

Microwave Electronics

INTRODUCTION

Microwave electronics is one of priorities for Micran Company, along with telecommunication equipment and microwave test and measurement systems.

Our company has years of experience in developing and manufacturing wide array of monofunctional and multifunctional microwave units and modules in monolithic and hybrid-monolithic form.

Quality of our products is provided by the technological full cycle of development, manufacturing, testing and verification.

Further information about Micran Company, it's activities and products could be obtained at www.micran.ru

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RECEIVING CONVERTERS

Micran Company produces a range of satellite TV converters for professional and community reception. All models are intended for Russian market. Converters are designed with hybrid thin-film processing and modern hardware components. It guarantees extreme electric characteristics, reliability and stability in wide range of environmental conditions.

PROFESSIONAL CONVERTERS FOR COMMUNICATION SYSTEMS

Intended for reception of satellite low-rate-data channels. Optional operation with inherent reference of 5, 10, 25 MHz.

Model	Input freq. range, GHz	IF range, MHz	Oscillator freq, GHz	Noise fig., dB (Noise temp., °K)	Oscillator freq. stability, -50 ... +50°C, kHz	Oscillator phase noise, dBc/Hz, at offset of	
						1 kHz	10 kHz
MD-112014-P	10,7-11,7	950-1950	9,75 10,00	0,4	±25	-75	-85
MD-122014-P	11,7-12,7	950-1950	10,75 11,30	0,4	±25	-75	-85
MD-3813-P	3,4-4,2	950-1750	5,15	12°K	±12	-75	-85
MD-4613-P	4,5-4,8	950-1250	5,75	20°K	±12	-75	-85
MD-1170114-P	10,7-12,7	950-2150	9,75 10,60	0,4 0,5	±25	-70	-85
MD-1220115-03 (04)	11,7-12,75	950-1950	10,75	0,4 0,5	500 1000 2000 4000	-70	-85
MD-3813-01	3,4-4,2	950-1750	5,15	12°K 15°K	500 1000 2000 4000	-75	-90
MD-117015-01 (full-range)	10,7-11,7 11,7-12,75	950-1950 950-2000	9,75 10,75	0,4 0,5	1000 4000	-70	-85
MD-2814-01 (for LMDS/LMCS)	27,35-28,5	950-1950	13,20	2,0	6000	-70	-80
MD-435455-P (int. or ext. reference)	43,5-45,5	1-2	42,50 43,50	4,0	±85	-70	-80



LOW NOISE WIDEBAND CONVERTERS SET 2.2 - 60.5 GHz

Low noise wideband converters set provides signal spectrum transfer from frequency range of 2.2 - 60 GHz to L-band. Built-in frequency synthesizer with PLL (Phase-Locked Loop) is stabilized with inner or outer local oscillator. Converters are hermetically enclosed, with waveguide or coaxial input and coaxial (connector type SMA or N) output.

Power supply +8V to +15V (optional +18V). Operating temperature -50°C to +50°C.

