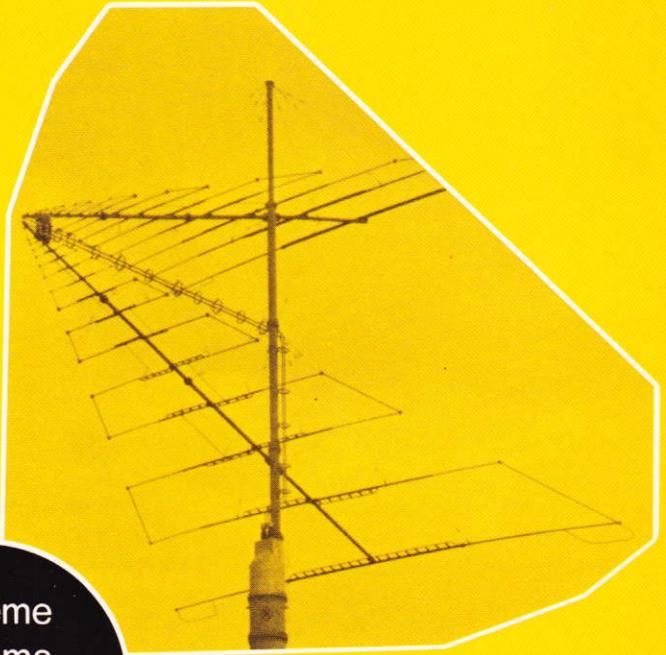
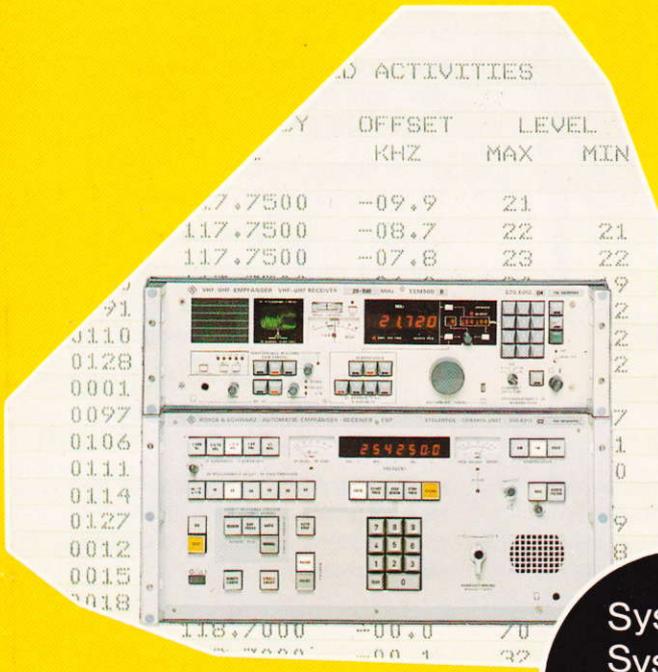


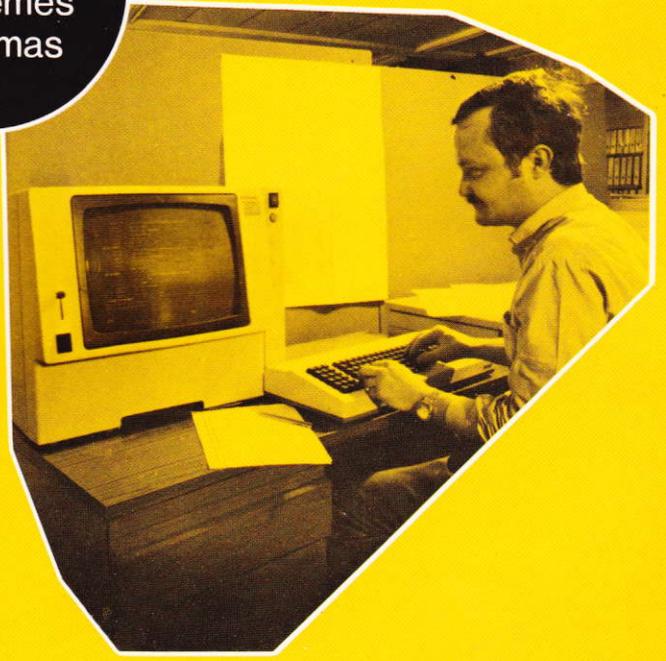


**ROHDE & SCHWARZ**

Radiomonitoring and  
Radiolocation Division



Systeme  
Systems  
Systèmes  
Sistemas



# Radiomonitoring Receivers

The above symbol of the R&S radiomonitoring and radiolocation division originates from the shape of a directional array for circular antenna arrays.

