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**SWEEP GENERATOR**



- ◆ Full waveguide bandwidth
- ◆ BWO source
- ◆ High output power
- ◆ GPIB, USB, RS-232 programmable

The **G440XE** Sweep Generators are a portable powerful wideband general-purpose sources for swept and CW microwave measurements local, remote, manual or automated testing. It incorporates the efficiency of micro-processing control with state-of-the-art BWO oscillator to produce a high performance sweep generator system suited for either manual or automatic measurements.

Model number	Frequency range, GHz	Frequency accuracy, %	Frequency stability	Residual FM	Min/Typ* output power, mW	Output VSWR
<b>G4406E</b>	33 - 50	±0.2	2·10 <sup>-4</sup>	2·10 <sup>-6</sup>	5/25	1.5
<b>G4404E</b>	50 - 75	±0.2	2·10 <sup>-4</sup>	2·10 <sup>-6</sup>	5/25	1.5
<b>G4403E</b>	75 - 110	±0.2	2·10 <sup>-4</sup>	2·10 <sup>-6</sup>	3/10	1.5
<b>G4402E</b>	110 - 170	±0.2	2·10 <sup>-4</sup>	2·10 <sup>-6</sup>	2/5	1.5

CW, internal square-wave modulation and external pulse modulation modes	
Internal square-wave modulation frequencies:	1 and 100 kHz
External pulse modulation (with external pin modulator, optional)	
- pulse duration:	50 ns
- pulse repetition rate:	1-10 kHz
External square-wave modulation frequencies:	0.3-10 kHz
Operating temperature range:	5-40 °C
Sweep time:	0.08, 1.0, 40 s
Remote programming:	IEEE-488, USB, RS-232C
Mains power source requirements:	220±20 V, 50-60, 400 Hz
Power consumption:	250 V·A
Dimensions:	360 x 160 x 380 mm
Weight:	12 kg

\* Required output power is a subject of negotiation with customer



**SIGNAL GENERATOR**



- ◆ **BWO source**
- ◆ Reference output power
- ◆ **GPIB, USB, RS-232 programmable**

The **G4-1XXM** series Signal Generator is general-purpose source for testing and verification of microwave equipment in industrial and laboratory conditions. The instrument provides high accuracy millimeter-wave signal level in wide attenuation range and can be integrated in manual or automatic measurement systems.

Model number	Operation frequency range, GHz *	Frequency accuracy, %	Frequency stability	Residual FM	Reference output power level, mW	Output VSWR
<b>G4-178M</b>	33 - 50	±0.2	±2·10 <sup>-4</sup>	2·10 <sup>-6</sup>	0.5	1.5
<b>G4-179M</b>	50 - 75	±0.2	±2·10 <sup>-4</sup>	2·10 <sup>-6</sup>	0.5	1.5
<b>G4-199M</b>	90 - 100	±0.2	±2·10 <sup>-4</sup>	2·10 <sup>-6</sup>	0.1	1.5
<b>G4-177M</b>	129.2 - 142.8	±0.2	±2·10 <sup>-4</sup>	2·10 <sup>-6</sup>	0.1	1.5

Reference power attenuation range: from 0 to minus 100 dB
Reference power level maintenance level error: ± 1.0 dB
Reference power attenuation level set accuracy: for 0÷20dB: not more than 0.4dB; for 20÷100dB: not more than 2%A; for 100÷120dB: 2dB+3%A-100dB; where A is set attenuation in dB
CW, internal square-wave modulation and external pulse modulation modes
Internal square-wave modulation frequencies: 1 kHz
External pulse modulation (with external pin modulator, optional)
- pulse duration: 50 ns ±2µs
- pulse repetition rate: 0.1-20 kHz
External square-wave modulation frequencies: 0.3-10 kHz
Operating temperature range: 5-40 °C
Microwave signal radiation level 5·10 <sup>-5</sup> W/m <sup>2</sup> at 1 m distance
Remote programming: IEEE-488 (IEC 625 part I), USB, RS-232C
Mains power source requirements: 220±22 and 110±11 V, 50-60, 400 Hz
Power consumption: 300 V·A
Size: 495x132x475 mm
Weight: 16.5 kg

\* The Instrument operation frequency range should be specified separately (customised) for short pulse modulation.

**SCALAR NETWORK ANALYZER**



- ◆ Automated scalar measurements from 33 to 170 GHz
- ◆ Full waveguide bandwidth
- ◆ PC based Instrument
- ◆ ETHERNET programmable

The **R24XE** Scalar Network Analyzers provide both manual and automated VSWR, insertion and return losses' measurements in five rectangular waveguide bands from 33 to 225 GHz. The system consists of the G44XE sweep generator, waveguide reflectometer, network analyzer and personal computer\*.

Model number	Frequency range, GHz	Frequency accuracy, %	VSWR meas range	VSWR meas accuracy, %	Transmission loss meas. range, dB	Transmission loss meas. accuracy, dB
<b>R2406E</b>	33 – 50	±0.2	1.1-5.0	±(5K+5) for K=1.1-2.0	0-35	±(0.6+0.06A) A=0-30 dB
<b>R2404E</b>	50 - 75	±0.2	1.1-5.0	±(5K+5) for K=1.1-2.0	0-35	±(0.6+0.06A) A=0-30 dB
<b>R2403E</b>	75 - 110	±0.2	1.1-5.0	±(5K+6) for K=1.1-2.0	0-35	±(0.6+0.06A) A=0-25 dB; ±(0.4+0.1A) A>25 dB
<b>R2402E</b>	110 - 170	±0.2	1.1-5.0	±(5K+6) for K=1.1-2.0	0-35	±(0.6+0.06A) A=0-25 dB; ±(0.8+0.08A) A>25 dB
<b>R24015E</b>	170 - 225	±0.2	1.1-5.0	±(5K+6) for K=1.1-2.0	0-30 @ 170-215 GHz 0-20 @ 215-225 GHz	±(0.6+0.06A) A=0-25 dB; ±(0.8+0.08A) A>25 dB
Operating temperature range			5-40 °C			
Mains power source requirements:			220±20 V, 50-60 Hz			
Power consumption			400 V·A			
Remote programming			ETHERNET			

\* PC is not included into delivery set of the Instrument

**VECTOR NETWORK ANALYZER**



- ◆ Automated vector measurements in frequency range from 33 to 170 GHz
- ◆ Full waveguide frequency bandwidth
- ◆ PC based Instrument
- ◆ ETHERNET programmable

The **R44XXE** Vector Network Analyzers are designed for measuring of S-parameters, VSWR and impedance of waveguide networks in the full frequency ranges of rectangular waveguides between 33 and 170 GHz. Frequency accuracy is  $\pm 0.2\%$ . The measurement range of reflection factor modulus is from 0 to 1. The measurement range of reflection factor phase is from 0 to  $\pm 180^\circ$  for  $0.1 < |G_x| < 1$  with accuracy  $\pm 7.5^\circ$  in 18-75 GHz frequency range and  $\pm 9.6^\circ$  in 75-170 GHz frequency range.

The measurement range of transmission factor phase is from 0 to  $\pm 180^\circ$  with accuracy  $\pm(5+0.1 |A_x|)^\circ$  for  $A_x > -50$  dB in frequency range to 75 GHz, for  $A_x > -30$  dB - to 170 GHz. Data can be displayed in the rectangular, Smith or polar diagrams.

