

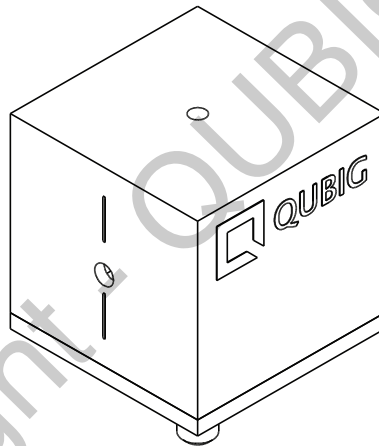
## Test Data Sheet

### PM8 - NIR

(EO-T50L3-NIR)

S/N: J5687

**Resonant electro-optic phase modulator**  
 with  
 - tunable resonance frequency  
 - TXC option



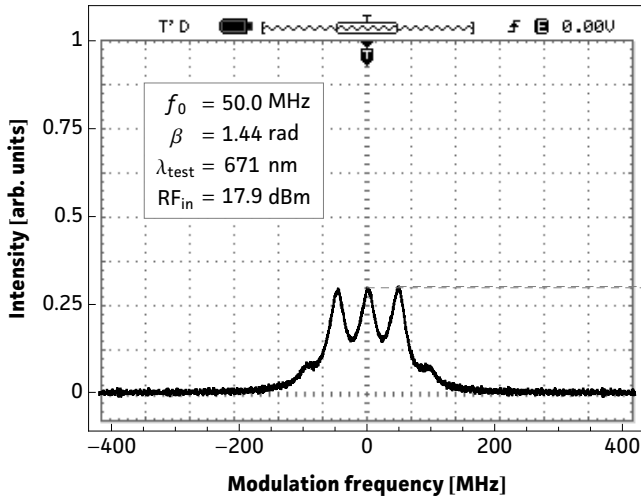
RF properties	Value	Unit
Resonance frequency: $f_0$ <sup>1)</sup>	42.1 - 57.6	MHz
Preset frequency: $f_{set}$ <sup>1)</sup>	50.0	MHz
Bandwidth: $\Delta\nu$	361	kHz
Quality factor: Q	139	
Required RF power for 1rad @ 960nm <sup>2)</sup>	18.2	dBm
max. RF power: $RF_{max}$ <sup>3)</sup>	1	W

Optical properties		
EO crystal	LN	
Aperture	3x3	mm <sup>2</sup>
Wavefront distortion (633nm)	$\lambda/6$	nm
recommended optical intensity (960nm)	< 1	W/mm <sup>2</sup>
AR coating (R<1%)	630 - 1200	nm

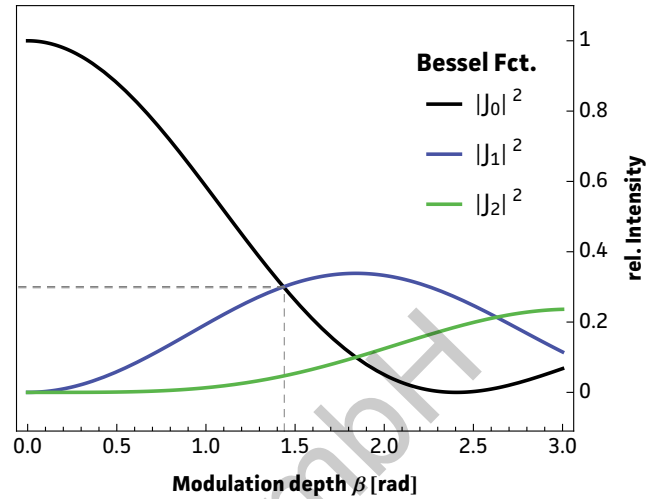
<sup>1)</sup> at 22.3°C   <sup>2)</sup> with 50Ω termination   <sup>3)</sup> no damage with  $RF_{in} < 2W$

