

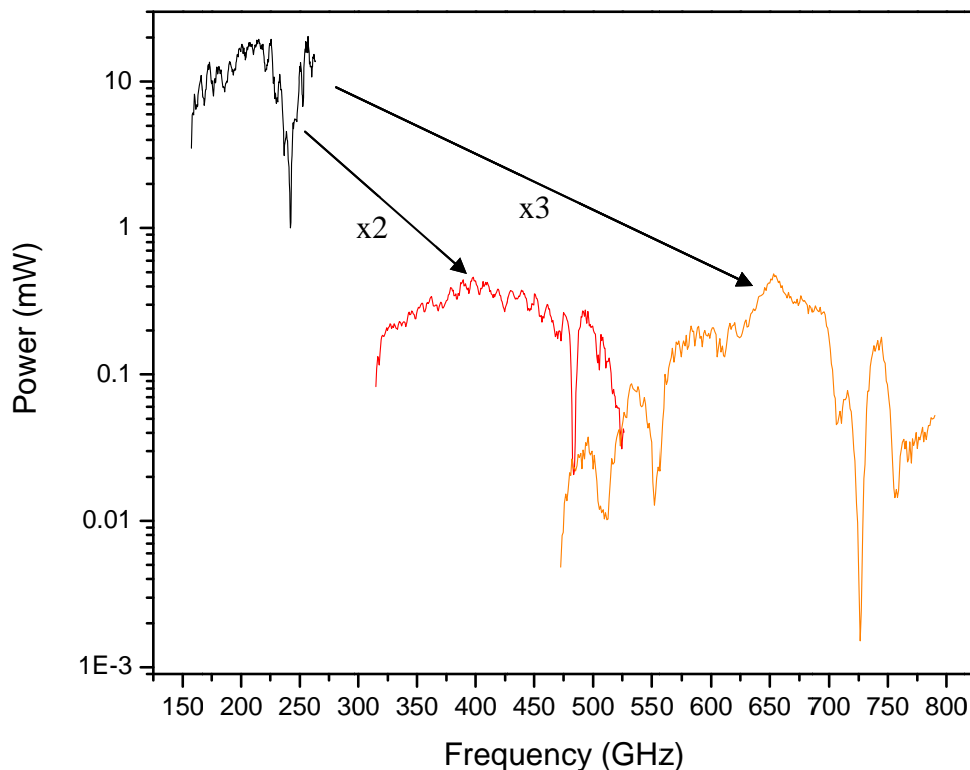
# QS1-260-750 Quasi-Optical Source



Frequency Range (GHz)	Power Range (mW)
160-260	1-20
320-520	0.01-0.45
480-780	0.01-0.45

1. Cathode voltage, V	<b>2000±50</b>
2. Cathode current, mA	<b>20</b>
3. Grid voltage, V	200±10
4. Heater current, A	<b>1.24±0.01</b>
5. Output frequency, GHz	200±1

The QS1-260-750 quasi-optical source is a hybrid device composed of a QS1-260 (OV-24) backward wave oscillator (BWO), waveguide adapter and several Schottky diode multipliers, including a frequency doubler, secondary tripler and a standalone tripler. It is tunable across the 160-260 GHz, 320-520 GHz, and 480-780 GHz frequency ranges.



The unit is rapidly configurable for any of those ranges. This makes it an excellent choice for a broad range of research and industrial applications.

The QS1-260 BWO can either be pre-packaged into MS-0.6 magnetic systems or used with any other MS-X.X system offered by Microtech Instruments Inc. Operation of QS1-260 also requires a high voltage power supply such as VR-6M and a water cooling system. In the baseline configuration, QS1-260 produces up to 20 mW of continuous wave tunable monochromatic power with a bandwidth of 3 MHz. A typical output power spectrum of QS1-260 is shown in Figure 1.

