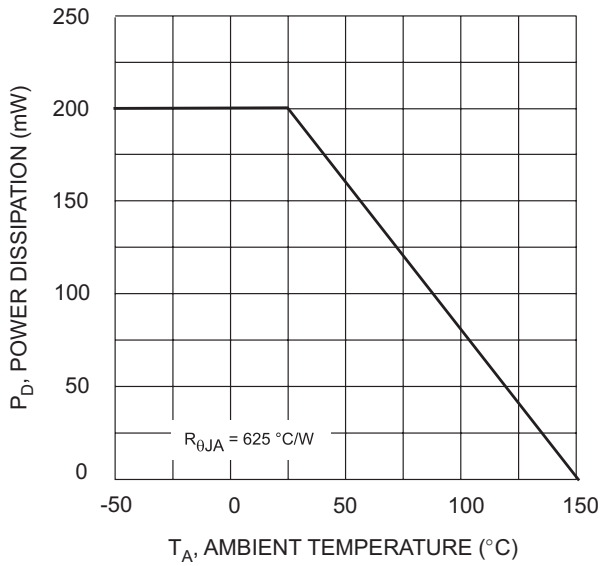


Fig. 15 Derating Curve

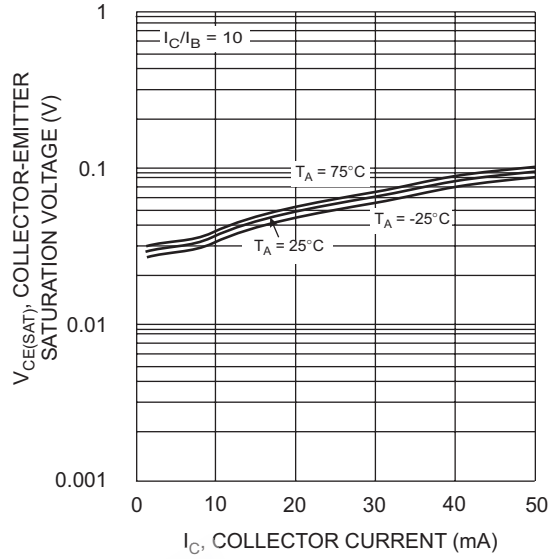


Fig. 16  $V_{CE(SAT)}$  vs.  $I_C$

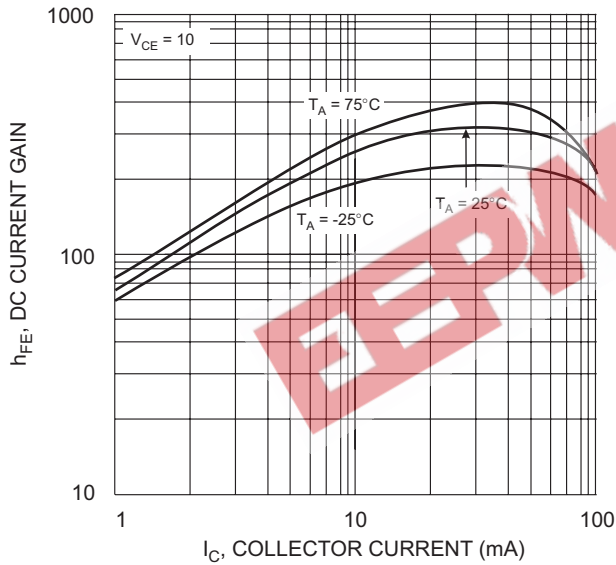


Fig. 17 DC Current Gain

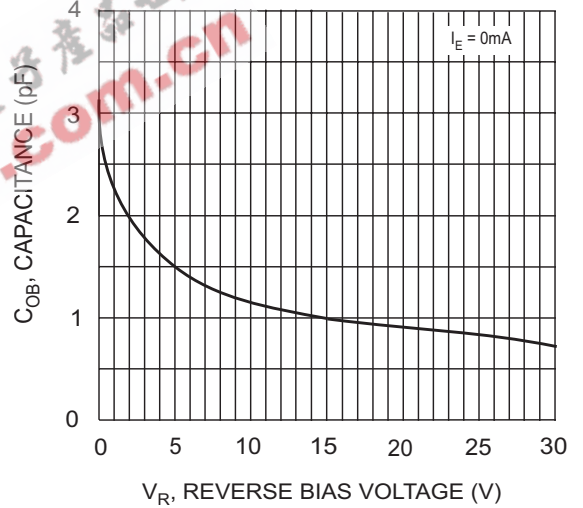


Fig. 18 Output Capacitance