Model number	Frequency range, GHz	VSWR measur. range	Attenuation meas. range, dB	VSWR measur. accuracy, %	Reflection factor modulus meas. accuracy	Attenuation meas. accuracy, dB
R4406E*	33 - 50	1.03 - 5	+10 ÷ -60	$\pm 10$ for K=1.03-2	$\pm 0.044$ for $ \Gamma_x  = 0.33$	$\pm(0.2+0.03 A_x )$ K < 1.2
R4404E*	50 - 75	1.03 - 5	+10 ÷ -60	$\pm 10$ for K=1.03-2	$\pm 0.044$ for $ \Gamma_x  = 0.33$	$\pm(0.2+0.03 A_x )$ K < 1.2
R4403E*	75 - 110	1.03 - 5	0 ÷ -50	+13.5 -11.5 for K=1.03-2	$\pm 0.056$ for $ \Gamma_x  = 0.33$	$\pm(0.3+0.04 A_x )$ K < 1.2
R4402E*	110 - 170	1.03 - 5	0 ÷ -50	+13.5 -11.5 for K=1.03-2	$\pm 0.056$ for $ \Gamma_x  = 0.33$	$\pm(0.3+0.04 A_x )$ K < 1.2
Operating temperature range				5-40 °C		
Mains power source requirements:				220±20 V; 50-60 Hz		
Power consumption				400 V·A		

\* discontinued models; new models are under construction.

**DIRECT READING ATTENUATOR**



manual



programmable; remote control; USB.

The **DA-XXE** Millimeter-Wave Direct Reading Attenuators are rotary-vane type attenuators. The value of attenuation is determined by the angle of rotation of a resistive film with respect to the waveguide and thus is independent of frequency.

The Attenuators are provided in seven waveguide bands between 18 GHz and 225 GHz.

Model number	Frequency range, GHz	Waveguide type	Waveguide flange	Attenuation accuracy	Insertion loss, dB, max	VSWR, max
DA-12E	18 – 26.5	WR - 42	UG 595/U		0.5	1.15
DA-08E	26.5 - 40	WR - 28	UG 599/U		0.6	1.15
DA-06E	33 - 50	WR - 22	UG 383/U	$\pm 0.2\text{dB}$ for $A=0\div 10\text{dB}$ ; $\pm 0.02 \cdot A$ for $A=10\div 50\text{dB}$ ;	0.8	1.2 <sub>(33-34GHz)</sub> 1.15 <sub>(34-50GHz)</sub>
DA-04E	50 - 75	WR - 15	UG 385/U	$\pm [1+0.08 \cdot (A-50)]\text{dB}$ for $A=50\div 60\text{dB}$ , where A is attenuation in dB.	1.0	1.15
DA-03E	75 - 110	WR - 10	UG 387/UM		1.5	1.2
DA-02E	110 - 170	WR - 06	UG 387/UM		3.0 <sub>(110-114 GHz)</sub> 2.5 <sub>(114-120 GHz)</sub> 2.0 <sub>(120-170 GHz)</sub>	1.3 <sub>(110-114 GHz)</sub> 1.2 <sub>(114-170 GHz)</sub>
DA-015E	170 - 225	WR - 05	UG 387/UM	$\pm 0.3\text{dB}$ for $A=0\div 10\text{dB}$ ; $\pm 0.02 \cdot A$ for $A=10\div 30\text{dB}$ ;	3.0	1.3
DA-010E	220-325	WR - 03	UG 387/UM	$\pm 0.4\text{dB}$ for $A=0\div 10\text{dB}$ ; $\pm 0.02 \cdot A$ for $A=10\div 30\text{dB}$ ;	$\leq 5.0$ @ 220-230 GHz $\leq 4.0$ @ 230-325 GHz	1.55

Attenuation range 0 ÷ 60 dB for WR-42, WR-28, WR-22, WR-15, WR-10, WR-6 models

Attenuation range 0 ÷ 30 dB for WR-5, WR-3 model

Power rating (CW, max): 20-100 mW, depending on the frequency range

**STRAIGHT WAVEGUIDE SECTION**



RN



SB

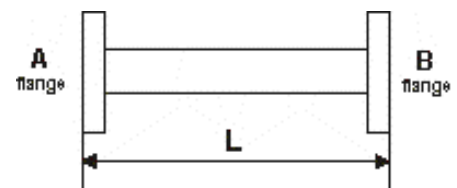
- Precision flanges (optional)
- Low VSWR
- Low insertion losses

Straight sections are used to make connections between components in waveguide systems. Lengths and combinations are available on special order. VSWR is better than 1.1 over the full waveguide frequency band (within 33-220 GHz).

Model number	Frequency range, GHz	Waveguide size	VSWR
SW-06E	33 - 50	WR-22	1,1
SW-04E	50 - 75	WR-15	1,1
SW-03E	75 - 110	WR-10	1,1
SW-02E	110 - 170	WR-6	1,1
SW-015E	140 - 220	WR-5	1,1
SW-012E	170 - 260	WR-4	
SW-010E	220 - 325	WR-3	
SW-008E	260 - 400	WR-2.8 (0.711x0.356(mm))	
SW-006E	325 - 500	WR-2.2 (0.559x0.279(mm))	
SW-005E	400 - 600	WR-1.9 (0,48 x 0,24)	
SW-004E	500 - 750	WR-1.5 (0.38x0.19)	

**ORDER INFORMATION**

- XX Operation range wave length, mm
- L Waveguide length, mm
- F Finish code (flanges):  
S – silver  
- gold
- G



SW-XXE/L-F

**Example: SW-06E/50-S**

Straight section for 33 - 50 GHz frequency range, 50mm length, silver plated.



**BEND WAVEGUIDE SECTION**



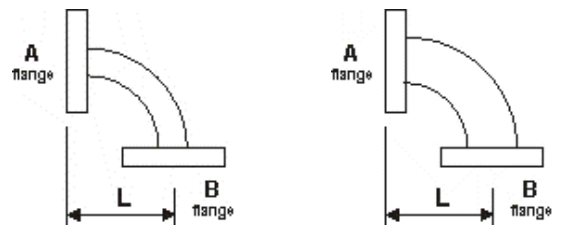
- Precision flanges (optional)
- Low VSWR
- Low insertion losses

E- or H-Plane Bends are essential parts of every waveguide systems. E- or H-Plane formed bends are available with angles of 15°, 30°, 45°, 90°. Maximum VSWR is 1.1 (within 33-170 GHz). The sizes and combinations are available on request.

Model number	Frequency range, GHz	Waveguide size	VSWR
BE90-06E BH90-06E	33 - 50	WR-22	1,1
BE90-04E BH90-04E	50 - 75	WR-15	1,1
BE90-03E BH90-03E	75 - 110	WR-10	1,1
BE90-02E BH90-02E	110 - 170	WR-6	1,1
BE90-015E BH90-015E	140 - 220	WR-5	1.15
BE90-012E BH90-012E	170 - 260	WR-4	1.15
BE90-010E BH90-010E	220 - 325	WR-3	1.2
BE90-006E/SB BH90-006E/SB	325 - 500	WR-2.2	1.3

**ORDERING INFORMATION**

- XX Operation range wave length, mm
- L Dimensions, (mm)
- E E -plane bend
- H H - plane bend
- Finish (flanges):
- F S – silver
- G - gold
- YY Degrees
- 90°, 45°, 30°, 15°, (and others)



**BEYYD-XXE/L-F**

Example: **BE90-06E/50-S**

E-Plane Bend for 33 - 50 GHz frequency range, 50mm length, 90° angle, silver plated.

