QUBIG

Empowering Laser Technologies

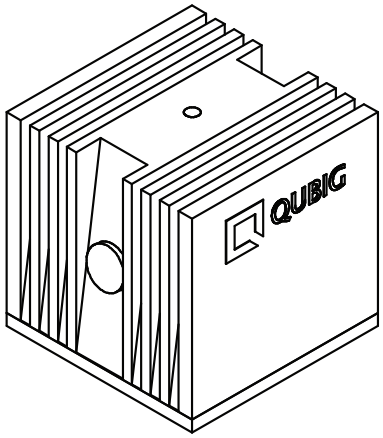
# Test Data Sheet

**EO-Mg25+**
S/N:

## Resonant electro-optic phase modulator

with

**- thermal crytsal mount**
**- hermetically sealed housing**
**- tunable resonance frequency**




| RF properties | Value | Unit |
|---|---|---|
| Resonance frequency: $f_0$ [1] | 1.57 - 1.86 | GHz |
| Preset frequency: $f_{set}$ [1] | 1789 | MHz |
| Bandwidth: Δν | 10 | MHz |
| Quality factor: Q | 180 | |
| Required RF power for 1rad @ 313nm [2] | 36.6 | dBm |
| max. RF power: $RF_{max}$ [3] | 4 | W |

| Optical properties | | |
|---|---|---|
| EO crystal | KDP | |
| Aperture | 3x3 | $mm^2$ |
| Wavefront distortion (633nm) | λ/6 | nm |
| recommended max. optical intensity (280nm) | <1 | $W/mm^2$ |
| AR coating (R<0.5%) | 240-420 | nm |

[1] at 24.3°C [2] with 50Ω termination [3] no damage with $RF_{in}$ < 5W

## Measured modulation

**Fig. 1: Oscilloscope trace**

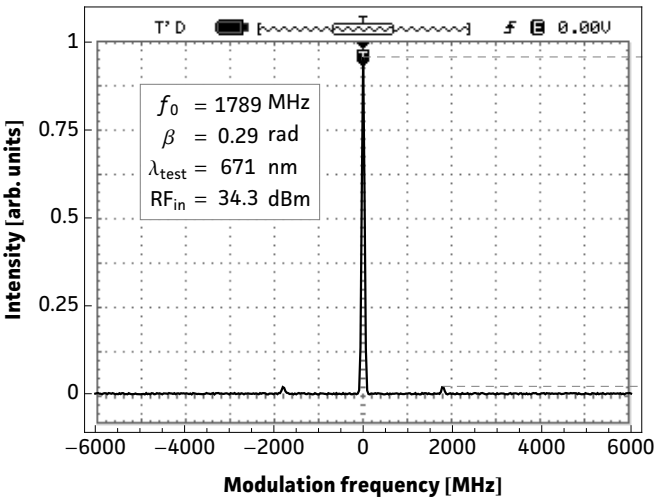



**Fig. 2: Carrier/sideband ratio**

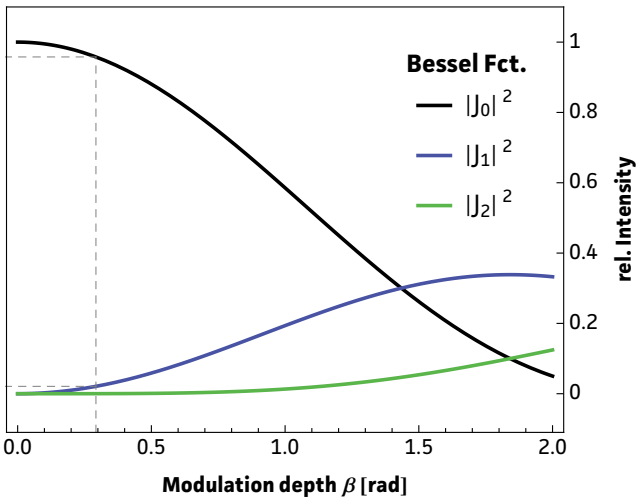



**Table 1: Expected modulation**

| $\beta = 1$ rad | unit | $\lambda_1$ | $\lambda_2$ |
|---|---|---|---|
| $\lambda$ | nm | **280** | **671** |
| P | dBm | 36.6 | 45. |
| P | W | 4.55 | 31.42 |
| U | $V_p$ | 21.3 | 56. |
| $U_\pi$ | $V_p$ | 67. | 176.1 |
| $\beta$ / U | rad / V | 0.05 | 0.02 |