Model	Input frequency, GHz		Output frequency, GHz		LO frequency, GHz	Noise figure, dB	Conversion gain, dB	VSWR IN	VSWR OUT	Image rejection GHz - dB	LO stability, KHz	Phase noise dBc/Hz, offset 0,1/1/10/100 KHz	Waveguide type
	start	end	start	end									
MD 030013-P2	2,70	3,40	1,00	1,70	4,400	1,0	45-50	<2,0	<1,7	45	±11	65/85/85/95	WR284
MD 038014-P2	3,40	4,20	0,95	1,75	5,150	1,0	45-50	<2,0	<1,7	45	±13	65/85/85/95	WR229
MD 046014-P2	4,20	5,00	0,95	1,75	5,950	1,0	45-50	<2,0	<1,7	45	±15	65/85/85/95	
MD 054014-P2	5,00	5,80	0,95	1,75	6,750	1,0	45-50	<2,0	<1,7	45	±17	65/85/85/95	WR159
MD 062014-P2	5,80	6,60	0,95	1,75	4,850	1,0	45-50	<2,0	<1,7	45	±12	65/85/85/95	WR137
MD069014-P2	6,50	7,30	0,95	1,75	5,550	1,0	45-50	<2,0	<1,7	45	±14	65/80/80/90	WR112
MD076014-P2	7,20	8,00	0,95	1,75	6,250	1,0	45-50	<2,0	<1,7	45	±16	65/85/85/95	
MD083014-P2	7,90	8,70	0,95	1,75	6,950	1,0	45-50	<2,0	<1,7	45	±20	65/80/80/90	WR90
MD091014-P2	8,70	9,50	0,95	1,75	7,750	1,2	45-50	<2,0	<1,7	45	±20	65/80/80/90	
MD099014-P2	9,45	10,25	0,95	1,75	8,500	1,2	45-50	<2,0	<1,7	45	±20	65/80/80/90	WR75
MD106014-P2	10,15	10,95	0,95	1,75	9,200	1,2	45-50	<2,0	<1,7	45	±23	60/80/80/90	
MD114014-P2	10,95	11,75	0,95	1,75	10,000	1,2	45-50	<2,5	<1,7	45	±25	60/80/80/90	WR75
MD120014-P2	11,55	12,35	0,95	1,75	10,600	1,3	45-50	<2,5	<1,7	45	±27	60/80/80/90	
MD127014-P2	12,25	13,05	0,95	1,75	11,300	1,3	45-50	<2,5	<1,7	45	±30	60/80/80/90	WR62
MD135014-P2	13,05	13,85	0,95	1,75	12,100	1,4	45-50	<2,5	<1,7	45	±30	55/75/75/85	
MD143014-P2	13,85	14,65	0,95	1,75	12,900	1,4	45-50	<2,5	<1,7	45	±32	55/75/75/85	WR62
MD150014-P2	14,55	15,35	0,95	1,75	13,600	1,5	45-50	<2,5	<1,7	45	±34	60/80/80/90	
MD158014-P2	15,35	16,15	0,95	1,75	14,400	1,5	45-50	<2,5	<1,7	45	±36	55/75/75/85	WR62
MD166014-P2	16,15	16,95	0,95	1,75	15,200	1,6	45-50	<2,5	<1,7	40	±38	55/75/75/85	
MD174014-P2	16,95	17,75	0,95	1,75	16,000	1,6	45-50	<2,0	<1,7	40	±40	60/80/80/90	WR42
MD182014-P2	17,75	18,55	0,95	1,75	8,400	1,6	45-50	<2,0	<1,7	40	±42	60/80/80/90	
MD190014-P2	18,55	19,35	0,95	1,75	8,800	1,6	45-50	<2,0	<1,7	40	±44	60/80/80/90	WR42
MD197014-P2	19,25	20,05	0,95	1,75	9,150	1,7	45-50	<2,0	<1,7	40	±46	60/80/80/90	
MD204014-P2	19,95	20,75	0,95	1,75	9,500	1,7	45-50	<2,0	<1,7	40	±48	60/80/80/90	WR42
MD212014-P2	20,75	21,55	0,95	1,75	9,900	1,7	45-50	<2,5	<1,7	40	±50	60/80/80/90	
MD220014-P2	21,55	22,35	0,95	1,75	10,300	2,0	45-50	<2,5	<1,7	35	±52	60/80/80/90	WR42
MD228014-P2	22,35	23,15	0,95	1,75	10,700	2,0	45-50	<2,5	<1,7	35	±55	60/80/80/90	
MD236014-P2	23,15	23,95	0,95	1,75	11,100	2,0	45-50	<2,5	<1,7	35	±55	60/80/80/90	WR42
MD244014-P2	23,95	24,75	0,95	1,75	11,500	2,2	45-50	<2,5	<1,7	35	±58	60/80/80/90	
MD252014-P2	24,75	25,55	0,95	1,75	11,900	2,2	45-50	<2,5	<1,7	35	±60	60/80/80/90	WR28
MD260014-P2	25,55	26,35	0,95	1,75	12,300	2,5	45-50	<2,5	<1,7	35	±63	60/80/80/90	
MD268014-P2	26,35	27,15	0,95	1,75	12,700	2,5	45-50	<2,5	<1,7	35	±63	60/80/80/90	WR28
MD274014-P2	26,95	27,75	0,95	1,75	13,000	2,5	45-50	<2,5	<1,7	35	±63	60/80/80/90	
MD282014-P2	27,75	28,55	0,95	1,75	13,400	3,0	45-50	<2,5	<1,7	35	±67	60/80/80/95	WR28
MD289014-P2	28,45	29,25	0,95	1,75	13,750	3,0	45-50	<2,5	<1,7	35	±69	55/75/80/95	
MD296014-P2	29,15	29,95	0,95	1,75	14,100	3,0	45-50	<2,5	<1,7	35	±72	55/75/80/90	WR28
MD302014-P2	29,75	30,55	0,95	1,75	14,400	3,0	45-50	<2,5	<1,7	35	±72	55/75/80/90	
MD309014-P2	30,50	31,30	0,95	1,75	14,775	3,0	45-50	<2,5	<1,7	35	±74	55/75/80/90	WR28
MD317014-P2	31,25	32,05	0,95	1,75	15,150	3,5	45-50	<2,5	<1,7	35	±75	55/75/80/90	
MD323014-P2	31,85	32,65	0,95	1,75	15,450	3,5	45-50	<2,5	<1,7	35	±78	55/75/80/90	WR28
MD330014-P2	32,60	33,40	0,95	1,75	15,825	3,5	45-50	<2,5	<1,7	35	±80	55/75/80/90	
MD338014-P2	33,35	34,15	0,95	1,75	16,200	3,5	45-50	<2,5	<1,7	35	±80	55/75/80/90	WR28
MD344014-P2	33,95	34,75	0,95	1,75	16,500	3,5	45-50	<2,5	<1,7	35	±84	55/7580/90	
MD351014-P2	34,70	35,50	0,95	1,75	16,875	4,0	45-50	<2,5	<1,7	35	±84	55/7580/90	WR28
MD359014-P2	35,45	36,25	0,95	1,75	17,250	4,0	45-50	<2,5	<1,7	30	±88	55/75/80/90	
MD366014-P2	36,20	37,00	0,95	1,75	17,625	4,0	45-50	<2,5	<1,7	30	±88	55/75/80/90	WR28
MD374014-P2	36,95	37,75	0,95	1,75	18,000	4,0	45-50	<2,5	<1,7	30	±90	55/75/80/90	
MD381014-P2	37,70	38,50	0,95	1,75	18,375	4,0	45-50	<2,5	<1,7	30	±93	55/75/80/90	WR28
MD389014-P2	38,45	39,25	0,95	1,75	18,750	4,0	45-50	<2,5	<1,7	30	±95	55/75/80/90	
MD396014-P2	39,20	40,00	0,95	1,75	19,125	4,2	45-50	<2,5	<1,7	30	±95	55/75/80/90	WR28

