

**COMPLEMENTARY PAIR SMALL SIGNAL SURFACE MOUNT TRANSISTOR**

**Features**

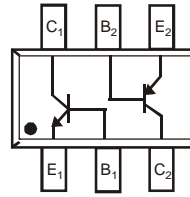
- Epitaxial Die Construction
- Two Internally Isolated NPN/PNP Transistors in one package
- Ultra-Small Surface Mount Package
- **Lead Free/RoHS Compliant (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **"Green" Device (Notes 3 and 4)**

**Mechanical Data**

- Case: SOT-363
- Case Material: Molded Plastic, "Green" Molding Compound, Note 4. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminals: Matte Tin Finish annealed over Alloy 42 leadframe (Lead Free Plating) Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Marking Information: See Page 4
- Ordering Information: See Page 4
- Weight: 0.006 grams (approximate)



Top View



Device Schematic

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	$V_{CBO}$	50	V
Collector-Emitter Voltage	$V_{CEO}$	45	V
Emitter-Base Voltage	$V_{EBO}$	6.0	V
Collector Current	$I_C$	100	mA
Peak Collector Current	$I_{CM}$	200	mA
Peak Emitter Current	$I_{EM}$	200	mA

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	$V_{CBO}$	-50	V
Collector-Emitter Voltage	$V_{CEO}$	-45	V
Emitter-Base Voltage	$V_{EBO}$	-5.0	V
Collector Current	$I_C$	-100	mA
Peak Collector Current	$I_{CM}$	-200	mA
Peak Emitter Current	$I_{EM}$	-200	mA

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 1) @ $T_A = 25^\circ\text{C}$ Total Device	$P_D$	200	mW
Thermal Resistance, Junction to Ambient (Note 1) @ $T_A = 25^\circ\text{C}$	$R_{\theta JA}$	625	$^\circ\text{C/W}$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-65 to +150	$^\circ\text{C}$

- Notes:
1. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch; pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.
  2. No purposefully added lead.
  3. Diodes Inc.'s "Green" policy can be found on our website at [http://www.diodes.com/products/lead\\_free/index.php](http://www.diodes.com/products/lead_free/index.php).
  4. Product manufactured with Date Code UO (week 40, 2007) and newer are built with Green Molding Compound. Product manufactured prior to Date Code UO are built with Non-Green Molding Compound and may contain Halogens or Sb2O3 Fire Retardants

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage (Note 5)	$V_{(BR)CBO}$	50	—	—	V	$I_C = 10\mu\text{A}, I_B = 0$
Collector-Emitter Breakdown Voltage (Note 5)	$V_{(BR)CEO}$	45	—	—	V	$I_C = 10\text{mA}, I_B = 0$
Emitter-Base Breakdown Voltage (Note 5)	$V_{(BR)EBO}$	6	—	—	V	$I_E = 1\mu\text{A}, I_C = 0$
DC Current Gain (Note 5)	$h_{FE}$	200	290	450	—	$V_{CE} = 5.0\text{V}, I_C = 2.0\text{mA}$
Collector-Emitter Saturation Voltage (Note 5)	$V_{CE(SAT)}$	—	90 200	250 600	mV	$I_C = 10\text{mA}, I_B = 0.5\text{mA}$ $I_C = 100\text{mA}, I_B = 5.0\text{mA}$
Base-Emitter Saturation Voltage (Note 5)	$V_{BE(SAT)}$	—	700 900	—	mV	$I_C = 10\text{mA}, I_B = 0.5\text{mA}$ $I_C = 100\text{mA}, I_B = 5.0\text{mA}$
Base-Emitter Voltage (Note 5)	$V_{BE(ON)}$	580	660	700 720	mV	$V_{CE} = 5.0\text{V}, I_C = 2.0\text{mA}$ $V_{CE} = 5.0\text{V}, I_C = 10\text{mA}$
Collector-Cutoff Current (Note 5)	$I_{CBO}$	—	—	15	nA	$V_{CB} = 30\text{V}$
	$I_{CBO}$	—	—	5.0	$\mu\text{A}$	$V_{CB} = 30\text{V}, T_A = 150^\circ\text{C}$
Gain Bandwidth Product	$f_T$	100	300	—	MHz	$V_{CE} = 5.0\text{V}, I_C = 10\text{mA}, f = 100\text{MHz}$
Collector-Base Capacitance	$C_{CBO}$	—	3.5	6.0	pF	$V_{CB} = 10\text{V}, f = 1.0\text{MHz}$
Noise Figure	NF	—	2.0	10	dB	$V_{CE} = 5\text{V}, I_C = 200\mu\text{A}, R_G = 2.0\text{k}\Omega,$ $f = 1.0\text{kHz}, \Delta f = 200\text{Hz}$

