# NPN Transistor Bare Die, MPSA05

**Rev 1.0**
**02/09/17**

**General purpose medium power amplifier or saturated switch in bare die form**
Complement to PNP MPSA55

## Features:

- Minimum gain of 100 @ 100mA
- 80 Volt $V_{CEO}$
- 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-PRF-38534 Class H LAT
- "**K**" - MIL-STD-750 /2072 Visual Inspection
  + MIL-PRF-38534 Class K LAT

LAT = Lot Acceptance Test.

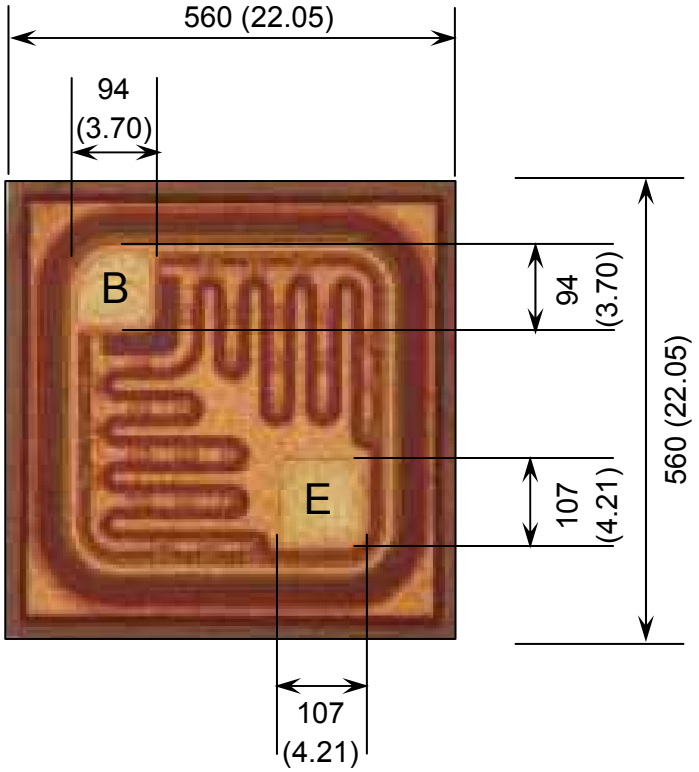
For further information on LAT process flows see below.

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

## 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

## Die Dimensions in µm (mils)




**E** = EMITTER **B** = BASE

**DIE BACK** = COLLECTOR

## Mechanical Specification

| | | |
|---|---|---|
| Die Size (Excluding Saw Street) | 560 x 560<br>22.05 x 22.05 | µm<br>mils |
| Base Pad Size | 94 x 94<br>3.70 x 3.70 | µm<br>mils |
| Emitter Pad Size | 107 x 107<br>4.21 x 4.21 | µm<br>mils |
| Die Thickness | 230 (±20)<br>9.06 (±0.79) | µm<br>mils |
| Top Metal Composition | Al - 1.3µm | |
| Back Metal Composition | AuAs - 0.9µm | |

# NPN Transistor Bare Die, MPSA05

**Rev 1.0**
**07/07/17**

## Absolute Maximum Ratings $T_A$ = 25°C unless otherwise stated

| PARAMETER | SYMBOL | VALUE | UNIT |
|---|---|---|---|
| Collector-Base Voltage | $V_{CBO}$ | 60 | V |
| Collector-Emitter Voltage | $V_{CEO}$ | 60 | V |
| Emitter-Base Voltage | $V_{EBO}$ | 4 | V |
| Collector Current | $I_C$ | 500 | 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 | $V_{(BR)CBO}$ | $I_C$ = 100µA | 60 | - | - | V |
| Collector-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | $I_C$ = 1mA | 60 | - | - | V |
| Emitter-Base Breakdown Voltage | $V_{(BR)EBO}$ | $I_E$ = 100µA | 4 | - | - | V |
| Collector Cut-off Current | $I_{CEO}$ | $V_{CE}$ = 60V | - | - | 100 | nA |
| Emitter Cut-off Current | $I_{EBO}$ | $V_{EB}$ = 5V | - | - | 100 | nA |
| **ON CHARACTERISTICS** | | | | | | |
| Forward-Current Transfer Ratio | $h_{FE}$ | $V_{CE}$ = 1V, $I_C$ = 10mA | 100 | - | - | - |
| | | $V_{CE}$ = 1V, $I_C$ = 100mA | 100 | - | 330 | - |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C$ = 100mA, $I_B$ = 10mA | - | - | 0.25 | V |
| Base-Emitter On Voltage | $V_{BE(on)}$ | $I_C$ = 100mA, $V_{CE}$= 1V | - | - | 1.2 | V |
| **SMALL SIGNAL CHARACTERISTICS**[1] | | | | | | |
| Transition Frequency | $f_T$ | $V_{CE}$ = 2V, $I_E$ = -10mA | 100 | - | - | MHz |
| Output Capacitance | $C_{obo}$ | $V_{CB}$ = 10V, $I_E$ = 0, f = 1MHz | - | 4.5 | - | pF |

Note 1: Not production testing in die form. Characterized by chip design and tested in package LAT.

