

## MICROWAVE POWER TRANSISTORS

NPN silicon transistors for use in common-base class-B power amplifiers up to 4.2 GHz.

Diffused emitter ballasting resistors, interdigitated structure, multicell geometry, localized thick oxide auto-alignment process and gold sandwich metallization ensure an optimum temperature profile and excellent performance and reliability.

PTB23003XA is RF tested by sampling, all other parameters being equal to PTB23003X.

### QUICK REFERENCE DATA

RF performance up to  $T_{mb} = 25\text{ }^{\circ}\text{C}$  in a common-base class-B circuit

type number	mode of operation	f GHz	V <sub>CC</sub> V	P <sub>L</sub> W	G <sub>p</sub> dB	$\eta$ %	z <sub>i</sub> $\Omega$	Z <sub>L</sub> $\Omega$
PTB23001X	CW	2	24	$\geq 1$	$\geq 7$	$\geq 45$	8 + j14	8 + j20
PTB23003X	CW	2	24	$\geq 3$	$\geq 8.75$	$\geq 45$	2.5 + j14	8 + j6
PTB23005X	CW	2	24	$\geq 5$	$\geq 9.2$	$\geq 50$	1.9 + j12	7.5 + j3

### MECHANICAL DATA

FO-41B (see Fig. 1).

### WARNING

#### Product and environmental safety – toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions.

After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with general industrial or domestic waste.

**MECHANICAL DATA**

Dimensions in mm

Fig.1 FO-41B.

Base and metallic cap  
 connected to flange.

**Pinning:**

- 1 = collector
- 2 = emitter
- 3 = base

Torque on screw: max. 0.5 Nm

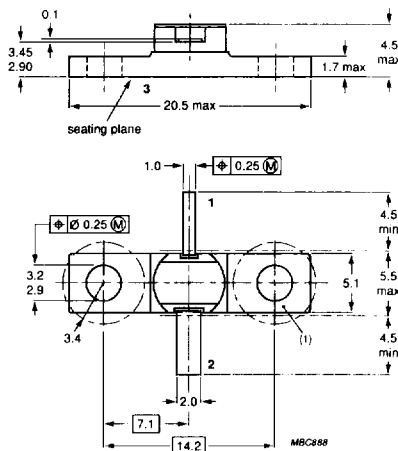
Recommended screw: M2.5

**Marking code:**

2301X for PTB23001X

2303X for PTB23003X

2305X for PTB23005X



(1) Flatness of this area ensures full  
 thermal contact with bolt head.

**RATINGS**

Limiting values in accordance with the Absolute Maximum System (IEC 134)

		PTB23001X	23003X	23005X
Collector-base voltage open emitter	$V_{CBO}$ max.	40	40	40 V
Collector-emitter voltage $R_{BE} = 0$ open base	$V_{CES}$ max.	40	40	40 V
	$V_{CEO}$ max.	15	15	15 V
Collector current (DC)	$I_C$ max.	0.25	0.5	0.75 A
Total power dissipation ( $f > 1$ MHz) up to $T_{mb} = 75$ °C	$P_{tot}$ max.	4.2	7.6	8.7 W
Storage temperature range	$T_{stg}$	-65 to +200		
Junction temperature	$T_j$ max.	200		
Lead soldering temperature at 0.3 mm from ceramic; $t_{sld} \leq 10$ s	$T_{sld}$ max.	235 °C		

**THERMAL RESISTANCE** (at  $T_j = 75\text{ }^\circ\text{C}$ )

		PTB23001X	23003X	23005X
From junction to mounting base	$R_{th\ j-mb}$ max.	22	12	10.5 K/W
From mounting base to heatsink	$R_{th\ mb-h}$ max.	0.7	0.7	0.7 K/W

