

Extension kit for R&S Vector Network Analysers

Characterisation of Nonlinear RF/HF Components in Time and Frequency domain



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Introduction

The NM300 is a combination of additional hardware and software that runs on top of a selection of ZVA and ZVT vector network analysers (VNA) from Rohde&Schwarz. The combination of the ZVx and the NM300 extension kit is referred to as “ZVxPlus”.

On top of the standard measurement capabilities of the R&S VNA, the ZVxPlus provides calibrated measurement capability of the time waveforms of the incident and reflected waves or voltages and currents at the ports of a component under test. The time waveforms are periodic with a minimal frequency of 600 MHz and with spectral components up to 20 GHz.

The NM300 kit consists of:

- 1x NM400 Synchronizer 600MHz-20GHz
- 1x NM200 Harmonic Phase Reference Drive Box
- 1x NM210 Harmonic Phase Reference Wand 600MHz-20GHz
- 1x NM301 3.5mm Connection Kit
- 1x ICE Software License
- One year warranty and support

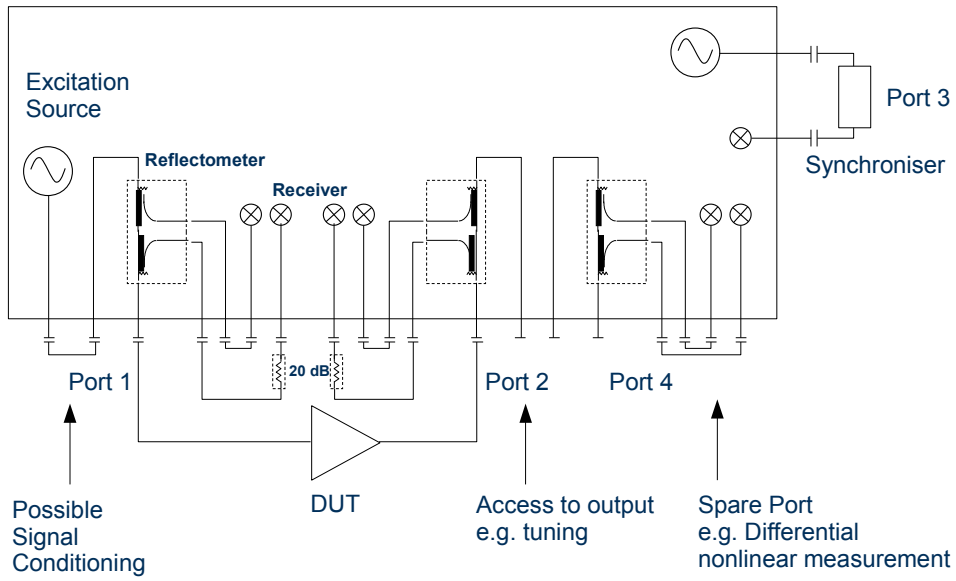
This kit runs on top of the 4-port R&S®ZVA24/40/50/67 and on top of the R&S®ZVT8 (at least 3 ports), with the following options:

- Direct generator/receiver Access option (R&S®ZVAxx-B16 or R&S®ZVT8-B16)
- Frequency conversion option (R&S®ZVA-K4)
- Optional: step attenuator option for measurement receivers at Port 1 and Port 2, allowing automatic range adaptation (R&S®ZVAxx-B31 and -B32 or R&S®ZVT8-B31 and -B32)

A 2.4mm to 3.5mm adapter option is provided for the NM301 Connection Kit on the R&S®ZVA50 and ZVA67.

When the step attenuator option on Port 1 (option B31) and/or Port 2 (option B32) is missing, one needs to put external attenuators in front of the corresponding measurement receiver. Attenuator and adapter kits are then provided per port, depending on the selected VNA and the desired frequency range.

