



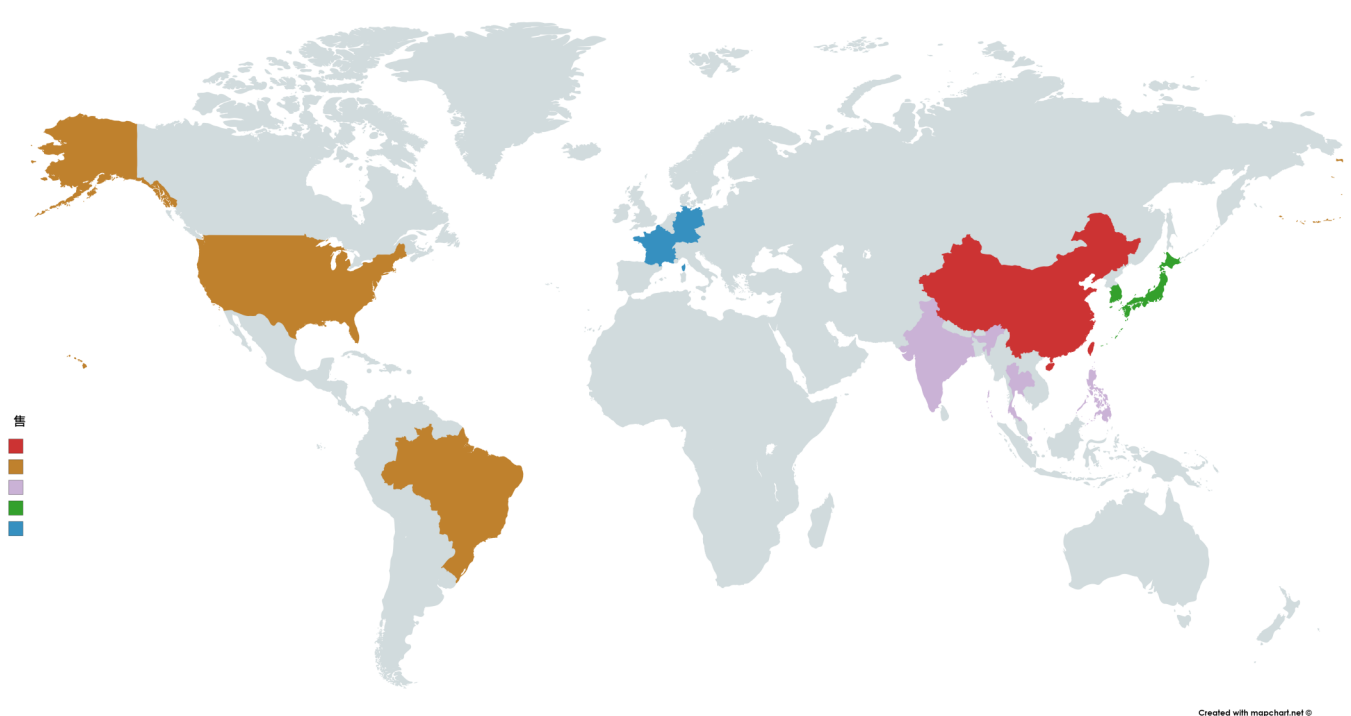
TWC INC.

TWC Inc.

in Zhongshan city in southern China is a modern company which specializes in designing, developing and manufacturing high-quality quartz crystals. Through the years of continued innovation, automation and expansion, TWC Inc. has grown up and become the global leader of quartz crystal manufacturer which accounts for as much as half of the world's total production yield.

Unlike many of TWC's peer rivals which outsource the crystal blank's production to another company, in fact, TWC produces the crystal blanks and controls the product quality from the beginning of the process.





There are significant highlights that pull our products ahead of our peer rivals.

First, we use high-quality piezoelectric quartz crystal bars imported from Russia, which are well-known for their long growing period and high Q value (Q value is over 3 million). In contrast, our peer rivals' crystal bars are about 2.4 million or lower for the Q value.

Second, we use the world-best and the state-of-the-art metal coating machine for our quartz crystal production. Not only does the deposited metal electrode film enjoy an extremely high density and much better adhesion, but its deposition precision is also within the range of 3 ppm.

Finally, we use the world-best, the most automated, and the most advanced inspecting and testing equipment to check every piece of finished quartz crystal before its leaving factory. The resistance value is the most important, or perhaps THE ONLY most important technical specification data for a quartz crystal. Because the resistance value varies with the methods used by the testing equipment to measure the quartz crystals, if the testing process is not highly automated, or maybe the process is conducted by human being manually, then the same resistance value might be unreproducible even when you inspect the same quartz crystal over and over. Thereby, the resistance value listed on the specification sheet could be inaccurate. For this matter, even though many peer rivals always allege they do 100% inspection for every single quartz crystal, but as long as the test is not highly automated, the technical performance of the quartz crystal will not be assured.