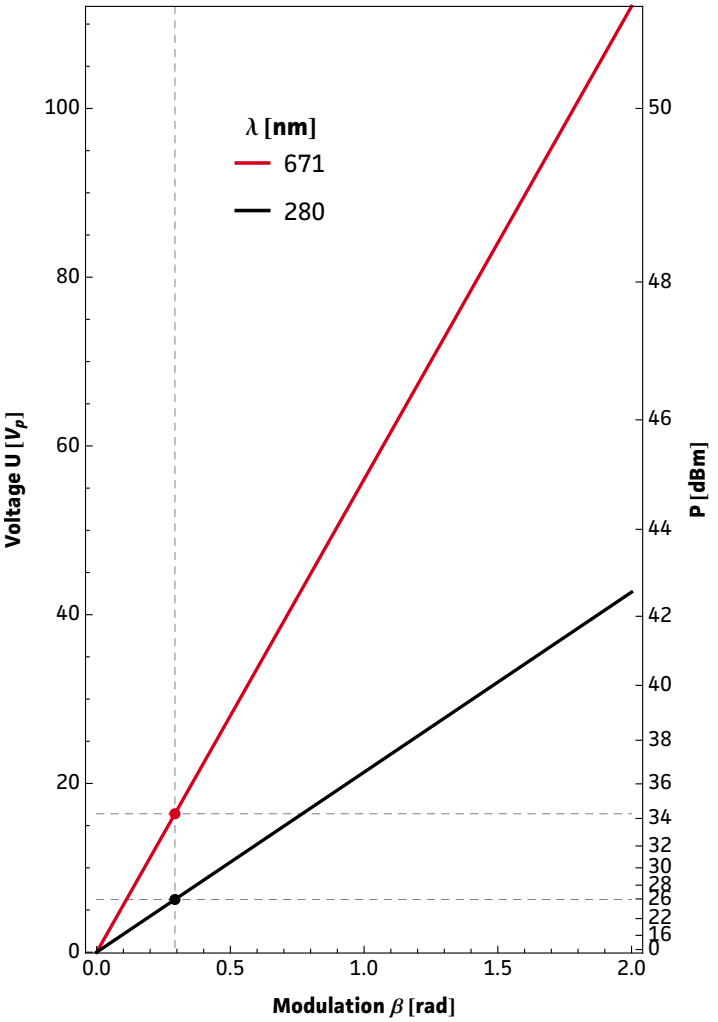


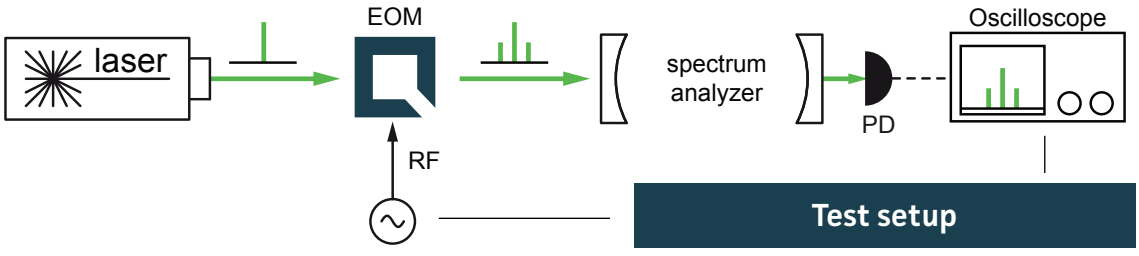

**Fig. 3: RF–signal amplitude vs. modulation depth**

**Fig.1:** Recorded oscilloscope trace retrieved from a test setup as illustrated below.

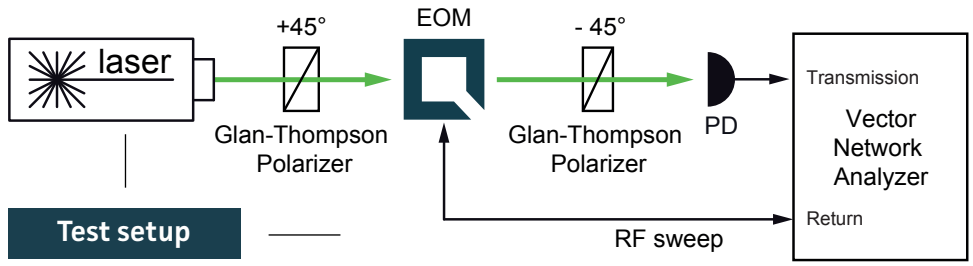
**Fig.2:** Squared absolute values of first-kind Bessel functions vs. modulation depth. Vertical lines reveal the ratio between the carrier $|J_0|^2$ and the $i^{th}$ sideband $|J_i|^2$ at a specific ß.

