



## Test Data Sheet

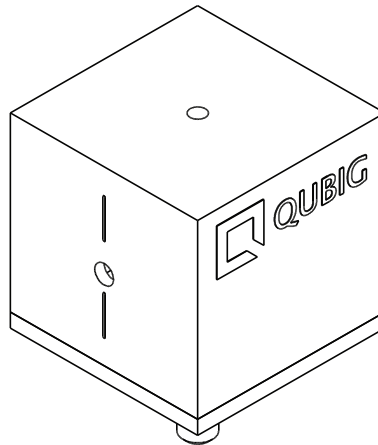
**EO-Yb171+**

S/N:

### Resonant electro-optic phase modulator

with

- thermal crystal mount
- tunable resonance frequency



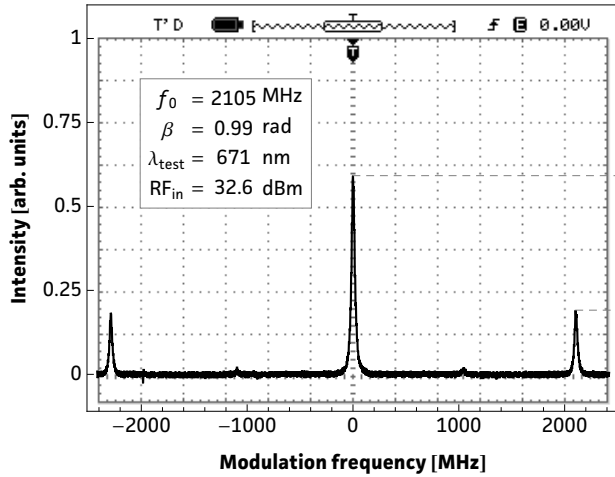
RF properties	Value	Unit
Resonance frequency: $f_0$ <sup>1)</sup>	1908 - 2115	MHz
Preset frequency: $f_{set}$ <sup>1)</sup>	2105	MHz
Bandwidth: $\Delta\nu$	14.9	MHz
Quality factor: Q	141	
Required RF power for 1rad @ 369nm <sup>2)</sup>	25.4	dBm
max. RF power: $RF_{max}$ <sup>3)</sup>	2	W

Optical properties		
EO crystal	MLN	
Aperture	3x3	mm <sup>2</sup>
Wavefront distortion (633nm)	$\lambda/4$	nm
recommended max. optical intensity (369nm)	<0.2	W/mm <sup>2</sup>
AR coating (R<0.5%)	350 - 670	nm

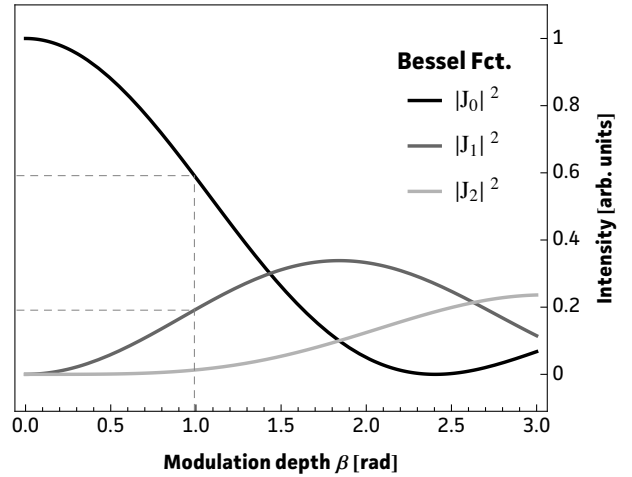
<sup>1)</sup> at 24.3°C <sup>2)</sup> with 50Ω termination <sup>3)</sup> no damage with  $RF_{in} < 5W$

