Compact Receiver ESMC

Lightweight – compact – user-friendly:
optimized radiomonitoring from 0.5 MHz to 3000 MHz

- Signal reception
  - aural monitoring
  - radiomonitoring
  - recording
- 1 Hz frequency resolution

- Searching and scanning
  - continuous manual tuning
  - at any channel spacing
  - 5 start/stop frequency ranges
  - spectrum display with a
    speed of up to 13 GHz/s
  - within 1000 memory locations

- Measurement of
  - frequency occupancy
  - level and frequency
  - coverage
- RF and IF spectrum display

ROHDE & SCHWARZ

With the Compact Receiver ESMC, a universal and multipurpose receiver for radiomonitoring applications has been produced in a compact size that was thought not possible up to now.

The new receiver is only half the size of customary 19" multipurpose receivers of 3 height units but its technical data are even superior to those of such units.

The most important features are:

- custom-specific frequency extension from HF to UHF (see diagram)
- detection of frequency-agile emissions with analog sweep
- compact design and low weight
- simple operation via LC display
- wide dynamic range and high overload capacity
- 1 Hz frequency resolution
- low phase noise
- master/slave operation without a PC
- accurate measurement of signal level
- offset display for channel frequency
- remote control unit for mobile use
- AC/DC supply without changing the power supply unit

Operation

The operating concept meets all the demands made on a state-of-the-art radio-monitoring receiver, ie all main functions such as type of demodulation, bandwidth, etc, can be set directly via labelled keys. A hotkey permits returning to the main menu from any submenu. Menu control is organized in priority levels so that signal processing is not interrupted by menu changes and the user never loses sight of what is going on.
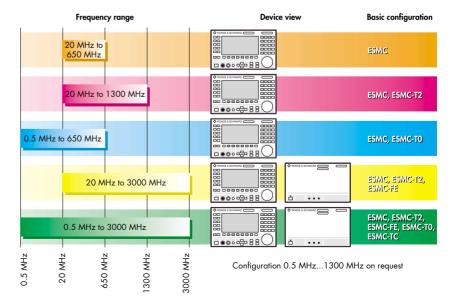
Description

ESMC is a heterodyne receiver with a second IF of 21.4 MHz. In spite of the compact design, no compromises have been made in the operating concept. For reducing the total signal load, the tuners are each provided with a tracking preselection filter. High-level mixers ensure high immunity to intermodulation. The low oscillator reradiation is the result of elaborate filtering. An advanced synthesizer concept featuring a very low phase noise allows switching times of less than 1 ms. This permits highly efficient scanning and fast status assignment in slave operation.

Compact Receiver ESMC: radiomonitoring from 0.5 MHz to 3000 MHz

Frequency range	Device view	Basic configuration
20 MHz to 650 MHz		ESMC
20 MHz to 1300 MHz		ESMC, ESMC-T2
0.5 MHz to 650 MHz		ESMC, ESMC-T0
20 MHz to 3000 MHz		ESMC, ESMC-T2, ESMC-FE
0.5 MHz to 3000 MHz		ESMC, ESMC-T2, ESMC-FE, ESMC-T0, ESMC-TC

0.5 MHz 20 MHz 650 MHz 1300 MHz 3000 MHz

Configuration 0.5 MHz...1300 MHz on request

ESMC is equipped with demodulators for AM, FM, LOG and PULSE modes. SSB reception for LSB/USB and A1 is optional. The log demodulator allows a dB-linear level indication over 9 decades. Average value or peak weighting may be selected. The absolute accuracy of the level display is further improved by taking into account the frequency response of the preselection filter and the tolerances of the log amplifier in the measurement of the signal level.

ESMC may be equipped with up to 5 IF bandwidths between 500 Hz and 8 MHz. Video filters matched to the bandwidth used and a switchable AF filter improve the S/N ratio after demodulation.

