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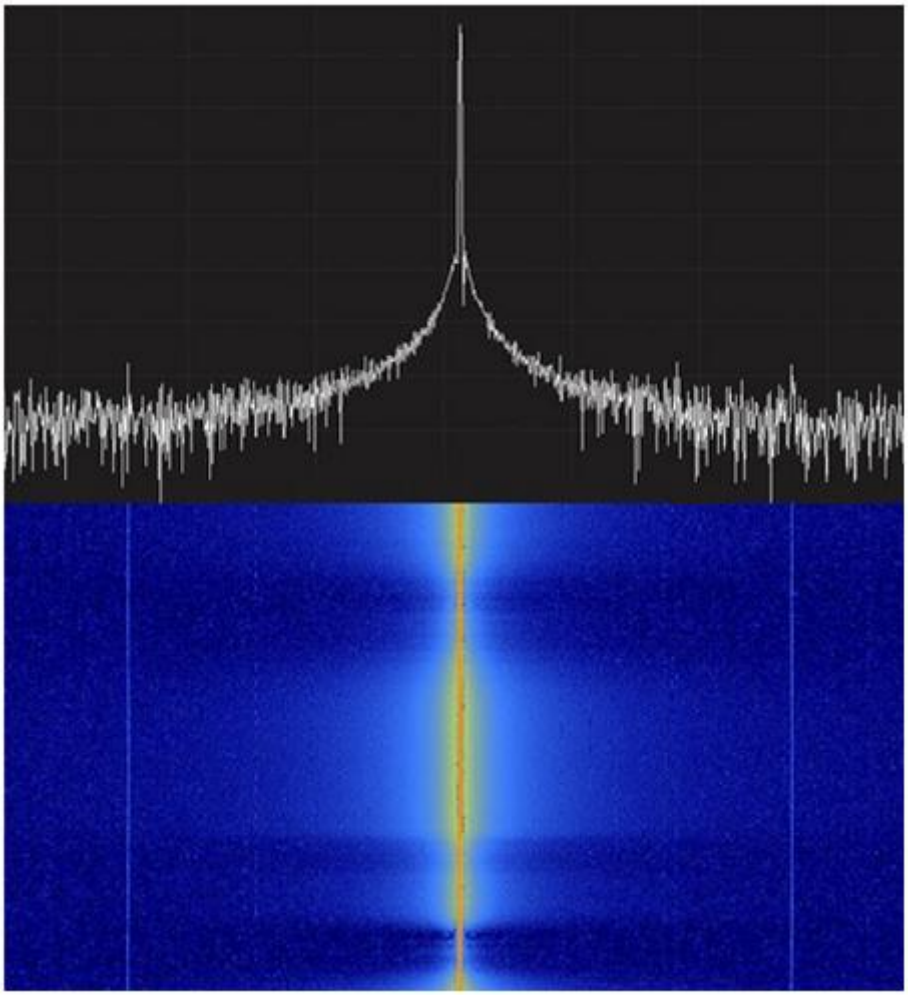
OPERATIONAL MANUAL

