

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

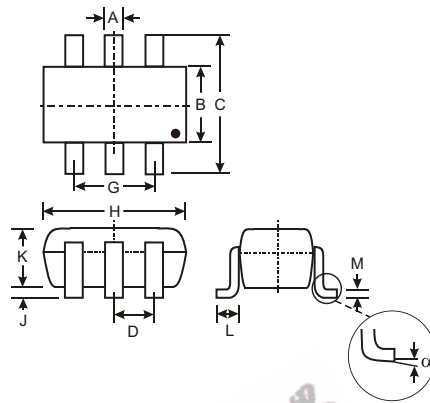
NEW PRODUCT

### Features

- Epitaxial Planar Die Construction
- Built-In Biasing Resistors

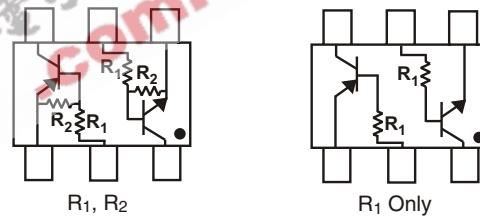
### Mechanical Data

- Case: SC-74R, Molded Plastic
- Case material - UL Flammability Rating 94V-0
- Moisture sensitivity: Level 1 per J-STD-020A
- Terminals: Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Marking: Date Code and Marking Code (See Diagrams & Page 4)
- Weight: 0.015 grams (approx.)
- Ordering Information (See Page 3)



SC-74R			
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
$\alpha$	0°	8°	—
All Dimensions in mm			

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



SCHEMATIC DIAGRAM

### Maximum Ratings NPN 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)	$V_{IN}$	-10 to +40 -10 to +40 -6 to +40 -5 to +12 -10 to +40 -5 $V_{max}$ -5 $V_{max}$	V
Output Current	$I_O$	30 30 70 100 50 100 100	mA
Output Current	$I_C$ (Max)	100	mA
Power Dissipation (Total)	$P_d$	300	mW
Thermal Resistance, Junction to Ambient Air (Note 1)	$R_{\theta JA}$	416.7	$^\circ\text{C/W}$
Operating and Storage and Temperature Range	$T_j, T_{STG}$	-55 to +150	$^\circ\text{C}$

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.

**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) DCX124EK DCX144EK DCX114YK DCX123JK DCX114EK DCX143TK DCX114TK	$V_{IN}$	+10 to -40 +10 to -40 +6 to -40 +5 to -12 +10 to -40 +5 $V_{max}$ +5 $V_{max}$	V
Output Current DCX124EK DCX144EK DCX114YK DCX123JK DCX114EK DCX143TK DCX114TK	$I_O$	-30 -30 -70 -100 -50 -100 -100	mA
Output Current All	$I_C$ (Max)	-100	mA
Power Dissipation (Total)	$P_d$	300	mW
Thermal Resistance, Junction to Ambient Air (Note 1)	$R_{\theta JA}$	833	$^\circ\text{C/W}$
Operating and Storage and Temperature Range	$T_j, T_{STG}$	-55 to +150	$^\circ\text{C}$

Note: 1. Mounted on FR4 PC Board with recommended pad layout at <http://www.diodes.com/datasheets/ap02001.pdf>.

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

Characteristic (DDC143TK & DDC114TK 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	$V_{I(off)}$	0.5 0.5 0.3 0.5 0.5	1.1 1.1 — — 1.1	— —	V	$V_{CC} = 5\text{V}, I_O = 100\mu\text{A}$
Output Voltage	$V_{O(on)}$	—	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	$I_I$	—	—	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	$G_I$	56 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

## 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	-1.1 -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	56 68 68 80 30	—	—	—	$V_O = -5\text{V}$ , $I_O = -5\text{mA}$ $V_O = -5\text{V}$ , $I_O = -2\text{mA}$ $V_O = -5\text{V}$ , $I_O = -10\text{mA}$ $V_O = -5\text{V}$ , $I_O = -10\text{mA}$ $V_O = -5\text{V}$ , $I_O = -5\text{mA}$	
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	$V_{CE} = -10\text{V}$ , $I_E = -5\text{mA}$ , $f = 100\text{MHz}$	

