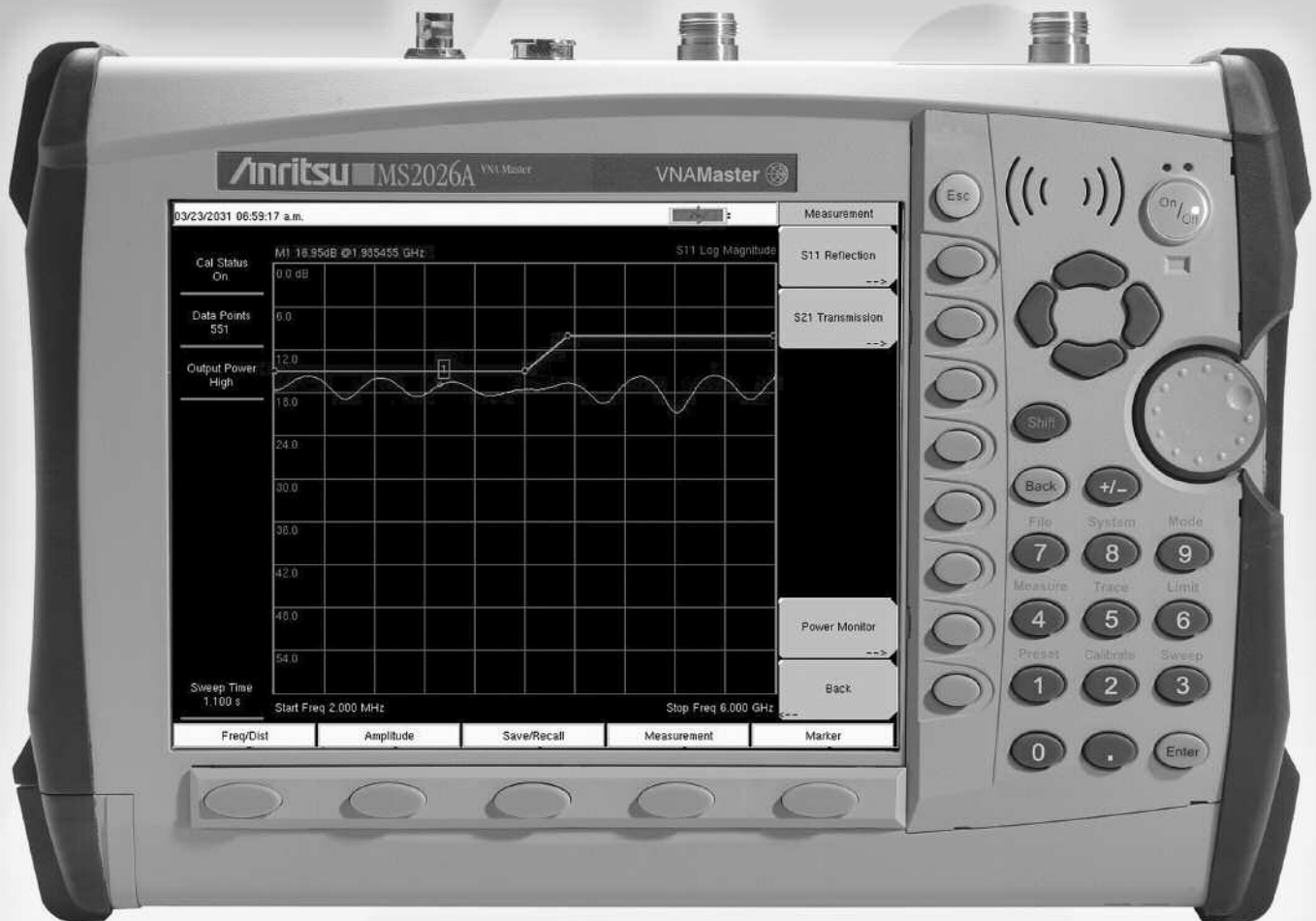


# MS2024A/MS2026A

## VNA Master™

2 MHz to 6 GHz



Handheld Vector Network Analyzer from 2 MHz to 6 GHz

## Introduction

VNA Master MS2024A/MS2026A are the most ultra-portable VNAs on the market. They are designed to make accurate vector corrected 1-Port and 1-path 2-Port magnitude and phase measurements from 2 MHz to 4 GHz (MS2024A) and 2 MHz to 6 GHz (MS2026A). VNA Master's light weight (6.4 lbs) and three hour battery life time provide you with the flexibility needed to make VNA measurements anywhere.