Info N 6-016 E-1  
Radiomonitoring receivers

# RADIOMONITORING RECEIVERS

Receivers are the basic units of radiomonitoring systems of any size, whose multiple tasks cannot be performed by just one unit. It is already the frequency range of 10 kHz to 1000 MHz and above with its different services and classes of emission to be observed which necessitates a splitting up into several frequency ranges and receivers with different demodulators and bandwidths.

Modern receivers must be **system-compatible**. Therefore microprocessors are used in all Rohde & Schwarz receivers to provide for the input and output of the receiver- and signal-related information and to enable communication with external facilities. The use of internationally standardized interfaces (IEC 625 bus, RS 232 C)

make the operation in computer-aided radio receiving systems easy. Built-in test facilities increase the operational convenience of the equipment and enable rapid fault location (very short MTTR). Excellent large-signal characteristics, high reliability and ruggedness are a matter-of-course with Rohde & Schwarz receivers.

## Automatic Receiver ESP (10 kHz to 2500 MHz)

The microprocessor-controlled Automatic Receiver ESP is ideally suited for scanning a great number of signals within a very short time. Up to 1000 frequency channels can be

checked for occupancy per second. The ESP provides for a high signal detection probability and creates the basis for handling the flood of signals occurring in congested frequency

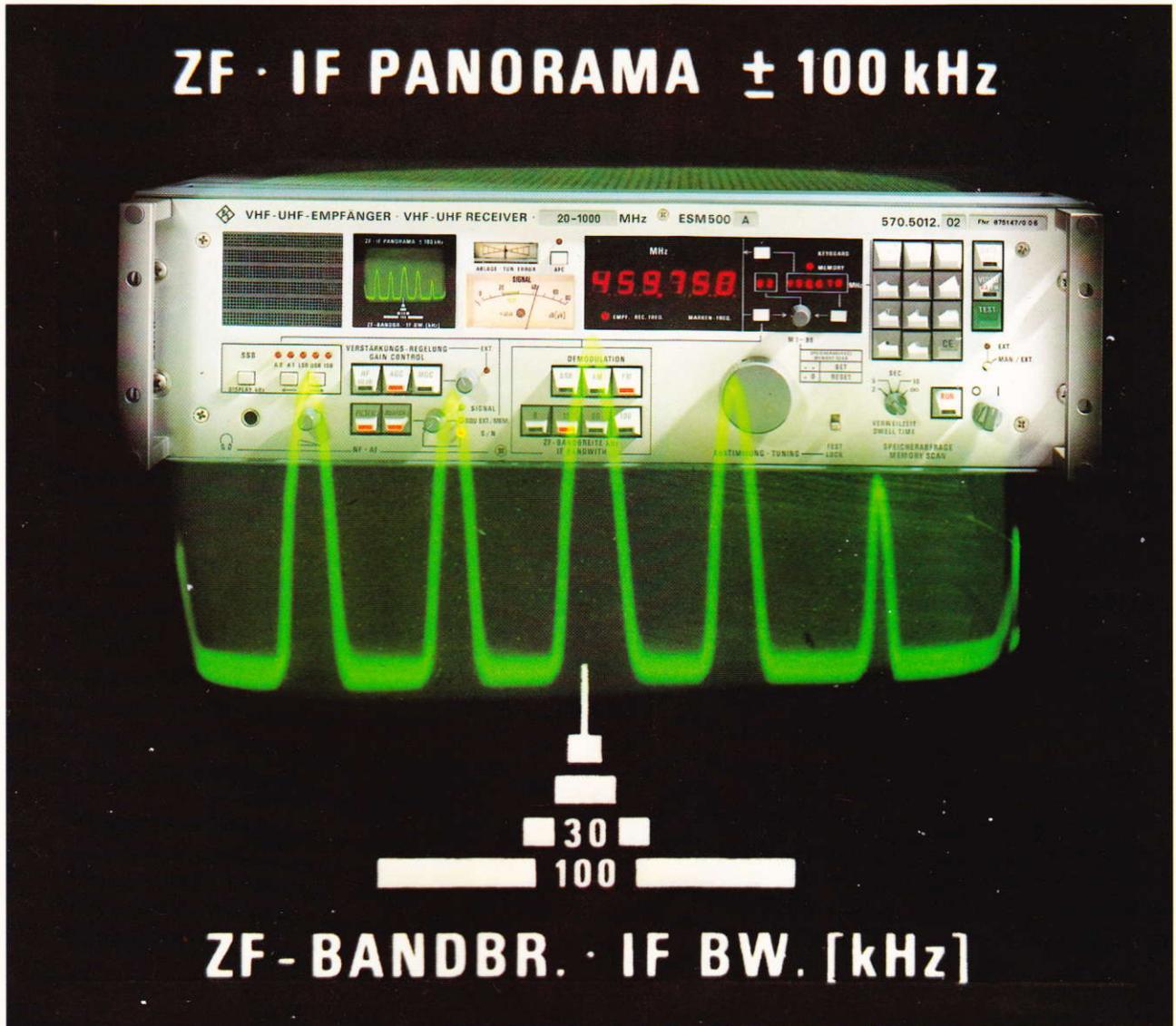
bands. The detected frequencies are read out with level and offset from the nominal frequency and are output for data processing.

