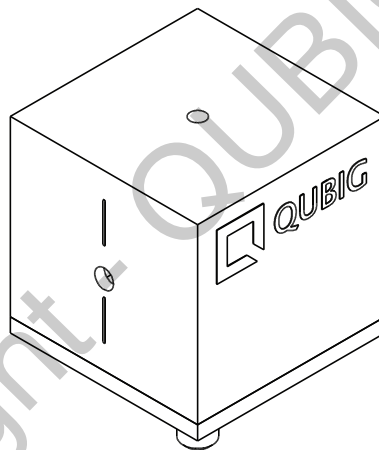


## Test Data Sheet

### PM-Sr\_1.1M3

S/N:

**Resonant electro-optic phase modulator**  
 with  
 - tunable resonance frequency  
 - thermal crystal mount



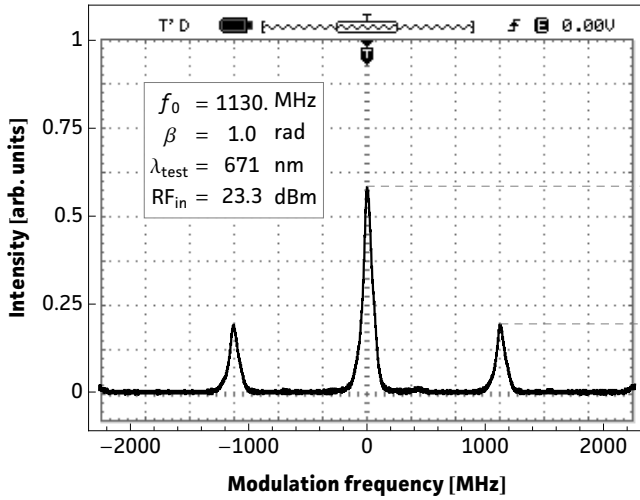
RF properties	Value	Unit
Resonance frequency: $f_0$ <sup>1)</sup>	995 - 1161	GHz
Preset frequency: $f_{set}$ <sup>1)</sup>	1130	MHz
Bandwidth: $\Delta\nu$	2.4	MHz
Quality factor: Q	471	
Required RF power for 1rad @ 461   689nm <sup>2)</sup>	19.1   23.6	dBm
max. RF power: $RF_{max}$ <sup>3)</sup>	2	W

Optical properties		
Aperture	3x3	mm <sup>2</sup>
Wavefront distortion (633nm)	$\lambda/6$	nm
Max. optical intensity (461   689nm)	$\leq 0.1$   $\leq 2$	W/mm <sup>2</sup>
AR coating ( $R_{avg} < 0.5\%$ )	360 - 650   630 - 1100	nm

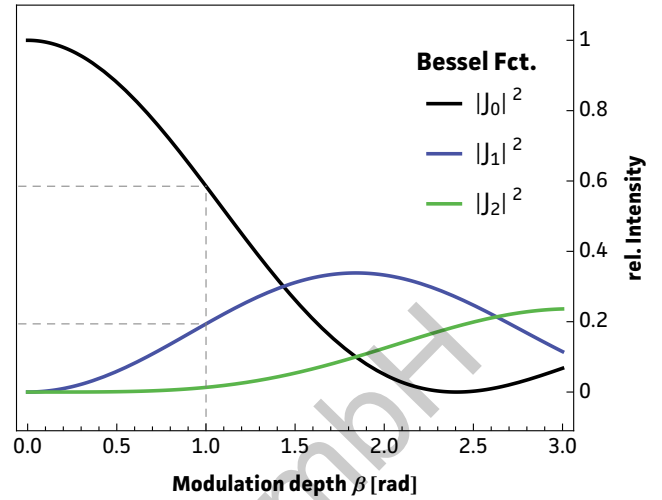
<sup>1)</sup> at 21°C   <sup>2)</sup> with 50Ω termination   <sup>3)</sup> no damage with  $RF_{in} < 3W$