**TWIST WAVEGUIDE SECTION**



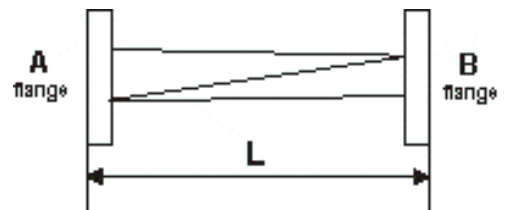
- Precision flanges (optional)
- Low VSWR
- Low insertion losses

Twists of 90° and 45° are used for changing of polarization in waveguide networks. Twists with different angles and combinations of bends are available on special order. Maximum VSWR is less than 1.10 over the full frequency range (within 33-170 GHz).

Model number	Frequency range, GHz	Waveguide size	VSWR
TW90-06E	33 - 50	WR-22	1,1
TW90-04E	50 - 75	WR-15	1,1
TW90-03E	75 - 110	WR-10	1,1
TW90-02E	110 - 170	WR-6	1,1
TW90-015E	140 - 220	WR-5	1.15
TW90-012E	170 - 260	WR-4	1.15
TW90-010E	220 - 325	WR-3	1.2
TW90-006E	325 - 500	WR-2.2	1.3

**ORDERING INFORMATION**

- XX Operation range wave length, mm
- L Length, (mm)
- YY Twist angle  
90°, 45°, (and others)
- Finish (flanges):
- F S – silver  
G - gold



**TWYYD-XXE/L-F**

**Example: TW90D-06E/50-S**

Twist for 33 - 50 GHz frequency range, 50mm length, 90° twist angle, silver plated.

**DIRECTIONAL COUPLER**



- High directivity
- Minimum coupling variation and insertion loss
- Low VSWR

The **DCZ-XXE/Y** directional couplers are used for extracting or introducing RF power flow in a transmission line without distortion of signal characteristics. The directional couplers are available in 3, 6, 10, 15, 20 dB coupling values and 30 - 35 dB minimum directivities\* (for 18-170 GHz). 4-ports directional couplers are available in bi-directional (BDC4-XXE/Y) and dual-directional (DDC4-XXE/Y) configurations.

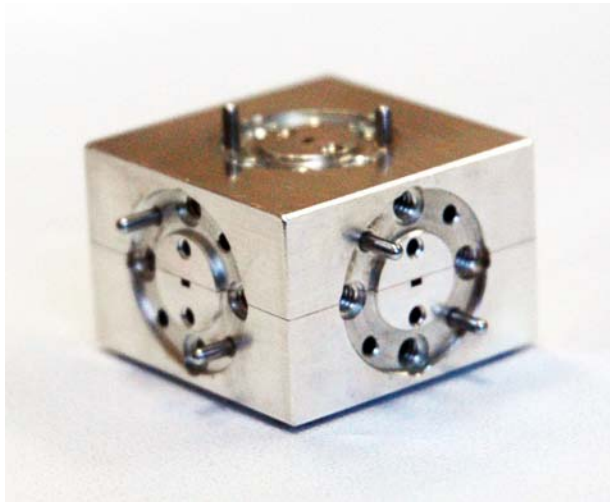
Model number	Frequency range, GHz	Waveguide size	Main line VSWR	Secondary line VSWR	Insertion loss, dB	Coupling accuracy, %
DCZ-12E/Y	18 – 26,5	WR-42	1,05	1,1	0,8	7
DCZ-08E/Y	26,5 - 40	WR-28	1,05	1,1	0,8	7
DCZ-06E/Y	33 - 50	WR-22	1,05	1,1	0,8	7
DCZ-04E/Y	50 - 75	WR-15	1,08	1,1	1,1	7
DCZ-03E/Y	75 - 110	WR-10	1,1	1,15	1,5	10
DCZ-02E/Y	110 - 170	WR-6	1,15	1,2	2,5	10
DCZ-015E/Y	140 - 220	WR-5	1.15	1.2	2,5	12
DCZ-012E/Y	170 - 260	WR-4				12
DCZ-010E/Y	220 - 325	WR-3				15
DCZ-008E/Y	260 - 400	WR-2.8				15
DCZ-006E/Y	325 - 500	WR-2.2				20
Coupling flatness			±( 0.7 ÷ 1.2) dB, depending on the frequency range			

\* ask for directivity specification in 140-325 GHz frequency range

**ORDERING INFORMATION**

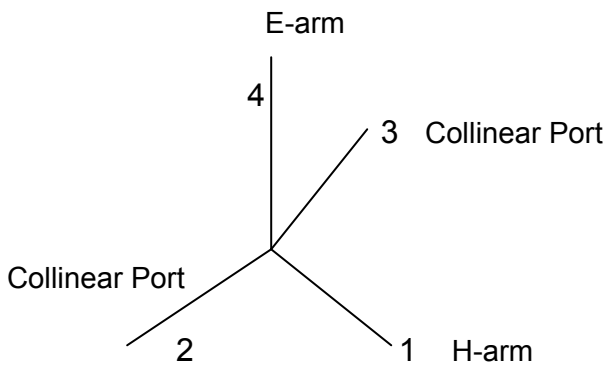
XX	Operation range wave length, mm	
Z	3 – 3 ports 4 – 4 ports	
Y	Coupling value 3, 6, 10, 15, 20 dB	
F	Finish: S - silver G - gold	<b>DCZ-XXE/Y-F</b>
		Example: DC3-06E/20-S
		3-ports Directional Coupler for 33 ÷ 50 GHz frequency range, 20dB coupling value, silver plated.

**MAGIC TEE**



- Low insertion losses
- High matching / high isolation
- Low power split unbalance

The **MHT-XXE** Magic Tee Hybrid Couplers for millimeter wave are matched power dividers for variety of applications (general purpose power splitters, power combining, phase measurement circuits, phase / frequency discriminators). The **MHT-XXE** Magic Tee Hybrid Couplers are available in waveguide bands between 33 and 220 GHz. These couplers are four-port transmission line components with a port configuration as shown in figure. Operation bandwidth is limited to 20÷90% waveguide operation frequency range depending on performance specifications.



$$S_{24} = -S_{34} \quad S_{22} = S_{33}$$

$$S_{24} = S_{34} \quad S_{14} = 0$$

Model number	Frequency range, GHz	Waveguide size	Insertion loss, dB	Isolation, (min) dB E-H/Col	VSWR max		Balance, dB
					E-arm	H-arm	
MHT-06E	33 - 50	WR - 22	0,7	30/20	1,5	1,5	±0,5
MHT-04E	50 - 75	WR - 15	1,0	30/20	1,5	1,5	±0,5
MHT-03E	75 - 110	WR - 10	1,2	30/20	1,6	1,6	±0,5
MHT-02E	110 - 170	WR - 6	1,5	30/20	1,6	1,6	±0,5
MHT-015E	140 - 220	WR - 5					

The above presented specifications can be reached not in full frequency band.

