

# R&S® EPL1000

## EMI TEST RECEIVER

### Specifications



Specifications  
Version 04.00

**ROHDE & SCHWARZ**

Make ideas real



# CONTENTS

|                                                                      |           |
|----------------------------------------------------------------------|-----------|
| <b>Definitions .....</b>                                             | <b>3</b>  |
| <b>Specifications.....</b>                                           | <b>4</b>  |
| Frequency .....                                                      | 4         |
| Preselection and preamplifier .....                                  | 5         |
| IF and resolution bandwidths .....                                   | 5         |
| Level .....                                                          | 5         |
| Sensitivity .....                                                    | 6         |
| Measurement speed .....                                              | 8         |
| Trigger functions .....                                              | 8         |
| I/Q data .....                                                       | 9         |
| Audio demodulation .....                                             | 9         |
| Inputs and outputs .....                                             | 9         |
| General data .....                                                   | 11        |
| <b>Options .....</b>                                                 | <b>12</b> |
| R&S®FPL1-B10 GPIB interface .....                                    | 12        |
| R&S®FPL1-B30 DC power input 12 V/24 V .....                          | 12        |
| R&S®FPL1-B31 internal lithium-ion battery.....                       | 12        |
| R&S®FSV-B34 charger (only needed for charging spare batteries) ..... | 12        |
| R&S®EPL1-B91 internal generator .....                                | 12        |
| R&S®EPL1-K55E real-time spectrogram .....                            | 14        |
| R&S®EPL1-K56 IF analysis .....                                       | 16        |
| R&S®EPL1-K59 click rate analyzer .....                               | 16        |
| <b>Ordering information .....</b>                                    | <b>17</b> |

# Definitions

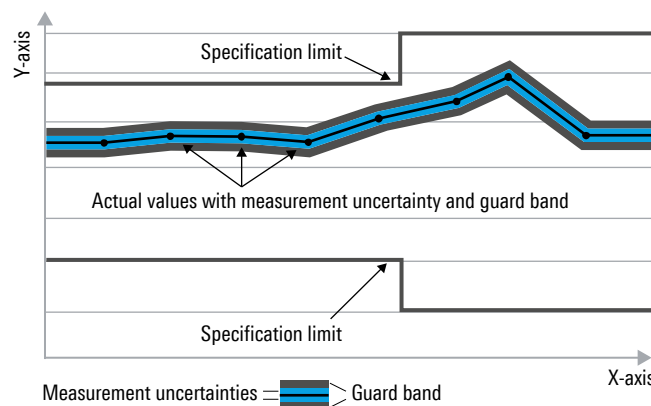
## General

Product data applies under the following conditions:

- Three hours of storage at ambient temperature followed by 30 minutes of warm-up operation
- Specified environmental conditions met
- Recommended calibration interval adhered to
- All internal automatic adjustments performed, if applicable

## Specifications with limits

Represent warranted product performance by means of a range of values for the specified parameter. These specifications are marked with limiting symbols such as  $<$ ,  $\leq$ ,  $>$ ,  $\geq$ ,  $\pm$ , or descriptions such as maximum, limit of, minimum. Compliance is ensured by testing or is derived from the design. Test limits are narrowed by guard bands to take into account measurement uncertainties, drift and aging, if applicable.



## Non-traceable specifications with limits (n. trc.)

Represent product performance that is specified and tested as described under “Specifications with limits” above. However, product performance in this case cannot be warranted due to the lack of measuring equipment traceable to national metrology standards. In this case, measurements are referenced to standards used in the Rohde & Schwarz laboratories.

## Specifications without limits

Represent warranted product performance for the specified parameter. These specifications are not specially marked and represent values with no or negligible deviations from the given value (e.g. dimensions or resolution of a setting parameter). Compliance is ensured by design.

## Typical data (typ.)

Characterizes product performance by means of representative information for the given parameter. When marked with  $<$ ,  $>$  or as a range, it represents the performance met by approximately 80 % of the instruments at production time. Otherwise, it represents the mean value.

## Nominal values (nom.)

Characterize product performance by means of a representative value for the given parameter (e.g. nominal impedance). In contrast to typical data, a statistical evaluation does not take place and the parameter is not tested during production.

## Measured values (meas.)

Characterize expected product performance by means of measurement results gained from individual samples.

## Uncertainties

Represent limits of measurement uncertainty for a given measurand. Uncertainty is defined with a coverage factor of 2 and has been calculated in line with the rules of the Guide to the Expression of Uncertainty in Measurement (GUM), taking into account environmental conditions, aging, wear and tear.

Device settings and GUI parameters are designated with the format “parameter: value”.

Non-traceable specifications with limits, typical data as well as nominal and measured values are not warranted by Rohde & Schwarz.

In line with the 3GPP standard, chip rates are specified in million chips per second (Mcps), whereas bit rates and symbol rates are specified in billion bit per second (Gbps), million bit per second (Mbps), thousand bit per second (kbps), million symbols per second (Msps) or thousand symbols per second (ksps), and sample rates are specified in million samples per second (Msample/s). Gbps, Mcps, Mbps, Msps, kbps, ksps and Msample/s are not SI units.

# Specifications

|                 |                                                                                        |
|-----------------|----------------------------------------------------------------------------------------|
| Operating modes | <ul style="list-style-type: none"> <li>receiver mode</li> <li>analyzer mode</li> </ul> |
|-----------------|----------------------------------------------------------------------------------------|

## Frequency

|                                               |                                                  |                                                                                                                                                                                     |
|-----------------------------------------------|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Frequency range                               |                                                  | 5 kHz to 30 MHz                                                                                                                                                                     |
| Frequency resolution                          |                                                  | 0.01 Hz                                                                                                                                                                             |
| Scaling                                       |                                                  | linear, logarithmic <sup>1</sup>                                                                                                                                                    |
| <b>Reference frequency, internal, nominal</b> |                                                  |                                                                                                                                                                                     |
| Accuracy                                      |                                                  | (time since last adjustment × aging rate) + temperature drift + calibration accuracy                                                                                                |
| Aging per year                                | standard                                         | $1 \times 10^{-6}$                                                                                                                                                                  |
|                                               | with R&S®FPL1-B4 OCXO reference frequency option | $1 \times 10^{-7}$                                                                                                                                                                  |
| Temperature drift (0 °C to +50 °C)            | standard                                         | $1 \times 10^{-6}$                                                                                                                                                                  |
|                                               | with R&S®FPL1-B4 OCXO reference frequency option | $1 \times 10^{-7}$                                                                                                                                                                  |
| Achievable initial calibration accuracy       | standard                                         | $5 \times 10^{-7}$                                                                                                                                                                  |
|                                               | with R&S®FPL1-B4 OCXO reference frequency option | $5 \times 10^{-8}$                                                                                                                                                                  |
| <b>Receiver scan</b>                          |                                                  |                                                                                                                                                                                     |
| Scan                                          |                                                  | max. 10 subranges with different settings                                                                                                                                           |
| Scan types                                    |                                                  | stepped, time domain                                                                                                                                                                |
| Measurement time                              | stepped scan, per frequency                      | 50 µs to 100 s                                                                                                                                                                      |
|                                               | time domain scan, per subrange                   | 50 µs to 100 s                                                                                                                                                                      |
| Number of trace points                        |                                                  | 10 000 000                                                                                                                                                                          |
| Frequency step size                           | stepped scan                                     | min. 1 Hz                                                                                                                                                                           |
|                                               | time domain scan                                 | $0.25 \times \text{resolution bandwidth}$                                                                                                                                           |
| <b>Time domain scan</b>                       |                                                  |                                                                                                                                                                                     |
| Frequency segment processed in parallel       | RBW = 200 Hz                                     | 0.66 MHz                                                                                                                                                                            |
|                                               | RBW = 9 kHz                                      | 29.85 MHz                                                                                                                                                                           |
|                                               | RBW = 120 kHz                                    | 24.6 MHz                                                                                                                                                                            |
|                                               | RBW = 1 MHz                                      | 25.6 MHz                                                                                                                                                                            |
| FFT overlap factor                            |                                                  | ≥ 93 %                                                                                                                                                                              |
| <b>Frequency readout (analyzer mode)</b>      |                                                  |                                                                                                                                                                                     |
| Marker resolution                             |                                                  | 0.01 Hz                                                                                                                                                                             |
| Uncertainty                                   |                                                  | $\pm(\text{marker frequency} \times \text{reference uncertainty} + 10 \% \times \text{resolution bandwidth} + \frac{1}{2}(\text{span} / (\text{sweep points} - 1)) + 1 \text{ Hz})$ |
| Number of sweep (trace) points                | default value                                    | 1001                                                                                                                                                                                |
|                                               | range                                            | 101 to 100001                                                                                                                                                                       |
| Marker tuning frequency step size             | marker step size = sweep points                  | $\text{span} / (\text{sweep points} - 1)$                                                                                                                                           |
|                                               | marker step size = standard                      | $\text{span} / (\text{default sweep points} - 1)$                                                                                                                                   |
| Frequency counter resolution                  |                                                  | 1 Hz                                                                                                                                                                                |
| Count accuracy                                |                                                  | $\pm(\text{frequency} \times \text{reference uncertainty} + \frac{1}{2}(\text{last digit}))$                                                                                        |
| Display range for frequency axis              |                                                  | 0 Hz, 10 Hz to maximum frequency                                                                                                                                                    |
| Resolution                                    |                                                  | 0.1 Hz                                                                                                                                                                              |
| Maximum span deviation                        |                                                  | 0.1 %                                                                                                                                                                               |
| Sweep time range                              | span = 0 Hz                                      | 1 µs to 8000 s                                                                                                                                                                      |
|                                               | span ≥ 10 Hz, RBW ≥ 100 kHz                      | 1 ms to 8000 s <sup>2</sup>                                                                                                                                                         |
|                                               | span ≥ 10 Hz, RBW < 100 kHz                      | 75 µs to 8000 s <sup>3</sup>                                                                                                                                                        |
|                                               | span = 0 Hz                                      | 0.1 % (nom.)                                                                                                                                                                        |
| Sweep time accuracy                           | span ≥ 10 Hz, RBW ≥ 100 kHz                      | 3 % (nom.)                                                                                                                                                                          |