## Performance Specification

### Frequency

Frequency Range:	2 to 4000 MHz (MS2024A) 2 to 6000 MHz (MS2026A)
Frequency Accuracy:	25 ppm
Frequency Resolution <sup>①</sup> :	10 kHz
Data Points:	Low, Medium, High (137/275/551)
Interference Immunity <sup>②</sup> :	
On-Channel:	+17 dBm
On-Frequency:	+10 dBm (RF Out), +30 dBc RF In
1-Port Power:	
High:	0 dBm (typical)
2-Port Power:	
High:	0 dBm (typical)
Low:	-35 dBm (typical)
Corrected Directivity <sup>③</sup> :	42 dB (2 MHz to 6 GHz)
1-Port Accuracy <sup>④</sup> :	= $<0.8 +  20 \log(1 \pm 10^{-E\Delta/20}) $ dB, typical E $\Delta$ = Directivity - Measured Return Loss
System Dynamic Range:	
	80 dB, 2 MHz to 3 GHz
	70 dB, >3 GHz to 5.5 GHz
	65 dB, >5.5 GHz to 6 GHz

### Return Loss

Range:	0 to 60 dB
Resolution:	0.01 dB

### VSWR

Range:	1 to 65
Resolution:	0.01

### Cable Loss

Range:	0 to 30 dB
Resolution:	0.01 dB

### 1-Port Phase

Range:	-180° to +180°
Resolution:	0.01°

### Smith Chart

Resolution:	0.01
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### 2-Port Gain

Range:	-120 to 100 dB
Resolution:	0.01 dB

### 2-Port Phase

Range:	-180° to +180°
Resolution:	0.01°

### Distance-to-Fault (DTF)

Fault Resolution (meters):	$(1.5 \times 10^8 \times vp) / \Delta F$ vp is the propagation constant and $\Delta F$ is F2-F1 in Hz
Horizontal Range (meters):	0 to (data points-1) x Fault Resolution to a maximum of 1500m (4921 ft) where datapoints = 137/275/551
Vertical Range (Return Loss):	0 to 60 dB
Vertical Range (VSWR):	1 to 65

### RF Power Monitor (Option 5):

Display Range:	-80 to +80 dBm (10 pW to 100 kW)
Measurement Range:	-50 to +16 dBm (10 nW to 40 mW)
Offset Range:	0 to +60 dB
Resolution:	0.1 dB or 0.1 W
Accuracy:	±1 dB

### Bias T (Option 10):

Voltage/Current:	+12 V, 250 or 500 mA steady state
	+15 V, 250 or 500 mA steady state
	+18 V, 350 mA steady state
	+21 V, 300 mA steady state
	+24 V, 250 mA steady state

### GPS Receiver (Option 31)

GPS Location Indicator  
Latitude, Longitude, Altitude and UTC on Display

## General Specifications

### Languages

Built-in English, Spanish, Italian, French, German, Japanese, Korean, and Chinese. Can also customize two additional languages using Master Software Tools.

### Memory

Internal memory provides for the storage and recall of more than 1000 traces and setups. The contents of the internal memory can be copied to and from a removable Compact Flash Card.

### Markers

6 markers (Delta marker, peak search, valley search) and Marker Table.

### Traces

View Trace, Memory, Trace-Memory, Trace + Memory, Trace and Memory

### Limit Lines

Upper and Lower Limit. Each upper and lower limit can consist of between one and forty segments.

### Display

Bright daylight viewable color TFT LCD, Full SVGA, 8.4 in.

### Interface Connectors

Type N female RF Out Port and RF In Port (50 $\Omega$ )  
5-pin Mini-B USB 2.0 for data transfer to a PC  
RJ45 Connector for Ethernet 10/100 Base-T  
2.5 mm 3-wire headset connector

### Remote Programmability Commands

Not available

### Power Supply

External DC Input, +12 V, 5A max

### ESD Damage Level

10 kV

### Maximum Input (Damage Level)

Test Port, Type N:	+22 dBm
RF Detector:	+20 dBm

### Impedance

50 $\Omega$

### Dimensions

12 x 8 x 3 in. (305 x 203 x 76 mm)

### Weight

<6.4 lbs (2.9 kg)

### Environment

MIL-PRF-2800F Class 2	
Operating:	-10°C to 55°C, humidity 85% or less
Storage:	-51°C to 71°C
Altitude:	4600 meters, operating and non-operating

### Safety

Conforms to EN 61010-1 for Class 1 portable equipment

### Electromagnetic Compatibility

Meets European Community requirements for CE marking

<sup>①</sup> If display resolution (Span / (DataPoints-1)) is less than 150 kHz, then frequency resolution only applies to measurements with RF Immunity set to Normal.