# Measured modulation

**Fig. 1: Oscilloscope trace**

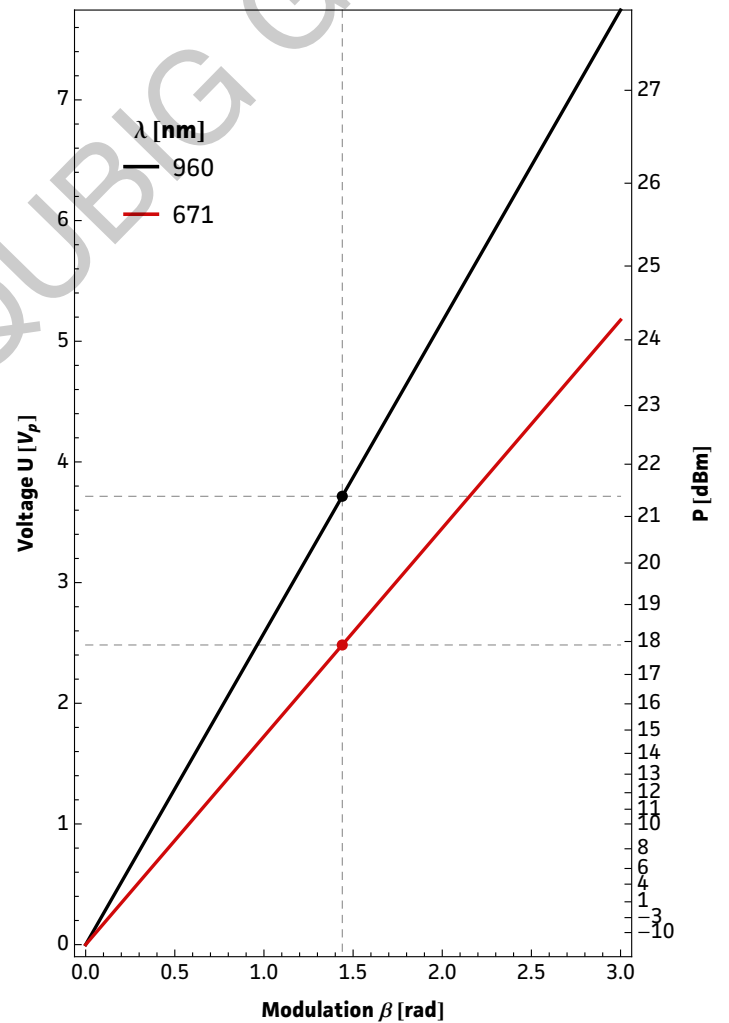


**Fig. 2: Carrier/sideband ratio**



**Table 1: Expected modulation**

$\beta = 1 \text{ rad}$	unit	$\lambda_1$	$\lambda_2$
$\lambda$	nm	<b>671</b>	<b>960</b>
P	dBm	14.8	18.2
P	mW	30	67
U	V <sub>p</sub>	1.7	2.6
U <sub><math>\pi</math></sub>	V <sub>p</sub>	5.4	8.1
$\beta / U$	rad / V	0.58	0.39



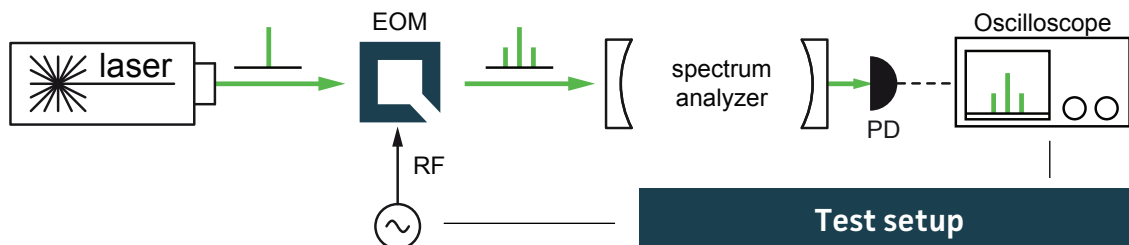
**Fig.1:** Recorded oscilloscope trace retrieved from a test setup as illustrated below.