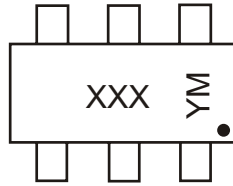
\* Transistor - For Reference Only

## Ordering Information (Note 2)

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

## Marking Information



XXX = Product Type Marking Code  
 See Sheet 1 Diagrams  
 YM = Date Code Marking  
 Y = Year ex: N = 2002  
 M = Month ex: 9 = September

Date Code Key

<b>Year</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>
<b>Code</b>	N	P	R	S	T	U	V	W

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

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## TYPICAL CURVES - DCX123JK PNP SECTION

NEW PRODUCT

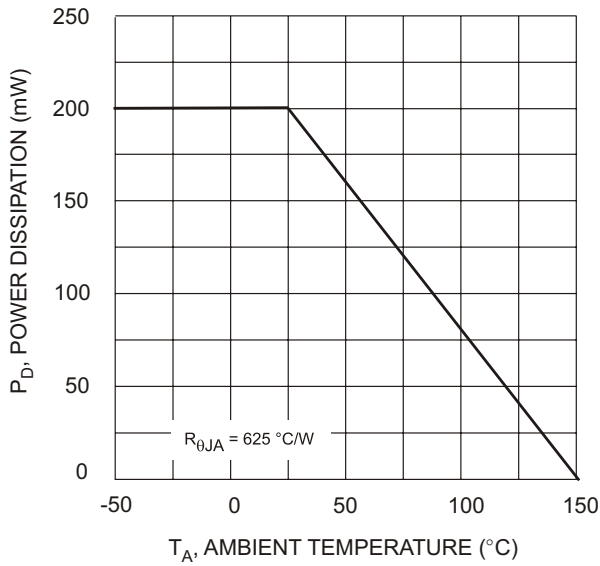


Fig. 1 Derating Curve

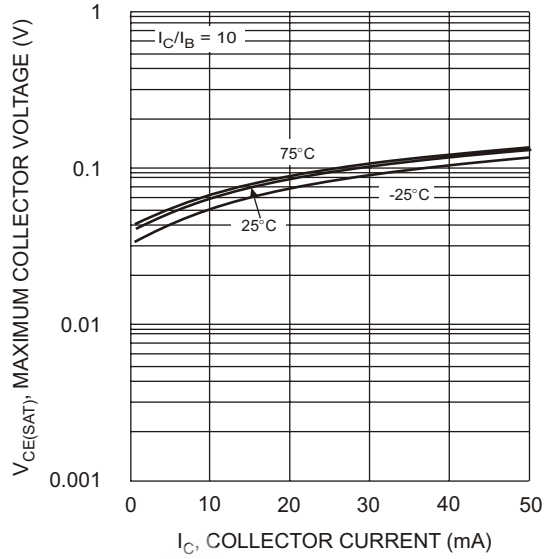