General block diagram



Block diagram of ZVxPlus for the different R&S VNAs

Connectivity

NM400 Synchroniser

| | |
|-----------------------|-----------------------|
| Input port connector | SMA, female |
| Output port connector | Precision SMA, female |

NM200 Harmonic Phase Reference Drive Box

| | |
|--------------------------------|-----------------------|
| Input port connector | Precision SMA, female |
| Power levelling port connector | 3.5 mm, female |
| Output port connector | 3.5 mm, female |

NM210 Harmonic Phase Reference Wand

| | |
|-----------------------|----------------|
| Input port connector | 3.5 mm, female |
| Output port connector | 3.5 mm, female |

NM301 Connection Kit

| | |
|--|--------------|
| 2x semi-rigid cables (Synchroniser) | |
| Input port connector | 3.5 mm, male |
| Output port connector | 3.5 mm, male |
| 1x flexible cable (Harmonic Phase Reference) | |
| Input port connector | SMA, male |
| Output port connector | SMA, male |

Attenuator Kits

| | |
|--|---|
| <p>NM302 20GHz Attenuator Kit for R&S®ZVT8 / R&S®ZVA24/50/67*</p> <p>1x 20GHz Connection Loop Input port connector Output port connector</p> <p>3x 20GHz (6dB, 10dB & 20dB) Attenuators Input port connectors Output port connectors</p> | <p>3.5 mm, male 3.5 mm, male</p> <p>3.5 mm, female 3.5 mm, male</p> |
| <p>NM304 40GHz Attenuator Kit for R&S®ZVA40*</p> <p>1x 40GHz Connection Loop Input port connector Output port connector</p> <p>3x 40GHz (6dB, 10dB & 20dB) Attenuators Input port connectors Output port connectors</p> | <p>2.92 mm, male 2.92 mm, male</p> <p>2.92 mm, female 2.92 mm, male</p> |
| <p>NM305 50GHz Attenuator Kit for R&S®ZVA50/67*</p> <p>1x 50GHz Connection Loop Input port connector Output port connector</p> <p>3x 50GHz (6dB, 10dB & 20dB) Attenuators Input port connectors Output port connectors</p> | <p>2.4 mm, male 2.4 mm, male</p> <p>2.4 mm, female 2.4 mm, male</p> |

* Required per port without internal step attenuator option (options B31 and/or B32)

Adapter Kits

| | |
|--|---|
| <p>NM301A 2.4mm Adapter Kit for NM301 on R&S®ZVA50/67</p> <p>3x Adapters Input port connector Output port connector</p> <p>1x Adapter Input port connector Output port connector</p> | <p>2.4 mm, male 3.5 mm, female</p> <p>2.4 mm, male 3.5 mm, male</p> |
| <p>NM302A 2.4mm Adapter Kit for NM302 on R&S®ZVA50/67*</p> <p>2x Adapters Input port connector Output port connector</p> | <p>2.4 mm, male 3.5 mm, female</p> |

* Required per port without internal step attenuator option (options B31 and/or B32)

ICE software requirements

Please refer to the [NMDG Software Requirements](#) document, for general information about the requirements.

Specifics for ICE software installed on ZVx

| | |
|---|---|
| External equipments control Required ZVx accessories | R&S®ZVAB-B44 Option |
| Installed software .NET Framework | .NET Framework 2.0 SP2* |
| Recommended accessories External display | Minimal resolution 1024 x 768 Recommended resolution 1280 x 1024 |

* The ICE software installer will automatically install this in case it is missing otherwise.

Specifications

Hardware specifications

ZVA24 Vector Network Analyser

Overall Specifications for ZVxPlus

| | | |
|---|------------------|--|
| Frequency range | 600 MHz – 20 GHz | limited by phase calibration |
| Minimal frequency grid spacing | 600 MHz | |
| Absolute phase uncertainty* | | 1 σ @ 20 GHz |
| using second internal source | 0.6° | independent of IF bandwidth, due to phase variations between the internal sources |
| using external source (locked to 10 MHz) | 6° | @ 100 Hz IF bandwidth, highly dependent on external source |

* Using one R&S®ZVA24 internal source to drive synchroniser @ 600MHz

Notes: when additive noise is dominant, the phase standard deviation can be linked to the dBm standard deviation using the following equation:

$$\sigma_{Phase(x)_{deg}} = \frac{180}{\pi} \frac{\ln(10)}{20} \sigma_{dBm(x)} \approx 6.6 \sigma_{dBm(x)}$$