Model	Input frequency, GHz		Output frequency, GHz		LO frequency, GHz	Noise figure, dB	Conversion gain, dB	VSWR IN	VSWR OUT	Image rejection GHz - dB	LO stability, KHz	Phase noise dBc/Hz, offset 0,1/1/10/100 KHz	Waveguide type
	start	end	start	end									
MD404014-P2	39,95	40,75	0,95	1,75	19,500	4,2	45-50	<2,5	<1,7	30	±98	55/75/80/90	WR22
MD411014-P2	40,75	41,55	0,95	1,75	19,900	4,2	45-50	<2,5	<1,7	30	±99	55/75/80/85	
MD419014-P2	41,45	42,25	0,95	1,75	20,250	4,5	45-50	<2,5	<1,7	30	±102	55/75/80/85	
MD426014-P2	42,20	43,00	0,95	1,75	20,625	4,5	45-50	<2,5	<1,7	30	±104	55/75/80/85	
MD434014-P2	42,95	43,75	0,95	1,75	21,000	4,5	45-50	<2,5	<1,7	30	±105	55/75/80/85	
MD441014-P1	43,75	44,55	0,95	1,75	21,400	4,5	45-50	<2,5	<1,7	30	±107	55/70/75/85	
MD449014-P1	44,55	45,35	0,95	1,75	21,800	4,5	45-50	<2,5	<1,7	30	±109	55/70/75/85	
MD457014-P1	45,35	46,15	0,95	1,75	22,200	4,5	45-50	<2,5	<1,7	30	±111	55/70/75/85	
MD465014-P1	46,15	46,95	0,95	1,75	22,600	5,0	45-50	<2,5	<1,7	30	±113	55/70/75/85	
MD473014-P1	46,95	47,75	0,95	1,75	23,000	5,0	45-50	<2,5	<1,7	30	±115	55/70/75/85	
MD481014-P1	47,75	48,55	0,95	1,75	23,400	5,0	45-50	<2,5	<1,7	30	±117	55/70/75/85	
MD489014-P1	48,55	49,35	0,95	1,75	23,800	5,0	45-50	<2,5	<1,7	25	±119	55/70/75/85	
MD497014-P1	49,35	50,15	0,95	1,75	24,200	5,0	45-50	<2,5	<1,7	25	±121	55/70/75/85	
MD505014-P1	50,15	50,95	0,95	1,75	24,600	5,0	45-50	<2,5	<1,7	25	±123	55/70/75/85	WR19
MD513014-P1	50,95	51,75	0,95	1,75	25,000	5,5	45-50	<2,5	<1,7	25	±125	55/70/75/85	
MD521014-P1	51,75	52,55	0,95	1,75	25,400	5,5	45-50	<2,5	<1,7	25	±127	55/70/75/80	
MD529014-P1	52,55	53,35	0,95	1,75	25,800	5,5	45-50	<2,5	<1,7	25	±129	55/70/75/80	
MD537014-P1	53,35	54,15	0,95	1,75	26,200	5,5	45-50	<2,5	<1,7	25	±131	55/70/75/80	
MD545014-P1	54,15	54,95	0,95	1,75	26,600	5,5	45-50	<2,5	<1,7	25	±133	55/70/75/80	
MD553014-P1	54,95	55,75	0,95	1,75	27,000	5,5	45-50	<2,5	<1,7	20	±135	50/70/75/80	
MD561014-P1	55,75	56,55	0,95	1,75	27,400	5,5	45-50	<2,5	<1,7	20	±137	50/70/75/80	
MD569014-P1	56,55	57,35	0,95	1,75	27,800	6,0	45-50	<2,5	<1,7	20	±139	50/70/75/80	
MD577014-P1	57,35	58,15	0,95	1,75	28,200	6,0	45-50	<2,5	<1,7	20	±141	50/70/75/80	
MD585014-P1	58,15	58,95	0,95	1,75	28,600	6,0	45-50	<2,5	<1,7	20	±143	50/70/75/80	
MD593014-P1	58,95	59,75	0,95	1,75	29,000	6,0	45-50	<2,5	<1,7	20	±145	50/70/75/80	
MD601014-P1	59,75	60,55	0,95	1,75	29,400	6,0	45-50	<2,5	<1,7	20	±147	50/70/75/80	

Coaxial converters

MD-025014-P	2,2	2,7	0,95	1,45	3,65	1,0	45-50	<2,0	<1,7	45	±11	65/85/85/95	N-N type
MD-030013-P	2,7	3,4	1,00	1,70	4,40	1,0	45-50	<2,0	<1,7	45	±11	65/85/85/95	N-N type
MD-036014-P	3,2	4,0	0,95	1,75	4,95	1,0	45-50	<2,0	<1,7	45	±13	65/85/85/95	N-N type
MD-038014-P	3,4	4,2	1,00	1,80	5,20	1,0	45-50	<2,0	<1,7	45	±13	65/85/85/95	N-N type
MD-046014-P	4,2	5,0	1,00	1,80	6,00	1,0	45-50	<2,0	<1,7	45	±15	65/85/85/95	N-N type
MD-055014-P	5,1	5,9	0,95	1,75	6,85	1,0	45-50	<2,0	<1,7	45	±19	65/85/85/95	N-N type
MD-056020-P	5,0	6,2	1,40	2,60	3,60	1,0	45-50	<2,0	<1,7	45	±19	65/85/85/95	N-N type
MD-066017-P	5,9	7,3	1,00	2,40	4,90	1,0	45-50	<2,0	<1,7	45	±21	65/80/80/90	N-N type
MD-079017-P	7,2	8,7	1,00	2,50	6,20	1,0	45-50	<2,0	<1,7	45	±23	65/80/80/90	N-N type
MD-096018-P	8,7	10,5	0,90	2,70	7,80	1,2	45-50	<2,0	<1,7	45	±27	65/80/80/90	N-N type
MD-111017-P	10,5	11,7	1,10	2,30	9,40	1,2	45-50	<2,0	<1,7	45	±32	60/80/80/90	N-N type
MD-125019-P	11,7	13,3	1,10	2,70	10,60	1,3	45-50	<2,5	<1,7	45	±36	60/80/80/90	N-N type
MD-138015-P	13,2	14,4	0,90	2,10	12,30	1,4	45-50	<2,5	<1,7	45	±38	55/75/75/85	N-N type
MD-150022-P	14,4	15,7	1,20	2,50	13,20	1,5	45-50	<2,5	<1,7	45	±34	55/75/75/85	N-N type