Fig. 2  $V_{CE(SAT)}$  vs.  $I_C$

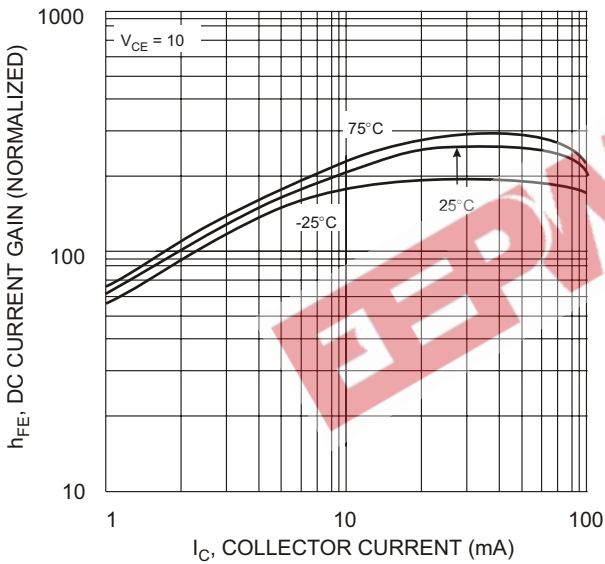


Fig. 3 DC Current Gain

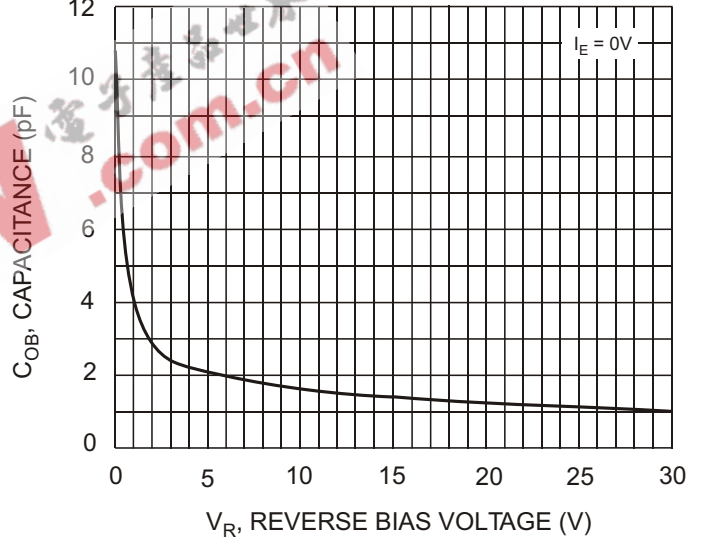


Fig. 4 Output Capacitance

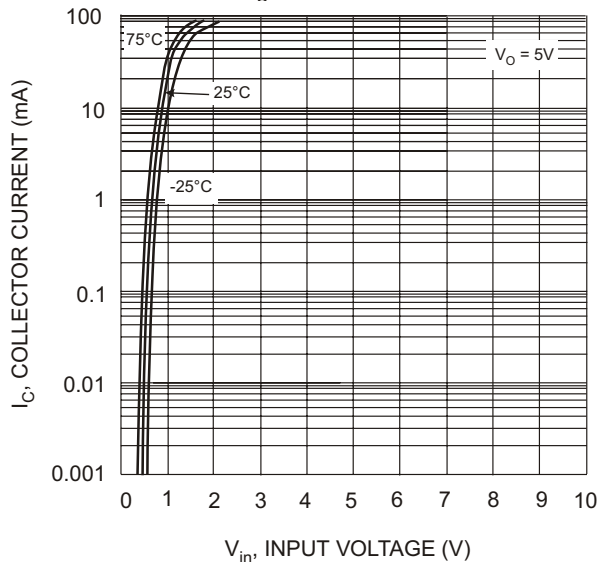


Fig. 5 Collector Current vs. Input Voltage

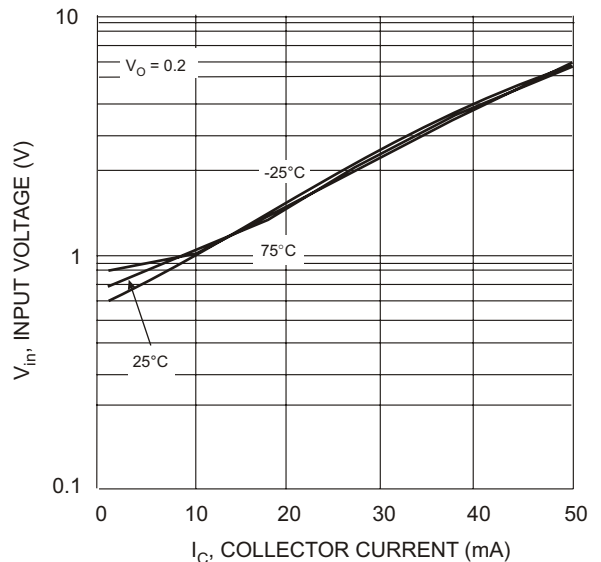


Fig. 6 Input Voltage vs. Collector Current

TYPICAL CURVES - DCX123JK  