# Measured modulation

**Fig. 1: Oscilloscope trace**

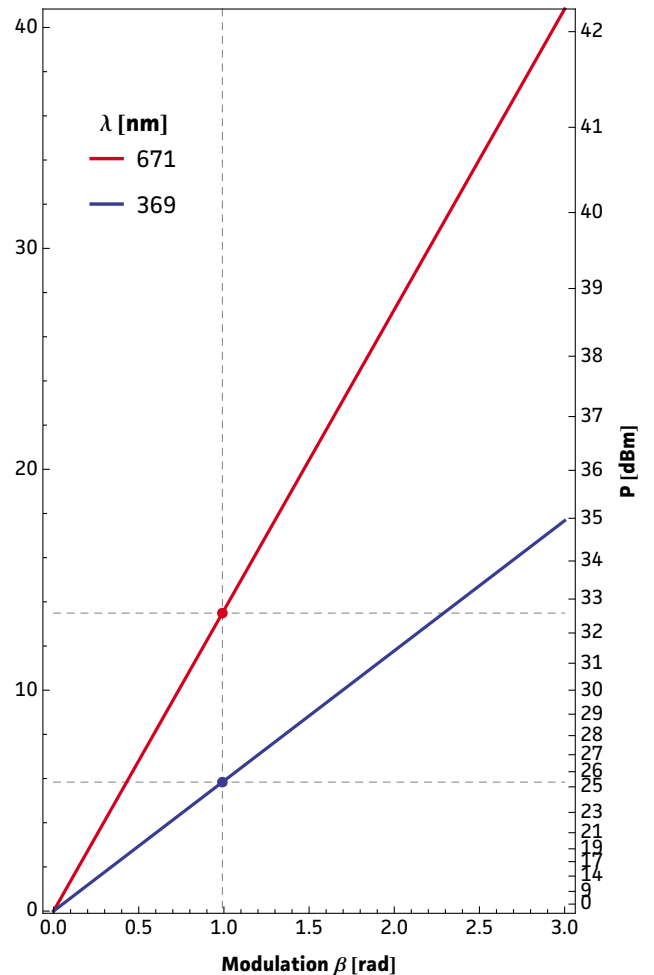


**Fig. 2: Carrier/sideband ratio**



**Table 1: Expected modulation**

$\beta = 1 \text{ rad}$	unit	$\lambda_1$	$\lambda_2$
$\lambda$	nm	<b>369</b>	<b>671</b>
P	dBm	25.4	32.7
P	W	0.35	1.85
U	V <sub>p</sub>	5.9	13.6
U <sub><math>\pi</math></sub>	V <sub>p</sub>	18.5	42.8
$\beta / U$	rad / V	0.17	0.07



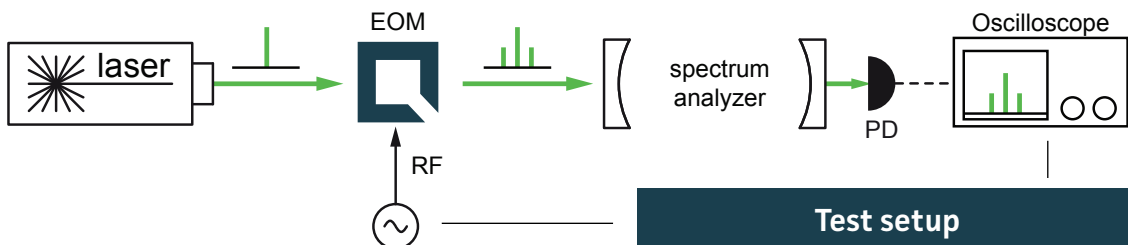
**Fig.1:** Recorded oscilloscope trace retrieved from a test setup as illustrated below.

**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  $\beta$ .

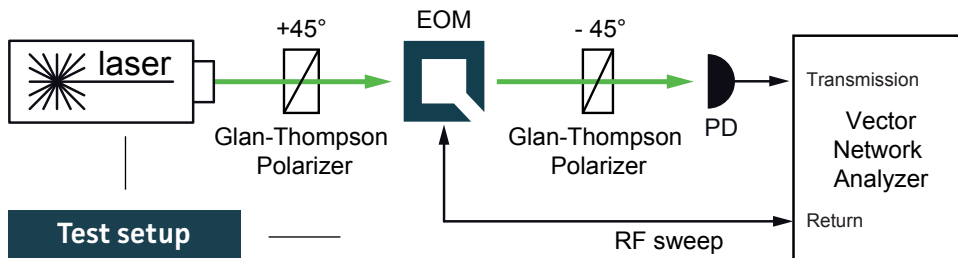
**Fig.3:** Dependency between RF amplitude and modulation depth for different wavelengths. Points on the curve allow to retrieve either the required RF amplitude for a specific/desired  $\beta$  or the max. achievable modulation depth for a given/available RF power.