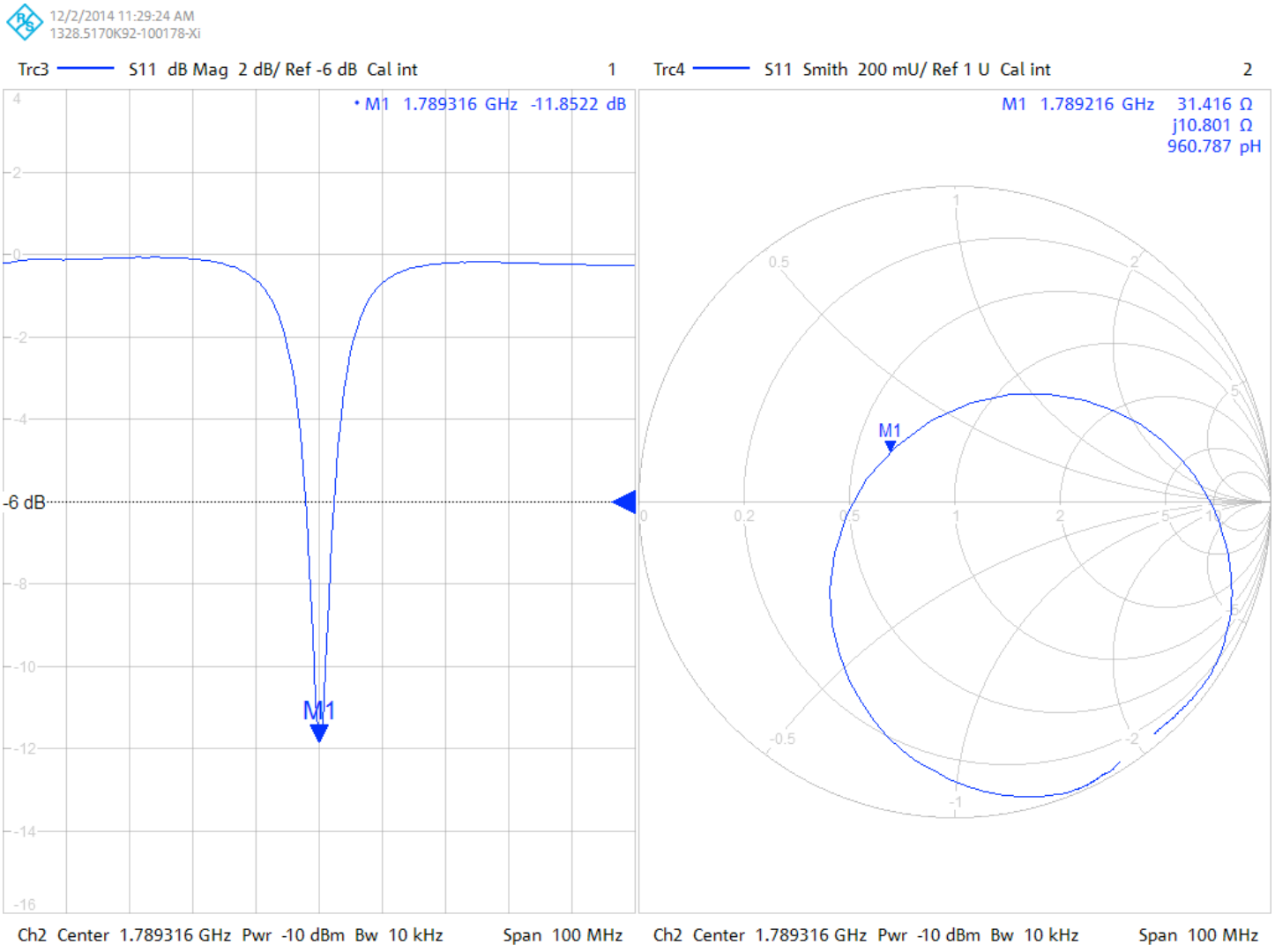
**Fig.3:** Dependency between RF amplitude and modulation depth for different wavelengths. Points on the curve allow to retrieve either the required RF amplitude for a specific/desired ß or the max. achievable modulation depth for a given/available RF power.

