



## Test Data Sheet

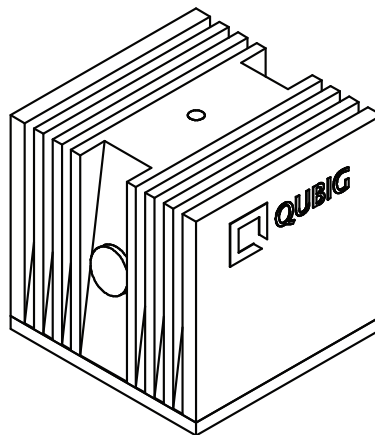
**EO-Be9+**

S/N:

### Resonant electro-optic phase modulator

with

- thermal crystal mount
- hermetically sealed housing
- tunable resonance frequency



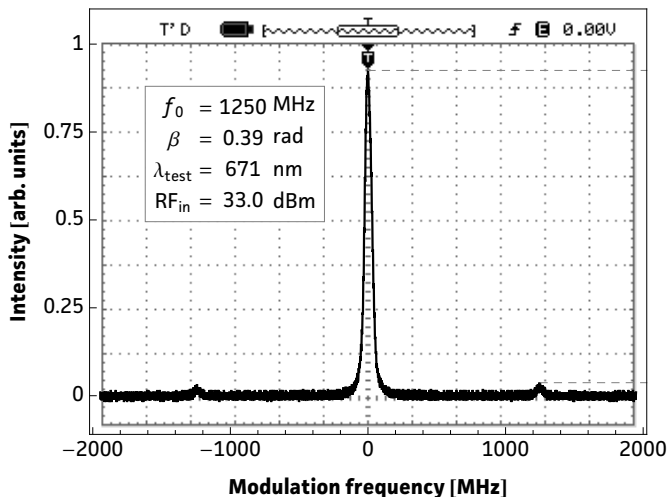
RF properties	Value	Unit
Resonance frequency: $f_0$ <sup>1)</sup>	1.1 - 1.36	GHz
Preset frequency: $f_{set}$ <sup>1)</sup>	1250	MHz
Bandwidth: $\Delta\nu$	6.2	MHz
Quality factor: Q	201	
Required RF power for 1rad @ 313nm <sup>2)</sup>	33.9	dBm
max. RF power: $RF_{max}$ <sup>3)</sup>	2	W

Optical properties		
EO crystal	KDP	
Aperture	3x3	mm <sup>2</sup>
Wavefront distortion (633nm)	$\lambda/8$	nm
recommended max. optical intensity (313nm)	<1	W/mm <sup>2</sup>
AR coating (R<0.5%)	240-420	nm

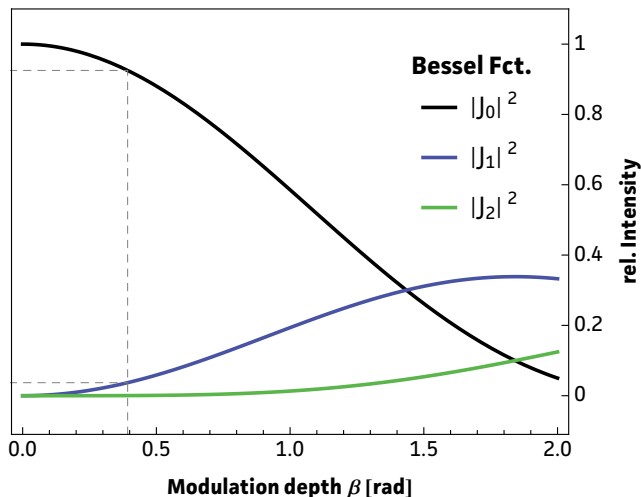
<sup>1)</sup> at 24.3°C <sup>2)</sup> with 50Ω termination <sup>3)</sup> no damage with  $RF_{in} < 5W$