Specifications

Reflectometers

| | | |
|---|-------------------|---------------|
| Insertion loss | <7 dB, typ. 5dB | |
| Return loss | >8 dB, typ. 15 dB | |
| Coupling factor in Reference channel | typ. 14 dB | 18dB @ 600MHz |
| in Measurement channel | typ. 12 dB | 15dB @ 600MHz |
| Directivity | >40dB | |
| Damage power level | +27 dBm | |
| Damage DC voltage | 30 V | |

Port bias

| | | |
|-------------------------------|--------|--|
| Maximum nominal input voltage | 30 V | |
| Maximum nominal input current | 200 mA | |
| Damage voltage | 30 V | |
| Damage current | 500 mA | |

Receivers

| | | |
|---|---------|---|
| Noise floor Reference receiver channel IF BW: 100 kHz -61 dBm 10 kHz -71 dBm 1 kHz -81 dBm 100 Hz -91 dBm 10 Hz -101 dBm Measurement* receiver channel IF BW: 100 kHz -68 dBm 10 kHz -78 dBm 1 kHz -88 dBm 100 Hz -98 dBm 10 Hz -108 dBm | | @ Test port |
| Compression Reference receiver channel Odd harmonics only +26 dBm All harmonics +6 dBm Measurement* receiver channel Odd harmonics only +27 dBm All harmonics +12.5 dBm | | @ Test port 60 dBc 3 rd harmonic level 60 dBc 2 nd harmonic level 60 dBc 3 rd harmonic level 60 dBc 2 nd harmonic level |
| Cross talk from Reference to Measurement receiver None from Measurement to Reference receiver -80 dB | | |
| Damage power level | +20 dBm | |
| Damage DC voltage | 0V | |

* Including 25 dB Attenuator

Specifications

Receiver step attenuators (B3x)

| | | |
|----------------------------|---------------|--|
| Attenuation | 0 dB to 35 dB | |
| Attenuation steps | 5 dB | |
| Attenuation accuracy | <2 dB | |
| Systematic amplitude error | typ. 0.5 dB | |
| Systematic phase error* | 5° | |

* After nominal delay compensation

Maximum power level versus receiver attenuation

| Attenuation | Reference receiver | Measurement receiver | |
|-------------|--|---|--------------------------------|
| | Maximum power @ Source Input (Odd harm. Only/All harm.) | Maximum power @ Test Port (Odd harm. Only/All harm.) | |
| | External attenuator | External attenuator (25 dB included) | Internal step attenuator (B3x) |
| 0 dB | +26 / +6 dBm | +27 / +12.5 dBm | +4.5 / -12.5 dBm |
| 5 dB | +27 / +11 dBm | +27 / +17.5 dBm | +9.5 / -7.5 dBm |
| 10 dB | +27 / +16 dBm | +27 / +22.5 dBm | +13.5 / -2.5 dBm |
| 15 dB | +27 / +21 dBm | +27 / +27 dBm | +18.5 / +2.5 dBm |
| 20 dB | +27 / +26 dBm | +27 / +27 dBm | +23.5 / +7.5 dBm |
| 25 dB | +27 / +27 dBm | +27 / +27 dBm | +27 / +12.5 dBm |
| 30 dB | +27 / +27 dBm | +27 / +27 dBm | +27 / +17.5 dBm |
| 35 dB | +27 / +27 dBm | +27 / +27 dBm | +27 / +22.5 dBm |

ZVT8 Vector Network Analyser

Overall Specifications for ZVxPlus

| | | |
|--------------------------------|-----------------|------------------------------|
| Frequency range | 600 MHz – 8 GHz | limited by phase calibration |
| Minimal frequency grid spacing | 600 MHz | |

Reflectometers

| | | |
|---|--------------------------|-----------------|
| Insertion loss | <9.5 dB, typ. 8.75 dB | 8.5 dB @ 1.2GHz |
| Return loss | <19 dB, typ. 26 dB | |
| Coupling factor in Reference channel in Measurement channel | typ. 41 dB typ. 20 dB | |
| Directivity | >7 dB | |
| Damage power level | +27 dBm | |
| Damage DC voltage | 30 V | |

Port bias

| | | |
|-------------------------------|--------|--|
| Maximum nominal input voltage | 30 V | |
| Maximum nominal input current | 200 mA | |
| Damage voltage | 30 V | |
| Damage current | 500 mA | |

