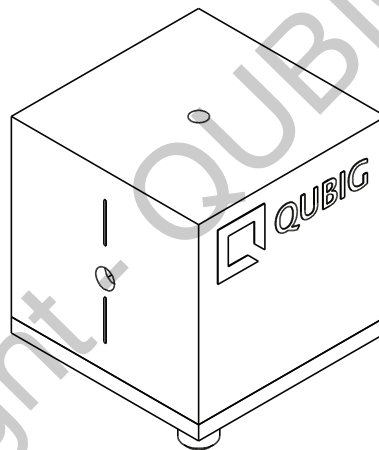


## Test Data Sheet

### PM-Sr\_1.5M3

S/N:

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



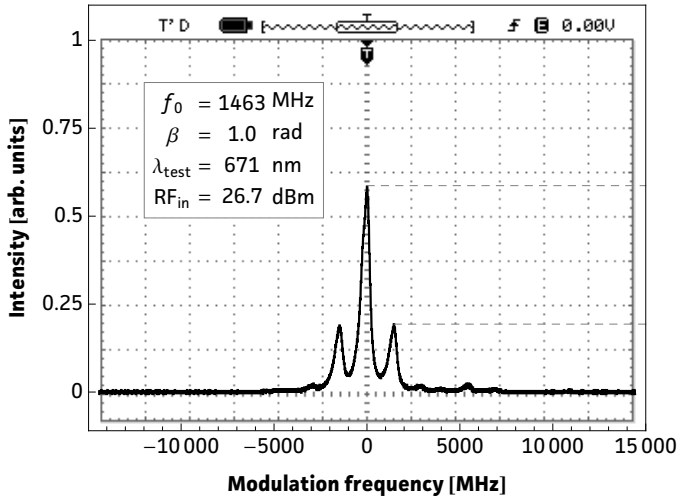
RF properties	Value	Unit
Resonance frequency: $f_0$ <sup>1)</sup>	1292 - 1523	GHz
Preset frequency: $f_{set}$ <sup>1)</sup>	1463	MHz
Bandwidth: $\Delta\nu$	4	MHz
Quality factor: Q	395	
Required RF power for 1rad @ 461   689nm <sup>2)</sup>	22.6   27.0	dBm
max. RF power: $RF_{max}$ <sup>3)</sup>	2	W

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

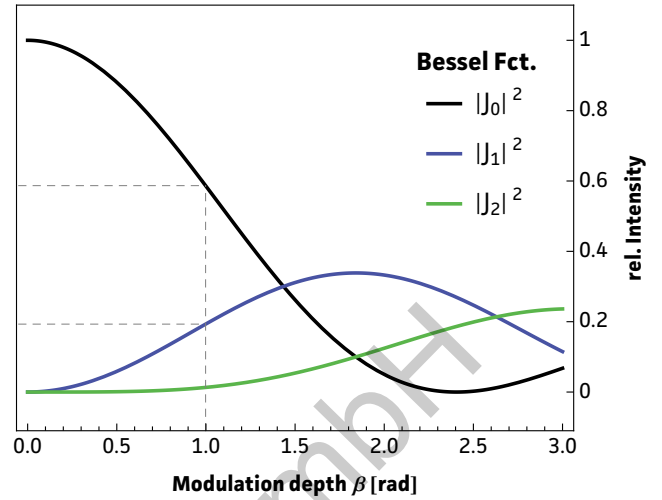
<sup>1)</sup> at 21°C   <sup>2)</sup> with 50Ω termination   <sup>3)</sup> no damage with  $RF_{in} < 3W$

