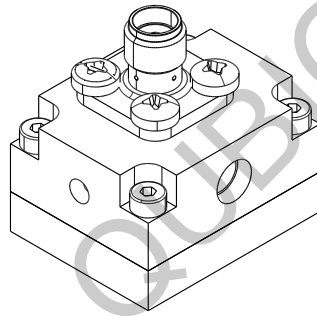


## Test Data Sheet

### PM11-VIS

S/N:

### Resonant electro-optic phase modulator



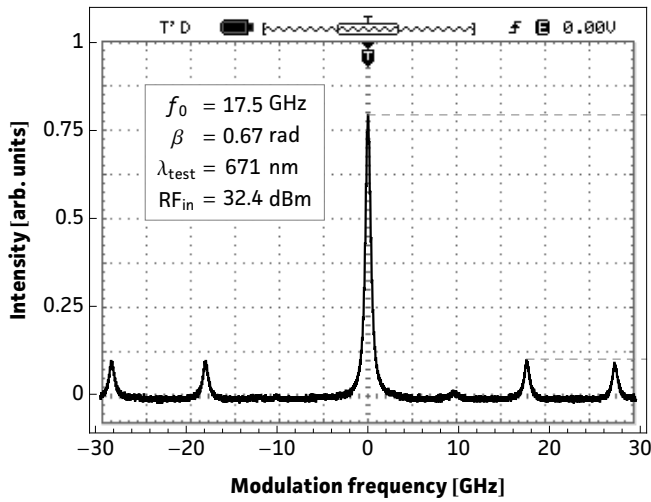
RF properties	Value	Unit
Resonance frequency: $f_0$ <sup>1)</sup>	17.44 - 17.59	GHz
Preset frequency: $f_{set}$ <sup>1)</sup>	17.5	GHz
Bandwidth: $\Delta\nu$	165	MHz
Quality factor Q	106	
Required RF power for 1 rad @ 369 nm	28.6	dBm
max. RF power: $RF_{max}$ <sup>2)</sup>	5	W

Optical properties		
EO crystal	MLN	
Aperture	Ø 1.0	mm
Wavefront distortion (@ 633 nm)	$\lambda/4$	
recommended max. optical intensity (@ 369nm)	< 0.1	W/mm <sup>2</sup>
AR coating ( $R_{avg} < 1\%$ )	360 - 650	nm

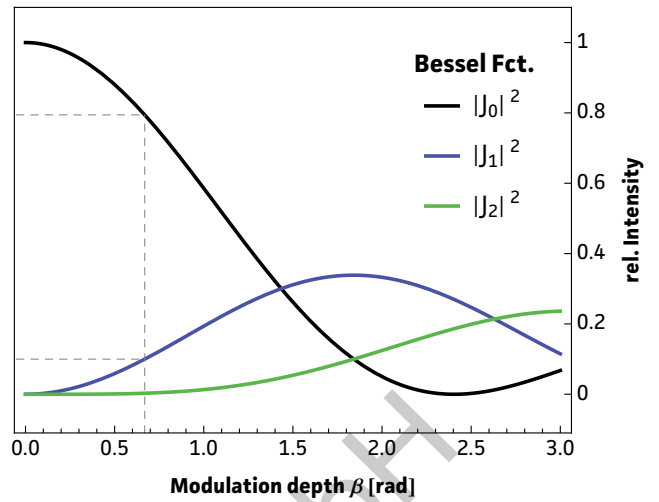
<sup>1)</sup> at 23.0 °C <sup>2)</sup> no damage with  $RF_{in} < 5W$ , but use of a proper heatsink is strongly recommended at high powers

