50 YEARS QED

GOLDEN ANNIVERSARY XT LOUDSPEAKER CABLE

With UP-OCC and X-Tube™ Plus Technology

The Sound of Science

Introduction

Why is QED introducing *yet another* speaker cable?

In celebration of fifty years at the forefront of speaker cable design and innovation, QED are proud to introduce the Golden Anniversary XT loudspeaker cable. Its design is a connoisseur-led development of the well-regarded XT400 cable and it is intended as an upgrade for any hifi enthusiast who wants a high-end cable at a budget price.

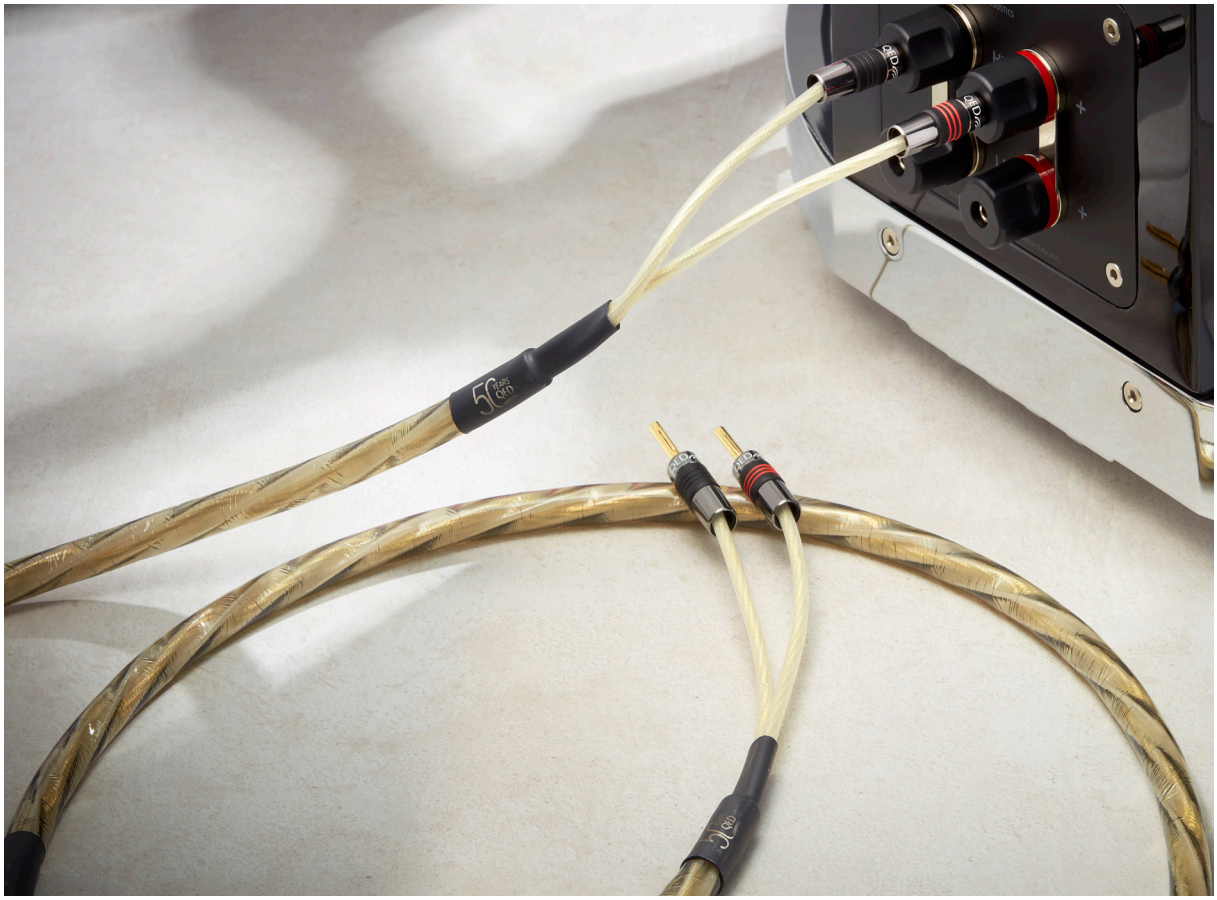


Fig.1 The Golden Anniversary XT loudspeaker cable.

QED's top-down design philosophy

In common with all our cables, the Golden Anniversary XT's design is informed by the results of our exhaustive research into loudspeaker cable design which was begun in 1995 and detailed in the recently updated Genesis Report. This report sets out the design principles to which we have adhered ever since, and which resulted in the development of the Supremus speaker cable – the ultimate expression of sound through science without compromise. Each QED cable in the range is based on this unique design and although their design may be variously prioritised by price, size or ease of use, each retains the basic original features of the flag-ship model. This gives even the base model cables a sonic advantage over their similarly priced competitors.

