QUBIG

Empowering Laser Technologies

Test Data Sheet

PM-K39/41_K3

(old: EO-K39/K41K3-VIS)

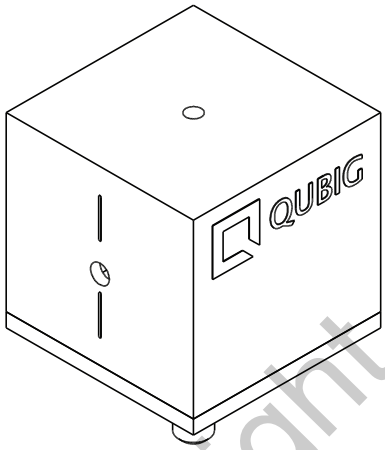
S/N:

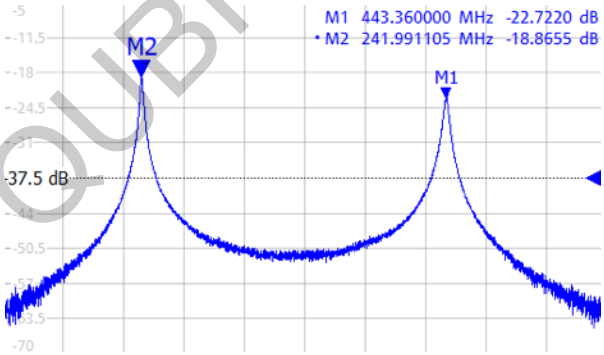
Double Resonance electro-optic phase modulator

