

R&S® ESCU ENHANCED SIGNAL CONDITIONING UNIT

Specifications



Specifications
Version 06.00

ROHDE & SCHWARZ

Make ideas real



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Definitions

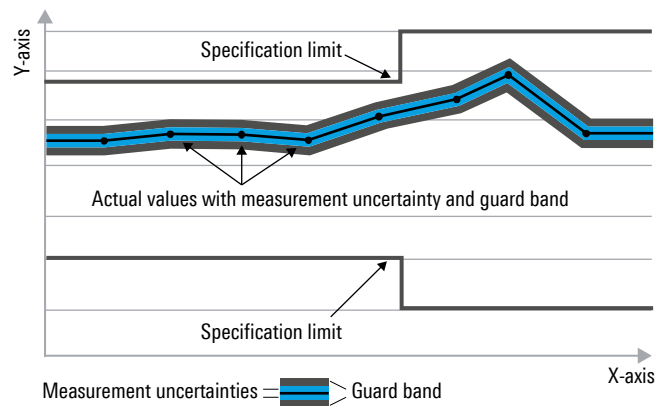
General

Product data applies under the following conditions:

- Three hours of storage at ambient temperature
- 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.

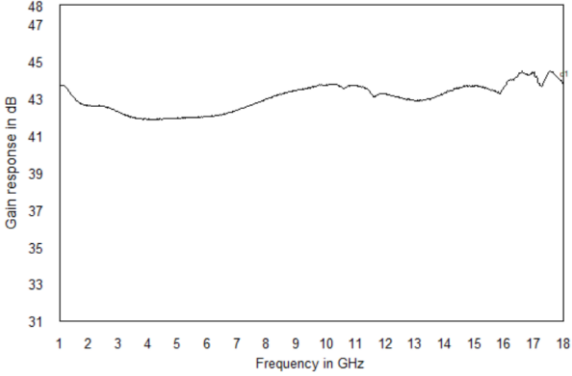
Specifications

| | | |
|---------------------------------------|---|---|
| Frequency range | R&S®ESCU08 | (30 MHz) ¹ 0.1 GHz to 8 GHz |
| | R&S®ESCU18 | 1 GHz to 18 GHz |
| Gain | | |
| Minimum gain | R&S®ESCU08 (model .21) | ≥ 31 dB |
| | R&S®ESCU08 (model .31) | ≥ 39 dB |
| | R&S®ESCU18 (model .41) | ≥ 39 dB |
| | R&S®ESCU08 (model .20) | ≥ 33 dB |
| | R&S®ESCU08 (model .30) | ≥ 41 dB |
| | R&S®ESCU18 (model .40) | ≥ 41 dB |
| Typical gain | R&S®ESCU08 (model .21) | 35 dB |
| | R&S®ESCU08 (model .31) | 43 dB |
| | R&S®ESCU18 (model .41) | 43 dB |
| | R&S®ESCU08 (model .20) | 36 dB |
| | R&S®ESCU08 (model .30) | 44 dB |
| | R&S®ESCU18 (model .40) | 44 dB |
| Maximum gain | R&S®ESCU08 (model .21) | 39 dB |
| | R&S®ESCU08 (model .31) | 47 dB |
| | R&S®ESCU18 (model .41) | 47 dB |
| | R&S®ESCU08 (model .20) | 41 dB |
| | R&S®ESCU08 (model .30) | 49 dB |
| | R&S®ESCU18 (model .40) | 49 dB |
| Gain flatness | R&S®ESCU08 (models .21/.31), R&S®ESCU18 (model .41) | ≤ ±3 dB |
| | R&S®ESCU08 (models .20/.30) R&S®ESCU18 (model .40) | ≤ ±2 dB |
| | | |
| Maximum input level (CW) ² | R&S®ESCU08 (models .20/.30/.21/.31), R&S®ESCU18 (models .40/.41) | +15 dBm |
| P1dB at +23 °C | R&S®ESCU08 (models .21/.31), R&S®ESCU18 (model .41) | ≥ 11 dBm |
| | R&S®ESCU08 (models .20/.30) R&S®ESCU18 (model .40) | ≥ 13 dBm |
| | | |
| Noise figure ³ at +23 °C | R&S®ESCU08 (models .20/.21) | 3.5 dB (nom.) (0.3 GHz to 0.5 GHz) ≤ 3.5 dB (from 0.5 GHz) |
| | R&S®ESCU08 (models .30/.31) | ≤ 3.5 dB (from 0.3 GHz) |
| | R&S®ESCU18 (models .40/.41) | ≤ 4 dB |

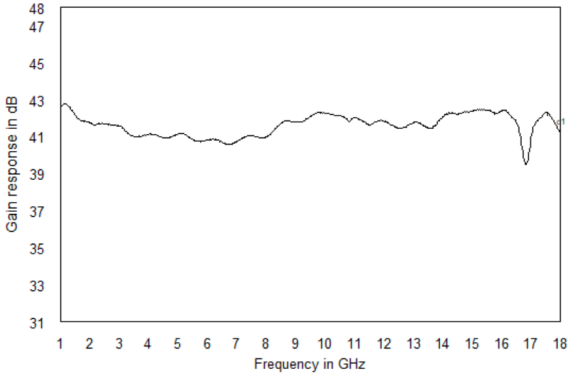
¹ Usable from 30 MHz.

