



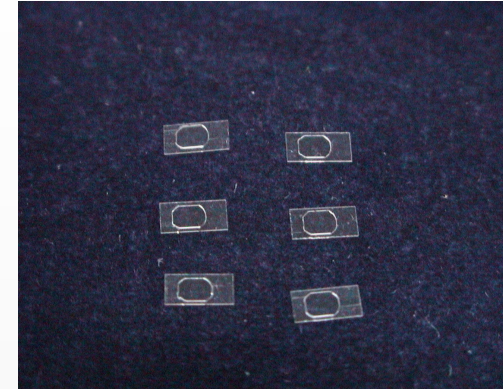
Application Notes: Inverted MESA Blank

What Is Inverted MESA Blank?

- Traditionally, crystal blanks are fabricated by mechanical lapping and polishing to obtain required thickness.
- Inverted Mesa Blank technology uses photolithography processes similar to those in semiconductor wafer manufacturing to etch out a “well” in the crystal blank.
- The thinner “well” is the resonating portion of the blank while the surrounding region of thicker crystal material provides the structural support

Inverted MESA Blank Illustration

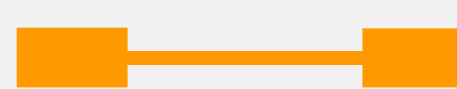
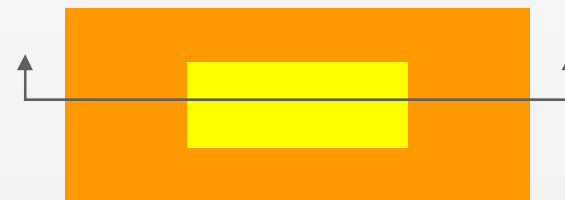
- 40MHz fundamental AT crystal :
Thickness $\approx 40 \mu\text{m}$
- 160MHz fundamental AT crystal :
Thickness $< 10 \mu\text{m}$



Traditional Blank



Inverted Mesa Blank



**Cross
Section** ←

TAITIEN Crystal Oscillator With Inverted MESA Blank



Why Inverted Mesa Blank? (1)

- Oscillator frequency is inversely proportional to the thickness of the crystal blank. The higher the frequency, the thinner the crystal blanks.
- Traditional polished blanks reach manufacturing limitation in thinning crystal blanks.
- Inverted Mesa technology creates a region on the crystal blank much thinner than polished blanks for resonating. Thicker crystal material surrounding the “well” provides robust structural support for better reliability
 - Currently, TAITIEN offers AT-Cut fundamental frequency up to 320MHz

Why Inverted Mesa Blank? (2)

- Inverted Mesa blanks can be used in crystals, crystal oscillators and VCXOs for high fundamental frequency applications.
 - Excellent phase noise/jitter performance than PLL oscillators
 - Better ESR and startup characteristics than 3rd overtone oscillation
 - Eliminate the need to use PLL or 3rd overtone oscillation for high frequency applications
- TAI TIEN has implemented Inverted Mesa blanks in many product series.
 - Available in OT, VT, VK series