DCX4710H

100mA DUAL COMPLEMENTARY PRE-BIASED TRANSISTORS

NEW PRODUCT

General Description

- DCX4710H is best suited for applications where the load needs to be turned on and off using micro-controllers, comparators or other control circuits particularly at a point of load. It features a discrete pre-based PNP transistor which can support continuous maximum current of 100 mA. It also contains a pre-based NPN transistor which can be used as a control and can be biased using a higher supply. The component devices can be used as a part of circuit or as stand alone discrete devices.

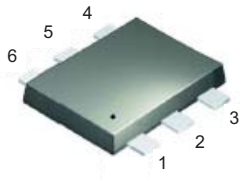

Fig. 1: SOT-563

Features

- Built in Biasing Resistors
- Epitaxial Planar Die Construction
- Ideally Suited for Automated Assembly Processes
- **Lead Free By Design/ROHS Compliant (Note 1)**
- **"Green" Device (Note 2)**

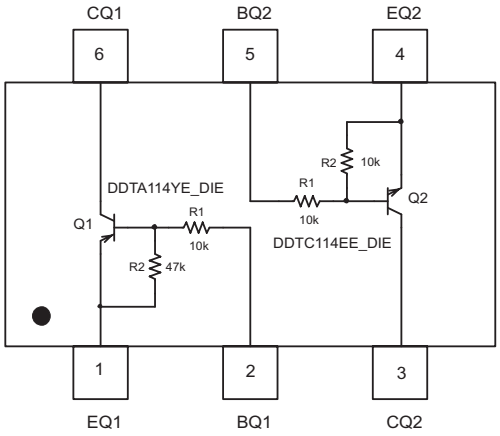

Fig. 2: Schematic and Pin Configuration

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-020C
- Terminal Connections: See Fig. 2
- Terminals: Finish - Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Marking & Type Code Information: See Page 7
- Ordering Information: See Page 7
- Weight: 0.005 grams (approximate)

Sub-Component P/N	Reference	Device Type	R1 (NOM)	R2 (NOM)	Figure
DDTA114YE_DIE	Q1	PNP	10KΩ	47KΩ	2
DDTC114EE_DIE	Q2	NPN	10KΩ	10KΩ	2

Maximum Ratings: Total Device @ T_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 3)	P_d	150	mW
Power Derating Factor above 45°C	P_{der}	1.43	mW/°C
Output Current	I_{out}	100	mA

Thermal Characteristics @ T_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Junction Operation and Storage Temperature Range	T_j, T_{stg}	-55 to +150	°C
Thermal Resistance, Junction to Ambient Air (Note 3) (Equivalent to one heated junction of PNP transistor)	$R_{\theta JA}$	833	°C/W

Notes: 1. No purposefully added lead.
2. Diodes Inc.'s "Green" policy can be found on our website at http:/www.diodes.com/products/lead_free/index.php.
3. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch; as per Diodes Inc. suggested pad layout document AP02001 on our website at http://www.diodes.com/datasheets/ap02001.pdf.

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Sub-Component Device - Pre-Biased PNP Transistor (Q1) @ T_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	-50	V
Collector-Emitter Voltage	V_{CEO}	-50	V
Supply Voltage	V_{CC}	-50	V
Input Voltage	V_{IN}	+6 to -40	V
Output Current (dc)	$I_{C(max)}$	-100	mA

Sub-Component Device - Pre-Biased PNP Transistor (Q1) @ T_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	50	V
Collector-Emitter Voltage	V_{CEO}	50	V
Supply Voltage	V_{CC}	50	V
Input Voltage	V_{IN}	-10 to +40	V
Output Current (dc)	$I_{C(max)}$	100	mA