<sup>1</sup> Not with internal generator in tracking mode.

<sup>2</sup> Net sweep time without additional hardware settling time.

<sup>3</sup> Time for data acquisition for FFT calculation.

## Preselection and preamplifier

|                                |                   |                                                         |
|--------------------------------|-------------------|---------------------------------------------------------|
| <b>Preselection</b>            |                   |                                                         |
| State                          | receiver mode     | always on                                               |
|                                | analyzer mode     | on/off (selectable)                                     |
| Number of preselection filters |                   | 2                                                       |
| Bandwidths (–6 dB), nominal    | 10 Hz to 150 kHz  | fixed lowpass filter                                    |
|                                | 150 kHz to 30 MHz | 38 MHz, fixed bandpass filter                           |
| <b>Preamplifier</b>            | switchable        |                                                         |
| Location                       |                   | in the signal path between preselection and first mixer |
| Gain                           |                   | 20 dB (nom.)                                            |

## IF and resolution bandwidths

|                                              |                         |                                                                                                                                                                        |
|----------------------------------------------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>EMI filters</b>                           |                         |                                                                                                                                                                        |
| Bandwidths (–6 dB)                           |                         | 10/100/200 Hz,<br>1/9/10/100/120 kHz,<br>1 MHz                                                                                                                         |
| Bandwidth uncertainty                        |                         | < 3 %                                                                                                                                                                  |
| Shape factor 60 dB:6 dB                      |                         | < 4                                                                                                                                                                    |
| <b>Sweep filters and FFT filters</b>         |                         |                                                                                                                                                                        |
| Resolution bandwidths (–3 dB)                | sweep filters           | 100 kHz to 10 MHz in 1/2/3/5 sequence                                                                                                                                  |
|                                              | FFT filters             | 1 Hz to 50 kHz in 1/2/3/5 sequence                                                                                                                                     |
| Bandwidth uncertainty                        |                         | < 3 % (nom.)                                                                                                                                                           |
| Shape factor 60 dB:3 dB                      |                         | < 5 (nom.)                                                                                                                                                             |
| <b>Channel filters (analyzer mode)</b>       |                         |                                                                                                                                                                        |
| Bandwidths (–3 dB)                           |                         | 100/200/300/500 Hz,<br>1/1.5/2/2.4/2.7/3/3.4/4/4.5/5/6/7.5/8.5/9/<br>10/12.5/14/15/16/20/21/25/30/50/100/<br>150/192/200/300/500 kHz,<br>1/1.228/1.5/2/3/3.75/5/10 MHz |
| Bandwidth uncertainty                        |                         | < 2 % (nom.)                                                                                                                                                           |
| Shape factor 60 dB:3 dB                      |                         | < 2 (nom.)                                                                                                                                                             |
| <b>Video bandwidths</b>                      | analyzer mode           | 1 Hz to 10 MHz in 1/2/3/5 sequence                                                                                                                                     |
| <b>Signal analysis bandwidth (equalized)</b> | standard, analyzer mode | 10 MHz (nom.)                                                                                                                                                          |

## Level

|                                |                                                                 |                                     |
|--------------------------------|-----------------------------------------------------------------|-------------------------------------|
| Display range                  |                                                                 | displayed noise floor up to +30 dBm |
| <b>Maximum input level</b>     |                                                                 |                                     |
| DC voltage                     | input                                                           | 0 V                                 |
| CW RF power                    | RF attenuation = 0 dB                                           |                                     |
|                                | RF preamplifier off                                             | 20 dBm (= 0.1 W)                    |
|                                | RF preamplifier on                                              | 13 dBm (= 0.02 W)                   |
|                                | RF attenuation ≥ 10 dB                                          |                                     |
|                                | RF preamplifier off                                             | 30 dBm (= 1 W)                      |
|                                | RF preamplifier on                                              | 23 dBm (= 0.2 W)                    |
| Pulse spectral density         | RF attenuation = 0 dB, preselection on,<br>RF preamplifier off  | 97 dB $\mu$ V/MHz                   |
| Maximum pulse voltage          | RF attenuation ≥ 10 dB                                          |                                     |
|                                | input                                                           | 450 V                               |
| Maximum pulse energy           | RF attenuation ≥ 10 dB, 10 $\mu$ s                              |                                     |
|                                | input                                                           | 20 mWs                              |
| <b>Intermodulation</b>         |                                                                 |                                     |
| 1 dB compression<br>(two-tone) | RF attenuation = 0 dB, preselection off,<br>RF preamplifier off |                                     |
|                                |                                                                 |                                     |
|                                | RF attenuation = 0 dB, preselection on,<br>RF preamplifier off  |                                     |
|                                |                                                                 |                                     |
|                                | RF attenuation = 0 dB, preselection on,<br>RF preamplifier on   |                                     |
|                                |                                                                 |                                     |

|                                   |                                                                                                                                                                  |                         |
|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| Third-order intercept point (TOI) | RF attenuation = 0 dB, preselection on, RF preamplifier off, level = $2 \times -20$ dBm, $\Delta f > 5 \times$ RBW or 10 kHz, whichever is larger                |                         |
|                                   | $f_{in} < 10$ MHz                                                                                                                                                | 20 dBm (nom.)           |
|                                   | $10 \text{ MHz} \leq f_{in} < 30 \text{ MHz}$                                                                                                                    | > 15 dBm, 20 dBm (typ.) |
|                                   | RF attenuation = 0 dB, preselection off <sup>4</sup> , RF preamplifier off, level = $2 \times -20$ dBm, $\Delta f > 5 \times$ RBW or 10 kHz, whichever is larger |                         |
|                                   | $f_{in} < 10$ MHz                                                                                                                                                | 20 dBm (nom.)           |
|                                   | $10 \text{ MHz} \leq f_{in} < 30 \text{ MHz}$                                                                                                                    | > 20 dBm, 23 dBm (typ.) |
| Second-harmonic intercept (SHI)   | RF attenuation = 0 dB, preselection on, RF preamplifier on, level = $2 \times -45$ dBm, $\Delta f > 5 \times$ RBW or 10 kHz, whichever is larger                 |                         |
|                                   | $f_{in} < 10$ MHz                                                                                                                                                | -10 dBm (nom.)          |
|                                   | $10 \text{ MHz} \leq f_{in} < 30 \text{ MHz}$                                                                                                                    | > -8 dBm                |
|                                   | RF attenuation = 0 dB, level = -13 dBm, preselection off, RF preamplifier off                                                                                    |                         |
|                                   | $1 \text{ MHz} < f_{in} \leq 30 \text{ MHz}$                                                                                                                     | 45 dBm (nom.)           |