**PTB23001X**

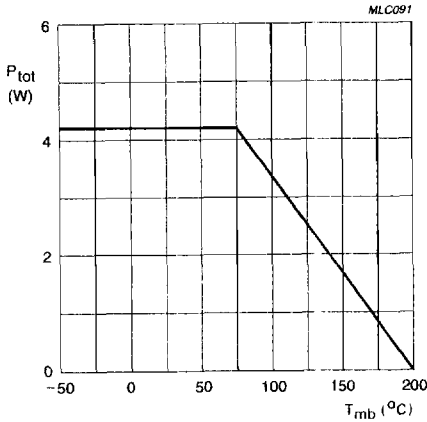


Fig. 2 Maximum permissible RF power dissipation as a function of mounting base temperature;  $f > 1\text{ MHz}$ .

**PTB23003X**

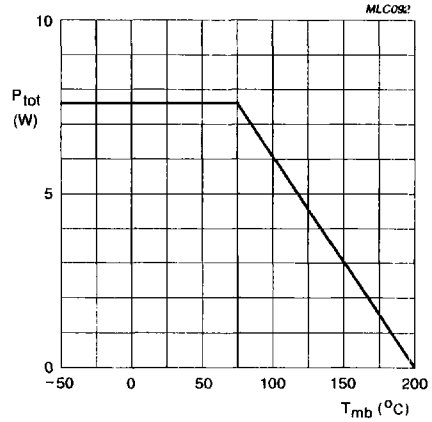
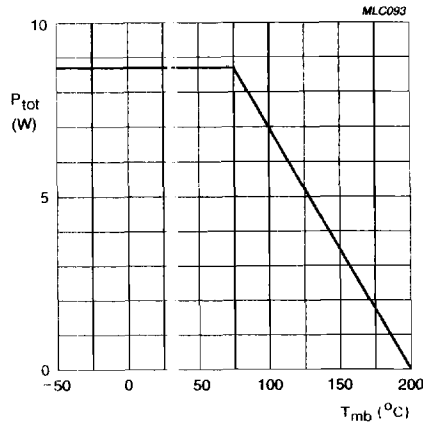


Fig. 3 Maximum permissible RF power dissipation as a function of mounting base temperature;  $f > 1\text{ MHz}$ .



**PTB23005X**

Fig. 4 Maximum permissible RF power dissipation as a function of mounting base temperature;  $f > 1\text{ MHz}$ .

CHARACTERISTICS

			PTB23001X	23003X	23005X
Collector-base breakdown voltage open emitter; $I_C = 1$ mA open emitter; $I_C = 2$ mA open emitter; $I_C = 3$ mA	$V_{(BR)CBO}$	min.	40	—	— V
		min.	—	40	— V
		min.	—	—	40 V
Collector-emitter breakdown voltage $R_{BE} = 0$ ; $I_C = 10$ mA	$V_{(BR)CES}$	min.	40	40	40 V
Collector cut-off current $I_E = 0$ ; $V_{CB} = 24$ V	$I_{CBO}$	max.	10	20	30 $\mu$ A
Emitter cut-off current $I_C = 0$ ; $V_{EB} = 1.5$ V	$I_{EBO}$	max.	0.2	0.4	0.6 $\mu$ A
Collector-base capacitance at $f = 1$ MHz $I_E = I_C = 0$ ; $V_{CB} = 24$ V; $V_{EB} = 1.5$ V	$C_{cb}$	typ.	2.2	3	3.8 pF
Collector-emitter capacitance at $f = 1$ MHz $I_E = I_C = 0$ ; $V_{CB} = 24$ V; $V_{EB} = 1.5$ V	$C_{ce}$	typ.	0.3	0.6	0.9 pF

APPLICATION INFORMATION

Microwave performance in a common-base class-B selective amplifier circuit.\*

type number	mode of operation	f GHz	$V_{CE}$ V	$P_L$ W	$G_p$ dB	$\tau_C$ %
PTB23001X	CW class-B	2	24	> 1 typ. 1.8	> 7 typ. 9	> 45 typ. 50
PTB23003X		2	24	> 3 typ. 4	> 8.75 typ. 10	> 45 typ. 50
PTB23005X		2	24	> 5 typ. 7	> 9.2 typ. 11	> 40 typ. 50

\* Circuit consists of prematching circuit board in combination with complementary input and output slug tuners.