Electrical Characteristics: Pre-Biased PNP Transistor (Q1) @ T_A = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Conditions
OFF CHARACTERISTICS						
Collector-Base Cut Off Current	I_{CBO}	—	—	-100	nA	V_{CB} = -50V, I_E = 0
Collector-Emitter Cut Off Current	I_{CEO}	—	—	-1	μA	V_{CE} = -50V, I_B = 0
Emitter-Base Cut Off Current	I_{EBO}	—	—	-500	μA	V_{EB} = -5V, I_C = 0
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	-50	—	—	V	I_C = -10 μA, I_E = 0
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	-50	—	—	V	I_C = -2 mA, I_B = 0
Output Off Voltage	V_{OH}	-4.6	—	—	V	V_{CC} = -5V, V_B = -0.05V, R_L = 1KΩ
Input Off Voltage	$V_{I(OFF)}$	—	-0.71	-0.5	V	V_{CE} = -5V, I_C = -100μA
Ouput Off Current	$I_{O(OFF)}$	—	—	-1	μA	V_{CC} = -50V, V_I = 0V
ON CHARACTERISTICS						
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	—	-0.066	-0.1	V	I_C = 5 mA, I_B = -0.25 mA
		—	-0.078	-0.1		I_C = -10mA, I_B = -0.3mA
		—	-0.06	-0.1		I_C = -10mA, I_B = -1mA
		—	-0.04	-0.1		I_C = -10mA, I_B= -5mA
		—	-0.99	-1.15		I_C = -100mA, I_B= -5mA
		—	0.99	-1.15		I_C = -100mA, I_B = -10mA
Equivalent on-resistance*	$R_{CE(SAT)}$	—	—	3.5	Ω	I_C = -100mA, I_B = -10mA
DC Current Gain	h_{FE}	50	—	—	—	V_{CE} = -5V, I_C = -1 mA
		130	—	—	—	V_{CE} = -5V, I_C =- 5 mA
		180	—	—	—	V_{CE} = -5V, I_C = -50 mA
		100	—	—	—	V_{CE} = -5V, I_C = -100 mA
		140	—	—	—	V_{CE} = -10V, I_C = -5 mA
Output On Voltage	V_{OL}	—	-0.185	-0.22	V	V_{CC} = -5V, V_B = -2.5V, R_L = 1KΩ
Input On Voltage (Load is on)	$V_{I(ON)}$	-1.25	-0.9	—	V	V_O = -0.3V, I_C = -2 mA
Input Current	I_i	—	—	-0.88	mA	V_I = -5V
Base-Emitter Turn-on Voltage	$V_{BE(ON)}$	—	-0.72	-0.8	V	V_{CE} = -5V, I_C = 100μA
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	—	-1.15	-1.25	V	I_C = 1mA, I_B = 50μA
Input Resistor +/- 30% (Base)	ΔR1	7	10	13	KΩ	—
Pull-up Resistor (Base to Vcc supply)	R2	32	47	62	KΩ	—
Resistor Ratio	Δ(R2/R1)	20	—	20	%	—

Electrical Characteristics: Pre-Biased PNP Transistor (Q1) (Continued)

SMALL SIGNAL CHARACTERISTICS						
Transition Frequency (gain bandwidth product)	f_T	—	200	—	MHz	V_{CE} = -10V, I_E = -5mA, f = 100MHz
Collector capacitance (Ccbo-Output Capacitance)	C_C	—	5	—	pF	V_{CB} = -10V, I_E = 0A, f = 1MHz

*Pulse Test: Pulse width, tp<300 uS, Duty Cycle, d<=0.02

Pre-Biased NPN Transistor (Q2)

