IRX SERIES

CdTe Pockels Cell

PRODUCT DATASHEET

The IRX Pockels cell series is a premier product from G&H that operates at mid IR wavelengths, designed to address the Q-switched CO_2 laser market at 10.6 µm with rep rates up to 100 kHz and both intrinsic and voltage contrast ratios greater than 500:1.

The IRX Pockels cell series features a cadmium telluride crystal (CdTe), a non-hygroscopic material that has a high electro-optic coefficient and low optical absorption. Through more than 30 years of electro-optic device design and experience, G&H provides IRX Pockels cells with application specific AR coatings or Brewster-cut ends, in apertures ranging from 3 – 9 mm.

The IRX Pockels cells are able to address applications beyond the spectral range of traditional oxide Pockels cells. Though non-hygroscopic, the CdTe crystal is sheltered in our unique Pockels cell design geared to extending the lifetime of the crystal.

Water-cooled designs are available for high optical laser power as well as high frequency modulation to maintain optical performance.

All units are supplied with a QA inspection report and suggested alignment procedures.



Key Features

- Non-hygroscopic CdTe crystal with high electro-optic coefficient and low optical absorption
- Operation from 7 µm – 12 µm up to 100 kHz
- Available apertures ranging from 3 – 9 mm.
- Intrinsic contrast ratio and voltage contrast ratio > 500:1 at 10.6 µm
- < λ/4 transmitted wavefront distortion at 10.6 µm
- LIDT >2.3 J/cm^2 (2.94 µm, 100 ns, 2 Hz)

Options

- Water cooling option available
- Brewster cut crystals available

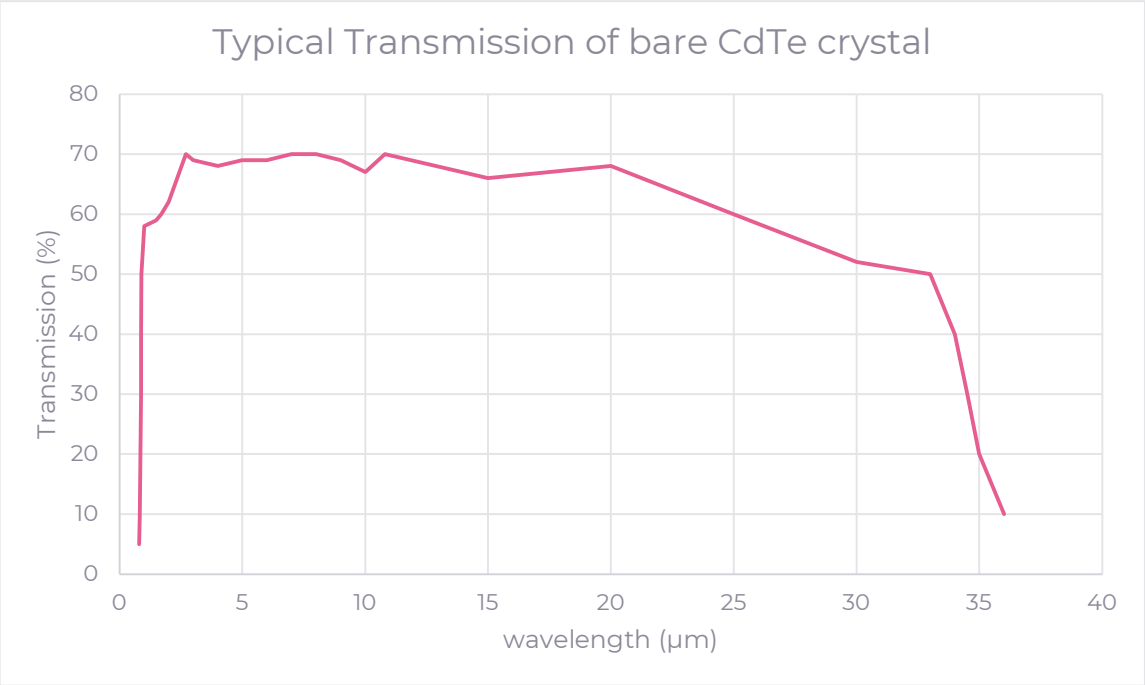
Applications

- Q-switching for CO_2 lasers for
  - Medical purposes (e.g. surgery, aesthetics)
  - Industry cutting and welding
  - Military defense (e.g. LIDAR)
  - Semiconductor manufacturing

Performance Data

IRX Series: Typical Performance CdTe	IRX 3	IRX 4	IRX 5	IRX 7	IRX 9
PHYSICAL					
Hard aperture diameter	3 mm	4 mm	5 mm	7 mm	9 mm
Single pass insertion loss @ 10.6 µm	< 2.0%				
Intrinsic contrast ratio (ICR) @ 10.6 µm	> 500:1, see figure 1				
Voltage contrast ratio (VCR) @ 10.6 µm (parallel polarizers)	>500:1, see figure 2				
Single pass distortion @ 10.6 µm	< λ/4				
ELECTRICAL					
Capacitance (DC)	~ 6 pF				
DC quarter wave voltage @ 10.6 µm	2 kV	2.5 kV	3 kV	3.5 kV	4.5 kV
10-90% rise time (theoretical) into 50 Ω line	~ 0.3 ns				
Modulation frequency	< 100 kHz				
Duty cycle (recommended)	< 10%				
LASER DAMAGE THRESHOLD (LIDT)					
2.94 µm, 100 ns, 2 Hz, 1 mm beam	>2.3 J/cm^2				
ENVIRONMENTAL CONDITIONS					
Operating conditions					
Temperature range	+15 C to +35 C				
Humidity	<85% RH (non-condensing)				
Storage conditions					
Temperature range	-50 C to +85 C				
Humidity	Non-condensing				

