

## Specifications

Specifications apply under the following conditions:

15 minutes warmup time at ambient temperature, specified environmental conditions met, calibration cycle adhered to, and total calibration performed.

Data designated "nominal" apply to design parameters and are not tested.

Data designated "overrange" are not warranted.

Warranted specs do not apply to the Extended Divider Range mode.

### Frequency

|                                                                                                                  |                  |
|------------------------------------------------------------------------------------------------------------------|------------------|
| Range                                                                                                            | 9 kHz to 1.1 GHz |
| R&S SML01                                                                                                        | 9 kHz to 1.1 GHz |
| R&S SML02                                                                                                        | 9 kHz to 2.2 GHz |
| R&S SML03                                                                                                        | 9 kHz to 3.3 GHz |
| Resolution                                                                                                       | 0.1 Hz           |
| Setting time (for an offset of $<1 \times 10^{-7}$ or $<90$ Hz for $f \leq 76$ MHz) after IEC/IEEE-bus delimiter | $<10$ ms         |

### Reference frequency

|                                    | Standard                      | Option R&S SML-B1                                      |
|------------------------------------|-------------------------------|--------------------------------------------------------|
| Aging (after 30 days of operation) | $<1 \times 10^{-6}$ /year     | $<1 \times 10^{-7}$ /year or $<5 \times 10^{-10}$ /day |
| Temperature drift (0°C to 55°C)    | $<1 \times 10^{-6}$           | $<2 \times 10^{-8}$                                    |
| Output for internal reference      |                               |                                                        |
| Frequency                          | 10 MHz                        |                                                        |
| Output voltage, V rms, sinewave    | $>0.5$ V into $50 \Omega$     |                                                        |
| Source impedance                   | $50 \Omega$                   |                                                        |
| Input for external reference       |                               |                                                        |
| Frequency                          | 10 MHz                        |                                                        |
| Permissible frequency drift        | $5 \times 10^{-6}$            |                                                        |
| Input voltage, V rms, sinewave     | 0.5 V to 2 V into $50 \Omega$ |                                                        |
| Input impedance                    | $50 \Omega$                   |                                                        |

### Spectral purity

|                                                                                       |                                     |
|---------------------------------------------------------------------------------------|-------------------------------------|
| Spurious signals                                                                      |                                     |
| Harmonics (for $f > 100$ kHz) <sup>1)</sup>                                           |                                     |
| R&S SML01                                                                             | $<-30$ dBc at levels $\leq +10$ dBm |
| R&S SML02/R&S SML03                                                                   | $<-30$ dBc at levels $\leq +8$ dBm  |
| Subharmonics                                                                          |                                     |
| $f \leq 1.1$ GHz                                                                      | none                                |
| $f > 1.1$ GHz                                                                         | $<-50$ dBc                          |
| Nonharmonics (carrier offset $>10$ kHz)                                               |                                     |
| $f \leq 1.1$ GHz                                                                      | $<-70$ dBc                          |
| $f > 1.1$ GHz to 2.2 GHz                                                              | $<-64$ dBc                          |
| $f > 2.2$ GHz to 3.3 GHz                                                              | $<-58$ dBc                          |
| Broadband noise <sup>2)</sup> ( $f = 1$ GHz, carrier offset $>2$ MHz, 1 Hz bandwidth) | $<-140$ dBc, typ. $-150$ dBc        |
| SSB phase noise ( $f = 1$ GHz, 20 kHz carrier offset, 1 Hz bandwidth)                 | $<-122$ dBc, typ. $-128$ dBc        |
| Spurious FM, rms ( $f = 1$ GHz)                                                       |                                     |
| 0.3 kHz to 3 kHz                                                                      | $<4$ Hz, typ. 1 Hz                  |
| 0.03 kHz to 20 kHz                                                                    | $<10$ Hz, typ. 3 Hz                 |
| Spurious AM, rms (0.03 kHz to 20 kHz)                                                 | $<0.02\%$                           |