TWC is proud to be a company that conducts a 100% accurate product inspection.

To provide the best defect-free products to customers, TWC strives for the best and goes the extra mile for every detailed step of the production process.

1. The crystal blanks' cleaning is carried out in a (dynamic) 1000-class or (static) 100-class clean room;

2. Producing, inspecting and package sealing of the quartz crystals are carried out in a 10000-class clean room;

3. The crystal blank's cut angle is $35^{\circ}15'$. The deviation is strictly bounded within $\pm 1'$;

4. Crystal blanks are randomly sampled to undergo a curvature inspection with the most advanced 3D Measurement System in the world to ensure the blank's central peak point sits at the center of a circular wafer or within the allowed tolerance;

5. Before leaving the factory, we also conduct a complete visual inspection for electrode uniformity and surface flaws;

6. A technical report is provided for every outgoing shipment. All shipping-ready products are subject to the audit control. Their production date and batch number can be backward-traceable.



Ultrasonic Cleaning Systems



3D Measurement System



Full-Automatic Testing Machine

Product Choices

To meet the needs of customers around the world, TWC manufactures all sorts of quartz crystals in the combinations of different electrode materials (gold, silver, alloy), different electrode patterns (double anchor, single anchor, double full face), different wafer sizes (13.97 mm, 12.45 mm) and different nominal frequencies (6 MHz, 5 MHz, 4 MHz).

In General, 6 MHz crystals are the most widely used; 5 MHz crystals are more or less tended to the Japan market or used by the coating machines made from Japan.



Gold crystal

Gold crystal is the mainstream product. It suits a variety of low-stress coating applications. It has excellent chemical stability, excellent contact electrical resistance, good adhesion, and very long storage life.



Silver crystal

Silver crystal targets on high-stress and high-heat coating applications. But because silver can easily tarnish in the air, it could have a short storage life and therefore is recommended to using up as soon as possible after its sealing has been opened.



Alloy crystal

Alloy represents a new quartz crystal application trend in the thin film coating industry. It can be used in both high-stress and low-stress applications. Alloy has many advantages: longer span life during the deposition process and higher stability of coating results are two of the most notable characteristics. As a matter of facts, many TWC customers have switched to the alloy in their applications where gold or silver was used in the past.

Our company can provide customers with customized products.

Please contact : xgh@tieway.cn.



PART NUMBER	DG6000
Electrode Material	Gold
Electrode Pattern	Double anchor
Nominal Frequency	6 MHz
Center Frequency	5.998MHz
Frequency Tolerance	$\pm 0.004\text{MHz}$
Wafer Diameter	14mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



PART NUMBER	DG6002
Electrode Material	Gold
Electrode Pattern	Double anchor
Nominal Frequency	6 MHz
Center Frequency	5.985MHz
Frequency Tolerance	$\pm 0.005\text{MHz}$
Wafer Diameter	14mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



PART NUMBER	DG6003
Electrode Material	Gold
Electrode Pattern	Double anchor
Nominal Frequency	6 MHz
Center Frequency	5.9925MHz
Frequency Tolerance	$\pm 0.0025\text{MHz}$
Wafer Diameter	14mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



PART NUMBER	DG6005
Electrode Material	Gold
Electrode Pattern	Double anchor
Nominal Frequency	6 MHz
Center Frequency	5.990MHz
Frequency Tolerance	$\pm 0.005\text{MHz}$
Wafer Diameter	14mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



PART NUMBER	DG6014
Electrode Material	Gold
Electrode Pattern	Double anchor
Nominal Frequency	6 MHz
Center Frequency	5.980MHz
Frequency Tolerance	$\pm 0.005\text{MHz}$
Wafer Diameter	14mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



PART NUMBER	DG6015
Electrode Material	Gold
Electrode Pattern	Double anchor
Nominal Frequency	6 MHz
Center Frequency	5.966MHz
Frequency Tolerance	$\pm 0.004\text{MHz}$
Wafer Diameter	14mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



PART NUMBER	DG6011
Electrode Material	Gold
Electrode Pattern	Full
Nominal Frequency	6 MHz
Center Frequency	5.985MHz
Frequency Tolerance	$\pm 0.005\text{MHz}$
Wafer Diameter	14mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