**ORDERING INFORMATION**

XX Operation wave length range, mm

F Finish:  
S – silver  
G - gold

**MHT-XXE/F**

**Example: MHT-06E/S**

Hybrid coupler for 33 - 50 GHz frequency range, silver plated.



**FIXED ATTENUATOR**



- Full waveguide bandwidth
- High attenuation accuracy

The **FA-XXE** Fixed Attenuators can be used as a lab standard against which other instruments or device are calibrated. The attenuators consist of the waveguide section with resistive plate in the waveguide diagonal plane. The **FA-XXE** 3, 6, 10, 15, 20, 30 dB attenuators are available in waveguide bands from 18 through 325 GHz.

Model	Frequency range, GHz	Waveguide size	Attenuation, dB	VSWR
FA-12E	18 – 26.5	WR - 42	3±0.5	1.15
FA-08E	26.5 - 40	WR - 28	6±1.0	1,15
FA-06E	33 - 50	WR - 22	10±1.5	1,15
FA-04E	50 - 75	WR - 15	20±2.0	1,15
FA-03E	75 - 110	WR - 10	30±3.0	1,15
FA-02E	110 - 170	WR - 6	3, 6, 10, 20, 30	1,15
FA-015E	140 - 220	WR - 5	3, 6, 10, 20	1,15
FA-012E	170 - 260	WR - 4	3, 6, 10, 20	
FA-010E	220 - 325	WR - 3	3, 6, 10, 20	

**ORDERING INFORMATION**

XX Operation range wave length, mm

**FA-XXE/A-F**

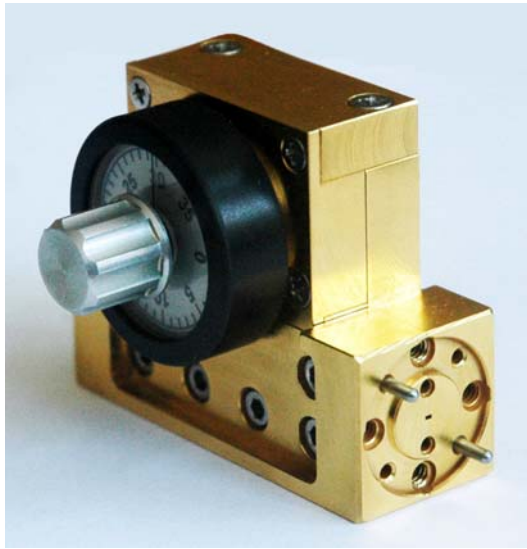
F Finish:  
S – silver  
G - gold

**Example: FA-06E/15-S**

15 dB fixed attenuator for 33 - 50 GHz frequency range, silver plated.

A Attenuation, dB

**VARIABLE ATTENUATOR**



Attenuator with round scale



Attenuator with micrometric screw

- Wide attenuation range, (40 dB typ.)
- Low VSWR
- Low insertion losses
- Full waveguide bandwidth

The **VA-XXE** Variable Attenuators are used for level-setting. The Attenuators consist of a waveguide section with a movable resistive element.

The Attenuators has 0÷30 dB minimum attenuation range. The **VA-XXE** Attenuators are available in waveguide bands between 33 GHz and 500 GHz; can be calibrated on specified frequencies.

Model number	Frequency range, GHz	Waveguide size	Attenuation range, dB, min	VSWR max	Insertion loss, dB
VA-06E	33 - 50	WR - 22	0÷30	1,15	0,5
VA-04E	50 - 75	WR - 15	0÷30	1,15	0,5
VA-03E	75 - 110	WR - 10	0÷30	1,15	0,7
VA-02E	110 - 170	WR - 06	0÷30	1,2	1,0
VA-015E	140 - 220	WR - 05	0÷30	1.25	1.0
VA-012E	170 - 260	WR - 04	0÷30	1.3	1.3
VA-010E	220 - 325	WR - 03	0÷30		
VA-006E	325 - 500	WR - 2.2	0÷30		

**ORDERING INFORMATION**

- XX Operation wave length range, mm
- Finish:
- F S – silver
- G - gold

**VA-XXE/F**  
**Example: VA-06E/S**  
 Variable attenuator for 33 - 50 GHz frequency range, silver plated.

**SHORT**



**Fixed waveguide short**



**Tunable waveguide short**



The **FS-XE** Fixed Waveguide Shorts and the **TS-XE** Tunable Shorts are designed to create the shorts circuit conditions in waveguides.

The **TS-XE** Tunable Waveguide Shorts are movable shorts, adjustable through at least half a wavelength at the low end of the band. The **TS-XE** Shorts consist of movable noncontacting choke plungers within a straight section of waveguide.

The **FS-XE** and **TS-XE** Shorts are provided in five waveguide bands between 33 and 225 GHz.

Model number	Frequency range, GHz	Waveguide size	VSWR
FS06E	33 - 50	WR - 22	30
FS04E	50 - 75	WR - 15	30
FS03E	75 - 110	WR - 10	20
FS02E	110 - 170	WR - 6	20
FS015E	170 - 225	WR - 5	20
TS06E	33 - 50	WR - 22	30
TS04E	50 - 75	WR - 15	30
TS03E	75 - 110	WR - 10	20
TS02E	110 - 170	WR - 6	20
TS015E	170 - 225	WR - 5	20

**ORDERING INFORMATION**

XX      Operation wave length range, mm

**TS-XXE/F**

F      Finish:  
S - silver

**Example: TS-06E/S**

Tunable short for 33 - 50 GHz frequency range, silver plated.

**MATCHED LOAD**



**Sliding Matched Load**



**Matched Load**

The **SMLXE** Sliding Matched Loads and the **MLXE** fixed Matched Loads consist of tapered absorber within a waveguide section. The **SMLXE** Loads utilize a metric micrometer tuning mechanism allows the microwave absorber to be positioned within the guide while maintaining a constant magnitude of reflection coefficient.

The **MLXE** Terminations and the **SMLXE** Sliding Matched Loads are provided in five waveguide bands between 33 GHz and 225 GHz.

Model number	Frequency range, GHz	Waveguide size	VSWR
SML06E	33 - 50	WR - 22	1,05
SML04E	50 - 75	WR - 15	1,05
SML03E	75 - 110	WR - 10	1,05
SML02E	110 - 170	WR - 6	1,05
SML015E	170 - 225	WR - 5	1.05
ML06E	33 - 50	WR - 22	1,07
ML04E	50 - 75	WR - 15	1,07
ML03E	75 - 110	WR - 10	1,07
ML02E	110 - 170	WR - 6	1,07
ML015E	170 - 225	WR - 5	1.07

**ORDERING INFORMATION**

XX      Operation wave length range, mm

F      S – silver  
G - gold

**ML-XXE/F**

**Example: ML-06E/S**  
Matched Load for 33 - 50 GHz frequency range,  
silver plated.



**DETECTOR MOUNT**



- Millimeter wave detection
- Full waveguide bandwidth

The **DMXE** Detector Mounts are broadband devices designed for operation in millimeter wave range. The Detectors are optimized for broadband performance and are used in mm-wave test setups to detect, monitor and measure modulated signals.