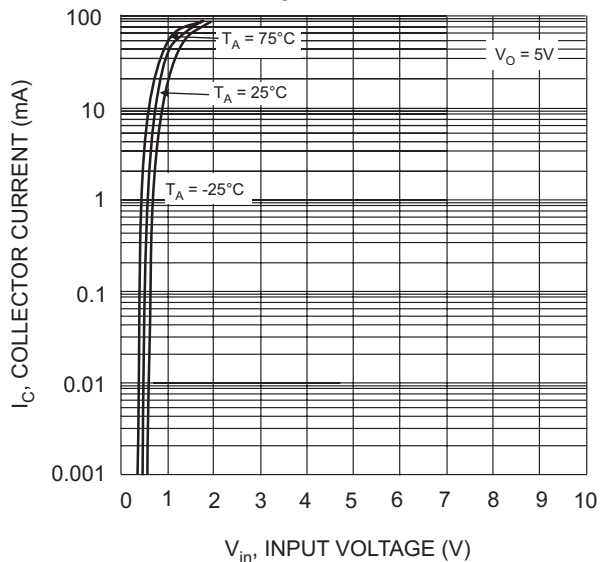


Fig. 19 Collector Current Vs. Input Voltage

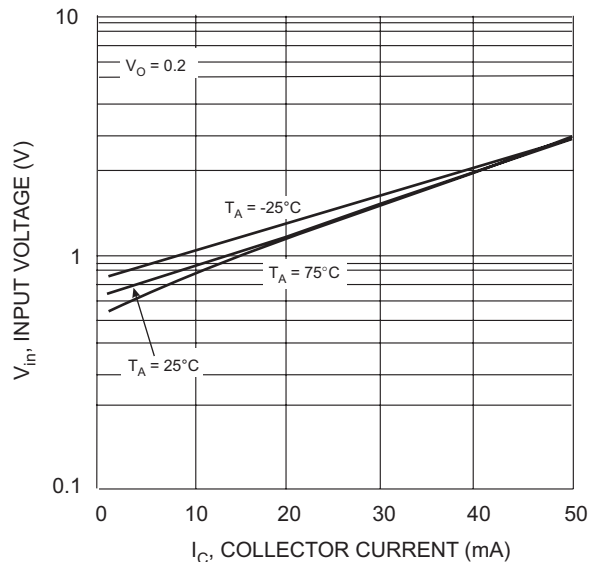


Fig. 20 Input Voltage vs. Collector Current



**TYPICAL CURVES - DCX123JK**  
**NPN SECTION**

NEW PRODUCT

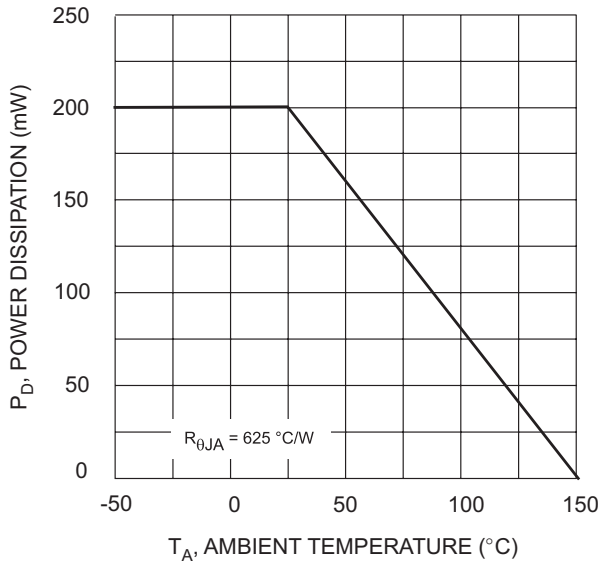


Fig. 21 Derating Curve