# Measured modulation

**Fig. 1: Oscilloscope trace**



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



**Table 1: Expected modulation**

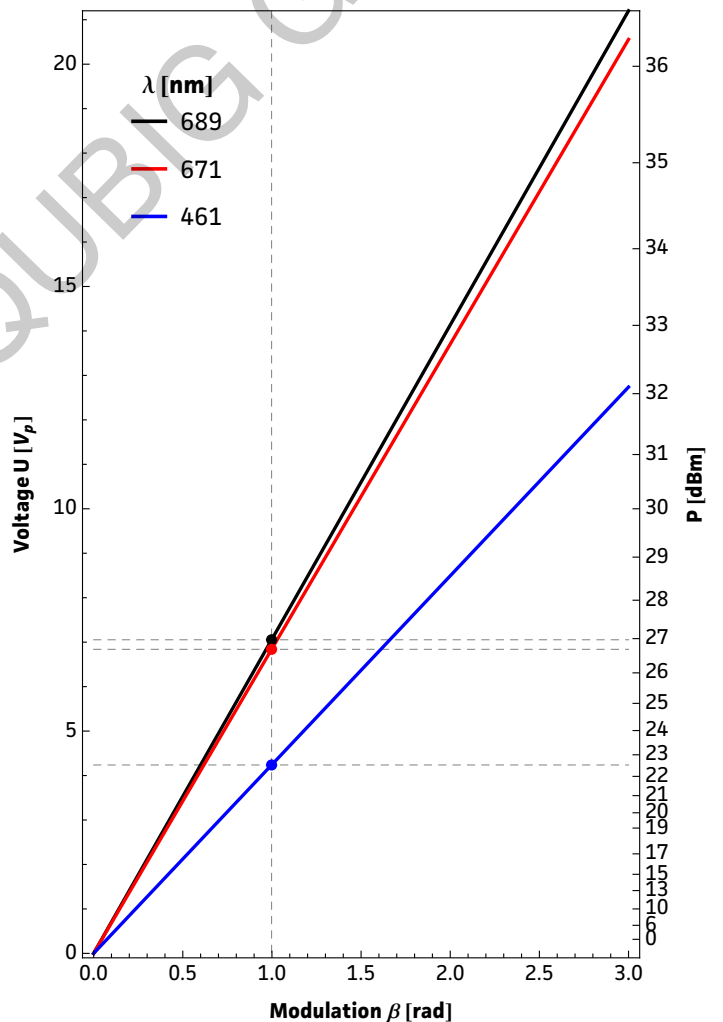
$\beta = 1 \text{ rad}$	unit	$\lambda_1$	$\lambda_2$	$\lambda_3$
$\lambda$	nm	461	671	689
P	dBm	22.6	26.7	27.
P	mW	181	469	500
U	V <sub>p</sub>	4.2	6.8	7.1
U <sub><math>\pi</math></sub>	V <sub>p</sub>	13.3	21.5	22.2
$\beta / U$	rad / V	0.24	0.15	0.14

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

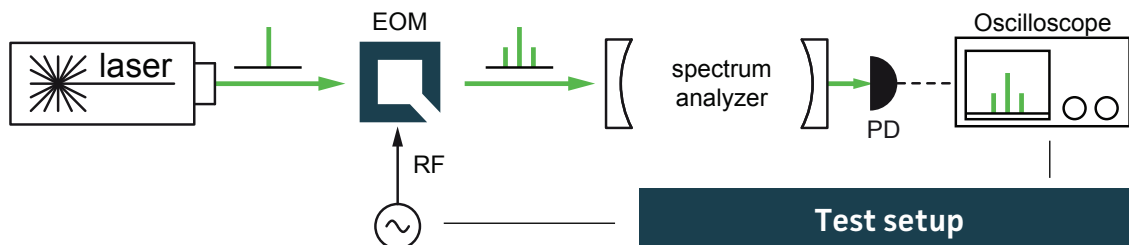
**Fig.2:** Squared absolute values of first-kind Bessel functions vs. modulation depth. Vertical lines reveal the ratio between the carrier  $|J_0|^2$  and the  $i^{\text{th}}$  sideband  $|J_i|^2$  at a specific  $\beta$ .