PART NUMBER	DG6012
Electrode Material	Gold
Electrode Pattern	Full
Nominal Frequency	6 MHz
Center Frequency	5.9925MHz
Frequency Tolerance	$\pm 0.0025\text{MHz}$
Wafer Diameter	14mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



PART NUMBER	DA6006
Electrode Material	Alloy
Electrode Pattern	Double anchor
Nominal Frequency	6 MHz
Center Frequency	5.980MHz
Frequency Tolerance	$\pm 0.005\text{MHz}$
Wafer Diameter	14mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



PART NUMBER	DA6007
Electrode Material	Alloy
Electrode Pattern	Double anchor
Nominal Frequency	6 MHz
Center Frequency	5.985MHz
Frequency Tolerance	$\pm 0.005\text{MHz}$
Wafer Diameter	14mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



PART NUMBER	DA6008
Electrode Material	Alloy
Electrode Pattern	Double anchor
Nominal Frequency	6 MHz
Center Frequency	5.988MHz
Frequency Tolerance	$\pm 0.004\text{MHz}$
Wafer Diameter	14mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



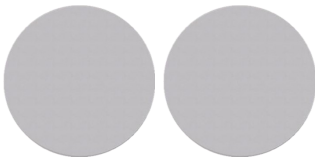
PART NUMBER	DA6009
Electrode Material	Alloy
Electrode Pattern	Double anchor
Nominal Frequency	6 MHz
Center Frequency	5.9875MHz
Frequency Tolerance	$\pm 0.0075\text{MHz}$
Wafer Diameter	14mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



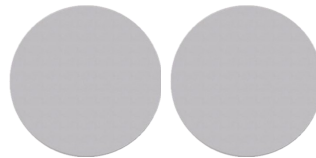
PART NUMBER	DA6010
Electrode Material	Alloy
Electrode Pattern	Double anchor
Nominal Frequency	6 MHz
Center Frequency	5.9925MHz
Frequency Tolerance	$\pm 0.0025\text{MHz}$
Wafer Diameter	14mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



PART NUMBER	DA6019
Electrode Material	Alloy
Electrode Pattern	Double anchor
Nominal Frequency	6 MHz
Center Frequency	5.998MHz
Frequency Tolerance	$\pm 0.004\text{MHz}$
Wafer Diameter	14mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



PART NUMBER	SA6001
Electrode Material	Alloy
Electrode Pattern	Full
Nominal Frequency	6 MHz
Center Frequency	5.985MHz
Frequency Tolerance	$\pm 0.005\text{MHz}$
Wafer Diameter	14mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



PART NUMBER	SA6004
Electrode Material	Alloy
Electrode Pattern	Full
Nominal Frequency	6 MHz
Center Frequency	5.9925MHz
Frequency Tolerance	$\pm 0.0025\text{MHz}$
Wafer Diameter	14mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



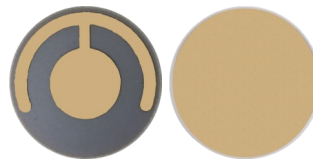
PART NUMBER	DS6007
Electrode Material	Silver
Electrode Pattern	Double anchor
Nominal Frequency	6 MHz
Center Frequency	5.980MHz
Frequency Tolerance	$\pm 0.005\text{MHz}$
Wafer Diameter	14mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



PART NUMBER	DS6008
Electrode Material	Silver
Electrode Pattern	Double anchor
Nominal Frequency	6 MHz
Center Frequency	5.990MHz
Frequency Tolerance	$\pm 0.005\text{MHz}$
Wafer Diameter	14mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



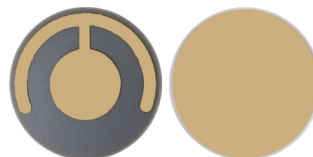
PART NUMBER	DG5001
Electrode Material	Gold
Electrode Pattern	Double anchor
Nominal Frequency	5 MHz
Center Frequency	4.966MHz
Frequency Tolerance	$\pm 0.004\text{MHz}$
Wafer Diameter	14mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



PART NUMBER	SG5004
Electrode Material	Gold
Electrode Pattern	Single anchor
Nominal Frequency	5 MHz
Center Frequency	4.966MHz
Frequency Tolerance	$\pm 0.004\text{MHz}$
Wafer Diameter	14mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



PART NUMBER	SG5005
Electrode Material	Gold
Electrode Pattern	Single anchor
Nominal Frequency	5 MHz
Center Frequency	5.007MHz
Frequency Tolerance	$\pm 0.007\text{MHz}$
Wafer Diameter	14mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