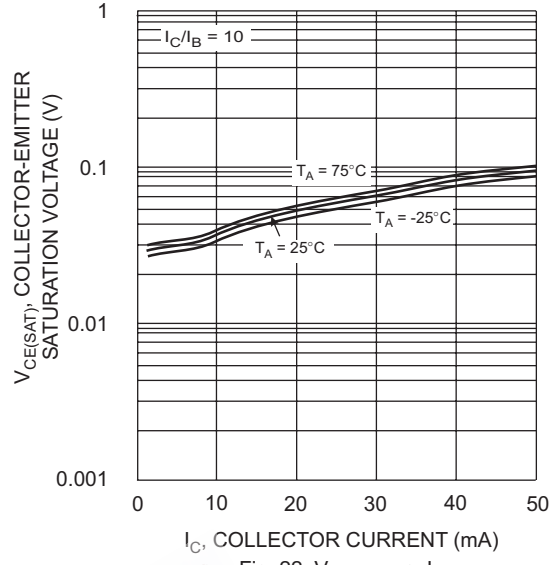


Fig. 22  $V_{CE(SAT)}$  vs.  $I_C$

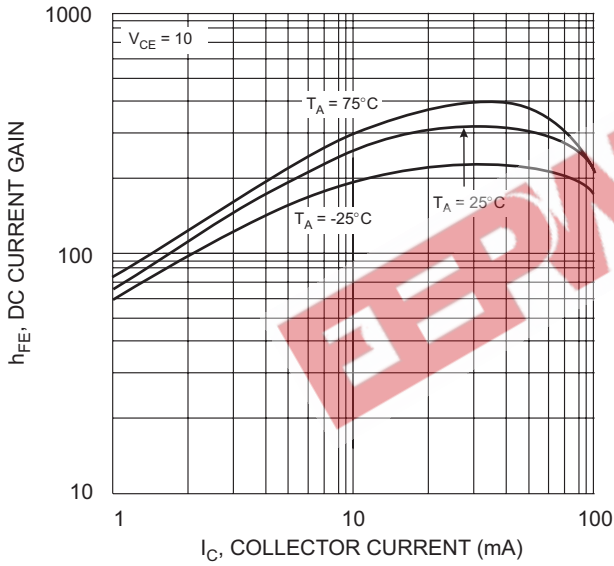


Fig. 23 DC Current Gain

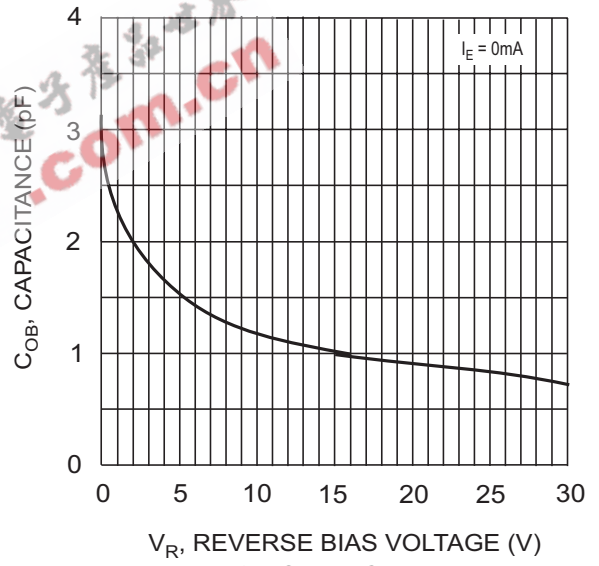


Fig. 24 Output Capacitance

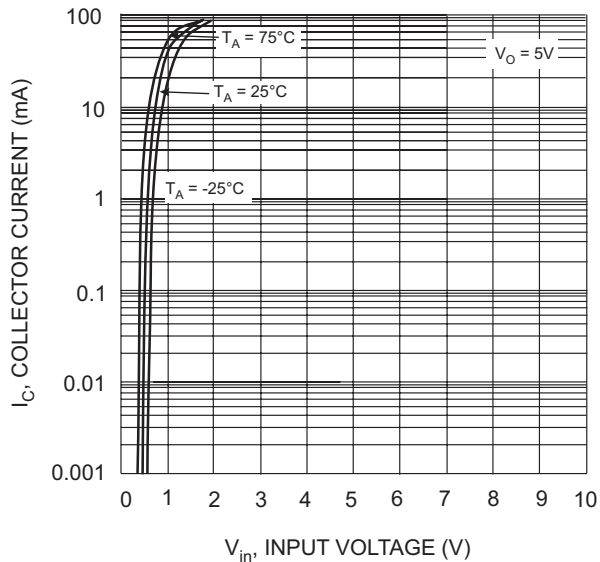


Fig. 25 Collector Current Vs. Input Voltage