**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.

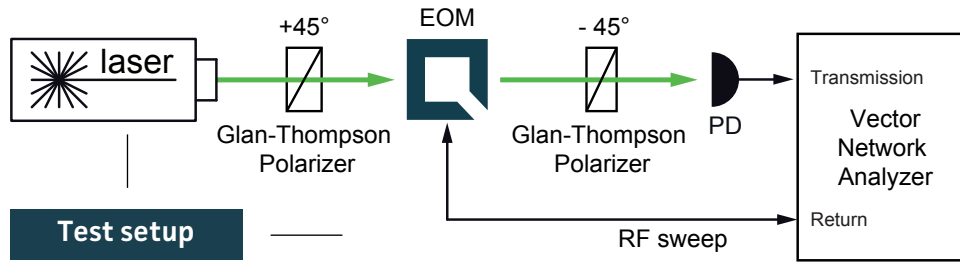
**Table 1:** Expected RF-amplitude/-power values and conversion factors for the required wavelength at the reference modulation depth of 1 rad. **Note:** Experimentally recorded modulation depth displayed in Fig.1 might vary from the respective values ( $\beta=1\text{rad}$ ) provided in the table.



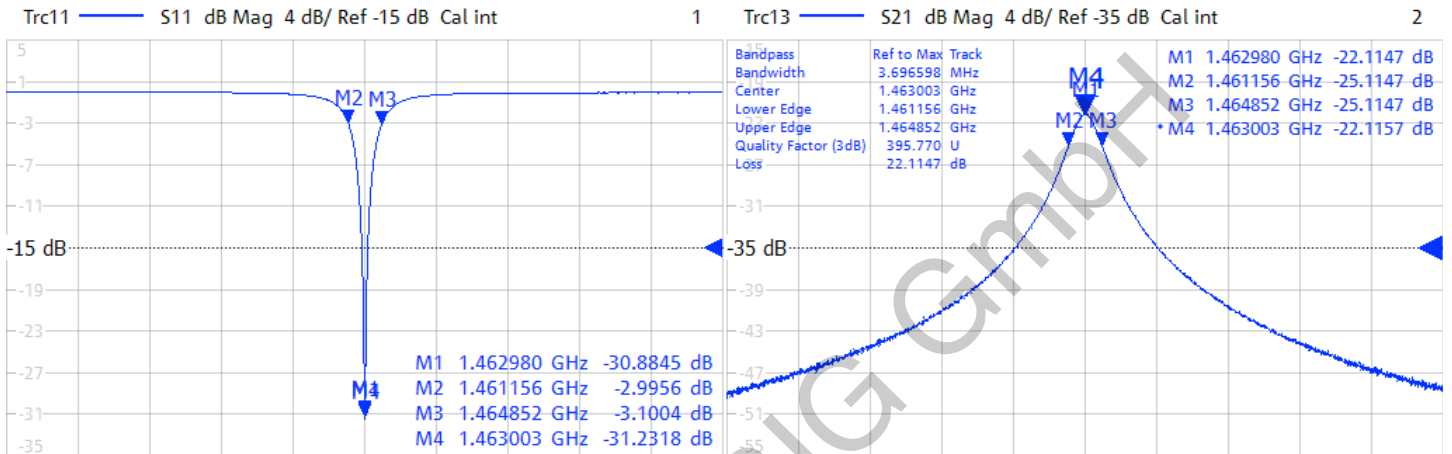
**Fig. 3: RF-signal amplitude vs. modulation depth**