## Sensitivity

|                                                                                 |                                                                                                                                                            |                                                                                  |
|---------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| Noise indication (receiver mode)                                                | RF attenuation = 0 dB, RF preamplifier off, termination = 50 $\Omega$ , average detector (AV)                                                              |                                                                                  |
|                                                                                 | $9 \text{ kHz} \leq f < 100 \text{ kHz}$ , BW = 200 Hz                                                                                                     | < -15 dB $\mu$ V                                                                 |
|                                                                                 | $100 \text{ kHz} \leq f < 150 \text{ kHz}$ , BW = 200 Hz                                                                                                   | < -15 dB $\mu$ V                                                                 |
|                                                                                 | $150 \text{ kHz} \leq f < 1 \text{ MHz}$ , BW = 9 kHz                                                                                                      | < +1 dB $\mu$ V                                                                  |
|                                                                                 | $1 \text{ MHz} \leq f < 30 \text{ MHz}$ , BW = 9 kHz                                                                                                       | < -4 dB $\mu$ V                                                                  |
|                                                                                 | RF attenuation = 0 dB, RF preamplifier on, termination = 50 $\Omega$ , average detector (AV)                                                               |                                                                                  |
|                                                                                 | $9 \text{ kHz} \leq f < 100 \text{ kHz}$ , BW = 200 Hz                                                                                                     | < -25 dB $\mu$ V                                                                 |
|                                                                                 | $100 \text{ kHz} \leq f < 150 \text{ kHz}$ , BW = 200 Hz                                                                                                   | < -25 dB $\mu$ V                                                                 |
|                                                                                 | $150 \text{ kHz} \leq f < 1 \text{ MHz}$ , BW = 9 kHz                                                                                                      | < -9 dB $\mu$ V                                                                  |
|                                                                                 | $1 \text{ MHz} \leq f < 10 \text{ MHz}$ , BW = 9 kHz                                                                                                       | < -16 dB $\mu$ V                                                                 |
|                                                                                 | $10 \text{ MHz} \leq f < 30 \text{ MHz}$ , BW = 9 kHz                                                                                                      | < -12 dB $\mu$ V                                                                 |
| Displayed average noise level (DANL, analyzer mode)                             | RF attenuation = 0 dB, termination = 50 $\Omega$ , logarithmic scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, sample detector, +20 °C to +30 °C |                                                                                  |
|                                                                                 | RF preamplifier off, preselection off                                                                                                                      |                                                                                  |
|                                                                                 | $5 \text{ kHz} \leq f < 1 \text{ MHz}$                                                                                                                     | < -145 dBm, -152 dBm (typ.)                                                      |
|                                                                                 | $1 \text{ MHz} \leq f < 30 \text{ MHz}$                                                                                                                    | < -150 dBm, -155 dBm (typ.)                                                      |
|                                                                                 | RF preamplifier on, preselection on                                                                                                                        |                                                                                  |
|                                                                                 | $5 \text{ kHz} \leq f < 1 \text{ MHz}$                                                                                                                     | < -142 dBm, -147 dBm (typ.)                                                      |
|                                                                                 | $1 \text{ MHz} \leq f < 30 \text{ MHz}$                                                                                                                    | < -142 dBm, -147 dBm (typ.)                                                      |
|                                                                                 | RF preamplifier on, preselection on (gain: 20 dB (nom.))                                                                                                   |                                                                                  |
|                                                                                 | $1 \text{ MHz} \leq f < 10 \text{ MHz}$                                                                                                                    | < -155 dBm, -158 dBm (typ.)                                                      |
|                                                                                 | $10 \text{ MHz} \leq f < 30 \text{ MHz}$                                                                                                                   | < -152 dBm, -156 dBm (typ.)                                                      |
| Spurious responses                                                              |                                                                                                                                                            |                                                                                  |
| input level $\leq -13$ dBm, sweep optimization: auto or dynamic, scaling linear |                                                                                                                                                            |                                                                                  |
| Residual spurious response                                                      | RF attenuation = 0 dB                                                                                                                                      |                                                                                  |
|                                                                                 | $f \leq 2 \text{ MHz}$                                                                                                                                     | < -90 dBm (nom.)                                                                 |
|                                                                                 | $2 \text{ MHz} \leq f < 30 \text{ MHz}$                                                                                                                    | < -110 dBm                                                                       |
| Level display (receiver mode)                                                   |                                                                                                                                                            |                                                                                  |
| Level display                                                                   | analog                                                                                                                                                     | bargraph display, separately for each detector                                   |
|                                                                                 | digital                                                                                                                                                    | numeric, 0.01 dB resolution                                                      |
| Detectors                                                                       | maximum 4 selectable                                                                                                                                       | maximum peak, minimum peak, RMS, average, quasi-peak, CISPR-average, RMS-average |
| Units of level axis                                                             |                                                                                                                                                            | dBm, dB $\mu$ V, dBmV, dB $\mu$ A, dBpW, dBpT                                    |
| RF spectrum                                                                     |                                                                                                                                                            |                                                                                  |
| Logarithmic level axis                                                          |                                                                                                                                                            | 10 dB to 200 dB, in steps of 10                                                  |
| Frequency axis                                                                  |                                                                                                                                                            | linear or logarithmic                                                            |
| Number of traces                                                                |                                                                                                                                                            | 6                                                                                |
| Detectors                                                                       |                                                                                                                                                            | maximum peak, minimum peak, RMS, average, quasi-peak, CISPR-average, RMS-average |

<sup>4</sup> Preselection off is only available in analyzer mode. In receiver mode the preselection is permanently on.