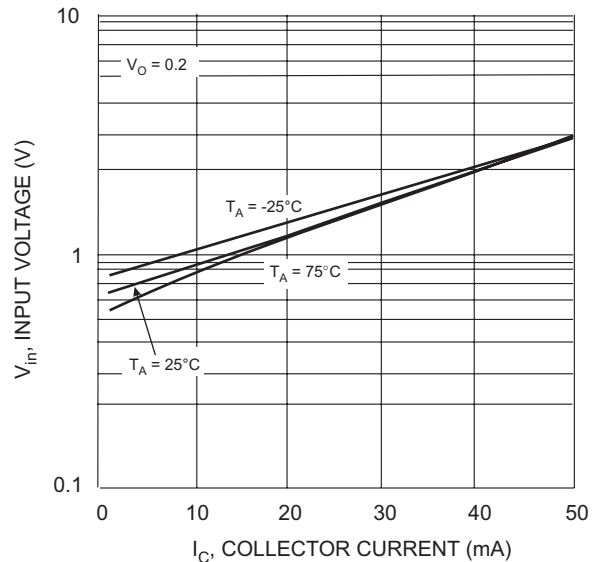


Fig. 26 Input Voltage vs. Collector Current



**TYPICAL CURVES - DCX114TK**  
**PNP SECTION**

NEW PRODUCT

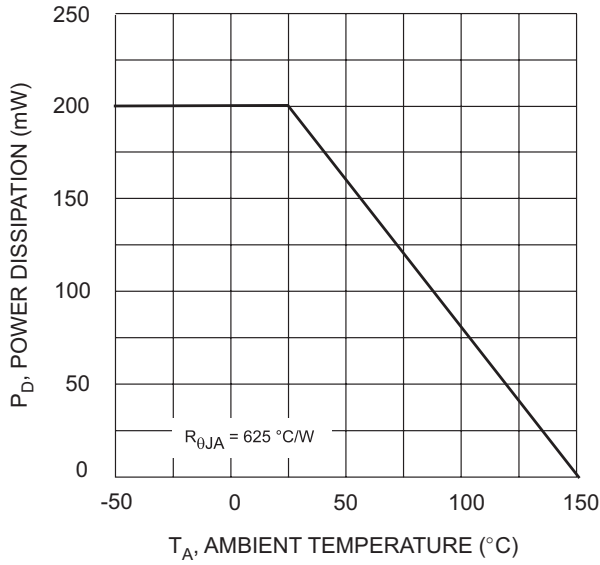


Fig. 27 Derating Curve

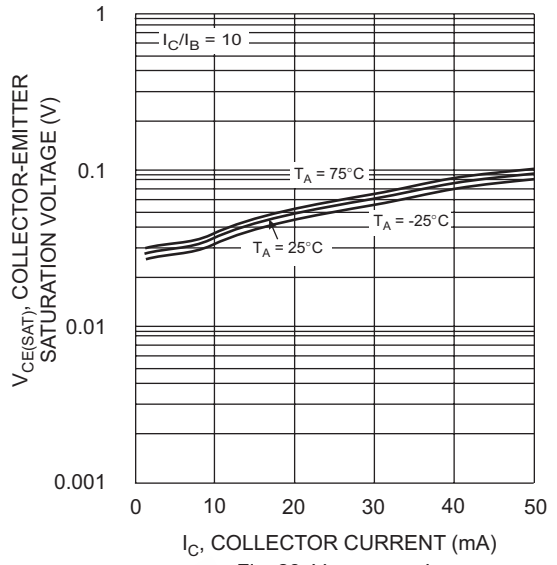


Fig. 28  $V_{CE(SAT)}$  vs.  $I_C$