with

- tunable resonance frequencies

- thermal crystal mount

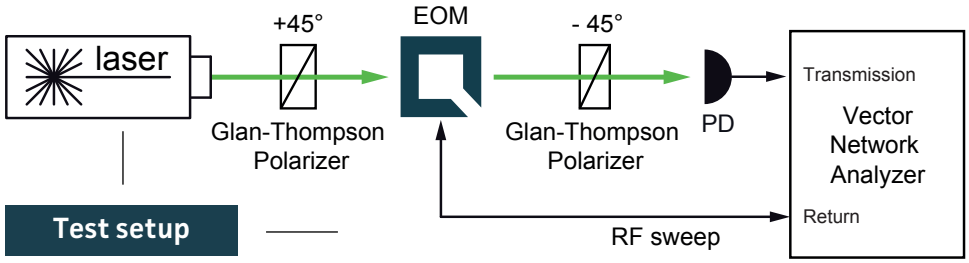


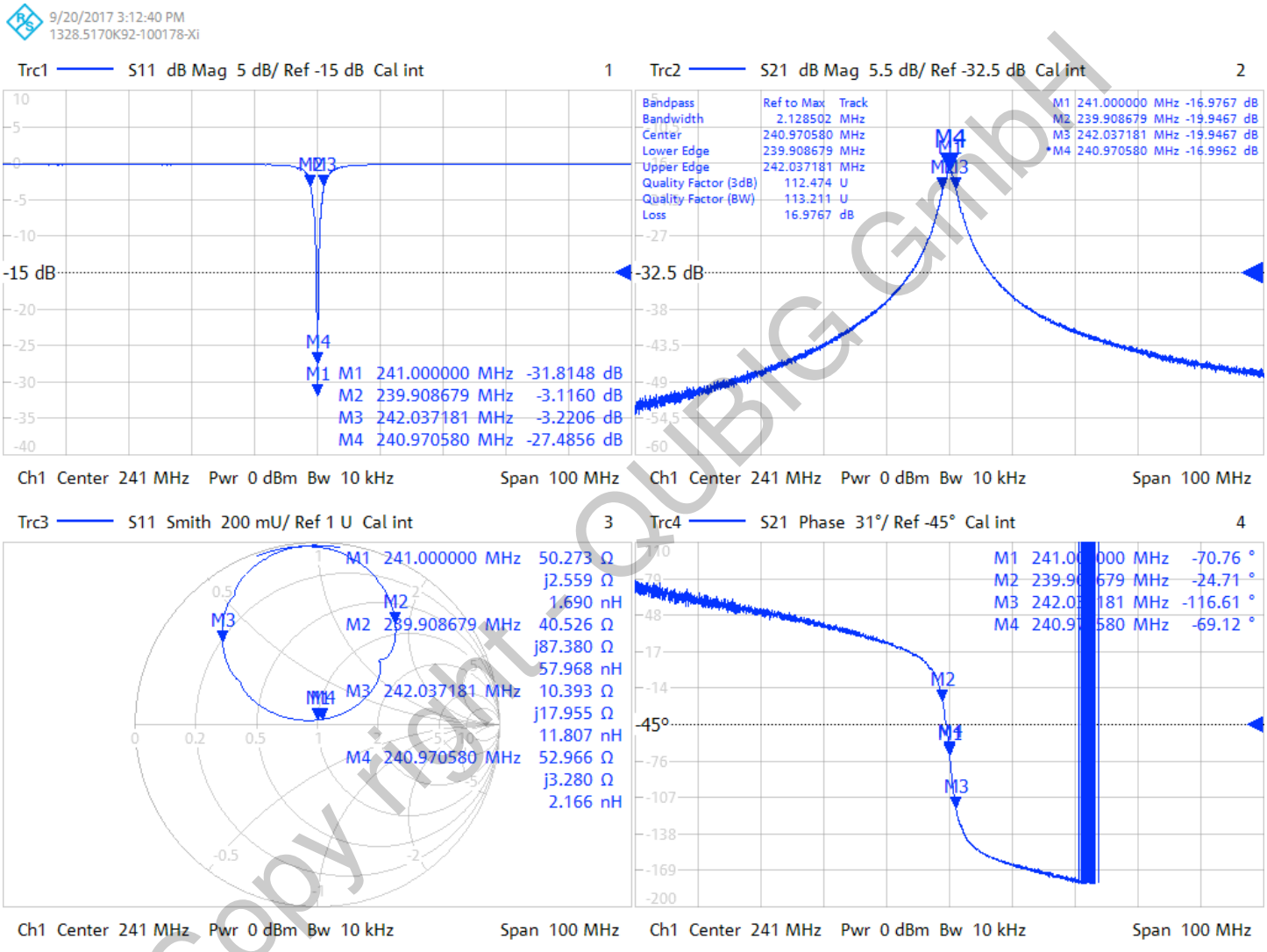


RF properties	R1	R2	Unit
Resonance frequency: f_0 [1]	222-272	382-531	MHz
Preset frequency: f_{set} [1]	241	441	MHz
Bandwidth: Δν	2.1	3.4	MHz
Quality factor: Q	115	130	
Required RF power for 1rad @ 767nm [2]	29.5	31.8	dBm
max. RF power: RF_{max} [3]	2		W
Optical properties			
EO crystal	KTP		
Aperture	3x3		mm^2
Wavefront distortion (633nm)	λ/8		nm
recommended max. optical intensity (767nm)	<10		W/mm^2
AR coating (R<0.5%)	390-780		nm

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

Resonance characteristics of R1

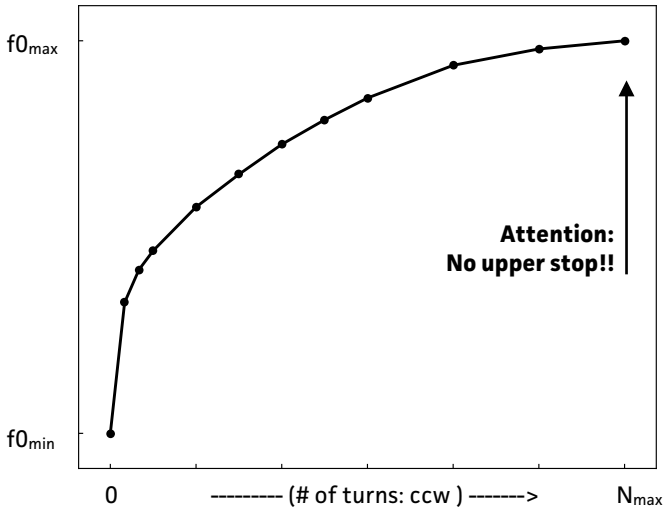




Tuning performance of R1

MAX resonance frequency	f_0 max	272	MHz
MIN resonance frequency	f_0 min	222	MHz
number of turns	N_{max}	6	
counter clock-wise turns	higher f_0 ↑		
clock-wise turns	lower f_0 ↓		

- actuate tuner carefully with supplied tuning tool
- tuner might not be perfectly perpendicular
- there might be no hard upper or lower stops (!)