@ T_A = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Conditions
OFF CHARACTERISTICS						
Collector-Base Cut Off Current	I_{CBO}	—	—	100	nA	V_{CB} = 50V, I_E = 0
Collector-Emitter Cut Off Current	I_{CEO}	—	—	1	μA	V_{CE} = 50V, I_B = 0
Emitter-Base Cut Off Current	I_{EBO}	—	—	500	μA	V_{EB} = 5V, I_C = 0
Collector-Base Breakdown Voltage	$V_{(BR)\ CBO}$	50	—	—	V	I_C = 10 μA, I_E = 0
Collector-Emitter Breakdown Voltage	$V_{(BR)\ CEO}$	50	—	—	V	I_C = 2 mA, I_B = 0
Output Off Voltage	V_{OH}	4.6	—	—	V	V_{CC} = 5V, V_B = 0.05V, R_L = 1KΩ
Input Off Voltage	$V_{I(OFF)}$	—	1.2	0.8	V	V_{CE} = 5V, I_C = 100μA
Ouput Current	$I_{O\ (OFF)}$	—	—	1	μA	V_{CC} = 50V, V_I = 0V
ON CHARACTERISTICS						
Collector-Emitter Saturation Voltage	$V_{CE\ (SAT)}$	—	0.06	0.1	V	I_C = 5 mA, I_B = 0.25 mA
		—	0.06	0.1		I_C = 10mA, I_B = 0.5mA
		—	0.042	0.06		I_C = 10mA, I_B = 1mA
		—	0.026	0.04		I_C = 10mA, I_B= 5mA
		—	0.272	0.35		I_C = 100mA, I_B= 5mA
		—	0.28	0.35		I_C = 100mA, I_B = 10mA
Equivalent on-resistance*	$R_{CE\ (SAT)}$	—	—	3.5	Ω	I_C = 100mA, I_B = 10mA
DC Current Gain	h_{FE}	12	—	—	—	V_{CE} = 5V, I_C = 1 mA
		45	—	—	—	V_{CE} = 5V, I_C = 5 mA
		130	—	—	—	V_{CE} = 5V, I_C = 50 mA
		70	—	—	—	V_{CE} = 5V, I_C = 100 mA
		40	58	—	—	V_{CE} = 10V, I_C = 5 mA
Output On Voltage	V_{OL}	—	0.12	0.2	V	V_{CC} = 5V, V_B = 2.5V, R_L = 1KΩ
Input On Voltage	$V_{I\ (ON)}$	2.8	1.6	—	V	V_O = 0.3V, I_C = 2 mA
Input Current	I_i	—	—	0.88	mA	V_I = 5V
Base-Emitter Turn-on Voltage	$V_{BE(ON)}$	—	—	1.195	V	V_{CE} = 5V, I_C = 100μA
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	—	—	1.02	V	I_C = 1mA, I_B = 50μA
Input Resistor +/- 30% (Base)	R1	7	10	13	KΩ	—
Resistor Ratio	(R2/R1)	0.8	1	1.2	—	—
SMALL SIGNAL CHARACTERISTICS						
Transition Frequency (Gain bandwidth product)	f_T	—	250	—	MHz	V_{CE} = 10V, I_E = 5mA, f = 100MHz
Collector capacitance (Ccbo-Output Capacitance)	C_C	—	4	—	pF	V_{CB} = 10V, I_E = 0A, f = 1MHz

*Pulse Test: Pulse width, tp<300 uS, Duty Cycle, d<=0.02

Typical Characteristics @ T_{amb} = 25°C unless otherwise specified

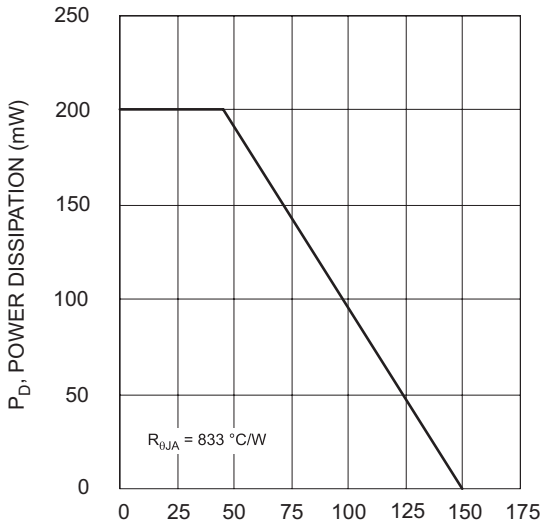

Fig. 3 Power Derating Curve

Characteristics Curves of PNP Transistor (Q1) @ T_{amb} = 25°C unless otherwise specified