NPN SECTION

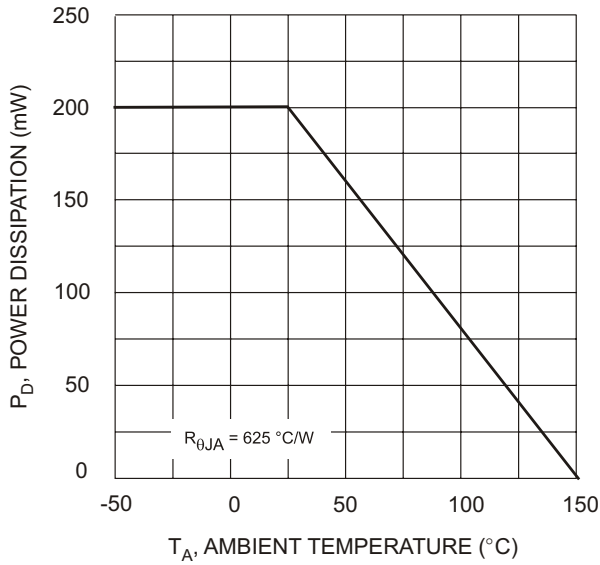


Fig. 1 Derating Curve

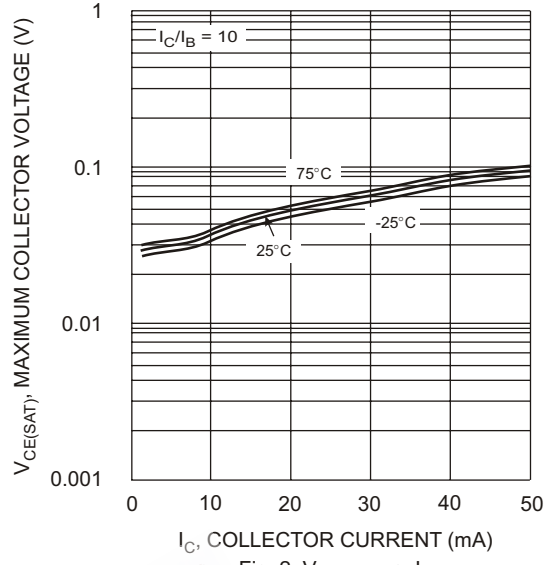


Fig. 2  $V_{CE(SAT)}$  vs.  $I_C$

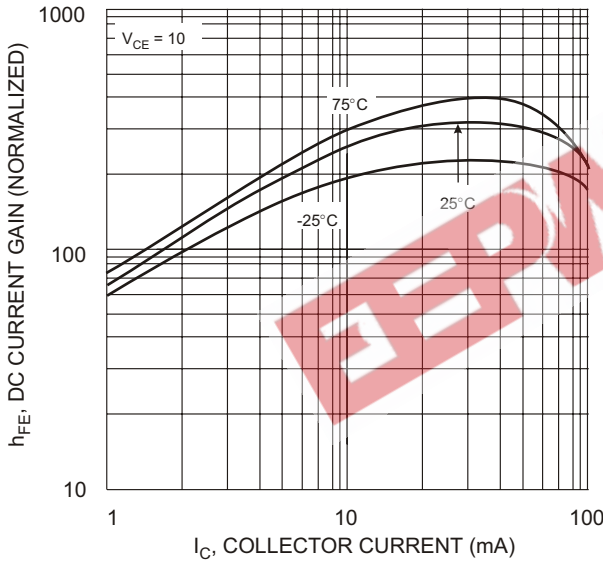


Fig. 3 DC Current Gain

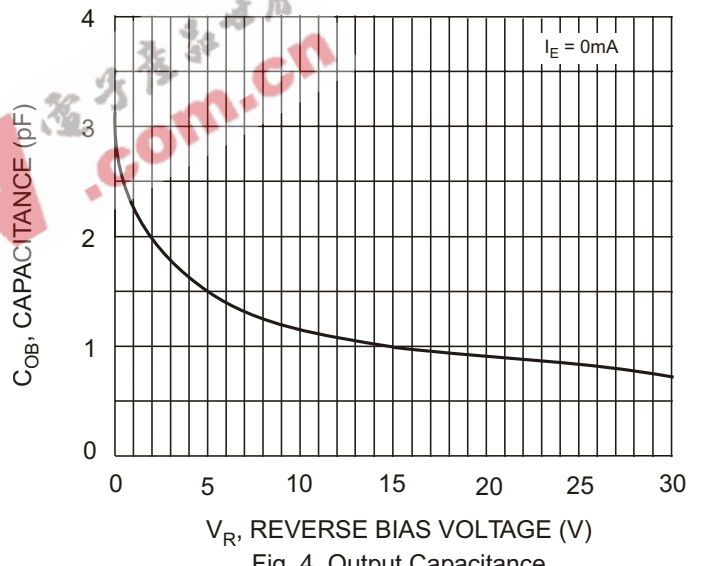


Fig. 4 Output Capacitance

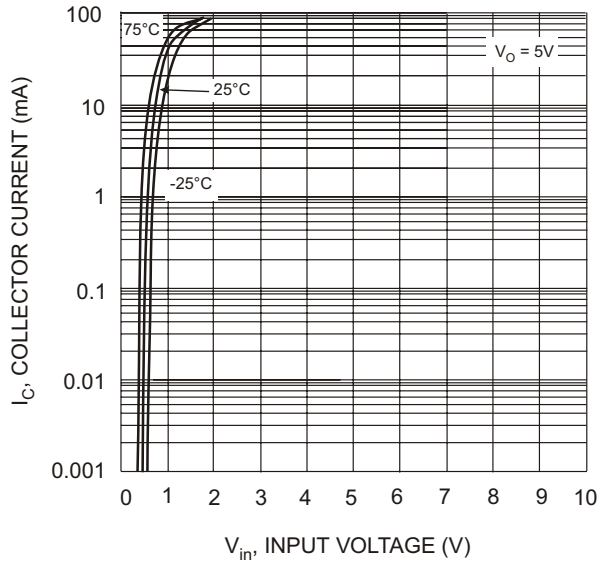


Fig. 5 Collector Current Vs. Input Voltage