The **DMXE** Detector Mounts use Schottky Barrier packaged diodes and are provided in five waveguide bands between 33 GHz and 225 GHz.

Model number	Frequency range, GHz	Waveguide size	Sensitivity, mV/mW	Maximum input, mW	Sensitivity flatness (Smax / Smin)
DM-06E	33 - 50	WR - 22	300	15	2,5
DM-04E	50 - 75	WR - 15	300	15	2,5
DM-03E	75 - 110	WR - 10	200	15	2,5
DM-02E	110 - 170	WR - 6	100	15	2,5
DM-015E	170 - 225	WR - 5	100	15	3,0

**ORDERING INFORMATION**

XX      Operation wave length range, mm

**DM-XXE/F**

F      Finish:  
S – silver  
G - gold

**Example: DM-06E/S**

Detector mount for 33 - 50 GHz frequency range, silver plated.

**CALORIMETRIC POWER METER**



- **High Accuracy**
- **High Sensitivity**
- **Automated Measurements**
- **Full Waveguide Frequency Band**

The Calorimetric Power Meter M1-25M/XX is a high precision broadband calorimetric microwave power measurement instrument operating in millimeter and sub-millimeter wave range.

The Instrument has a waveguide type Calorimetric Sensor for corresponding frequency ranges. The sensor has a self compensation transistor transducers that substitute the absorbed microwave power with direct current power. The five sensors' models provide accurate absolute power measurement in single mode waveguides, and one – in multimode Metal-Dielectric Waveguide (MDW). The last model could be a priority for terahertz (THz) physics and technology.

The Calorimetric Power Meter M1-25M provides PC connection via RS-232 interface.

Model	Frequency range, GHz	Input Waveguide Port	Power measurement range, mW	Power measurement error	VSWR, max
<b>M1-25M/06E</b>	33 - 50	WR-22, UG383/U	0,020-20	3%+2μW	1.1*
<b>M1-25M/04E</b>	50 - 75	WR-15, UG385/U	0,020-20	3%+2μW	1.1
<b>M1-25M/035E</b>	60 - 90	WR-12, UG387/U	0,020-20	3%+2μW	1.1
<b>M1-25M/03E</b>	75 - 110	WR-10, UG387/UM	0,020-20	3%+2μW	1.1
<b>M1-25M/025E</b>	90 - 140	WR-08, UG387/UM	0,020-20	3%+2μW	1.1
<b>M1-25M/02E</b>	110 - 170	WR-06, UG387/UM	0,020-20	3%+2μW	1.1
<b>M1-25M/015E</b>	140 - 220	WR-05, UG387/UM	0,020-20	5%+2μW	1.15
<b>M1-25M/012E</b>	170 - 260	WR-04, UG387/UM	0,020-20	5%+2μW	1.2
<b>M1-25M/010E</b>	220 - 325	WR-03, UG387/UM	0,020-20	5%+2μW	1.25
<b>M1-25M /008E</b>	260 – 400	WR-2.8 (0,711 x 0,356)	0,020-20	10%+2μW	-
<b>M1-25M /006E</b>	325 – 500	WR-2.2 (0,559 x 0,279)	0,020-20	10%+2μW	-
<b>M1-25M /005E</b>	400 - 600	WR-1.9 (0,48 x 0,24)	0,020-20		
<b>M1-25M/004</b>	500 - 750	WR-1.5 (0.38x0.19)	0,020-20		

\* VSWR 1.2 max in 33-37.5 GHz frequency range;

**BAND PASS AND LOW PASS WAVEGUIDE FILTERS**



- Custom design of pass band

High-Pass (HPF series), Low Pass (LPF series) and Band Pass (BPF series) Filters are available, providing desired skirt, selectivity and rejection levels with minimum possible insertion loss in the pass band. The filters are offered in all standard waveguide bands covering 18 to 400 GHz depending on our possibility to fulfil the customers' requirements.

Dimensions of filters depends on required specifications. Please contact us for any questions.

Filter Model	Frequency range, GHz	Waveguide Ports	Pass Band Insertion Loss, dB, max <sup>1)</sup>	Pass Band width, % <sup>2)</sup>	Pass Band VSWR, max <sup>3)</sup>
BPF-06E	33 - 50	WR-22, UG383/U	1.0	≥20	1.5
BPF-04E	50 - 75	WR-15, UG385/U	1.0	≥20	1.5
BPF-035E	60 - 90	WR-12, UG387/U	1.5	≥20	1.5
BPF-03E	75 - 110	WR-10, UG387/UM	1.5	≥20	1.5
BPF-025E	90 - 140	WR-08, UG387/UM	2.0	≥20	1.5
BPF-02E	110 - 170	WR-06, UG387/UM	2.0	≥20	1.5
BPF-015E	140 - 220	WR-05, UG387/UM	2.0	≥20	1.5
BPF-012E	170 - 260	WR-04, UG387/UM	3.0	≥20	1.5
BPF-010E	220 - 325	WR-03, UG387/UM	3.0	≥20	1.5

<sup>1), 3)</sup> Depends on required specifications like rejection level and skirt selectivity

<sup>2)</sup> Depends on applied design technology

**ORDERING INFORMATION**

XX	Operation range wave length, mm	BPF-XXE/S-F/P
S-F	Start-Finish frequencies of the pass band	Example: BPF-06E/35-40S
P	Plating:	Band Pass filter with the pass band of 35 - 40 GHz frequency range, silver plated.
	S – silver	G - gold

GENERAL REFERENCE INFORMATION

Relative (dBm) vs absolute (W) power

Power							
dBm	$\mu$ W	dBm	$\mu$ W	dBm	$\mu$ W	dBm	W
-60	0.001	-30	0.001	0	1	30	1
-59	0.00126	-29	0.00126	1	1.2589	31	1.2589
-58	0.00158	-28	0.00158	2	1.5849	32	1.5849
-57	0.00200	-27	0.00200	3	1.9953	33	1.9953
-56	0.00251	-26	0.00251	4	2.5119	34	2.5119
-55	0.00316	-25	0.00316	5	3.1623	35	3.1623
-54	0.00398	-24	0.00398	6	3.9811	36	3.9811
-53	0.00501	-23	0.00501	7	5.0119	37	5.0119
-52	0.00361	-22	0.00631	8	6.3096	38	6.3096
-51	0.00794	-21	0.00794	9	7.9433	39	7.9433
-50	0.01	-20	0.01	10	10	40	10
-49	0.01259	-19	0.01259	11	12.589	41	12.589
-48	0.01585	-18	0.01585	12	15.849	42	15.849
-47	0.01995	-17	0.01995	13	19.953	43	19.953
-46	0.02512	-16	0.02512	14	25.119	44	25.119
-45	0.03162	-15	0.03162	15	31.623	45	31.623
-44	0.03981	-14	0.03981	16	39.811	46	39.811
-43	0.05012	-13	0.05012	17	50.199	47	50.119
-42	0.06310	-12	0.06310	18	63.096	48	63.096
-41	0.07943	-11	0.07943	19	79.433	49	79.433
-40	0.1	-10	0.1	20	100	50	100
-39	0.12589	-9	0.12589	21	125.89	51	125.89
-38	0.15849	-8	0.15849	22	158.49	52	158.49
-37	0.19953	-7	0.19953	23	199.53	53	199.53
-36	0.25119	-6	0.25119	24	251.19	54	251.19
-35	0.31623	-5	0.31623	25	316.23	55	316.23
-34	0.39811	-4	0.39811	26	398.11	56	398.11
-33	0.50119	-3	0.50119	27	501.19	57	501.19
-32	0.63096	-2	0.63096	28	630.96	58	630.96
-31	0.79433	-1	0.79433	29	794.33	59	794.33
-30	1	0	1	30	1000	60	1000