Specifications

Receivers

| | | |
|---|---------|---|
| <p>Noise floor</p> <p>Reference receiver channel</p> <p>IF BW: 100 kHz -100 dBm 10 kHz -110 dBm 1 kHz -120 dBm 100 Hz -130 dBm 10 Hz -140 dBm</p> <p>Measurement* receiver channel</p> <p>IF BW: 100 kHz -108 dBm 10 kHz -118 dBm 1 kHz -128 dBm 100 Hz -138 dBm 10 Hz -148 dBm</p> | | @ Test port |
| <p>Compression</p> <p>Reference receiver channel All harmonics +27 dBm</p> <p>Measurement* receiver channel All harmonics +23 dBm</p> | | @ Test port, @ 600MHz 60 dBc 2 nd harmonic level 60 dBc 2 nd harmonic level |
| <p>Cross talk</p> <p>from Reference to Measurement* receiver - 88 dB</p> <p>from Measurement* to Reference receiver None</p> | | |
| Damage power level | +20 dBm | |
| Damage DC voltage | 0 V | |

* Including 20 dB Attenuator

Receiver step attenuators (B3x)

| | | |
|-------------------|---------------|--|
| Attenuation | 0 dB to 75 dB | |
| Attenuation steps | 5 dB | |

Specifications

Maximum power level versus receiver attenuation

| Attenuation | Reference receiver | Measurement receiver | |
|-------------|------------------------------|--------------------------------------|--------------------------------|
| | Maximum power @ Source Input | Maximum power @ Test Port | |
| | External attenuator | External attenuator (20 dB included) | Internal step attenuator (B3x) |
| 0 dB | +27 dBm | +23 dBm | +3 dBm |
| 5 dB | +27 dBm | +27 dBm | +8 dBm |
| 10 dB | +27 dBm | +27 dBm | +13 dBm |
| 15 dB | +27 dBm | +27 dBm | +18 dBm |
| 20 dB | +27 dBm | +27 dBm | +23 dBm |
| 25 dB | +27 dBm | +27 dBm | +27 dBm |
| 30 dB | +27 dBm | +27 dBm | +27 dBm |
| 35 dB | +27 dBm | +27 dBm | +27 dBm |
| 40 dB | +27 dBm | +27 dBm | +27 dBm |
| 45 dB | +27 dBm | +27 dBm | +27 dBm |
| 50 dB | +27 dBm | +27 dBm | +27 dBm |
| 55 dB | +27 dBm | +27 dBm | +27 dBm |
| 60 dB | +27 dBm | +27 dBm | +27 dBm |
| 65 dB | +27 dBm | +27 dBm | +27 dBm |
| 70 dB | +27 dBm | +27 dBm | +27 dBm |
| 75 dB | +27 dBm | +27 dBm | +27 dBm |

ZVA40 Vector Network Analyser

Overall Specifications for ZVxPlus

| | | |
|--------------------------------|------------------|------------------------------|
| Frequency range | 600 MHz – 20 GHz | limited by phase calibration |
| Minimal frequency grid spacing | 600 MHz | |

Reflectometers

| | | |
|------------------------|------------|---------------|
| Coupling factor | | |
| in Reference channel | typ. 21 dB | 17dB @ 600MHz |
| in Measurement channel | typ. 10 dB | 17dB @ 600MHz |
| Damage power level | +27 dBm | |
| Damage DC voltage | 30 V | |

Port bias

| | | |
|-------------------------------|--------|--|
| Maximum nominal input voltage | 30 V | |
| Maximum nominal input current | 200 mA | |
| Damage voltage | 30 V | |
| Damage current | 500 mA | |

Specifications

Receivers

| | | |
|--|--------------------|--|
| Compression | | @ Test port |
| Reference receiver channel Odd harmonics only All harmonics | +27 dBm +9 dBm | 60 dBc 3 rd harmonic level 60 dBc 2 nd harmonic level |
| Measurement* receiver channel Odd harmonics only All harmonics | +27 dBm +10 dBm | 60 dBc 3 rd harmonic level 60 dBc 2 nd harmonic level |
| Cross talk | | |
| from Reference to Measurement* receiver | None | |
| from Measurement* to Reference receiver | None | |
| Damage power level | +20 dBm | |
| Damage DC voltage | 0 V | |