**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  $\beta$ .

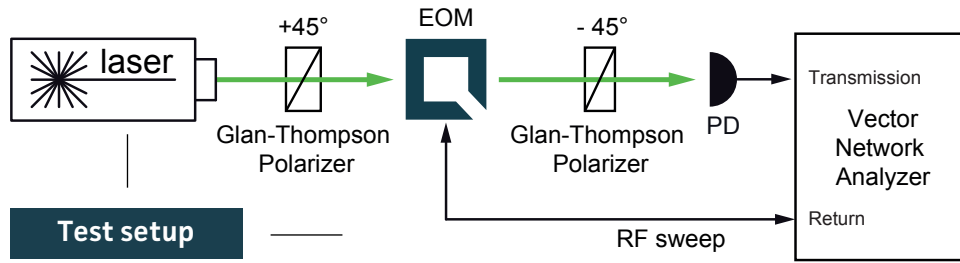
**Fig.3:** Dependency between RF amplitude and modulation depth for different wavelengths. Points on the curve allow to retrieve either the required RF amplitude for a specific/desired  $\beta$  or the max. achievable modulation depth for a given/available RF power.

**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.

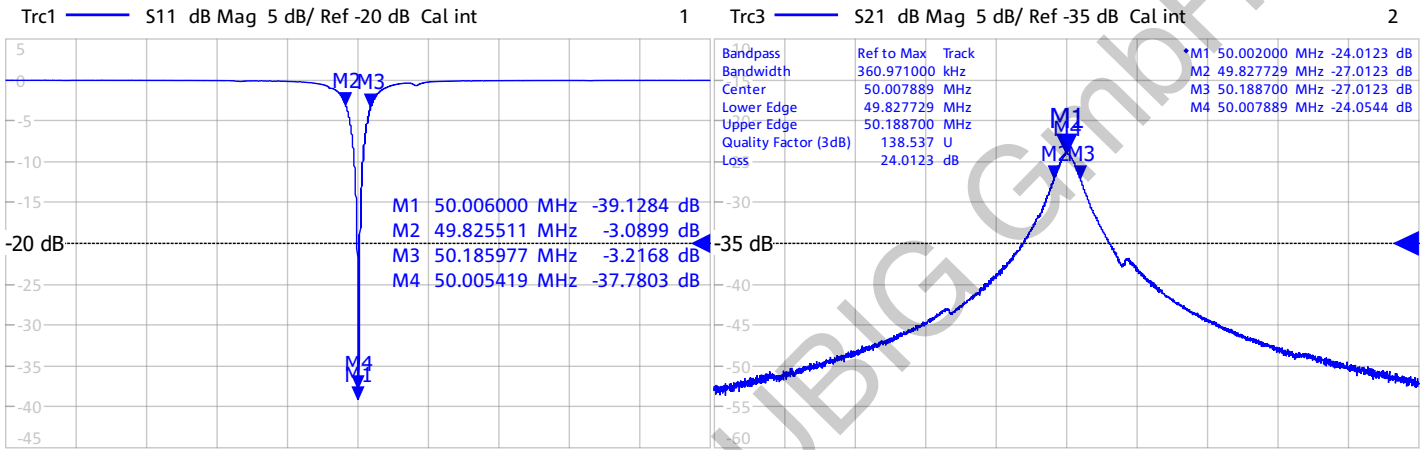
**Fig. 3: RF-signal amplitude vs. modulation depth**