# Measured phase modulation

**Fig. 1: Oscilloscope trace**

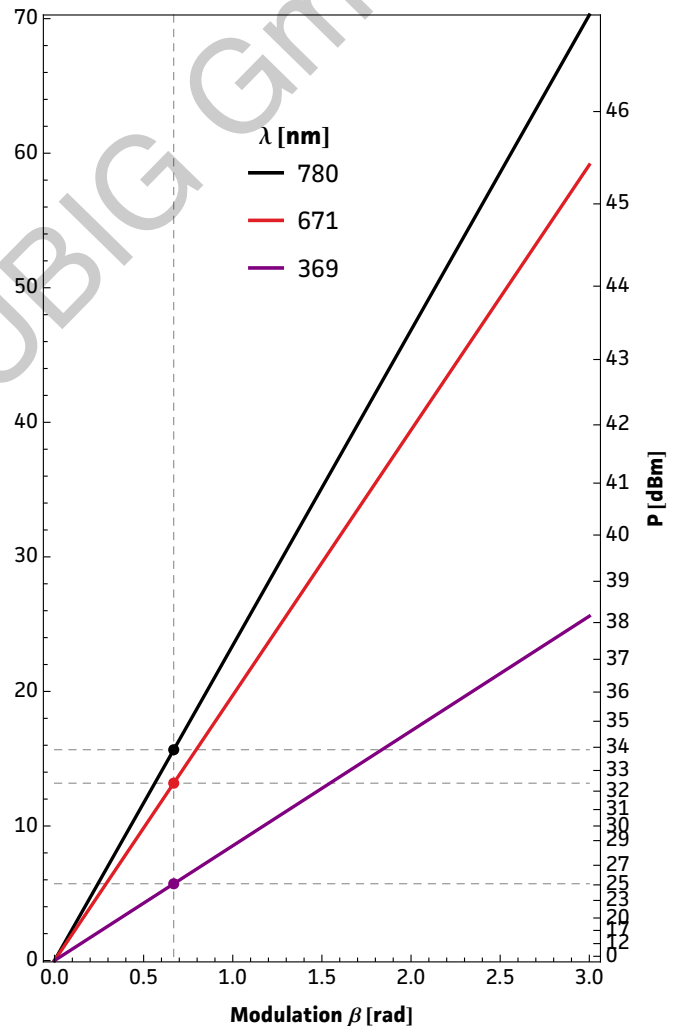


**Fig. 2: Carrier/sideband ratio**



**Table 1: Expected modulation**

$\beta = 1 \text{ rad}$	unit	$\lambda_1$	$\lambda_2$	$\lambda_3$
$\lambda$	nm	369	671	780
P	dBm	28.6	35.9	37.4
P	W	0.73	3.88	5.48
U	V <sub>p</sub>	8.5	19.7	23.4
$U_\pi$	V <sub>p</sub>	26.8	61.9	73.6
$\beta/U$	rad/V	0.12	0.05	0.04



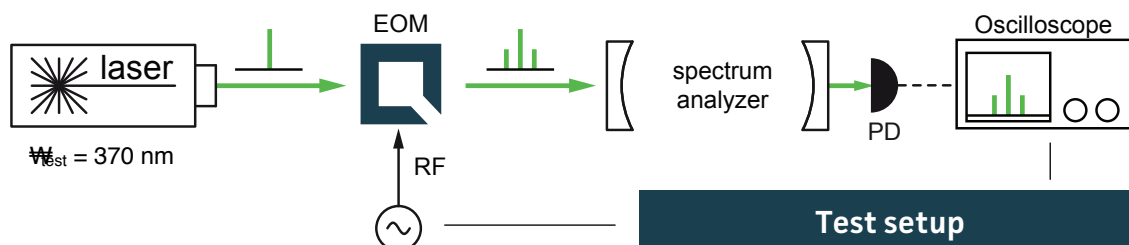
**Fig. 1:** Recorded oscilloscope trace retrieved from a test setup as illustrated below.

**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  $\beta$ .

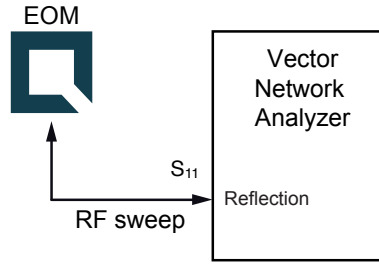
**Fig. 3:** Dependency between RF amplitude and modulation depth for different wavelengths. Points on the curve allow to retrieve either the required RF amplitude for a specific/desired  $\beta$  or the max. achievable modulation depth for a given/available RF power.

