QUBIG

Empowering Laser Technologies

Test Data Sheet

PM8 - MWIR

(old: EO-500T3-IR3)

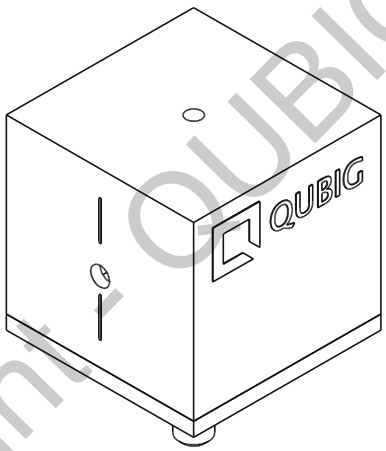
S/N:

Resonant electro-optic phase modulator

with

- thermal crystal mount

- temperature sensor (Pt1000)



RF properties	Value	Unit
Resonance frequency: f_0 [1)]	488	MHz
Bandwidth: Δν	1.71	MHz
Quality factor (BW): Q	285	
avg. temperature dependence	-380	kHz/°C
Required RF power for 1rad @ 4.5µm [2)]	41.5	dBm
max. RF power: RF_{max} [3)]	5	W

Optical properties		
EO crystal	LT	
Aperture	3x3	mm^2
Wavefront distortion (633nm)	λ/6	nm
recommended max. optical intensity (4.5µm)	<2	W/mm^2
AR coating (R_{avg}<0.5%)	2500 - 4000	nm

[1)] at 25°C [2)] with 50Ω termination [3)] no damage with RF_{in} < 10W

Measured modulation

Fig. 1: Oscilloscope trace

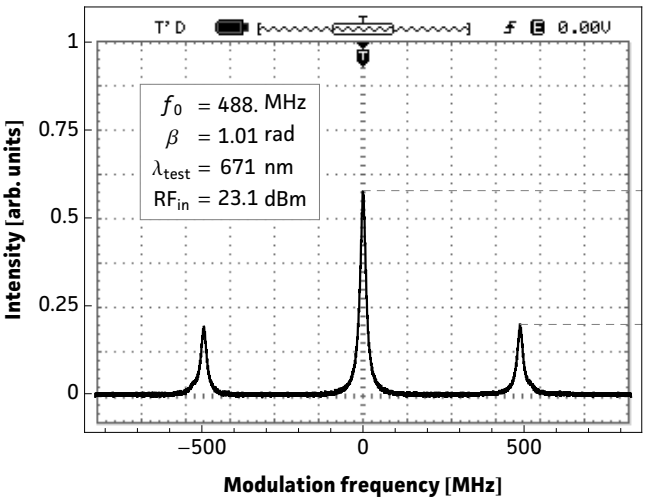


Fig. 2: Carrier/sideband ratio

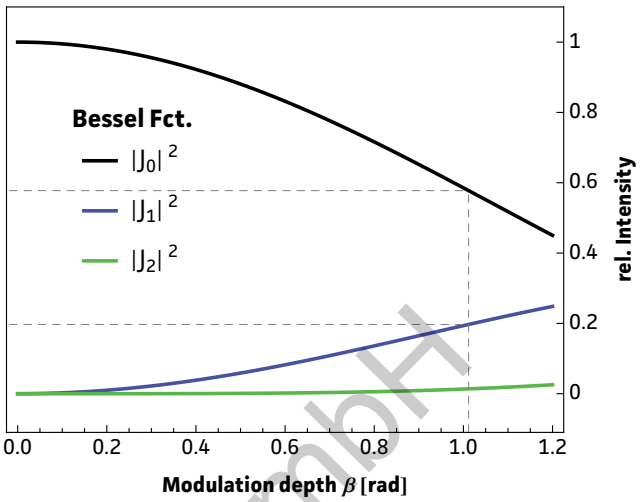


Table 1: Expected modulation

$\beta = 1$ rad	unit	λ_1	λ_2
λ	nm	**671**	**4500**
P	dBm	23.	41.5
P	W	0.2	14.21
U	V_p	4.5	37.7
U_π	V_p	14.	118.4
β / U	rad / V	0.22	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^{th} sideband $|J_i|^2$ at a specific ß.

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 ß 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 (ß=1rad) provided in the table.