Coaxial converters with switching frequency band*

MD-167022-P	15,7	16,7	1,7	2,7	14,0	1,7	45-50	<2,5	<1,7	40	±38	55/75/75/85	N-N type
	16,7	17,7			15,0								
MD-187022-P	17,7	18,7	1,7	2,7	16,0	1,7	45-50	<2,5	<1,7	40	±40	55/75/75/85	SMA-N
	18,7	19,7			17,0								
MD-205020-P	19,5	20,5	1,5	2,5	18,0	2,0	45-50	<2,5	<1,7	40	±43	55/75/75/85	SMA-N
	20,5	21,5			19,0								
MD-224020-P	21,2	22,4	1,4	2,6	18,8	2,2	45-50	<2,5	<1,7	35	±55	55/75/75/85	SMA-N
	22,4	23,6			21,0								
MD-245020-P	23,5	24,5	1,5	2,5	22,0	2,5	45-50	<2,5	<1,7	35	±58	55/75/75/85	SMA-N
	24,5	25,5			23,0								
MD-264020-P	25,2	26,4	1,4	2,6	23,8	2,5	45-50	<2,5	<1,7	35	±60	55/75/75/85	SMA-N
	26,4	27,6			25,0								

* band switching is controlled by power supply value. Power range is determined additionally. For example, lower band is 8-12V, higher band is 13-18V.

MICROWAVE SYNTHESIZERS

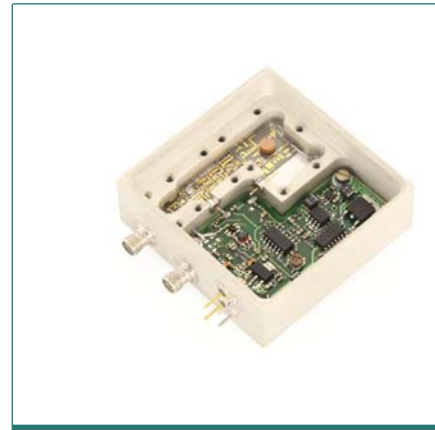
Intended for use within oscillators of transceivers in telecommunication systems, radiolocation, test and measurement equipment. Wide range of frequency synthesizers is produced: from single phase-locked loop frequency control to complex multiloop PLL with direct analog and digital computational synthesis.

MS F

Dielectric resonator oscillators, stabilized PLL from internal or external reference oscillator. Low phase noise, low g-sensitivity.

MS N

Frequency synthesizers for transceivers of telecommunication equipment with QPSK, QAM modulation.



Characteristic, units	MS F	MS N
Frequency range, GHz	4 ... 40	2,5 ... 40
Frequency coverage range, %	-	≤ 5 ... 10
Frequency spacing	-	≥ 1 MHz
External reference oscillator frequency, MHz	5 ... 200	-
Spurious level, dBc	-70	-65
Typical phase noise at frequency, dBc/Hz offset to 1 kHz / 10 kHz / 100 kHz	10 GHz -95 / -110 / -115	18 GHz -90 / -95 / -105
Frequency stability in operating temperature range, 10 ⁻⁶	-	± 2
Operating temperature range, °C	-50 ... +60	

MS W

Wideband low-noise frequency synthesizers with octave frequency coverage and external reference oscillator synchronization.



Characteristic, units	MS W
Frequency range, MHz	1000 - 2000
Frequency resolution, Hz	0,01
Switch time, mks	< 200
Spurious level, dBc	-75
Typical phase noise at 2 GHz, dBc/Hz offset to 1 kHz / 10 kHz / 100 kHz / 1 MHz / 10 MHz	-110 / -120 / -125 / -130 / -150
Operating temperature range, °C	-40 ... +60

**MS W**

Wideband low-noise frequency synthesizers with octave frequency coverage and external reference oscillator synchronization.

Characteristic, units	MS UW
Frequency range, MHz	0,1 - 4000,0
Frequency resolution, Hz	0,01
Switch time, mks	< 200
Spurious level, dBc	-60
Typical phase noise at 4 GHz, dBc/Hz offset to 1 kHz / 10 kHz / 100 kHz / 1 MHz / 10 MHz	-80 / -85 / -90 / -130 / -150
Operating temperature range, °C	+5 ... +60

**MS UW**

Ultrawideband frequency synthesizers. Intended for use in microwave test and measurement equipment.

MS W SF

Ranged frequency synthesizers with direct synthesis with high frequencies switch speed. Intended for use in radiolocation transceiver modules.

Characteristic, units	MS W SF
Frequency range, GHz	6 ... 18
Frequency resolution, Hz	
Switch time, ns	≤ 150 - 200
Spurious level, dBc	-60
Typical phase noise at 1- GHz, dBc/Hz offset to 1 kHz / 10 kHz / 100 kHz	-100 / -110 / -115
Operating temperature range, °C	-50 ... +60

**ЖККЮ.467870.022-03**

Synthesizer for replacement of fixed-frequency oscillators in transceivers of telecommunication equipment "Harris Quadralink".

Characteristic, units	ЖККЮ.467870.022-03
Frequency range, MHz	7800-8820
Frequency step, MHz	14
Output power, dBm	12-16
SWR load	≤ 2
Relative instability of frequency in operating temperature range, 10 ⁻⁶	± 2
Spurious level, dBc	-60
Signal level at test port, dBm	-10±6
Phase noise at offset from carrier, dBc/Hz	10 kHz / 100 kHz -85 / -100
Power supply, V	10±0,5
Current consumption, mA	≤ 280 (max)
Operating temperature range, °C	-20 ... +50

MIXERS

Design: Hermetic housing with coaxial input and output.