Measured modulation for R1

Fig. 1: Oscilloscope trace

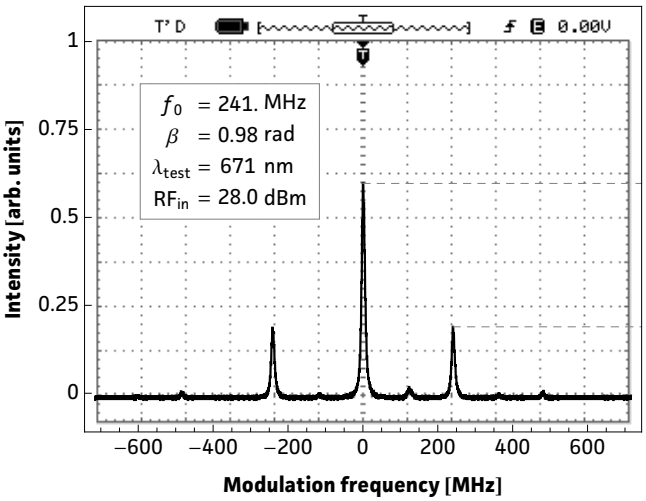


Fig. 2: Carrier/sideband ratio

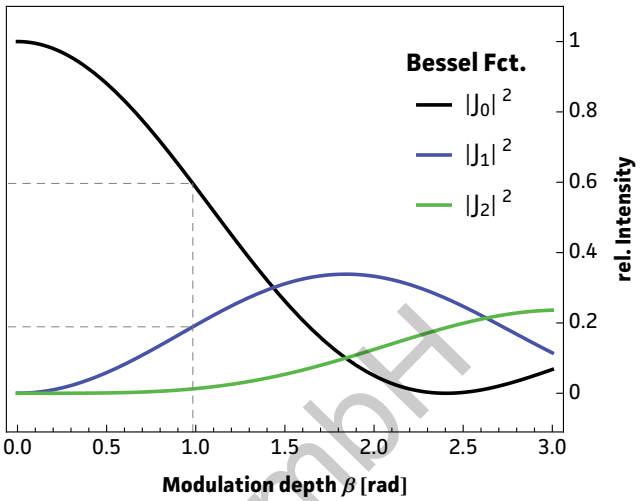


Table 1: Expected modulation

$\beta = 1$ rad	unit	λ_1	λ_2
λ	nm	**671**	**767**
P	dBm	28.1	29.5
P	mW	653	884
U	V_p	8.1	9.4
U_π	V_p	25.4	29.5
β / U	rad / V	0.12	0.11

