NPN Transistor Bare Die - BC546

Rev 1.0
08/01/19

General purpose medium power amplifier or switch in bare die form

Complement to PNP BC556

Features:

- Gain graded
- Low saturation voltage
- Well suited for amplifier applications
- High reliability gold back metal
- High reliability tested grades for Military + Space

Ordering Information:

The following part suffixes apply:

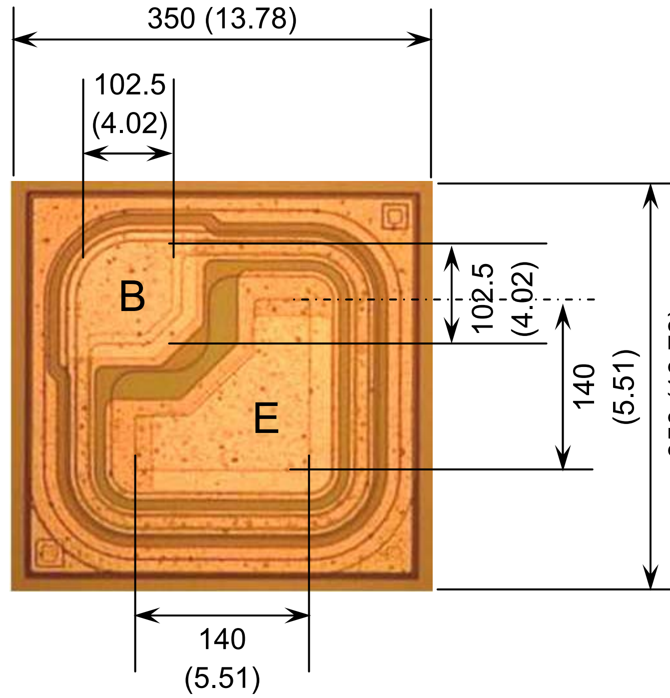
- No suffix - MIL-STD-750 /2072 Visual Inspection
- "**H**" - MIL-STD-750 /2072 Visual Inspection
  + MIL-STD-38534 Class H LAT
- "**K**" - MIL-STD-750 /2072 Visual Inspection
  + MIL-STD-38534 Class K LAT

LAT = Lot Acceptance Test.

For further information on LAT process flows see below.

www.siliconsupplies.com\quality\bare-die-lot-qualification

Die Dimensions in µm (mils)



E = EMITTER **B** = BASE

DIE BACK = COLLECTOR

Supply Formats:

- Default – Die in Waffle Pack (400 per tray capacity)
- Sawn Wafer on Tape – Specific request
- Unsawn Wafer – Specific request
- With additional electrical selection – Specific request
- Sawn as pairs or adjacent pair pick – Specific request

Mechanical Specification

Die Size (Excluding Saw Street)	350 x 350 13.78 x 13.78	µm mils
Base Pad Size	102.5 x 102.5 4.02 x 4.02	µm mils
Emitter Pad Size	96 x 96 5.51 x 5.51	
Die Thickness	230 (±15) 9.06 (±0.59)	µm mils
Top Metal Composition	Al - 1.3µm	
Back Metal Composition	AuAs - 0.9µm	

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Absolute Maximum Ratings T_A = 25°C unless otherwise stated

PARAMETER	SYMBOL	VALUE	UNIT
Collector-Base Voltage	V_{CBO}	80	V
Collector-Emitter Voltage	V_{CEO}	65	V
Emitter-Base Voltage	V_{EBO}	6	V
Collector Current	I_C	100	mA
Junction Temperature	T_J	150	°C
Storage Temperature	T_{stg}	-55 to 150	°C

Electrical Characteristics T_A = 25°C unless otherwise stated

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	I_C = 50µA, I_E = 0		50	-	-	V
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C = 1mA, I_B = 0		45	-	-	V
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	I_E = 50µA, I_C = 0		6	-	-	V
Collector Cut-off Current	I_{CBO}	V_{CB} = 30V, I_E = 0		-	-	15	nA
ON CHARACTERISTICS							
Forward-Current Transfer Ratio[1]	h_{FE}	BC546	V_{CE} = 5V, I_C = 2mA	110	-	800	-
		BC546A		110	-	220	-
		BC546B		200	290	450	-
		BC546C		420	-	800	-
		BC546A	V_{CE} = 5V, I_C = 10µA	-	90	-	-
			V_{CE} = 5V, I_C = 100mA	-	120	-	-
		BC546B	V_{CE} = 5V, I_C = 10µA	-	150	-	-
			V_{CE} = 5V, I_C = 100mA	-	180	-	-
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 10mA, I_B = 0.5mA		-	90	250	mV
		I_C = 100mA, I_B = 5mA		-	200	600	mV
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	I_C = 10mA, I_B = 0.5mA		-	700	-	mV
		I_C = 100mA, I_B = 5mA		-	900	-	mV
Base-Emitter On Voltage	$V_{BE(on)}$	I_C = 2mA, V_{CE} = 5V		580	660	700	mV
		I_C = 10mA, V_{CE} = 5V		-	-	720	mV
SMALL SIGNAL CHARACTERISTICS[2]							
Transition Frequency[3]	f_T	V_{CE} = 5V, I_C = 10mA, f = 100MHz		150	300	-	MHz
Small-Signal Current Gain	h_{fe}	BC546	V_{CE}= 5V, I_C = 2mA, f = 1 kHz	125	-	900	
		BC546A		125	220	260	
		BC546B		240	330	500	
Output Capacitance	C_{obo}	V_{CB} = 10V, I_E = 0, f = 1MHz		-	3.5	6	pF
Input Capacitance	C_{ibo}	V_{BE} = 10V, I_C = 0, f = 1MHz		-	9	-	pF
Noise Figure	NF	V_{CE} = 5V, I_C = 200µA, f = 1KHz, R_G=2KΩ		-	2	10	dB