WITH PHASE IMAGE REJECTION

Mixer types: parametric MESFET, diode.



Model	Frequency range, GHz		Image rejection relative to direct channel, dB	Conversion loss, dB	VSWR RF/L ₀	P L ₀ , mW	Isolation, dB		Voltage, V
	RF	IF					L ₀ /IF	RF/IF	
MMBT-3060-01	3-6	0,1-0,5	25	-5...-7	1,5/2,0	10	35	30	-5
MMBT-080150-01	8-15	0,5-1,0	20	-5...-7	1,5/2,0	7	40	40	-5
MMDT-080150-01	8-15	1,5-3,0	20	-7...-9	1,5/2,0	10	40	40	-5

BALANCED AND DOUBLE BALANCED MIXERS

Circuit designs:

- parametric transistor MESFET with phase rejection of signal and heterodyne frequency and of heterodyne AM noise in IF channel;
- parametric four-transistor MESFET ring composed as a single MIC;
- subharmonic antiparallel diode pair;
- diode ring.



Model	Frequency range F, GHz*	Range of L ₀ frequency set, GHz (L ₀ tuning is allowed in 50% band)	Conversion loss, dB	VSWR RF/L ₀	P L ₀ , mW	Isolation, dB		Voltage, V
						L ₀ /IF	RF/IF	
MMBT-2030-01	2-3	1-15	-3 ... -5	2/2	7	20	20	-5
MMBT-3050-01	3-5	1-15	-3 ... -5	2/2	7	20	20	-5
MMBT-5080-01	5-8	1-15	-3 ... -5	2/2	7	20	20	-5
MMBT-080120-01	8-12	1-15	-3 ... -5	2/2	7	20	20	-5
MMBT-120180-01	12-18	1-15	-3 ... -5	2/2	7	25	25	-5
MMDD-1020-01	1-2	1-15	-8 ... -10	2/2	20	30	30	
MMDD-2040-01	2-4	1-15	-8 ... -10	2/2	20	30	30	
MMDD-4080-01	4-8	1-15	-8 ... -10	2/2	20	30	30	
MMDD-080160-01	8-16	1-15	-8 ... -10	2/2	20	30	30	
MMDD-180260-01	18-26	9-10	-8 ... -10	2/2	20	40	40	

* - frequency range can be corrected when ordering

AMPLIFIERS



Hermetic housing with coaxial input and output. Operating frequency range: $\pm 50^{\circ}\text{C}$.

LOW-NOISE NARROWBAND COAXIAL AMPLIFIERS

Voltage: +8...+15 V (unstabilized) or +5 V (stabilized).

Connector types:

- SMA, N up to 18 GHz,
- SMA from 18,0 to 27,5 GHz.

Name	Freq. range, GHz	Noise fig., dB (at +25°C)	Gain, dB	P_{OUT} dBm at 1 dB compress.	VSWR in/out
MALN 034042-01 /-02	3,4-4,2	0,50	25/35	10/13	3,0/2,0
-03 /-04		0,80	25/35	10/13	
MALN 044050-01 /-02	4,4-5,0	0,55	25/35	10/13	2,5/2,0
-03 /-04		0,80	25/35	10/13	1,5/1,5
MALN 058068-01 /-02	5,8-6,8	0,60	25/35	10/13	2,5/2,0
-03 /-04		0,80	25/35	10/13	1,5/1,5
MALN 066077-01 /-02	6,6-7,9	0,60	25/35	10/13	2,5/2,0
-03 /-04		0,80	25/35	10/13	1,5/1,5
MALN 079084-01 /-02	7,9-8,7	0,60	25/35	10/13	2,5/2,0
-03 /-04		1,00	25/35	10/13	1,5/1,5
MALN 109117-01 /-02	10,7-11,7	0,65	25/35	10/13	2,5/2,0
-03 /-04		1,20	25/35	10/13	1,5/1,5
MALN 117127-01 /-02	11,7-12,7	0,70	25/35	10/13	2,5/2,0
-03 /-04		1,30	25/35	10/13	1,5/1,5
MALN 109128-01 /-02	10,9-12,8	0,80	25/35	10/13	2,5/2,0
-03 /-04		1,30	25/35	10/13	1,5/1,5
MALN 144155-01 /-02	14,4-15,5	1,00	25/35	10/13	2,5/2,0
-03 /-04		1,50	25/35	10/13	1,5/1,5
MALN 177197-01 /-02	17,7-19,7	1,30	25/35	13	2,0/2,0
MALN 195215-01 /-02	19,5-21,5	1,40	25/35	13	2,0/2,0
MALN 210235-01 /-02	21,0-23,5	1,60	25/35	13	2,0/2,0
MALN 235255-01 /-02	23,5-25,5	1,80	25/35	13	2,0/2,0
MALN 250275-01 /-02	25,0-27,5	2,00	25/35	13	2,0/2,0
MALN 270295-01 /-02	27,0-29,5	2,00	25/35	13	2,0/2,0
MALN290310-01 /-02	29,0-31,0	2,20	25/35	13	2,0/2,0
MALN 305325-01 /-02	30,5-32,5	2,20	25/35	13	2,0/2,0
MALN 325345-01 /-02	32,5-34,5	2,20	25/35	13	2,0/2,0
MALN 345365-01 /-02	34,5-36,5	2,40	25/35	13	2,0/2,0
MALN 365385-01 /-02	36,5-38,5	2,40	25/35	13	2,0/2,0
MALN 380400-01 /-02	38,0-40,0	2,40	25/35	13	2,0/2,0

LOW-NOISE NARROWBAND WAVEGUIDE AMPLIFIERS

Voltage: +8...+15 V (unstabilized) or +5 V (stabilized).