<sup>②</sup> On Channel Interference Immunity is specified at >1.0 MHz of the carrier frequency.

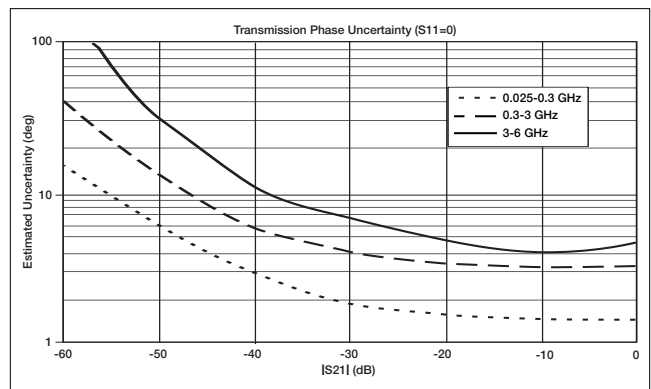
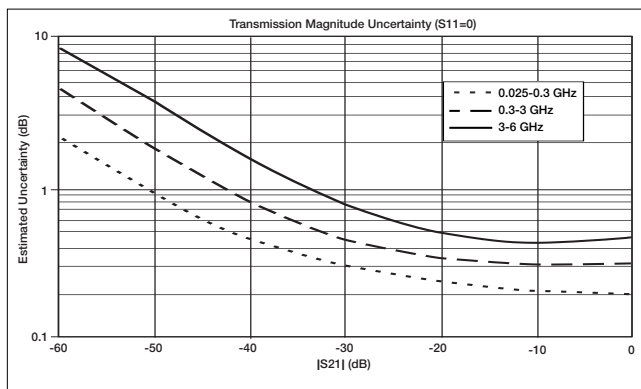
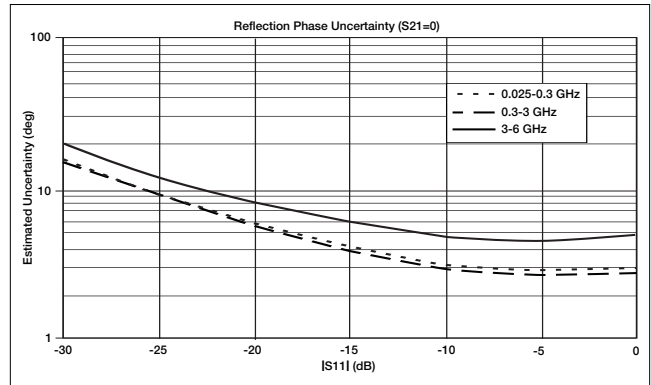
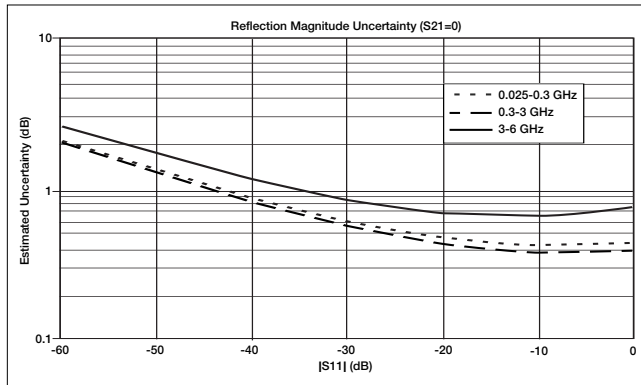
On-Frequency Interference Immunity is specified to within  $\pm 10$  kHz of the carrier frequency.

<sup>③</sup> All accuracy and directivity specifications apply only when using Anritsu's precision components.

<sup>④</sup> For data transfer only, remote programmability commands not available.