Note 1: Pulse Test: Pulse Width ≤ 300 µs, Duty Cycle ≤ 2%
Note 2: Not production testing in die form. Characterized by chip design and tested in package
Note 3: f_T is defined as the frequency at which $|h_{fe}|$ extrapolates to unity.

Typical Characteristics T_A = 25°C unless otherwise stated

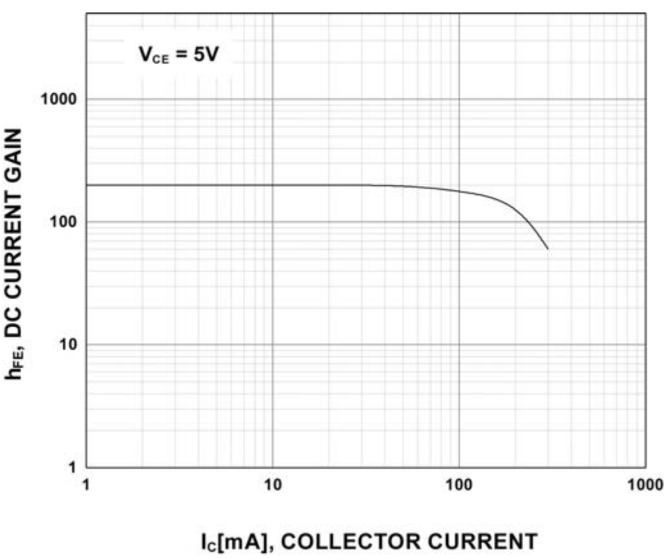

Figure 1 – DC Current Gain

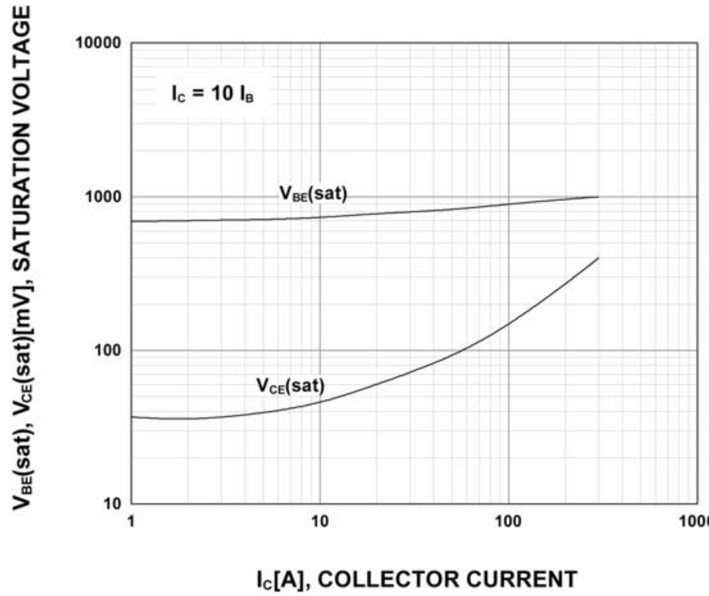

Figure 3 – Base-Emitter Saturation Voltage versus Collector-Emitter Saturation Voltage