**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.

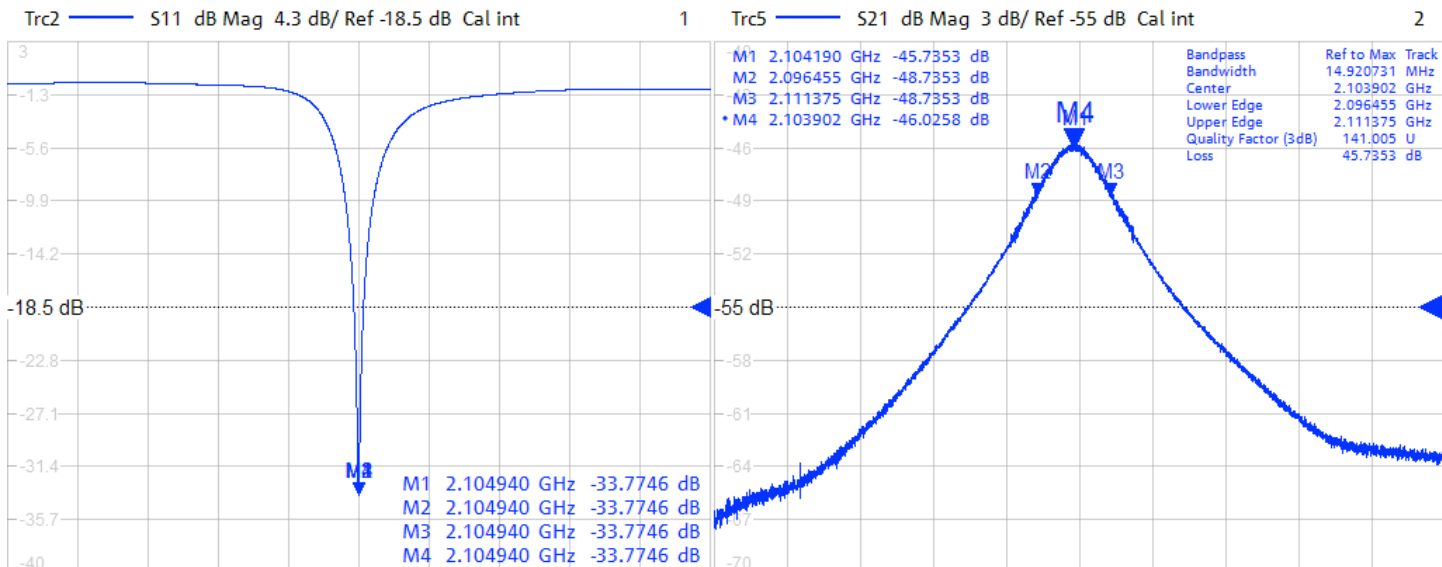
**Fig. 3: RF-signal amplitude vs. modulation depth**