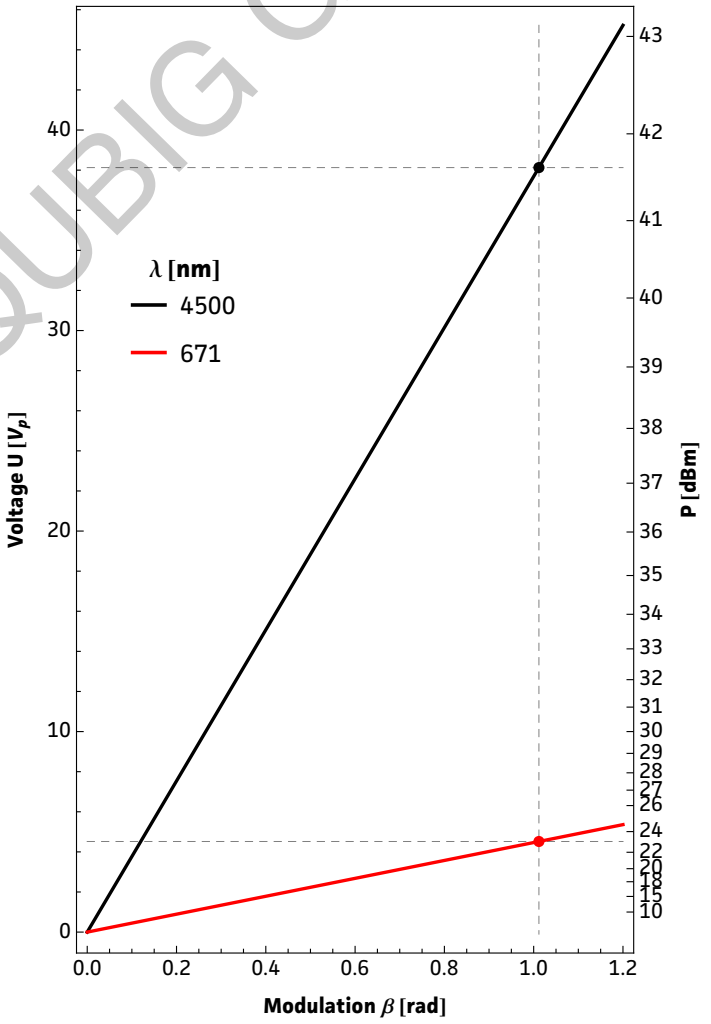
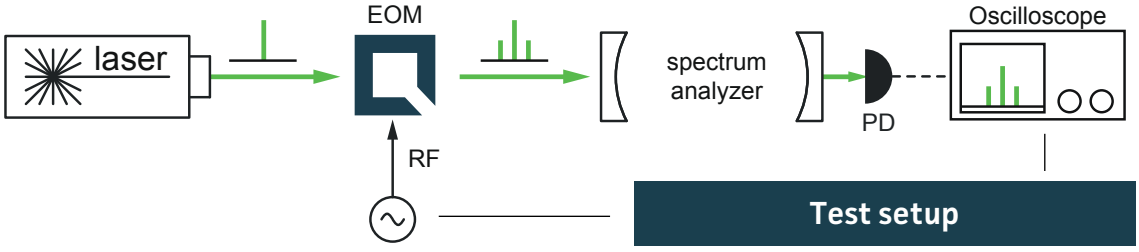
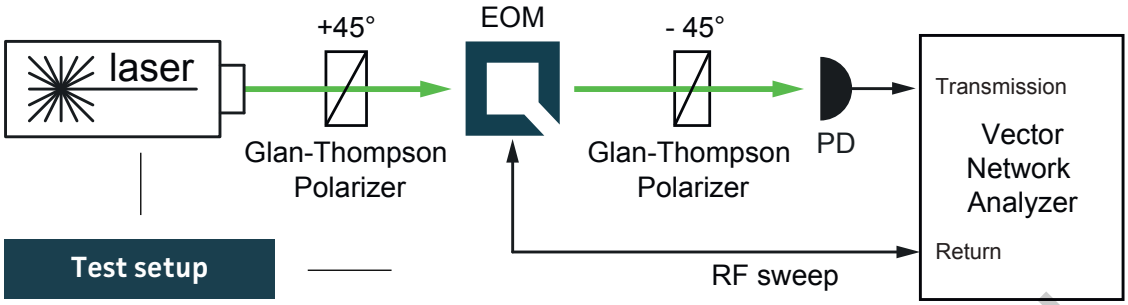