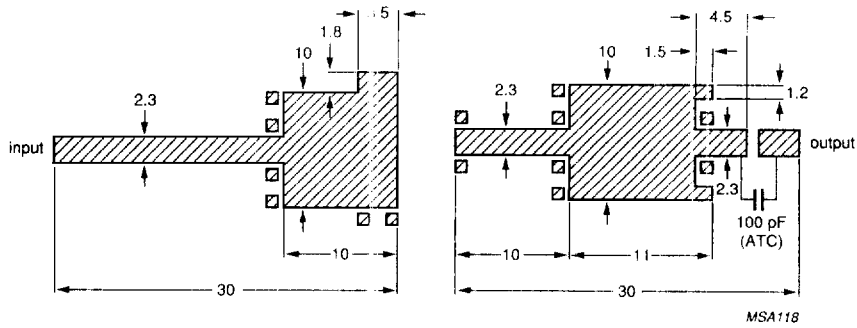


Fig. 5 Prematching test circuit board for PTB23001X.

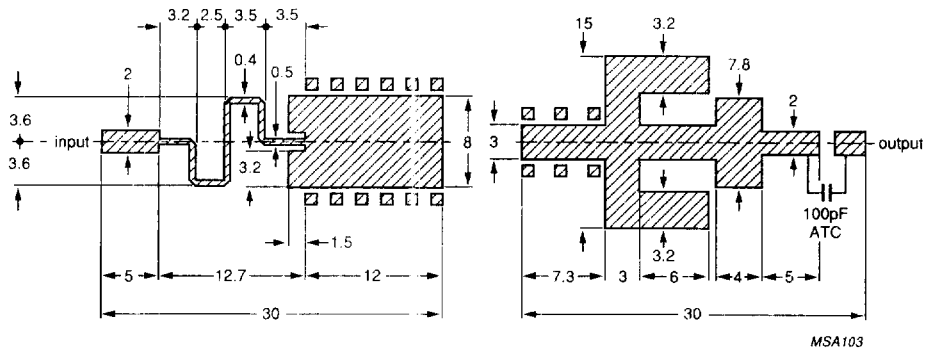


Fig. 6 Prematching test circuit board for PTB23003X.

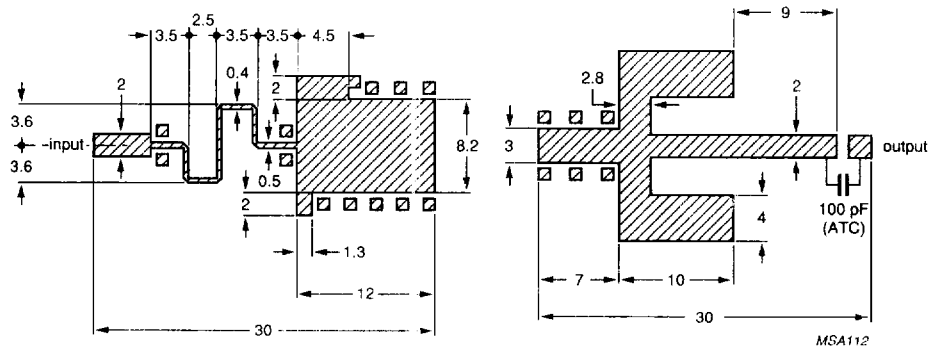


Fig. 7 Prematching test circuit board for PTB23005X.

Circuits on a double Cu-clad printed-circuit board Teflon fibre-glass dielectric ( $\epsilon_r = 2.55$ ) thickness 0.8 mm.