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage (Note 5)	$V_{(BR)CBO}$	-50	—	—	V	$I_C = -10\mu\text{A}, I_B = 0$
Collector-Emitter Breakdown Voltage (Note 5)	$V_{(BR)CEO}$	-45	—	—	V	$I_C = -10\text{mA}, I_B = 0$
Emitter-Base Breakdown Voltage (Note 5)	$V_{(BR)EBO}$	-5	—	—	V	$I_E = -1\mu\text{A}, I_C = 0$
DC Current Gain (Note 5)	$h_{FE}$	220	290	475	—	$V_{CE} = -5.0\text{V}, I_C = -2.0\text{mA}$
Collector-Emitter Saturation Voltage (Note 5)	$V_{CE(SAT)}$	—	-75 -250	-300 -650	mV	$I_C = -10\text{mA}, I_B = -0.5\text{mA}$ $I_C = -100\text{mA}, I_B = -5.0\text{mA}$
Base-Emitter Saturation Voltage (Note 5)	$V_{BE(SAT)}$	—	-700 -850	—	mV	$I_C = -10\text{mA}, I_B = -0.5\text{mA}$ $I_C = -100\text{mA}, I_B = -5.0\text{mA}$
Base-Emitter Voltage (Note 5)	$V_{BE(ON)}$	-600	-650	-750 -820	mV	$V_{CE} = -5.0\text{V}, I_C = -2.0\text{mA}$ $V_{CE} = -5.0\text{V}, I_C = -10\text{mA}$
Collector-Cutoff Current (Note 5)	$I_{CBO}$	—	—	-15	nA	$V_{CB} = -30\text{V}$
	$I_{CBO}$	—	—	-4.0	$\mu\text{A}$	$V_{CB} = -30\text{V}, T_A = 150^\circ\text{C}$
Gain Bandwidth Product	$f_T$	100	200	—	MHz	$V_{CE} = -5.0\text{V}, I_C = -10\text{mA}, f = 100\text{MHz}$
Collector-Base Capacitance	$C_{CBO}$	—	3	4.5	pF	$V_{CB} = -10\text{V}, f = 1.0\text{MHz}$
Noise Figure	NF	—	—	10	dB	$V_{CE} = -5\text{V}, I_C = -200\mu\text{A}, R_G = 2.0\text{k}\Omega,$ $f = 1.0\text{kHz}, \Delta f = 200\text{Hz}$

Notes: 5. Short duration pulse test used to minimize self-heating effect.

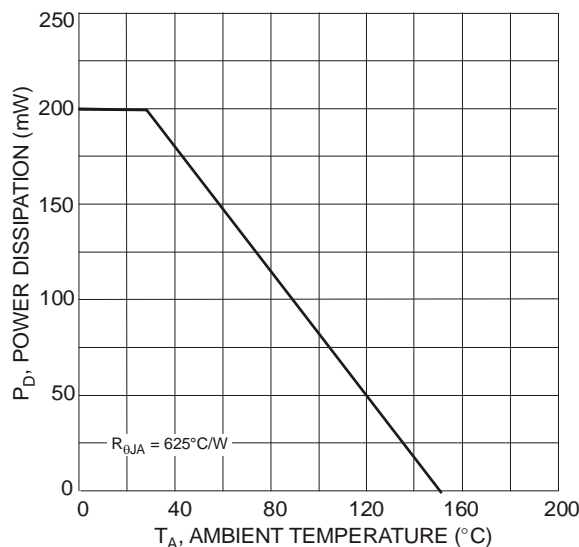


Fig. 1 Power Dissipation vs. Ambient Temperature (Total Device, Note 1)

