

**COMPLEMENTARY NPN/PNP PRE-BIASED  
SMALL SIGNAL DUAL SURFACE MOUNT TRANSISTOR**
**Features**

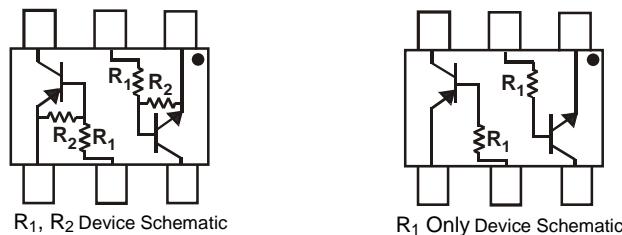
- Epitaxial Planar Die Construction
- Built-In Biasing Resistors
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)**

P/N	R1	R2	MARKING
DCX124EH	22KΩ	22KΩ	C17
DCX144EH	47KΩ	47KΩ	C20
DCX143EH	4.7KΩ	4.7KΩ	C08
DCX114YH	10KΩ	47KΩ	C14
DCX123JH	2.2KΩ	47KΩ	C06
DCX114EH	10KΩ	10KΩ	C13
DCX143TH	4.7KΩ	—	C07
DCX114TH	10KΩ	—	C12

**Mechanical Data**

- Case: SOT-563
- Case Material: Molded Plastic "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208<sup>e3</sup>
- Terminal Connections: See Diagram
- Weight: 0.005 grams (Approximate)

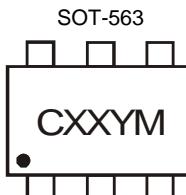
SCHEMATIC DIAGRAM, TOP VIEW


**Ordering Information** (Note 4)

Device	Packaging	Shipping
DCX124EH-7	SOT-563	3,000/Tape & Reel
DCX144EH-7	SOT-563	3,000/Tape & Reel
DCX143EH-7	SOT-563	3,000/Tape & Reel
DCX114YH-7	SOT-563	3,000/Tape & Reel
DCX123JH-7	SOT-563	3,000/Tape & Reel
DCX114EH-7	SOT-563	3,000/Tape & Reel
DCX143TH-7	SOT-563	3,000/Tape & Reel
DCX114TH-7	SOT-563	3,000/Tape & Reel

Notes:

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

**Marking Information**


CXX = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year ex: P = 2003  
 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

**Maximum Ratings NPN Section (@ $T_A = +25^\circ\text{C}$  unless otherwise specified.)**

Characteristic	Symbol	Value	Unit
Supply Voltage	$V_{CC}$	50	V
Input Voltage	$V_{IN}$	-10 to +40 -10 to +40 -10 to +30 -6 to +40 -5 to +12 -10 to +40 -5V max -5V max	V
Output Current	$I_O$	30 30 100 70 100 50 100 100	mA
Output Current All	$I_C$ (Max)	100	mA
Power Dissipation (Total)	$P_d$	150	mW
Thermal Resistance, Junction to Ambient Air (Note 5)	$R_{\theta JA}$	833	°C/W
Operating and Storage Temperature Range	$T_j, T_{STG}$	-55 to +150	°C

Note: 5. Mounted on FR4 Board with recommended pad layout at <http://www.diodes.com/datasheets/ap02001.pdf>.

**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	$V_{IN}$	+10 to -40 +10 to -40 +10 to -30 +6 to -40 +5 to -12 +10 to -40 +5V max +5V max	V
Output Current	$I_O$	-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 Temperature Range	$T_j, T_{STG}$	-55 to +150	°C