Hermetic housing with waveguide input and output.



Name	Freq. range, GHz	Noise fig., dB (at +25°C)	Gain, dB	P _{OUT} dBm, at 1 dB compress.	VSWR in/out
MALN 034042 -11/-12	3,4-4,2	0,20	25/35	10/13	3,0/2,0
		0,50	25/35	10/13	1,5/1,5
MALN 044050 -11/-12	4,4-5,0	0,25	25/35	10/13	3,0/2,0
		0,50	25/35	10/13	1,5/1,5
MALN 058068 -11/-12	5,8-6,8	0,30	25/35	10/13	3,0/2,0
		0,60	25/35	10/13	1,5/1,5
MALN 066079 -11/-12	6,6-7,9	0,30	25/35	10/13	3,0/2,0
		0,70	25/35	10/13	1,5/1,5
MALN 079087 -11/-12	7,9-8,7	0,30	25/35	10/13	3,0/2,0
		0,70	25/35	10/13	1,5/1,5
MALN 107117 -11/-12	10,7-11,7	0,35	25/35	10/13	3,0/2,0
		0,80	25/35	10/13	1,5/1,5
MALN 117128 -11/-12	11,7-12,8	0,40	25/35	10/13	3,0/2,0
		1,00	25/35	10/13	1,5/1,5
MALN 109128 -11/-12	10,9-12,8	0,60	27	10/13	3,0/2,0
		1,00			1,5/1,5
MALN 144155 -11/-12	14,4-15,5	0,80	25	10/13	2,5/2,0
		1,00			1,5/1,5
MALN 177197 -11 /-12	17,7-19,7	1,10	25/35	13	2,0/2,0
MALN 195215 -11 /-12	19,5-21,5	1,10	25/35	13	2,0/2,0
MALN 210235 -11 /-12	21,0-23,5	1,10	25/35	13	2,0/2,0
MALN 235255 -11 /-12	23,5-25,5	1,30	25/35	13	2,0/2,0
MALN 250275 -11 /-02	25,0-27,5	1,40	25/35	13	2,0/2,0
MALN 270295 -01 /-02	27,0-29,5	1,50	25/35	13	2,0/2,0
MALN290310 -01 /-02	29,0-31,0	1,80	25/35	13	2,0/2,0
MALN 305325 -01 /-02	30,5-32,5	2,00	25/35	13	2,0/2,0
MALN 325345 -01 /-02	32,5-34,5	2,00	25/35	13	2,0/2,0
MALN 345365 -01 /-02	34,5-36,5	2,20	25/35	13	2,0/2,0
MALN 365385 -01 /-02	36,5-38,5	2,40	25/35	13	2,0/2,0
MALN 380400 -01 /-02	38,0-40,0	2,60	25/35	13	2,0/2,0

WIDEBAND AMPLIFIERS



Voltage: +8...+15 V.

Connector types:

- SMA, N up to 18 GHz,
- SMA from 18,0 to 27,5 GHz.

Internal voltage regulator with protection from surge and polarity reversal.

Name	Freq. range, GHz	Noise fig., dB (at +25°C)	Gain, dB	P _{OUT} dBm, at 1 dB compress.	VSWR in/out
MAW 001010 -01 /-02 -03 /-04	0,1-1,0	0,5	25/35	10/13	2,0/2,0
		0,8	25/35	10/13	
MAW 010020 -01 /-02 -03 /-04	1,0 - 2,0	0,8	25/35	10/13	2,0/2,0
		1,5	25/35	10/13	
MAW 020040 -01 /-02 -03 /-04	2,0-4,0	0,8	25/35	10/13	2,0/2,0
		1,5	25/35	10/13	
MAW 040080 -01 /-02 -03 /-04	4,0-8,0	1,0	25/35	10/13	2,0/2,0
		1,5	25/35	10/13	
MAW 080120 -01 /-02 -03 /-04	8,0-12,0	1,0	25/35	10/13	2,0/2,0
		1,5	25/35	10/13	
MAW 120180 -01 /-02 -03 /-04	12,0-18,0	2,2	20/30	10/13	2,0/2,0
		3,0	20/30	10/13	
MAW 180260 -01 /-02	18,0-26,0	2,5	20/30	10	2,0/2,0



ULTRAWIDEBAND AMPLIFIERS

Voltage: +8...+15 V.

Connector types: SMA, N.

Internal voltage regulator with protection from surge and polarity reversal.

Name	Freq. range, GHz	Noise fig., dB (at +25°C)	Gain, dB	P _{OUT} dBm, at 1 dB compress.	VSWR in/out
MAHW001030	0,1-3,0	2,0	35	12	2,0/2,0
MAHW010060	1,0-6,0	1,5	40	12	2,5/2,0
MAHW060120	6,0-12,0	1,8	35	12	2,5/2,0
MAHW080180	8,0-18,0	2,5	40	12	2,5/2,0
MAHW010120	1,0-12,0	2,0	30	12	2,5/2,0
MAHW080260	8,0-26,0	4,0	30	10	2,5/2,0
MAHW140320	14,0-32,0	3,5	40	10	2,5/2,0
MAHW001260	0,1-26,0	5,5	30	16	2,0/2,0
MAHW001350	0,1-35,0	8,5	22	10	2,0/2,0

POWER AMPLIFIER



Voltage: +9, -5 V.

XXX – central operating frequency, GHz.

YYY – operating frequency band, MHz.

Microwave connector 3,5/1,52 mm, 50 W.

