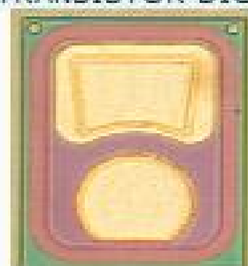
# US MICROWAVES

Advanced Microwave Components

PNP GENERAL PURPOSE TRANSISTOR

USMBC557

| FEATURES | APPLICATIONS | TRANSISTOR DICE |
|---|---|---|
| Low current (max. 100 mA).<br>Low voltage (max. 65 V). | General purpose switching and amplification. |  |

## PRODUCT DESCRIPTION AND SHORT APPLICATION NOTE

USMBC557 is a general purpose PNP transistor offered in die form, and in a TO-92 or SOT54 plastic package.

## TECHNOLOGY DESCRIPTION: SEMICONDUCTOR-THIN FILM MANUFACTURING

All thin film microwave products are manufactured using advanced semiconductors and thin film technologies including ultra-stable and self passivating Tantalum Nitride resistors, gold interconnect metallization and reliable MNOS capacitors to achieve excellent uniformity, performance and reliability. Thin film technology is the preferred solution for all applications that require low noise, long term stability and excellent performance at very high frequencies. US Microwaves employs proprietary thin film technologies for deposition of a wide range of resistive films with sheet resistance films from 1Ω/sq to 10,000Ω/sq. All US Microwaves products are available in die form and are ideal for high reliability hybrid and multi chip module applications.

All US Microwaves products are manufactured using GOLD CHIP TECHNOLOGY™ a trade mark of Semiconix Corporation.

## MAXIMUM RATINGS

| PARAMETER | VALUE | UNITS |
|---|---|---|
| $V_{CBO}$, Collector-base voltage, open emitter | -50 | V |
| $V_{CEO}$, collector-emitter voltage, open base | -45 | V |
| $V_{EBO}$, emitter-base voltage, open collector | -5 | V |
| $I_C$, collector current (DC) | -100 | mA |
| $I_{CM}$, peak collector current | -200 | mA |
| $I_{BM}$, peak base current | -200 | mA |
| $P_{tot}$, total power dissipation, $T_{AMB}$≤25°C | 500 | mW |
| $T_{STG}$, storage temperature | -65 to +150 | °C |
| $T_J$, junction temperature | 150 | °C |
| $T_{AMB}$, operating ambient temperature | -65 to +150 | °C |

ONLY Proper die handling equipment and procedures should be employed. Stresses beyond listed absolute maximum ratings may cause permanent damage to the device.

## ELECTRICAL CHARACTERISTICS

| PARAMETER | VALUE | UNITS |
|---|---|---|
| $I_{CBO}$, collector cut-off current, $I_E$=0; $V_{CB}$=-30V | typ.-1 max.15 | nA |
| $I_{CBO}$, collector cut-off current, $I_E$=0; $V_{CB}$=-30V, Tj=150°C | max -4 | µA |
| $I_{EBO}$, emitter cut-off current, $I_C$=0; $V_{EB}$=-5V | -100 | nA |
| $h_{FE}$, DC current gain, $I_C$=-2 mA; $V_{CE}$=-5V | min 125 max 800 | - |
| $V_{CEsat}$, collector-emitter saturation voltage, $I_C$=-10mA; $I_B$=-0.5mA | typ.-60 max.-300 | mV |
| $V_{CEsat}$, collector-emitter saturation voltage, $I_C$=-100mA; $I_B$=-5mA | typ.-180 max -650 | mV |
| $V_{BEsat}$, base-emitter saturation voltage, $I_C$=-10 mA; $I_{BB}$=-0.5mA; note 1 | -750 | mV |
| $V_{BEsat}$, base-emitter saturation voltage, $I_C$=-100 mA; $I_B$=-5mA; note 1 | -930 | mV |
| $V_{BE}$, base-emitter voltage, $I_C$=-2mA; $V_{CE}$=-5V; note 2 | min.-600 typ.-650 max. -750 | mV |
| $V_{BE}$, base-emitter voltage, $I_C$=-10mA; $V_{CE}$=-5 V; note 2 | max.-820 | mV |
| $C_C$, collector capacitance, $I_E$=0; $V_{CB}$=-10V; f=1MHz | 3 | pF |
| $C_E$, emitter capacitance | 10 | pF |
| $f_T$, transition frequency, $I_C$=-10mA; $V_{CE}$=-5V; f=100MHz | ≥100 | MHz |
| F, noise figure, $I_C$=-200mA; $V_{CE}$=-5V; $R_S$=2kΩ f=1MHz | typ.2 max 10 | dB |

Note 1. $V_{BEsat}$ decreases by about -1.7 mV/K with increasing temperature.
Note 2. $V_{BE}$ decreases by about -2 mV/K with increasing temperature.

## GENERAL DIE INFORMATION

| Substrate | Thickness [mils] | Die Size [mils] | Bonding Pads | Backside metal |
|---|---|---|---|---|
| Silicon | 6±1 | 15 x 18±1 | min 4x4 mils, 3µm thick, 99.99% electroplated gold with a TiW barrier | Backside of the die is NOT metallized. Standard TiW/Au or custom metallization is available for special orders. |

All US Microwaves products are available in die form. Typical delivery for die products is 2-3 weeks ARO. For Custom designs, delivery is 3-4 weeks ARO. Certain items may be available from stock. Inventory is periodically updated. All devices for chip and wire applications are 100% tested, visual inspected and shipped in waffle packs (WP). For high volume automated assembly, MIS chip capacitors are supplied as 4" wafers 100% tested, inked and diced on expanded film frame (FF).

## DIE LAYOUT