# MICROWAVE INSTRUMENTS

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ON

YOUR

CRITICAL

SYSTEMS

MODULAR AND SCALABLE

WIDEBAND UP AND

DOWN CONVERTERS


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SPHEREA

# MODULAR AND SCALABLE WIDEBAND UP AND DOWN CONVERTERS

Testing is a key process when producing and introducing new Radar and Electronic Warfare (ELINT, SIGINT) equipment. Repeatable, accurate and traceable test data is critical through multiple assembly stages and environments. New types of instruments including Software Defined Radio cores require frequency converters to match applications frequency coverage.

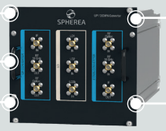
SPHEREA's Up & Down converters combine a wide instantaneous bandwidth (up to 2Ghz), with an extended frequency coverage (up to 18 / 26 / 40Ghz) making a product unique on the market and capable of addressing a wide variety of programs.

## Generic overview and Key features

Design based on building block for an open form factor

Scalability – Wide range from 1GHz to 18GHz / 26GHz / 40GHz and IBW up to 2Ghz

Control by LAN with SCPI Commands



Modularity and flexibility:

- Rackmount Lab solution in 1U-19 inch with 2 channels Up or Dw;
- Internal basic LO and external LO input;

Optimized solution for wide single or multi-signal test equipments

## Up converter Specifications

| UP - Output Characteristics | Vers1-18_2 | Vers1-26_2 |
|---|---|---|
| RF Output Frequency (SMA 50 Ohms) | [1 to 18] GHz | [1 to 26] GHz |
| Instantaneous Bandwidth | 2 GHz (3dB) | 2 GHz (3 dB) |
| Option – Frequency Extension 26Ghz | Yes | - |
| Option – Frequency Extension 40Ghz | - | Yes |
| IF to RF Gain | 20-25 dB typ | |
| Flatness in frequency band (before System calibration) from 1Ghz to 18/26Ghz | ± 3 dB typ | ± 4 dB typ |
| Flatness in Bandwidth (before SW calibration) | ± 1,5 dB typ | ± 2,5 dB typ |
| Output Attenuator (Gain adjustment) | 0-31 dB step 0,5 dB | |
| OP1dB (Output 1 dB Compression Gain) | > +10 dBm | |
| OIP3 (Output 3rd-order Intercept Point) | > +18 dBm | |
| Output VSWR | ≤ 2.0:1 | |
| Harmonics (at 0dBm output) | -25 dBc typ | |
| LOs to RF Leakage (to output) | <-50 dBm typ | |
| In-Bandwidth Spurious (over the entire frequency range [In band] GHz) | -60 dBc typ | -60 dBc typ |
| Wideband Spurious, [In band] GHz | -60 dBc typ | -60 dBc typ |
| SFDR excluding harmonics (at +10 dBm output), in band | -60 dBc typ | -60 dBc typ |
| Image rejection | -60 dBc typ | -60 dBc typ |
| Spectral sense | Non-inverting all version up to 40 GHz | |
| Phase noise 10GHz Output | -94 dBc/Hz typ@10KHz<br>-105 dBc/Hz typ@1MHz | On demand |
| **UP - Input Characteristics** | | |
| IF Center Frequency (Typ) (SMA 50 Ohms) | 1,7 / 2.5 GHz | |
| Max Input Power no damage | +20 dBm | |
| Input Attenuator (Gain adjustment) | 0 - 31 dB step 0.5 dB | |
| Nominal Mixer Input Power | -10 dBm typ | |
| Input VSWR | ≤ 2.0:1 | |
| LO to IF Leakage (to input) | < -50 dBm | |
| **UP - General Characteristics** | | |
| Operating Temperature (lab equipment) | 10° to 30 °C<br>(Option 0°C to +50°C on demand for Embedded version) | |
| Power requirement | 110/220VAC 50/60Hz < 30 W by channel | |
| Size, inches | EIA 19'' 1RU chassis | |
| Remote access | Ethernet | |
| Remote Control | SCPI-type command set | |



## Application domains

- Capture and streaming solutions (single or multi-channel);
- Radar system testing - Radar pulse generation;
- Multichannel coherent signal generation;
- Electronic warfare testing equipment (ELINT, SIGINT) - Realtime Hil testing;
- Military receiver test (Performance & Robustness testing);
- Space communication testing system (Parametric and system test).

## Additional information on demand about:

- Phase noise higher performances;
- Phase coherence (for multichannel systems);
- Phase linearity in bandwidth / Group delay;
- Switching timing in band...

*«High form factor flexibility offering unique capabilities for your test facilities; from classic rackmount lab equipment for R&D tests; to on-board and / or ruggedized equipment for tests during integration on the final system (on ship, on aircraft or on combat vehicle...).»*

Rackmount 19inch - Vers1-18_2 with Opt 26 GHz

## Down converter Specifications

| Down - Input Characteristics | Vers1-18_2 | Vers1-26_2 |
|---|---|---|
| RF Input Frequency (SMA 50 Ohms) | [1 to 18] GHz | [1 to 26] GHz |
| Instantaneous Bandwidth | 2 GHz (3 dB) | 2 GHz (3 dB) |
| Option – Frequency Extension 26Ghz | Yes | - |
| Option – Frequency Extension 40Ghz | - | Yes |
| RF to IF Gain | 20-25dB typ | |
| Flatness in frequency band (before System calibration) from 1Ghz to 18/26Ghz | ± 3 dB typ | ± 4 dB typ |
| Input Attenuator (Gain adjustment) | 0-31dB step 0.5dB | |
| Input VSWR | ≤ 2.0:1 | |
| Max Input Power no damage | +20 dBm | |
| Nominal Mixer Input Power | -10 dBm typ | -10 dBm typ |
| Image rejection | -60 dBc typ | -60 dBc typ |
| **Down - Output Characteristics** | | |
| IF Center Frequency (SMA 50 Ohms) | 1,7 / 2,5 GHz | |
| Output Attenuator (Gain adjustment) | 0-31dB step 0.5dB | |
| LO to IF Leakage | < -50 dBm | |
| Flatness in Bandwidth (before SW calibration) | ± 1,5 dB typ | ± 2,5 dB typ |
| Nominal Output Power IF (Gain max) | +10 dBm | |
| OP1dB (Output 1 dB Compression Gain) | > +10 dBm | |
| OIP3 (Output 3rd-order Intercept Point) | > +18 dBm | |
| Output VSWR | ≤ 2.0:1 | |
| In-Bandwidth Spurious (at +10 dBm output) | -60 dBc typ | -60 dBc typ |
| SFDR excluding harmonics (at +10 dBm output), In band | -60 dBc typ | -60 dBc typ |
| Harmonics at 0 dBm output | -25 dBc typ | |
| Spectral sense | Non-inverting all version up to 40 GHz | |
| Phase noise 10G Output | -94 dBc/Hz typ@10KHz<br>-105 dBc/Hz typ@1MHz | On demand |
| **Down - Output Characteristics** | | |
| Operating Temperature (lab equipment) | 10 to 30 °C<br>(Option 0°C/+50°C on demand for Embedded version) | |
| Power requirement | 110/220VAC 50/60Hz < 30 W by channel | |
| Size, inches | EIA 19'' 1RU chassis | |
| Remote access | Ethernet | |
| Remote Control | SCPI-type command set | |