



PNP Transistor Bare Die - 2N4209

Rev 1.1
08/03/19

Ultra-high speed Saturated Switch in bare die form
Complement NPN 2N2369A

Features:

- Low $V_{CE(sat)}$: 0.18V Max @ $I_C = 10mA$
- Very fast $t_{on} + t_{off}$ switching time + low capacitance
- Collector current up to 200mA
- High Reliability Gold Back Metal
- High Reliability tested grades for Military + Space

Ordering Information:

The following part suffixes apply:

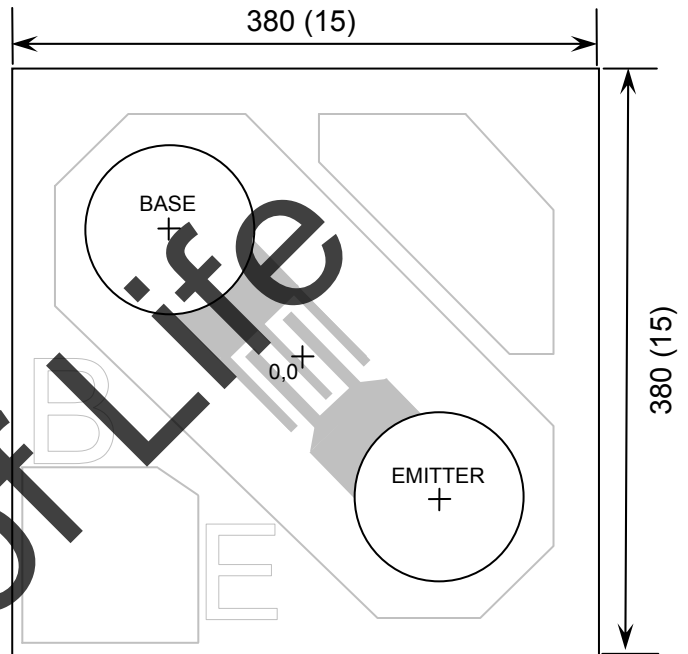
- No suffix - MIL-STD-750 /2072 Visual Inspection
- "H" - MIL-STD-750 /2072 Visual Inspection + MIL-PRF-38534 Class H LAT
- "K" - MIL-STD-750 /2072 Visual Inspection + MIL-PRF-38534 Class K LAT

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)



PAD	COORDINATES (μm)	
	X	Y
BASE	-70	70
EMITTER	70	-70
CHIP BACKSIDE IS 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 (Unsawn)	380 x 380 15 x 15	μm mils
Base Pad Size Emitter Pad Size	110 \varnothing 4.33 \varnothing	μm mils
Die Thickness	180 (± 20) 7.09 (± 0.79)	μm mils
Top Metal Composition	Al 1.3 μm	
Back Metal Composition	Au 1.7 μm	





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Absolute Maximum Ratings $T_A = 25^\circ\text{C}$ unless otherwise stated

PARAMETER	SYMBOL	VALUE	UNIT
Collector-Base Voltage	V_{CBO}	-15	V
Collector-Emitter Voltage	V_{CEO}	-15	V
Emitter-Base Voltage	V_{EBO}	-4.5	V
Collector Current	I_C	200	mA
Junction & Storage Temperature	T_J, T_{stg}	-55 to 200	$^\circ\text{C}$

Electrical Characteristics $T_A = 25^\circ\text{C}$ unless otherwise stated

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C = 100\mu\text{A}, I_E = 0$	-15	-	-	V
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = 3\text{mA}, I_B = 0$	-15	-	-	V
Collector-Emitter Breakdown Voltage	$V_{(BR)CES}$	$I_C = 100\mu\text{A}, V_{BE} = 0$	-15	-	-	V
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E = 100\mu\text{A}, I_C = 0$	4.5	-	-	V
Collector Cut-off Current ¹	I_{CES}	$V_{CE} = -8\text{V}, V_{BE} = 0$	-	-	10	nA
		$V_{CE} = -8\text{V}, V_{BE} = 0, T_A = 125^\circ\text{C}$	-	-	5	μA
ON CHARACTERISTICS						
Forward-Current Transfer Ratio ¹	h_{FE}	$V_{CE} = -0.5\text{V}, I_C = 1\text{mA}$	35	-	-	-
		$V_{CE} = -0.3\text{V}, I_C = 10\text{mA}$	50	-	120	-
		$V_{CE} = -0.3\text{V}, I_C = 10\text{mA}, T_A = -55^\circ\text{C}$	20	-	-	-
		$V_{CE} = -1\text{V}, I_C = 50\text{mA}$	40	-	-	-
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 1\text{mA}, I_B = 0.1\text{mA}$	-	-	-0.15	V
Pulsed Collector-Emitter Saturation Voltage ¹		$I_C = 10\text{mA}, I_B = 1\text{mA}$	-	-	-0.18	V
		$I_C = 50\text{mA}, I_B = 5\text{mA}$	-	-	-0.6	V
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 1\text{mA}, I_B = 0.1\text{mA}$	-	-	-0.8	V
Pulsed Base-Emitter Saturation Voltage ¹		$I_C = 10\text{mA}, I_B = 1\text{mA}$	-0.8	-	-0.95	V
		$I_C = 50\text{mA}, I_B = 5\text{mA}$	-	-	-1.5	V
SMALL SIGNAL CHARACTERISTICS²						
High Frequency Current Gain	h_{fe}	$I_C = 10\text{mA}, V_{CE} = -10\text{V}, f = 100\text{MHz}$	-	-	8.5	-
Output Capacitance	C_{ob}	$V_{CB} = -5\text{V}, I_E = 0$	-	-	3	pF
Input Capacitance	C_{ib}	$V_{BE} = -0.5\text{V}, I_C = 0$	-	-	3.5	
SWITCHING CHARACTERISTICS²						
Transition Frequency	f_T	$V_{CE} = -10\text{V}, I_C = 10\text{mA}, f = 100\text{MHz}$	850	-	-	MHz
Turn-On Time	t_{on}	$I_C = 10\text{mA}, I_{B1} = 1\text{mA}, V_{CC} = -1.5\text{V}$	-	-	15	ns
Turn-Off Time	t_{off}	$I_C = 10\text{mA}, I_{B1} = I_{B2} = 1\text{mA}, V_{CC} = -1.5\text{V}$	-	-	20	
Storage Time	t_s	$I_C = 10\text{mA}, I_{B1} = I_{B2} = 10\text{mA}, V_{CC} = -3\text{V}$	-	-	20	

Note 1: Pulse conditions : length = 300 μs ; duty cycle = 1%

Note 2: Not production testing in die form, proven by chip design and qualification test





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End Of Life

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