|                                             |                                                                                                                                                                                                                                               |                                                                                    |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| <b>Level display (analyzer mode)</b>        |                                                                                                                                                                                                                                               |                                                                                    |
| Logarithmic level axis                      |                                                                                                                                                                                                                                               | 1 dB to 200 dB, in 1 dB steps                                                      |
| Linear level axis                           |                                                                                                                                                                                                                                               | 10 % of reference level per level division, 10 divisions or logarithmic scaling    |
| Number of traces                            |                                                                                                                                                                                                                                               | 6                                                                                  |
| Trace detector                              |                                                                                                                                                                                                                                               | maximum peak, minimum peak, auto peak (normal), sample, RMS, average               |
| Trace functions                             |                                                                                                                                                                                                                                               | clear/write, maximum hold, minimum hold, average, view                             |
| EMI detectors                               |                                                                                                                                                                                                                                               | quasi-peak, RMS-average, CISPR average                                             |
| Measurement marker detector                 |                                                                                                                                                                                                                                               | maximum peak, average, quasi-peak, RMS-average, CISPR-average                      |
| Setting range of reference level            |                                                                                                                                                                                                                                               | –130 dBm to (–13 dBm + RF attenuation – RF preamplifier gain), in steps of 0.01 dB |
| Units of level axis                         |                                                                                                                                                                                                                                               | dBm, dBμV, dBmV, dBμA, dBpW, V, A, W                                               |
| <b>Level measurement uncertainty</b>        |                                                                                                                                                                                                                                               |                                                                                    |
| Absolute level uncertainty at 16.667 MHz    | RBW = 10 kHz, level = –10 dBm, reference level = –10 dBm, RF attenuation = 10 dB                                                                                                                                                              |                                                                                    |
|                                             | +20 °C to +30 °C                                                                                                                                                                                                                              |                                                                                    |
|                                             | preselection off                                                                                                                                                                                                                              | < 0.3 dB ( $\sigma = 0.1$ dB)                                                      |
|                                             | preselection on                                                                                                                                                                                                                               | < 0.4 dB ( $\sigma = 0.14$ dB)                                                     |
|                                             | 0 °C to +50 °C                                                                                                                                                                                                                                |                                                                                    |
|                                             | preselection off                                                                                                                                                                                                                              | < 0.5 dB ( $\sigma = 0.17$ dB)                                                     |
| Frequency response referenced to 16.667 MHz | RF attenuation = 10/20/30/40 dB, preselection off, RF preamplifier off, +20 °C to +30 °C                                                                                                                                                      |                                                                                    |
|                                             | 5 kHz ≤ f < 9 kHz                                                                                                                                                                                                                             | < 1 dB (nom.)                                                                      |
|                                             | 9 kHz ≤ f < 30 MHz                                                                                                                                                                                                                            | < 0.3 dB ( $\sigma = 0.1$ dB)                                                      |
|                                             | RF attenuation = 10/20/30/40 dB, preselection on, RF preamplifier off, +20 °C to +30 °C                                                                                                                                                       |                                                                                    |
|                                             | 5 kHz ≤ f < 9 kHz                                                                                                                                                                                                                             | < 1 dB (nom.)                                                                      |
|                                             | 9 kHz ≤ f < 30 MHz                                                                                                                                                                                                                            | < 0.8 dB ( $\sigma = 0.27$ dB)                                                     |
|                                             | any setting of RF attenuation and preselection, RF preamplifier off, 0 °C to +50 °C                                                                                                                                                           |                                                                                    |
|                                             | 5 kHz ≤ f < 30 MHz                                                                                                                                                                                                                            | < 1 dB (nom.)                                                                      |
|                                             | RF attenuation ≤ 20 dB, RF preamplifier on, preselection on, +20 °C to +30 °C                                                                                                                                                                 |                                                                                    |
|                                             | 5 kHz ≤ f < 9 kHz                                                                                                                                                                                                                             | < 1 dB (nom.)                                                                      |
| Attenuator switching uncertainty            | 9 kHz ≤ f < 30 MHz                                                                                                                                                                                                                            | < 0.8 dB ( $\sigma = 0.27$ dB)                                                     |
|                                             | f = 50 MHz, 0 dB to 55 dB, referenced to 10 dB attenuation                                                                                                                                                                                    | < 0.2 dB ( $\sigma = 0.07$ dB)                                                     |
| Uncertainty of reference level setting      |                                                                                                                                                                                                                                               | 0 dB <sup>5</sup>                                                                  |
| Bandwidth switching uncertainty             | referenced to RBW = 10 kHz and sweep type FFT                                                                                                                                                                                                 |                                                                                    |
|                                             | sweep type = FFT (RBW < 100 kHz)                                                                                                                                                                                                              | < 0.1 dB (nom.)                                                                    |
|                                             | sweep type = sweep (RBW ≥ 100 kHz)                                                                                                                                                                                                            | < 0.2 dB (nom.)                                                                    |
| <b>Nonlinearity of displayed level</b>      |                                                                                                                                                                                                                                               |                                                                                    |
| Logarithmic level display                   | S/N > 16 dB, 0 dB to –50 dB                                                                                                                                                                                                                   | < 0.1 dB ( $\sigma = 0.07$ dB)                                                     |
| Linear level display                        | S/N > 16 dB, 0 dB to –70 dB                                                                                                                                                                                                                   | 5 % of reference level (nom.)                                                      |
| CISPR detectors                             | CISPR band A/B                                                                                                                                                                                                                                | in line with CISPR 16-1-1:2019                                                     |
| <b>Total measurement uncertainty</b>        | signal level from 0 dB to –50 dB below reference level, S/N > 20 dB, sweep time = auto, sweep type = FFT, RF attenuation = 10/20/30/40 dB, preselection off, RF preamplifier off, span/RBW < 100, confidence level = 95 %, +20 °C to +30 °C   |                                                                                    |
|                                             | 1 MHz ≤ f < 30 MHz                                                                                                                                                                                                                            | 0.5 dB                                                                             |
|                                             | signal level from 0 dB to –50 dB below reference level, S/N > 20 dB, sweep time = auto, sweep type = FFT, RF attenuation = 10/20/30/40 dB, preselection on, RF preamplifier off/on, span/RBW < 100, confidence level = 95 %, +20 °C to +30 °C |                                                                                    |
|                                             | 1 MHz ≤ f < 30 MHz                                                                                                                                                                                                                            | 0.8 dB                                                                             |

<sup>5</sup> The setting of the reference level affects only the graphical representation of the measurement result on the display, not the measurement itself. Therefore, the reference level setting causes no additional uncertainty in measurement results.

## Measurement speed

| <b>Receiver mode</b>                                                |                                                                                                                                                                             |                        |
|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Time domain scan                                                    | CISPR band A, 9 kHz to 150 kHz,<br>RBW = 200 Hz or<br>CISPR band B, 150 kHz to 30 MHz,<br>RBW = 9 kHz;<br>measurement time = 100 ms,<br>peak detector                       | 500 ms (meas.)         |
|                                                                     | CISPR band A, 9 kHz to 150 kHz,<br>RBW = 200 Hz or<br>CISPR band B, 150 kHz to 30 MHz,<br>RBW = 9 kHz;<br>measurement time = 1 s,<br>peak detector                          | 1.4 s (meas.)          |
|                                                                     | CISPR band A, 9 kHz to 150 kHz,<br>RBW = 200 Hz or<br>CISPR band B, 150 kHz to 30 MHz,<br>RBW = 9 kHz;<br>measurement time = 1 s,<br>quasi-peak and CISPR-average detector  | ≤ 3 s (meas.)          |
|                                                                     | CISPR band A, 9 kHz to 150 kHz,<br>RBW = 200 Hz or<br>CISPR band B, 150 kHz to 30 MHz,<br>RBW = 9 kHz;<br>measurement time = 15 s,<br>peak detector                         | 15.4 s (meas.)         |
|                                                                     | CISPR band A, 9 kHz to 150 kHz,<br>RBW = 200 Hz or<br>CISPR band B, 150 kHz to 30 MHz,<br>RBW = 9 kHz;<br>measurement time = 15 s,<br>quasi-peak and CISPR-average detector | ≤ 17 s (meas.)         |
|                                                                     | 1001 sweep points, sweep optimization<br>set to "speed"                                                                                                                     | 5 ms (200/s) (nom.)    |
| Local measurement and display update<br>rate                        |                                                                                                                                                                             |                        |
| Maximum sweep rate,<br>remote operation <sup>6,7</sup>              | trace average = on                                                                                                                                                          | 0.9 ms (1100/s) (nom.) |
| Remote measurement and LAN transfer <sup>6</sup>                    |                                                                                                                                                                             | 3.2 ms (357/s) (nom.)  |
| Marker peak search <sup>6</sup>                                     |                                                                                                                                                                             | 1.9 ms (nom.)          |
| Center frequency tune + sweep + sweep<br>data transfer <sup>6</sup> |                                                                                                                                                                             | 16 ms (nom.)           |

## Trigger functions

| <b>Trigger</b>                          |                      |                                                    |
|-----------------------------------------|----------------------|----------------------------------------------------|
| Trigger source                          |                      | free run, video, external, IF power,<br>I/Q power  |
| Trigger offset                          | span ≥ 10 Hz         | 0 s to 20 s                                        |
|                                         | span = 0 Hz          | (–sweep time) to 20 s                              |
| Maximum deviation of trigger offset     |                      | ±10 ns                                             |
| <b>IF power trigger (analyzer mode)</b> |                      |                                                    |
| Sensitivity                             | minimum signal power | –60 dBm + RF attenuation –<br>RF preamplifier gain |
|                                         | maximum signal power | –15 dBm + RF attenuation –<br>RF preamplifier gain |
| IF power trigger bandwidth              |                      | 10 MHz (nom.)                                      |
| <b>Gated sweep</b>                      |                      |                                                    |
| Gate source                             |                      | video, external, IF power,                         |
| Gate delay                              |                      | 0 s to 20 s,<br>minimum resolution: 10 ns          |
| Gate length                             |                      | 10 ns to 20 s,<br>minimum resolution: 10 ns        |
| Maximum deviation of gate length        |                      | ±10 ns                                             |

<sup>6</sup> Measured with a PC equipped with Intel® Core™ i7 2.8 GHz and Gigabit LAN interface.

<sup>7</sup> Measurement is performed with a sweep count of 1000. The indicated speed is the average speed of 1 sweep.