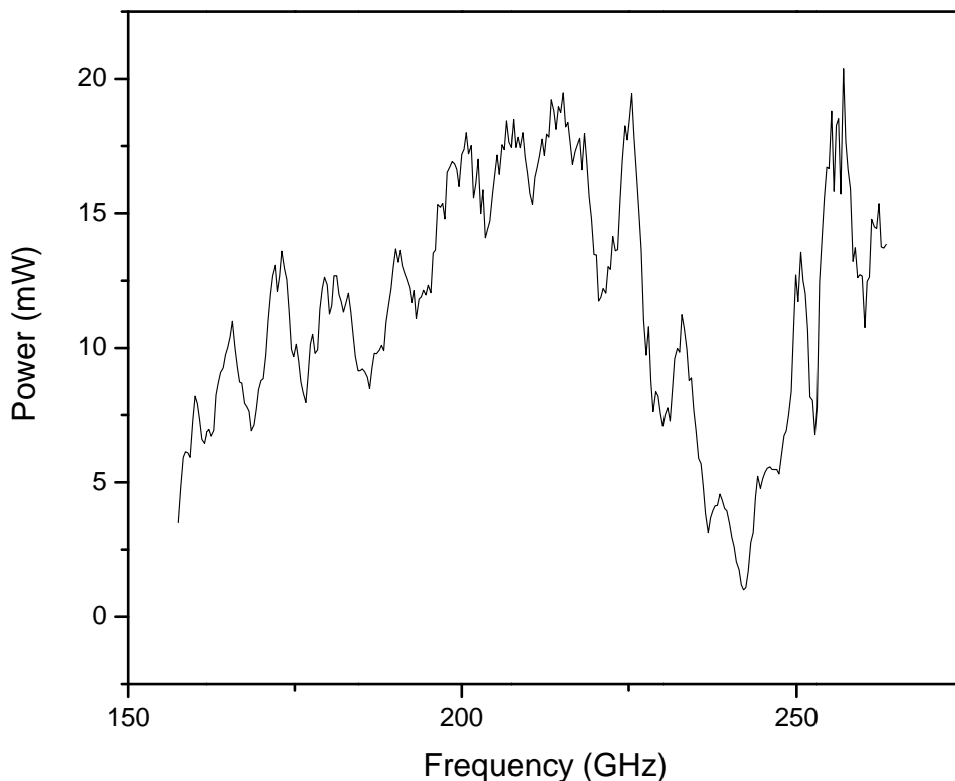


Figure 1: Typical power spectrum from a QS1-260 BWO source with waveguide adapter

The Schottky diodes attach easily to the wave guide adapter for quick range changes. With the frequency doubler the power spectrum has a broad usable range 380-780 GHz with power up to 0.45 mW. The frequency doubled configuration has a bandwidth of 10 MHz. The secondary tripler affords a frequency range of 960-1560 GHz with a bandwidth of approximately 30 MHz and power up to 0.017 mW. Finally, the other tripler has a frequency range of 480-780 with power up to 0.45 mW and bandwidth 10 MHz. Typical spectrums for the QS1-260-750 are shown below.

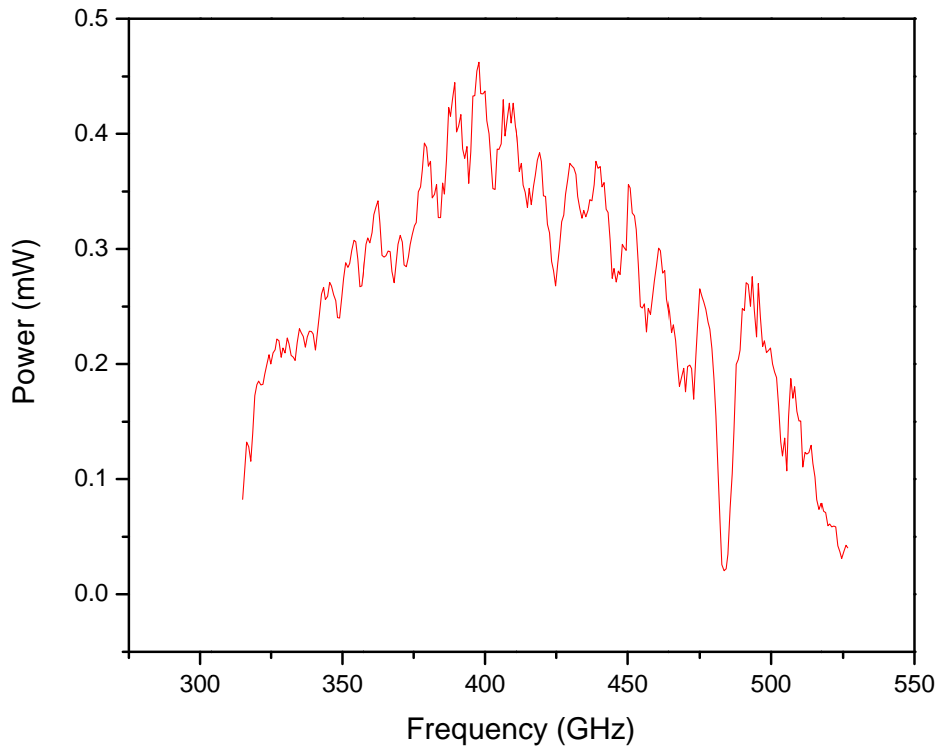


Figure 2: Typical power spectrum of a QS1-260-D generator.