# Measured modulation

**Fig. 1: Oscilloscope trace**

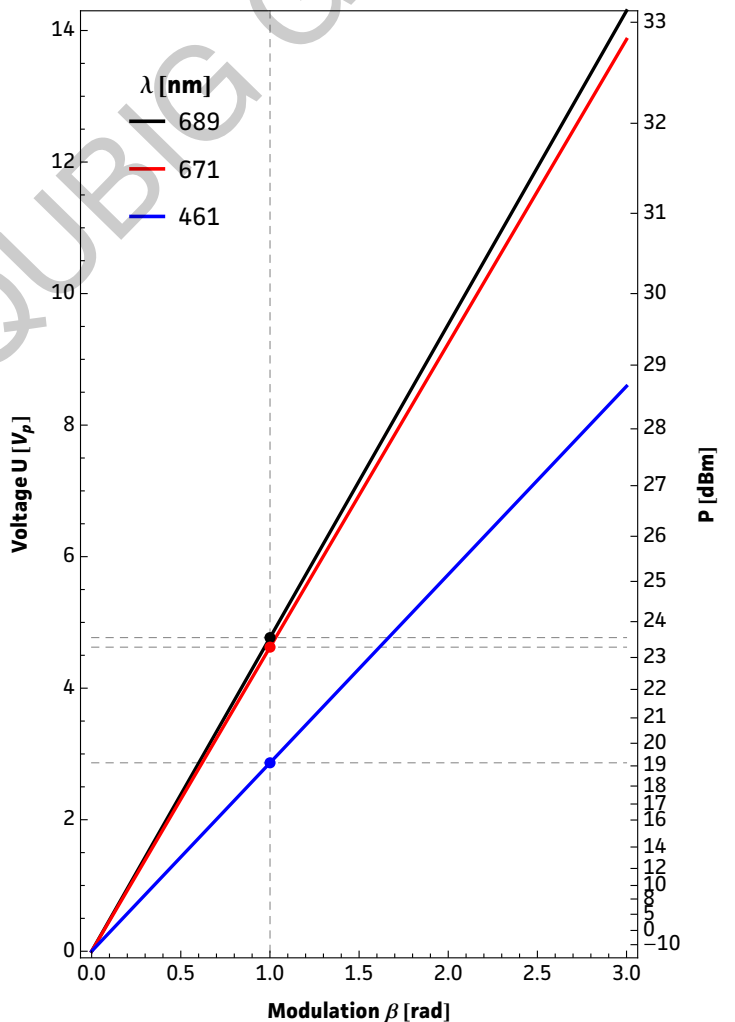


**Fig. 2: Carrier/sideband ratio**



**Table 1: Expected modulation**

$\beta = 1$ rad	unit	$\lambda_1$	$\lambda_2$	$\lambda_3$
$\lambda$	nm	461	671	689
P	dBm	19.1	23.3	23.6
P	mW	82	213	228
U	V <sub>p</sub>	2.9	4.6	4.8
U <sub><math>\pi</math></sub>	V <sub>p</sub>	9.	14.5	15.
$\beta / U$	rad / V	0.35	0.22	0.21



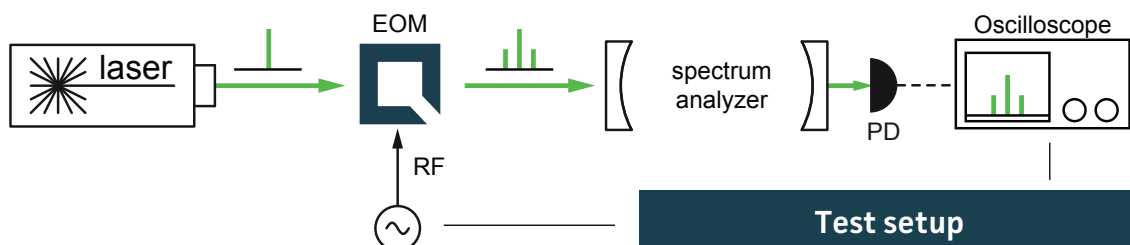
**Fig.1:** Recorded oscilloscope trace retrieved from a test setup as illustrated below.