## I/Q data

|                                               |                                                                                      |                         |
|-----------------------------------------------|--------------------------------------------------------------------------------------|-------------------------|
| Interface                                     |                                                                                      | GPIO or LAN interface   |
| Memory length                                 |                                                                                      | max. 25 Msample I and Q |
| Word length of I/Q samples                    |                                                                                      | 14 bit                  |
| Sampling rate                                 | standard                                                                             | 100 Hz to 16 MHz        |
| Maximum signal analysis bandwidth (equalized) | standard                                                                             | 12.8 MHz                |
| Signal analysis bandwidth $\leq 10$ MHz       |                                                                                      |                         |
| Amplitude flatness                            | $f_{\text{center}} \geq 12$ MHz and $(1.25 \times \text{signal analysis bandwidth})$ | $\pm 0.3$ dB (nom.)     |
| Deviation from linear phase                   | $f_{\text{center}} \geq 12$ MHz and $(1.25 \times \text{signal analysis bandwidth})$ | $\pm 1^\circ$ (nom.)    |
| Signal analysis bandwidth $\leq 30$ MHz       |                                                                                      |                         |
| Amplitude flatness                            | $f_{\text{center}} \geq 12$ MHz and $(1.25 \times \text{signal analysis bandwidth})$ | $\pm 0.5$ dB (nom.)     |
| Deviation from linear phase                   | $f_{\text{center}} \geq 12$ MHz and $(1.25 \times \text{signal analysis bandwidth})$ | $\pm 1.5^\circ$ (nom.)  |

## Audio demodulation

|                                   |  |                            |
|-----------------------------------|--|----------------------------|
| AF demodulation types             |  | AM and FM                  |
| Audio output                      |  | loudspeaker and phone jack |
| Marker stop time in analyzer mode |  | 100 ms to 60 s             |

## Inputs and outputs

|                                              |                                                                                  |                                          |
|----------------------------------------------|----------------------------------------------------------------------------------|------------------------------------------|
| <b>RF input</b>                              |                                                                                  |                                          |
| Impedance                                    |                                                                                  | 50 $\Omega$                              |
| Connector                                    |                                                                                  | N female                                 |
| VSWR                                         | RF attenuation $\geq 10$ dB, receiver mode or analyzer mode with preselection on |                                          |
|                                              | $9 \text{ kHz} \leq f < 30 \text{ MHz}$                                          | $< 1.2$                                  |
|                                              | RF attenuation $\leq 10$ dB, receiver mode or analyzer mode with preselection on |                                          |
|                                              | $9 \text{ kHz} \leq f < 30 \text{ MHz}$                                          | $< 2.0$                                  |
|                                              | RF attenuation $\geq 10$ dB, analyzer mode with preselection off                 |                                          |
|                                              | $9 \text{ kHz} \leq f < 30 \text{ MHz}$                                          | $< 1.5$ (nom.)                           |
| Setting range of attenuator                  | input                                                                            | 0 dB to 55 dB, in 1 dB steps             |
| <b>USB interfaces</b>                        | front                                                                            | 2 ports, type A plug, version 2.0        |
|                                              | rear                                                                             | 2 ports, type A plug, version 3.1        |
| <b>Reference output</b>                      |                                                                                  |                                          |
| Connector                                    |                                                                                  | BNC female                               |
| Impedance                                    |                                                                                  | 50 $\Omega$                              |
| Output frequency                             | internal reference                                                               | 10 MHz                                   |
|                                              | external reference                                                               | same as reference input signal           |
| Level                                        |                                                                                  | $> 0$ dBm (nom.)                         |
| <b>Reference input</b>                       |                                                                                  |                                          |
| Connector                                    |                                                                                  | BNC female                               |
| Impedance                                    |                                                                                  | 50 $\Omega$                              |
| Input frequency range                        |                                                                                  | 10 MHz $\pm 5$ ppm                       |
| Required level                               |                                                                                  | $> 0$ dBm into 50 $\Omega$               |
| <b>External trigger/gate input</b>           |                                                                                  |                                          |
| Connector                                    |                                                                                  | BNC female                               |
| Trigger voltage                              |                                                                                  | 0.5 V to 3.5 V                           |
| Input impedance                              |                                                                                  | 10 k $\Omega$                            |
| <b>LAN interface</b>                         |                                                                                  |                                          |
| Connector                                    |                                                                                  | RJ-45                                    |
| <b>External monitor</b>                      |                                                                                  |                                          |
| Connector                                    |                                                                                  | DisplayPort Rev. 1.3                     |
| <b>User port</b>                             |                                                                                  |                                          |
| Connector                                    |                                                                                  | 25 pin D-Sub female                      |
| Output                                       |                                                                                  | TTL compatible, 0 V/5 V, max. 15 mA      |
| Input                                        |                                                                                  | TTL compatible, max. 5 V                 |
| <b>Noise source control and power sensor</b> |                                                                                  |                                          |
| Connectors                                   | for R&S®NRP-Zxx power sensors                                                    | 7 pin LEMOSA female                      |
|                                              | for noise source control                                                         | BNC female                               |
| Noise source control output voltage          |                                                                                  | 0 V/28 V, switchable, max. 100 mA (nom.) |

|                                           |                                                                                              |                             |
|-------------------------------------------|----------------------------------------------------------------------------------------------|-----------------------------|
| <b>IF/video/demod out (analyzer mode)</b> |                                                                                              |                             |
| Connector                                 |                                                                                              | BNC female, 50 $\Omega$     |
| <b>IF out</b>                             |                                                                                              |                             |
| Bandwidth                                 |                                                                                              | equal to RBW setting        |
| IF frequency                              |                                                                                              | 25 MHz                      |
| Output level                              | center frequency > 10 MHz, span = 0 Hz,<br>signal at reference level and center<br>frequency | 0 dBm (nom.)                |
| <b>Video out</b>                          |                                                                                              |                             |
| Bandwidth                                 |                                                                                              | equal to VBW setting        |
| Output scaling                            | logarithmic display scale                                                                    | logarithmic                 |
|                                           | linear display scale                                                                         | linear                      |
| Output level                              | center frequency > 10 MHz, span = 0 Hz,<br>signal at reference level and center<br>frequency | 1 V (nom.), open circuit    |
| <b>Audio output</b>                       |                                                                                              |                             |
| Loudspeaker                               |                                                                                              | built-in, volume adjustable |
| <b>AF out</b>                             |                                                                                              |                             |
| Connector                                 |                                                                                              | 3.5 mm mini jack            |
| Output impedance                          |                                                                                              | 10 $\Omega$                 |
| Open-circuit voltage                      |                                                                                              | up to 1.5 V, adjustable     |

## General data

|                                         |                                                            |                                                                                                                                                                       |
|-----------------------------------------|------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Display</b>                          |                                                            | 21 cm LC TFT color display (10.1")                                                                                                                                    |
| Resolution                              |                                                            | 1280 × 800 pixel (WXGA resolution)                                                                                                                                    |
| Pixel failure rate                      |                                                            | $< 1 \times 10^{-5}$                                                                                                                                                  |
| <b>Data storage</b>                     |                                                            |                                                                                                                                                                       |
| Internal                                | standard                                                   | solid-state drive (SSD) 128 Gbyte                                                                                                                                     |
| External                                |                                                            | supports USB 2.0/3.1 compatible memory devices                                                                                                                        |
| <b>Environmental conditions</b>         |                                                            |                                                                                                                                                                       |
| Temperature                             | operating temperature range                                | +0 °C to +50 °C                                                                                                                                                       |
|                                         | storage temperature range                                  | −20 °C to +70 °C                                                                                                                                                      |
| Climatic loading                        | without condensation                                       | +40 °C at 85 % relative humidity, in line with EN 60068-2-30,                                                                                                         |
| <b>Mechanical resistance</b>            |                                                            |                                                                                                                                                                       |
| Vibration                               | sinusoidal                                                 | 5 Hz to 55 Hz,<br>0.15 mm constant amplitude (1.8 g at 55 Hz);<br>55 Hz to 150 Hz,<br>acceleration: 0.5 g constant;<br>in line with EN 60068-2-6                      |
|                                         | random                                                     | 8 Hz to 500 Hz,<br>acceleration: 1.2 g (RMS),<br>in line with EN 60068-2-64                                                                                           |
| Shock                                   |                                                            | 40 g shock spectrum, in line with MIL-STD-810E, method no. 516.4, procedure I, MIL-PRF-28800F                                                                         |
| <b>EMC</b>                              |                                                            | in line with EMC Directive 2014/30/EU including IEC/EN 61326-1 <sup>8,9</sup> , IEC/EN 61326-2-1, CISPR 11/EN 55011 <sup>8</sup> , IEC/EN 61000-3-2, IEC/EN 61000-3-3 |
| <b>Recommended calibration interval</b> |                                                            | 1 year                                                                                                                                                                |
| <b>Power supply</b>                     |                                                            |                                                                                                                                                                       |
| AC supply                               | with battery option                                        | 100 V to 240 V ± 10 %, 50 Hz to 60 Hz ± 5 %                                                                                                                           |
| Current consumption                     | without options                                            | nom. 2.16 A (at 100 V) to 0.95 A (at 240 V)                                                                                                                           |
|                                         | with internal battery (R&S®FPL1-B31 option in charge mode) | nom. 3 A to 1.5 A                                                                                                                                                     |
| Safety                                  |                                                            | in line with EN 61010-1, IEC 61010-1, UL 61010-1, CAN/CSA-C22.2 No. 61010-1                                                                                           |
| Test mark                               |                                                            | CE, KCC, UKCA, cCSA <sub>US</sub>                                                                                                                                     |
| <b>Dimensions and weight</b>            |                                                            |                                                                                                                                                                       |
| Dimensions                              | W × H × D                                                  | 408 mm × 186 mm × 235 mm (16.06 in × 7.32 in × 9.25 in)                                                                                                               |
| Net weight, nominal                     | without options                                            | 6.9 kg (15.2 lb)                                                                                                                                                      |
|                                         | with internal battery                                      | 8.6 kg (18.95 lb)                                                                                                                                                     |