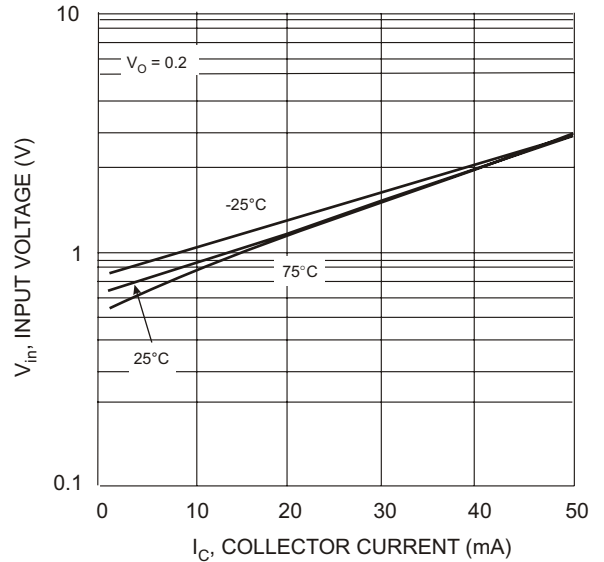


Fig. 6 Input Voltage vs. Collector Current

TYPICAL CURVES - DCX114TK  
PNP SECTION

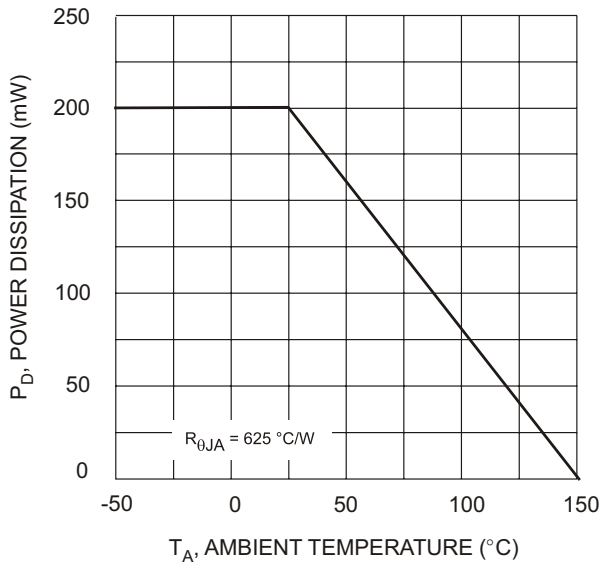


Fig. 1 Derating Curve

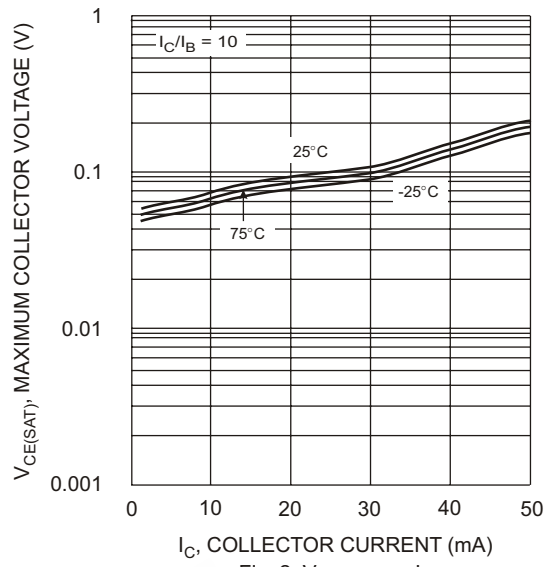


Fig. 2  $V_{CE(SAT)}$  vs.  $I_C$

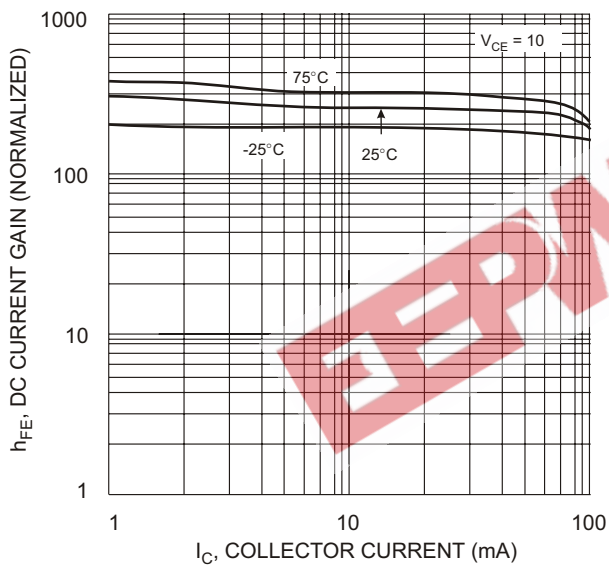


Fig. 3 DC Current Gain