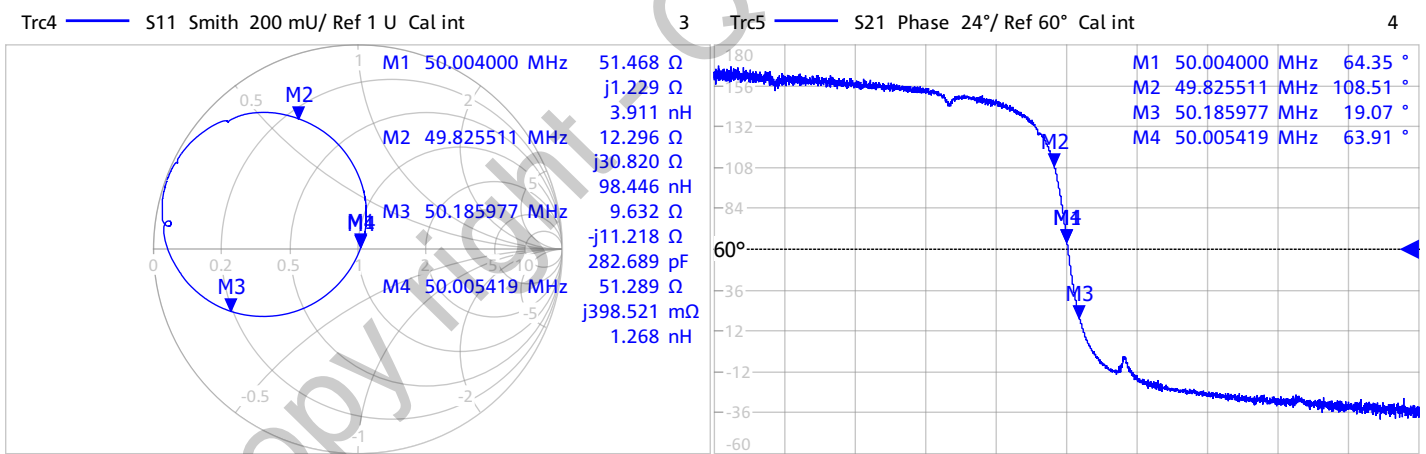
## Resonance characteristics



5/17/2017 9:38:16 PM  
1328.5170K92-100178-XI



Ch1 Center 50 MHz Pwr -10 dBm Bw 10 kHz Span 10 MHz Ch1 Center 50 MHz Pwr -10 dBm Bw 10 kHz Span 10 MHz

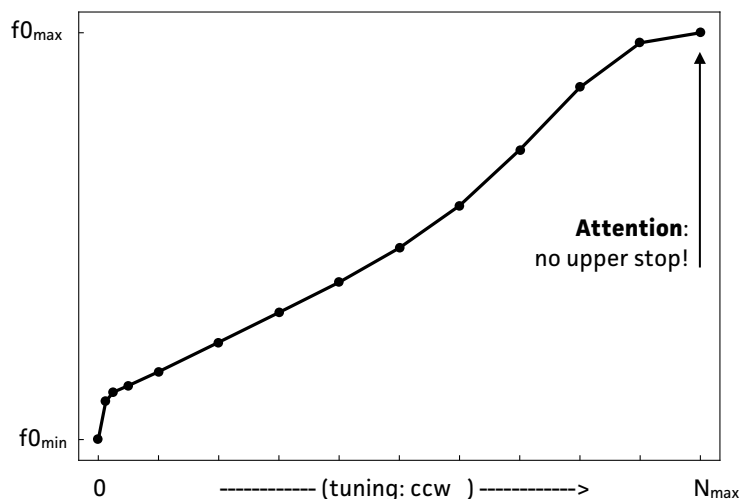


Ch1 Center 50 MHz Pwr -10 dBm Bw 10 kHz Span 10 MHz Ch1 Center 50 MHz Pwr -10 dBm Bw 10 kHz Span 10 MHz

## Tuning performance

MAX resonance frequency	$f_0 \text{ max}$	57.6	MHz
MIN resonance frequency	$f_0 \text{ min}$	42.1	MHz
number of turns	$N_{\text{max}}$	19	
counter clock-wise turns ↻	higher $f_0$ ↑		
clock-wise turns ↻	lower $f_0$ ↓		