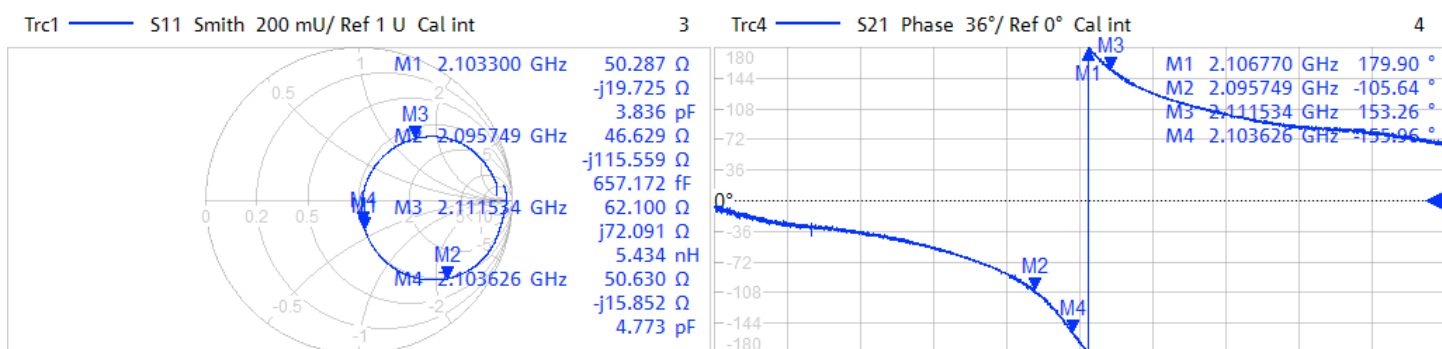
## Resonance characteristics



11/10/2015 11:32:00 AM  
1328.5170K92-100178-XI



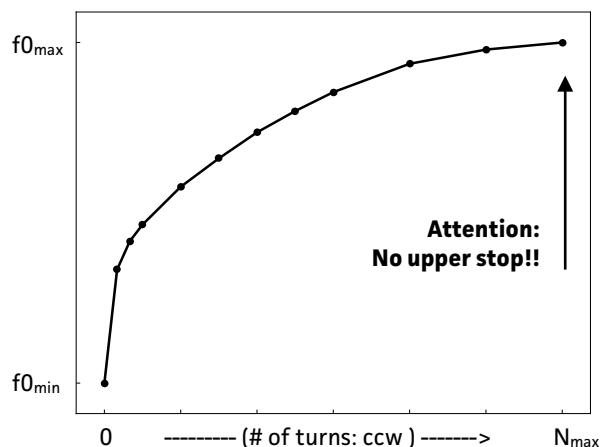
Ch2 Center 2.10506 GHz Pwr 3 dBm Bw 10 kHz Span 150 MHz



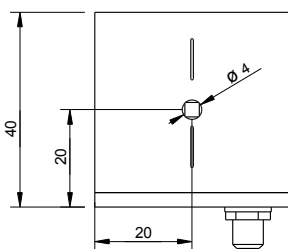
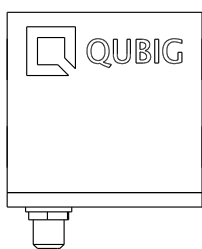
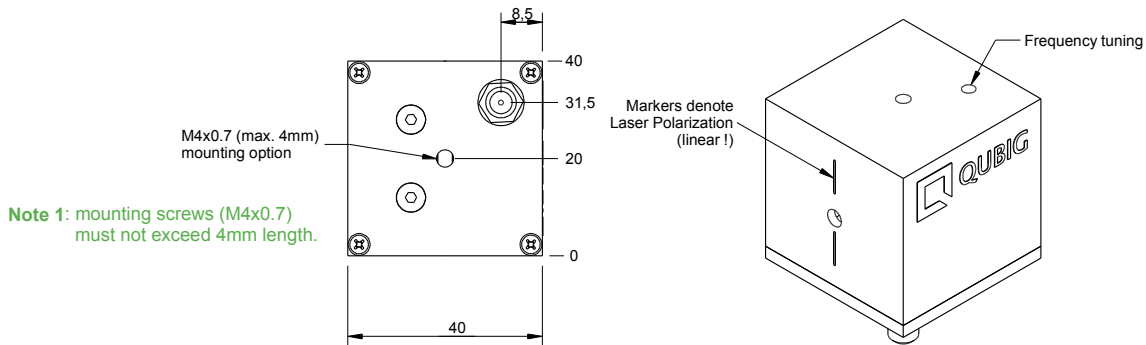
Ch2 Center 2.10506 GHz Pwr 3 dBm Bw 10 kHz Span 150 MHz

## Tuning performance

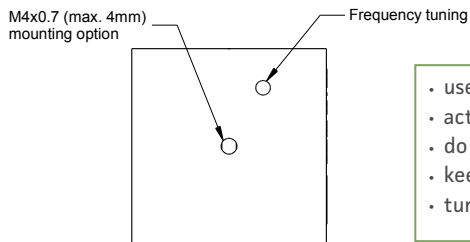
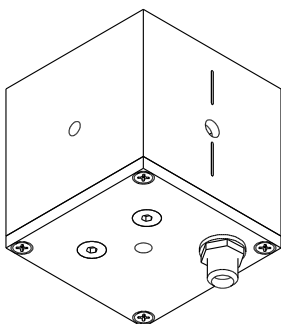
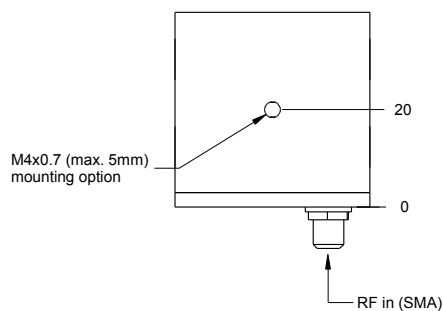
MAX resonance frequency	$f_0$ max	2123	MHz
MIN resonance frequency	$f_0$ min	1945	MHz
number of turns	$N_{max}$	6	
incr. frequency shift	$\Delta f$	~ 30	MHz / turn
counter clock-wise turns ↻	higher $f_0$ ↑		
clock-wise turns ↻	lower $f_0$ ↓		



# 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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