# Measured modulation

**Fig. 1: Oscilloscope trace**

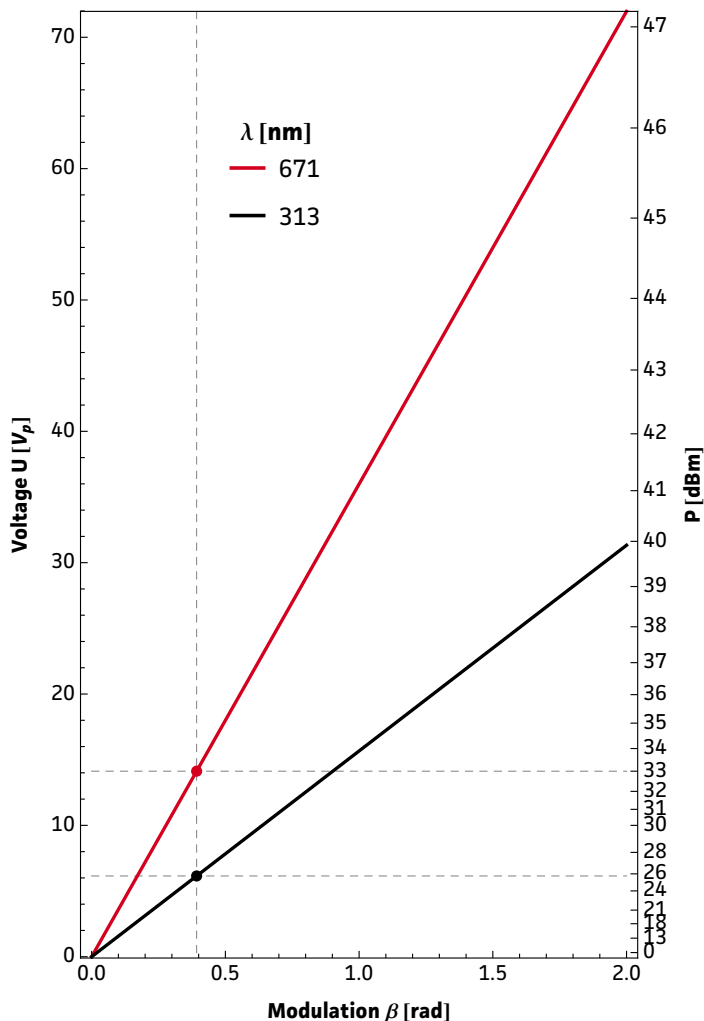


**Fig. 2: Carrier/sideband ratio**



**Table 1: Expected modulation**

$\beta = 1 \text{ rad}$	unit	$\lambda_1$	$\lambda_2$
$\lambda$	nm	313	671
P	dBm	33.9	41.1
P	W	2.45	12.95
U	V <sub>p</sub>	15.7	36.
U <sub><math>\pi</math></sub>	V <sub>p</sub>	49.2	113.
$\beta / U$	rad / V	0.06	0.03



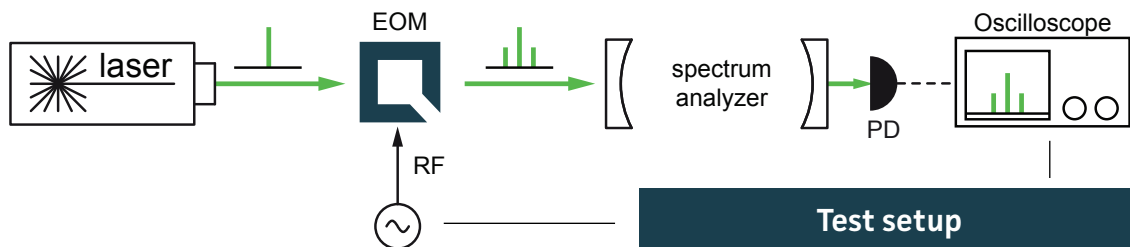
**Fig.1:** Recorded oscilloscope trace retrieved from a test setup as illustrated below.

**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  $\beta$ .

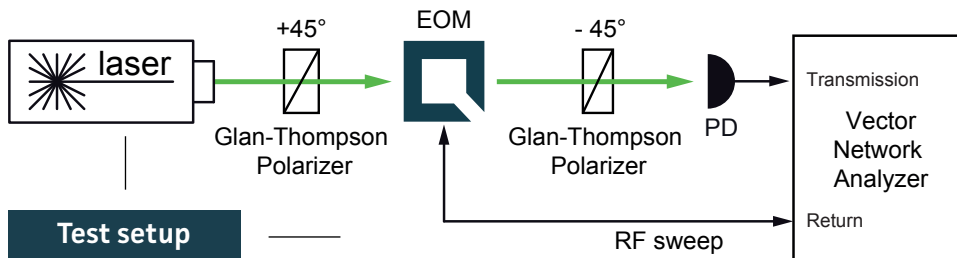
**Fig.3:** Dependency between RF amplitude and modulation depth for different wavelengths. Points on the curve allow to retrieve either the required RF amplitude for a specific/desired  $\beta$  or the max. achievable modulation depth for a given/available RF power.