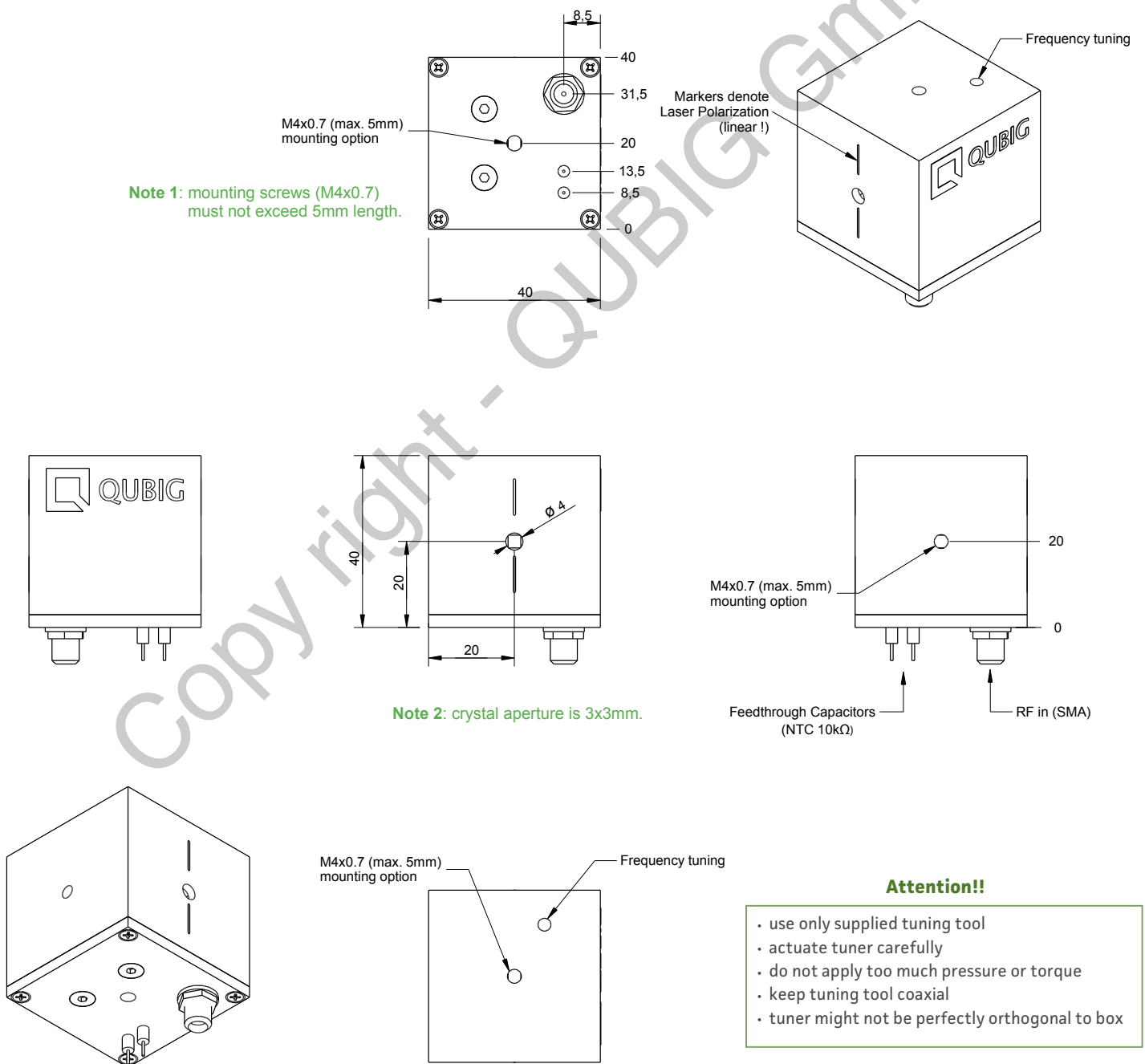
- use only supplied tuning tool
- actuate tuner carefully
- do not apply too much pressure or torque
- keep tuning tool coaxial
- tuner might not be perfectly orthogonal to box



## 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).
- Slight angle adjustment can reduce unwanted residual amplitude modulation (RAM)

