NPN Transistor Bare Die, 2N3501

Rev 1.0
31/01/25

General purpose high voltage amplifier in bare die form
Complement to PNP 2N5401

Features:

- High Breakdown Voltage
- Low $V_{CE(sat)}$
- Characterized at temperature extremes
- High Reliability Gold Back Metal
- High Reliability tested grades for Military + Space

Ordering Information:

The following part suffixes apply:

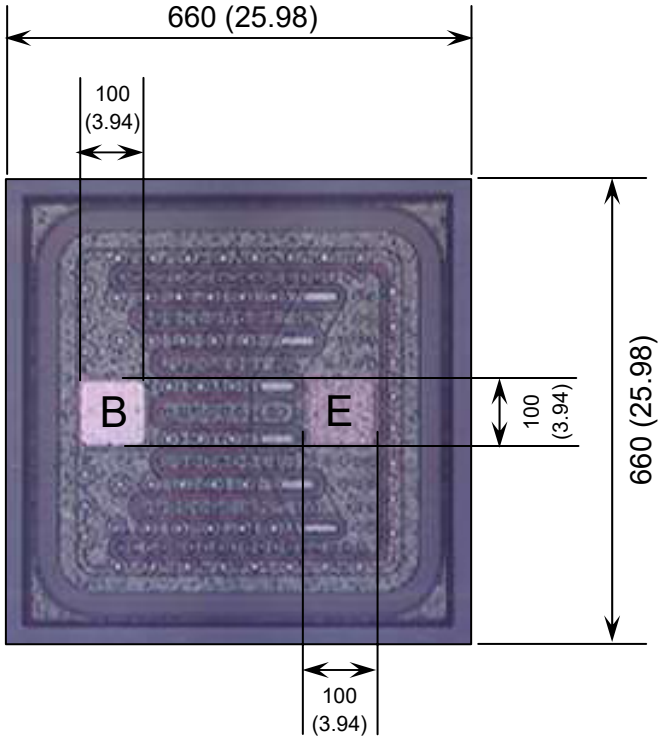
- No suffix - MIL-STD-750 /2072 Visual Inspection
- "**H**" - MIL-STD-750 /2072 Visual Inspection
  + MIL-STD-38534 Class H LAT
- "**K**" - MIL-STD-750 /2072 Visual Inspection
  + MIL-STD-38534 Class K LAT

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)	660 x 660 25.98 x 25.98	µm mils
Base & Emitter Pad Size	100 x 100 3.94 x 3.94	µm mils
Die Thickness	230 (±20) 9.06 (±0.79)	µm mils
Top Metal Composition	Al - 2.6µm	
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}	150	V
Collector-Emitter Voltage	V_{CEO}	150	V
Emitter-Base Voltage	V_{EBO}	6	V
Collector Current	I_C	300	mA
Junction & Storage Temperature	T_J , T_{stg}	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 = 10µA	150	-	-	V
Collector-Emitter Breakdown Voltage[1]	$V_{(BR)CEO}$	I_C = 10mA	150	-	-	V
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	I_E = 10µA	6	-	-	V
Collector Cut-off Current	I_{CBO}	V_{CB} = 75V	-	-	50	nA
		V_{CB} = 150V	-	-	10	µA
Emitter Cut-off Current	I_{EBO}	V_{EB} = 4V	-	-	25	nA
		V_{EB} = 6V	-	-	10	µA
ON CHARACTERISTICS[1]						
Forward-Current Transfer Ratio	h_{FE}	V_{CE} = 10V, I_C = 0.1mA	35	-	-	-
		V_{CE} = 10V, I_C = 1mA	50	-	-	-
		V_{CE} = 10V, I_C = 10mA	75	-	-	-
		V_{CE} = 10V, I_C = 150mA	100	-	300	-
		V_{CE} = 10V, I_C = 300mA	20	-	-	-
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 10mA, I_B = 1mA	-	-	0.2	V
		I_C = 150mA, I_B = 15mA	-	-	0.4	V
Base Saturation Voltage	$V_{BE(sat)}$	I_C = 10mA, I_B = 1mA	-	-	0.8	V
		I_C = 150mA, I_B = 15mA	-	-	1.2	V
SMALL SIGNAL CHARACTERISTICS[2]						
Forward Current Transfer Ratio	$\|h_{fe}\|$	V_{CE} = 20V, I_C = 20mA, f = 100MHz	1.5	-	8.0	-
Output Capacitance	C_{obo}	V_{CB} = 10V,I_E = 0, 100kHz ≤ f ≤ 1MHz	-	-	8.0	pF
Input Capacitance	C_{ibo}	V_{EB} = 0.5V,I_C = 0, 100kHz ≤ f ≤ 1MHz	-	-	80	pF
SWITCHING CHARACTERISTICS[2]						
Turn-On Time	t_{on}	V_{EB} = 5V, I_C = 150mA, I_{B1} = 15 mA	-	-	115	ns
Turn-Off Time	t_{off}	I_C = 150mA, I_{B1} = I_{B2} = -15mA	-	-	1150	ns

1. Pulse Test: pulse width = 300µs, duty cycle < 2.0% **2.** Not production testing in die form, characterized by chip design & package verification.

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