Typical transmission spectra of CdTe crystal used in IRX series



Source: cadmium-telluride-cdte-transmission-curve-datasheet.pdf (lakeshore.com)

Typical contrast ratios of IRX series

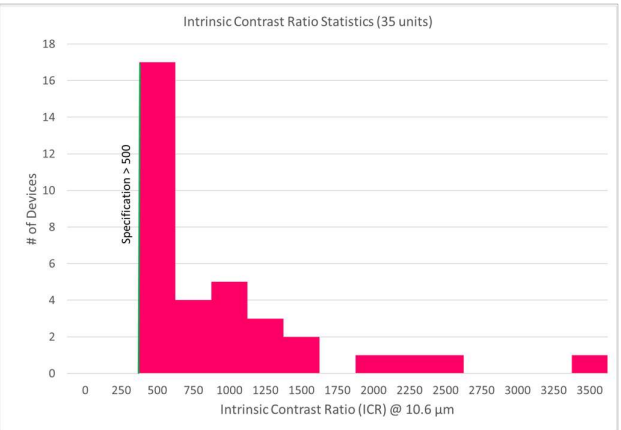


Figure 1 Intrinsic contrast ratio

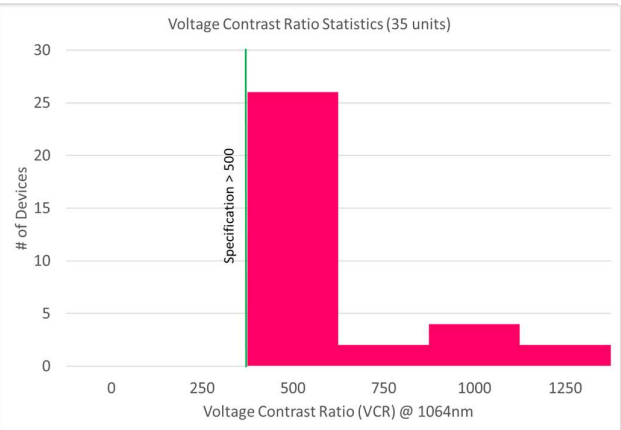
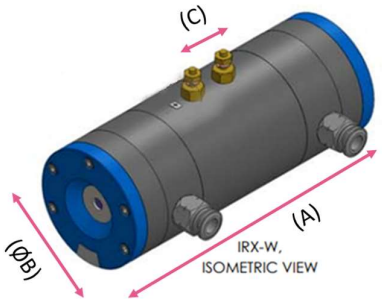


Figure 2 Voltage contrast ratio

Dimensions of IRX series

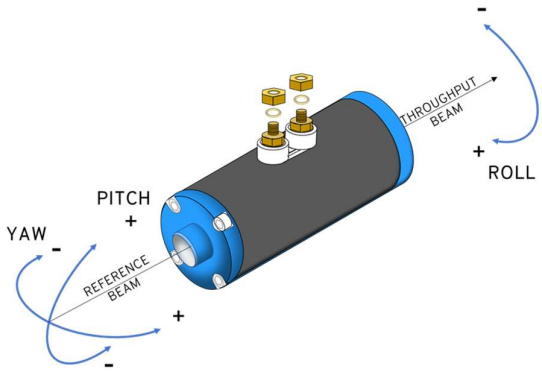
MODEL	DIM 'A'	DIM 'B'	DIM 'C'
IRX 3	2.255 [57.2]	0.998 [25.3]	0.472 [12.0]
IRX 4	2.255 [57.2]	0.998 [25.3]	0.472 [12.0]
IRX 5	2.255 [57.2]	0.998 [25.3]	0.472 [12.1]
IRX 7	2.255 [57.2]	0.998 [25.3]	0.472 [12.1]
IRX 9	2.982 [75.7]	1.375 [34.9]	0.633 [16.1]



Dimensions of water cooled IRX series (IRX 5-WC shown))

MODEL	DIM 'A'	DIM 'B'	DIM 'C'
IRX 5-WC	5.06 [128.5]	2.00 [50.8]	0.65 [16.5]

Example of test data provided with each device



NOTES:

1: Definitions:
ICR: Intrinsic contrast ratio
VCR: Voltage dependent contrast ratio
TWE: Transmitted wavefront error/distortion
2: Inspection beam is HeNe, vertically polarized
3: Pockels cell is depicted in inspection orientation
4: Typical input polarization shown (parallel or perpendicular to electrodes
5: Pockels cell has sensitive optical surfaces: Remove from package and handle only in cleanroom environment
6: Do not attempt to clean optical surfaces: Doing so will void the warranty and/or shorten the lifetime of the cell
7: Do not attempt soldering operations on or near the cell
8: Refer to 'Pockels cell alignment' datasheet for additional information and precautions
9: Typical configuration shown: End cap and electrode may vary depending on configuration purchased

IRX series CdTe Pockels cell Inspection Report	
MODEL:	IRX 7
CLEAR APERTURE (mm):	7
SERIAL NUMBER:	XXXX
PART NUMBER:	1234
SHIP DATE:	01/01/2000
AR COATING (µm):	10.6
ICR[1] (@ 10.6 µm):	500
VCR[1] (@ 10.6 µm):	500
λ/4 VOLTAGE (@ 10.6 µm):	3.5
LEAKAGE CURRENT @ λ/2 V (µA):	0.04
TRANSMISSION (%):	99.2
TYPICAL CAPACITANCE (pF):	6
YAW (MINUTES):	+13.09
PITCH (MINUTES):	+3.25
ROLL (DEGREES):	+1.57
TWE[1] (@ λ = 10.6 µm)	< λ/4 TYPICAL

For further information

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