**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.

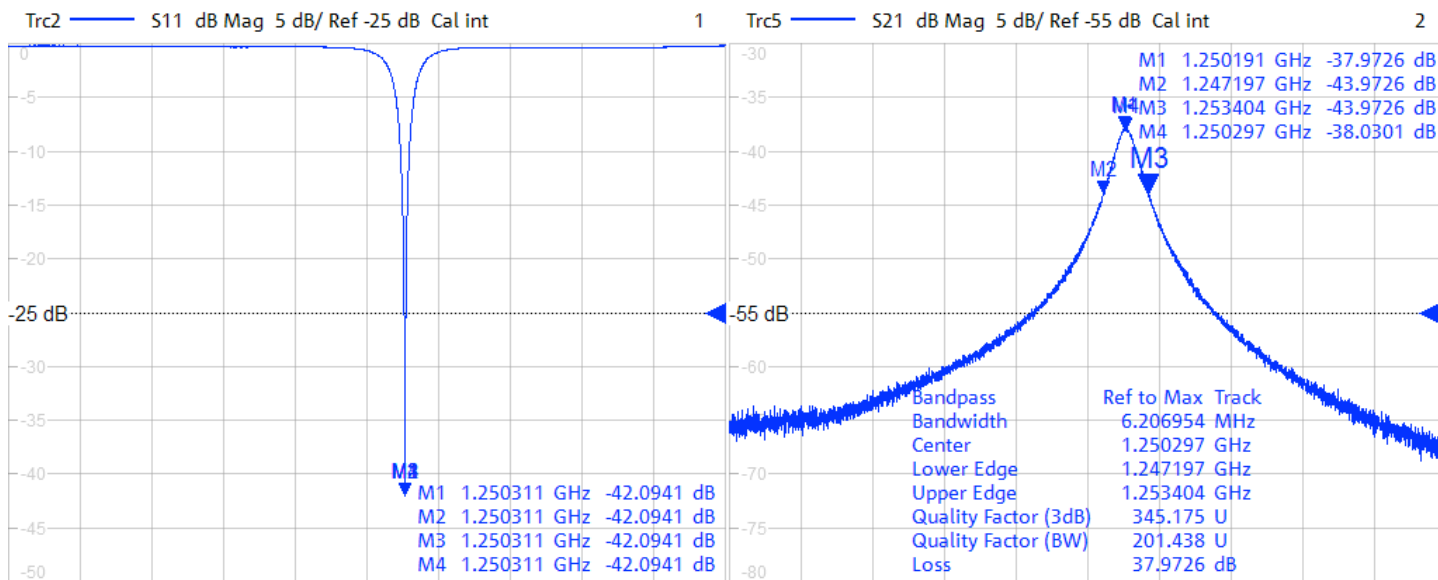
**Fig. 3: RF-signal amplitude vs. modulation depth**



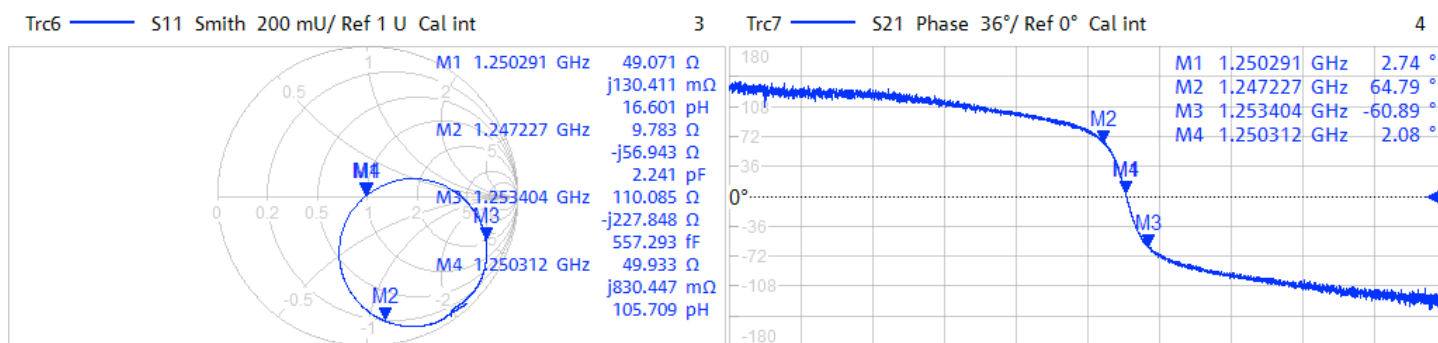
## Resonance characteristics



11/26/2015 2:57:09 PM  
1328.5170K92-100178-XI



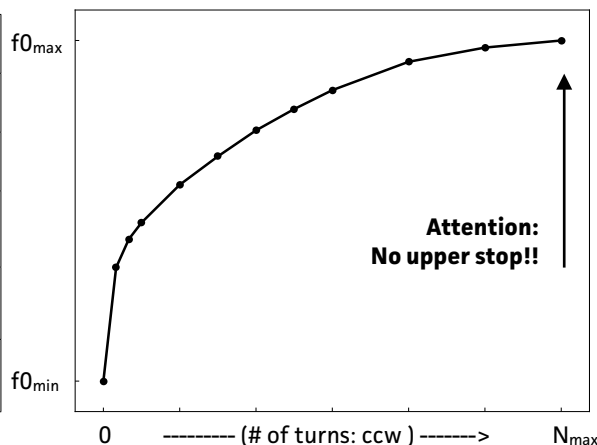
Ch2 Center 1.245011 GHz Pwr 3 dBm Bw 10 kHz Span 100 MHz