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

Characteristic (DDC143TH & DDC114TH only)	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$\text{BV}_{\text{CBO}}$	50	—	—	V	$I_C = 50\mu\text{A}$
Collector-Emitter Breakdown Voltage	$\text{BV}_{\text{CEO}}$	50	—	—	V	$I_C = 1\text{mA}$
Emitter-Base Breakdown Voltage	$\text{BV}_{\text{EBO}}$	5	—	—	V	$I_E = 50\mu\text{A}$
Collector Cut-Off Current	$I_{\text{CBO}}$	—	—	0.5	$\mu\text{A}$	$V_{\text{CB}} = 50\text{V}$
Emitter Cut-Off Current	$I_{\text{EBO}}$	—	—	0.5	$\mu\text{A}$	$V_{\text{EB}} = 4\text{V}$
Collector-Emitter Saturation Voltage	$V_{\text{CE}(\text{sat})}$	—	—	0.3	V	$I_C/I_B = 2.5\text{mA} / 0.25\text{mA}$ $I_C/I_B = 1\text{mA} / 0.1\text{mA}$
DC Current Transfer Ratio	$h_{\text{FE}}$	100	250	600	—	$I_C = 1\text{mA}$ , $V_{\text{CE}} = 5\text{V}$
Gain-Bandwidth Product*	$f_T$	—	250	—	MHz	$V_{\text{CE}} = 10\text{V}$ , $I_E = -5\text{mA}$ , $f = 100\text{MHz}$
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Input Voltage	DCX124EH	0.5	1.1	—	V	$V_{\text{CC}} = 5\text{V}$ , $I_O = 100\mu\text{A}$
	DCX144EH	0.5	1.1	—	V	
	DCX143EH	0.5	1.1	—	V	
	DCX114YH	0.3	—	—	V	
	DCX123JH	0.5	—	—	V	
	DCX114EH	0.5	1.1	—	V	
Output Voltage	DCX124EH	1.9	3.0	—	V	$V_O = 0.3\text{V}$ , $I_O = 5\text{mA}$
	DCX144EH	1.9	3.0	—	V	$V_O = 0.3\text{V}$ , $I_O = 2\text{mA}$
	DCX143EH	1.9	3.0	—	V	$V_O = 0.3\text{V}$ , $I_O = 20\text{mA}$
	DCX114YH	—	1.4	—	V	$V_O = 0.3\text{V}$ , $I_O = 1\text{mA}$
	DCX123JH	—	1.1	—	V	$V_O = 0.3\text{V}$ , $I_O = 5\text{mA}$
	DCX114EH	1.9	3.0	—	V	$V_O = 0.3\text{V}$ , $I_O = 10\text{mA}$
Input Current	DCX124EH	—	0.1	0.3	V	$I_O/I_I = 10\text{mA} / 0.5\text{mA}$
	DCX144EH	—	0.1	0.3	V	$I_O/I_I = 10\text{mA} / 0.5\text{mA}$
	DCX143EH	—	0.1	0.3	V	$I_O/I_I = 10\text{mA} / 0.5\text{mA}$
	DCX114YH	—	0.1	0.3	V	$I_O/I_I = 5\text{mA} / 0.25\text{mA}$
	DCX123JH	—	0.1	0.3	V	$I_O/I_I = 5\text{mA} / 0.25\text{mA}$
	DCX114EH	—	0.1	0.3	V	$I_O/I_I = 10\text{mA} / 0.5\text{mA}$
Output Current	$I_{\text{O}(\text{off})}$	—	—	0.5	$\mu\text{A}$	$V_{\text{CC}} = 50\text{V}$ , $V_I = 0\text{V}$
DC Current Gain	DCX124EH	56	—	—	V	$V_O = 5\text{V}$ , $I_O = 5\text{mA}$
	DCX144EH	68	—	—	V	$V_O = 5\text{V}$ , $I_O = 5\text{mA}$
	DCX143EH	20	—	—	V	$V_O = 5\text{V}$ , $I_O = 10\text{mA}$
	DCX114YH	68	—	—	V	$V_O = 5\text{V}$ , $I_O = 10\text{mA}$
	DCX123JH	80	—	—	V	$V_O = 5\text{V}$ , $I_O = 10\text{mA}$
	DCX114EH	30	—	—	V	$V_O = 5\text{V}$ , $I_O = 5\text{mA}$