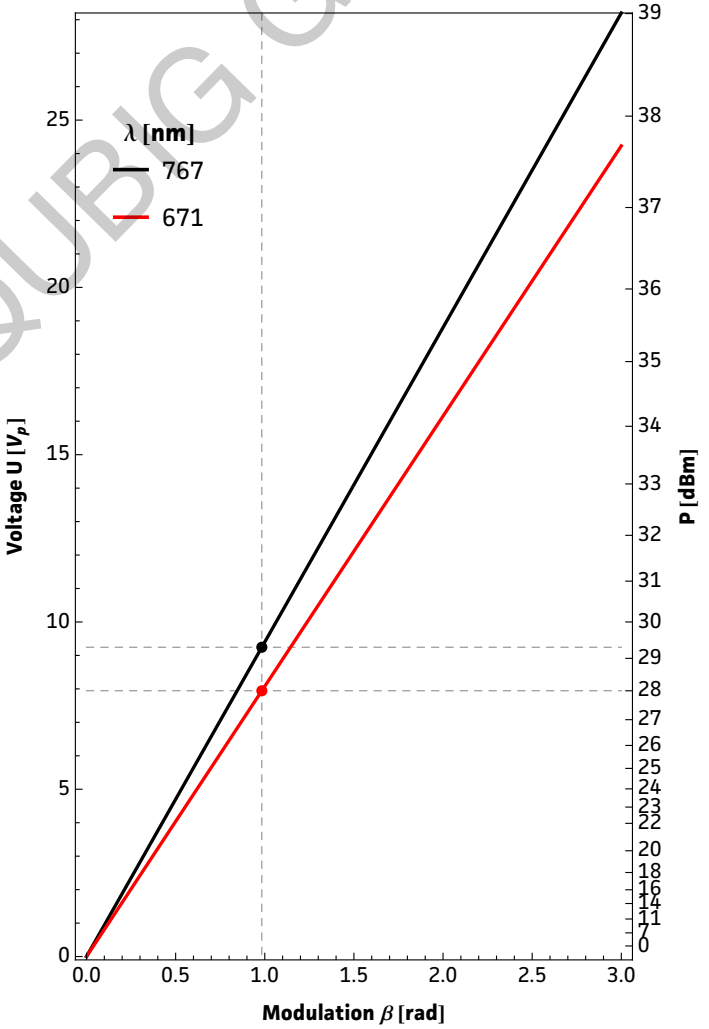


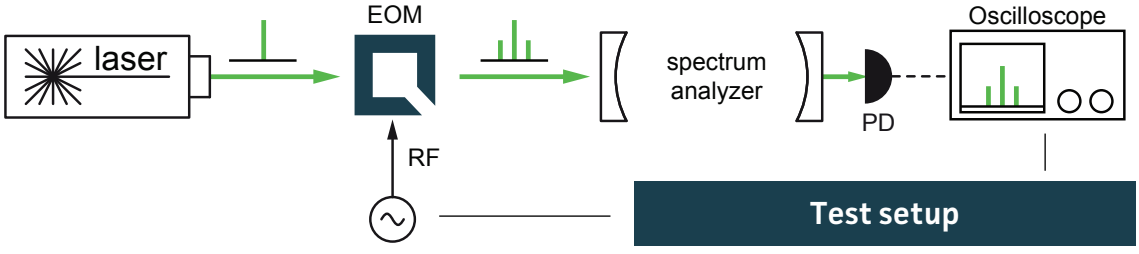
Fig. 3: RF–signal amplitude vs. modulation depth

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

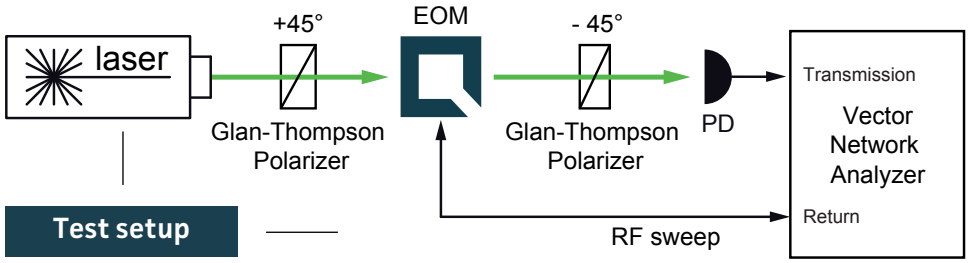
Fig.2: Squared absolute values of first-kind Bessel functions vs. modulation depth. Vertical lines reveal the ratio between the carrier $|J_0|^2$ and the i^{th} sideband $|J_i|^2$ at a specific ß.