GENERAL REFERENCE INFORMATION

**Absolute (W) vs relative (dBm) power**

		Power					
mW	dBm	mW	dBm	mW	dBm	W	dBm
0.001	-60	0.001	-30	1	0	1	30
0.002	-56.99	0.002	-26.99	2	3.0103	2	33.010
0.003	-55.23	0.003	-25.23	3	4.7712	3	34.771
0.004	-53.98	0.004	-23.98	4	6.0206	4	36.021
0.005	-53.01	0.005	-23.01	5	6.9897	5	36.990
0.006	-52.22	0.006	-22.22	6	7.7815	6	37.782
0.007	-51.55	0.007	-21.55	7	8.4510	7	38.451
0.008	-50.97	0.008	-20.97	8	9.0309	8	39.031
0.009	-50.46	0.009	-20.46	9	9.5424	9	39.542
0.01	-50	0.01	-20	10	10	10	40
0.02	-46.99	0.02	-16.99	20	13.010	20	43.010
0.03	-45.23	0.03	-15.23	30	14.771	30	44.771
0.04	-43.98	0.04	-13.98	40	16.021	40	46.021
0.05	-43.01	0.05	-13.01	50	16.990	50	46.990
0.06	-42.22	0.06	-12.22	60	17.782	60	47.782
0.07	-41.55	0.07	-11.55	70	18.451	70	48.451
0.08	-40.97	0.08	-10.97	80	19.031	80	49.031
0.09	-40.46	0.09	-10.46	90	19.542	90	49.542
0.1	-40	0.1	-10	100	20	100	50
0.2	-36.99	0.2	-6.990	200	23.010	200	53.010
0.3	-35.23	0.3	-5.229	300	24.771	300	54.771
0.4	-33.98	0.4	-3.979	400	26.021	400	56.021
0.5	-33.10	0.5	-3.010	500	26.990	500	56.990
0.6	-32.22	0.6	-2.218	600	27.782	600	57.782
0.7	-31.55	0.7	-1.549	700	28.451	700	58.451
0.8	-30.97	0.8	-0.9691	800	29.031	800	59.031
0.9	-30.46	0.9	-0.4576	900	29.542	900	59.542
1	-30	1	0	1000	30	1000	60

GENERAL REFERENCE INFORMATION

Power ratio in times vs power ratio in dB.

Power ratio (times)	Power ratio (dB)	Power ratio (times)	Power ratio (dB)	Power ratio (times)	Power ratio (dB)
0.001	-30	0.1258	-9	12.589	11
0.00125	-29	0.1584	-8	15.848	12
0.0158	-28	0.1995	-7	19.952	13
0.00199	-27	0.251	-6	25.11	14
0.00251	-26	0.31622	-5	31.6227	15
0.00316	-25	0.3981	-4	39.8107	16
0.00398	-24	0.5011	-3	50.118	17
0.00501	-23	0.6309	-2	63.095	18
0.0063	-22	0.7943	-1	79.4328	19
0.00794	-21	1	0	100	20
0.01	-20	1.258	1	125.89	21
0.01258	-19	1.584	2	158.48	22
0.01584	-18	1.995	3	199.52	23
0.0199	-17	2.511	4	251.1	24
0.0251	-16	3.1622	5	316.22	25
0.03162	-15	3.981	6	398.107	26
0.03981	-14	5.0118	7	501.187	27
0.0501	-13	6.3095	8	630.957	28
0.0631	-12	7.9432	9	794.328	29
0.07943	-11	10	10	1000	30

GENERAL REFERENCE INFORMATION

**Standard circular waveguides**  
(IEC & EIA (Electronic Industries Association) version)

Waveguide freq. band	Circular waveguide undersize (L / M / S)	Freq.range, GHz (wave mode TE <sub>01</sub> )	Inner diameter of circular waveguide (inches / mm)
K	Large	17.5 - 20.5	0.455/11.56
	Middle	20.0 - 24.5	0.396/10.06
	Small	24.0 - 26.5	0.328/8.33
Ka	Large	26.5 - 33.0	0.315/8.0
	Middle	33.0 - 38.5	0.250/6.35
	Small	38.5 - 40.0	0.219/5.56
Q	Large	33.0 - 38.5	0.250/6.35
	Middle	38.5 - 43.0	0.219/5.56
	Small	43.0 - 50.0	0.188/4.78
U	Large	40.0 - 43.0	0.210/5.33
	Middle	43.0 - 50.0	0.188/4.78
	Small	50.0 - 60.0	0.165/4.19
V	Large	50.0 - 58.0	0.165/4.19
	Middle	58.0 - 68.0	0.141/3.58
	Small	68.0 - 75.0	0.125/3.18
E	Large	60.0 - 66.0	0.136/3.45
	Middle	66.0 - 82.0	0.125/3.18
	Small	82.0 - 90.0	0.094/2.39
W	Large	75.0 - 88.0	0.112/2.84
	Small	88.0 - 110.0	0.094/2.39
F	Large	90.0 - 115.0	0.089/2.26
	Small	115.0 - 140.0	0.075/1.91
D	Large	110.0 - 140.0	0.073/1.85
	Small	140.0 - 160.0	0.059/1.50
G	Large	140.0 - 180.0	0.058/1.47
	Small	180.0 - 220.0	0.045/1.14
H	—	170.0 - 260.0	0.049/1.25
J	—	220.0 - 325.0	0.039/0.99