**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  $i^{\text{th}}$  sideband  $|J_i|^2$  at a specific  $\beta$ .

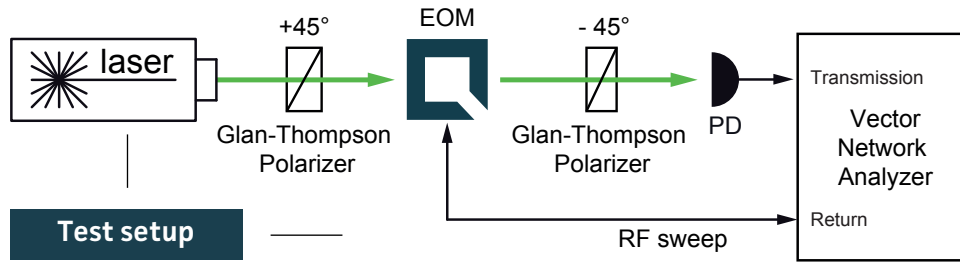
**Fig.3:** Dependency between RF amplitude and modulation depth for different wavelengths. Points on the curve allow to retrieve either the required RF amplitude for a specific/desired  $\beta$  or the max. achievable modulation depth for a given/available RF power.

**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 ( $\beta=1$ rad) provided in the table.

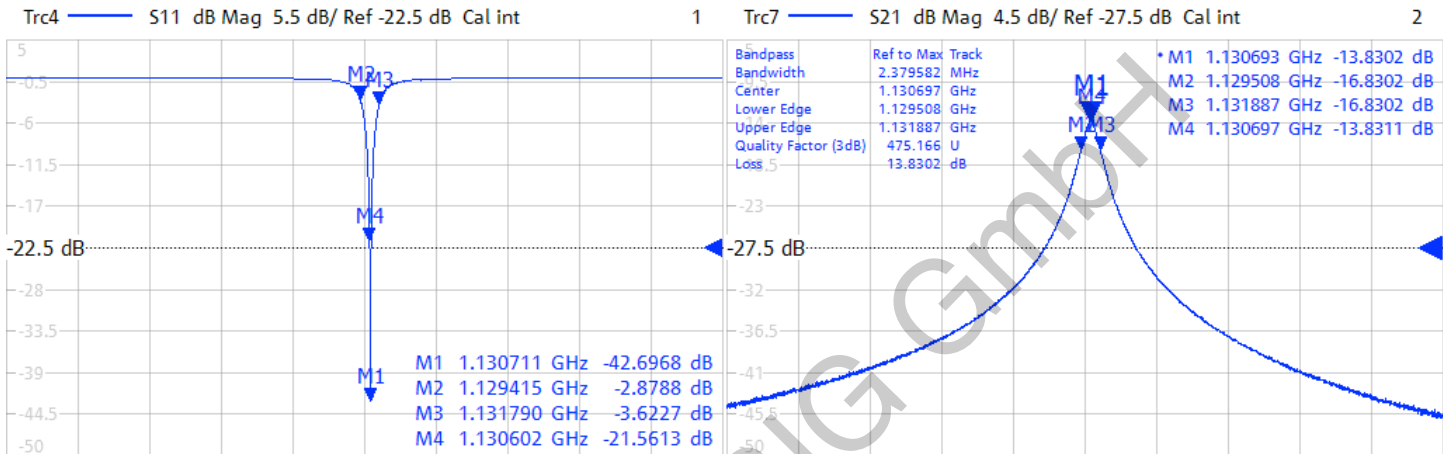
**Fig. 3: RF-signal amplitude vs. modulation depth**



