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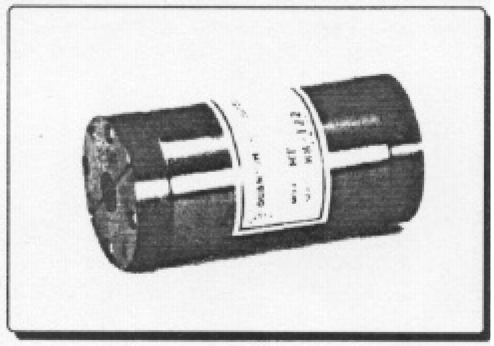
**MODEL MT-10 & MQ-10
MONOLITHIC TRIPLER
AND QUADRUPLER.
DATA SHEET 712**

MONOLITHIC TRIPLER AND MONOLITHIC QUADRUPLER

FEATURES:

DOUBLER AND TRIPLER / QUADRUPLER SHARE ONE CELL.



1) Nd:YAG LASER:

A) TRIPLER: CD*A TYPE 1 (81° angle) DOUBLER (D) AND KD*P TYPE 2 (58.5° angle) TRIPLER (T) OR LBO TYPE 1 (D) (11.8° angle) AND BBO TYPE 2 (T) (39° angle) FOR OUTPUT OF 354.6 NM. ALTERNATELY BBO TYPE 1 (T) (31.3° angle) WITH A HALFWAVE PLATE.

B) QUADRUPLER: CD*A TYPE 1 (D) (81° angle) AND KD*P TYPE 1 (90° angle) QUADRUPLER (Q) OR BBO TYPE 1 (Q) (47.6° angle AT 532 NM) FOR OUTPUT OF 266 NM.

C) QUINTUPLER: FIFTH HARMONIC OF 212.8 NM. MIX QUADRUPLED OUTPUT WITH THE FUNDAMENTAL (4+1) IN A BBO TYPE 1. (51.1° angle). OR MIX TRIPLED OUTPUT WITH THE FUNDAMENTAL (3+1) IN A BBO TYPE 1 (69.3° angle). (LAST PROCESS IS LOW IN EFFICIENCY)

2) Ti:SAPPHIRE LASER:

A) TRIPLER: LBO TYPE 1 (D) (31.8° angle at 800 nm) AND BBO TYPE 2 (T) (55.1° angle) FOR OUTPUT OF 266 NM. .TYPE 1 (T) (44.3° angle) CAN ALSO BE USED, ALTHOUGH TYPE 2 IS MORE CONVENIENT.

B) QUADRUPLER: LBO TYPE 1 (D) (31° angle at 820 nm) AND BBO TYPE 1 (Q) (87 ° angle at 410 NM) FOR OUTPUT OF 205 NM.

3) ALEX LASER:

A) TRIPLER: LBO TYPE 1 (D) (37.7° angle at 744 nm) AND BBO TYPE 1 (T) (49.2° angle) WITH 1/4 WAVE PLATE OR TYPE 2 (62.6° angle) FOR THE OUTPUT OF 253 NM

4) RUBY LASER:

A) TRIPLER: RDA TYPE 1 (D) (85° angle at 694 NM) AND BBO TYPE 1 (T) (55° angle) WITH 1/4 WAVE PLATE.OR BBO TYPE 2 (T) (72.8° angle) FOR THE OUTPUT OF 231.5 NM.

DESCRIPTION:

The Monolithic Tripler Model MT-10 and the Monolithic Quadrupler Model MQ-10 are unique composite cells which share one housing with two crystals, first crystal for the doubler and second crystal for the tripler/quadrupler, as described above for a particular laser. This is a refreshingly new solution to the problem of adjusting two seperate cells,one for a doubler and the other for the tripler/quadrupler. By placing two crystals in one Cell, there is a saving of cost of two windows and one cell. The monolithic device is user friendly, because tuning is much simpler since the sensitive axis of the doubler lies in the plane of the insensitive axis of the tripler. Crystals of CD*A and KD*P are available in larger aperture sizes upto 20 mm, Crystals of BBO and LBO are available upto 12 mm aperture sizes. For 6 mm beam, 10 mm apertures are recommended. For 9 mm beam, 12 mm apertures are required. These crystals are aligned in the laboratory at room temperature. For the purpose of getting stable output, it is recommended that the Monolithic device is used with an oven and a temperature controller at about 40° C. The crystal angles will change depending upon the thermal birefringence of the crystals used.

Under optimum conditions, Tripler efficiency can reach about 25 % of the fundamental and the Quadrupler efficiency can be about 10 % of the fundamental. The Quintupler will be a seperate cell with a fifth harmonic crystal. For SHG of 1064 nm, the polarization rule is oo-e. This results in the appropriate polarization rule for the Type 2 tripling namely eo-e or oe-e. For highest THG efficiency, the fundamental beam at e and SHG beam at o is preferred. The tripler / quadrupler is normally filled with dry nitrogen. Quantum has developed high damage Polymer coatings for dry cells with about 1 % reflection per surface. The Polymer coating is a single layer, deposited in a vacuum chamber at room temperature. The damage threshold of the crystals are CD*A (350 MW/cm2), KD*P (500 MW/cm2), BBO (2GW/cm2) and LBO (5GW/cm2) at 1064 for 1 nsec pulse width.

The Figure below shows the Monolithic Tripler orientation, in which the CD*A is tuned in the horizontal plane and KD*P is tuned in the vertical plane. Sensitive axis of CD*A is the insensitive axis of KD*P and tuning is independant of each other.

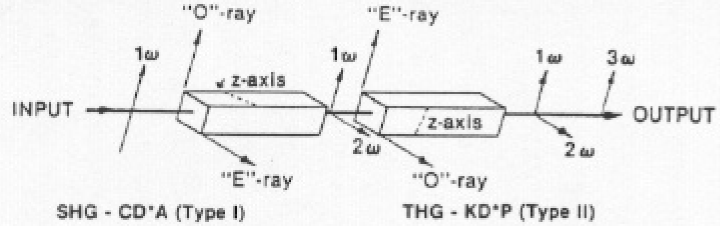


Figure 1 - Monolithic Tripler Crystal Orientation