AGC covers a level range of 120 dB, 90 dB of which is used for IF control and 30 dB for an attenuator at the tuner input which may be switched in automatically or manually when strong signals are received. This attenuator is considered in the level display. With manual gain control (MGC) the IF gain may be varied by 90 dB. The 30 dB attenuation too may be switched in if required.

A tuning indication controlled by the crystal discriminator simplifies tuning to the center of the selected IF bandwidth. When signals of unstable frequency are received, digital AFC may be used for retuning the receiver.

Search facilities

The ESMC uses highly advanced search routines. Fast synthesizer settling and short level measurement times guarantee highly effective search operations. The shortest period for scanning is 5 ms with an IF bandwidth of 15 kHz (incl. measurement time for level).

Frequency scan
Five start/stop frequency ranges (5 jobs) may be defined and a complete data set allocated to each range. In addition to receiver settings, the following scan parameters may be included in the data set:

– step width
– signal threshold (dBµV)
– dwell time (s)
– hold time (ms) plus the time required for external devices, if any
– number of scan repetitions
– signal-controlled continuation (on/off)
– suppression (individual frequencies or ranges)

Memory scan
ESMC uses 1000 memory locations, each holding a complete receiver setting, such as frequency, type of modulation, bandwidth, etc. The content of the memory can be modified manually or overwritten by results of a scan operation. User-definable code names, group ID and scan enable flags may also be defined for each location. Finally the whole memory can be sorted according to increasing frequency values. The content of any memory location can be transferred to the receiver manually, by using the RCL key, by turning the tuning knob or automatically by activating the memory scan.

Analog scan – full-speed detection of bursts and hoppers
The advantage of analog sweep is the extremely high speed. This allows detection of burst signals and frequency-agile transmissions. With the option ESMC-AS and an external PC a program under Windows™ is provided, which enables panoramic and waterfall displays. Start and stop frequency are freely selectable within any tuner range. Depending on the performance of the controlling PC, a scanning speed of up to 13 GHz/s can be achieved. With the aid of a printer, measurement results may be documented as a frequency-versus-time plot.

Click & listen
For fixed frequency monitoring a spectrum line can be selected by mouse click or by frequency marker.

With option ESMC-AS fast hopping frequencies can be detected

Real-time spectrum display with EPZ513

The external Spectrum Display EPZ 513 provides highly versatile display modes. An analog CRT guarantees display in real time.

RF mode 650 MHz within 50 ms
In this mode the tuner section of ESMC is directly controlled by the EPZ513. The period of the sweep is 50 ms, independent of the span.

The spectrum is displayed on the screen within the tuner range. A superimposed marker indicates the frequency to which the receiver has been tuned. With the aid of the start/stop frequency markers entered on the ESMC, the span may be expanded within a wide range. The amplitude range covers 80 dB and uses a selectable level line.

IF mode
In this mode the signal environment around the receive frequency is displayed. The span may be varied continuously or in steps of 7/2/0.2 MHz. Selection of resolution filters is automatic. The zoom capability of the EPZ is very useful in practical applications since details of the signal spectrum can be examined. In the double-trace mode, the total span (7 MHz) and any expanded section thereof may be displayed simultaneously.

The advantage of real-time spectrum display is that a quick overview of the receive range is obtained and unknown signal activities (bursts, frequency hopping) can be detected.

Interfaces

For system applications ESMC is provided with a number of important interfaces:

- IEC 625-2 (IEEE 488) for computer operation (standard)

With VHF-UHF Direction Finder DDF190 and Spectrum Display EPZ513 the Compact Receiver ESMC forms a convenient VHF-UHF monitoring system

- RS232C/RS422/RS485 for computer operation (option ESMC-R2)
- Outputs for antenna control (eg via Antenna Selector GS 050) with
  – antenna number and
  – coded frequency information
- 21.4 MHz IF output, controlled (50 Ω, BNC)
- 21.4 MHz IF output, uncontrolled (50 Ω, BNC)
- 21.4 MHz connector for external spectrum display (50 Ω, BNC)
- Video output, AM/FM/LOG, DC-coupled (50 Ω, BNC)
- DC connector for battery supply
- Connector for external bidirectional reference frequency, 10 MHz (BNC)
- Output for 1st LO (50 Ω, BNC)
- Output for 2nd LO (50 Ω, BNC)
- AF balanced, 600 Ω
- AF unbalanced via AF filter
- 4 Ω output for external loudspeaker
- Carrier-operated relay (COR)