Digitally controlled mm-wave generator

Model: OMIL-03/263.45/1/22

TeraHertz series



2017

1. SPECIFICATIONS:

Table 1

N	Parameter	Value
1	FREQUENCY RANGE (CONTROLLED)	**262.45…264.45 GHz**
2	OUTPUT POWER (see Fig. 1)	**22…25 mW (30 mW max)**
3	FREQUENCY STEP (TYP)	**2 kHz**
4	PHASE NOISE (TYP) ***)**	**–50 dBc/Hz @ 10 kHz offset** **–80 dBc/Hz @ 100 kHz offset** **better than –100dBc/Hz @ 1000 kHz offset**
5	FREQUENCY STABILITY	**< 1 MHz over +10…+40°C temperature range**
6	FREQUENCY SETTLING TIME	**1 sec (max)**
7	ABSOLUTE ACCURACY OF SET FREQUENCY	**+/- 0.35 kHz**
8	OUTPUT WAVEGUIDE	**WR-03 with UG0387/U-M flange**
9	OUTPUT FREQUENCY CONTROL INTERFACE/CONNECTOR	**USB-HID (software is included)/USB-mini B**
10	DIMENSIONS AND MASS	**85x125x350 mm, <5 kg**
11	POWER SUPPLY UNIT (PSU)	**external AC(100VAC, 50/60Hz)/DC PSU (is applied), 85x125x240 mm**
12	POWER DC/DC CABLE	**DB9M–DB9F cable,** **1 unit by 5 m is applied**
13	USB INTERFACE CABLE	**USB-A–USB-mini B cable,** **1 unit by 5 m is applied**
14	OPERATING TEMPERATURE	**+10…+40°C**
15	OPERATING HUMIDITY	**< 70% (non-condensing) at Temp range +10 to +40°C**

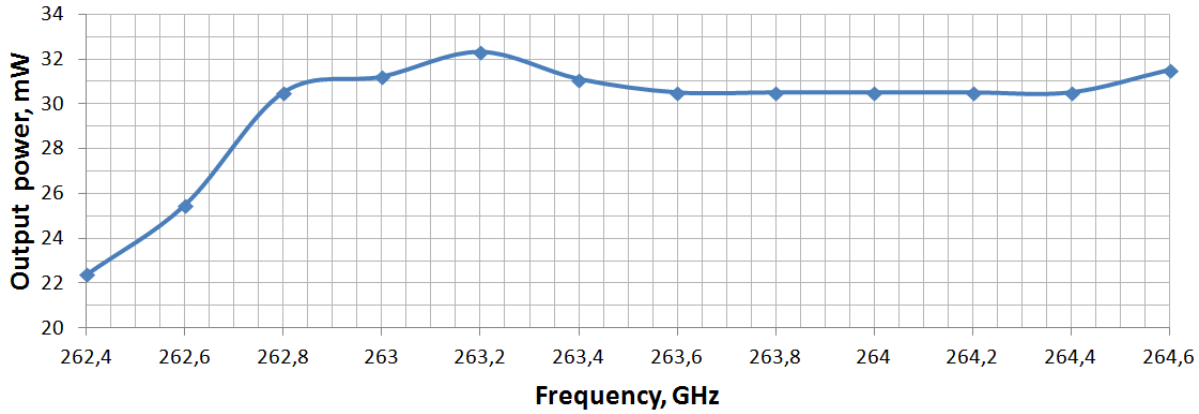


Fig. 1 RF output power vs. frequency

***)** Approximately from LO measured data.

2. OUTWARD VIEW

Generator:

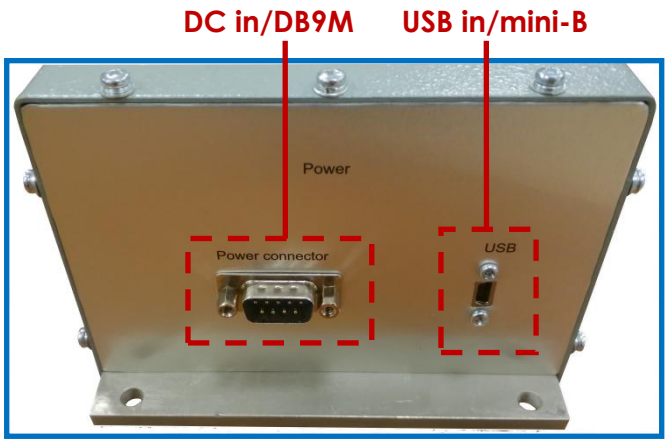


Fig. 2 Generator control panel

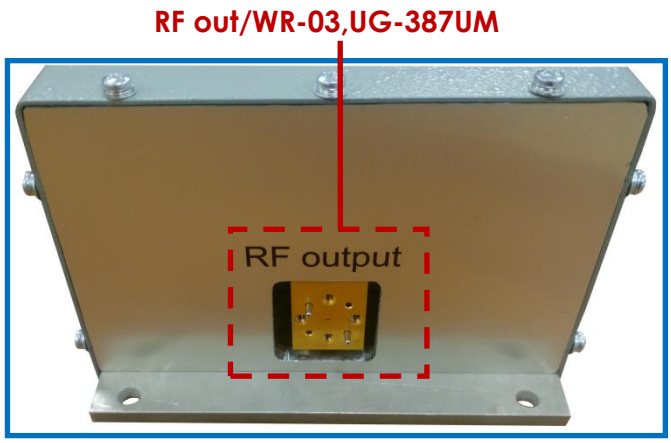


Fig. 3 Generator RF output panel

External PSU:

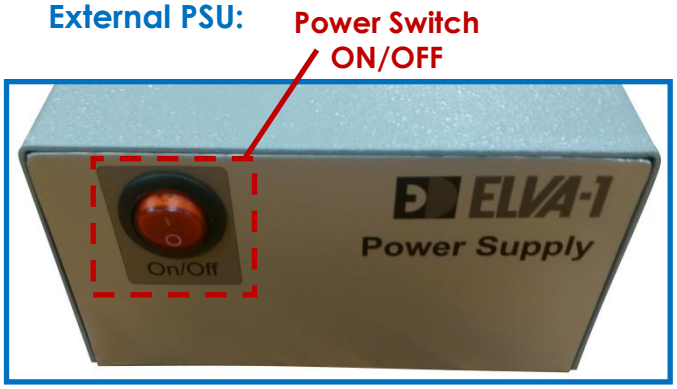


Fig. 4 PSU front panel

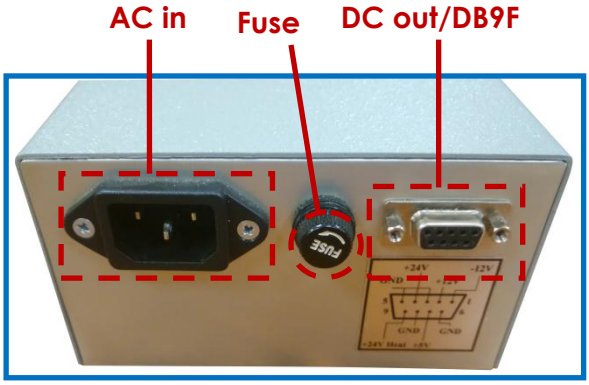
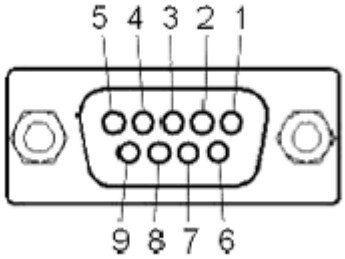


Fig. 5 PSU rear panel

Power socket pinout (PSU rear panel):



1: -12V	6: GND
2: +12V	7: +5V
3: GND	8: GND
4: +24V	9: +24V
5: GND	

!!ATTENTION!!
Use the device only with the supplied PSU

3. HOW TO USE:

To prepare for the use, follow the steps:

- carefully read this manual and install software from the DVD to your PC;
- remove the protective covers from the waveguide and other elements;
- to conduct an external inspection of the device and external PSU, make sure that there is no mechanical damage to the case and connecting elements;
- mount the device and external PSU to the workplace;
- put the power switch on external PSU to «**OFF**» position and connect the DC/DC external power supply cable;
- connect the external PSU to a power source (AC input);
- connect the USB cable to the «**USB**» socket on the device communication side and to PC;
- put the power switch on the external PSU to the «**ON**» position and wait 20…30 minutes for the device warming up;
- run the «**Frequency Tuning Tool**» on your PC, and configure current frequency. Device is ready for use!