* Including 35 dB Attenuator

Receiver step attenuators (B3x)

| | | |
|----------------------------|---------------|--|
| Attenuation | 0 dB to 35 dB | |
| Attenuation steps | 5 dB | |
| Attenuation accuracy | <2 dB | |
| Systematic amplitude error | typ. 0.4 dB | |
| Systematic phase error* | 7° | |

* After nominal delay compensation

Maximum power level versus receiver attenuation

| Attenuation | Reference receiver | Measurement receiver | |
|-------------|--|---|--------------------------------|
| | Maximum power @ Source Input (Odd harm. Only/All harm.) | Maximum power @ Test Port (Odd harm. Only/All harm.) | |
| | External attenuator | External attenuator (35 dB included) | Internal step attenuator (B3x) |
| 0 dB | +27 / +9 dBm | +27 / +10 dBm | -1.5 / -25 dBm |
| 5 dB | +27 / +14 dBm | +27 / +15 dBm | +3.5 / -20 dBm |
| 10 dB | +27 / +19 dBm | +27 / +20 dBm | +8.5 / -15 dBm |
| 15 dB | +27 / +24 dBm | +27 / +25 dBm | +13.5 / -10 dBm |
| 20 dB | +27 / +27 dBm | +27 / +27 dBm | +18.5 / -5 dBm |
| 25 dB | +27 / +27 dBm | +27 / +27 dBm | +23.5 / 0 dBm |
| 30 dB | +27 / +27 dBm | +27 / +27 dBm | +27 / +5 dBm |
| 35 dB | +27 / +27 dBm | +27 / +27 dBm | +27 / +10 dBm |

ZVA50 Vector Network Analyser

Overall Specifications for ZVxPlus

| | | |
|--------------------------------|------------------|------------------------------|
| Frequency range | 600 MHz – 20 GHz | limited by phase calibration |
| Minimal frequency grid spacing | 600 MHz | |

Reflectometers

| | | |
|---|--------------------------|--|
| Coupling factor in Reference channel in Measurement channel | typ. 22 dB typ. 10 dB | |
| Damage power level | +27 dBm | |
| Damage DC voltage | 30 V | |

Port bias

| | | |
|-------------------------------|--------|--|
| Maximum nominal input voltage | 30 V | |
| Maximum nominal input current | 200 mA | |
| Damage voltage | 30 V | |
| Damage current | 500 mA | |

Receivers

| | | |
|--|--------------------|--|
| Compression | | @ Test port |
| Reference receiver channel Odd harmonics only All harmonics | +27 dBm +12 dBm | 60 dBc 3 rd harmonic level 60 dBc 2 nd harmonic level |
| Measurement* receiver channel Odd harmonics only All harmonics | +23 dBm +10 dBm | 60 dBc 3 rd harmonic level 60 dBc 2 nd harmonic level |
| Cross talk | | |
| from Reference to Measurement* receiver | None | |
| from Measurement* to Reference receiver | None | |
| Damage power level | +20 dBm | |
| Damage DC voltage | 0 V | |

* Including 25 dB Attenuator

Specifications

Receiver step attenuators (B3x)

| | | |
|-------------------|---------------|--|
| Attenuation | 0 dB to 35 dB | |
| Attenuation steps | 5 dB | |

Maximum power level versus receiver attenuation

| Attenuation | Reference receiver | Measurement receiver | |
|-------------|--|---|--------------------------------|
| | Maximum power @ Source Input (Odd harm. Only/All harm.) | Maximum power @ Test Port (Odd harm. Only/All harm.) | |
| | External attenuator | External attenuator (25 dB included) | Internal step attenuator (B3x) |
| 0 dB | +27 / +12 dBm | +23 / +10 dBm | -2 / -15 dBm |
| 5 dB | +27 / +17 dBm | +27 / +15 dBm | +3 / -10 dBm |
| 10 dB | +27 / +22 dBm | +27 / +20 dBm | +8 / -5 dBm |
| 15 dB | +27 / +27 dBm | +27 / +25 dBm | +13 / +0 dBm |
| 20 dB | +27 / +27 dBm | +27 / +27 dBm | +18 / +5 dBm |
| 25 dB | +27 / +27 dBm | +27 / +27 dBm | +23 / +10 dBm |
| 30 dB | +27 / +27 dBm | +27 / +27 dBm | +27 / +15 dBm |
| 35 dB | +27 / +27 dBm | +27 / +27 dBm | +27 / +20 dBm |