- Output for signal > threshold
- Output for log signal level
- Internal/external control
- Input for control voltage (MGC)
- Output for channel offset
- Others (special function ports)

Options

Several "plug&play" options allow the user to tailor the ESMC to his special needs:

ESMC-T2 for frequency extension up to 1.3 GHz

ESMC-T0 for frequency extension from 0.5 MHz to 30 MHz instead of ESMC-T2 or for installation in ESMC-FE. (Max. IF bandwidth = 30 kHz).

ESMC-FE	separate $^1/_2$19" unit for frequency extension from 1.3 GHz to 3 GHz or 0.5 MHz to 3 GHz	**ESMC-GB**	remote control unit (operator front panel) for controlling ESMC model .02 or .03 via serial link espcially for mobile applications
ESMC-AN	antenna splitter for one antenna input, 20 MHz to 3 GHz (only with ESMC-FE)	**ESMC-Z1**	IF section with special bandwidth (see ordering information)
ESMC-OR	10 MHz OCXO reference (error ≤0.1 x 10^{-6}) [5]		
ESMC-S3	for reception of LSB/USB and A1		
ESMC-SU	low-cost panoramic adapter using the LCD of the receiver		

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ESMC-SU low-cost panoramic adapter using the LCD of the receiver

ESMC-AS analog scan function and software for use with PC AT486 or Pentium

ESMC-R1 for remote control via IEC 625-2/IEEE 488 (instead of ESMC-R2)

ESMC-R2 for remote control via RS232, RS422 and RS485 bus (instead of ESMC-R1)
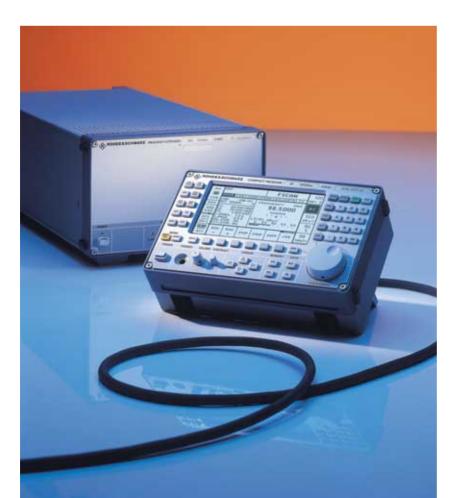
ESMC-GB remote control unit (operator front panel) for controlling ESMC model .02 or .03 via serial link espcially for mobile applications

ESMC-Z1 IF section with special bandwidth (see ordering information)

All these options can be added to the basic version of the ESMC without any software reconfiguration; whenever a module is changed or added, a recalibration process is started automatically after power-up.

Designed to meet the standards

The receiver has been designed for stationary and mobile use according to DIN IEC721 recommendations for class-C instruments. Careful shielding and filtering of all input and output lines ensures ultralow spurious emissions and low EMS.

Diagnostic center included

The receiver is permanently monitored by built-in test (BIT). If deviations from nominal values are detected, an error message is output with a code informing on the type of fault. For detailed information, the values of 48 internal test probes including upper and lower limits are available on the screen. Any values which are out of range will be highlighted on the display. In a loop test triggered by the user, the complete signal path between the antenna input and the loudspeaker or video output is checked out. This test is carried out with an internally generated and modulated test signal of calibrated frequency.

User-friendly maintenance

The advanced design, based on plug-in modules guarantees short MTTR. All modules of the unit may be exchanged without any recalibration or adjustments being required.