## Typical Electrical Characteristics

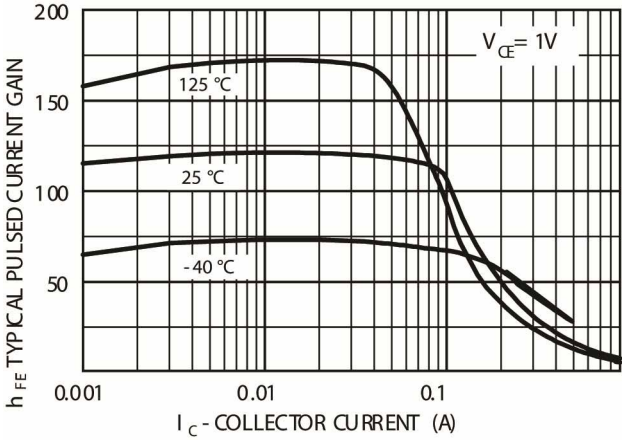



**Fig 1** - Typical Pulsed Current Gain versus Collector Current

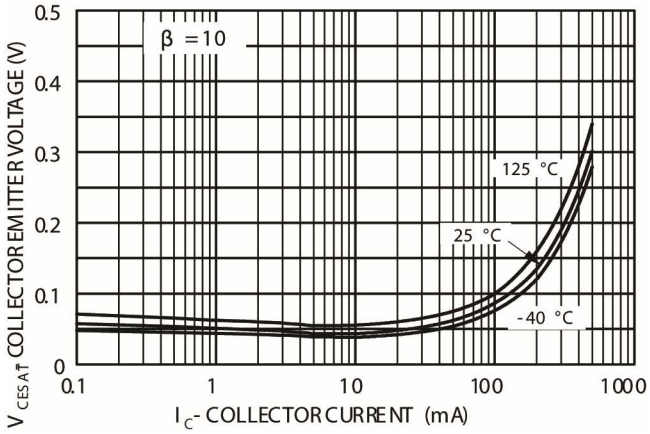



**Fig 2** - Collector-Emitter Saturation Voltage versus Collector Current

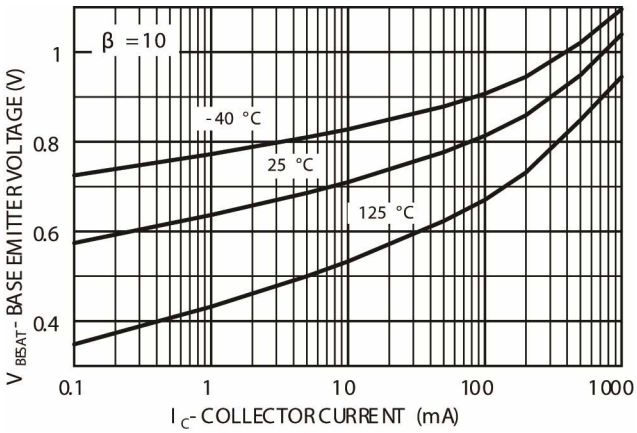



**Fig 3** - Base-Emitter Saturation Voltage versus Collector Current

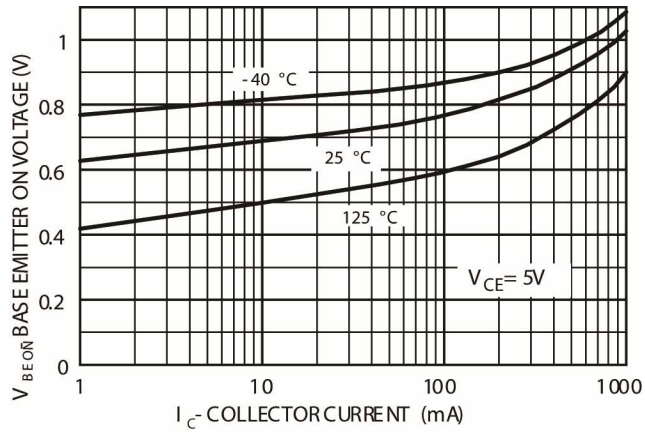



**Fig 4** - Base-Emitter ON Voltage versus Collector Current

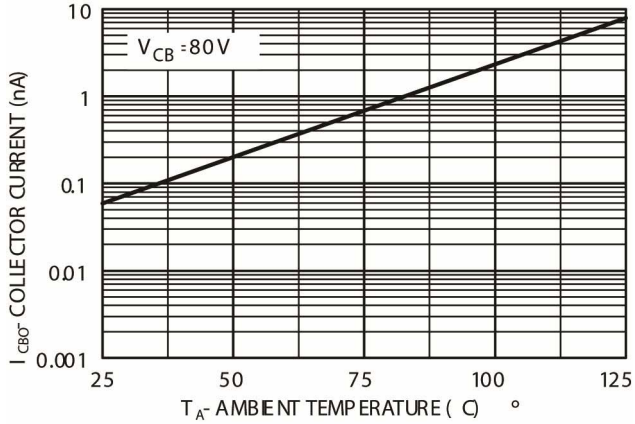