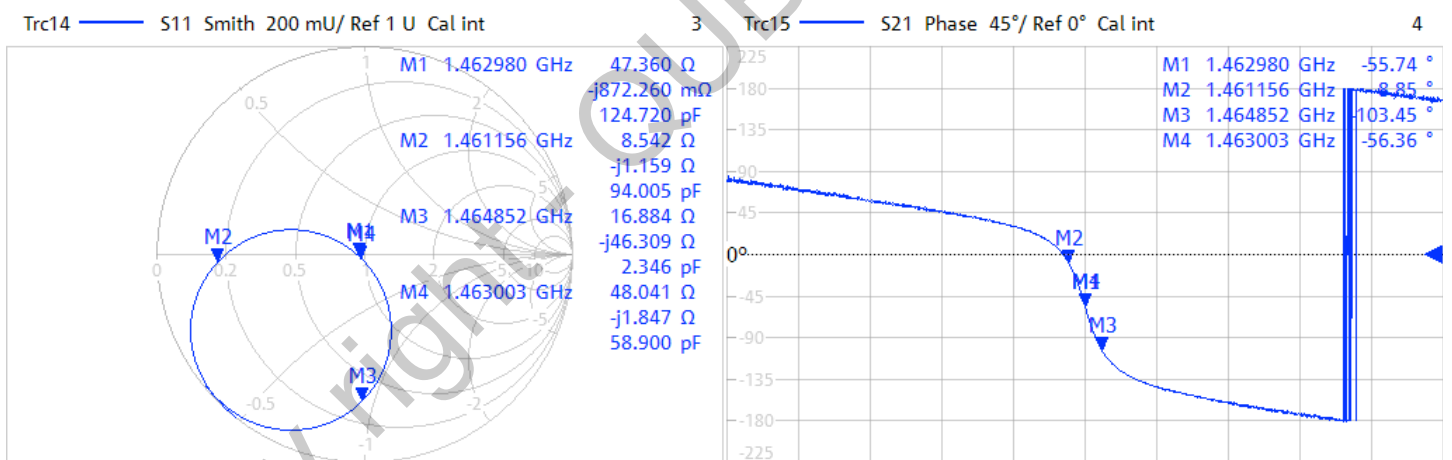
## Resonance characteristics



2/28/2018 3:22:09 PM  
1328.5170K92-100178-XI



Ch1 Center 1.463 GHz Pwr 0 dBm Bw 10 kHz Span 80 MHz Ch1 Center 1.463 GHz Pwr 0 dBm Bw 10 kHz Span 80 MHz

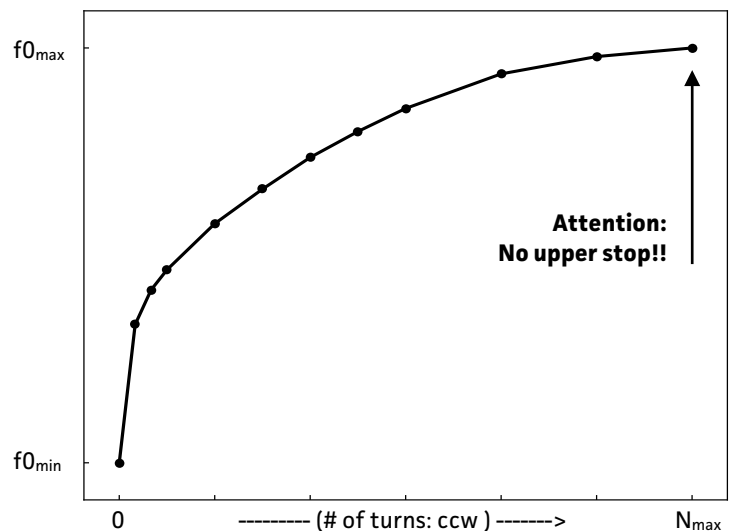


Ch1 Center 1.463 GHz Pwr 0 dBm Bw 10 kHz Span 80 MHz Ch1 Center 1.463 GHz Pwr 0 dBm Bw 10 kHz Span 80 MHz

## Tuning performance

MAX resonance frequency	$f_0 \text{ max}$	1523	MHz
MIN resonance frequency	$f_0 \text{ min}$	1292	MHz
number of turns	$N_{\text{max}}$	5	
counter clock-wise turns ↻	higher $f_0 \uparrow$		
clock-wise turns ↻	lower $f_0 \downarrow$		