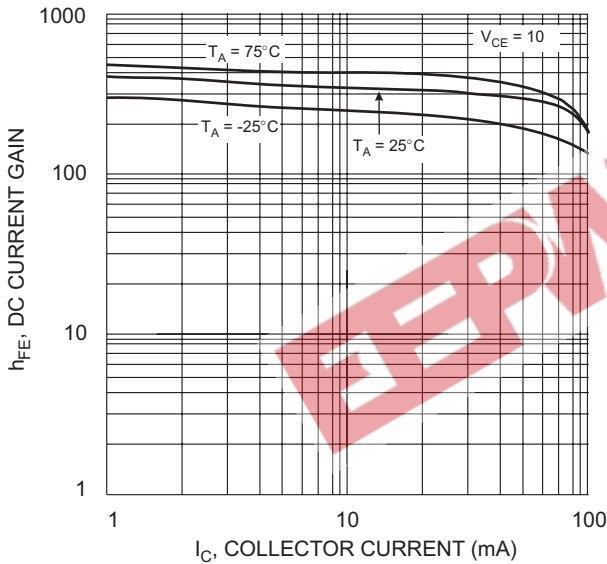


Fig. 29 DC Current Gain

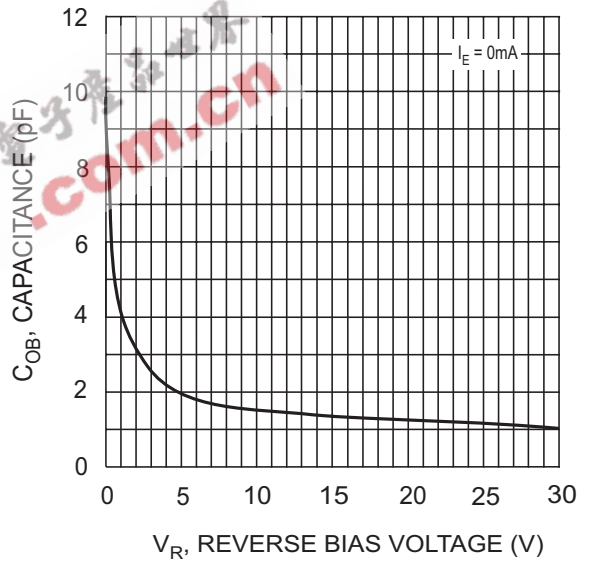


Fig. 30 Output Capacitance

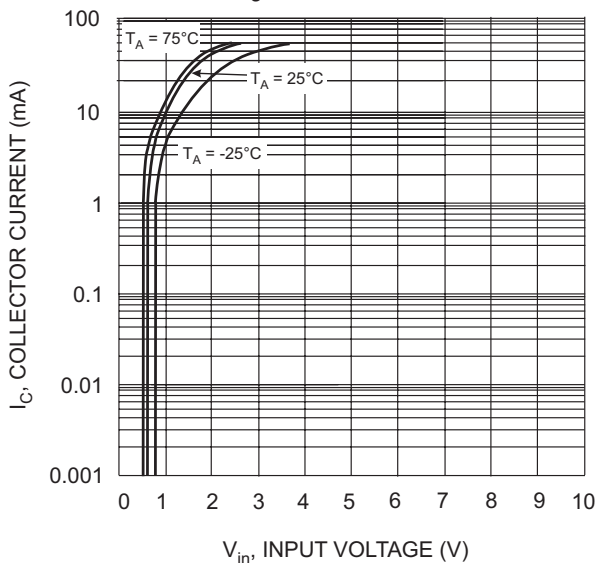


Fig. 31 Collector Current Vs. Input Voltage

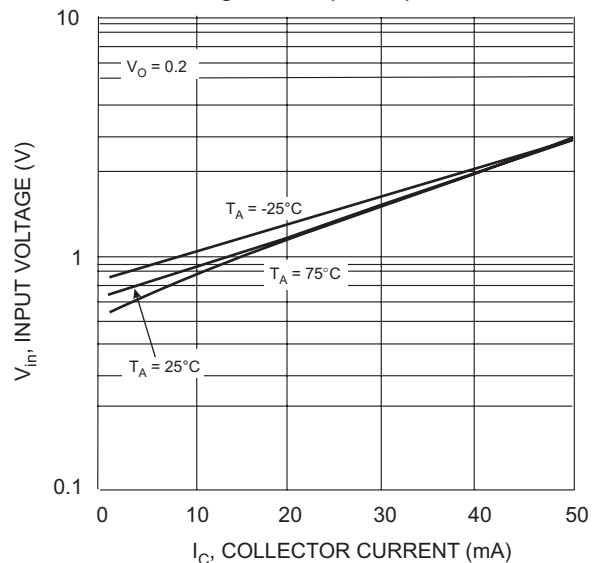


Fig. 32 Input Voltage vs. Collector Current

