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 $\approx 40 \, \mu m$
- 160MHz fundamental AT crystal: Thickness $< 10 \, \mu m$
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 3\textsuperscript{rd} overtone oscillation
  - Eliminate the need to use PLL or 3\textsuperscript{rd} overtone oscillation for high frequency applications

- TAITIEN has implemented Inverted Mesa blanks in many product series.
  - Available in OT, VT, VK series