\* Transistor - For Reference Only

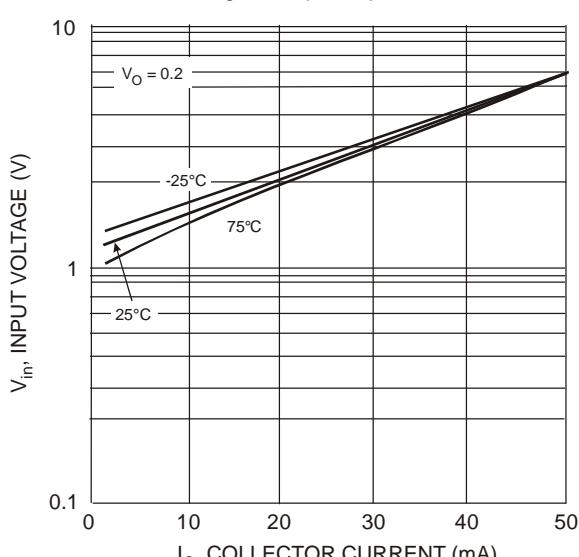
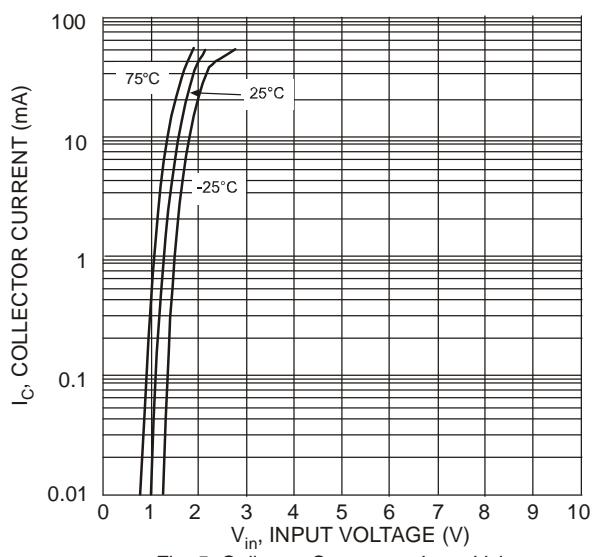
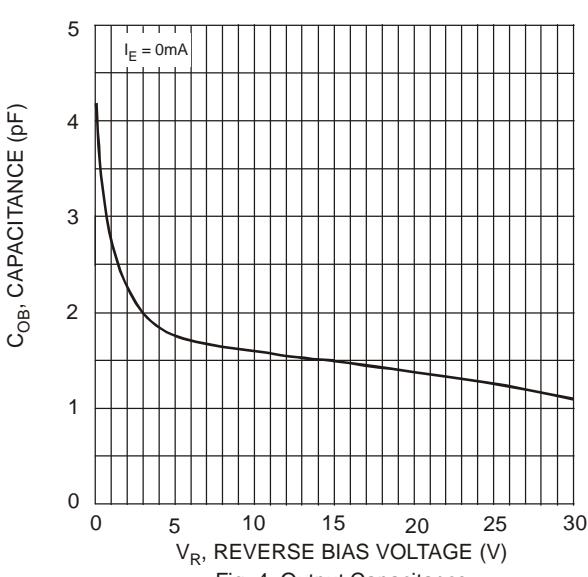
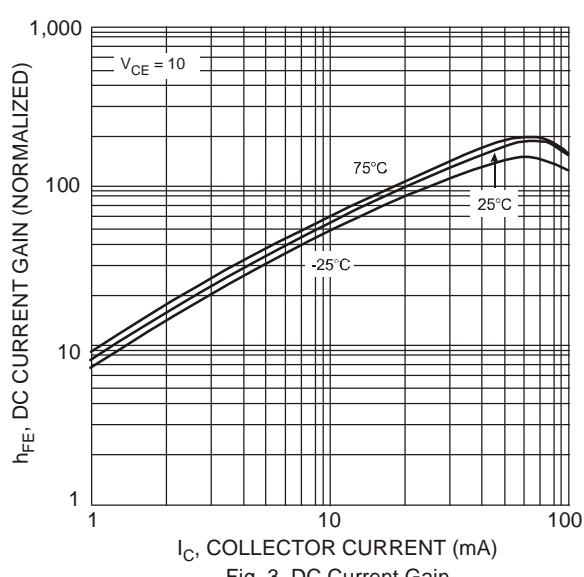
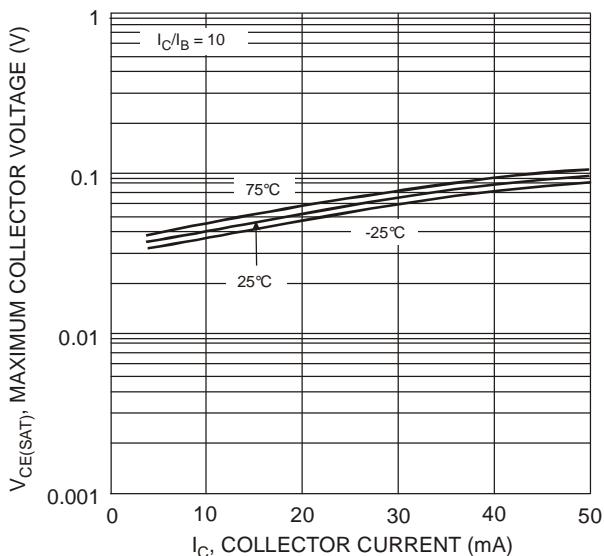
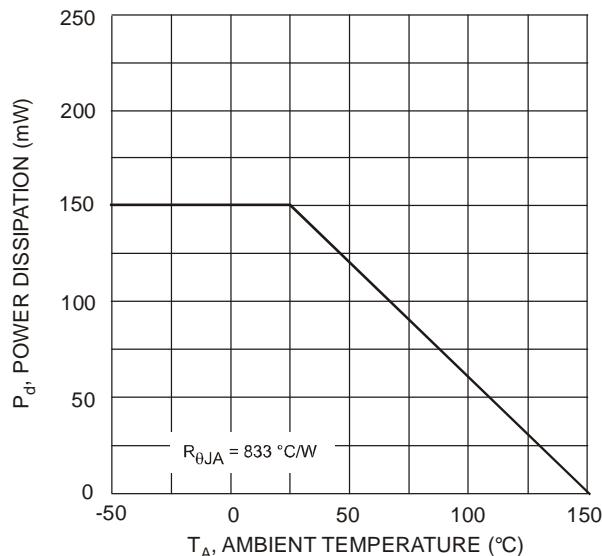
**Electrical Characteristics PNP Section** (@ $T_A = +25^\circ\text{C}$  unless otherwise specified.)