ZVA67 Vector Network Analyser

Overall Specifications for ZVxPlus

| | | |
|--------------------------------|------------------|------------------------------|
| Frequency range | 600 MHz – 20 GHz | limited by phase calibration |
| Minimal frequency grid spacing | 600 MHz | |

Reflectometers

| | | |
|------------------------|------------|--|
| Coupling factor | | |
| in Reference channel | typ. 22 dB | |
| in Measurement channel | typ. 10 dB | |
| Damage power level | +27 dBm | |
| Damage DC voltage | 30 V | |

Port bias

| | | |
|-------------------------------|--------|--|
| Maximum nominal input voltage | 30 V | |
| Maximum nominal input current | 200 mA | |
| Damage voltage | 30 V | |
| Damage current | 500 mA | |

Specifications

Receivers

| | | |
|---|---|--|
| <p>Compression</p> <p>Reference receiver channel Odd harmonics only All harmonics</p> <p>Measurement* receiver channel Odd harmonics only All harmonics</p> | <p>+27 dBm +12 dBm</p> <p>+27 dBm +11 dBm</p> | <p>@ Test port</p> <p>60 dBc 3rd harmonic level 60 dBc 2nd harmonic level</p> <p>60 dBc 3rd harmonic level 60 dBc 2nd harmonic level</p> |
| <p>Cross talk</p> <p>from Reference to Measurement* receiver</p> <p>from Measurement* to Reference receiver</p> | <p>None</p> <p>None</p> | |
| <p>Damage power level</p> | <p>+20 dBm</p> | |
| <p>Damage DC voltage</p> | <p>0 V</p> | |

* Including 35 dB Attenuator

Receiver step attenuators (B3x)

| | | |
|-------------------|---------------|--|
| Attenuation | 0 dB to 35 dB | |
| Attenuation steps | 5 dB | |

Maximum power level versus receiver attenuation

| Attenuation | Reference receiver | Measurement receiver | |
|-------------|--|---|--------------------------------|
| | Maximum power @ Source Input (Odd harm. Only/All harm.) | Maximum power @ Test Port (Odd harm. Only/All harm.) | |
| | External attenuator | External attenuator (35 dB included) | Internal step attenuator (B3x) |
| 0 dB | +27 / +12 dBm | +27 / +11 dBm | +0 / -24 dBm |
| 5 dB | +27 / +17 dBm | +27 / +16 dBm | +5 / -19 dBm |
| 10 dB | +27 / +22 dBm | +27 / +21 dBm | +10 / -14 dBm |
| 15 dB | +27 / +27 dBm | +27 / +26 dBm | +15 / -9 dBm |
| 20 dB | +27 / +27 dBm | +27 / +27 dBm | +20 / -4 dBm |
| 25 dB | +27 / +27 dBm | +27 / +27 dBm | +25 / +1 dBm |
| 30 dB | +27 / +27 dBm | +27 / +27 dBm | +27 / +6 dBm |
| 35 dB | +27 / +27 dBm | +27 / +27 dBm | +27 / +11 dBm |

NM400 Synchroniser

| | | |
|-----------------------|-------------------|--|
| Frequency range | 600 MHz – 20 GHz | |
| Drive frequency range | 600 MHz – 1.2 GHz | |
| Nominal input power | 0 dBm | |
| Input damage level | +10 dBm | |
| Output peak voltage | -2 Vp | |

NM200 Harmonic Phase Reference Drive Box

| | | |
|---------------------|------------------|----------------------------------|
| Frequency range | 10 MHz – 1.2 GHz | |
| Nominal input power | +9 dBm | typical with NM210 HPR wand unit |
| Input damage level | +10 dBm | |
| Output power | +33 dBm | load required |