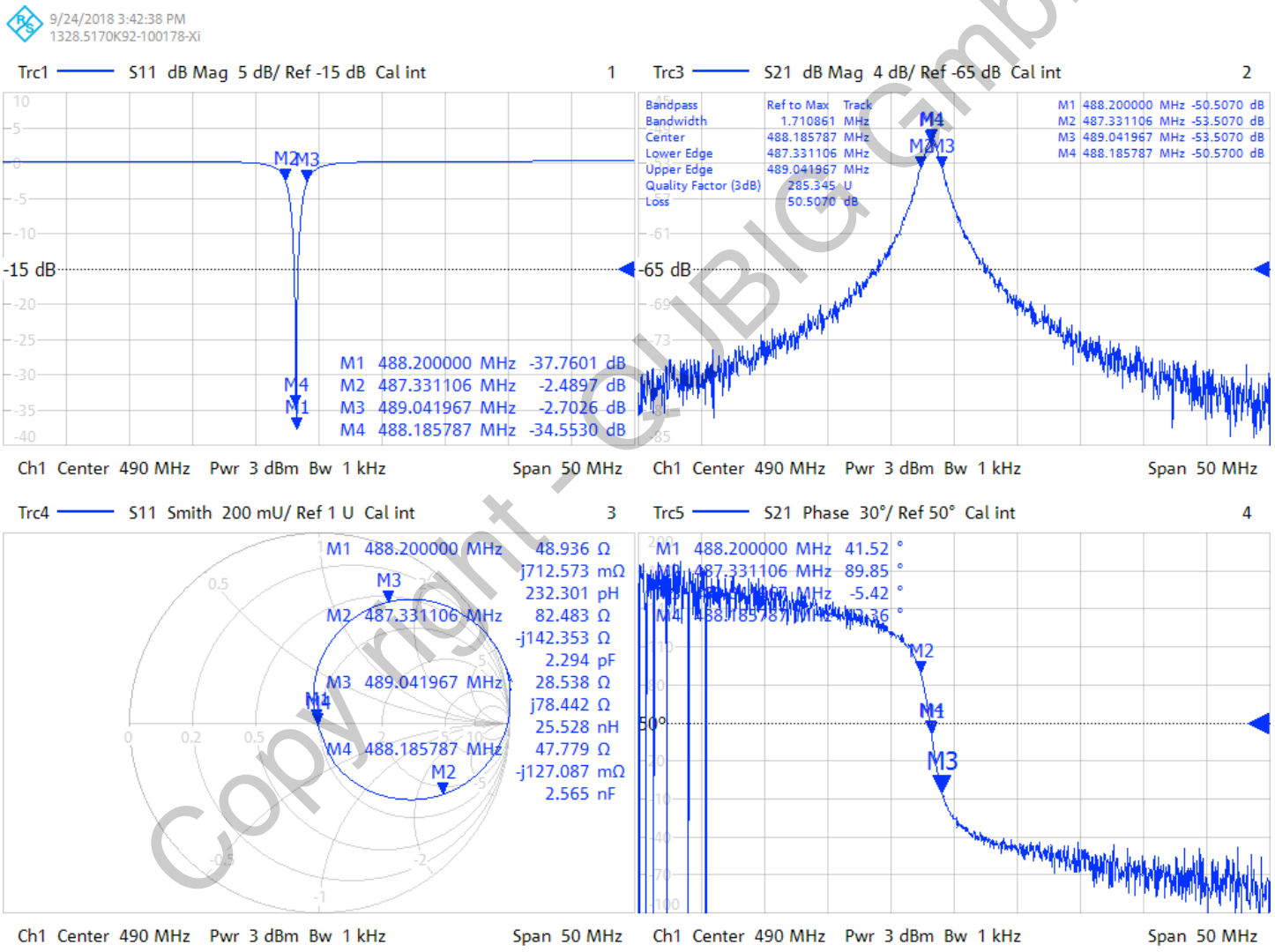
Fig. 3: RF–signal amplitude vs. modulation depth