PART NUMBER	SG5006
Electrode Material	Gold
Electrode Pattern	Single anchor
Nominal Frequency	5 MHz
Center Frequency	4.997MHz
Frequency Tolerance	$\pm 0.007\text{MHz}$
Wafer Diameter	14mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



PART NUMBER	SG5007
Electrode Material	Gold
Electrode Pattern	Full
Nominal Frequency	5 MHz
Center Frequency	4.9925MHz
Frequency Tolerance	$\pm 0.005\text{MHz}$
Wafer Diameter	12.45mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



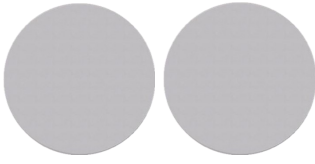
PART NUMBER	SG5008
Electrode Material	Gold
Electrode Pattern	Full
Nominal Frequency	5 MHz
Center Frequency	4.998MHz
Frequency Tolerance	$\pm 0.003\text{MHz}$
Wafer Diameter	12.45mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



PART NUMBER	SG5009
Electrode Material	Gold
Electrode Pattern	Full
Nominal Frequency	5 MHz
Center Frequency	5.0015MHz
Frequency Tolerance	$\pm 0.0035\text{MHz}$
Wafer Diameter	12.45mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



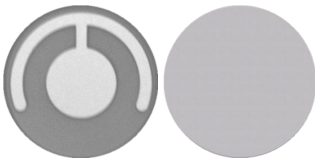
PART NUMBER	SG5012
Electrode Material	Gold
Electrode Pattern	Full
Nominal Frequency	5 MHz
Center Frequency	5.0055MHz
Frequency Tolerance	$\pm 0.0025\text{MHz}$
Wafer Diameter	12.45mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



PART NUMBER	SA5013
Electrode Material	Alloy
Electrode Pattern	Full
Nominal Frequency	5 MHz
Center Frequency	5 MHz
Frequency Tolerance	$\pm 0.005\text{MHz}$
Wafer Diameter	12.45mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



PART NUMBER	DA5003
Electrode Material	Alloy
Electrode Pattern	Double anchor
Nominal Frequency	5 MHz
Center Frequency	4.966MHz
Frequency Tolerance	$\pm 0.004\text{MHz}$
Wafer Diameter	14mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



PART NUMBER	SA5011
Electrode Material	Alloy
Electrode Pattern	Single anchor
Nominal Frequency	5 MHz
Center Frequency	4.966MHz
Frequency Tolerance	$\pm 0.004\text{MHz}$
Wafer Diameter	14mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



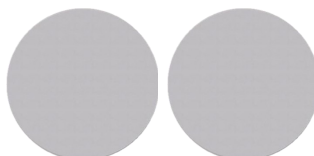
PART NUMBER	DS5002
Electrode Material	Silver
Electrode Pattern	Double anchor
Nominal Frequency	5 MHz
Center Frequency	4.966MHz
Frequency Tolerance	$\pm 0.004\text{MHz}$
Wafer Diameter	14mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



PART NUMBER	SS5010
Electrode Material	Silver
Electrode Pattern	Single anchor
Nominal Frequency	5 MHz
Center Frequency	4.966MHz
Frequency Tolerance	$\pm 0.004\text{MHz}$
Wafer Diameter	14mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



PART NUMBER	SG4001
Electrode Material	Gold
Electrode Pattern	Full
Nominal Frequency	4 MHz
Center Frequency	4 MHz
Frequency Tolerance	$\pm 0.005\text{MHz}$
Wafer Diameter	12.45mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%



PART NUMBER	SA4002
Electrode Material	Alloy
Electrode Pattern	Full
Nominal Frequency	4 MHz
Center Frequency	4 MHz
Frequency Tolerance	$\pm 0.005\text{MHz}$
Wafer Diameter	12.45mm
Resistance	$<12\Omega$
Crystal Cut	AT
Storage Humidity	40%-50%

Package Choices



- 1 A flat carousel box of ten crystals

- 2 A smaller flat carousel box of six crystals



- 3 Twenty crystals per small square box with each piece in a small air-laid paper bag

- 4 Ten crystals in a smaller square box with each piece in a small air-laid paper bag



Final Words

To date, in adherence to the best products and the excellent services, TWC Inc. has grown up to become one of the top quartz crystal suppliers in the world and the first choice for many well-known companies around the world, including Essilor Group, Sunny Optical Technology, Zhejiang Crystal-Optech, Sintai Optical, Biel Crystal, etc.



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