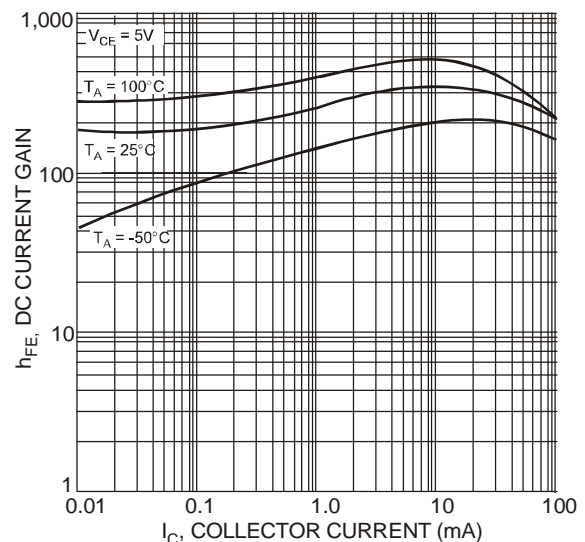


Fig. 2 Typical DC Current Gain vs. Collector Current (NPN)

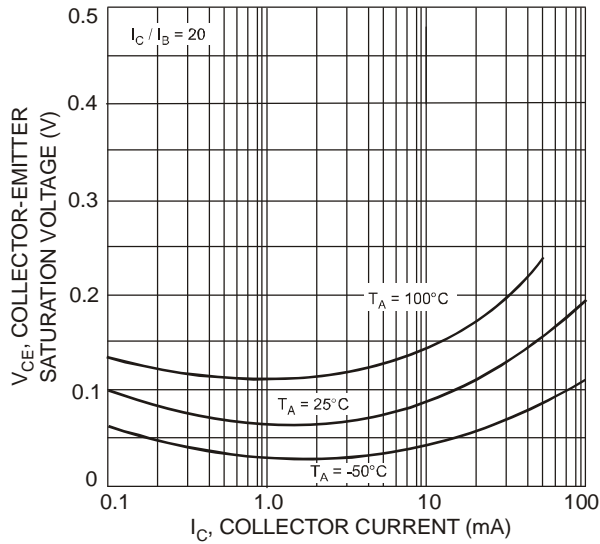


Fig. 3 Typical Collector-Emitter Saturation Voltage vs. Collector Current (NPN)

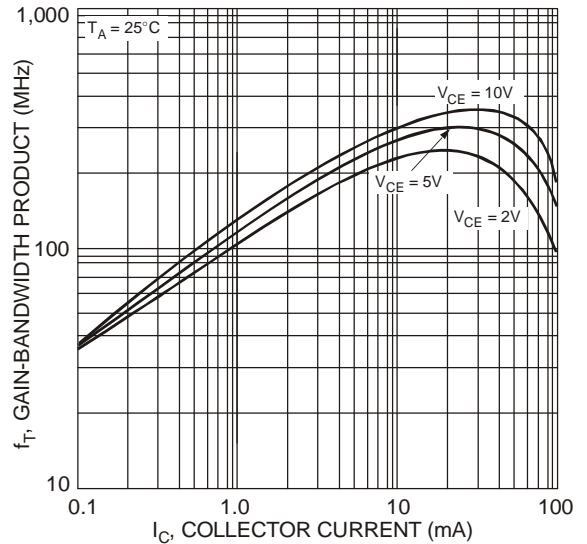


Fig. 4 Typical Gain-Bandwidth Product vs. Collector Current (NPN)

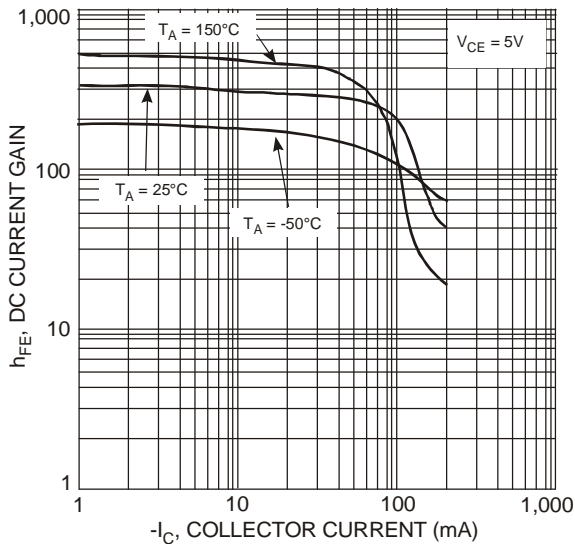


Fig. 5 Typical DC Current Gain vs. Collector Current (PNP)