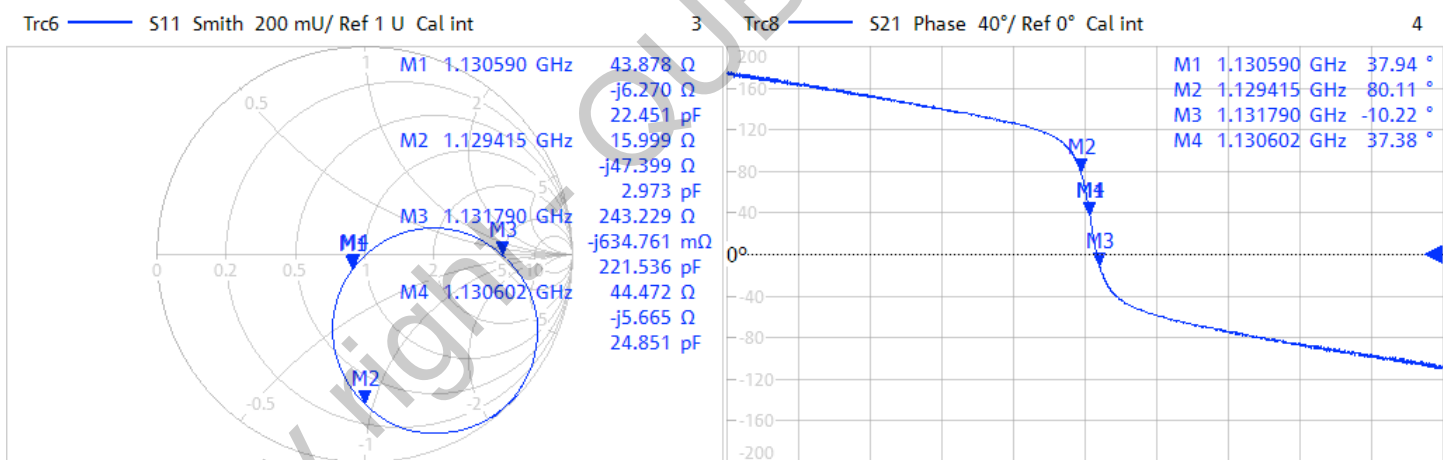
## Resonance characteristics



12/20/2017 6:33:58 PM  
1328.5170K92-100178-XI



Ch1 Center 1.13 GHz Pwr 0 dBm Bw 10 kHz Span 90 MHz

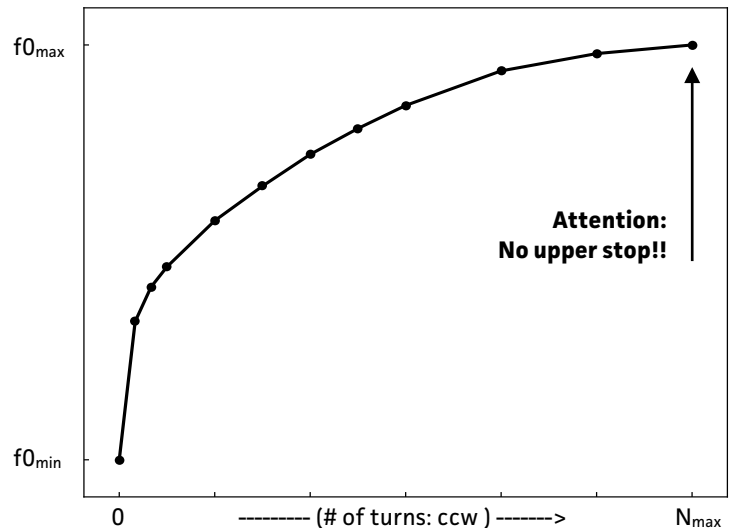


Ch1 Center 1.13 GHz Pwr 0 dBm Bw 10 kHz Span 90 MHz

## Tuning performance

MAX resonance frequency	$f_0 \text{ max}$	1161	MHz
MIN resonance frequency	$f_0 \text{ min}$	995	MHz
number of turns	$N_{\text{max}}$	5	
counter clock-wise turns ↻		higher $f_0 \uparrow$	
clock-wise turns ↻		lower $f_0 \downarrow$	