**Fig 5** - Collector-Cut-off Current versus Ambient Temperature

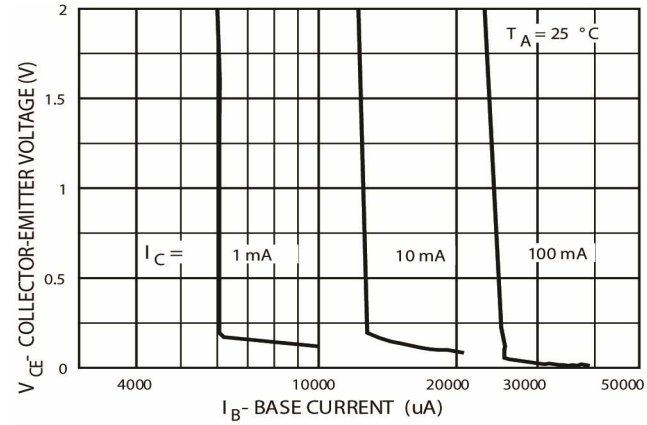



**Fig 6** – Collector Saturation Region

## Typical Electrical Characteristics (Continued)

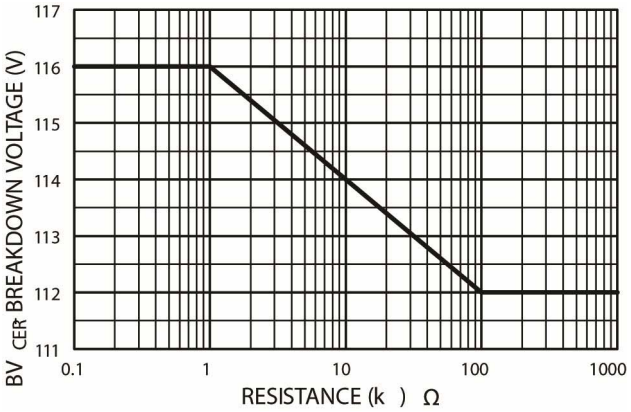



**Fig 7** – Collector-Emitter Breakdown Voltage with Resistance Between Emitter-Base

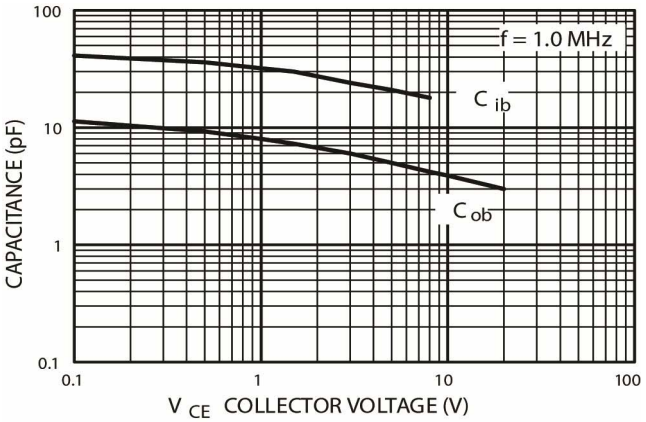



**Fig 8** - Noise Figure versus Source Resistance

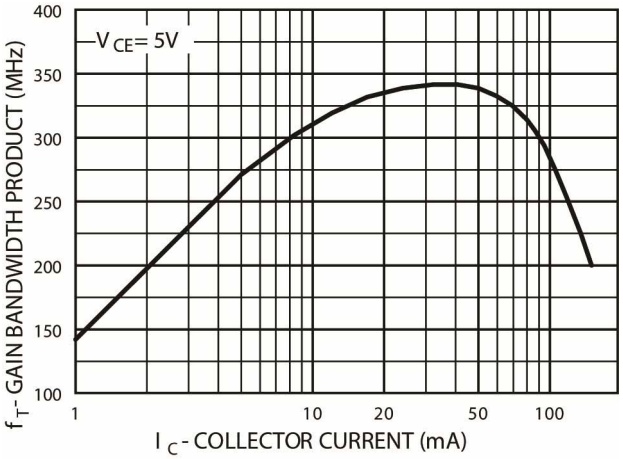



**Fig 9** – Gain Bandwidth Product versus Collector Current