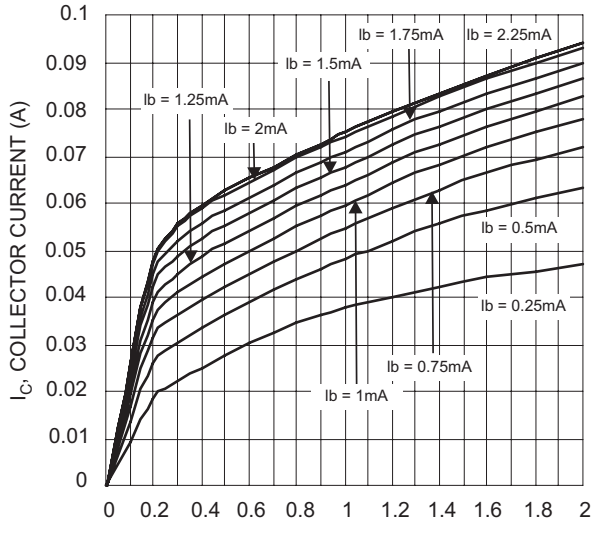

Fig. 4 V_{CE} vs. I_C

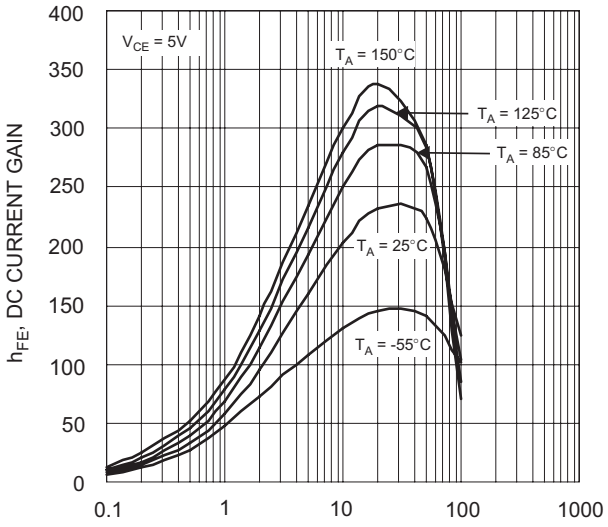

Fig. 5 DC Current Gain vs. I_C

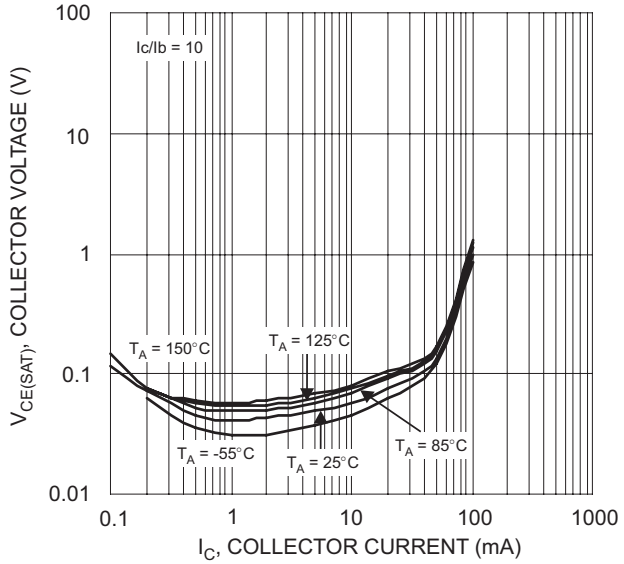

Fig. 6 I_C vs. $V_{CE(SAT)}$

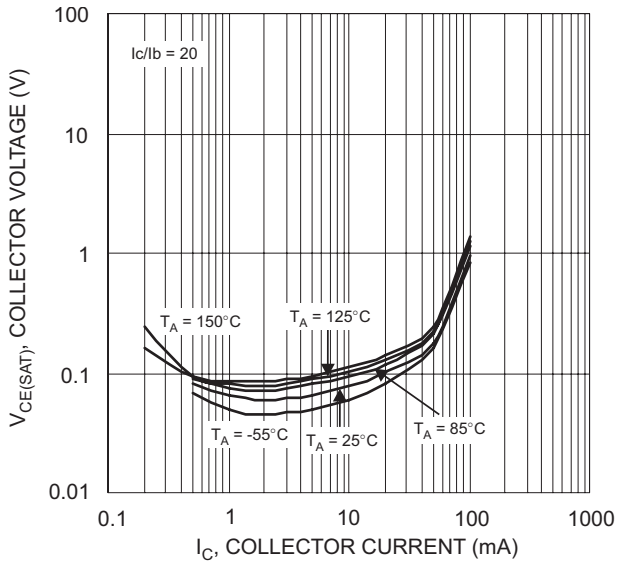

Fig. 7 I_C vs. $V_{CE(SAT)}$

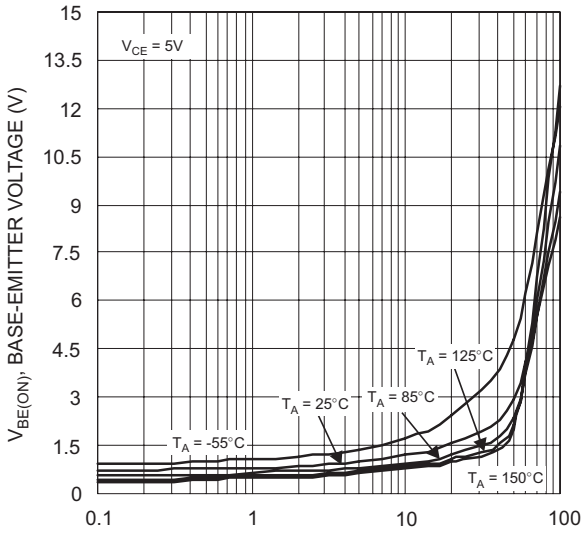