Thanks to its microprocessor-controlled intelligence, the ESP can perform many tasks without the aid of a computer. When it operates in conjunction with a minicomputer, its flexibility is hard to beat. The ESP permits the user to perform his tasks with a minimum of time, equipment and personnel and is the basic unit in all computer-controlled receiving systems. The receiver is made up of the control unit and the tuner (ESP-T1 for 10 kHz to 1300 MHz, ESP-T2 up to 2500 MHz).

### Main features:

- Frequency range 10 kHz to 1300 MHz (2500 MHz); RF frequency response flatness  $\leq 3$  dB; 3rd-order intercept point (IP<sub>3</sub>) +12 dBm; noise figure 12 dB; IF bandwidth 1 kHz, 7.5 kHz, 25 kHz, 100 kHz, 2 MHz
- Smallest selectable frequency increment 100 Hz; frequency error of reference oscillator typically  $1 \times 10^{-8}$  after 24 hours; 8-digit LED readout for frequency; resolution 100 Hz; setting and dwell time per frequency step approx. 1 ms for B  $\geq 25$  kHz
- Capacity of step occupancy memory 12,288 steps; pulse interference rejection of man-made and atmospheric noise; interface for computer connection 4x16 bit parallel; weight (of both units) approx. 56 kg

LIST OF TERMINATED ACTIVITIES				LISTED AT: 16. 50. 54	
NO.	FREQUENCY MHz	OFFSET KHZ	LEVEL MAX MIN	ACTIVITY FROM	UNTIL
0009	116. 5000	-00. 1	35	16. 48. 07	16. 48. 08
0013	116. 5000	+11. 5	32	16. 48. 10	16. 48. 11
0012	116. 5500	-09. 9	31	16. 48. 09	16. 48. 10
0019	116. 5500	-07. 0	33	16. 48. 14	16. 48. 15
0027	116. 5500	-08. 4	31	16. 48. 21	16. 48. 21
0001				16. 48. 01	16. 48. 04
0001				16. 48. 05	16. 48. 06
0009				16. 49. 23	16. 49. 29
0100				16. 49. 30	16. 49. 36
0002				16. 48. 15	16. 48. 18
0003				16. 48. 23	16. 48. 23
0003				16. 48. 27	16. 48. 31
0004				16. 48. 32	16. 48. 34
0005				16. 48. 45	16. 48. 48
0005				16. 48. 49	16. 48. 53
0100					16. 49. 34
0111					16. 49. 39
0004					16. 48. 38
0004					16. 48. 40
0005					16. 48. 49
0062	119. 2000				16. 48. 53
0069	119. 2000				16. 48. 03
0078	119. 2000				16. 48. 12
0022	120. 2000				16. 48. 29
0039	120. 2000				16. 48. 34
0060	120. 2000				16. 48. 54
0064	120. 2000				16. 48. 58
0085	120. 2000	+00. 0	51	50	16. 49. 14
0090	120. 2000	+00. 0	55		16. 49. 19
0037	120. 4500	+00. 0	20	17	16. 48. 28
0048	120. 4500	+00. 0	25		16. 48. 39
0050	120. 4500	+00. 0	20		16. 48. 40
0017	120. 6500	+00. 0	67	65	16. 48. 13
0025	120. 6500	+00. 0	47	46	16. 48. 18
0032	120. 6500	+00. 0	67	66	16. 48. 23
0034	120. 6500	+00. 0	47	45	16. 48. 27
0101	120. 6500	+00. 0	67	50	16. 49. 27
0111	120. 6500	+00. 0	67	66	16. 49. 34
0114	120. 6500	-00. 1	45	41	16. 49. 36
0004	121. 9000	+00. 0	50		16. 48. 01