### Level

|            |                                                               |
|------------|---------------------------------------------------------------|
| Range      | $-140$ dBm to $+13$ dBm <sup>2)3)</sup> (overrange $+19$ dBm) |
| Resolution | 0.1 dB                                                        |

|                                                                  |                        |
|------------------------------------------------------------------|------------------------|
| Level accuracy <sup>2) 4)</sup> (level $\geq -120$ dBm)          |                        |
| R&S SML01 (for $f > 100$ kHz)                                    | $<0.5$ dB              |
| R&S SML02/SML03                                                  | $<0.5$ dB              |
| 100 kHz to $\leq 2$ GHz                                          | $<0.9$ dB              |
| $f > 2$ GHz                                                      | $<0.9$ dB              |
| Frequency response at 0 dBm <sup>2) 4)</sup>                     |                        |
| R&S SML01 (for $f > 100$ kHz)                                    | $<0.5$ dB, typ. 0.3 dB |
| R&S SML02/R&S SML03                                              | $<0.7$ dB              |
| 100 kHz to $\leq 2$ GHz                                          | $<1.0$ dB              |
| $f > 2$ GHz                                                      | $<1.0$ dB              |
| Characteristic impedance                                         | $50 \Omega$            |
| VSWR                                                             |                        |
| R&S SML01                                                        | $<1.5$                 |
| R&S SML02/03                                                     |                        |
| 100 kHz to 1.5 GHz                                               | 1.6                    |
| $f > 1.5$ GHz                                                    | 2.3                    |
| Setting time (IEC/IEEE bus), $f > 100$ kHz                       | $<10$ ms, typ. 5 ms    |
| Non-interrupting level setting (for $f > 100$ kHz) <sup>5)</sup> | 20 dB, overrange 30 dB |

### Overvoltage protection

safeguards unit against externally applied RF power and DC voltage ( $50 \Omega$  source)

|                             |      |
|-----------------------------|------|
| Max. permissible RF power   |      |
| $f \leq 2.2$ GHz            | 50 W |
| $f > 2.2$ GHz               | 25 W |
| Max. permissible DC voltage | 35 V |

### Internal modulation generator

|                                                                         |                                                     |
|-------------------------------------------------------------------------|-----------------------------------------------------|
| Frequency range                                                         | 0.1 Hz to 1 MHz                                     |
| Resolution                                                              | 0.1 Hz                                              |
| Frequency accuracy                                                      | as for reference frequency $+2.4 \times 10^{-3}$ Hz |
| Frequency response (up to 500 kHz, level $>100$ mV)                     | $<0.5$ dB                                           |
| THD (up to 100 kHz, level 4 V, $R_L = 600 \Omega$ )                     | $<0.1\%$                                            |
| Open-circuit voltage $V_p$ (LF connector)                               | 1 mV to 4 V                                         |
| Resolution                                                              | 1 mV                                                |
| Setting accuracy (at 1 kHz)                                             | 1% of $V_p + 1$ mV                                  |
| Output impedance                                                        | approx. $10 \Omega$                                 |
| Frequency setting time (after reception of last IEC/IEEE-bus character) | $<10$ ms                                            |

### Simultaneous modulation

AM, FM/ $\phi$ M and pulse modulation

### Amplitude modulation<sup>6)</sup>

|                                                        |                                                                                                                                                                                                              |
|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating modes                                        | internal, external AC/DC, internal/external two-tone                                                                                                                                                         |
| Modulation depth                                       | 0% to 100%, settable modulation depth continuously decreasing between $+7$ dBm and $+13$ dBm <sup>7)</sup> while adhering to AM specifications; a status message is output when modulation depth is too high |
| Resolution                                             | 0.1%                                                                                                                                                                                                         |
| Setting accuracy at 1 kHz ( $m < 80\%$ ) <sup>8)</sup> | $<4\%$ of reading $+1\%$                                                                                                                                                                                     |
| AM distortion at 1 kHz                                 |                                                                                                                                                                                                              |
| $m = 30\%$                                             | $<1\%$                                                                                                                                                                                                       |
| $m = 80\%$                                             | $<2\%$                                                                                                                                                                                                       |
| Modulation frequency range ( $<3$ dB)                  | DC/10 Hz to 50 kHz                                                                                                                                                                                           |

|                                                 |                 |
|-------------------------------------------------|-----------------|
| Incidental $\phi M$ at AM (30%),<br>AF = 1 kHz  | <0.2 rad        |
| Modulation input EXT                            |                 |
| Input impedance                                 | >100 k $\Omega$ |
| Input voltage $V_p$ for set<br>modulation depth | 1 V             |