Fig. 8 I_C vs. $V_{BE(ON)}$

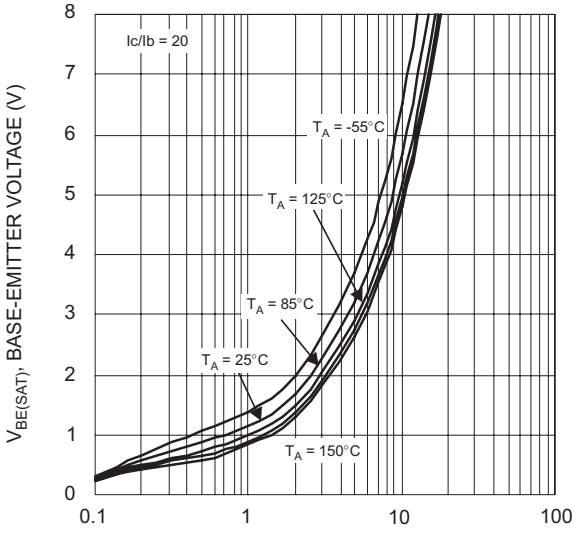

Fig. 9 I_C vs. $V_{BE(SAT)}$

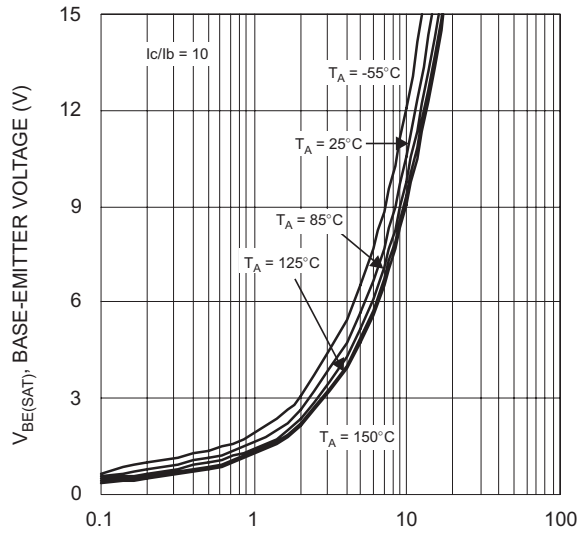

Fig. 10 I_C vs. $V_{BE(SAT)}$

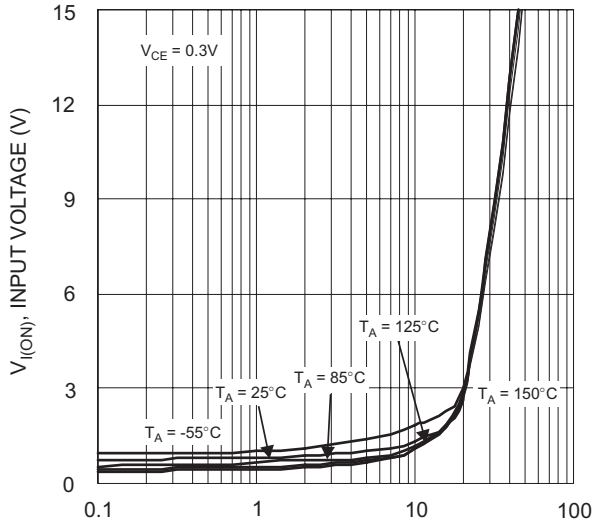

Fig. 11 Input Voltage vs. Collector Current

Characteristics Curves of NPN Transistor (Q2) @ T_{amb} = 25°C unless otherwise specified