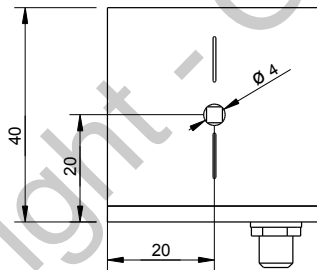
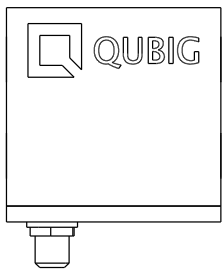
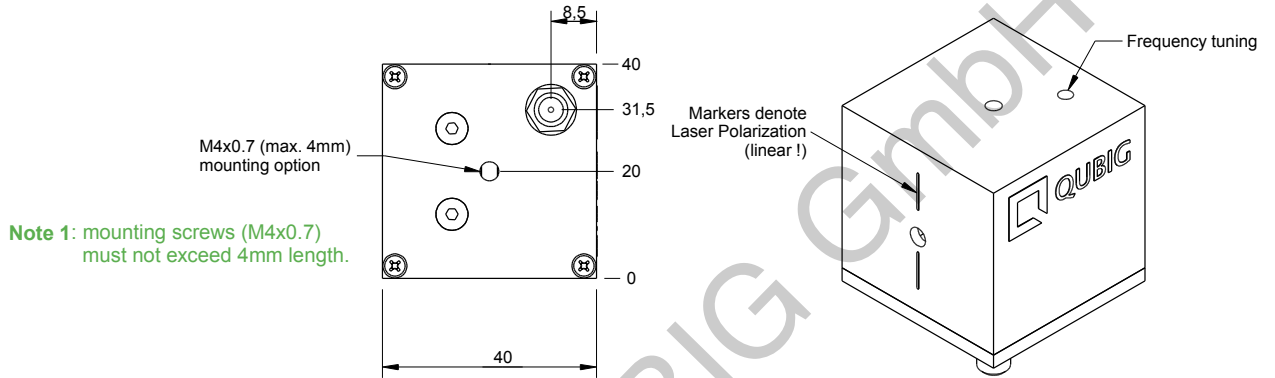
- use only supplied tuning tool
- actuate tuner carefully
- do not apply too much pressure or torque
- keep tuning tool coaxial
- tuner might not be perfectly orthogonal to box



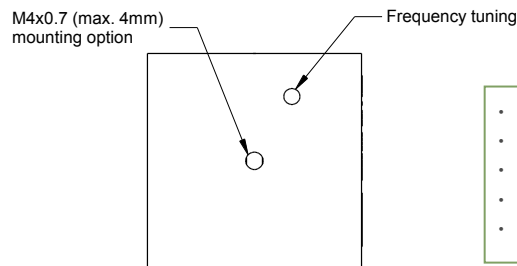
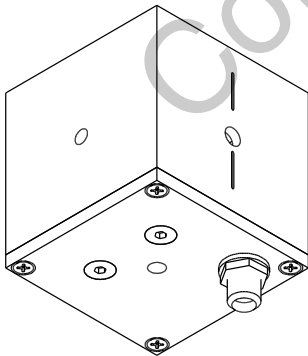
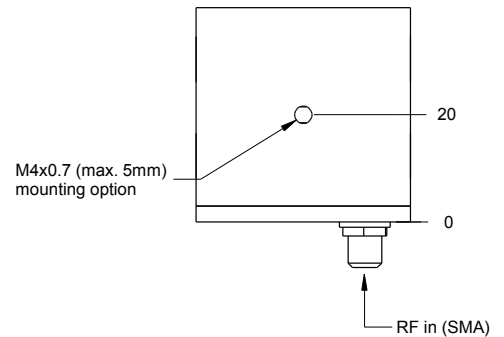
## Handling instructions

- 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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