Name	Freq. range, GHz	Operating freq. band, MHz	Gain, dB	P _{OUT} dBm at 1 dB compress. (t _{CP} =25°C)	VSWR in/out
MAPXXX-YYY-01 MAPXXX-YYY-02 MAPXXX-YYY-03 MAPXXX-YYY-04	1,0-2,0	150-300	20/30/40	37	2,0/2,0
	2,0-4,0		20/30/40	36	
	4,0-8,0		20/30/40	32	
	8,0-12,0	250-1000	20/30/40	31	
	12,0-18,0	18/25/32/40	30		

FREQUENCY MULTIPLIERS

MXS, MXB

Hermetic housing with coaxial input and output.



Characteristic, units	MXS-12-01	MXS-24-01	MXB-12-01	MXB-24-01
Input frequency range F_0 , GHz	1-2	2-4	1-2	2-4
Input operating frequency band ΔF , % of F_0	10	10	20	20
VSWR in/out	1,5/1,5	1,5/1,5	1,5/1,5	1,5/1,5
Nominal input power level, dBm	4-6	4-6	4-6	4-6
Multiplicity	4-6	4	4-6	4-6
Rejection of harmonic and subharmonic products in output signal spectrum, related to main signal, dB	60	60	60	60
Nominal output power level, dBm	10	10	10	10
Output power level deviation in frequency range, dB	$\pm 1,5$	$\pm 1,5$	$\pm 1,5$	$\pm 1,5$

BANDPASS FILTERS



WAVEGUIDE

Design:

- 1) 4-resonator evanescent through inductive diaphragms in rectangular waveguide, H10 wave;
- 2) 3-resonator with cylindrical cavities, H011 wave;
- 3) 6-resonator evanescent through inductive diaphragms in rectangular waveguide, H10 wave.

Model	Central frequency F_0 variation range, GHz	Passband ΔF at level of -1 dB, in % from F_0	Passband attenuation, less than, dB	Attenuation at offset $\pm\Delta F$ from F_0 more than, dB	VSWR in/out, less than	Mechanical tuning range of F_0 , MHz	Design
MFPW-03604-02	3,6-4,2	2-4	-1,0 ... -1,5	-50	1,5/1,5	± 50	3
MFPW-079083-01	7,9-8,3	0,5-2,0	-1,0 ... -1,5	-30	1,5/1,5	± 50	1
MFPW-107117-01	10,7-11,7	0,5-2,0	-1,0 ... -1,5	-30	1,5/1,5	± 50	1
MFPW-144153-01	14,4-15,3	0,5-1,0	-1,0 ... -1,5	-30	1,5/1,5	± 50	1
MFPW-144153-02	14,4-15,3	0,2	-1	-40	1,5/1,5	± 50	2



WITH CAVITY RESONATORS

Design:

- 1) 9-resonator with coaxial in/out;
- 2) 11-resonator with coaxial in/out.

Model	Central frequency F_0 variation range, GHz	Passband ΔF at level of -1 dB, in % from F_0	Passband attenuation, less than, dB	Attenuation at offset $\pm\Delta F$ from F_0 more than, dB	VSWR in/out, less than	Mechanical tuning range of F_0 , MHz	Design
MFPV-045065-01	4,5-6,5	15,0	-0,3 ... -0,7	-60	1,5/1,5	2,0	1
MFPV-080105-01	8,0-10,5	9,5	-0,3 ... -0,7	-60	1,5/1,5	2,5	2



WITH DIELECTRIC RESONATORS AND COAXIAL DIELECTRIC RESONATORS

Design:

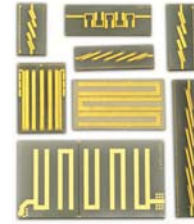
- MFPD – with cylindrical dielectric ceramic resonators;
- MFPK – with coaxial dielectric ceramic resonators.

Model	Central frequency F_0 variation range, GHz	Passband ΔF at level of -1 dB, in % from F_0	Passband attenuation, dB	Attenuation at offset $2\Delta F$ from F_0 dB	VSWR in/out, less than	F_0 variation in temperature range of ± 50 °C, 10^{-6}
MFPD-****-01	1,5 ... 1,6	1,0	-2,0	-35	1,5/1,5	50 ... 100
MFPD-****-01	4,0 ... 5,0	0,5	-2,5	-35	1,5/1,5	50 ... 100
MFPD-****-01	10,0 ... 15,0	0,5	-3,0	-30	1,5/1,5	50 ... 100
MFPK-****-01	0,3 ... 2,0	0,5 ... 25,0	-5,0 ... -0,7	-20 ... -40	1,5/1,5	50 ... 100

MICROSTRIP

Designs:

- 1) multiresonator, highly compact (given the number of resonators), on cut-offs of multiwire coupled microstrip lines;
- 2) 2-resonator, on cut-offs of coupled microstrip lines with attenuation poles on chosen frequencies.



Model	Central frequency F_0 variation range, GHz	Passband ΔF at level of -1 dB, in % from F_0	Passband attenuation, dB	Attenuation at offset $2\Delta F$ from F_0 , dB	VSWR in/out, less than	Design
MFPM-****-01	1 -18	3 - 100	+1 ... +3	+35	1,5/1,5	1
MFPM-****-02	1 -18	3 - 10	+1 ... +2	+30	1,5/1,5	2

WAVEGUIDE WITH LONGITUDINAL RIBBON DIAPHRAGMS IN E PLANE

Design:

- 1) 7-resonator with section dimensions of 11,0x5,5 mm;
- 2) 7-resonator with section dimensions of 8,6x4,3 mm;
- 3) 7-resonator with section dimensions of 7,2x3,4 mm;
- 4) 8-resonator with section dimensions of 5,6x2,8 mm;
- 5) 8-resonator with section dimensions of 5,2x2,6 mm.