Features

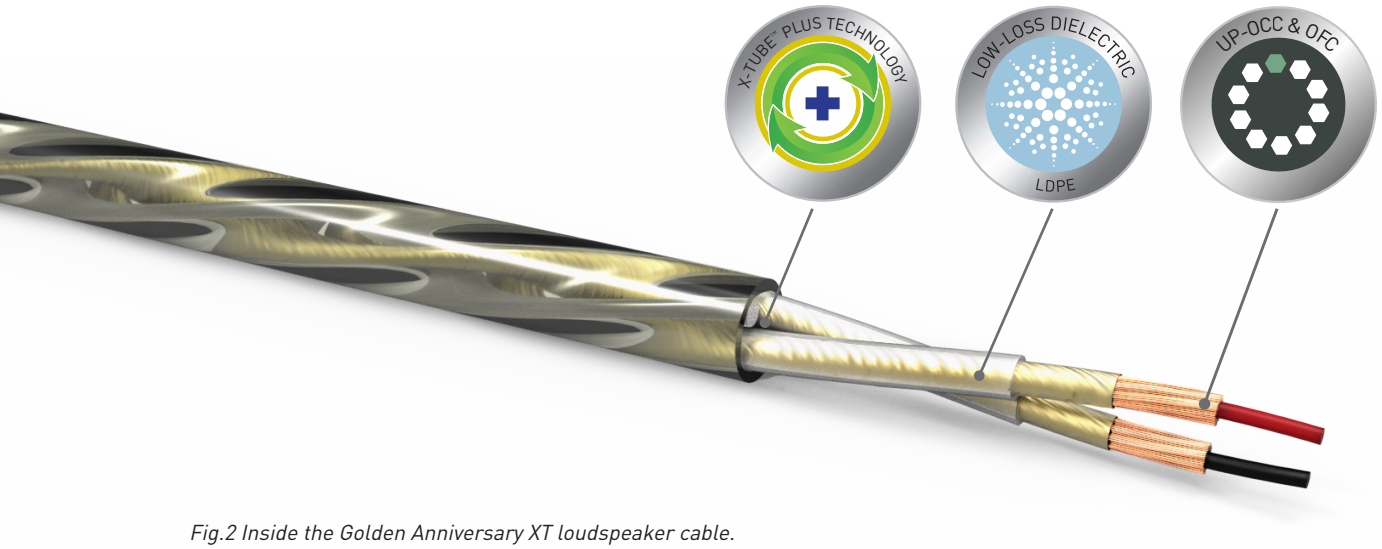


Fig.2 Inside the Golden Anniversary XT loudspeaker cable.

Ultra-pure Ohno Continuous Cast Copper (UP-OCC)

The Golden Anniversary XT has a large 2.5 mm^2 cross-sectional area which makes it perfect for floor standing speakers sited up to 7 m away from the power amplifier. It uses a unique hybrid blend of Ultra-Pure Ohno Continuous-Cast Copper (UP-OCC) and 99.999% Oxygen-Free Copper (OFC) which gives the cable some of the advantages of ultra-pure copper conductors at a fraction of the usual price. In common with technologies developed for our Audio 40 interconnect range, we found that the impression of timing and transient response could be improved if two types of conductors were employed in the same speaker cable.

The continuous casting process is very expensive, involving specialist equipment and complex techniques, and produces single copper crystals of up to 125 m in length which are then cold drawn to produce wires thin enough for speaker cables. The lack of crystal boundaries in UP-OCC cables makes them more conductive and subjectively better sounding, but it was found during exhaustive listening tests that it was not necessary to have all of the conductors cast in this way to achieve a useful improvement. We have combined both UP-OCC and OFC in such a way that there is still an improved path for transients and high frequency detail not available using just OFC alone.

UP-OCC Technology

In 1986 the Ohno Continuous Casting (OCC) process was introduced. The world patented "UP-OCC" (Ultra-Pure Copper by Ohno Continuous Casting Process) was developed by Professor Ohno of Chiba Institute of Technology in Japan. This technology has been applied to the manufacturing process of heated mould continuous casting, to produce monocrystalline copper. The resulting products are small rods of OCC pure copper, from which the wire is drawn, and which can have copper grains of over 125 m in length.

The characteristics of the single crystal make it ideal for high end audio applications because it is flexible, fatigue-resistant, corrosion resistant, highly conductive, has zero crystal boundaries and therefore, rapid transmissibility and is free of impurities.