**Table 1:** Expected RF-amplitude/-power values and conversion factors for the required wavelength at the reference modulation depth of 1 rad. **Note:** Experimentally recorded modulation depth displayed in Fig.1 might vary from the respective values (ß=1rad) provided in the table.



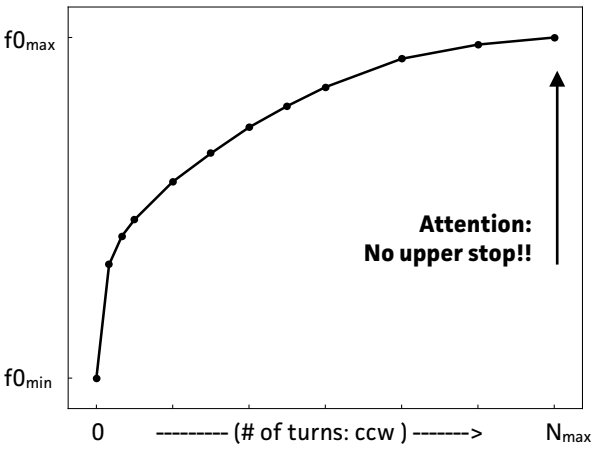
## Resonance characteristics




## Tuning performance

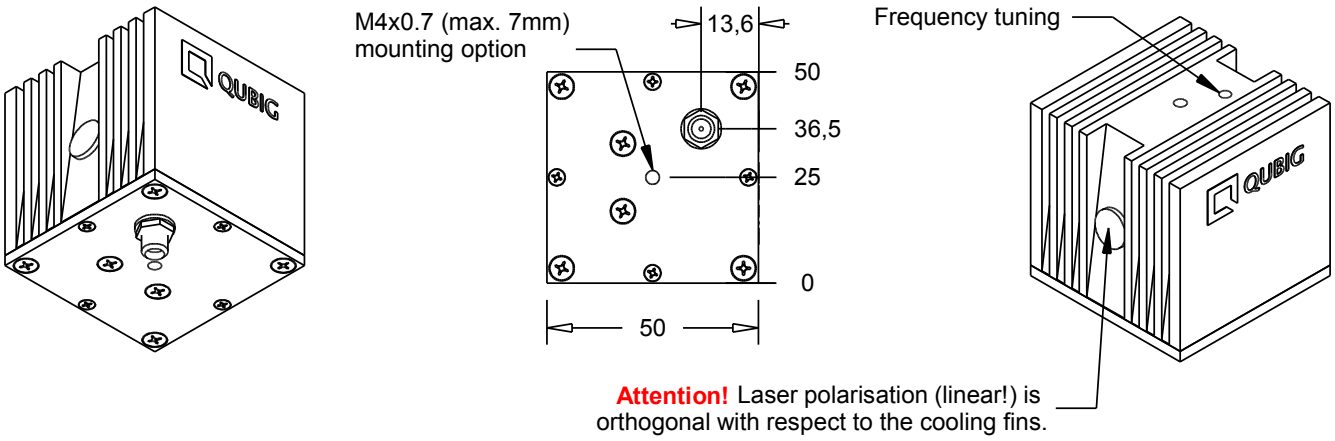
| | | | |
|---|---|---|---|
| MAX resonance frequency | $f_0$ max | 1860 | MHz |
| MIN resonance frequency | $f_0$ min | 1570 | MHz |
| number of turns | $N_{max}$ | 6 | |
| incr. frequency shift | $\Delta f$ | ~ 48 | MHz / turn |
| counter clock-wise turns ⤴ | higher $f_0$ ↑ | | |
| clock-wise turns ⤵ | lower $f_0$ ↓ | | |