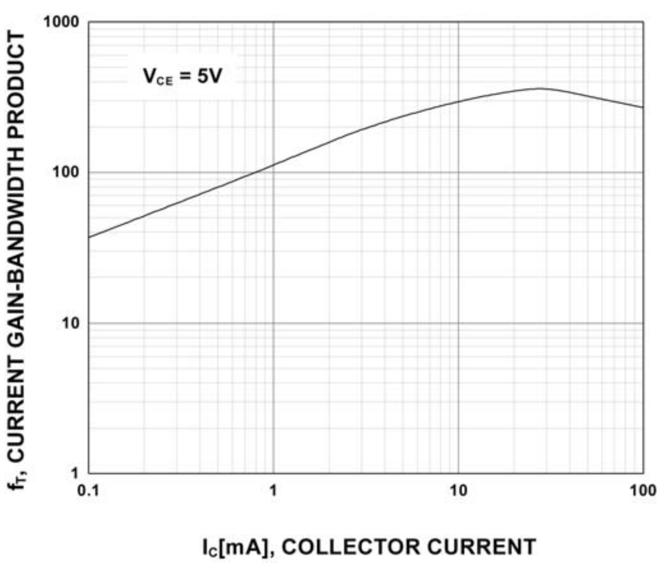

Figure 3 – Current Gain Bandwidth Product

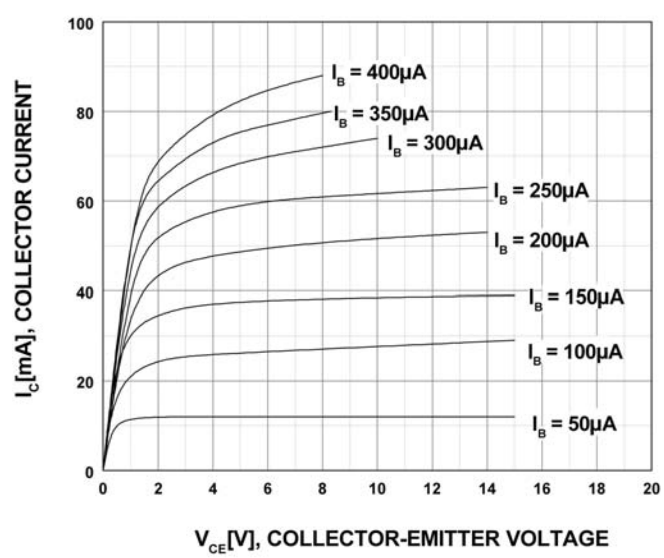

Figure 4 – Static Characteristics

Typical Characteristics T_A = 25°C unless otherwise stated

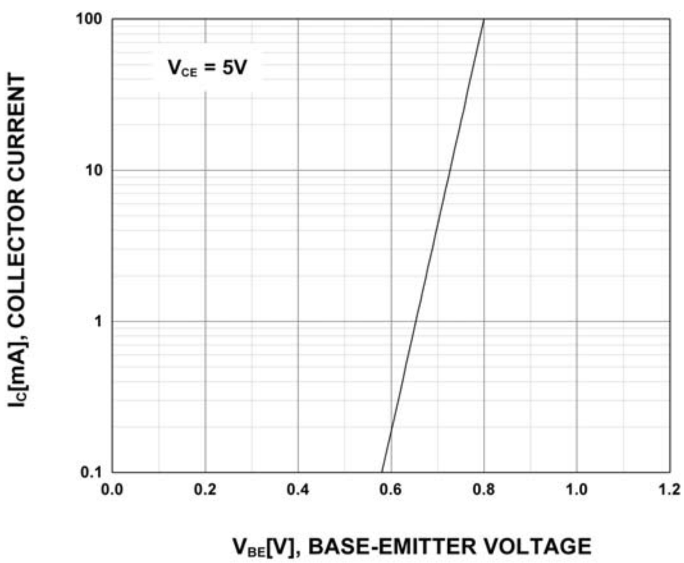

Figure 5 – Transfer Characteristic

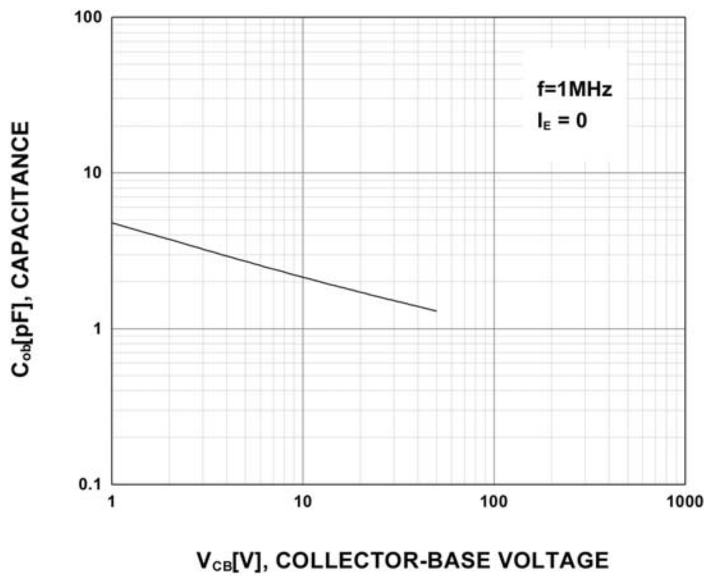

Figure 6 – Output Capacitance