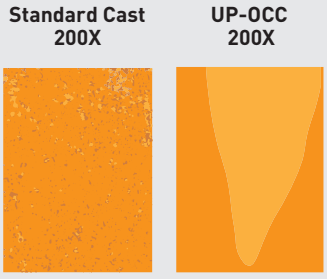


Fig.3 A comparison of OFC with UP-OCC at 200x magnification

Low Loss Ultra-Uniform Dielectric

It is not generally appreciated that the electrical signals moving at or near the speed of light in a wire do so via the medium of electromagnetic (EM) waveforms which propagate within the dielectric surrounding the conductors as well as within the conductors themselves. The movement of electrons within the conductor merely facilitates generation of the EM waveform with their "drift velocity" being much slower - only a few micrometres per second. It is therefore important to ensure that the dielectric material used to insulate and protect the central conductors of the speaker cable is of a type which "permits" the establishment of EM waveforms without appreciable loss.

Dielectric losses are directly proportional to the "permittivity" of the material used and as this a measure of each material relative to that in a vacuum it should be as close to unity as possible. The Golden Anniversary XT loudspeaker cable uses a specially formulated low-density polyethylene (LDPE) dielectric which at 1.69 has the lowest relative permittivity practically available. In addition, as part of the X-Tube™ Plus construction (see below) the two conductors are suspended in a hollow PVC outer tube supported by more LDPE filler rods to isolate the cable from surrounding materials which can affect the uniformity of the dielectric.

Instead of having the EM fields perturbed by carpeting or wooden flooring and concrete materials the conductors are suspended in air on all sides so that in effect the cable has its own built-in cable stand. QED research has shown that low capacitance cables are generally preferred in listening tests over high capacitance counterparts and this is usually because low-loss dielectrics have been utilised. The use of LDPE and a hollow air-filled support structure alongside careful control of conductor spacing results in a cable with a very low capacitance per metre and a dissipation factor (loss tangent) of 0.009 at 10 kHz.

X-Tube™ Plus

As frequency increases electrons flow more and more towards the periphery of a conductor so that if the frequency is high enough only a very thin layer (or skin) on the outside of the conductor is used. This "skin depth" varies for different materials at a fixed frequency and in copper it means that if a conductor has larger than 0.66 mm^2 cross-sectional area, not all of that area is available for an analogue music signal to use.

In the Golden Anniversary XT, the "skin effect" problem is effectively eliminated by the use of X-Tube™ Technology which works by placing all of the conducting material around a central hollow insulating rod. However, for AC signals, changing magnetic fields generated by the flow of current set up eddy currents in nearby conductors which force current to flow only in areas furthest away from conductors carrying current in the same direction and vice versa. This "proximity effect" has a detrimental influence on current distribution in a speaker cable even if it utilises X-Tube™ Technology.

With the Golden Anniversary XT we tackle the proximity effect and the skin effect by combining our existing Aircore™ and X-Tube™ Technologies into a new geometry that we call X-Tube™ Plus. By forming the conductors into a tube-like shape with hollow centre, current densities at different frequencies are maintained because the electric field which contributes towards the skin effect acts towards the centre of the conductor from where the conductive material has been removed. At the same time the ring of conductors is formed from separate bundles with only a loose electrical association which are then twisted into a 90 mm lay so that no single conductor bundle remains on the inside or outside of the cable (and therefore prey to the proximity effect) for long enough for it to become an audible problem. Finally, to complete the X-Tube™ Plus configuration the X-Tubes are suspended in an air-filled PVC tube as described above (see Low Loss Ultra-Uniform Dielectric).

What is the measurable result of all these improvements?

The graph below shows how the DC resistance of Golden Anniversary remains effectively unchanged across the entire audible frequency band even when compared to a well-regarded cable of the same cross-sectional area such as QED 79 strand. X-Tube™ Plus, combined with the sonic advantages of a low loss ultra-uniform dielectric, places the new cable in a unique position to rival its own illustrious stable mate.