### Frequency modulation

|                                                                                        |                                                         |
|----------------------------------------------------------------------------------------|---------------------------------------------------------|
| Operating modes                                                                        | internal, external AC/DC,<br>internal/external two-tone |
| Frequency deviation                                                                    |                                                         |
| 9 kHz to 76 MHz                                                                        | 0 MHz to 1 MHz                                          |
| >76 MHz to 151.3125 MHz                                                                | 0 kHz to 125 kHz                                        |
| >151.3125 MHz to 302.625 MHz                                                           | 0 kHz to 250 kHz                                        |
| >302.625 MHz to 605.25 MHz                                                             | 0 kHz to 500 kHz                                        |
| >605.25 MHz to 1.2105 GHz                                                              | 0 MHz to 1 MHz                                          |
| >1.2105 GHz to 1.818 GHz                                                               | 0 MHz to 2 MHz                                          |
| >1.818 GHz to 2.655 GHz                                                                | 0 MHz to 3 MHz                                          |
| >2.655 GHz to 3.300 GHz                                                                | 0 MHz to 4 MHz                                          |
| Resolution                                                                             | <1% of set deviation, minimum 10 Hz                     |
| Setting accuracy (at AF = 1 kHz)                                                       | <4% of reading + 20 Hz                                  |
| FM distortion (at AF = 1 kHz and<br>50% of max. deviation)                             | <0.2%, typ. 0.1%                                        |
| Modulation frequency range (<3 dB),<br>standard/wide                                   | DC/10 Hz to 100 kHz/500 kHz                             |
| Incidental AM (at AF = 1 kHz,<br>f >10 MHz, 40 kHz deviation)                          | <0.1%                                                   |
| Stereo modulation at 40 kHz useful<br>deviation, AF = 1 kHz,<br>RF = 87 MHz to 108 MHz |                                                         |
| Crosstalk                                                                              | >50 dB                                                  |
| S/N ratio unweighted, rms                                                              | >70 dB                                                  |
| S/N ratio weighted, rms                                                                | >70 dB                                                  |
| Distortion                                                                             | <0.2%, typ. 0.1%                                        |
| Carrier frequency offset at FM DC                                                      | typ. 0.1% of set deviation                              |
| Modulation input EXT                                                                   |                                                         |
| Input impedance                                                                        | >100 k $\Omega$                                         |
| Input voltage $V_p$ for set deviation<br>(nominal value)                               | 1 V                                                     |

### Phase modulation

|                                                                  |                                                         |
|------------------------------------------------------------------|---------------------------------------------------------|
| Operating modes                                                  | internal, external AC/DC,<br>internal/external two-tone |
| Phase deviation <sup>9)</sup>                                    |                                                         |
| 9 kHz to 76 MHz                                                  | 0 rad to 10 (2) rad                                     |
| >76 MHz to 151.3125 MHz                                          | 0 rad to 1.25 (0.25) rad                                |
| >151.3125 MHz to 302.625 MHz                                     | 0 rad to 2.5 (0.5) rad                                  |
| >302.625 MHz to 605.25 MHz                                       | 0 rad to 5 (1) rad                                      |
| >605.25 MHz to 1.2105 GHz                                        | 0 rad to 10 (2) rad                                     |
| >1.2105 GHz to 1.818 GHz                                         | 0 rad to 20 (4) rad                                     |
| >1.818 GHz to 2.655 GHz                                          | 0 rad to 30 (6) rad                                     |
| >2.655 GHz to 3.300 GHz                                          | 0 rad to 40 (8) rad                                     |
| Resolution                                                       | <1%, min. 0.001 rad                                     |
| Setting accuracy at AF = 1 kHz                                   | <4% of reading + 0.02 rad                               |
| Phase distortion (at AF = 1 kHz and<br>50% of maximum deviation) | <0.2%, typ. 0.1%                                        |
| Modulation frequency range (-3 dB),<br>standard/wide             | DC/10 Hz to 100 kHz/500 kHz                             |
| Modulation inputs EXT                                            |                                                         |
| Input impedance                                                  | >100 k $\Omega$                                         |
| Input voltage $V_p$ for set deviation<br>(nominal value)         | 1 V                                                     |