!!ATTENTION!!
The device saves the settings after power switch is turned «OFF»

4. CONTROL INTERFACE DEFINITION

Remote device management is carried out on the USB-HID interface. For the under-connecting to a PC (HOST) the device (CLIENT) provides a mini-USB socket. For remote control, you can use the GUI software «**Frequency Tuning Tool**» (Fig. 6) in the sales package. The software is easy to learn and does not require any additional comments. You can also write your application.

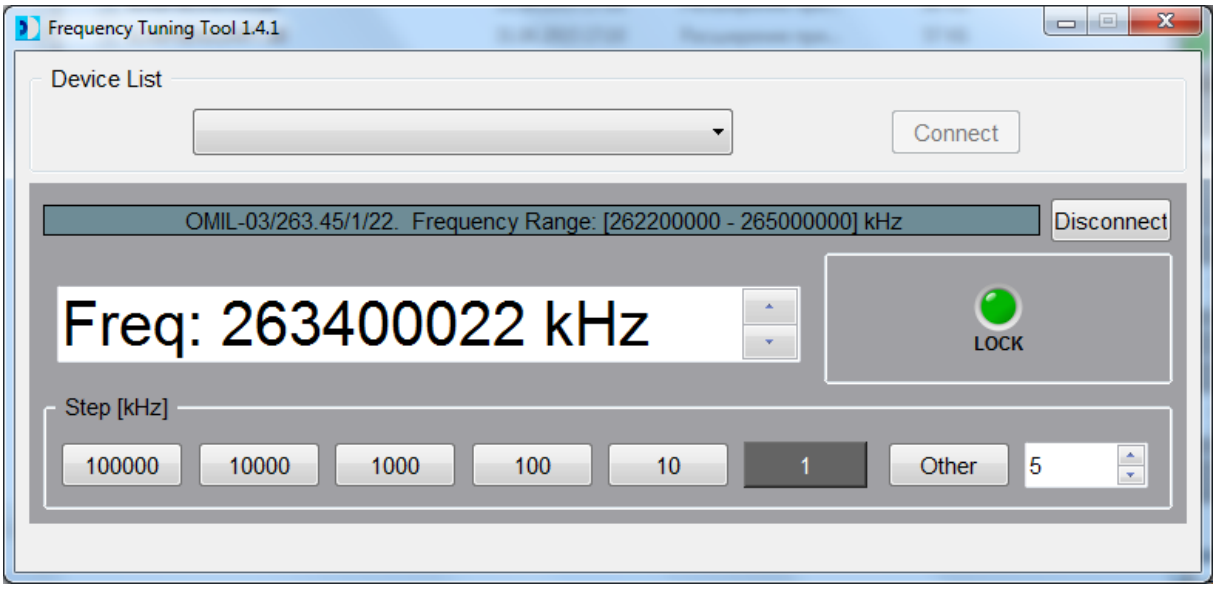


Fig. 6 Frequency Tuning Tool graphic user interface

The USB interface is implemented on the USB-UART Bridge CP2110 (Silicon Laboratories). The manufacturer supplies a complete set of documents, required for using this chip. Table 2 shows the CP2110 chip configuration. A detailed description of communication protocol is given below. Complete documentation is on the DVD in the sales package.

Table 2

Parameter	Value
USB-HID descriptors	
VID (hex)	**0x10C4**
PID (hex)	**0xEA80**
Power Mode	**Self powered**
Manufacturing String	**ELVA-1**
Product String	**SYN-130-1**
Serial String	**002C7EF4**
UART parameters	
Baud Rate	**115200**
Parity	**0x00 (None)**
Flow Control	**0x00 (None)**
Data Bits	**0x08 (8 bits)**
Stop Bits	**0x01 (1 bit)**

Command 1: Device information

The command requests main device information. Command description is shown in Table 3.