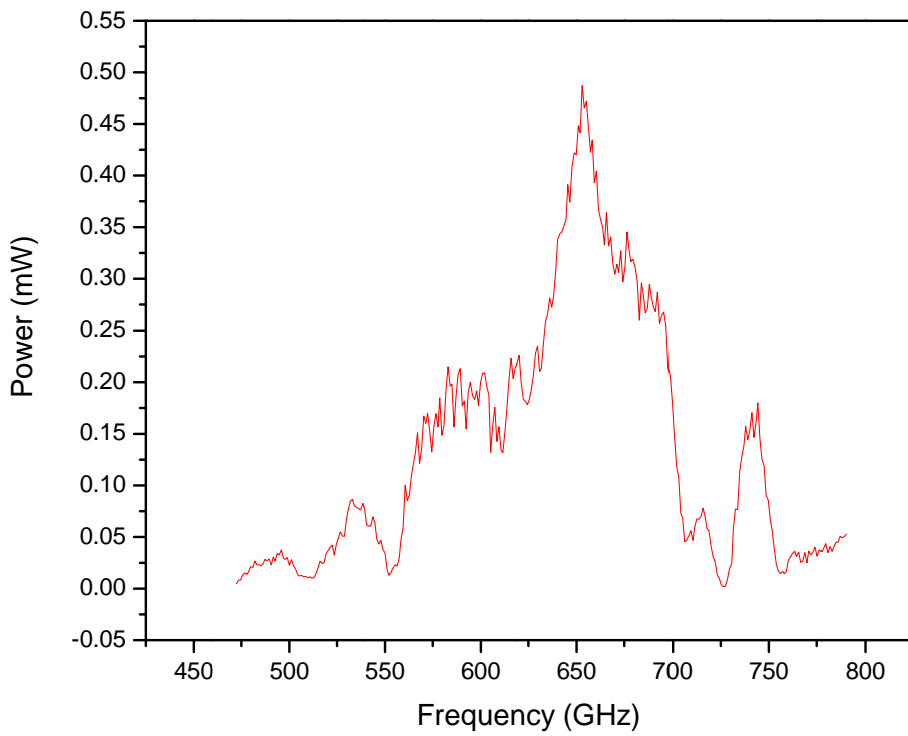
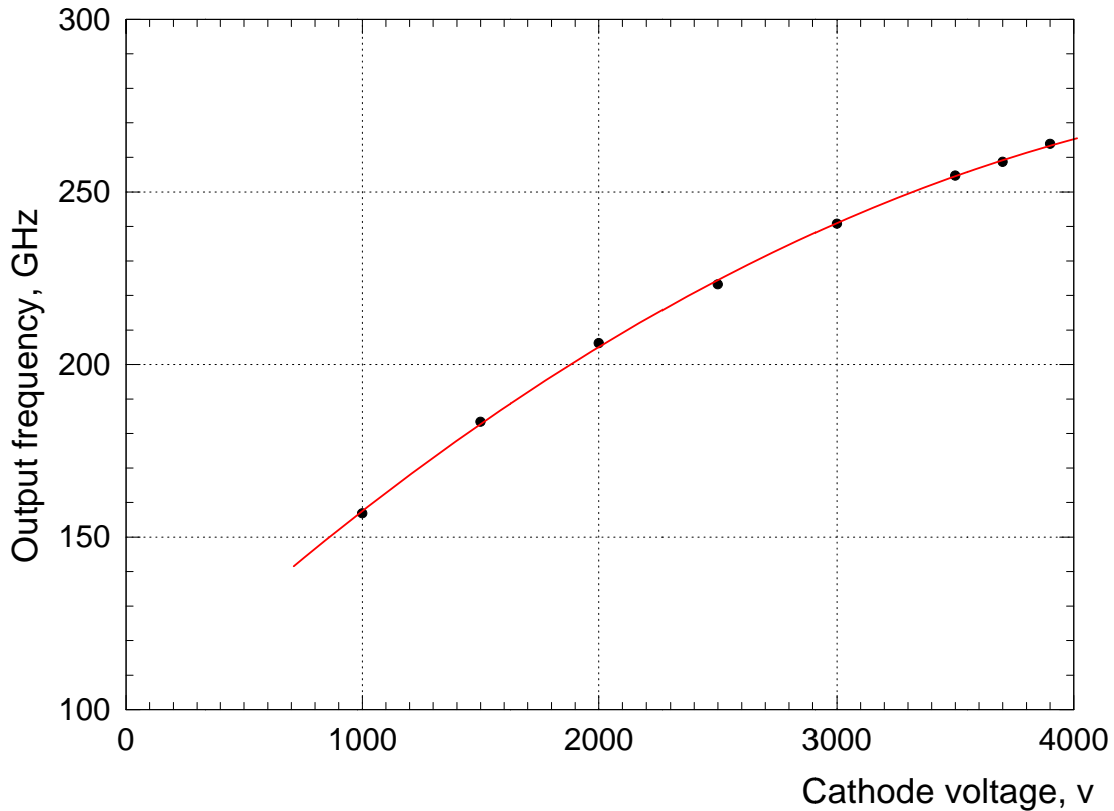