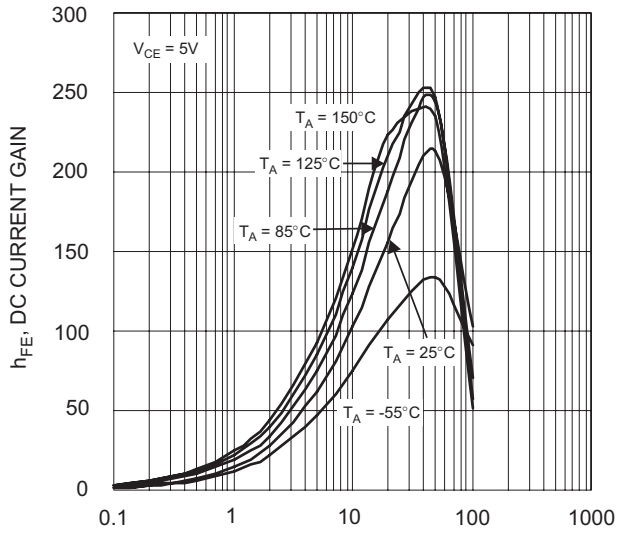

Fig. 12 DC Current Gain vs. I_C

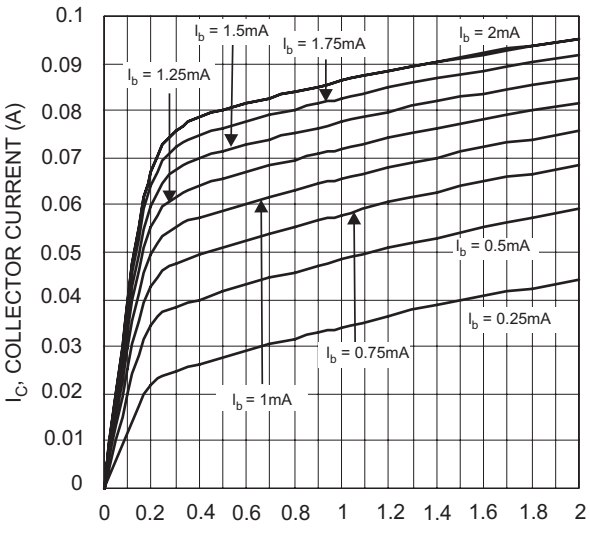

Fig. 13 V_{CE} vs. I_C

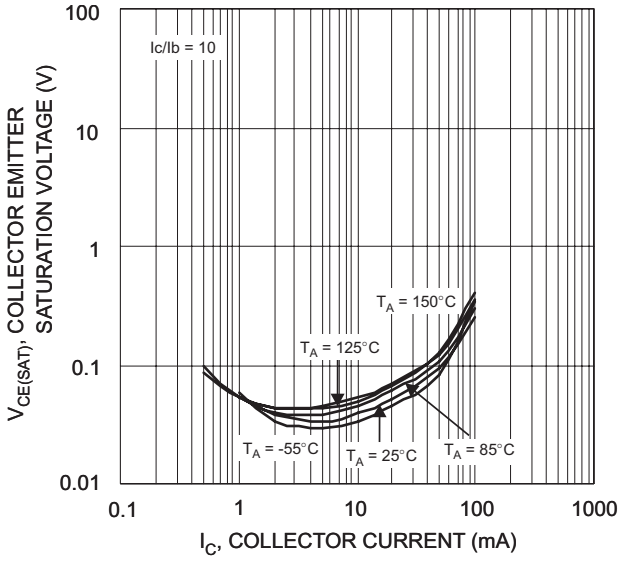

Fig. 14 I_C vs. $V_{CE(SAT)}$

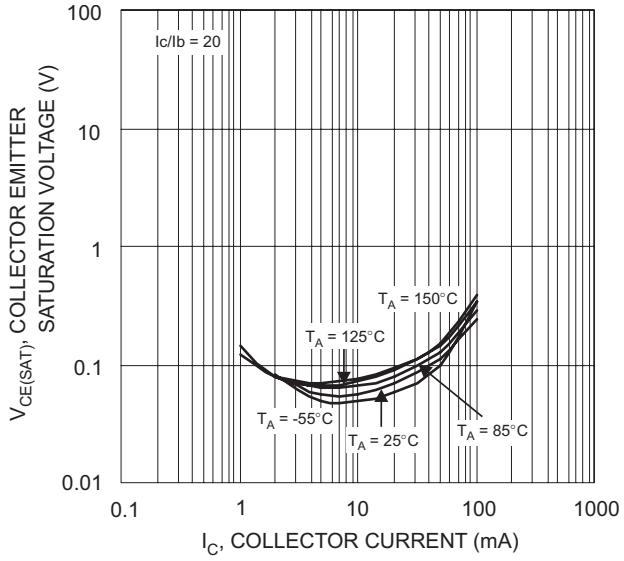

Fig. 15 I_C vs. $V_{CE(SAT)}$

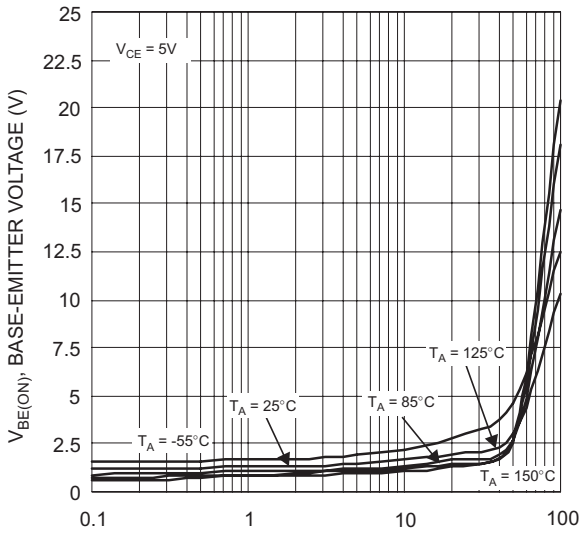

Fig. 16 I_C vs. $V_{BE(ON)}$

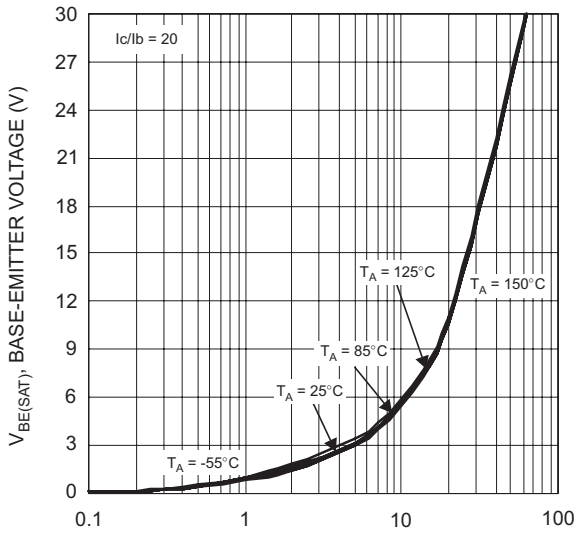

Fig. 17 I_C vs. $V_{BE(SAT)}$

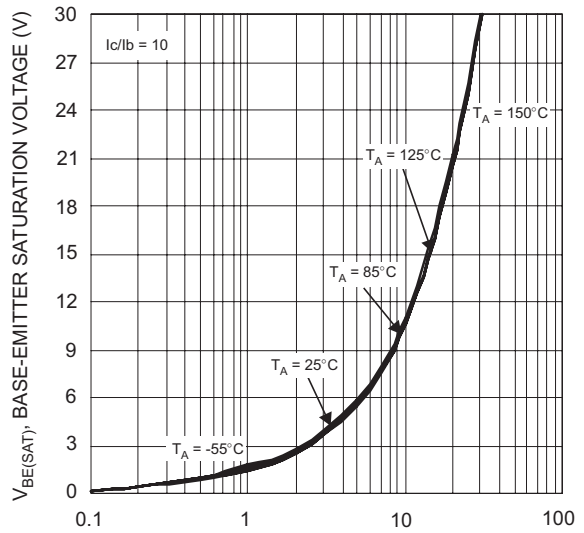

Fig. 18 I_C vs. $V_{BE(SAT)}$