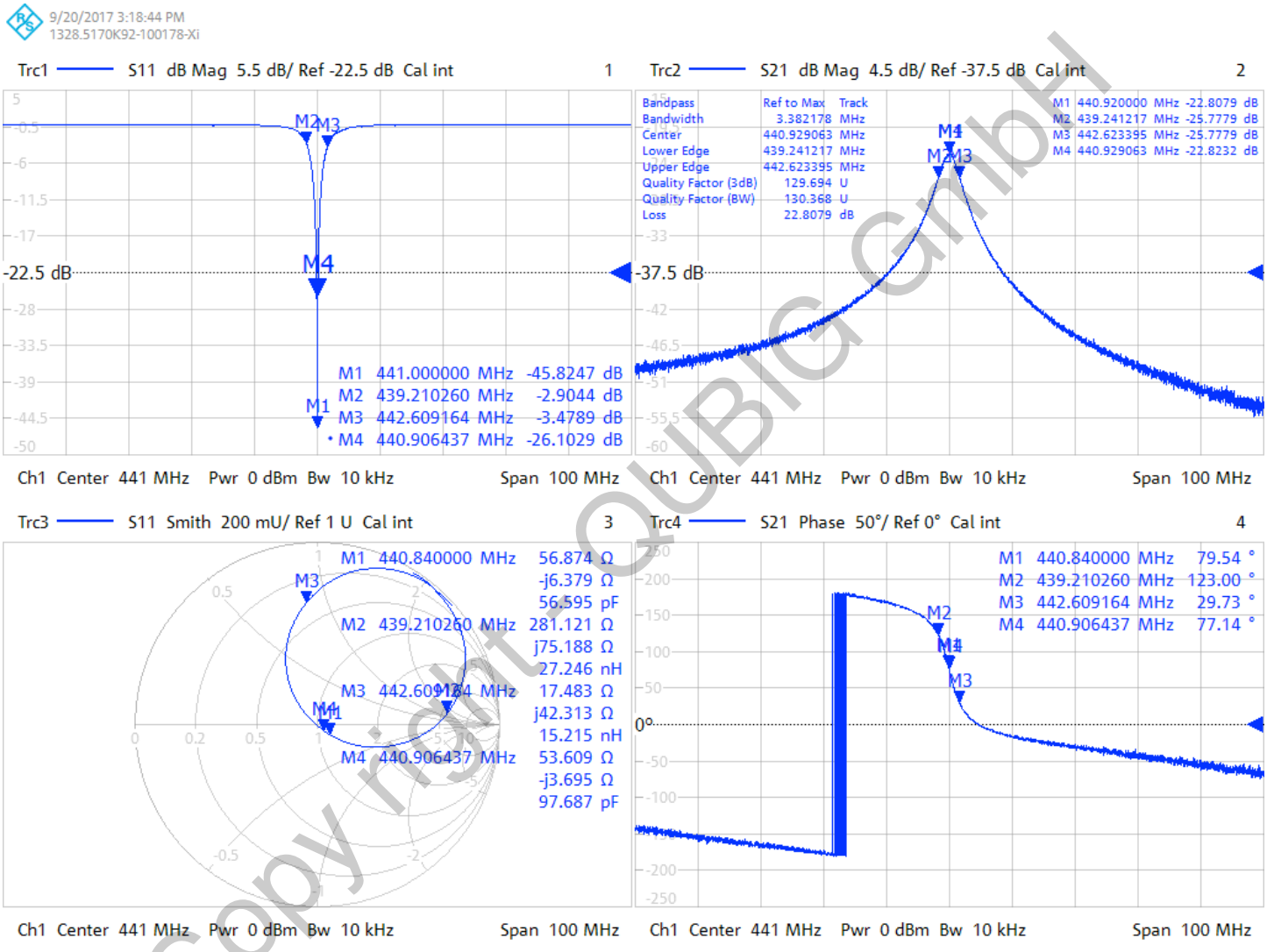
Fig.3: Dependency between RF amplitude and modulation depth for different wavelengths. Points on the curve allow to retrieve either the required RF amplitude for a specific/desired ß or the max. achievable modulation depth for a given/available RF power.