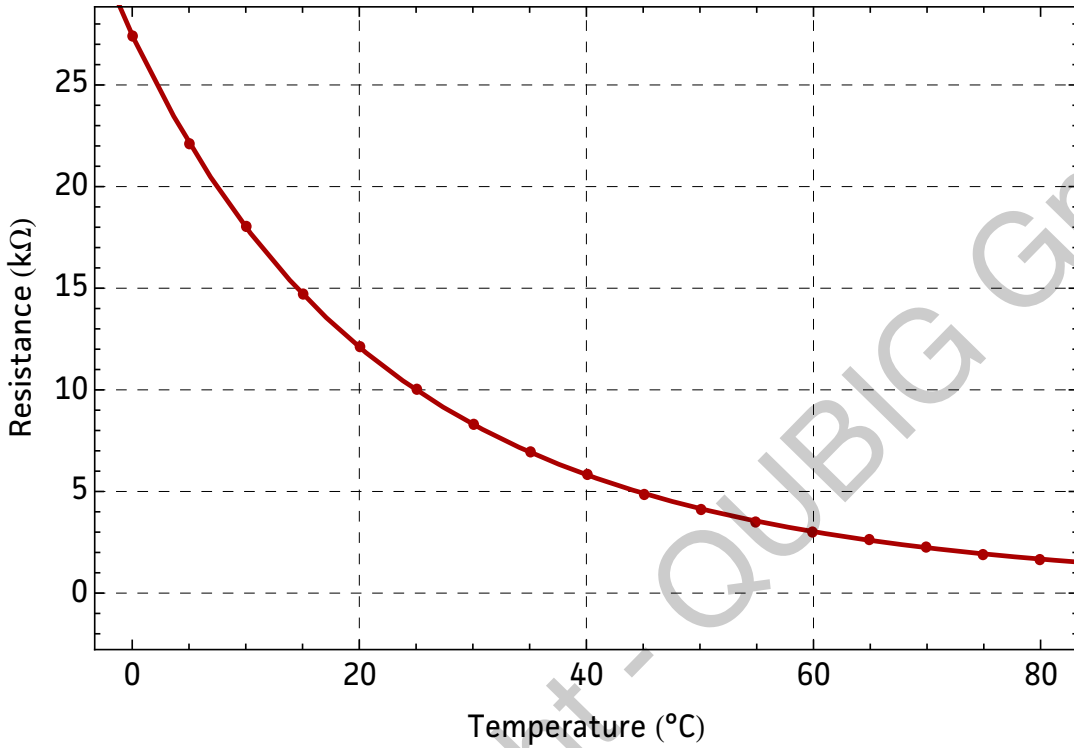
## Package drawing



## NTC characteristics

NTC part number	Resistance (25°C) (ohm)	B-Constant (25-50°C) (K)	Operating Current for Sensor (25°C) (mA)	Rated Electric Power (25°C) (mW)	Typical Dissipation Constant (25°C) (mW/°C)	Thermal Time Constant (25°C) (s)
NXFT15XH103FA2B050	10k +/- 1%	3380 +/- 1%	0.12	7.5	1.5	4

- Operating Current for Sensor rises Thermistor's temperature by 0.1°C
- Rated Electric Power shows the required electric power that causes Thermistor's temperature to rise to 30°C by self heating, at ambient temperature of 25°C.



Part Number	NXFT15XH103
Resistance	10kΩ
B-Constant	3380K
Temp. (°C)	Resistance (kΩ)
-40	197.388
-35	149.395
-30	114.345
-25	88.381
-20	68.915
-15	54.166
-10	42.889
-5	34.196
0	27.445
5	22.165
10	18.010
15	14.720
20	12.099
25	10.000
30	8.309
35	6.939
40	5.824
45	4.911
50	4.160
55	3.539
60	3.024
65	2.593
70	2.233
75	1.929
80	1.673
85	1.455
90	1.270
95	1.112
100	0.976
105	0.860
110	0.759
115	0.673
120	0.598
125	0.532

## TEC characteristics

TEC part number	I <sub>max</sub> (A)	U <sub>max</sub> (V)	Q <sub>cmax</sub> (W)	ΔT <sub>max</sub> (K)	T <sub>max</sub> (°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