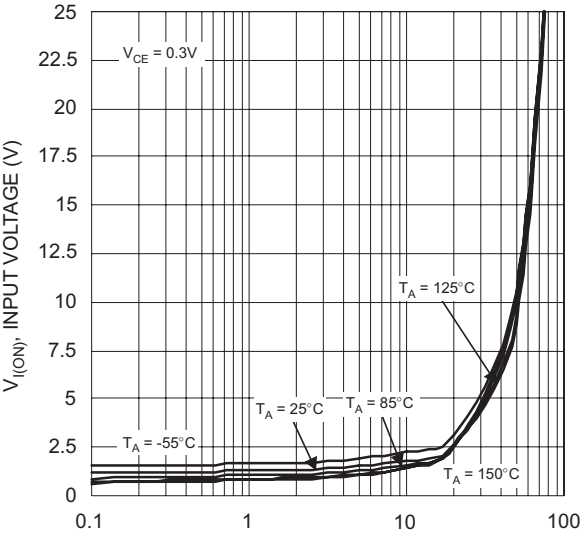

Fig. 19 Input Voltage vs. Output Current

NEW PRODUCT

Ordering Information (Note 5)

Device	Marking Code	Packaging	Shipping
DCX4710H-7	C02	SOT-563	3000/Tape & Reel

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

Marking Information

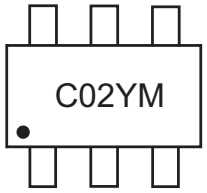

Fig. 20

C02 = Product Type Marking Code
YM = Date Code Marking
Y = Year e.g., T = 2006
M = Month e.g., 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