<sup>8</sup> Emission limits for class B equipment.

<sup>9</sup> Immunity test requirement for industrial environment (EN 61326 table 2).

## Options

### R&S®FPL1-B10 GPIB interface

|                      |  |                                               |
|----------------------|--|-----------------------------------------------|
| IEC/IEEE bus control |  | interface in line with IEC 625-2 (IEEE 488.2) |
| Command set          |  | SCPI 1997.0                                   |
| Connector            |  | 24 pin Amphenol female                        |
| Interface functions  |  | SH1, AH1, T6, L4, SR1, RL1, PP1, DC1, DT1, C0 |

### R&S®FPL1-B30 DC power input 12 V/24 V

|                     |                                                                                           |                                                                             |
|---------------------|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| Input voltage range | DC                                                                                        | 12 V to 24 V (nom.),<br>10.4 V to 28 V,<br>switch-on voltage > 11 V (meas.) |
| Input current       | $V_{in} = 12 \text{ V/24 V}$                                                              | 15 A/7.5 A (nom.)                                                           |
|                     | $V_{in} = 12 \text{ V/24 V}$ , operating mode, without internal batteries (R&S®FPL1-B31)  | 6.8 A/3.2 A (meas.)                                                         |
|                     | $V_{in} = 12 \text{ V/24 V}$ , operating mode, internal batteries in charge mode          | 11 A/5 A (meas.)                                                            |
|                     | $V_{in} = 12 \text{ V/24 V}$ , instrument standby mode, internal batteries in charge mode | 6.5 A/3.0 A (meas.)                                                         |
| Temperature         | operating temperature range                                                               | 0 °C to +40 °C                                                              |
|                     | storage temperature range                                                                 | –20 °C to +70 °C                                                            |

### R&S®FPL1-B31 internal lithium-ion battery

|                |                                                 |                                |
|----------------|-------------------------------------------------|--------------------------------|
| Operating time |                                                 | 2 h (nom.)                     |
| Charge time    | standby mode, AC supply                         | < 2 h (nom.)                   |
|                | standby mode, external DC supply (R&S®FPL1-B30) | < 2 h (nom.)                   |
|                | operating mode                                  | < 4 h (nom.)                   |
| Temperature    | operating temperature range, discharge          | 0 °C to +50 °C                 |
|                | operating temperature range, charge             | 0 °C to +40 °C                 |
|                | storage temperature range                       | –20 °C to +60 °C <sup>10</sup> |

### R&S®FSV-B34 charger (only needed for charging spare batteries)

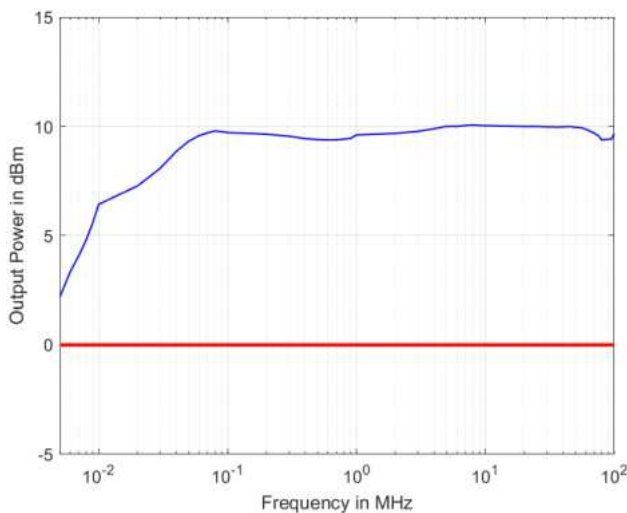
|                        |           |                                                      |
|------------------------|-----------|------------------------------------------------------|
| AC input voltage range |           | 100 V to 240 V $\pm$ 10 % (nom.)                     |
| AC supply frequency    |           | 50 Hz to 60 Hz (nom.)                                |
| Power consumption      |           | max. 300 W (nom.)                                    |
| Number of charger bays |           | 4                                                    |
| Dimensions             | W × H × D | 400 mm × 127 mm × 203 mm<br>(15.75 in × 5 in × 8 in) |
| Net weight             |           | 3.1 kg (6.9 lb)                                      |

### R&S®EPL1-B91 internal generator

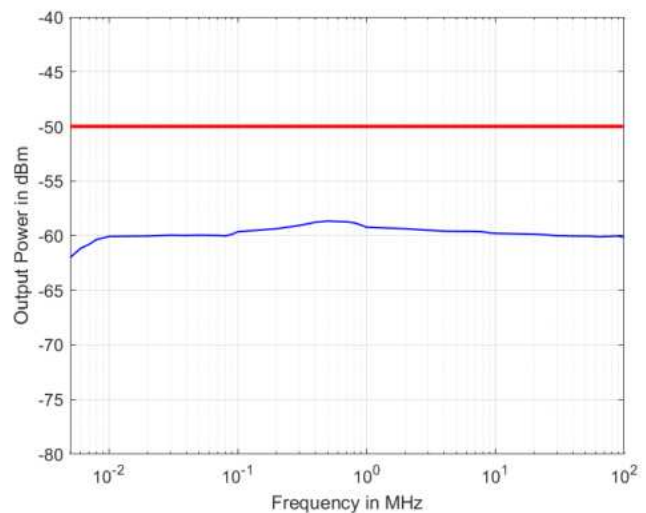
|                         |                       |                    |
|-------------------------|-----------------------|--------------------|
| Modes                   |                       | tracking generator |
|                         |                       | independent source |
|                         |                       | power sweep        |
| <b>Frequency</b>        |                       |                    |
| Frequency range         |                       | 5 kHz to 30 MHz    |
| Setting resolution      | independent CW source | 0.01 Hz            |
| <b>Frequency offset</b> |                       |                    |
| Setting range           |                       | 0 Hz to 30 MHz     |
| Setting resolution      |                       | 0.01 Hz            |

<sup>10</sup> The battery packs should be stored in an environment with low humidity, free from corrosive gas at a recommended temperature range < +21 °C. Extended exposure to temperatures above +45 °C could degrade battery performance and life.