Ch2 Center 1.245011 GHz Pwr 3 dBm Bw 10 kHz Span 100 MHz

## Tuning performance

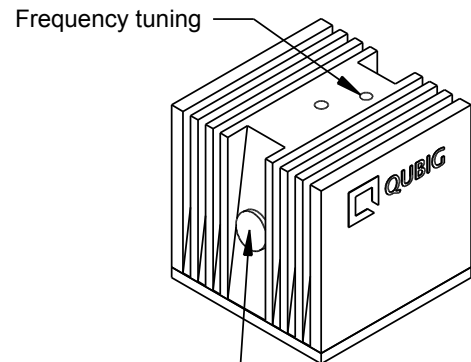
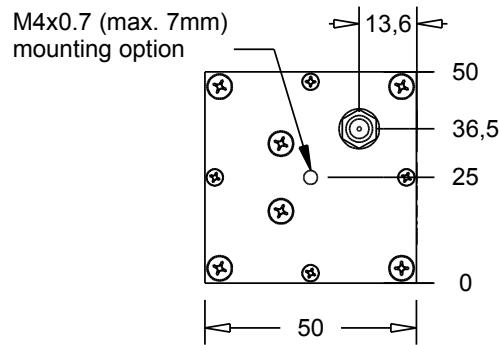
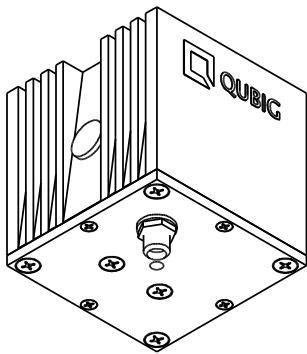
MAX resonance frequency	$f_0 \text{ max}$	1356	MHz
MIN resonance frequency	$f_0 \text{ min}$	1096	MHz
number of turns	$N_{\text{max}}$	6	
incr. frequency shift	$\Delta f$	~ 43	MHz / turn
counter clock-wise turns ↻		higher $f_0$ ↑	
clock-wise turns ↻		lower $f_0$ ↓	



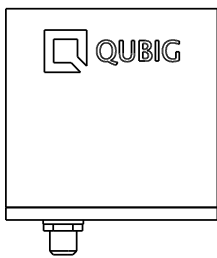
## Handling instructions

- 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 orthogonal 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).

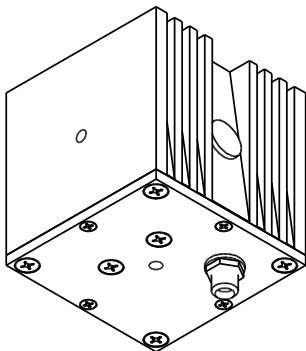
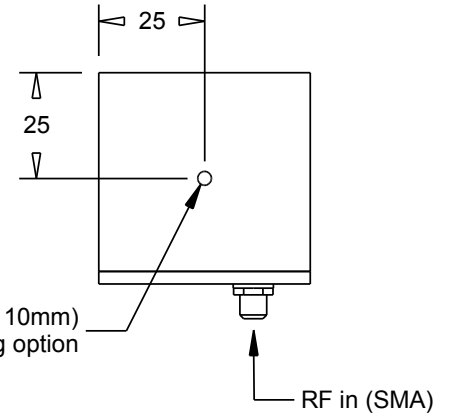
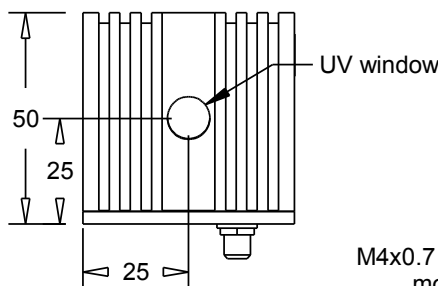
## Package drawing



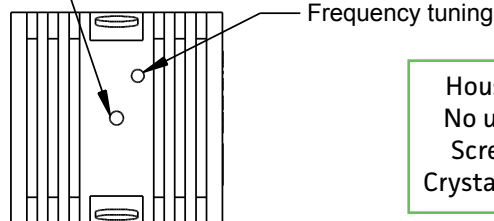
**Attention!** Laser polarisation (linear!) is orthogonal with respect to the cooling fins.



**Note:** crystal aperture is 3x3mm



M4x0.7 (max. 9mm) mounting option



**Attention!!!**

Housing is hermetically sealed.  
No use serviceable parts inside.  
Screws must not be loosened!  
Crystal will be damaged otherwise.

Tested by:

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