Mechanical Details

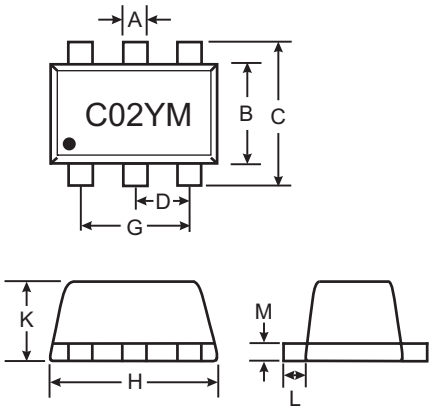

Fig. 21

SOT-563			
Dim	**Min**	**Max**	**Typ**
A	0.15	0.3	0.25
B	1.1	1.25	1.2
C	1.55	1.7	1.6
D		0.5	
G	0.9	1.1	1
H	1.5	1.7	1.6
K	0.56	0.6	0.6
L	0.15	0.25	0.2
M	0.1	0.18	0.11
All Dimensions in mm			

Suggested Pad Layout: (Based on IPC-SM-782)

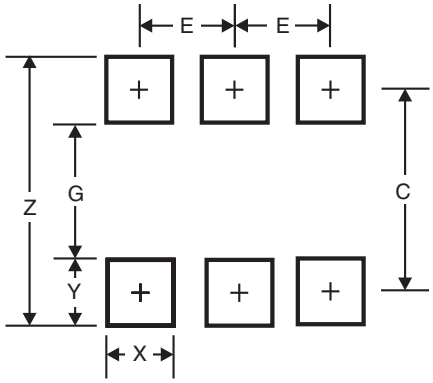

Fig. 22

Figure 4 Dimensions	SOT-563
Z	2.2
G	1.2
X	0.375
Y	0.5
C	1.7
E	0.5

IMPORTANT NOTICE

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