|                            |                                                                                                         |                                           |
|----------------------------|---------------------------------------------------------------------------------------------------------|-------------------------------------------|
| <b>Spectral purity</b>     |                                                                                                         |                                           |
| SSB phase noise            | frequency = 15 MHz, output level = 0 dBm                                                                |                                           |
|                            | carrier offset = 10 kHz                                                                                 | < -102 dBc (1 Hz), -108 dBc (1 Hz) (typ.) |
|                            | carrier offset = 100 kHz                                                                                | < -105 dBc (1 Hz), -111 dBc (1 Hz) (typ.) |
|                            | carrier offset = 1 MHz                                                                                  | < -117 dBc (1 Hz), -130 dBc (1 Hz) (typ.) |
| Harmonics                  | output level = 0 dBm, +20 °C to +30 °C                                                                  |                                           |
|                            | 5 kHz ≤ f < 100 kHz                                                                                     | < -30 dBc (nom.)                          |
|                            | 100 kHz ≤ f ≤ 30 MHz                                                                                    | < -30 dBc                                 |
| Non-harmonic spurious      | output level = 0 dBm                                                                                    |                                           |
|                            | 1 kHz < offset from carrier ≤ 4 MHz                                                                     | -35 dBc (nom.)                            |
|                            | offset from carrier > 4 MHz                                                                             | < -35 dBc, -45 dBc (typ.)                 |
| <b>Level</b>               |                                                                                                         |                                           |
| Specified level range      |                                                                                                         | -50 dBm to 0 dBm                          |
| Setting resolution         |                                                                                                         | 0.1 dB                                    |
| Setting range              |                                                                                                         | -60 dBm to +10 dBm                        |
| Absolute level uncertainty | frequency = 16.667 MHz,<br>+20 °C to +30 °C,<br>output level = -10 dBm,<br>frequency offset = 0 Hz      | < 0.5 dB                                  |
| Frequency response         | output level = -10 dBm, referenced to level at 16.667 MHz, +20 °C to +30 °C,<br>frequency offset = 0 Hz |                                           |
|                            | 100 kHz ≤ f ≤ 30 MHz                                                                                    | < 1 dB                                    |
| Level nonlinearity         | for specified level range, referenced to<br>-10 dBm output level, +20 °C to +30 °C,<br>f ≥ 100 kHz      | ≤ 2 dB, < 0.5 dB (typ.)                   |



Maximum output power versus frequency,  
level in dBm (meas.)



Minimum output power versus frequency,  
level in dBm (meas.)

|                       |                         |                    |
|-----------------------|-------------------------|--------------------|
| <b>Dynamic range</b>  | RBW = 1 kHz, f = 30 MHz | 115 dB (nom.)      |
| <b>Power sweep</b>    |                         |                    |
| Specified level range |                         | -50 dBm to 0 dBm   |
| Setting resolution    |                         | 0.1 dB             |
| Setting range         |                         | -60 dBm to +10 dBm |
| <b>GEN output</b>     |                         |                    |
| Connector             |                         | N female, 50 Ω     |
| VSWR                  |                         | 1.5 (nom.)         |
| <b>Reverse power</b>  |                         |                    |
| DC voltage            |                         | 50 V               |
| CW RF power           |                         | 30 dBm (= 1 W)     |
| Maximum pulse voltage |                         | 150 V              |
| Maximum pulse energy  | pulse duration: 10 μs   | 1 mWs              |

## R&S®EPL1-K55E real-time spectrogram

|                                                                                                       |                            |                                                                            |
|-------------------------------------------------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|
| <b>Span <sup>11</sup></b>                                                                             |                            |                                                                            |
| Range                                                                                                 | f < 30 MHz                 | 1 kHz to 29.85 MHz                                                         |
| Resolution                                                                                            |                            | 1 Hz                                                                       |
| <b>Measurement time</b>                                                                               |                            |                                                                            |
| Range                                                                                                 |                            | 33 ms to 100 s <sup>12</sup>                                               |
| <b>Resolution bandwidths</b>                                                                          |                            |                                                                            |
| Range                                                                                                 |                            | 10 Hz to 1 MHz                                                             |
| Bandwidth uncertainty                                                                                 |                            | < 3 % (nom.)                                                               |
| Maximum span <sup>11</sup>                                                                            | RBW = 100 Hz               | 327.6 kHz                                                                  |
|                                                                                                       | RBW = 200 Hz               | 655.3 kHz                                                                  |
|                                                                                                       | RBW = 300 Hz               | 983 kHz                                                                    |
|                                                                                                       | RBW = 500 Hz               | 1.638 MHz                                                                  |
|                                                                                                       | RBW = 1 kHz                | 3.27 MHz                                                                   |
|                                                                                                       | RBW = 2 kHz                | 6.553 MHz                                                                  |
|                                                                                                       | RBW = 3 kHz                | 9.83 MHz                                                                   |
|                                                                                                       | RBW = 5 kHz                | 16.38 MHz                                                                  |
|                                                                                                       | RBW = 9 kHz                | 29.85 MHz                                                                  |
|                                                                                                       | RBW = 10 kHz               | 16.38 MHz                                                                  |
|                                                                                                       | RBW = 30 kHz               | 24.57 MHz                                                                  |
|                                                                                                       | RBW = 50 kHz               | 20.48 MHz                                                                  |
|                                                                                                       | RBW = 100 kHz              | 20.48 MHz                                                                  |
|                                                                                                       | RBW = 120 kHz              | 24.57 MHz                                                                  |
|                                                                                                       | RBW = 200 kHz              | 20.48 MHz                                                                  |
|                                                                                                       | RBW = 500 kHz              | 25.6 MHz                                                                   |
|                                                                                                       | RBW = 1 MHz                | 25.6 MHz                                                                   |
| <b>Level</b>                                                                                          |                            |                                                                            |
| Minimum signal duration for 100 % probability of intercept with full amplitude accuracy <sup>13</sup> | trace detector = max. peak |                                                                            |
|                                                                                                       | RBW = 100 Hz               | 42.5 ms                                                                    |
|                                                                                                       | RBW = 200 Hz               | 21.3 ms                                                                    |
|                                                                                                       | RBW = 300 Hz               | 14.2 ms                                                                    |
|                                                                                                       | RBW = 500 Hz               | 8.5 ms                                                                     |
|                                                                                                       | RBW = 1 kHz                | 4.25 ms                                                                    |
|                                                                                                       | RBW = 2 kHz                | 2.13 ms                                                                    |
|                                                                                                       | RBW = 3 kHz                | 1.42 µs                                                                    |
|                                                                                                       | RBW = 5 kHz                | 850 µs                                                                     |
|                                                                                                       | RBW = 9 kHz                | 473 µs                                                                     |
|                                                                                                       | RBW = 10 kHz               | 425 µs                                                                     |
|                                                                                                       | RBW = 30 kHz               | 142 µs                                                                     |
|                                                                                                       | RBW = 50 kHz               | 85 µs                                                                      |
|                                                                                                       | RBW = 100 kHz              | 42.5 µs                                                                    |
|                                                                                                       | RBW = 120 kHz              | 35.4 µs                                                                    |
|                                                                                                       | RBW = 200 kHz              | 21.3 µs                                                                    |
|                                                                                                       | RBW = 500 kHz              | 8.47 µs                                                                    |
|                                                                                                       | RBW = 1 MHz                | 4.22 µs                                                                    |
| <b>Result display types</b>                                                                           |                            | real-time spectrum, real-time spectrogram                                  |
| <b>Spectrum</b>                                                                                       |                            |                                                                            |
| Number of traces                                                                                      |                            | 6                                                                          |
| Trace detector                                                                                        | max. 4 selectable          | max. peak, min. peak, RMS, average, quasi-peak, CISPR-average, RMS-average |
| Trace functions                                                                                       |                            | clear/write, max. hold, min. hold, average                                 |
| Number of markers                                                                                     |                            | 16                                                                         |
| Marker readout                                                                                        |                            | frequency, level                                                           |

<sup>11</sup> Achievable span is determined by frequency settings and preselector limits.

<sup>12</sup> Time period during which individual FFTs contribute to the results of the selected trace detector.

<sup>13</sup> Events lasting shorter than the minimum signal duration specification will result in degraded level accuracy.

|                                        |  |                                                                            |
|----------------------------------------|--|----------------------------------------------------------------------------|
| <b>Spectrogram</b>                     |  |                                                                            |
| Result display                         |  | color-graded bitmap                                                        |
| Spectrogram bitmap color depth         |  | 240 colors                                                                 |
| Dynamic range covered by bitmap colors |  | selectable, up to 200 dB (nom.)                                            |
| History depth                          |  | max. 100 000 frames <sup>14</sup>                                          |
| Trace detector                         |  | max. peak, min. peak, RMS, average, quasi-peak, CISPR-average, RMS-average |
| Number of markers                      |  | 16                                                                         |
| Marker readout                         |  | frequency, time/frame number, level                                        |
| <b>Trigger source</b>                  |  | free run, external                                                         |

---

<sup>14</sup> A frame is the measurement result displayed in one row of the spectrogram. It may consist of one or more traces, depending on the set sweep count. For example, a sweep count of 2 means that two traces will be combined to one row in the spectrogram using the set trace detector.

