

### FEATURES

Low current (max. 100 mA).  
Low voltage (max. 65 V).

### APPLICATIONS

General purpose switching and amplification.

### TRANSISTOR DICE



### 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  $1\Omega/\text{sq}$  to  $10,000\Omega/\text{sq}$ . 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, $T_{AMB} \leq 25^\circ\text{C}$	500	mW
$T_{STG}$ , storage temperature	-65 to +150	$^\circ\text{C}$
$T_J$ , junction temperature	150	$^\circ\text{C}$
$T_{AMB}$ , operating ambient temperature	-65 to +150	$^\circ\text{C}$

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, $I_E=0$ ; $V_{CB}=-30\text{V}$	typ.-1 max.15	nA
$I_{CBO}$ , collector cut-off current, $I_E=0$ ; $V_{CB}=-30\text{V}$ ; $T_J=150^\circ\text{C}$	max -4	$\mu\text{A}$
$I_{EBO}$ , emitter cut-off current, $I_C=0$ ; $V_{EB}=-5\text{V}$	-100	nA
$h_{FE}$ , DC current gain, $I_C=-2\text{ mA}$ ; $V_{CE}=-5\text{V}$	min 125 max 800	-
$V_{CEsat}$ , collector-emitter saturation voltage, $I_C=-10\text{mA}$ ; $I_B=-0.5\text{mA}$	typ.-60 max.-300	mV
$V_{CEsat}$ , collector-emitter saturation voltage, $I_C=-100\text{mA}$ ; $I_B=-5\text{mA}$	typ.-180 max -650	mV
$V_{BEsat}$ , base-emitter saturation voltage, $I_C=-10\text{ mA}$ ; $I_{BB}=-0.5\text{mA}$ ; note 1	-750	mV
$V_{BEsat}$ , base-emitter saturation voltage, $I_C=-100\text{ mA}$ ; $I_B=-5\text{mA}$ ; note 1	-930	mV
$V_{BE}$ , base-emitter voltage, $I_C=-2\text{mA}$ ; $V_{CE}=-5\text{V}$ ; note 2	min.-600 typ.-650 max. -750	mV
$V_{BE}$ , base-emitter voltage, $I_C=-10\text{mA}$ ; $V_{CE}=-5\text{ V}$ ; note 2	max.-820	mV
$C_C$ , collector capacitance, $I_E=0$ ; $V_{CB}=-10\text{V}$ ; $f=1\text{MHz}$	3	pF
$C_E$ , emitter capacitance	10	pF
$f_T$ , transition frequency, $I_C=-10\text{mA}$ ; $V_{CE}=-5\text{V}$ ; $f=100\text{MHz}$	$\geq 100$	MHz
$F$ , noise figure, $I_C=-200\text{mA}$ ; $V_{CE}=-5\text{V}$ ; $R_S=2\text{k}\Omega$ $f=1\text{MHz}$	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	$6 \pm 1$	$15 \times 18 \pm 1$	min 4x4 mils, $3\mu\text{m}$ 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

