

## COMPLEMENTARY NPN/PNP PRE-BIASED SMALL SIGNAL SOT-563 DUAL SURFACE MOUNT TRANSISTOR

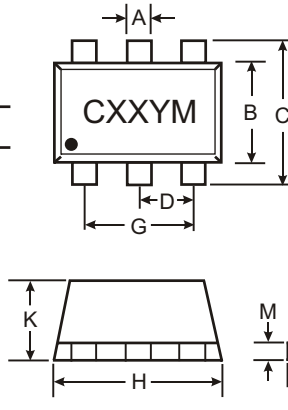
NEW PRODUCT

### Features

- Epitaxial Planar Die Construction
- Built-In Biasing Resistors
- Lead Free By Design/RoHS Compliant (Note 2)

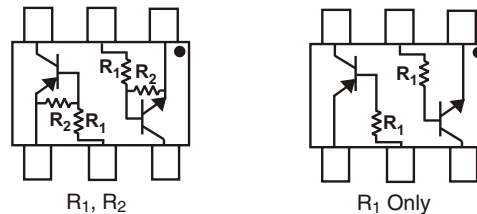
### Mechanical Data

- Case: SOT-563
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture sensitivity: Level 1 per J-STD-020C
- Terminals: Finish - Matte Tin annealed over Alloy 42 leadframe. Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Weight: 0.005 grams (approx.)



SOT-563			
Dim	Min	Max	Typ
A	0.15	0.30	0.25
B	1.10	1.25	1.20
C	1.55	1.70	1.60
D	0.50		
G	0.90	1.10	1.00
H	1.50	1.70	1.60
K	0.56	0.60	0.60
L	0.15	0.25	0.20
M	0.10	0.18	0.11
All Dimensions in mm			

P/N	R1	R2	MARKING
DCX124EH	22K $\Omega$	22K $\Omega$	C17
DCX144EH	47K $\Omega$	47K $\Omega$	C20
DCX143EH	4.7K $\Omega$	4.7K $\Omega$	C08
DCX114YH	10K $\Omega$	47K $\Omega$	C14
DCX123JH	2.2K $\Omega$	47K $\Omega$	C06
DCX114EH	10K $\Omega$	10K $\Omega$	C13
DCX143TH	4.7K $\Omega$	-	C07
DCX114TH	10K $\Omega$	-	C12



SCHMATIC DIAGRAM, TOP VIEW

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

Characteristic	Symbol	Value	Unit
Supply Voltage	V <sub>CC</sub>	50	V
Input Voltage	V <sub>IN</sub>	DCX124EH -10 to +40 DCX144EH -10 to +40 DCX143EH -10 to +30 DCX114YH -6 to +40 DCX123JH -5 to +12 DCX114EH -10 to +40 DCX143TH -5 V <sub>max</sub> DCX114TH -5 V <sub>max</sub>	V
Output Current	I <sub>O</sub>	DCX124EH 30 DCX144EH 30 DCX143EH 100 DCX114YH 70 DCX123JH 100 DCX114EH 50 DCX143TH 100 DCX114TH 100	mA
Output Current	I <sub>C</sub> (Max)	100	mA
Power Dissipation (Total)	P <sub>d</sub>	150	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

- Notes:
1. Mounted on FR4 Board with recommended pad layout at <http://www.diodes.com/datasheets/ap02001.pdf>.
  2. No purposefully added lead.