NM210 Harmonic Phase Reference Wand Unit

| | | |
|-----------------------|------------------|--|
| Drive frequency range | 600 MHz – 20 GHz | |
| Frequency range | 600 MHz – 20 GHz | |
| Input damage level | +33 dBm | |
| Output peak voltage | -1 Vp | |

NM302 Attenuator Kit* for R&S[®]ZVT8 & R&S[®]ZVA24/ ZVA50 / ZVA67

| | | |
|--------------------|--------------------|----------------------------|
| Frequency range | DC – 20 GHz | Preliminary Specifications |
| Attenuation | typ. 6, 10 & 20 dB | Preliminary Specifications |
| Damage Power Level | +30 dBm | Preliminary Specifications |

* Required per port without internal step attenuator option (options B31 and/or B32)

NM304 Attenuator Kit* for R&S[®]ZVA40

| | | |
|--------------------|--------------------|----------------------------|
| Frequency range | DC – 40 GHz | Preliminary Specifications |
| Attenuation | typ. 6, 10 & 20 dB | Preliminary Specifications |
| Damage Power Level | +30 dBm | Preliminary Specifications |

* Required per port without internal step attenuator option (options B31 and/or B32)

NM305 Attenuator Kit* for R&S[®]ZVA50 / ZVA67

| | | |
|--------------------|--------------------|----------------------------|
| Frequency range | DC – 50 GHz | Preliminary Specifications |
| Attenuation | typ. 6, 10 & 20 dB | Preliminary Specifications |
| Damage Power Level | +27 dBm | Preliminary Specifications |

* Required per port without internal step attenuator option (options B31 and/or B32)

General data

| | | |
|--|--|---|
| <p>Temperature loading</p> <p>NM400 Synchroniser</p> <p>NM200 Harmonic Phase Reference Drive Box</p> <p>NM210 Harmonic Phase Reference Wand</p> | <p>Operating temperature range Storage temperature range</p> <p>Operating temperature range Storage temperature range</p> <p>Operating temperature range Storage temperature range</p> | <p>0 °C to +65 °C -40 °C to +85 °C</p> <p>0 °C to +65 °C -20 °C to +85 °C</p> <p>-45 °C to +95 °C -55 °C to +100 °C</p> |
| <p>Calibration interval</p> | <p>1 year</p> | |
| <p>Power supply</p> <p>NM400 Synchroniser</p> <p>NM200 Harmonic Phase Reference Drive Box</p> | <p>100 V to 240 V (AC), 47 Hz to 63 Hz</p> <p>90 V to 264 V (AC), 47 Hz to 63 Hz</p> | |
| <p>Power consumption</p> <p>NM400 Synchroniser</p> <p>NM200 Harmonic Phase Reference Drive Box</p> | <p>65 W</p> <p>60 W</p> | |
| <p>Dimensions (W x H x D)</p> <p>NM400 Synchroniser</p> <p>NM200 Harmonic Phase Reference Drive Box</p> <p>NM210 Harmonic Phase Reference Wand</p> | <p>124 mm x 98 mm x 237 mm</p> <p>235 mm x 88 mm x 315 mm</p> <p>28 mm x 28 mm x 160 mm</p> | |

| Weight | |
|---|----------|
| NM400 Synchroniser (with AC adapter) | 2.150 kg |
| NM200 Harmonic Phase Reference Drive Box | 2.600 kg |
| NM210 Harmonic Phase Reference Wand | 0.275 kg |

Additional Hardware

Supported equipments

DC Sources (including DC Voltage and Current Meters)

| | |
|-----------------------|---|
| R&S®NGMO series | controlled via its IEC/IEEE-bus interface |
| Hameg HMP series | controlled via its USB interface |
| Agilent 662x series | controlled via its IEC/IEEE-bus interface |
| Agilent DC4142 | controlled via its IEC/IEEE-bus interface |
| Agilent E363xA series | controlled via its IEC/IEEE-bus interface |
| Keithley 24xx series | controlled via its IEC/IEEE-bus interface |
| Yokogawa GS610 | controlled via its IEC/IEEE-bus interface |

DC Voltage and Current Meters

| | |
|----------------|---|
| Hameg HM8112-3 | controlled via its USB interface |
| Agilent 34401A | controlled via its IEC/IEEE-bus interface |