Remote control

All receiver functions can be remote-controlled by a controller via the standard IEC 625-2 (IEEE 488) interface or via the optional RS232C/RS422/RS485 interface. If no acknowledgements for the settings are required, simplified master-slave operation will be possible without the use of an additional controller. In this case the ESMC used as a master (talker) may address up to ten slave ESMCs (listeners) and transfer the corresponding setups to the slaves. The transferred setups are stored automatically in the master under the slave addresses and may be read out (electronic notebook).

Model .02/.03 of ESMC for remote control or for detached front panel ESMC-GB, eg for convenient use in cars

ESMC-FE — separate $^1/_2$19" unit for frequency extension from 1.3 GHz to 3 GHz or 0.5 MHz to 3 GHz

ESMC-AN — antenna splitter for one antenna input, 20 MHz to 3 GHz (only with ESMC-FE)

ESMC-OR — 10 MHz OCXO reference (error ≤0.1 x 10^{-6}) [5]

ESMC-S3 — for reception of LSB/USB and A1

ESMC-SU — low-cost panoramic adapter using the LCD of the receiver

ESMC-AS — analog scan function and software for use with PC AT486 or Pentium

ESMC-R1 — for remote control via IEC 625-2/IEEE 488 (instead of ESMC-R2)

ESMC-R2 — for remote control via RS232, RS422 and RS485 bus (instead of ESMC-R1)

ESMC-GB — remote control unit (operator front panel) for controlling ESMC model .02 or .03 via serial link espcially for mobile applications

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ESMC-RAMON – access to computer-aided radiomonitoring
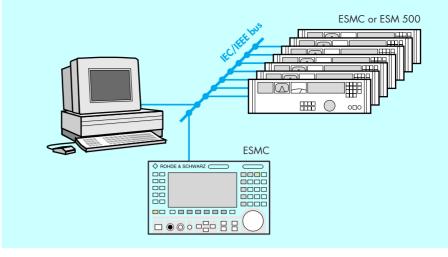
Compact radiomonitoring system

With its favourable price, ESMC-RAMON is an ideal compact radio monitoring software. It is configured to control one ESMC and can be expanded to set additional ESMC and ESM500 slave receivers to perform radiomonitoring and radiosurveillance tasks.

The system provides three operating modes:

- Static mode: the receiver can be tuned for monitoring
- Search mode: the receiver scans frequency ranges and/or a frequency list and stops for a definable time at each signal activity
- Overview mode: the receiver scans frequency ranges and/or a frequency list continuously to display the frequency spectrum

The overview mode

shows active signals with their levels as green lines. The duration of the signal activity is displayed in a waterfall, with the signal level being indicated in colour. Important parameters can be measured using markers and rulers in different colours.
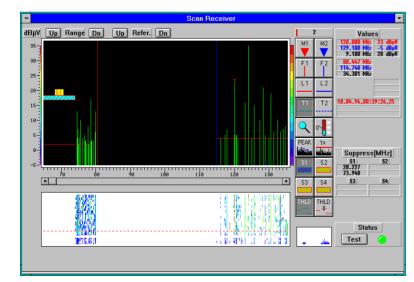
ESMC-RAMON: Overview Mode

ESMC-RAMON-Evaluate

The ESMC-RAMON-Evaluate option permits the recording of signal activities in the overview mode. Such recordings can be evaluated with the scan replay tool and analyzed in detail with the activity analyzer.

ESMC-RAMON-MasterSlave

This option allows up to six ESMC receivers to be connected to the system via IEC/IEEE bus. The slave receivers are set and enabled automatically. A free slave receiver will be set to a frequency, which is detected by the master receiver running in the search mode. The slave receiver will be enabled for new settings after the signal is below a selectable threshold for a selectable time. With this option, frequency bands and single frequencies can be monitored automatically.

ESMC-RAMON-Log

This option allows the logging of the master receiver settings.

The settings can be stored in a log file. In combination with the Log option or the Master Slave option, all transfers to slave receivers are also stored in the log file.

ESMC RAMON-IEEE488 Kit

This option contains the necessary IEEE488 board for the control PC, the board driver software, the driver installation manual and a 2 m IEEE488 cable for connecting the ESMC.