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 of R2

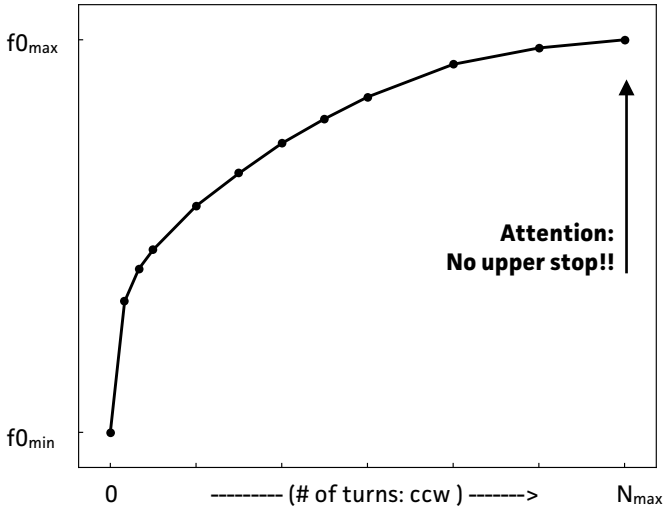




Tuning performance of R2

MAX resonance frequency	f_0 max	531	MHz
MIN resonance frequency	f_0 min	382	MHz
number of turns	N_{max}	6	
counter clock-wise turns ☒	higher f_0 ↑		
clock-wise turns ☒	lower f_0 ↓		

- actuate tuner carefully with supplied tuning tool
- tuner might not be perfectly perpendicular
- there might be no hard upper or lower stops (!)



Measured modulation for R2

Fig. 1: Oscilloscope trace

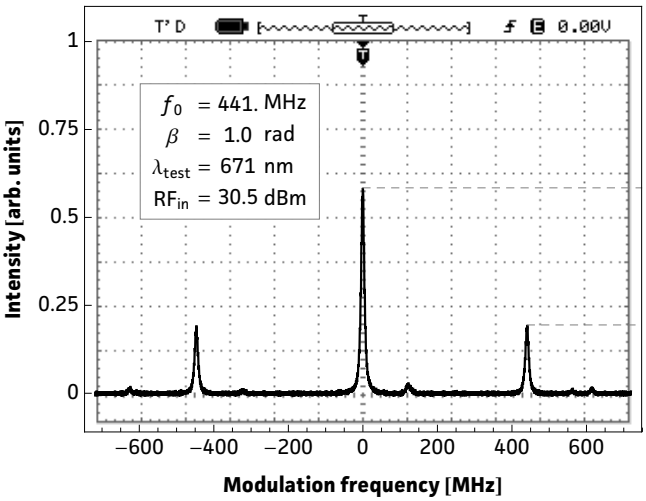


Fig. 2: Carrier/sideband ratio

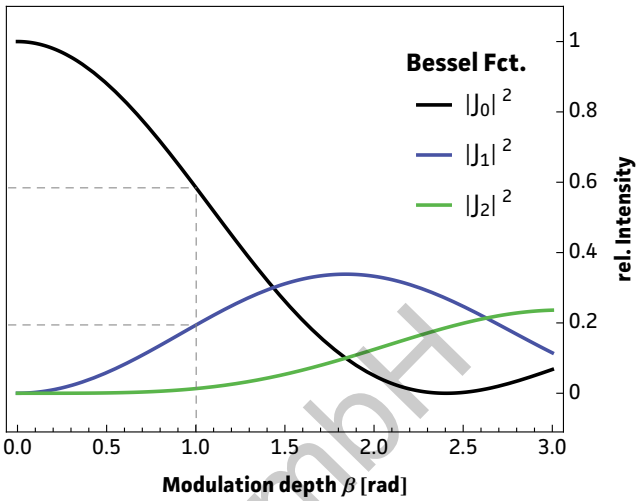


Table 1: Expected modulation

$\beta = 1$ rad	unit	λ_1	λ_2
λ	nm	**671**	**767**
P	dBm	30.5	31.8
P	W	1.12	1.51
U	V_p	10.6	12.3
U_π	V_p	33.2	38.6
β / U	rad / V	0.09	0.08