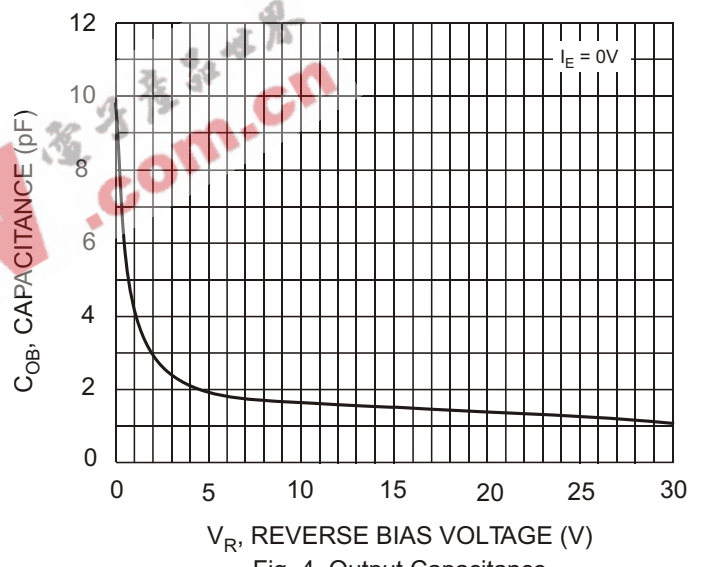


Fig. 4 Output Capacitance

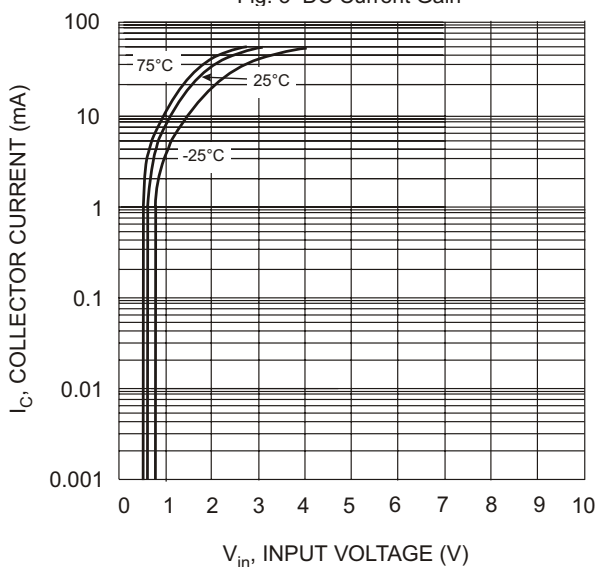


Fig. 5 Collector Current vs. Input Voltage

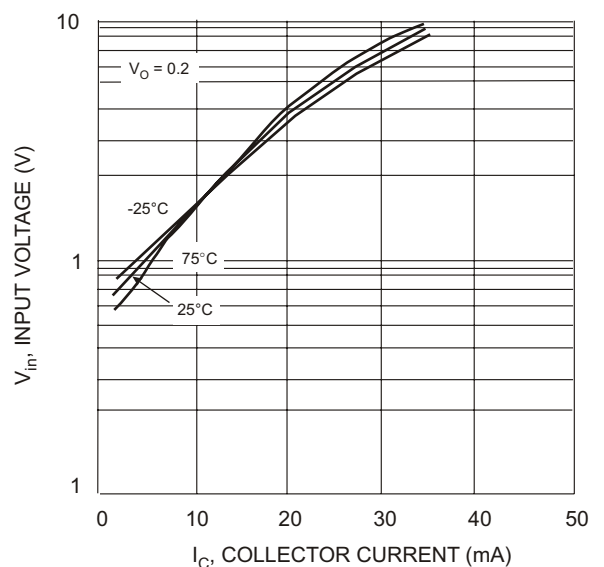


Fig. 6 Input Voltage vs. Collector Current

TYPICAL CURVES - DCX114TK  
NPN SECTION

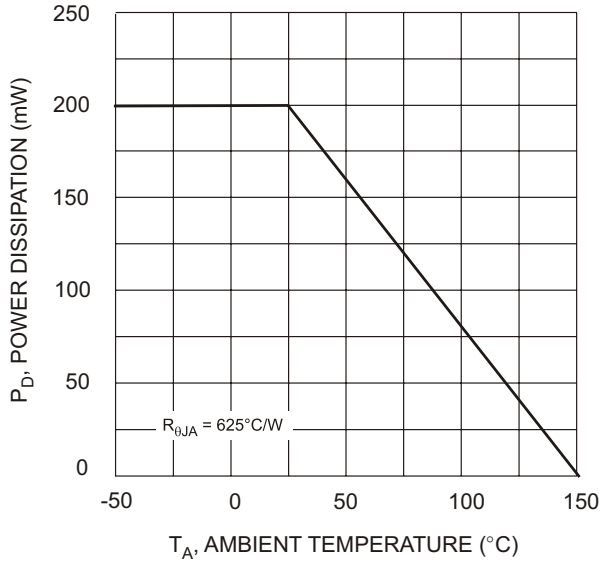


Fig. 1 Derating Curve

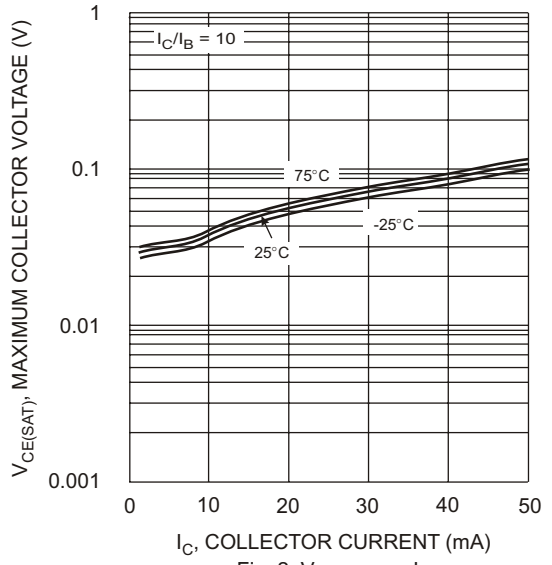