Upgrading possibility

The close relationship to RAMON® makes upgrading to the full RAMON software very easy. Existing equipment can still be used. All that remains to be done is to install the new software. As the operational concept is similar, existing knowledge can be used. All this shows that ESMC-RAMON is a Rohde &Schwarz product providing easy access to computer-aided radiomonitoring.

System requirements

- IBM-compatible PC
- minimum 486/DX2-66, 8 MByte RAM
- min. 10 MB hard disk space
- colour graphics adapter with min. resolution 1024 x 768 pixels
- mouse or other pointing device
- Windows 3.1, Windows 95 or Windows NT

Specifications

Frequency range

Basic unit (with tuner 1)	20 MHz to 650 MHz
Tuner 0	0.5 MHz to 30 MHz (optional)
Tuner 2	650 MHz to 1300 MHz (optional)
ESMC-FE (Tuner 3)	1300 MHz to 3000 MHz (optional)
Frequency setting	1 kHz, 100 Hz, 10 Hz, 1 Hz
Frequency error	$\leq \pm 1.5 \times 10^{-6}$ ($-10\,°C$ to $+55\,°C$)
	$\leq \pm 0.1 \times 10^{-6}$ (Option ESMC-OR)
Frequency aging	$\leq \pm 0.5 \times 10^{-6}$ per year
Oscillator phase noise	≤ -110 dBc (10 kHz)
for tuner 0	≤ -138 dBc (10 kHz)
Synthesizer settling time	≤ 1 ms

Antenna input s

N connectors, 50 Ω, VSWR ≤2.5, overload-protected

Oscillator reradiation	≤ -107 dBm
Tuner 0	≤ -127 dBm
Input selectivity	tuned filters
Tuner 0	4 switched bandpass filters
ESMC-FE (Tuner 3)	3 switched bandpass filters

Immunity to interference, nonlinearities

Image frequency rejection , all tuners	typ. 110 dB, ≥90 dB
IF rejection, all tuners	typ. 110 dB, ≥90 dB
IP2	
Tuner 1, tuner 2	typ. 50 dBm, ≥40 dBm
ESMC-FE (Tuner 3)	typ. 43 dBm, ≥35 dBm
Tuner 0	typ. 70 dBm, ≥55 dBm
IP3	
Tuner 1	typ. 12 dBm, ≥8 dBm
Tuner 2, ESMC-FE (Tuner 3)	typ. 10 dBm, ≥6 dBm
Tuner 0	typ. 35 dBm, ≥28 dBm
Spurious	
Tuner 1, tuner 2, ESMC-FE Tuner 3)	≤ -107 dBm
Tuner 0	≤ -113 dBm

Sensitivity

Total noise figure (incl. AF section)	typ. 10 dB, ≤13.5 dB (20 MHz to 650 MHz)
	typ. 11 dB, ≤14.5 dB (650 MHz to 1300 MHz)
	typ. 11 dB, ≤13 dB (1300 MHz to 2000 MHz)
	typ. 12 dB, ≤14.5 dB (2000 MHz to 3000 MHz)
(S+N)/N ratio	measurement using telephone filter to CCITT

AM, B=8 kHz, f_{mod}=1 kHz, m=0.5

20 MHz to 650 MHz (tuner 1), V_{in}=−107 dBm (1 µV)	≥10 dB
650 MHz to 1300 MHz (tuner 2), V_{in}=−103.5 dBm (1.5 µV)	≥10 dB
V_{in}=−47 dBm (1 mV)	≥47 dB
1300 MHz to 3000 MHz (ESMC-FE, tuner 3)	
U_e=−103.5 dBm (1.5 µV)	≥10 dB
U_e=−47 dBm (1 mV)	≥47 dB