² Although R&S®ESCU is designed to allow input level of up to +24 dBm, warranty will be void if input level is > +15 dBm.

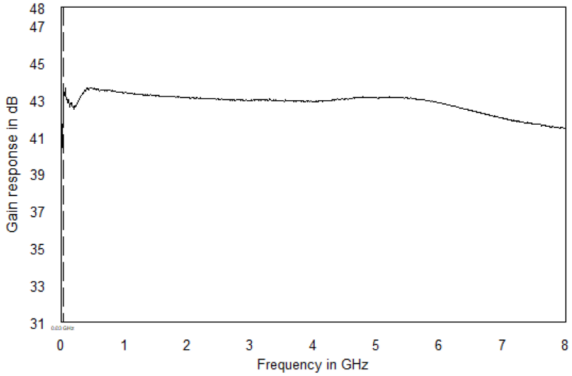
³ For the statement of conformity, the simple acceptance rule is selected (ref. ILAC-G8:09/2019 Clause 4.2.1).



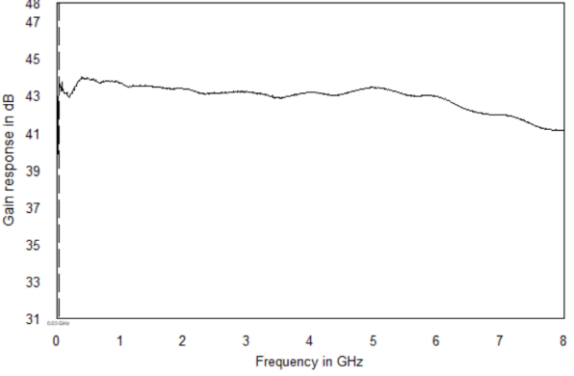
S₂₁ for R&S[®]ESCU18 (model .40)



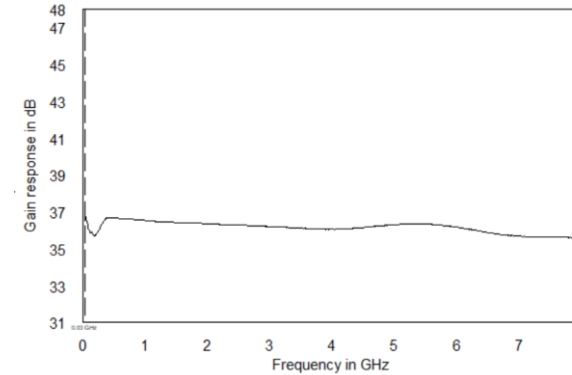
S₂₁ for R&S[®]ESCU18 (model .41)



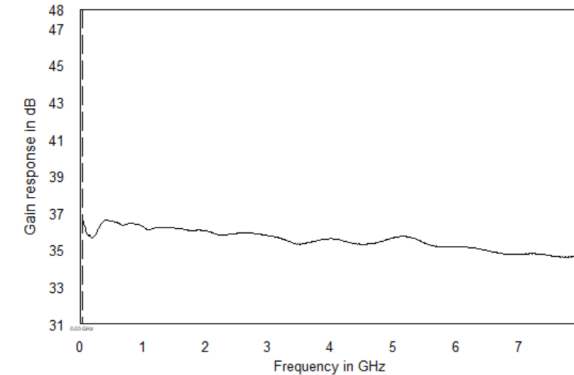
S₂₁ for R&S[®]ESCU08 (model .30)



S₂₁ for R&S[®]ESCU08 (model .31)



S₂₁ for R&S[®]ESCU08 (model .20)



S₂₁ for R&S[®]ESCU08 (model .21)

Input and output

| RF input | | |
|-------------------------|--|--|
| Impedance | | 50 Ω |
| Connector | | RPC2.92 (f) |
| Input VSWR | R&S [®] ESCU08, R&S [®] ESCU18 | $\leq 2.5:1$ |
| Maximum input level | R&S [®] ESCU08, R&S [®] ESCU18 | +15 dBm |
| Maximum input DC level | R&S [®] ESCU08, R&S [®] ESCU18 | 0 V DC, DC coupled |
| RF output | | |
| Impedance | | 50 Ω |
| Connector | R&S [®] ESCU08, R&S [®] ESCU18 R&S [®] ESCU-Z01 | N type (f) RPC2.92 (f) |
| Output VSWR | R&S [®] ESCU08, R&S [®] ESCU18 | $\leq 2.5:1$ |
| Damage DC input voltage | R&S [®] ESCU08, R&S [®] ESCU18 | ≥ 50 V DC |
| Power supply | | |
| DC input voltage | R&S [®] ESCU R&S [®] ESCU-Z01 | 12 V \pm 10 % 12 V \pm 10 % |
| DC output voltage | R&S [®] ESCU-Z01 | 12 V \pm 10 % |
| Input current | R&S [®] ESCU08 (models .21/.31) R&S [®] ESCU18 (model .41) R&S [®] ESCU08 (models .20/.30) R&S [®] ESCU18 (model .40) | 0.375 A \pm 10 % 0.355 A \pm 10 % |
| Connector | | barrel type (2.1 mm) |