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

Characteristic	Symbol	Value	Unit
Supply Voltage	$V_{CC}$	50	V
Input Voltage DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH DCX143TH DCX114TH	$V_{IN}$	+10 to -40 +10 to -40 +10 to -30 +6 to -40 +5 to -12 +10 to -40 +5 $V_{max}$ +5 $V_{max}$	V
Output Current DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH DCX143TH DCX114TH	$I_o$	-30 -30 -100 -70 -100 -50 -100 -100	mA
Output Current All	$I_C$ (Max)	-100	mA
Power Dissipation (Total)	$P_d$	150	mW
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 (DCX143TH & DCX114TH 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	$I_C/I_B = 2.5\text{mA} / 0.25\text{mA}$ DCX143TH $I_C/I_B = 1\text{mA} / 0.1\text{mA}$ DCX114TH
DC Current Transfer Ratio	$h_{FE}$	100	250	600	—	$I_C = 1\text{mA}, V_{CE} = 5\text{V}$
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 DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH	$V_{I(off)}$	0.5 0.5 0.5 0.3 0.5 0.5	1.1 1.1 1.1 — — 1.1	—	V	$V_{CC} = 5\text{V}, I_o = 100\mu\text{A}$
Input Voltage DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH	$V_{I(on)}$	—	1.9 1.9 1.9 — — 1.9	3.0 3.0 3.0 1.4 1.1 3.0	V	$V_o = 0.3\text{V}, I_o = 5\text{mA}$ $V_o = 0.3\text{V}, I_o = 2\text{mA}$ $V_o = 0.3\text{V}, I_o = 20\text{mA}$ $V_o = 0.3\text{V}, I_o = 1\text{mA}$ $V_o = 0.3\text{V}, I_o = 5\text{mA}$ $V_o = 0.3\text{V}, I_o = 10\text{mA}$
Output Voltage DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH	$V_{O(on)}$	—	0.1	0.3	V	$I_o/I_i = 10\text{mA} / 0.5\text{mA}$ $I_o/I_i = 10\text{mA} / 0.5\text{mA}$ $I_o/I_i = 10\text{mA} / 0.5\text{mA}$ $I_o/I_i = 5\text{mA} / 0.25\text{mA}$ $I_o/I_i = 5\text{mA} / 0.25\text{mA}$ $I_o/I_i = 10\text{mA} / 0.5\text{mA}$
Input Current DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH	$I_i$	—	—	0.36 0.18 1.8 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 DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH	$G_i$	56 68 20 68 80 30	—	—	—	$V_o = 5\text{V}, I_o = 5\text{mA}$ $V_o = 5\text{V}, I_o = 5\text{mA}$ $V_o = 5\text{V}, I_o = 10\text{mA}$ $V_o = 5\text{V}, I_o = 10\text{mA}$ $V_o = 5\text{V}, I_o = 10\text{mA}$ $V_o = 5\text{V}, I_o = 5\text{mA}$

\* Transistor - For Reference Only

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

Characteristic (DCX143TH & DCX114TH 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	$I_C/I_B = 2.5\text{mA} / 0.25\text{mA}$ DCX143TH $I_C/I_B = 1\text{mA} / 0.1\text{mA}$ DCX114TH
DC Current Transfer Ratio	$h_{FE}$	100	250	600	—	$I_C = -1\text{mA}, V_{CE} = -5\text{V}$
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	DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH	$V_{I(off)}$	-0.5 -0.5 -0.5 -0.3 -0.5 -0.5	-1.1 -1.1 -1.1 — — -1.1	—	—	$V_{CC} = -5\text{V}, I_O = -100\mu\text{A}$
	DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH	$V_{I(on)}$	—	-1.9 -1.9 -1.9 — — -1.9	-3.0 -3.0 -3.0 -1.4 -1.1 -3.0	V	$V_O = -0.3\text{V}, I_O = -5\text{mA}$ $V_O = -0.3\text{V}, I_O = -2\text{mA}$ $V_O = -0.3\text{V}, I_O = -20\text{mA}$ $V_O = -0.3\text{V}, I_O = -1\text{mA}$ $V_O = -0.3\text{V}, I_O = -5\text{mA}$ $V_O = -0.3\text{V}, I_O = -10\text{mA}$
Output Voltage	DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH	$V_{O(on)}$	—	-0.1	-0.3	V	$I_O/I_I = -10\text{mA} / -0.5\text{mA}$ $I_O/I_I = -10\text{mA} / -0.5\text{mA}$ $I_O/I_I = -10\text{mA} / -0.5\text{mA}$ $I_O/I_I = -5\text{mA} / -0.25\text{mA}$ $I_O/I_I = -5\text{mA} / -0.25\text{mA}$ $I_O/I_I = -10\text{mA} / -0.5\text{mA}$
Input Current	DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH	$I_I$	—	—	-0.36 -0.18 -1.8 -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	DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH	$G_I$	56 68 20 68 80 30	—	—	—	$V_O = -5\text{V}, I_O = -5\text{mA}$ $V_O = -5\text{V}, I_O = -5\text{mA}$ $V_O = -5\text{V}, I_O = -10\text{mA}$ $V_O = -5\text{V}, I_O = -10\text{mA}$ $V_O = -5\text{V}, I_O = -10\text{mA}$ $V_O = -5\text{V}, I_O = -5\text{mA}$
Gain-Bandwidth Product*		$f_T$	—	250	—	MHz	$V_{CE} = -10\text{V}, I_E = -5\text{mA}, f = 100\text{MHz}$