### Pulse modulation (with option R&S SML-B3)

|                 |                    |
|-----------------|--------------------|
| Operating modes | internal, external |
| On/off ratio    | >80 dB             |

|                            |                                                                 |
|----------------------------|-----------------------------------------------------------------|
| Rise/fall time (10%/90%)   | <20 ns, typ. 10 ns,                                             |
| Pulse repetition frequency | 0 MHz to 2.5 MHz                                                |
| Pulse delay                | typ. 50 ns                                                      |
| Video crosstalk ( $V_p$ )  | <30 mV                                                          |
| Modulation input PULSE     |                                                                 |
| Input level                | TTL level (HCT)                                                 |
| Input impedance            | 10 k $\Omega$ or 50 $\Omega$ , selectable with internal<br>link |

### Pulse generator (with option R&S SML-B3)

|                      |                                                                                                                             |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Operating modes      | automatic, externally triggered, external<br>gate mode, single pulse, double pulse,<br>delayed pulse (externally triggered) |
| Active trigger edge  | positive or negative                                                                                                        |
| Pulse period         | 100 ns to 85 s                                                                                                              |
| Resolution           | 5 digits, min. 20 ns                                                                                                        |
| Accuracy             | <1 x 10 <sup>-4</sup>                                                                                                       |
| Pulse width          | 20 ns to 1 s                                                                                                                |
| Resolution           | 4 digits, min. 20 ns                                                                                                        |
| Accuracy             | <(1 x 10 <sup>-4</sup> + 3 ns)                                                                                              |
| Pulse delay          | 20 ns to 1 s                                                                                                                |
| Resolution           | 4 digits, min. 20 ns                                                                                                        |
| Accuracy             | <(1 x 10 <sup>-4</sup> + 3 ns)                                                                                              |
| Double-pulse spacing | 20 ns to 1 s                                                                                                                |
| Resolution           | 4 digits, min. 20 ns                                                                                                        |
| Accuracy             | <(1 x 10 <sup>-4</sup> + 3 ns)                                                                                              |
| Trigger delay        | typ. 50 ns                                                                                                                  |
| Jitter               | <10 ns                                                                                                                      |
| PULSE/VIDEO output   | TTL signal ( $R_L \geq 50 \Omega$ )                                                                                         |

### Sweep

|                    |                                                                                      |
|--------------------|--------------------------------------------------------------------------------------|
|                    | digital in discrete steps                                                            |
| RF sweep, AF sweep |                                                                                      |
| Operating modes    | automatic, single-shot, manually or exter-<br>nally triggered, linear or logarithmic |
| Sweep range        | user-selectable                                                                      |
| Step width (lin)   | user-selectable                                                                      |
| Step width (log)   | 0.01% to 100%                                                                        |
| Level sweep        |                                                                                      |
| Operating modes    | automatic, single-shot, manually or<br>externally triggered, logarithmic             |
| Sweep range        | user-selectable                                                                      |
| Step width (log)   | user-selectable                                                                      |
| Step time          | 10 ms to 1 s                                                                         |
| Resolution         | 0.1 ms                                                                               |

### Memory for device settings

|                   |     |
|-------------------|-----|
| Storable settings | 100 |
|-------------------|-----|

### Remote control

|                      |                                                  |
|----------------------|--------------------------------------------------|
| System               | IEC 625 (IEEE 488) and RS-232                    |
| Command set          | SCPI 1995.0                                      |
| Connector            | Amphenol, 24-pin and 9-pin                       |
| IEC/IEEE-bus address | 0 to 30                                          |
| Interface functions  | SH1, AH1, T6, L4, SR1, RL1, PP1, DC1,<br>DT1, CO |

<sup>1)</sup> With option R&S SML-B3 only for f > 20 MHz.