## VHF-UHF Receiver Family ESM 500 (20 to 1000 MHz)

The intelligent multi-purpose VHF-UHF receivers of the ESM 500 series permit the most diversified radiomonitoring tasks to be solved at an attractive price. Thanks to the use of microprocessors the ESM 500 A for 20 to 1000 MHz and the ESM 500 B for 20 to 500 MHz can be fully remotely controlled and are very easy to operate. Their common features also include:

- Large dynamic range free from spurious responses ( $IP_3 = +10$  dBm)
- Tuned preselection circuits
- High reliability in mobile and stationary use

Further characteristics are:

- Synthesizer control and tuning in steps of 1 kHz (10 Hz for SSB)
- Scanning of 99 storage locations for receiver status per frequency and directivity capability (dwell time selectable between 2 s and  $\infty$ )
- BITE already contained in standard model
- S/N ratio squelch or adjustable carrier squelch are fitted as well as
- Permanently operating test facility with fault signalling using code numbers, therefore very low MTR
- Addressing of 10 slave receivers (AO to A9) possible without controller

- AC supply or DC supply operation between 19 and 30 V possible without replacing the power supply unit
- Automatic control of antenna switches

Options:

SSB/ISB Demodulator (GM 050 S1), IF Panoramic Display with 200 kHz display width (GH 050), Wideband Demodulator with  $B = 300$  kHz and  $B = 2$  MHz (VZ 050 B1), IEC-bus Interface (GH 023) and RS 232 C Interface (GH 024).

# RADIOMONITORING RECEIVERS

## Hand-off Receivers ESM 508 K, ESM 517 K, ESM 540 K

In radiomonitoring systems a great number of different frequency channels must often be observed. When using standard receivers (such as ESM 500 A/B), the costs of the system would become too high. Receivers that are tailored to certain frequency bands but whose frequency setting can be varied at any time are far more economical. For this purpose the ESM 500 receiver family offers the so-called **cassette receivers** which are designed as 1/4 19" plug-ins:

ESM 508 K for 20 to 87 MHz,  
ESM 517 K for 68 to 174 MHz,  
ESM 540 K for 220 to 400 MHz.

Each cassette is a self-contained receiver without front-panel controls but with its own tuner, synthesizer and IF/AF amplifier and with an extremely attractive price/performance ratio.

Up to eight cassettes can be operated from one control and power supply unit GX 500 D1. This contains a microprocessorized control system, a 10-MHz reference oscillator, a power supply and an IEC-bus interface for data input and output to the central control system. The control system can be:

- An ESM 500 A/B, addressing via A0 to A9
- A minicomputer with IEC-bus interface such as the PPC/PUC from R&S
- An Automatic Receiver ESP with computer (e.g. Data General NOVA 4 or ROLM 1602 B) and IEC-bus interface. The cassette receivers are in all cases the basic modules of modern efficient receiving systems of different size



## VLF-HF Receiver EK 070 (10 kHz to 30 MHz)

For the frequency range from 10 kHz to 30 MHz Rohde & Schwarz can also offer a high-grade, multi-purpose receiver. The EK 070 is microprocessorized and tunable in steps of 10 Hz,

100 Hz or 1000 Hz via the built-in synthesizer. Like the ESM 500 receiver family the EK 070 can be remotely controlled in all its operating functions. It has standardized data in-

terfaces (IEC 625 bus, RS 232 C), is fully system-compatible and is outstanding for its excellent large-signal characteristics ( $IP_3 = +22$  dBm).