Resonance characteristics



Test setup

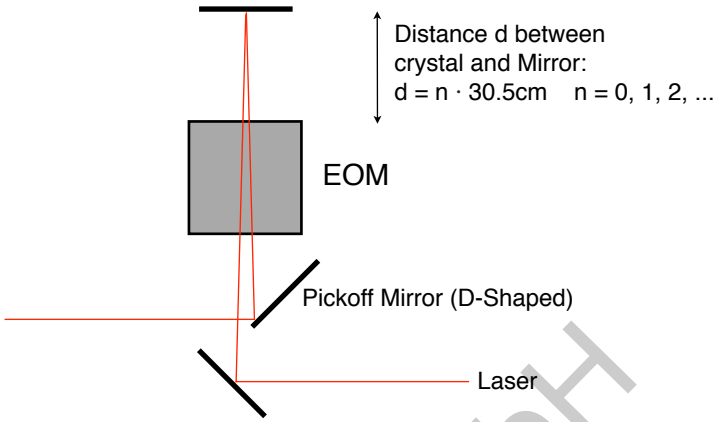


Handling instructions

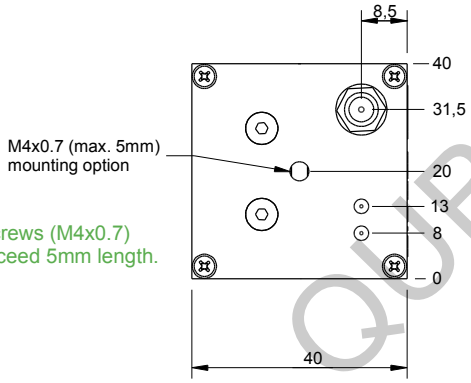
- Input laser polarization must be aligned with respect to the white markers on the housing
- Please handle device carefully. Avoid shock. Don't drop.
- After turn on the resonance frequency drifts slightly with applied RF power. Please compensate by tuning the RF drive frequency until steady-state (~min).

Double Pass Setup

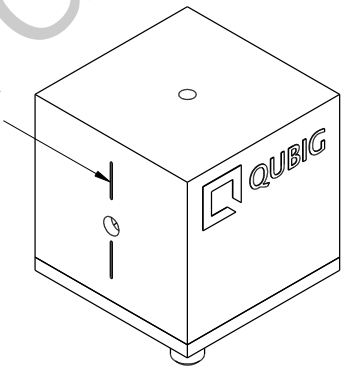
- Use the EOM in the shown double pass configuration to achieve a more efficient modulation
- To avoid demodulation during the second pass through the EOM the distance between the crystal and the mirror should be as shown on the right.
- When correctly aligned, the efficiency gain will be about 6dBm.



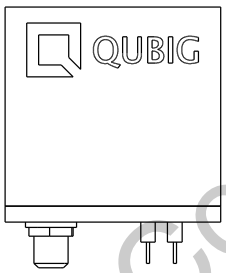
Package drawing

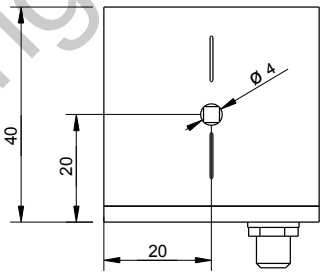


Note 1: mounting screws (M4x0.7) must not exceed 5mm length.

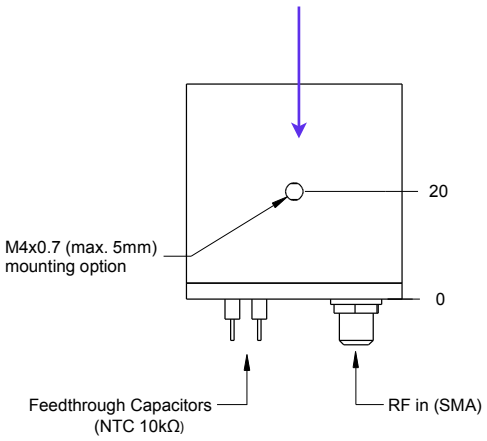


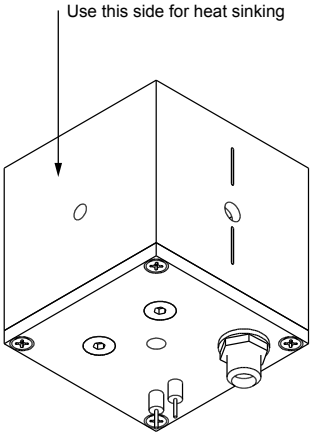
Use this side for heat sinking!