**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**

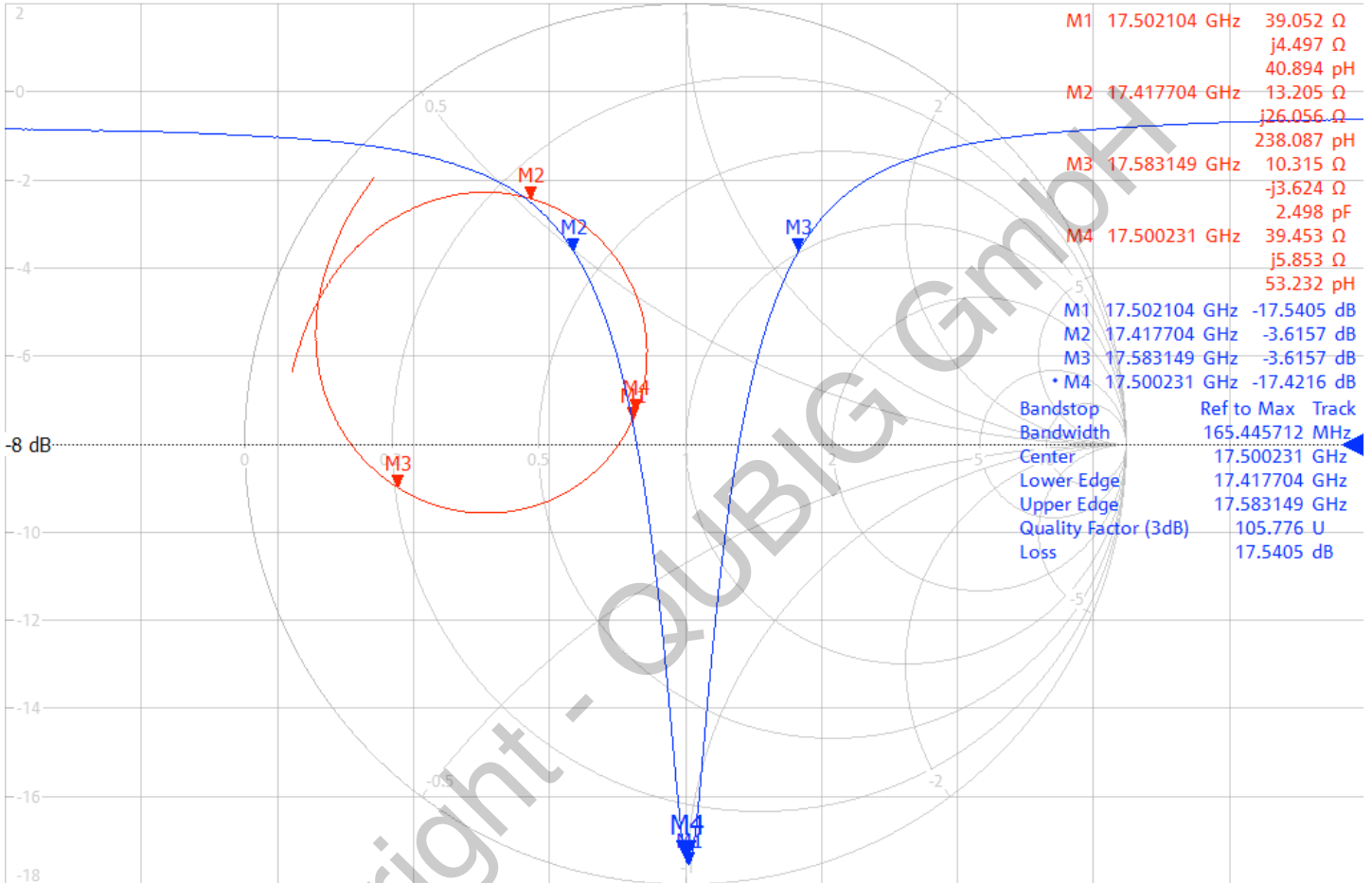


# Resonance characteristics



$T_{EOM} = 23.0\text{ }^{\circ}\text{C}$

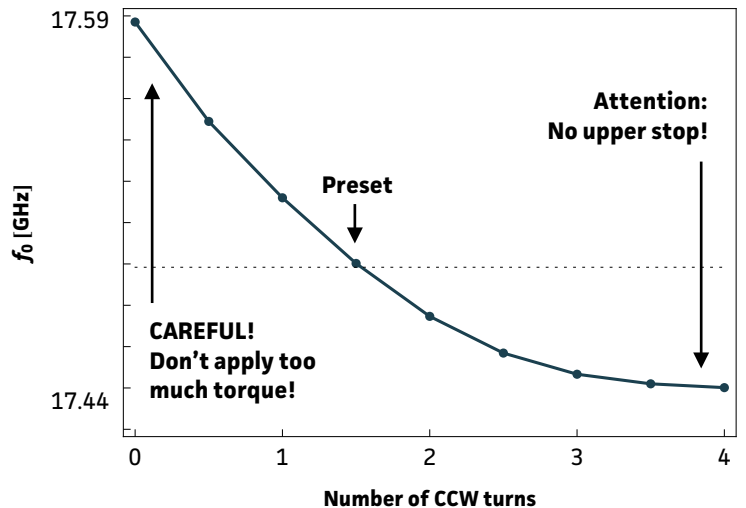
Trc1 — S11 dB Mag 2 dB/ Ref -8 dB Cal int Trc2 — S11 Smith 200 mU/ Ref 1 U Cal int



Ch1 Center 17.500104 GHz Pwr 3 dBm Bw 10 kHz Span 1 GHz

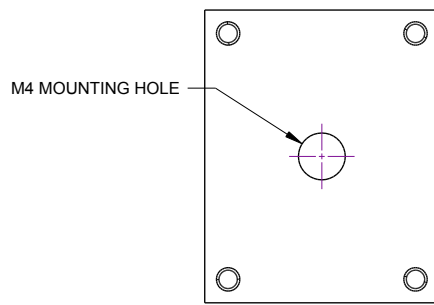
## Frequency tuning performance @ T=21.0°C

MAX resonance frequency	$f_{0,max}$	17.59	MHz
MIN resonance frequency	$f_{0,min}$	17.44	MHz
number of turns	$N_{max}$	4	
tuning range		150	MHz
temperature dependence	$df_0/dT$	-5.2	MHz/°C