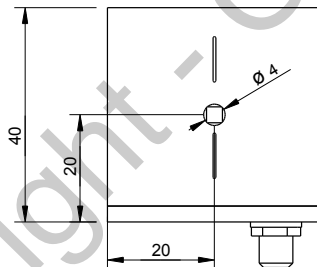
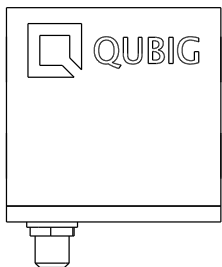
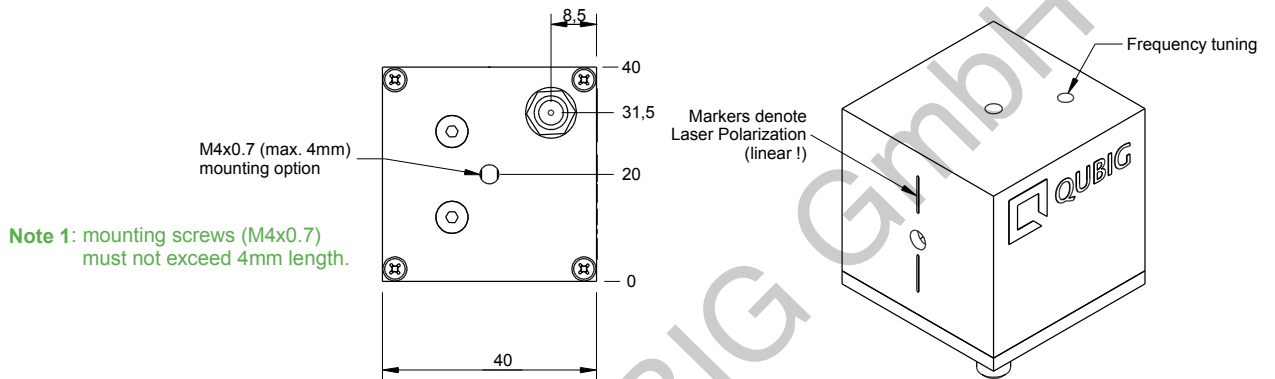
- use only supplied tuning tool
- actuate tuner carefully
- do not apply too much pressure or torque
- keep tuning tool coaxial
- tuner might not be perfectly orthogonal to box



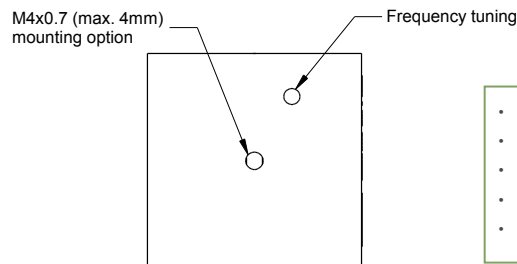
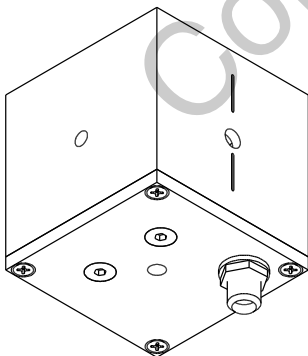
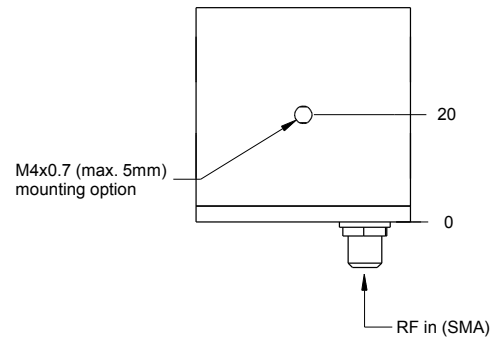
## Handling instructions

- 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).

## Package drawing



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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