FM, B=15 kHz, f_{mod}=1 kHz, deviation 5 kHz

20 MHz to 650 MHz (tuner 1), V_{in}=−107 dBm (1 µV)	≥25 dB
650 MHz to 1300 MHz (tuner 2), V_{in}=−103.5 dBm (1.5 µV)	≥25 dB
V_{in}=−47 dBm (1 mV)	≥70 dB
1300 MHz to 3000 MHz (ESMC-FE, tuner 3)	
U_e=−103.5 dBm (1.5 µV)	≥25 dB
U_e=−47 dBm (1 mV)	≥70 dB

USB/LSB, B=2.5 kHz, Δf=1 kHz

20 MHz to 650 MHz (tuner 1), V_{in}=−117 dBm (0.3 µV)	≥10 dB
V_{in}=−47 dBm (1 mV)	≥50 dB

Tuner 0, (S+N)/N ratio
LSB/USB, IF bandwidth 500 Hz, Δf=500 Hz

0.5 MHz to 20 MHz, V_{in}=0.4 µV	≥10 dB
20 to 30 MHz, V_{in}= 0.5 µV	≥10 dB

LSB/USB, IF bandwidth 2.5 kHz, Δf=1 kHz

0.5 MHz to 20 MHz, V_{in}= 0.6 µV	≥10 dB
20 MHz to 30 MHz, V_{in}= 0.7 µV	≥10 dB
V_{in}=100 µV	≥46 dB

Rear of ESMC; the IEC/IEEE bus can optionally be replaced by RS232 and RS422/RS485 interface

AM, IF bandwidth 2.5 kHz,
f_{mod} = 1 kHz, m = 0.5

0.5 MHz to 20 MHz, V_{in}= 1 µV	≥10 dB
20 MHz to 30 MHz, V_{in}= 1.2 µV	≥10 dB

Large signal behaviour for tuner 0
Crossmodulation
interfering signal 2.5 V (+21 dBm),
Δf ≥ 30 kHz; m = 0.3; f = 1 kHz,
signal level 5 mV (–33 dBm)

modulation transfer	≤10 %

Blocking
interf. signal 3.15 V (+ 23 dBm),
Δf ≥ 30 kHz,
signal level 500 µV (–53 dBm),
m = 0.3, f = 1 kHz

signal attenuation	≤1 dB

Desensitization
interf. signal 150 mV (–3.5 dBm),
Δf ≥ 30 kHz,
signal level 15 µV (–83.5 dBm),
bandwidth 2.5 kHz

SINAD	≥20 dB
Demodulation	AM, FM , LOG, PULSE; SSB and CW optional
Squelch	signal-controlled, adjustable –10 dBµV to 80 dBµV (max. 110 dBµV, 120 dBµV with tuner 0)
AGC range	90 dB; 1 µV to 10 mV makes ≤4 dB difference in AF level
RF attenuator	30 dB (40 dB with tuner 0) selectable or signal-controlled

AGC speed for 90 dB range

	Attack	Decay
AM/B=15 kHz	<15 ms	15 ms
Pulse/B=100 kHz	<0.1 ms	3 s, corr. to
SSB/B=2.5 kHz	<1 ms	3dB/100ms

Range of MGC (manual gain control)	90 dB
EGC (external gain control) by analog voltage	90 dB

COR

Decay	adjustable 1 s to 10 s
Attack	≤25 ms
AFC	digital tuning for signals of unstable frequency
Offset indication	graphic using tuning markers, numeric in 50 Hz steps (B ≤100 kHz)
Signal-level indication	graphic as level line or numeric from –10 dBµV to 80 dBµV (110 dBµV), with tuner 0 120 dBµV
Resolution	graphic 1 dB, numeric 0.1 dB
Error	≤±3 dB, ≤±2 dB for level ≥ 0 dBµV

Memory scan MSCAN — 1000 definable memory locations, each location may be allocated a complete set of receive data, up to 250 ch/s

Frequency scan FSCAN — five definable start/stop frequency spans with separate receive data sets (5 jobs), up to 250 ch/s

Analog sweep ASCAN (option) — full receive range (max. 650 MHz) or any expanded section