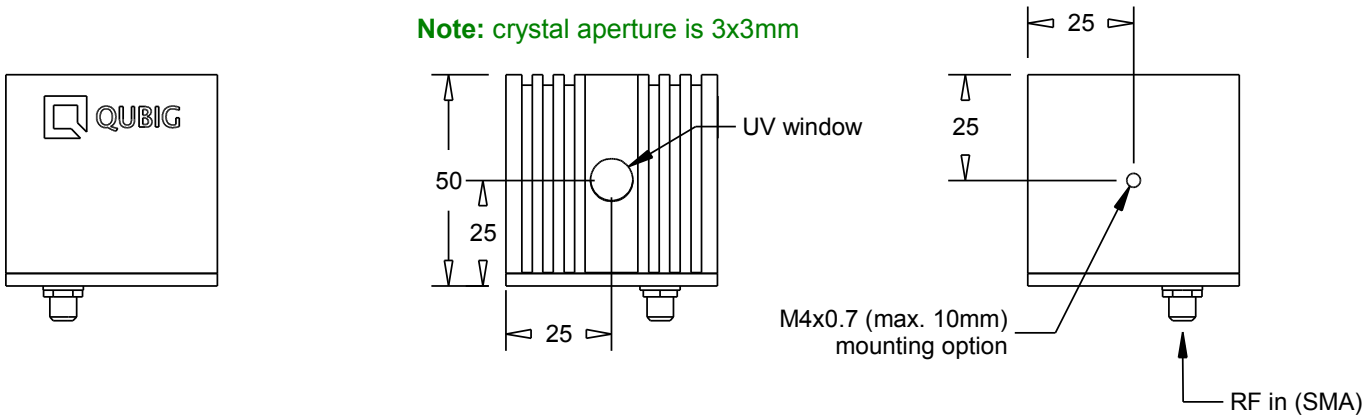


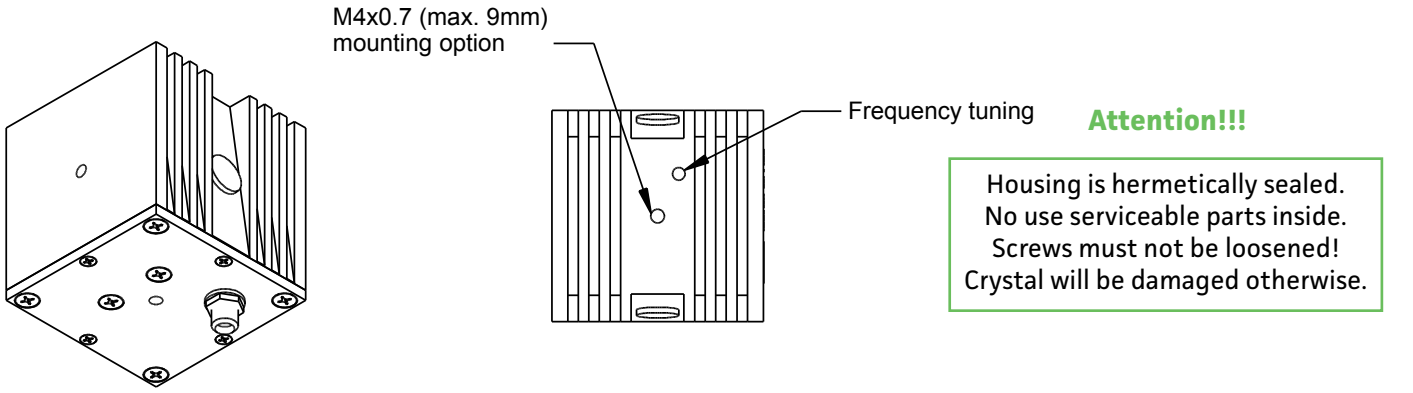
## Handling instructions

- Housing is hermetically sealed. There are no user serviceable parts inside. None of the screws must not be loosened at any time! Crystal will be damaged otherwise.
- Input laser polarisation must be orthogonally aligned with respect to the cooling fins
- Please handle device carefully. Avoid shock. Don't drop.
- After turn on the resonance frequency might drift slightly with applied rf power. Please compensate by tuning the rf drive frequency until steady-state (~min).

## Package drawing




Tested by:

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Tel: +49 8642 2449064
Fax: +49 8642 2447063
eMail: mail@qubig.de
web: www.qubig.com

**Qubig GmbH**
Greimelstr. 26
83236 Übersee
Germany