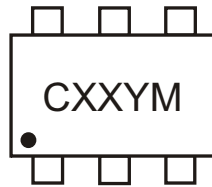
\* Transistor - For Reference Only

**Ordering Information** (Note 3)

Device	Packaging	Shipping
DCX124EH-7	SOT-563	3000/Tape & Reel
DCX144EH-7	SOT-563	3000/Tape & Reel
DCX143EH-7	SOT-563	3000/Tape & Reel
DCX114YH-7	SOT-563	3000/Tape & Reel
DCX123JH-7	SOT-563	3000/Tape & Reel
DCX114EH-7	SOT-563	3000/Tape & Reel
DCX143TH-7	SOT-563	3000/Tape & Reel
DCX114TH-7	SOT-563	3000/Tape & Reel

Notes: 3. For Packaging Details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

**Marking Information**



CXX = Product Type Marking Code (See Page 1)  
 YM = Date Code Marking  
 Y = Year ex: P = 2003  
 M = Month ex: 9 = September

Date Code Key

Year	2003	2004	2005	2006	2007	2008	2009
Code	P	R	S	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 - DCX143EH NPN SECTION**

NEW PRODUCT

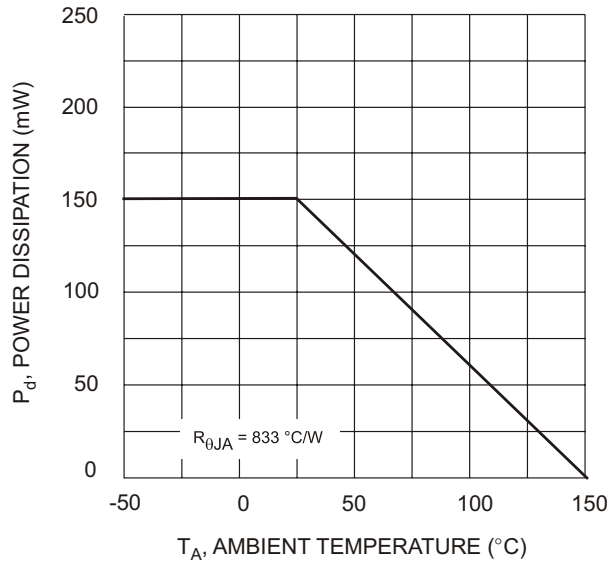