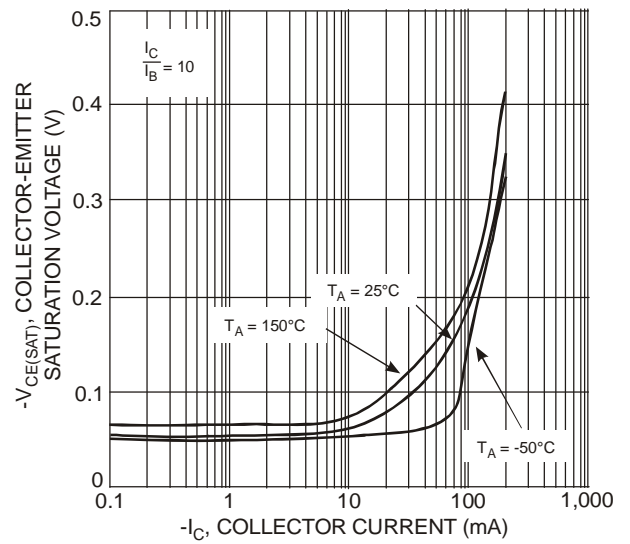


Fig. 6 Typical Collector-Emitter Saturation Voltage vs. Collector Current (PNP)

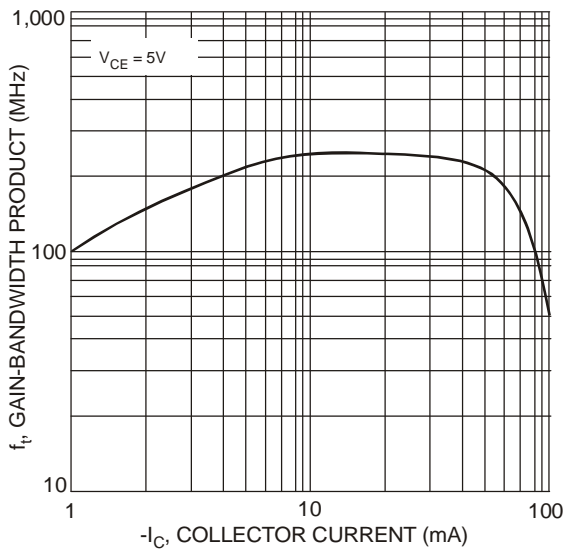
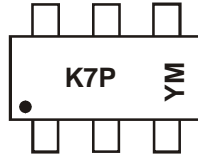


Fig. 7 Typical Gain-Bandwidth Product vs. Collector Current (PNP)

**Ordering Information** (Note 6)

Part Number	Case	Packaging
BC847PN-7-F	SOT-363	3000/Tape & Reel

Notes: 6. For packaging details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

**Marking Information**


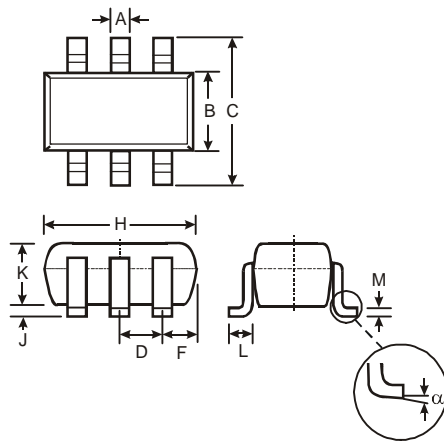
K7P = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: T = 2006)  
 M = Month (ex: 9 = September)

**Date Code Key**

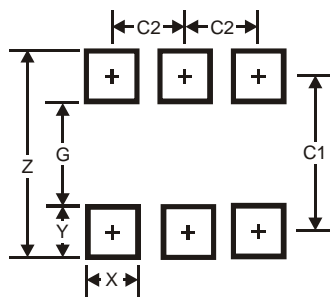
Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Code	M	N	P	R	S	T	U	V	W	X	Y	Z	A	B	C

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

**Package Outline Dimensions**


SOT-363		
Dim	Min	Max
A	0.10	0.30
B	1.15	1.35
C	2.00	2.20
D	0.65 Typ	
F	0.40	0.45
H	1.80	2.20
J	0	0.10
K	0.90	1.00
L	0.25	0.40
M	0.10	0.22
$\alpha$	0°	8°
All Dimensions in mm		

**Suggested Pad Layout**


Dimensions	Value (in mm)
Z	2.5
G	1.3
X	0.42
Y	0.6
C1	1.9
C2	0.65

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