Frequency marker	added for receiver tuning
Sweep time	approx. 47 ms
Resolution filter	IF filters of receiver

Built-in test (BIT)

Continuous test	module monitoring, test points of modules can be shown on display, fault signalling with error code + text
Loop test	key-triggered, automatic test of complete receive section incl. AF section

Real-time display on Spectrum Display EPZ 513[1])

IF	±3.5 MHz, ±1 MHz, ±100 kHz or zoom
RF	full receive range (max. 650 MHz) or any expanded section

Inputs and outputs

IF 21.4 MHz, controlled output	500 Hz to 8 MHz[2]), BNC, 50 Ω, –10 dBm
IF 21.4 MHz, uncontrolled output	500 Hz to 8 MHz[2]), BNC, 50 Ω, V_{in} + 12 dB
21.4 MHz, wideband output	±4 MHz uncontrolled, BNC, 50 Ω, V_{in} +9 dB, for external spectrum display
Video output, AM/FM/LOG	1/2 IF bandwidth, DC-coupled, BNC, 50 Ω, 2 V (pp); for log 1 V
AF output, balanced	600 Ω, 0 dBm
AF output, filtered, unbalanced	0.3 kHz to 3.4 kHz, fixed, 1 V (rms)
AF output, unbalanced	1 V (rms)
AF loudspeaker output (AF filter 0.3 kHz to 3.4 kHz may be switched to any AF output)	4 Ω, 500 mW
Output, log signal level	0 V to +5 V, Z_{out} = 1 kΩ
Output, channel offset	–5 V to +5 V, Z_{out} = 1 kΩ
Input, ext. MGC voltage	0 V to 2 V, Z_{in} = 10 kΩ
Output, 1st LO	50 Ω, SMA, –10 dBm
Output, 2nd LO	50 Ω, SMA, –15 dBm
Bidirectional reference-frequency connector	10 MHz, BNC in: 0.1 V to 2 V, Z_{in}= 500 Ω out: 3 dBm, Z_{out} = 50 Ω
Special function ports	configurable for muting, ext. scan stop, etc
Output for controlling antenna selectors	BCD, TTL level (for frequency information)
Data interfaces	IEC 625-2 (IEEE 488) (standard) or RS232C/RS422/RS485 (option) SCPI syntax

General data

Operating temperature range		–10 °C to +55 °C
Nominal temperature range		0 °C to +50 °C
Storage temperature range		–40 °C to +70 °C
Humidity		to IEC 68-2-30,
model .02/.03		max. 95%, cyclic test 25 °C/55 °C
model .22/.23		max. 80%, cyclic test 25 °C/40 °C
Shock		to IEC 68-2-27 (MIL-STD-810D, MIL-T-28800D), shock spectrum 45 Hz to 2000 Hz, 40 g
Vibration (sinewave)		to IEC 68-2-6 (MIL-T-28800D), 5 Hz to 55 Hz, 0.15 mm amplitude
Vibration (noise)		to IEC 68-2-36, 10 Hz to 500 Hz, 1.9 g (rms)
EMC		VDE 0875 (RFI suppression grade K) VDE 0871, MIL-STD-461 - CE 03, MIL-STD-461 - RE 02
Power supply	AC	100/120/230/240 V, –12%/+10%, 47 Hz to 440 Hz, overvoltage protection to VDE 160
	DC	10 V to 32 V, reversed polarity protection
Power consumption	AC	≤100 VA
	DC	≤75 W
Dimensions (W x H x D)		219 mm x 147 mm x 460 mm ($^1/_2$ 19", 3 height units)
Weight		
model .02/.03		11.5 kg
model .22/.23		12 kg

Ordering information

Compact Receiver ESMC (VHF/UHF basic unit)
Model .22, with front-panel control ... 4030.2007.22
Model .02, without front-panel control ... 4030.2007.02
   models .22/.02 including:
   IEC 625 (IEEE 488) interface   ESMC-R1
   IF Section (filters 2.5 kHz/8 kHz/
   15 kHz/100 kHz/2 MHz)   ESMC-Z1
Model .23, with front-panel control ... 4030.2007.23
Model .03, without front-panel control ... 4030.2007.03
   basic models .23/.03 without
   ESMC-R1 and ESMC-Z1