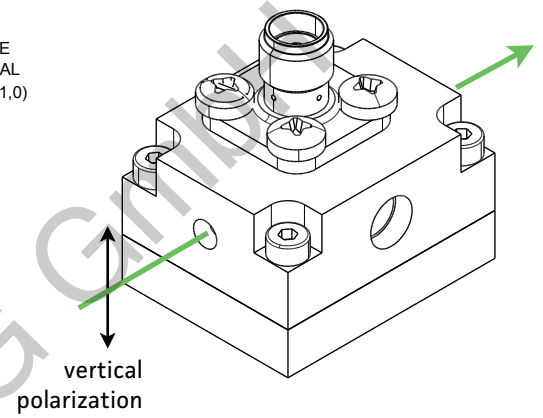
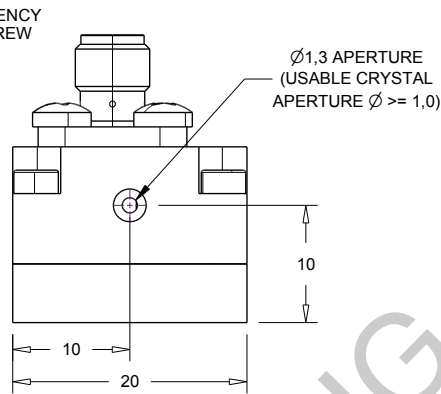
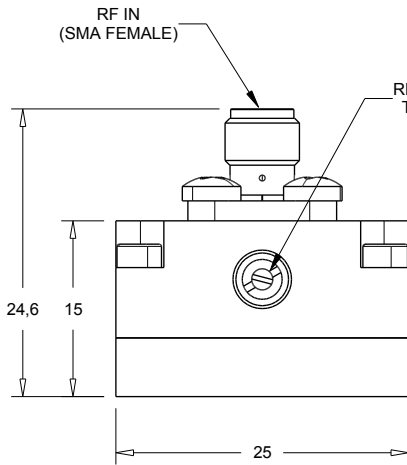
- only use supplied tuning tool
- actuate tuner carefully / do not apply too much torque especially around  $f_{0,max}$
- there might be no hard upper or lower stops (!)

# Package drawing



**No user serviceable parts inside. None of the screws must be loosened at any time! EOM may get damaged otherwise.**

**Please handle device carefully. Avoid shock. Don't drop.**



PM-C.37E7..b

All dimensions in mm.

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