Characteristic (DCX143TH & DCX114TH only)	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$\text{BV}_{\text{CBO}}$	-50	—	—	V	$I_C = -50\mu\text{A}$
Collector-Emitter Breakdown Voltage	$\text{BV}_{\text{CEO}}$	-50	—	—	V	$I_C = -1\text{mA}$
Emitter-Base Breakdown Voltage	$\text{BV}_{\text{EBO}}$	-5	—	—	V	$I_E = -50\mu\text{A}$
Collector Cut-Off Current	$I_{\text{CBO}}$	—	—	-0.5	$\mu\text{A}$	$V_{\text{CB}} = -50\text{V}$
Emitter Cut-Off Current	$I_{\text{EBO}}$	—	—	-0.5	$\mu\text{A}$	$V_{\text{EB}} = -4\text{V}$
Collector-Emitter Saturation Voltage	$V_{\text{CE}(\text{sat})}$	—	—	-0.3	V	$I_C/I_B = 2.5\text{mA} / 0.25\text{mA}$ $I_C/I_B = 1\text{mA} / 0.1\text{mA}$
DC Current Transfer Ratio	$\text{h}_{\text{FE}}$	100	250	600	—	$I_C = -1\text{mA}$ , $V_{\text{CE}} = -5\text{V}$
Gain-Bandwidth Product*	$f_T$	—	250	—	MHz	$V_{\text{CE}} = -10\text{V}$ , $I_E = 5\text{mA}$ , $f = 100\text{MHz}$