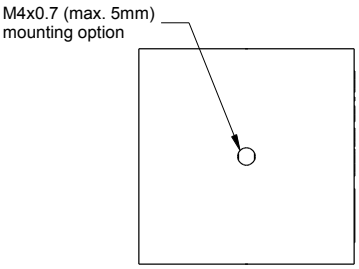




Note 2: crystal aperture is 3x3mm.





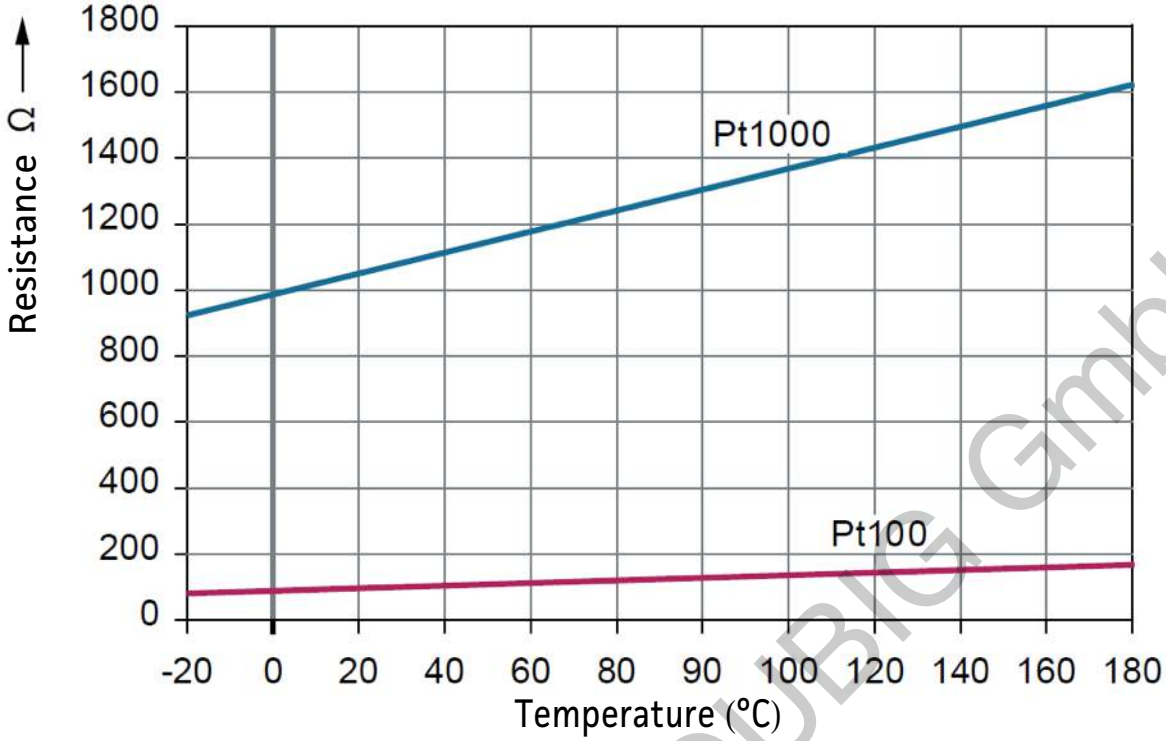


Attention!!

- 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

TXC-option information

Pt1000 characteristics:



Temp. (°C)	Resistance (Ω)
-40	842.71
-35	862.48
-30	882.22
-25	901.92
-20	921.6
-15	941.24
-10	960.60
-5	980.44
0	1000
5	1019.53
10	1039.03
15	1058.49
20	1077.94
25	1097.35
30	1116.73
35	1136.08
40	1155.41
45	1178.56
50	1193.97
55	1213.21
60	1232.42
65	1251.60
70	1270.75
75	1289.87
80	1308.97
85	1328.03
90	1347.07
95	1366.08
100	1385.06
105	1404.00
110	1422.93
115	1441.82
120	1460.68
125	1479.51

TEC characteristics:

TEC part number	Imax (A)	Umax (V)	Qcmax (W)	ΔTmax (K)	Tmax (°C)	A (mm)	B (mm)	H (mm)	ID (mm)	Sealing
UEPT-440-127-040M12 5S	4.0	15.2	40	67.0	125.0	40.0	40.0	4.6	4.5	Silicon