**TYPICAL CURVES - DCX114TK**  
**NPN SECTION**

NEW PRODUCT

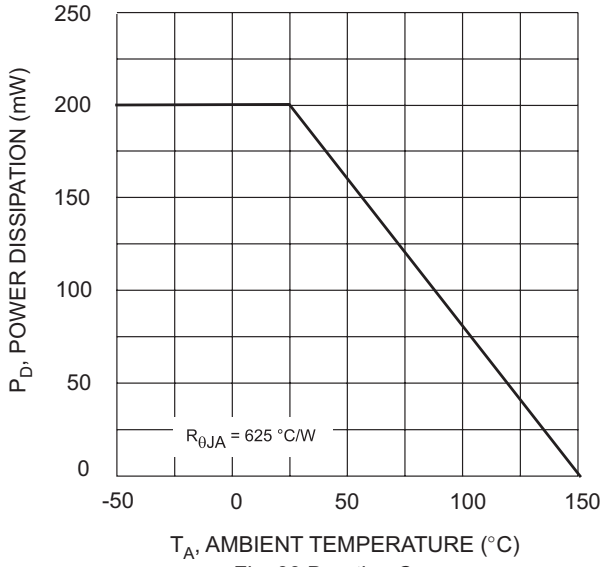


Fig. 33 Derating Curve

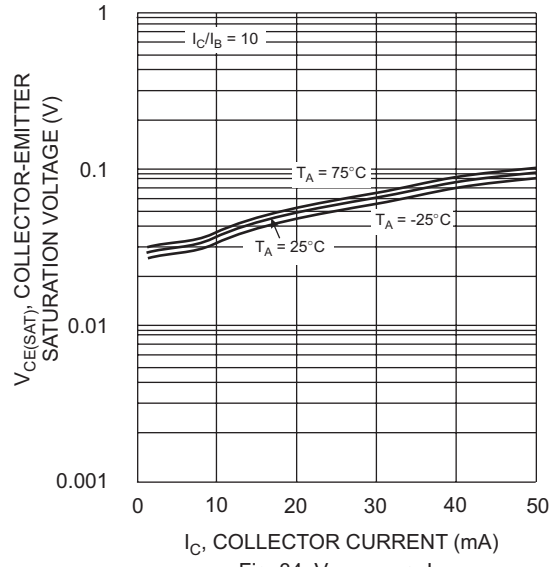


Fig. 34  $V_{CE(SAT)}$  vs.  $I_C$

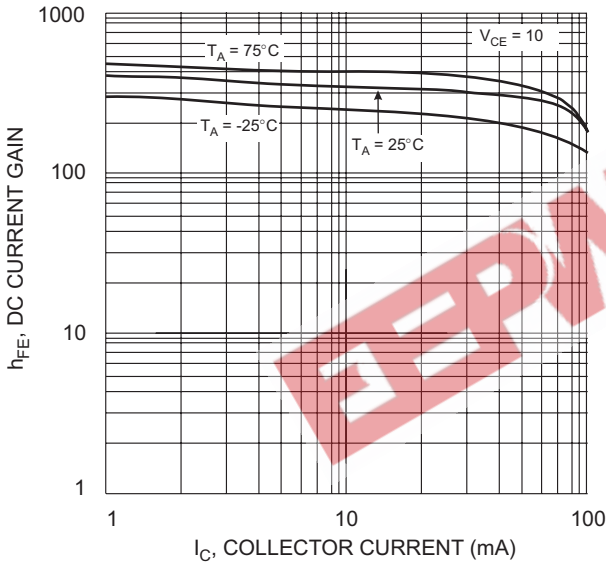


Fig. 35 DC Current Gain