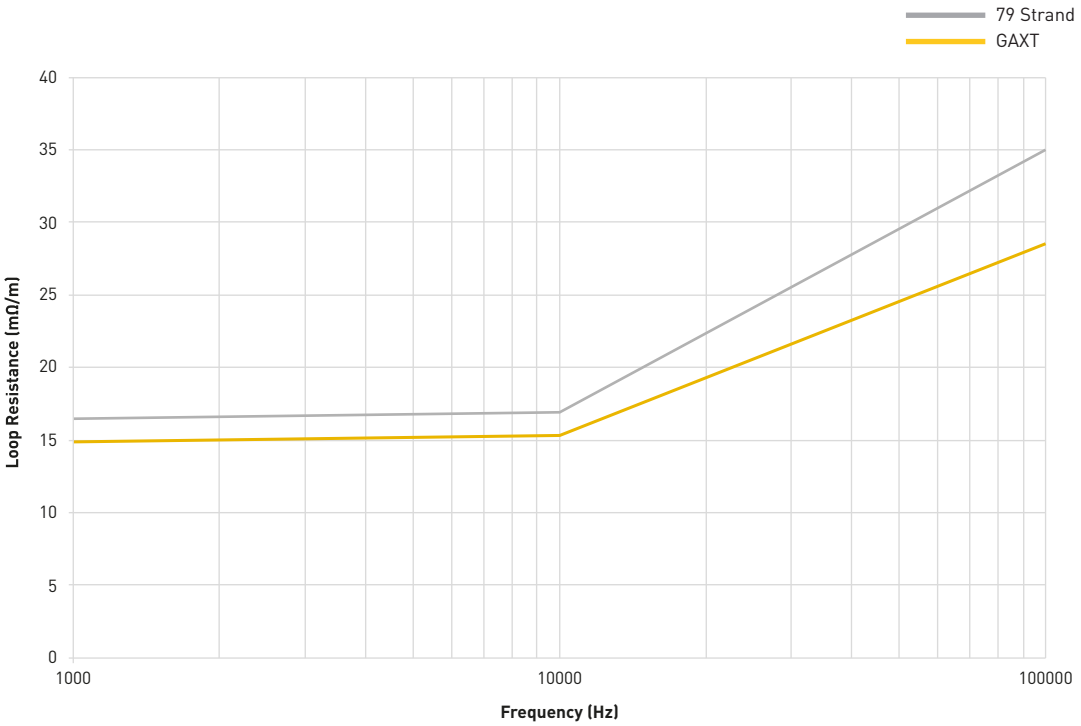


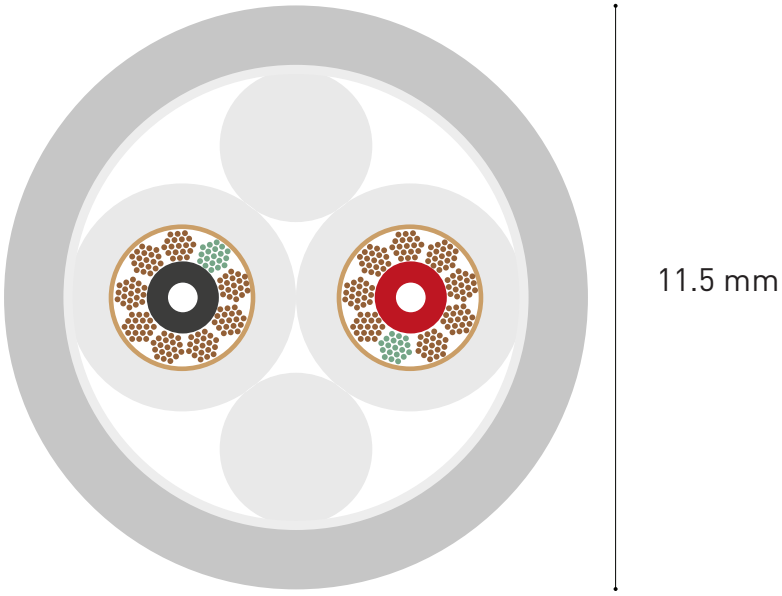
Fig.4 Graph of resistance against frequency for QED cables.

And what does it sound like?

Typical comments when comparing it to the XT25, praised the cable for its precise imaging and timing, with especially faithful rendering of lower mid-range detail such as brass and woodwind, lending more body to dynamic events such as snare drum hits. Furthermore, when compared to QED's silver-plated and much larger cross-section XT400 cable, the Golden Anniversary XT sounded tightly focussed with listeners able to more easily pin-point certain musical instruments within the sound stage. The well-controlled bass transients were similar with all three X-Tube™ cables, but the Golden Anniversary XT possessed more sublime treble detail and a far more convincing three-dimensional presentation in comparison.

It appears that the QED Golden Anniversary XT's unique combination of Ultra-Pure Ohno Continuous-Cast Copper and X-Tube™ Plus, alongside Ultra-Uniform Low-Loss Dielectrics, has provided a significant improvement in its ability to convey complex timing and imaging details to the speakers.

Specification



Cross-sectional area	2.5 mm^2
Wire gauge	14 AWG
Jacket outside diameter	11.5 mm
Loop inductance	0.58 µH / m
Loop resistance	14.8 mΩ / m
Capacitance	42.0 pF
Dissipation factor @10kHz	0.0090
Conductors	9 x 19/0.13 mm OFC + 1 x 19/0.13 UP-OCC
Insulation	LDPE jacket with 100% coverage of gold mylar tape wrap
Plugs and spades	QED Airloc™ forte banana plugs

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Our policy is one of continuous product improvement. We reserve the right to change the designs and specifications without notice.

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