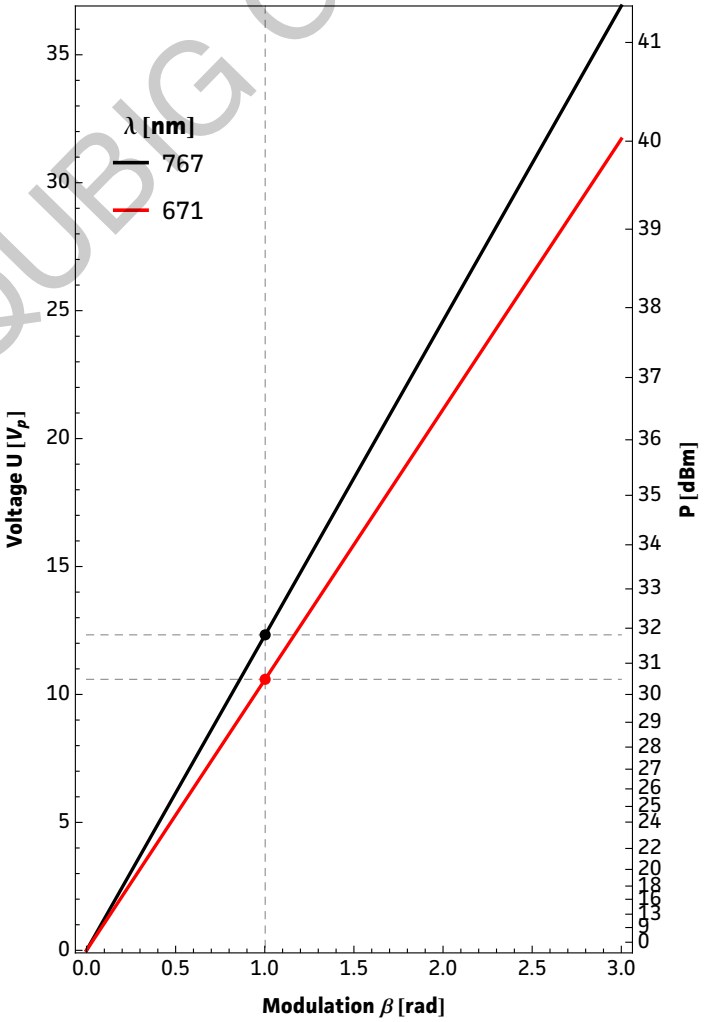


Fig. 3: RF–signal amplitude vs. modulation depth

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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.

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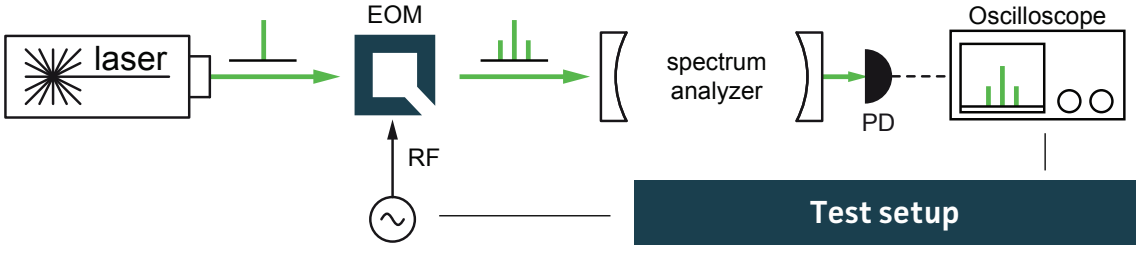
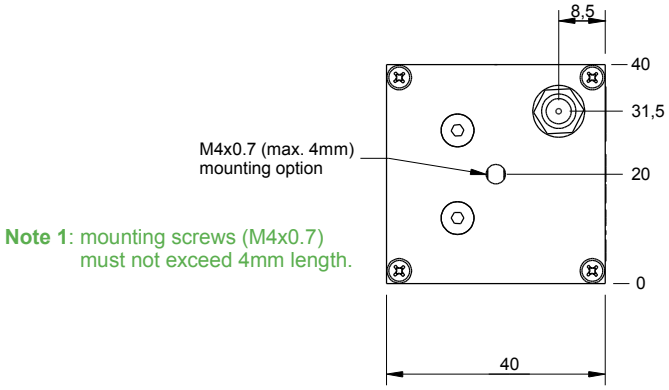