Fig. 2  $V_{CE(SAT)}$  vs.  $I_C$

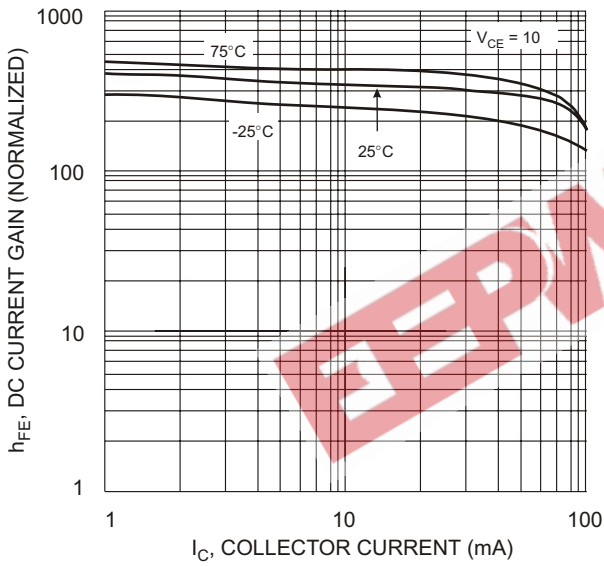


Fig. 3 DC Current Gain

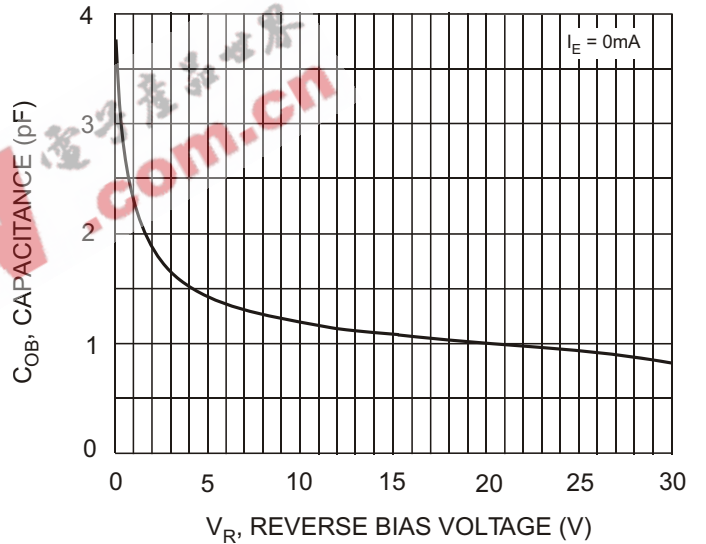


Fig. 4 Output Capacitance

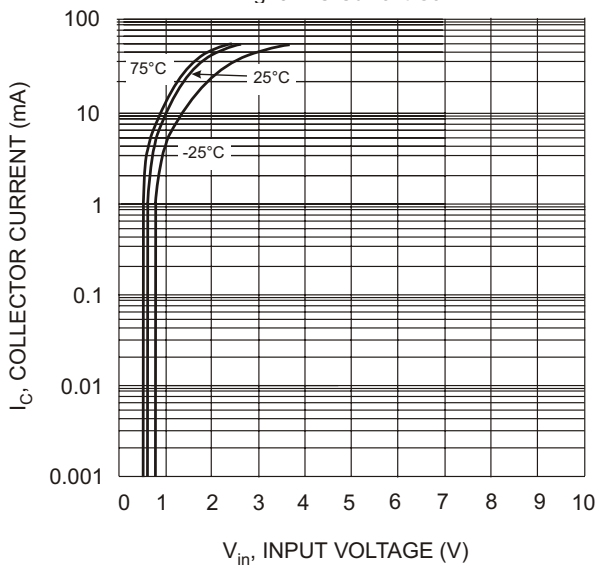


Fig. 5 Collector Current vs. Input Voltage

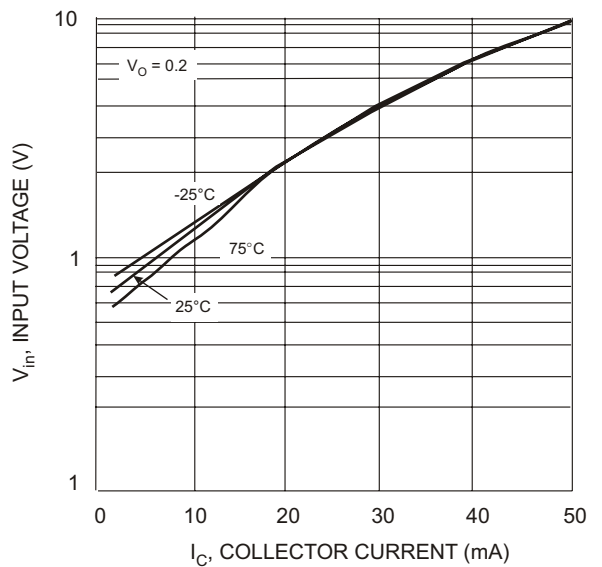


Fig. 6 Input Voltage vs. Collector Current