## Performance Specifications

The following graphs provide measurement uncertainty at 23°C after vector correction for the standard N connector type. The errors are worst-case contributions of residual directivity, source match, frequency response, network analyzer dynamic range, and connector repeatability. For the 1-path 2-port measurements, transmission tracking, crosstalk and physical load match terms were added. Calibration components OSLN50-1 were used.



## Power Monitor - Detectors

Model	Frequency Range	Impedance	Return Loss	Input Connector	Frequency Response
5400-71N50	0.001 to 3 GHz	50Ω	26 dB	N(m)	±0.2 dB, <1 GHz ±0.3 dB, <3 GHz
5400-71N75	0.001 to 3 GHz	75Ω	26 dB, <2 GHz 20 dB, <3 GHz	N(m)	±0.2 dB, <1 GHz ±0.5 dB, <3 GHz
560-7A50	0.01 to 18 GHz	50Ω	15 dB, <0.04 GHz 22 dB, <8 GHz 17 dB, <18 GHz	GPC-7	±0.5 dB, <18 GHz
560-7N50B	0.01 to 20 GHz	50Ω	15 dB, <0.04 GHz 22 dB, <8 GHz 17 dB, <18 GHz 14 dB, <20 GHz	N(m)	±0.5 dB, <18 GHz ±1.25 dB, <20 GHz
560-7S50B	0.01 to 20 GHz	50Ω	15 dB, <0.04 GHz 22 dB, <8 GHz 17 dB, <18 GHz 14 dB, <20 GHz	WSMA(m)	±0.5 dB, <18 GHz ±1.25 dB, <20 GHz
560-7S50-2	0.01 to 26.5 GHz	50Ω	15 dB, <0.04 GHz 22 dB, <8 GHz 17 dB, <18 GHz 14 dB, <26.5 GHz	WSMA(m)	±0.5 dB, <18 GHz ±1.25 dB, <26.5 GHz
560-7K50	0.01 to 40 GHz	50Ω	12 dB, <0.04 GHz 22 dB, <8 GHz 17 dB, <18 GHz 15 dB, <26.5 GHz 14 dB, <32 GHz 13 dB, <40 GHz	K(m)	±0.5 dB, <18 GHz ±1.25 dB, <26.5 GHz ±2.2 dB, <32 GHz ±2.5 dB, <40 GHz
560-7VA50	0.01 to 50 GHz	50Ω	12 dB, <0.04 GHz 19 dB, <20 GHz 15 dB, <40 GHz 10 dB, <50 GHz	V(m)	±0.8 dB, <20 GHz ±2.5 dB, <40 GHz ±3.0 dB, <50 GHz

## Ordering Information

### Models

MS2024A	VNA Master, 2 MHz to 4 GHz
MS2026A	VNA Master, 2 MHz to 6 GHz

### Options

MS2020/5	Power Monitor (requires external detector)
MS2020/10	Built-in Variable Bias-Tee
MS2020/31	GPS Receiver (including GPS antenna)

### Standard Accessories Include:

10580-00122	MS2024A/MS2026A User's Guide
61382	Soft Carrying Case
64343	Tilt Bail
2300-498	Master Software Tools CD ROM
633-44	Rechargeable battery, Li-Ion
40-168	AC – DC adapter
806-141	Automotive cigarette lighter/12 Volt DC adapter
2000-1360	USB A-mini B cable, 6 ft (1.83 m)
2000-1371	Ethernet cable, 7 ft (2.13 m)
2000-1358	Compact Flash Card (64 MB)
	One Year Warranty

### Optional Accessories:

OSLN50-1	Precision N(m) Open/Short/Load, 42 dB, 6 GHz
OSLNF50-1	Precision N(f) Open/Short/Load, 42 dB, 6 GHz
22N50	Precision N(m) Short/Open, 18 GHz
22NF50	Precision N(f) Short/Open, 18 GHz
SM/PL-1	Precision N(m) Load, 42 dB, 6.0 GHz
SM/PLNF-1	Precision N(f) Load, 42 dB, 6.0 GHz
2000-767	Precision Open/Short/Load, 7/16(m), 4.0 GHz
2000-768	Precision Open/Short/Load, 7/16(f), 4.0 GHz
1N50C	Limitter, N(m) to N(f), 50Ω, 0.01 to 50 GHz
42N50-20	Attenuator, 20 dB, 5W, DC to 18 GHz, N(m)-N(f)
42N50A-30	Attenuator, 30 dB, 50W, DC to 18 GHz, N(m)-N(f)
2000-1410	Magnet Mount GPS Antenna with 15 ft (4.6 m) cable