GENERAL REFERENCE INFORMATION

Transmitted and reflected power dependence on VSWR

VSWR	Return loss (dB)	VSWR (dB)	K <sub>ref</sub> voltage	Transmission loss (dB)	Transmitted power (%)	Reflected power (%)	VSWR	Return loss (dB)	VSWR (dB)	K <sub>ref</sub> voltage	Transmission loss (dB)	Transmitted power (%)	Reflected power (%)
1.006	50.00	0.05	0.00	.0000	100.	0.00	1.31	17.45	2.35	0.13	0.08	98.20	1.80
1.01	46.06	0.09	0.00	.0001	100.	0.00	1.32	17.21	2.41	0.14	0.08	98.10	1.90
1.011	45.00	0.10	0.01	.0001	100.	0.00	1.329	17.00	2.47	0.14	0.09	98.00	2.00
1.02	40.09	0.17	0.01	.0004	99.99	0.01	1.33	16.98	2.48	0.14	0.09	97.99	2.01
1.020	40.00	0.17	0.01	.0004	99.99	0.01	1.34	16.75	2.54	0.15	0.09	97.89	2.11
1.03	36.61	0.26	0.01	.0009	99.98	0.02	1.35	18.54	2.61	0.15	0.10	97.78	2.22
1.036	35.00	0.31	0.02	.0014	99.97	0.03	1.36	16.33	2.61	0.15	0.10	97.67	2.33
1.04	34.15	0.34	0.02	.0017	99.96	0.04	1.37	16.13	2.73	0.16	0.11	97.56	2.44
1.045	33.15	0.38	0.02	.0021	99.95	0.05	1.377	16.00	2.78	0.16	0.11	97.49	2.51
1.05	32.26	0.42	0.02	.0026	99.94	0.06	1.38	15.94	2.80	0.16	0.11	97.45	2.55
1.06	30.71	0.51	0.03	.0037	99.92	0.08	1.39	15.75	2.86	0.16	0.12	97.34	2.66
1.065	30.00	0.55	0.03	.0043	99.90	0.10	1.40	15.56	2.92	0.17	0.12	97.22	2.78
1.07	29.42	0.59	0.03	.0050	99.89	0.11	1.41	15.38	2.98	0.17	0.13	97.11	2.89
1.08	28.30	0.67	0.04	.0064	99.85	0.15	1.42	15.21	3.05	0.17	0.13	96.99	3.01
1.09	27.32	0.75	0.04	.0081	99.81	0.19	1.43	15.04	3.11	0.18	0.14	96.87	3.13
1.10	26.44	0.83	0.05	.0099	99.77	0.23	1.433	15.00	3.12	0.18	0.14	96.84	3.16
1.11	25.66	0.91	0.05	.0118	99.73	0.27	1.44	14.88	3.17	0.18	0.14	96.75	3.25
1.119	25.00	0.98	0.06	.0138	99.68	0.32	1.45	14.72	3.23	0.18	0.15	96.63	3.37
1.12	24.94	0.98	0.06	.0139	99.68	0.32	1.46	14.56	3.29	0.19	0.15	96.50	3.50
1.13	24.29	1.06	0.06	.0162	99.63	0.37	1.464	14.50	3.31	0.19	0.16	96.45	3.55
1.135	24.00	1.10	0.06	.0173	99.60	0.40	1.47	14.41	3.35	0.19	0.16	96.38	3.62
1.14	23.69	1.14	0.07	.0186	99.57	0.43	1.48	14.26	3.41	0.19	0.17	96.25	3.75
1.15	23.13	1.21	0.07	.0212	99.51	0.49	1.49	14.12	3.46	0.20	0.17	96.13	3.87
1.152	23.00	1.23	0.07	.0218	99.50	0.50	1.499	14.00	3.51	0.20	0.18	96.02	3.98
1.16	22.61	1.29	0.07	.0239	99.45	0.55	1.50	13.96	3.52	0.20	0.18	96.00	4.00
1.17	22.12	1.36	0.08	.0267	99.39	0.61	1.536	13.50	3.73	0.21	0.20	95.53	4.47
1.173	22.00	1.38	0.08	.0275	99.37	0.63	1.55	13.32	3.81	0.22	0.21	95.35	4.65
1.18	21.66	1.44	0.08	.0297	99.32	0.68	1.577	13.00	3.96	0.22	0.22	94.99	5.01
1.19	21.23	1.51	0.09	.0328	99.25	0.75	1.60	12.74	4.08	0.23	0.24	94.67	5.33
1.196	21.00	1.55	0.09	.0346	99.21	0.79	1.622	12.50	4.20	0.24	0.25	94.38	5.62
1.20	20.83	1.58	0.09	.0360	99.17	0.83	1.65	12.21	4.35	0.25	0.27	93.98	6.02
1.21	20.44	1.66	0.10	.0394	99.10	0.90	1.671	12.00	4.46	0.25	0.28	93.69	6.31
1.22	21.08	1.73	0.10	.0429	99.02	0.98	1.70	11.73	4.61	0.26	0.30	93.28	6.72
1.222	20.00	1.74	0.10	.0436	99.00	1.00	1.725	11.50	4.74	0.27	0.32	92.92	7.08
1.23	19.73	1.80	0.10	.0464	98.94	1.06	1.75	11.29	4.86	0.27	0.34	92.56	7.44
1.24	19.40	1.87	0.11	.0501	98.85	1.15	1.785	11.00	5.03	0.28	0.36	92.06	7.94
1.25	19.08	1.94	0.11	.0540	98.77	1.23	1.80	10.88	5.11	0.29	0.37	91.84	8.16
1.253	19.00	1.96	0.11	.0550	98.74	1.26	1.851	10.50	5.35	0.30	0.41	91.09	8.16
1.26	18.78	2.01	0.12	.0579	98.68	1.32	1.90	10.16	5.58	0.31	0.44	90.37	9.63
1.27	18.49	2.08	0.12	.0619	98.59	1.41	1.925	10.00	5.69	0.32	0.46	90.00	10.00
1.28	18.22	2.14	0.12	.0660	98.49	1.51	2.00	9.54	6.02	0.33	0.51	88.89	11.11
1.288	18.00	2.20	0.13	.0694	98.42	1.58	2.50	7.36	7.96	0.43	0.88	81.63	18.37
1.29	17.95	2.21	0.13	.0702	98.40	1.60	3.00	6.02	9.54	0.50	1.25	75.00	25.00
1.30	17.89	2.28	0.13	.0745	98.30	1.70	3.50	5.11	10.88	0.56	1.60	69.14	30.86

GENERAL REFERENCE INFORMATION

Rectangular waveguides' specifications (IEC version)