## RADIOMONITORING RECEIVERS

There is hardly any requirement that the standard model does not fulfill:

- Reception of practically all classes of emission in the HF range without requiring any additional units: A1, A2, A3, A3H, A3B and F1 corresponding to A1A, A1B, A2A, A2B, A3E, H2A, H3E, R2A, R3E, J2B, J3E, B8E, F1A and F1B
- Built-in line current source for TTY connection with visual tuning aid
- Scanning of 30 storage locations with receiver status per frequency
- Eight selectable bandwidths from 150 Hz to 12 kHz
- 12.5-kHz recording output for tape-recording of signals and later evaluation by the EK 070
- Connection for panoramic adapter with 2 MHz bandwidth



- Addressing of twelve slave receivers without requiring a controller
- High reliability in mobile and stationary use

### Panoramic Adapter EZP

The Panoramic Adapter EZP in conjunction with a suitable receiver displays the frequency spectrum within a particular range in real time, thus supplying further useful information. Experience has shown that the detection of a signal and tuning to this signal frequency is greatly facilitated by a panoramic adapter. Depending on the selected display width and resolution, the screen display with a calibrated range of 80 dB supplies information on the band occupancy as well as on the level, modulation and frequency spacing of the individual signals. A superimposed marker below the signal line indicates the tuning frequency of the receiver. Tuning to a desired signal frequency is thus considerably facilitated and accelerated.

In conjunction with the VHF-UHF Receiver ESM 500 broadband display (RF analysis) is possible in the range from 20 to 500 MHz and 500 to 1000 MHz. A particular section of this range can be displayed in expanded mode. The IF analysis permits a sweep width of  $\pm 1$  MHz,  $\pm 100$  kHz and  $\pm 10$  kHz about the selected receive frequency.

The EZP can be operated in conjunction with the following R&S receivers: ESM 500 A, ESM 500 B, ESM 5.. K,

Automatic Receiver ESP, VLF-HF Receiver EK 070. The combination of one of these receivers with the EZP and the Radiomonitoring Recorder ZSG 3 permits long-time recording of the frequency band occupancy. The response threshold for the recorder can be adjusted with the level line superimposed on the screen display.

- Dynamic range (interference-free)  $\geq 70$  dB
- Resolution bandwidth of 1.5 kHz (0.5 kHz for EK 070), 4.5 kHz, 15 kHz, 50 kHz and 120 kHz selectable or automatically ganged with sweep width; sweep time between 40 ms and 2.4 s.