### Test Port Cables Armored

15NN50-1.5C	1.5 meters, N(m)-N(m), 6 GHz, 50Ω
15NN50-3.0C	3.0 meters, N(m)-N(m), 6 GHz, 50Ω
15NN50-5.0C	5.0 meters, N(m)-N(m), 6 GHz, 50Ω
15NNF50-1.5C	1.5 meters, N(m)-N(f), 6 GHz, 50Ω
15NNF50-3.0C	3.0 meters, N(m)-N(f), 6 GHz, 50Ω
15NNF50-5.0C	5.0 meters, N(m)-N(f), 6 GHz, 50Ω
15ND50-1.5C	5.0 meters, N(m)-7/16 DIN(m), 6 GHz, 50Ω
15NDF50-1.5C	5.0 meters, N(m)-7/16 DIN(f), 6 GHz, 50Ω

### Precision Adapters

34NN50A	N(m)-N(m), DC to 18 GHz, 50Ω
34NPNF50	N(f)-N(f), DC to 18 GHz, 50Ω

### Adapters

1091-26	N(m)-SMA(m), DC to 18 GHz, 50Ω
1091-27	N(m)-SMA(f), DC to 18 GHz, 50Ω
1091-80	N(f)-SMA(m), DC to 18 GHz, 50Ω
1091-81	N(f)-SMA(f), DC to 18 GHz, 50Ω
1091-172	N(m)-BNC(f), DC to 1.3 GHz, 50Ω
510-90	7/16 DIN(f)-N(m), DC to 7.5 GHz, 50Ω
510-91	7/16 DIN(f)-N(f), DC to 7.5 GHz, 50Ω
510-92	7/16 DIN(m)-N(m), DC to 7.5 GHz, 50Ω
510-93	7/16 DIN(m)-N(f), DC to 7.5 GHz, 50Ω
510-96	7/16 DIN(m)-7/16 DIN(m), DC to 7.5 GHz, 50Ω
510-97	7/16 DIN(f)-7/16 DIN(f), DC to 7.5 GHz, 50Ω
510-102	N(m)-N(m) 90° right angle, DC to 11 GHz, 50Ω

### SALES CENTERS:

United States (800) ANRITSU	Europe 44 (0) 1582-433433	Microwave Measurement Division
Canada (800) ANRITSU	Japan 81 (46) 223-1111	490 Jarvis Drive, Morgan Hill, CA 95037-2809
South America 55 (21) 2527-6922	Asia-Pacific (852) 2301-4980	<a href="http://www.us.anritsu.com">http://www.us.anritsu.com</a>



### Band Pass Filters

1030-109	836.5 MHz Ctr Freq, 25.8 MHz BW, N(m)-SMA(f), 50Ω
1030-110	897.5 MHz Ctr Freq, 35 MHz BW, N(m)-SMA(f), 50Ω
1030-111	1.88 GHz Ctr Freq, 63.1 MHz BW, N(m)-SMA(f), 50Ω
1030-112	2.442 GHz Ctr Freq, 85.1 MHz BW, N(m)-SMA(f), 50Ω

### Detector Extender Cables

800-109	7.6 m (25 ft)
800-110	15.2 m (50 ft)
800-111	30.5 m (100 ft)
800-112	61.0 m (200 ft)

760-235	Hard Transit Case
10580-00122	MS2024A/MS2026A User's Guide
61382	Soft Carrying Case
64343	Tilt Bail
2300-498	Master Software Tools CD ROM
633-44	Rechargeable battery, Li-Ion
40-168	AC – DC adapter
806-62	Automotive cigarette lighter/12 Volt DC adapter
2000-1358	Compact Flash Card (64 MB)
2000-1360	USB A-mini B cable, 6 ft (1.83 m)
2000-1371	Ethernet cable, 7 ft (2.13 m)
2000-1374	Dual Battery Charger

### Literature:

10580-00122	MS2024A/MS2026A User's Guide
10580-00123	MS2024A/MS2026A Programmng Manual
11410-00369	MS2024A/MS2026A Brochure
11410-00274	Tower Mounted Amplifiers Application Note
11410-00214	Reflection Measurement Application Note



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