Fig. 1 Derating Curve - Total

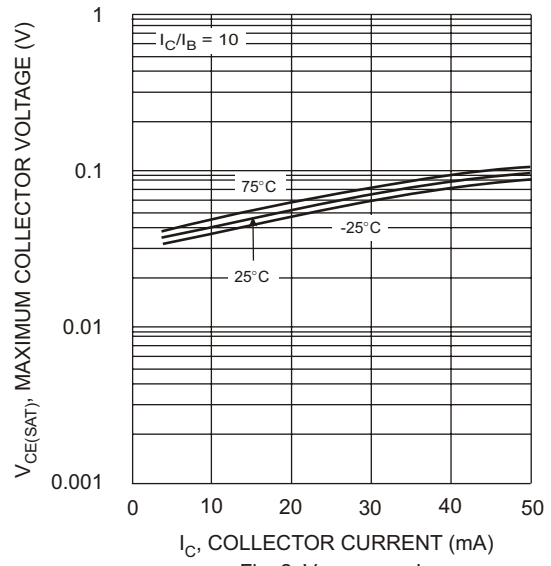


Fig. 2  $V_{CE(SAT)}$  vs.  $I_C$

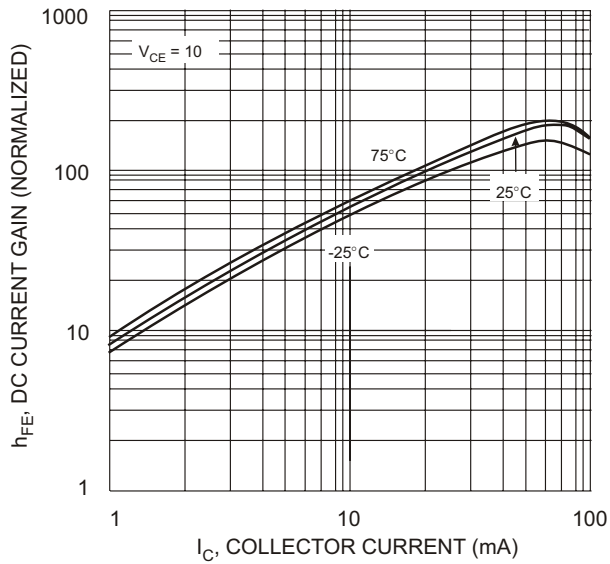


Fig. 3 DC CURRENT GAIN

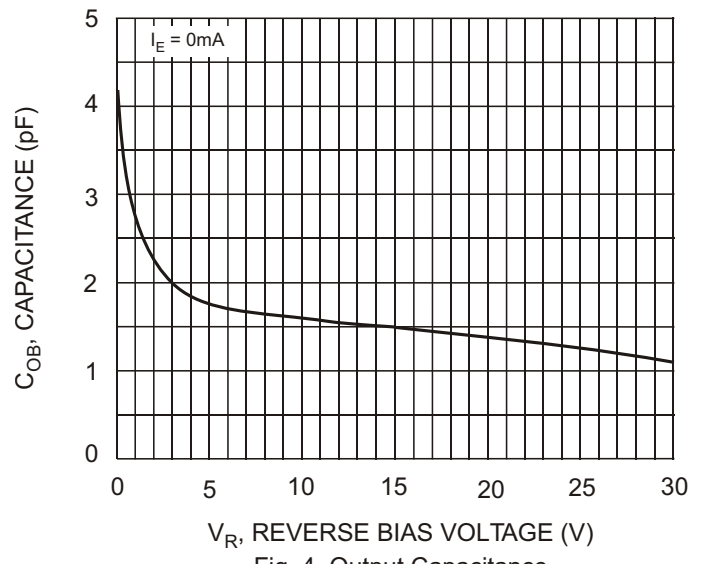


Fig. 4 Output Capacitance

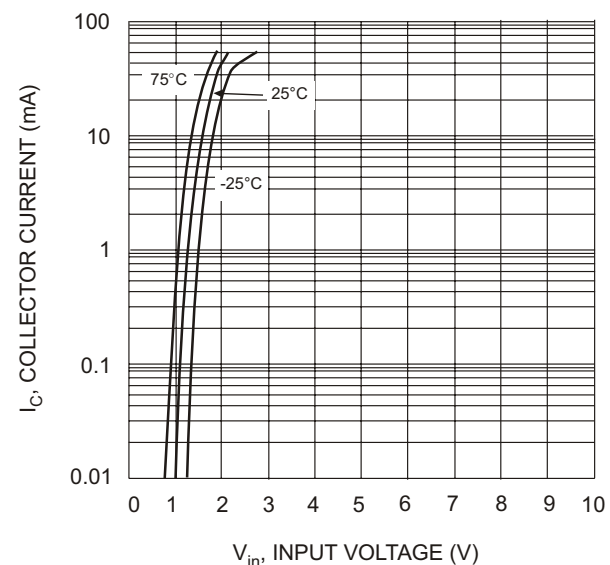


Fig. 5 Collector Current Vs. Input Voltage

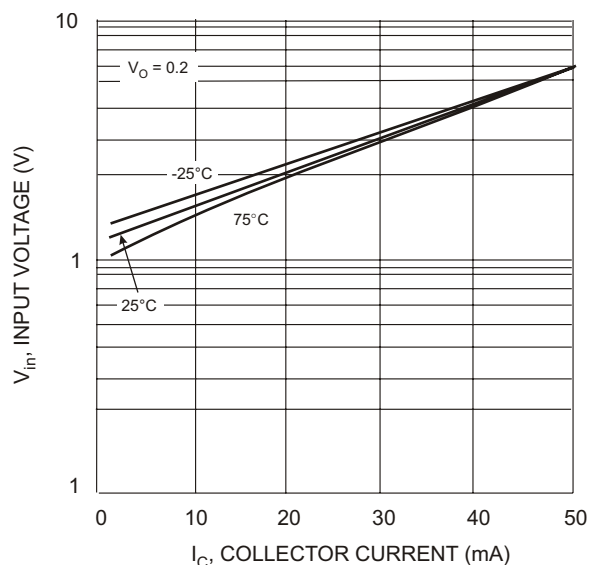


Fig. 6 Input Voltage vs. Collector Current