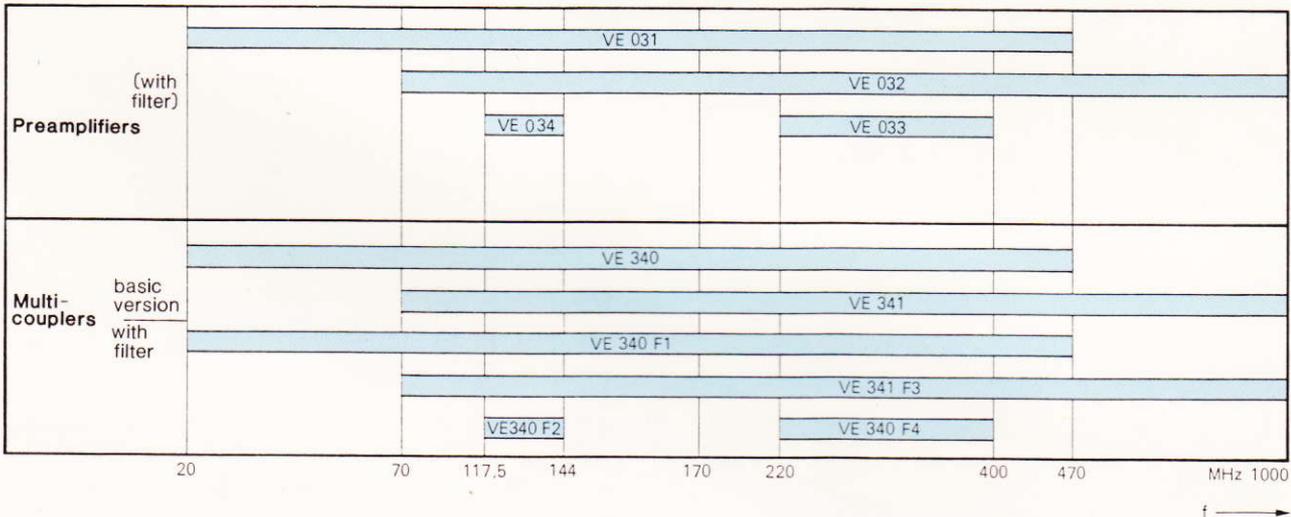
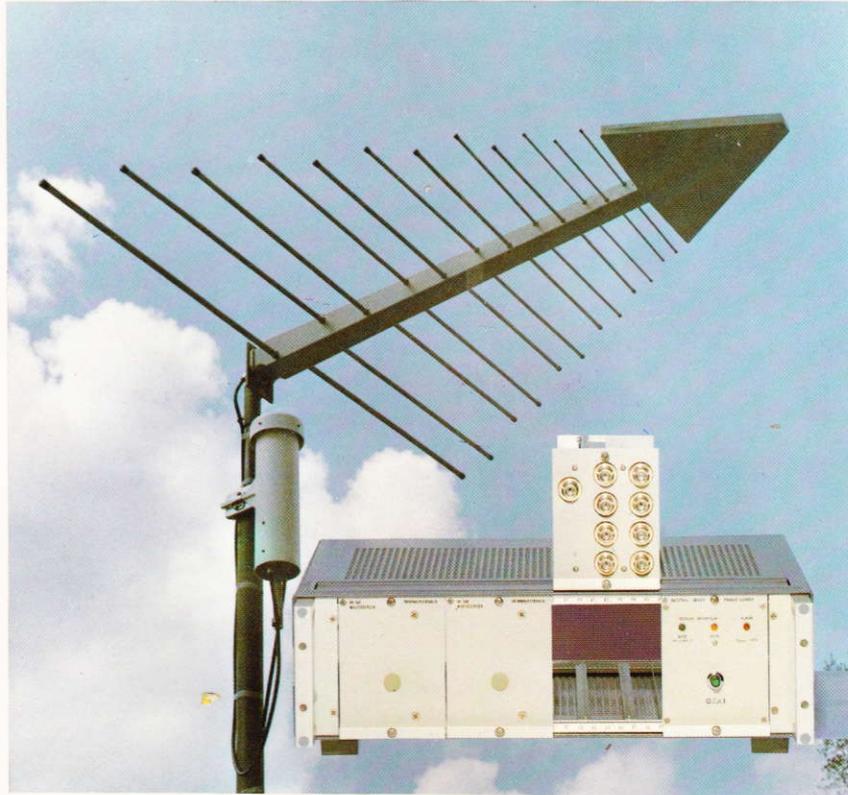
# RADIOMONITORING RECEIVERS

## Preamplifiers and Multicouplers

In larger receiving systems several receivers must be fed from one antenna. This is usually done via preamplifiers and multicouplers whose performance data have a great influence on the characteristics of the receiving system. Therefore all Rohde & Schwarz preamplifiers and multicouplers feature:

- Wide dynamic range free from spurious responses
- Low inherent noise

The photo shows a preamplifier of the VE 03 series in a weatherproof case attached to the antenna mast as well as three multicouplers VE 34 in a 19" rackmount.



	VE 031/033	VE 032	VE 034	VE 340	VE 341
Noise figure	$\leq 6.5$ dB	$\leq 7.5$ dB	$\leq 3.5$ dB	$\leq 8$ dB	$\leq 8$ dB
Average gain	12 dB	13.5 dB	20 dB	1 dB	1 dB
Input/output impedance	50 $\Omega$	50 $\Omega$	50 $\Omega$	50 $\Omega$	50 $\Omega$
Intercept point of 2nd order (IP <sub>2</sub> )	+75 dBm	+58 dBm	+70 dBm	+75 dBm	+55 dBm
Intercept point of 3rd order (IP <sub>3</sub> )	+35 dBm	+27 dBm	+36 dBm	+30 dBm	+22 dBm
Outputs	1	1	1	8	8
RF connectors			N female		
MTBF			$\geq 800,000$ hours		