RF Sources

Remark: A 10 MHz clock needs to be shared between the RF source and the ZVx, and the ZVx is set as the master clock.

| | |
|---------------------------------------|---|
| Internal R&S® ZVx sources | |
| R&S® SMx100A series ^{*,**} | controlled via its IEC/IEEE-bus interface |
| R&S® SMBV100A source ^{*,**} | controlled via its IEC/IEEE-bus interface |
| R&S® SMIQ source ^{*,**} | controlled via its IEC/IEEE-bus interface |
| Agilent 836x series [*] | controlled via its IEC/IEEE-bus interface |
| Agilent ESG series ^{*,**} | controlled via its IEC/IEEE-bus interface |
| Anritsu MG369x series ^{*,**} | controlled via its IEC/IEEE-bus interface |
| SCPI-compliant RF source [*] | controlled via its IEC/IEEE-bus interface |

* Not supported for calibration

** Including phase control

Power Meters

| | |
|---------------------------------|---|
| R&S® NRVD | connected to ZVx, requires: - R&S® ZVAB-B44 Option |
| R&S® NRP-Z series power sensors | connected to ZVx via: R&S® NRP-Z3 (active) USB adapter or R&S® NRP-Z4 (passive) USB adapter |
| Agilent E4418A | connected to ZVx, requires: - R&S® ZVAB-B44 Option |
| Agilent N1911A | connected to ZVx, requires: - R&S® ZVAB-B44 Option |
| Anritsu ML2437A | connected to ZVx, requires: - R&S® ZVAB-B44 Option |

Calibration Units

| | |
|--------------------|------------------|
| R&S ZV-Z5x series* | connected to ZVx |
|--------------------|------------------|

* Not supported for on wafer calibration

Tuners

Please refer to the [NMDG Software Requirements](#) document, for general information about the supported tuner models, and the required software.

Customization

Instrument drivers

Drivers for other equipments can be added on customer request.

External Test sets

External test sets for high power measurement applications (such as high power amplifier measurements) can be added on customer request, with the proper calibration routines.

Order Information

| Designation | Type | Order number |
|--|----------------|--------------|
| ZVxPlus 600MHz-20GHz Kit | NMDG NM300 | NM300 |
| 2.4mm Adapter Option for NM301 on ZVA50/ZVA67 | NMDG NM300-10 | NM300-10 |
| 20GHz Attenuator Option per port for ZVT20/ZVA24 | NMDG NM300-20 | NM300-20 |
| 20GHz Attenuator Option per port for ZVA40 | NMDG NM300-40A | NM300-40A |
| 20GHz Attenuator Option per port for ZVA50 | NMDG NM300-50A | NM300-50A |
| 20GHz Attenuator Option per port for ZVA67 | NMDG NM300-67A | NM300-67A |
| 40GHz Attenuator Option per port for ZVA40 | NMDG NM300-40B | NM300-40B |
| 50GHz Attenuator Option per port for ZVA50 | NMDG NM300-50B | NM300-50B |
| 50GHz Attenuator Option per port for ZVA67 | NMDG NM300-67B | NM300-67B |
| Harmonic Phase Reference Drive Unit | NMDG NM200 | NM200 |
| Harmonic Phase Reference 600MHz-20GHz Wand | NMDG NM210 | NM210 |
| 3.5mm Connection Kit | NMDG NM301 | NM301 |
| 2.4mm Adapter Kit for NM301 on ZVA50/ZVA67 | NMDG NM301A | NM301A |
| 20GHz Attenuator Kit for ZVT20/ZVA24/40/50/67 | NMDG NM302 | NM302 |
| 2.4mm Adapter Kit for NM302 on ZVA50/ZVA67 | NMDG NM302A | NM302A |
| 40 GHz Attenuator Kit for ZVA40 | NMDG NM304 | NM304 |
| 50 GHz Attenuator Kit for ZVA50 | NMDG NM305 | NM305 |
| Synchroniser 600MHz-20GHz | NMDG NM400 | NM400 |

Trademark Information

Microsoft .NET is a brand associated with Microsoft technology.

Contact Information

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ZVxPlus, NM300 and other products and services, focusing on nonlinear RF and HF characterisation, behavioural modelling and test:



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September 2012 - Product description and specification are subject to change without notice.