General data

| Environmental conditions | | |
|---------------------------------|---|---|
| Temperature | operating temperature range | 0 °C to +55 °C |
| Damp heat | | +25 °C/+55 °C, 95 % rel. humidity, cyclic; in line with EN 60068-2-30 for damp heat, cyclic temperature variation and EN 60068-2-78 for damp heat, constant temperature |
| Mechanical resistance | | |
| Vibration | sinusoidal | 5 Hz to 55 Hz, 0.3 mm amplitude const., 55 Hz to 150 Hz, 0.5 g const., in line with EN 60068-2-6 |
| | random | 8 Hz to 650 Hz, acceleration 1.9 g RMS, in line with EN 60068-2-64 |
| Shock | | 40 g shock spectrum, in line with MIL-STD-810G, method no. 516.6, procedure I |
| Power rating (GSM40A12-P1JRS) | input specifications | 100 V to 240 V AC, 50 Hz/60 Hz, 1.0 A to 0.5 A |
| | output specifications | 12 V, 3.34 A, max. 40 W |
| | operating temperature range | 0 °C to +55 °C |
| | storage temperature range | -40 °C to +85 °C |
| | test mark | KC mark |
| Power consumption | R&S [®] ESCU08 (models .21/.31) RSS [®] ESCU18 (model .41) | 4.5 W (meas.) |
| | R&S [®] ESCU08 (models .20/.30) RSS [®] ESCU18 (model .40) | 4.2 W (meas.) |
| Product conformity | | |
| Electromagnetic compatibility | in line with EMC Directive 2004/30/EU | EN 61326-1, EN 61326-2-1, EN 55011 (class B), EN 61000-3-2, EN 61000-3-3 |
| Electrical safety | in line with Low Voltage Directive 2014/35/EU | EN 61010-1 |
| | USA | UL 61010-1 |
| | Canada | CAN/CSA-C22.2 No. 61010-1 |
| Calibration interval | recommended | 12 months |
| Dimensions (W x H x D) | R&S [®] ESCU08, R&S [®] ESCU18 | 70 mm x 52.5 mm x 96.5 mm (2.8 in x 2.1 in x 3.8 in) |
| | R&S [®] ESCU-Z01 | 69 mm x 32 mm x 113 mm (2.8 in x 1.3 in x 4.4 in) |
| Weight | R&S [®] ESCU08, R&S [®] ESCU18 | 461 g (1 lb) |
| | R&S [®] ESCU-Z01 | 300 g (0.66 lb) |

Ordering information

| Designation | Type | Order No. |
|---|--------------|--------------|
| Bias unit versions | | |
| Enhanced signal conditioning unit, 0.1 GHz to 8 GHz, with R&S®ESCU-Z01 bias unit, 31 dB minimum gain, including AC adapter | R&S®ESCU08 | 5602.9825.21 |
| Enhanced signal conditioning unit, 0.1 GHz to 8 GHz, with R&S®ESCU-Z01 bias unit, 39 dB minimum gain, including AC adapter | R&S®ESCU08 | 5602.9825.31 |
| Enhanced signal conditioning unit, 1 GHz to 18 GHz, with R&S®ESCU-Z01 bias unit, 39 dB minimum gain, including AC adapter | R&S®ESCU18 | 5602.9825.41 |
| DC power supply versions | | |
| Enhanced signal conditioning unit, 0.1 GHz to 8 GHz, with DC jack, 33 dB minimum gain, including AC adapter | R&S®ESCU08 | 5602.9825.20 |
| Enhanced signal conditioning unit, 0.1 GHz to 8 GHz, with DC jack, 41 dB minimum gain, including AC adapter | R&S®ESCU08 | 5602.9825.30 |
| Enhanced signal conditioning unit, 1 GHz to 18 GHz, with DC jack, 41 dB minimum gain, including AC adapter | R&S®ESCU18 | 5602.9825.40 |
| Accessories | | |
| 19" rackmount adapter, 1 HU, for a single R&S®ESCU-Z01 bias unit | R&S®ESCU-ZZA | 5602.9060.00 |
| Mounting bracket to attach the R&S®ESCU to the R&S®UAS universal antenna stand with the R&S®HF907 horn antenna | R&S®ESCU-Z10 | 5602.9760.00 |
| Contact your local Rohde & Schwarz sales office for R&S®ESCU mounting kits supporting the attachment of other antenna types to the R&S®UAS universal antenna stand. | | |

| | | |
|---|---------|--|
| 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 ⁵. 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 ⁵ 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 and accredited calibration at the recommended intervals as well as any accredited calibration carried out during repairs or option upgrades.

⁵ 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.

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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

Certified Environmental Management

ISO 14001

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