Table 3

Command 1: Device information			
N byte		**Description**	**Value, hex**
HOST (request)	0	prefix	0xA0
	1	command code	0x01
	2	command length	0x04
	3	postfix	0xF0
CLIENT (answer)	0	prefix	0xA1
	1	command code	0x01
	2	command length	0x25
	3	DEV_ID(LSB first) – device ID in 16 Bytes of ASCII data type array	DEV_ID[0]
	…		…
	18		DEV_ID[15]
	19	reserved	0x20
	20	Freq_Min (MSB first) – lower frequency value [kHz] in format: $2\sum_{i=0}^{8}((\text{Freq\_Min}[i]-0\text{x}30)\cdot 10^{i})$	Freq_Min[8]
	…		…
	28		Freq_Min [0]
	29	Freq_Max (MSB first) – upper frequency value [kHz] in format: $2\sum_{i=0}^{8}((\text{Freq\_Max}[i]-0\text{x}30)\cdot 10^{i})$	Freq_Max[8]
	…		…
	37		Freq_Max[0]
	38	postfix	0xF1

Example		
Source	**Package in hex**	**Description**
HOST(request):	A0 01 04 F0	request device info
CLIENT(answer):	A1 01 27 53 59 4E 2D 31 33 30 2D 30 31 20 20 20 20 20 20 20 31 33 31 31 30 30 30 30 30 31 33 32 35 30 30 30 30 30 F1	ID:'SYN-130-01 '; Freq. range: 262200000… 265000000 kHz

Command 2: Status request

The command requests current status of device and lets you know frequency value. Command description is shown in Table 4.

Table 4

Command 2: Status request			
N byte		**Description**	**Value, hex**
HOST (request)	0	prefix	0xA0
	1	command code	0x02
	2	command length	0x04
	3	postfix	0xF0
CLIENT (answer)	0	prefix	0xA1
	1	command code	0x02
	2	command length	0x0E
	3	LOCK_ST – the byte of PLL detector: 0x00 – frequency capture is lost; 0x01 – frequency capture is present (locked). 0x02 – PLL detector not available	LOCK_ST
	4	Cur_Freq (MSB first) – current frequency [kHz] in format: $2\sum_{i=0}^{8}((\text{Cur\_Freq}[i]-0\text{x}30)\cdot 10^{i})$	Cur_Freq[8]
	5		Cur_Freq[7]
	6		Cur_Freq[6]
	7		Cur_Freq[5]
	8		Cur_Freq[4]
	9		Cur_Freq[3]
	10		Cur_Freq[2]
	11		Cur_Freq[1]
	12		Cur_Freq[0]
	13	postfix	0xF1

Example		
Source	**Package in hex**	**Description**
HOST(request):	A0 02 04 F0	request status
CLIENT(answer):	A1 02 0E 01 31 33 31 31 30 30 30 30 30 F1	LOCK_ST = 1; Fout = 262200000 kHz

Command 3: Frequency setting

This command set a frequency value. Command parameter stored in nonvolatile reprogrammable flash memory on device board. Command description is shown in Table 5.

Table 5

Command B: Frequency setting			
N byte		**Description**	**Value, hex**
HOST (request)	0	prefix	0xA0
	1	command code	0x03
	2	command length	0x0D
	3	Set_Freq (MSB first) –frequency in format: $2\sum_{i=0}^{8}((Set\_Freq[i]-0x30)\cdot 10^{i})$ [kHz]	Set_Freq[8]
	4		Set_Freq[7]
	5		Set_Freq[6]
	6		Set_Freq[5]
	7		Set_Freq[4]
	8		Set_Freq[3]
	9		Set_Freq[2]
	10		Set_Freq[1]
	11		Set_Freq[0]
	12	postfix	0xF0
CLIENT (answer)	0	prefix	0xA1
	1	command code	0x03
	2	command length	0x04
	3	postfix	0xF1

Example		
Source	**Package in hex**	**Description**
HOST(request):	A0 03 0D 31 33 31 35 30 30 30 30 30 F0	set 263000000kHz (263000000/2 =131500000kHz)
CLIENT(answer):	A1 03 04 F1	command is received and processed