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Input Voltage	DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH	$V_{I(\text{off})}$	-0.5	-1.1	—	$V_{\text{CC}} = -5\text{V}$ , $I_O = -100\mu\text{A}$
			-0.5	-1.1		
			-0.5	-1.1		
			-0.3	—		
			-0.5	—		
			-0.5	-1.1		
	DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH	$V_{I(\text{on})}$	—	-1.9	-3.0	$V_O = -0.3\text{V}$ , $I_O = -5\text{mA}$ $V_O = -0.3\text{V}$ , $I_O = -2\text{mA}$ $V_O = -0.3\text{V}$ , $I_O = -20\text{mA}$ $V_O = -0.3\text{V}$ , $I_O = -1\text{mA}$ $V_O = -0.3\text{V}$ , $I_O = -5\text{mA}$ $V_O = -0.3\text{V}$ , $I_O = -10\text{mA}$
			—	-1.9	-3.0	
			—	-1.9	-3.0	
			—	-1.4	-3.0	
			—	-1.1	-3.0	
			—	-1.9	-3.0	
Output Voltage	DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH	$V_{O(\text{on})}$	—	-0.1	-0.3	$I_O/I_I = -10\text{mA} / -0.5\text{mA}$ $I_O/I_I = -10\text{mA} / -0.5\text{mA}$ $I_O/I_I = -10\text{mA} / -0.5\text{mA}$ $I_O/I_I = -5\text{mA} / -0.25\text{mA}$ $I_O/I_I = -5\text{mA} / -0.25\text{mA}$ $I_O/I_I = -10\text{mA} / -0.5\text{mA}$
			—	-0.1	-0.3	
Input Current	DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH	$I_I$	—	—	-0.36 -0.18 -1.8 -0.88 -3.6 -0.88	$V_I = -5\text{V}$
			—	—		
			—	—		
			—	—		
			—	—		
			—	—		
Output Current	$I_O(\text{off})$	—	—	-0.5	$\mu\text{A}$	$V_{\text{CC}} = 50\text{V}$ , $V_I = 0\text{V}$
DC Current Gain	DCX124EH DCX144EH DCX143EH DCX114YH DCX123JH DCX114EH	$G_I$	56	—	—	$V_O = -5\text{V}$ , $I_O = -5\text{mA}$ $V_O = -5\text{V}$ , $I_O = -5\text{mA}$ $V_O = -5\text{V}$ , $I_O = -10\text{mA}$ $V_O = -5\text{V}$ , $I_O = -10\text{mA}$ $V_O = -5\text{V}$ , $I_O = -10\text{mA}$ $V_O = -5\text{V}$ , $I_O = -5\text{mA}$
			68	—		
			20	—		
			68	—		
			80	—		
			30	—		
Gain-Bandwidth Product*	$f_T$	—	250	—	MHz	$V_{\text{CE}} = -10\text{V}$ , $I_E = -5\text{mA}$ , $f = 100\text{MHz}$