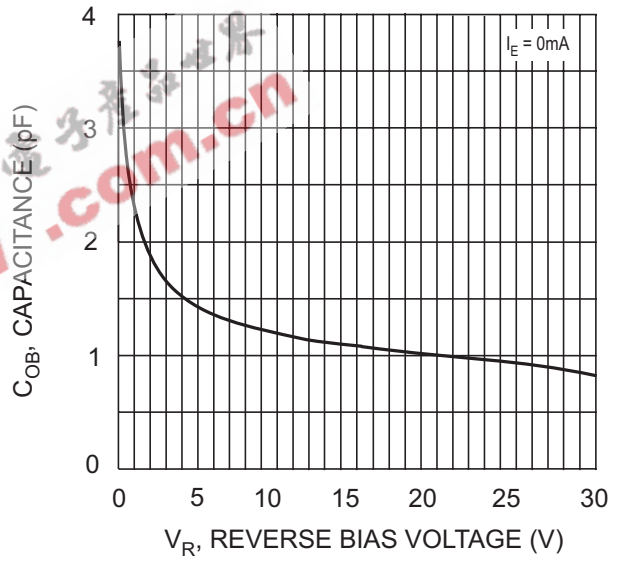


Fig. 36 Output Capacitance

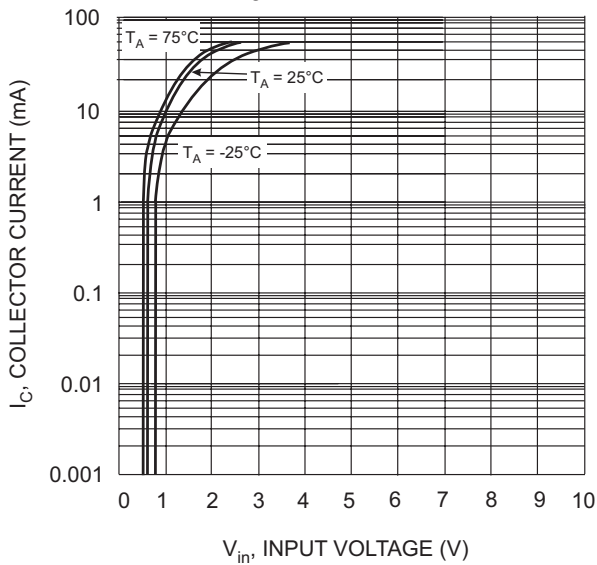


Fig. 37 Collector Current Vs. Input Voltage

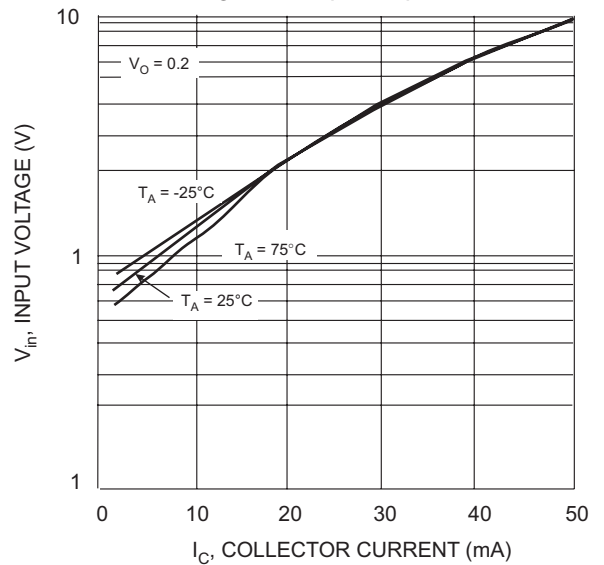


Fig. 38 Input Voltage vs. Collector Current

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