ESMC-RAMON

	ESMC-RA	4037.6508.02
	ESMC-RE	3013.4815.02
	ESMC-RM	3013.4838.02
	ESMC-RL	3013.4844.02
	ESMC-RI	3013.4867.02

Options for all models

Tuner 0 for 0.5 MHz to 30 MHz	ESMC-T0[3]	4039.9004.03
Tuner 2 for 650 MHz to 1300 MHz	ESMC-T2[3]	4037.5201.02
(combination of tuner 0 and tuner 2 in one ESMC case not possible)		
SSB Unit	ESMC-S3	4037.5501.02
IF Spectrum Unit	ESMC-SU	4037.5553.02

Analog Scan (software)	ESMC-AS	4042.0404.02
IEC 625 (IEEE 488) Interface	ESMC-R1[4]	4037.5401.02
Serial Interface (RS 232/422/485)	ESMC-R2[4]	4037.5453.02
Remote Control Unit for model .02/.03	ESMC-GB	4039.8508.02
Frequency Extension 1.3 GHz to 3 GHz (separate $^1/_2$ 19" unit)	ESMC-FE	4042.6002.02
OCXO Reference	ESMC-OR [5]	4042.6902.02
Antenna Splitter	ESMC-AN	4042.6702.02

Recommended extras

Spectrum Display (data sheet PD756.9451)	EPZ513	4011.9500.04
19 " Adapter	ZZA-98	0827.4533.00
for		
one or two ESMC		
one ESMC and one EK890/895		
one ESMC and one EPZ513		
one ESMC and one ESMC-FE		

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[1]) External unit.
[2]) Depending on selected bandwidth (see table on this page).
[3]) Only one of these options to be fitted in ESMC.
[4]) Only one of these options to be fitted.
[5]) Slot in option ESMC-FE available, otherweise in ESMC basic unit instead of option ESMC-SU.

Certified Quality System
ISO 9001
DQS REG. NO 1954-04

Certified Environmental System
ISO 14001
REG. NO 1954

Option to choose for model .23/.03
IF Section (special bandwidths)   ESMC-Z1   4037.5253.XX

500 Hz	2.5 kHz	8 kHz	15 kHz	30 kHz	50 kHz	100 kHz	200 kHz	500 kHz	1 MHz	2 MHz	4 MHz	8 MHz	Model
	●	●	●			●				●			.02
●	●		●			●				●			.03
	●		●	●		●	●						.04
		●	●	●	●	●							.05
	●	●	●			●	●						.06
			●		●	●	●			●			.07
●	●	●		●		●							.08
		●	●	●		●					●		.09
	●	●	●	●		●							.10
	●	●				●				●		●	.11
		●	●	●			●					●	.12
	●	●	●	●		●							.13
	●				●			●	●		●		.15
	●	●				●				●		●	.16
		●				●	●	●				●	.17
		●	●	●		●						●	.18
		●	●	●				●		●			.19
●	●					●					●	●	.20
		●		●		●			●	●			.21
	●	●				●					●	●	.22
						●	●	●	●	●			.23
		●			●		●	●		●			.24
		●		●		●			●	●			.25
		●		●					●	●	●		.26
			●			●			●	●		●	.27
		●		●	●				●	●			.29
						●	●		●		●	●	.30
						●	●		●	●		●	.31
	●	●	●	●		●							.32
						●	●	●	●			●	.33
●	●		●				●				●		.34
		●				●				●	●	●	.35
	●	●		●							●	●	.36
						●	●			●	●	●	.37

Other combinations (5 out of 13) on request
The max. IF bandwidth of tunerT0 (0.5 MHz to 30 MHz) is 30 kHz.
Bandwidths >30 kHz cannot be used in this frequency range.

ROHDE & SCHWARZ