<sup>2)</sup> With Attenuator Mode Auto.

<sup>3)</sup> -140 dBm to 11 dBm at f  $\leq$  5 MHz, f > 3 GHz.

<sup>4)</sup> Temperature range 20°C to 30°C.

<sup>5)</sup> With Attenuator Mode Fixed.

<sup>6)</sup> With Attenuator Mode Auto, f  $\geq$  100 kHz.

<sup>7)</sup> +5 dBm to 11 dBm at f  $\leq$  5 MHz, f > 3 GHz.

<sup>8)</sup> With option R&S SML-B3 only for f > 10 MHz.

<sup>9)</sup> Values in brackets apply to wide modulation bandwidth.

## General data

|                                         |                                                                                                                                       |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Temperature loading                     |                                                                                                                                       |
| Specs complied with between             | 0 °C and 55 °C;<br>meets IEC68-2-1 and IEC68-2-2                                                                                      |
| Storage temperature range               | -40°C to +70°C                                                                                                                        |
| Climatic resistance                     |                                                                                                                                       |
| Damp heat                               | 95% relative humidity at +25 °C/<br>+40 °C cyclically; meets IEC68-2-3                                                                |
| Mechanical resistance                   |                                                                                                                                       |
| Vibration, sinusoidal                   | 5 Hz to 150 Hz, max. 2 g at 55 Hz,<br>max. 0.5 g between 55 Hz and<br>150 Hz, meets IEC68-2-6, IEC1010-1<br>and MIL-T-28800D, class 5 |
| Vibration, random                       | 10 Hz to 300 Hz,<br>acceleration 1.2 g (rms)                                                                                          |
| Shock                                   | 40 g shock spectrum,<br>meets MIL-STD-810D and<br>MIL-T-28800D, class 3/5                                                             |
| Electromagnetic compatibility           | meets EN 50081-1 and EN 50082-1<br>(EMC directive of EU)                                                                              |
| Susceptibility to radiated interference | 10 V/m                                                                                                                                |
| Power supply                            | 100 V to 120 V (AC), 50 Hz to 400 Hz,<br>200 V to 240 V (AC), 50 Hz to 60 Hz,<br>autoranging, max. 150 VA                             |
| Safety                                  | meets DIN EN 61010-1, IEC 1010-1,<br>UL 3111-1, CSA 22.2 No. 1010-1                                                                   |
| Dimensions (W x H x D)                  | 427 mm x 88 mm x 450 mm                                                                                                               |
| Weight                                  | 8.5 kg when fully equipped                                                                                                            |

## Ordering information

|                             |                                           |                                              |
|-----------------------------|-------------------------------------------|----------------------------------------------|
| <b>Signal Generator</b>     | R & S SML01<br>R & S SML02<br>R & S SML03 | 1090.3000.11<br>1090.3000.12<br>1090.3000.13 |
| <b>Accessories supplied</b> |                                           | power cable,<br>user manual                  |
| <b>Options</b>              |                                           |                                              |
| Reference Oscillator OCXO   | R & S SML-B1                              | 1090.5790.02                                 |
| Pulse Modulator             | R & S SML-B3                              | 1090.5403.02*)                               |
| Rear Connectors for AF, RF  | R & S SML-B19                             | 1090.5303.02*)                               |
| <b>Recommended extras</b>   |                                           |                                              |
| Service Kit                 | R & S SML-Z2                              | 1090.5203.02                                 |
| 19" Rack Adapter            | R & S ZZA-211                             | 1096.3260.00                                 |
| Transport Bag               | R & S ZZT-214                             | 1109.5119.00                                 |
| Service Manual, Modules     |                                           | 1090.3123.24                                 |

\*) Factory-fitted only.

Certified Environmental System  
**ISO 14001**  
REG. NO 1954

Certified Quality System  
**ISO 9001**  
DQS REG. NO 1954



  
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