**TYPICAL CURVES - DCX143EH PNP SECTION**

**NEW PRODUCT**

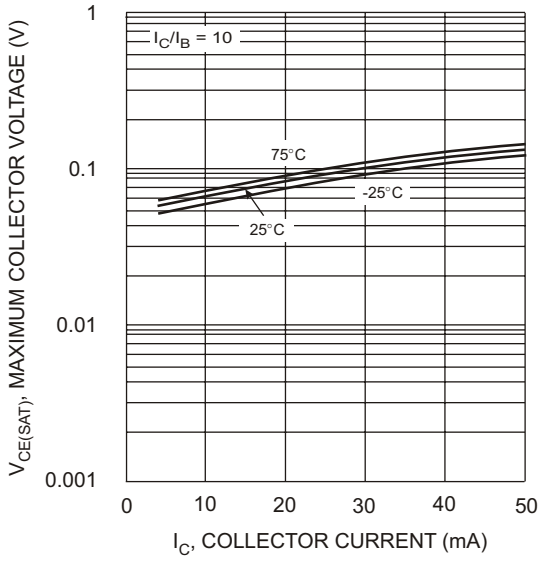


Fig. 7  $V_{CE(SAT)}$  vs.  $I_C$

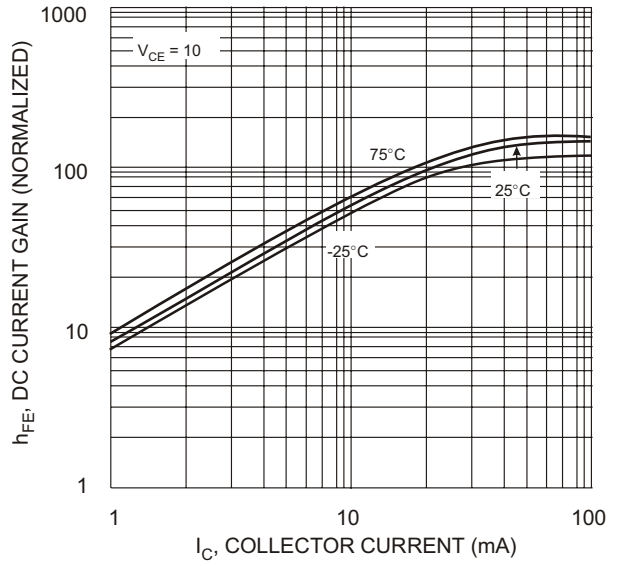


Fig. 8 DC Current Gain

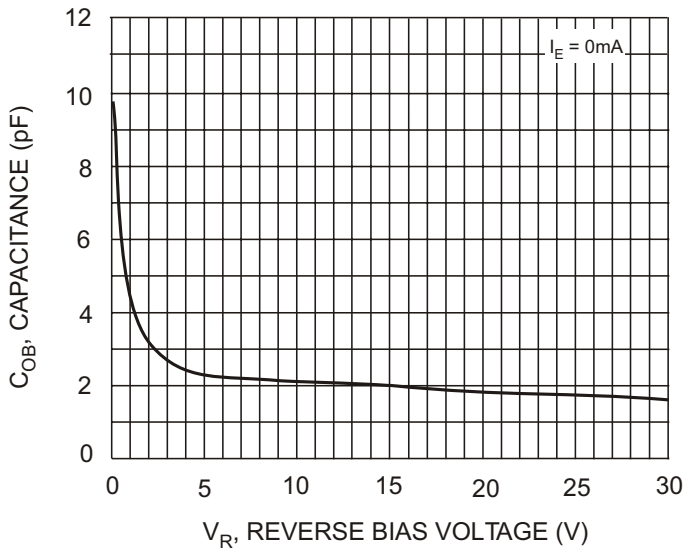


Fig. 9 Output Capacitance

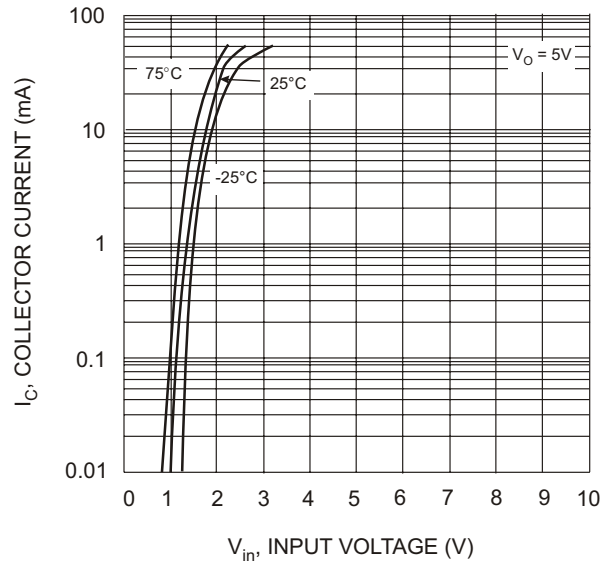


Fig. 10 Collector Current Vs. Input Voltage

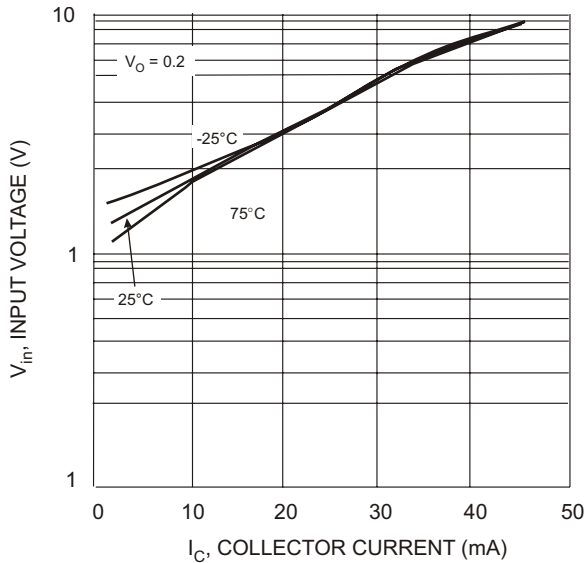


Fig. 11 Input Voltage vs. Collector Current