Freq.band name	W/G size (EIA)	Freq. range (GHz)	Inner dimensions (inches / mm)	Cut off freq. TE <sub>10</sub> , GHz	Power limit		Insertion loss, dB/m
					P <sub>peak</sub> , MW (kW)	P <sub>ave</sub> , CW kW (W)	
R band	WR-430	1.70 - 2.60	4.300x2.150 / 109,22x54,61		18,230		
D band	WR-340	2.20 - 3.30	3.400x1.700 / 86,36x43,18		11,870		
S band	WR-284	2.60 - 3.95	2.840x1.420 / 72,14x34,04	2,08	7,64-10,85	13,4-19,6	0,03-0,02
E band	WR-229	3.30 - 4.90	2.290x1.150 / 58,17x29,08		7,65		0,05-0,03
G band	WR-187	3.95 - 5.85	1.870x0.940 / 47,55x22,15	3,155	3,30-4,69	5,2-7,4	0,06-0,04
F band	WR-159	4.90 - 7.05	1.590x0.800 / 40,39x20,19		3,30		0,09-0,05
C band	WR-137	5.85 - 8.20	1.370x0.690 / 34,85x15,80	4,285	1,97-2,53	2,08-3,70	0,12-0,06
H band	WR-112	7.05 - 10.00	1.120x0.560 / 28,5x12,62	5,26	1,28-1,70	1,61-2,07	0,14-0,11
X band	WR-90	8.2 - 12.4	0.900x0.450 / 22,860x10,160	6,56	0,76-1,12	0,86-1,25	0,21-0,15
	WR-75	10,0 - 15,0	0.75x0.375 / 19,050x9,525	7,847	0,62-0,90	0,66-0,95	0,25-0,17
Ku band	WR-62	12.4 - 18.0	0.622x0.311 / 15,799x7,899	9,49	0,46-0,63	0,45-0,61	0,32-0,23
K band	WR-51	15.0 - 22.0	0.510x0.255 / 12,954x6,477	11,54	0,31-0,43	0,29-0,40	0,43-0,31
K band	WR-42	18.0 - 26.5	0.420x0.170 / 10,668x4,318	14,08	0,17-0,25	0,16-0,21	0,68-0,50
	WR-34	22,0 - 33,0	0,340x0,170 / 8,636x4,318				
Ka band	WR-28	26.5 - 40.0	0.280x0.140 / 7,112x3,556	21,1	(96-146)	(110-160)	1,13-0,77
Q band	WR-22	33 - 50	0.224x0.112 / 5,690x2,845	26,3	(64-97)	(69-101)	1,6-1,1
U band	WR-19	40 - 60	0.188x0.094 / 4,775x2,388	31,4	(48-70)	(51-71)	1,3-0,94
V band	WR-15	50 - 75	0.148x0.074 / 3,759x1,880	39,9	(30-40)	(30-44)	1,98-1,35
E band	WR-12	60 - 90	0.122x0.061 / 3,099x1,549	48,4			
W band	WR-10	75 - 110	0.100x0.050 / 2,540x1,270	59,0	(14-20)	(15-21)	3,46-2,44
F band	WR-8	90 - 140	0.080x0.040 / 2,032x1,016	73,8			
D band	WR-6	110 - 170	0.0650x0.0325 / 1,651x0,826	90,8			
	WR-5	140 - 220	0.0510x0.0255 / 1,295x0,648	115,7			
G band	WR-4	170 - 260	0.0430x0.0215 / 1,092x0,546	137,2			
	WR-3	220 - 325	0.0340x0.0170 / 0,864x0,432	173,6			
J band	WR-2.8	260 - 400	0,0280x0,0140 / 0,711x0,356	210,8			
	WR-2.2	325 - 500	0.0200x0.0100 / 0,559x0,279	268,2			
	WR-1.9	400 - 600	0,0190x0,0095 / 0,483x0,241	310,6			
Y-band	WR-1.5	500 - 750	0.0150x0.0075 / 0,381x0,191	393,4			
	WR-1.2	600 - 900	0,0120x0,0060 / 0,305x0,152	491,8			
	WR-1	750 - 1100	0.0100x0.0050 / 0,254x0,127	590,1			



GENERAL REFERENCE INFORMATION

Rectangular Russian/English waveguides' dimensions and operation frequency ranges

Waveguide size a x b, mm (line №)	Freq.range, GHz	Waveguide type	Waveguide size a x b, mm	Freq.range, GHz	Flange type
by OST 4.206.000 edition 1-77		by EIA version			
0,7 x 0,35 (2)	258,4 - 405,1	WR-2.8	0.711x0.356	260-400	UG 387/UM
0,9 x 0,45 (1)	218,8 - 315,6	WR-3	0.864x0.432	220-325	UG 387/UM
1,1 x 0,55 (2)	178,4 - 258,4	WR-4	1.092x0.546	170 - 260	UG 387/UM
1,3 x 0,65 (1)	142,8 - 218,8	WR-5	1.295x0.648	140 - 220	UG 387/UM
1,6 x 0,80 (2)	118,1 - 178,4	WR-6	1.651x0.826	110 -170	UG 387/UM
2,0 x 1,0 (1)	94,28 - 142,8	WR-8	2.032x1.016	90 -140	UG 387/UM
2,4 x 1,20 (2)	78,33 - 118,1	WR-10	2.540x1.270	75 - 110	UG 387/UM
3,0 x 1,50 (1)	63,79 - 94,28	WR-12	3.099x1.549	60 - 90	UG 387/U
3,6 x 1,80 (2)	53,57- 78,33	WR-15	3.759x1.880	5 0- 75	UG 385/U
4,4 x 2,2 (1)	44,09 - 63,79	WR-19	4.775x2.388	40 - 60	UG 383/UM
5,2 x 2,60 (2)	37,50 - 53,57	WR-22	5.690x2.845	33 - 50	UG 383/U
6,2 x 3,1 (1)	30,91 - 44,09				
7,2 x 3,40 (2)	25,95 - 37,50	WR-28	7.112x3.556	26.5-40	UG 381/U UG 599/U
9,0 x 4,5 (1)	21,43 - 30,93	WR-34	8.636x4.318	22 - 33	UG 1530/U
11,0 x 5,50 (2)	17,44 - 25,95	WR-42	10.668x4.318	18 – 26.5	UG 595/U
13,0 x 6,5 (1)	14,71 - 21,43	WR-51	12.954x6.477	15 - 22	
16,0 x 8,00 (2)	12,05 - 17,44	WR-62	15.799x7.899	12.4 - 18	UG 419/U
(17,0 x 8,00) (2)	11,55 - 16,66				
19,0 x 9,5 (1)	9,93 - 14,71	WR-75	19.050x9.525	10 - 15	
23 x 10,0 (2)	8,15 - 12,05	WR-90	22.860x10.160	8.2 – 12.4	UG 39/U
		WR-102	25.908x12.954	7 - 11	
28,5 x 12,6 (1)	6,85 - 9,93	WR-112	28.499x12.624	7.05 - 10	UG 51/U
35 x 15,0 (2)	5,64 - 8,15	WR-137	34.849x15.799	5.85 – 8.2	UG 344/U
40,0 x 20,0 (1)	4,80 - 6,85	WR-159	40.386x20.193	4.9 – 7.05	UG 1730/U
48 x 24,0 (2)	3,94 - 5,64	WR-187	47.549x22.149	3.95 – 5.85	UG 149A/U
58,0 x 29,0 (1)	3,20 - 4,80	WR-229	58.166x29.083	3.3 – 4.9	UG 1726/U
72 x 34 (2)	2,59 - 3,94	WR-284	72.136x34,036	2.6 – 3.95	UG 53/U
90,0 x 45,0 (1)	2,14 - 3,20	WR-340	86,360x43,180	3.4 – 1.7	UG 1712/U
110 x 55 (2)	1,72 - 2,59	WR-430	109,22x54,610	1.7 – 2.6	UG 1716/U
(120 x 57) (2)	1,56 - 2,38				
130,0 x 65,0 (1)	1,45 - 2,14				
160 x 80 (2)	1,16 - 1,72				

## ABOUT US

"Elmika" Joint Stock Company was established in the 1993 as a former microwave division of Vilnius Scientific Research Institute of Radio Measurement Instruments.

Now "Elmika" is a research, development and manufacturing company, which works in the area of mm-wave and sub-mm wave (THz) measurement instruments.

We design and manufacture sweep and signal generators, scalar and vector network analyzers, power meters, direct reading attenuators, frequency measurement instruments.

"Elmika" also produces waveguides and waveguide components for measurement instruments and wireless applications.

At present, "Elmika" has about 50 employees, more than half of them are degreed scientists and engineers.

"Elmika" provides integration and test services to match individual customers' needs. Complete turnkey systems including installation services are offered. Custom design sub-systems and components are designed, developed, and manufactured at our facilities.

Our engineering and fine mechanics' staff welcomes your special requirements and the opportunity to be useful for your needs.

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