\* Transistor - For Reference Only

Typical Curves – DCX143EH NPN Section



Typical Curves – DCX143EH PNP Section

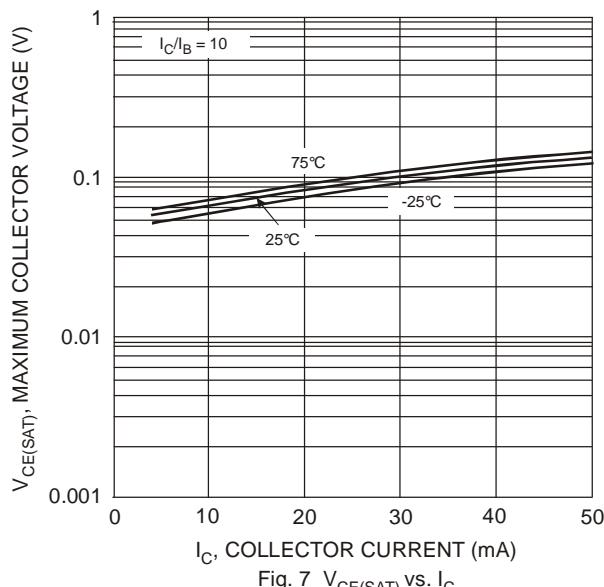


Fig. 7  $V_{CE(SAT)}$  vs.  $I_C$

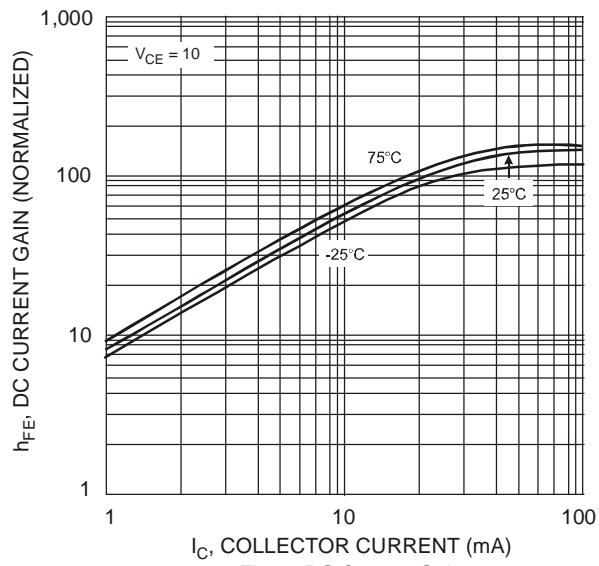


Fig. 8 DC Current Gain

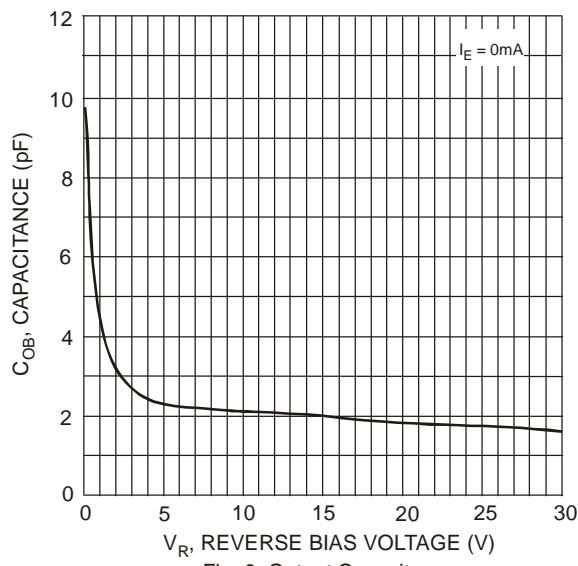


Fig. 9 Output Capacitance

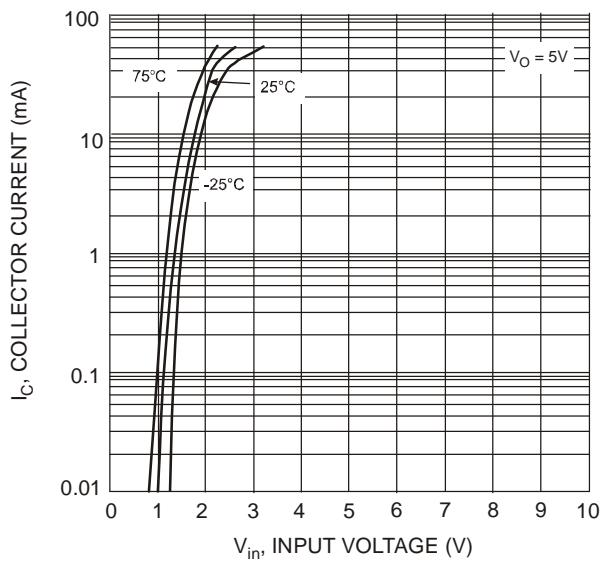


Fig. 10 Collector Current vs. Input Voltage

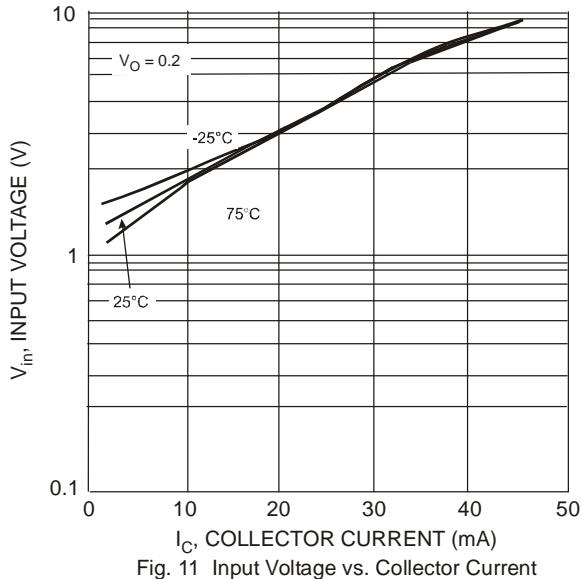
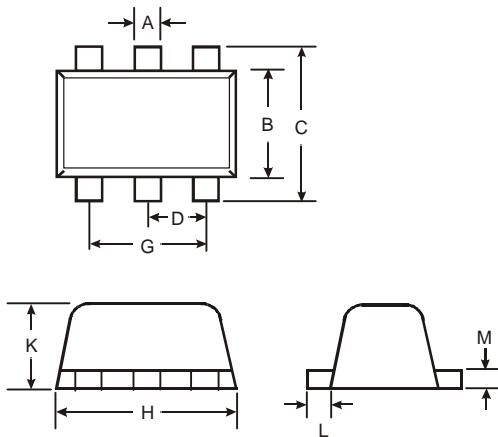


Fig. 11 Input Voltage vs. Collector Current

## Package Outline Dimensions

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.

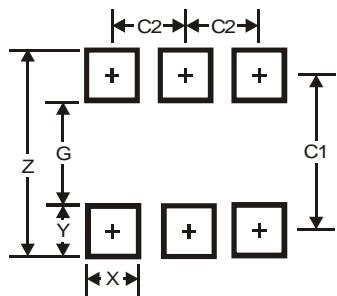


SOT563			
Dim	Min	Max	Typ
<b>A</b>	0.15	0.30	0.20
<b>B</b>	1.10	1.25	1.20
<b>C</b>	1.55	1.70	1.60
<b>D</b>	-	-	0.50
<b>G</b>	0.90	1.10	1.00
<b>H</b>	1.50	1.70	1.60
<b>K</b>	0.55	0.60	0.60
<b>L</b>	0.10	0.30	0.20
<b>M</b>	0.10	0.18	0.11

All Dimensions in mm

## Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for latest version.



Dimensions	Value (in mm)
<b>Z</b>	2.2
<b>G</b>	1.2
<b>X</b>	0.375
<b>Y</b>	0.5
<b>C1</b>	1.7
<b>C2</b>	0.5

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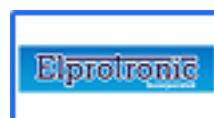
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