## R&S®EPL1-K56 IF analysis

| Level display (receiver mode) |  |                                       |
|-------------------------------|--|---------------------------------------|
| IF spectrum                   |  |                                       |
| Span                          |  | max. 10 MHz                           |
| Resolution bandwidths         |  | 10 Hz to 100 kHz, in 1/2/3/5 sequence |
| Detector                      |  | sample                                |
| Logarithmic level axis        |  | 10 dB to 200 dB, in steps of 10 dB    |
| Frequency axis                |  | linear                                |
| Number of traces              |  | 3                                     |

## R&S®EPL1-K59 click rate analyzer

|                                     |            |                                                  |
|-------------------------------------|------------|--------------------------------------------------|
| Click evaluation                    |            | in line with CISPR 14-1:2016 and CISPR 14-1:2020 |
| Maximum test duration               |            | 4 h                                              |
| Resolution bandwidth (RBW)          |            | 9 kHz                                            |
| Measurement time                    |            | 500 µs                                           |
| 4 frequencies processed in parallel | CISPR 14-1 | 150 kHz, 500 kHz, 1.4 MHz, 30 MHz                |
|                                     | DENAN-law  | 150 kHz, 550 kHz, 1.4 MHz, 30 MHz                |



# Ordering information

| Designation                                          | Type        | Order No.    |
|------------------------------------------------------|-------------|--------------|
| <b>Base unit</b>                                     |             |              |
| EMI test receiver                                    | R&S®EPL1000 | 1350.4444.10 |
| Accessories supplied: power cable, quick start guide |             |              |

| Designation                                                              | Type          | Order No.    | Retrofittable  | Remarks                                                                          |
|--------------------------------------------------------------------------|---------------|--------------|----------------|----------------------------------------------------------------------------------|
| <b>Hardware options</b>                                                  |               |              |                |                                                                                  |
| Internal generator, 5 kHz to 30 MHz                                      | R&S®EPL1-B91  | 1350.4073.02 | no             |                                                                                  |
| Replacement SSD, including controller unit                               | R&S®EPL1-B19  | 1350.4450.02 | yes            | user-retrofittable mounted on PC board, including analyzer firmware              |
| OCXO, precision frequency reference                                      | R&S®FPL1-B4   | 1323.1902.02 | yes            | retrofit in service center                                                       |
| GPIO interface                                                           | R&S®FPL1-B10  | 1323.1890.02 | yes            | user-retrofittable                                                               |
| DC power supply for 12 V/24 V supply voltage                             | R&S®FPL1-B30  | 1323.1877.02 | yes            | user-retrofittable                                                               |
| Lithium-ion battery pack, with controller unit for internal battery slot | R&S®FPL1-B31  | 1323.1725.02 | yes            | retrofit in service center; including 2 battery packs and internal charging unit |
| <b>Keycode options</b>                                                   |               |              |                |                                                                                  |
| Real-time spectrogram                                                    | R&S®EPL1-K55E | 1350.4473.02 | user (keycode) |                                                                                  |
| Click rate analyzer                                                      | R&S®EPL1-K59  | 1350.4509.02 | user (keycode) |                                                                                  |
| IF analysis                                                              | R&S®EPL1-K56  | 1350.4067.02 | user (keycode) |                                                                                  |
| AM/FM/PM measurement demodulator                                         | R&S®FPL1-K7   | 1323.1731.02 | user (keycode) |                                                                                  |

| Designation                                                                 | Type           | Order No.    |
|-----------------------------------------------------------------------------|----------------|--------------|
| <b>EMC test software</b>                                                    |                |              |
| Essential EMI test software                                                 | R&S®ELEMI-E    | 5601.0030.02 |
| License dongle                                                              | R&S®EMCPC      | 5601.0018.02 |
| <b>Recommended extras</b>                                                   |                |              |
| Protective hard cover                                                       | R&S®EPL1-Z1    | 1350.4296.02 |
| Soft carrying bag, for transport and outdoor operation                      | R&S®EPL1-Z2    | 1350.4309.02 |
| H-style shoulder harness (requires R&S®EPL1-Z2 option)                      | R&S®EPL1-Z3    | 1350.4315.02 |
| Spare lithium-ion battery pack                                              | R&S®FPL1-Z4    | 1323.1677.02 |
| Lithium-ion battery charger, for charging spare batteries                   | R&S®FSV-B34    | 1321.3950.02 |
| 19" rackmount kit                                                           | R&S®EPL1-Z6    | 1350.4321.02 |
| Control cable, for R&S®ENV216/R&S®ENV420/R&S®ENV432                         |                |              |
| Length: 3 m                                                                 | R&S®EZ-21      | 1107.2087.03 |
| Length: 10 m                                                                | R&S®EZ-21      | 1107.2087.10 |
| <b>Calibration</b>                                                          |                |              |
| Accredited calibration                                                      | R&S®ACAEPL1000 | 3599.0699.03 |
| Accredited calibration with click rate analyzer (R&S®EPL1-K59) verification | R&S®ACAEPL1000 | 3599.4771.03 |
| Documentation of calibration values                                         | R&S®DCV-2      | 0240.2193.09 |
| Printout of DCV                                                             | R&S®DCV-ZP     | 1173.6506.02 |

| Service options                                                     |         |                                                  |
|---------------------------------------------------------------------|---------|--------------------------------------------------|
| Extended warranty, one year                                         | R&S®WE1 | Contact your local Rohde & Schwarz sales office. |
| Extended warranty, two years                                        | R&S®WE2 |                                                  |
| Extended warranty, three years                                      | R&S®WE3 |                                                  |
| Extended warranty, four years                                       | R&S®WE4 |                                                  |
| Extended warranty with calibration coverage, one year               | R&S®CW1 |                                                  |
| Extended warranty with calibration coverage, two years              | R&S®CW2 |                                                  |
| Extended warranty with calibration coverage, three years            | R&S®CW3 |                                                  |
| Extended warranty with calibration coverage, four years             | R&S®CW4 |                                                  |
| Extended warranty with accredited calibration coverage, one year    | R&S®AW1 |                                                  |
| Extended warranty with accredited calibration coverage, two years   | R&S®AW2 |                                                  |
| Extended warranty with accredited calibration coverage, three years | R&S®AW3 |                                                  |
| Extended warranty with accredited calibration coverage, four years  | R&S®AW4 |                                                  |

**Extended warranty with a term of one to four years (WE1 to WE4)**

Repairs carried out during the contract term are free of charge <sup>15</sup>. Necessary calibration and adjustments carried out during repairs are also covered.

**Extended warranty with calibration (CW1 to CW4)**

Enhance your extended warranty by adding calibration coverage at a package price. This package ensures that your Rohde & Schwarz product is regularly calibrated, inspected and maintained during the term of the contract. It includes all repairs <sup>15</sup> and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

**Extended warranty with accredited calibration (AW1 to AW4)**

Enhance your extended warranty by adding accredited calibration coverage at a package price. This package ensures that your Rohde & Schwarz product is regularly calibrated under accreditation, inspected and maintained during the term of the contract. It includes all repairs <sup>15</sup> and accredited calibration at the recommended intervals as well as any accredited calibration carried out during repairs or option upgrades.

Intel, the Intel logo, and Intel Core are trademarks of Intel Corporation or its subsidiaries.

<sup>15</sup> Excluding defects caused by incorrect operation or handling and force majeure. Wear-and-tear parts are not included.



**Service at Rohde & Schwarz**  
**You're in great hands**

- ▶ Worldwide
- ▶ Local and personalized
- ▶ Customized and flexible
- ▶ Uncompromising quality
- ▶ Long-term dependability

**Rohde & Schwarz**

The Rohde & Schwarz technology group is among the trailblazers when it comes to paving the way for a safer and connected world with its leading solutions in test & measurement, technology systems and networks & cybersecurity. Founded 90 years ago, the group is a reliable partner for industry and government customers around the globe. The independent company is headquartered in Munich, Germany and has an extensive sales and service network with locations in more than 70 countries.

[www.rohde-schwarz.com](http://www.rohde-schwarz.com)

**Sustainable product design**

- ▶ Environmental compatibility and eco-footprint
- ▶ Energy efficiency and low emissions
- ▶ Longevity and optimized total cost of ownership

Certified Quality Management

**ISO 9001**

**Rohde & Schwarz training**

[www.training.rohde-schwarz.com](http://www.training.rohde-schwarz.com)

**Rohde & Schwarz customer support**

[www.rohde-schwarz.com/support](http://www.rohde-schwarz.com/support)