Figure 3: Typical power spectrum of a QS1-260-T generator.

For those applications that don't require high power in 260-750 GHz range, QS1-260-750 offers a very attractive alternative to more expensive and complex systems. QS1-260-750 also bridges the gap of 400-500 GHz, which is not covered by any BWO, unless it is combined with a frequency multiplier.

### CALIBRATION CURVE



### CALIBRATION POLYNOMIAL

$$1) U(f) = (U_0 + U_1 f + U_2 f^2 + U_3 f^3)^2,$$

$$2) f(U) = f_0 + f_1 \sqrt{U} + f_2 U + f_3 U^{3/2},$$

U in Volts, f in GHz

Table of the polynomial parameters for working interval

<b>U<sub>0</sub> = -29.3730577361</b>	<b>f<sub>0</sub> = 53.2243926582</b>
<b>U<sub>1</sub> = 0.5904719042</b>	<b>f<sub>1</sub> = 2.4380379728</b>
<b>U<sub>2</sub> = -0.0018229556</b>	<b>f<sub>2</sub> = 0.0384535787</b>
<b>U<sub>3</sub> = 0.0000034245</b>	<b>f<sub>3</sub> = -0.0003760216</b>

Mean square deviation U(F) s=0.3134% F(U) s=0.2335%

## Turn ON Procedure for QS1-260-750 (Using VR6-M BWO Power supply)

1. Confirm the following settings for switches on VR6-M front panel
  - “Range kV” selector is set at **4 kV**
  - “Control” switch is in “INT” position
  - “Heater current control” is set at 2-3% below the value specified in control point parameter table (Section II)
2. Turn ON the main power by pushing the **big black “ON” button on the right side of VR6-MU**. Green Power indicator will light up at this point.
3. Press the “LOAD” button (above the heater current control). Green indicator above the load button will start blinking and heater current will increase gradually. Once the heater current reaches a preset value, the green indicator will stop blinking.
4. Turn the “COARSE” adjustment knob all the way counter clockwise (setting it to zero) and make 2 turns in the clockwise direction. This will preset the high voltage in 1000-1500 V range
5. Switch ON high voltage by pressing the **big black “ON” button on the left side of VR6-M** front panel. Red “High Voltage” indicator will light up and cathode voltage meter should show 1000-1500V at this point.
6. Set cathode voltage at the control point value (specified in Section II) by “COARSE” potentiometer.
7. By adjusting the heater current set the cathode current to a value 1-2 mA smaller than the control point value. The heater current setting is adjusted by entering a new value and pressing the load button again. Once the tube warms up (after 20-30 minutes), the cathode current should reach the control point value.
8. Change the cathode voltage to choose the output frequency required. Do not exceed maximum voltage specified in Section I.

## Turn OFF procedure for QS1-260-750 (Using VR6-M BWO Power supply)

1. **Turn OFF the high voltage** by pressing the big red button on the left side of VR6-M front panel.
2. Press the red “UNLOAD” button. Wait until the heater current goes down to zero and green indicator stops blinking.
4. Switch OFF the main power by pressing the big red button on the right side of VR6-M front panel.

**Please follow recommended Turn ON/OFF procedures to prevent damage of quasi-optical sources.**

**Please check the cathode current at the control point once every 30 minutes to make sure it does not exceed the value specified in Section II.**