Model	Frequency range $F_s - F_p$, GHz, at -1 dB level	Passband attenuation, less than, dB	VSWR in/out, less than	Offset from F_c / F_p with -40 dB compression, GHz	Design
MFPW-17651825-01	17,65-18,25	-0,5 ... -1,0	1,6/1,6	0,25	1
MFPW-18151870-01	18,15-18,70	-0,5 ... -1,0	1,6/1,6	0,25	1
MFPW-18651925-01	18,65-19,25	-0,5 ... -1,0	1,6/1,6	0,25	1
MFPW-19201975-01	19,20-19,75	-0,5 ... -1,0	1,6/1,6	0,25	1
MFPW-21152180-01	21,15-21,80	-0,5 ... -1,0	1,6/1,6	0,25	2
MFPW-21702240-01	21,70-22,40	-0,5 ... -1,0	1,6/1,6	0,25	2
MFPW-22402305-01	22,40-23,05	-0,5 ... -1,0	1,6/1,6	0,25	2
MFPW-22952360-01	22,95-23,60	-0,5 ... -1,0	1,6/1,6	0,25	2
MFPW-27502800-01	27,50-28,00	-0,7 ... -1,5	1,7/1,7	0,25	3
MFPW-28002850-01	28,00-28,50	-0,7 ... -1,5	1,7/1,7	0,25	3
MFPW-28502900-01	28,50-29,00	-0,7 ... -1,5	1,7/1,7	0,25	3
MFPW-29002950-01	29,00-29,50	-0,7 ... -1,5	1,7/1,7	0,25	3
MFPW-36003630-01	36,00-36,30	-1,0 ... -1,7	1,7/1,7	0,12	4
MFPW-36223652-01	36,22-36,52	-1,0 ... -1,7	1,7/1,7	0,12	4
MFPW-36503680-01	36,50-36,80	-1,0 ... -1,7	1,7/1,7	0,12	4
MFPW-36703700-01	36,70-37,00	-1,0 ... -1,7	1,7/1,7	0,12	4
MFPW-37053765-01	37,05-37,65	-1,0 ... -1,7	1,9/1,9	0,27	5
MFPW-37603820-01	37,60-38,20	-1,0 ... -1,7	1,9/1,9	0,27	5
MFPW-38303890-01	38,30-38,90	-1,0 ... -1,7	1,9/1,9	0,27	5
MFPW-38853950-01	38,85-39,50	-1,0 ... -1,7	1,9/1,9	0,27	5



FREQUENCY DIVIDING EQUIPMENT

WAVEGUIDE FREQUENCY DIPLEXERS

Design: waveguide diplexer on microwave filters with longitudinal ribbon diaphragms in E plane.

Waveguide	Dimension, mm			
	In (round)	Ø 11	Ø9	Ø7.5
Out (rectangular section)	11,0x5,5	8,6x4,3	7,2x3,4	5,6x2,8

Model	Operating frequency band at 1st channel out, GHz	Operating frequency band at 2nd channel out, GHz	Passband attenuation, less than, dB	VSWR in/out in operating band, less than	Channel isolation, dB	Design
MFDW-17651925-0.1	17,65-18,25	18,65-19,25	-1,0 ... -1,5	2/2	-40	1
MFDW-18151975-0.1	18,15-18,70	19,20-19,75	-1,0 ... -1,5	2/2	-40	1
MFDW-21752305-0.1	21,15-21,80	22,40-23,05	-1,5 ... -2,0	2/2	-40	2
MFDW-21752360-0.1	21,75-22,40	22,95-23,60	-1,5 ... -2,0	2/2	-40	2
MFDW-27502900-0.1	27,50-28,00	28,50-29,00	-1,5 ... -2,0	2/2	-40	3
MFDW-28002950-0.1	28,00-28,50	29,00-29,50	-1,5 ... -2,0	2/2	-40	3
MFDW-36003680-0.1	36,00-36,30	36,50-36,80	-1,5 ... -2,0	2/2	-40	4
MFDW-36223700-0.1	36,22-36,52	36,70-37,00	-1,5 ... -2,0	2/2	-40	4



WITH CAVITY RESONATORS

Intended for frequency selection of signals. Microstrip isolators are used to improve isolation between filters and to decrease return loss of input and output.

Characteristic, units	Value
Input signals operating frequency band, GHz	2,7-3,7
Output signals operating frequency band at response jitter level of 0.5 dB	output 1 / output 2, GHz output 3 / output 4, GHz
	2,70-2,95 / 2,95-3,20 3,20-3,45 / 3,45-3,70
Passband attenuation at each output, max, dB	9
Attenuation at each output at offset from central frequency for 250 MHz, min, dB	45
VSWR in/out, max	1,30/1,25



COMB PASSBAND FILTERS

Compact design with shortened coaxial resonators with magnetic coupling, providing low losses and no parasitic passbands in a wide frequency range (approximately up to $4F_0$).

Characteristic, units	Value
Central frequency F_0 variation range, GHz	1 - 4
Passband at level of 0,5 dB, % of F_0	1 - 10
Passband attenuation, dB	1 - 2
Attenuation at offset of $2\Delta F$ from F_0 , dB	20 - 50
VSWR in/out, max	1,4

Research and Production Company "Micran"

47 Vershinina Str., Tomsk, Russia, 634045

Phone: +7 3822 413-403 Fax: +7 3822 423-615

mic@micran.ru

www.micran.ru

"Micran" Moscow Office:

Malaya Gruzinskaya 52/34, bd. 1, room 42.1, Moscow, Russia, 123557

Phone: +7 499 660-3-650 Fax: +7 499 253-07-35

msk@micran.ru