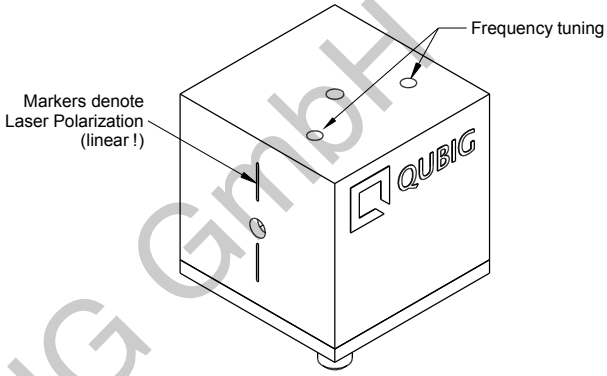
Handling instructions

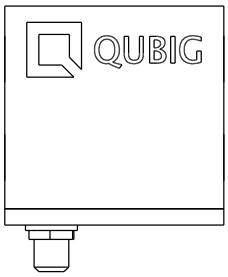
- Input laser polarization must be aligned with respect to the white markers on the housing
- Please handle device carefully. Avoid shock. Don't drop.
- After turn on the resonance frequency might drift slightly with applied RF power. Please compensate by tuning the RF drive frequency until steady-state (~min).
- Slight angle adjustment can reduce unwanted residual amplitude modulation (RAM)

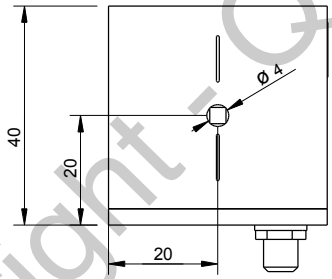
Package drawing



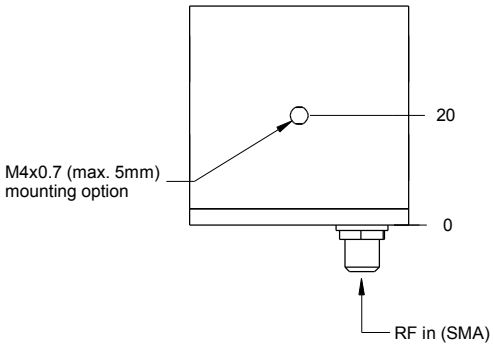
Note 1: mounting screws (M4x0.7) must not exceed 4mm length.

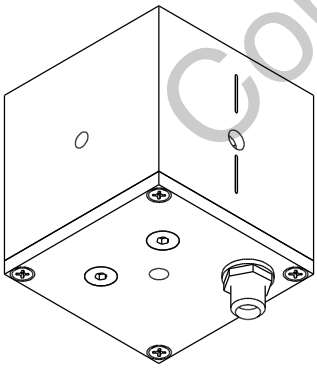


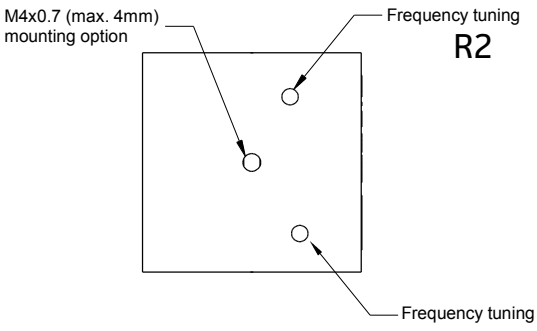




Note 2: crystal aperture is 3x3mm.







Attention!!

- use only supplied tuning tool
- actuate tuner carefully
- do not apply too much pressure or torque
- keep tuning tool coaxial
- tuner might not be perfectly orthogonal to box

Tested by:

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