

# Test Equipment Solutions Datasheet

Test Equipment Solutions Ltd specialise in the second user sale, rental and distribution of quality test & measurement (T&M) equipment. We stock all major equipment types such as spectrum analyzers, signal generators, oscilloscopes, power meters, logic analysers etc from all the major suppliers such as Agilent, Tektronix, Anritsu and Rohde & Schwarz.

We are focused at the professional end of the marketplace, primarily working with customers for whom high performance, quality and service are key, whilst realising the cost savings that second user equipment offers. As such, we fully test & refurbish equipment in our in-house, traceable Lab. Items are supplied with manuals, accessories and typically a full no-quibble 2 year warranty. Our staff have extensive backgrounds in T&M, totalling over 150 years of combined experience, which enables us to deliver industry-leading service and support. We endeavour to be customer focused in every way right down to the detail, such as offering free delivery on sales, covering the cost of warranty returns BOTH ways (plus supplying a loan unit, if available) and supplying a free business tool with every order.

As well as the headline benefit of cost saving, second user offers shorter lead times, higher reliability and multivendor solutions. Rental, of course, is ideal for shorter term needs and offers fast delivery, flexibility, try-before-you-buy, zero capital expenditure, lower risk and off balance sheet accounting. Both second user and rental improve the key business measure of Return On Capital Employed.

We are based near Heathrow Airport in the UK from where we supply test equipment worldwide. Our facility incorporates Sales, Support, Admin, Logistics and our own in-house Lab.

All products supplied by Test Equipment Solutions include:

- No-quibble parts & labour warranty (we provide transport for UK mainland addresses).
- Free loan equipment during warranty repair, if available.
- Full electrical, mechanical and safety refurbishment in our in-house Lab.
- Certificate of Conformance (calibration available on request).
- Manuals and accessories required for normal operation.
- Free insured delivery to your UK mainland address (sales).
- Support from our team of seasoned Test & Measurement engineers.
- ISO9001 quality assurance.

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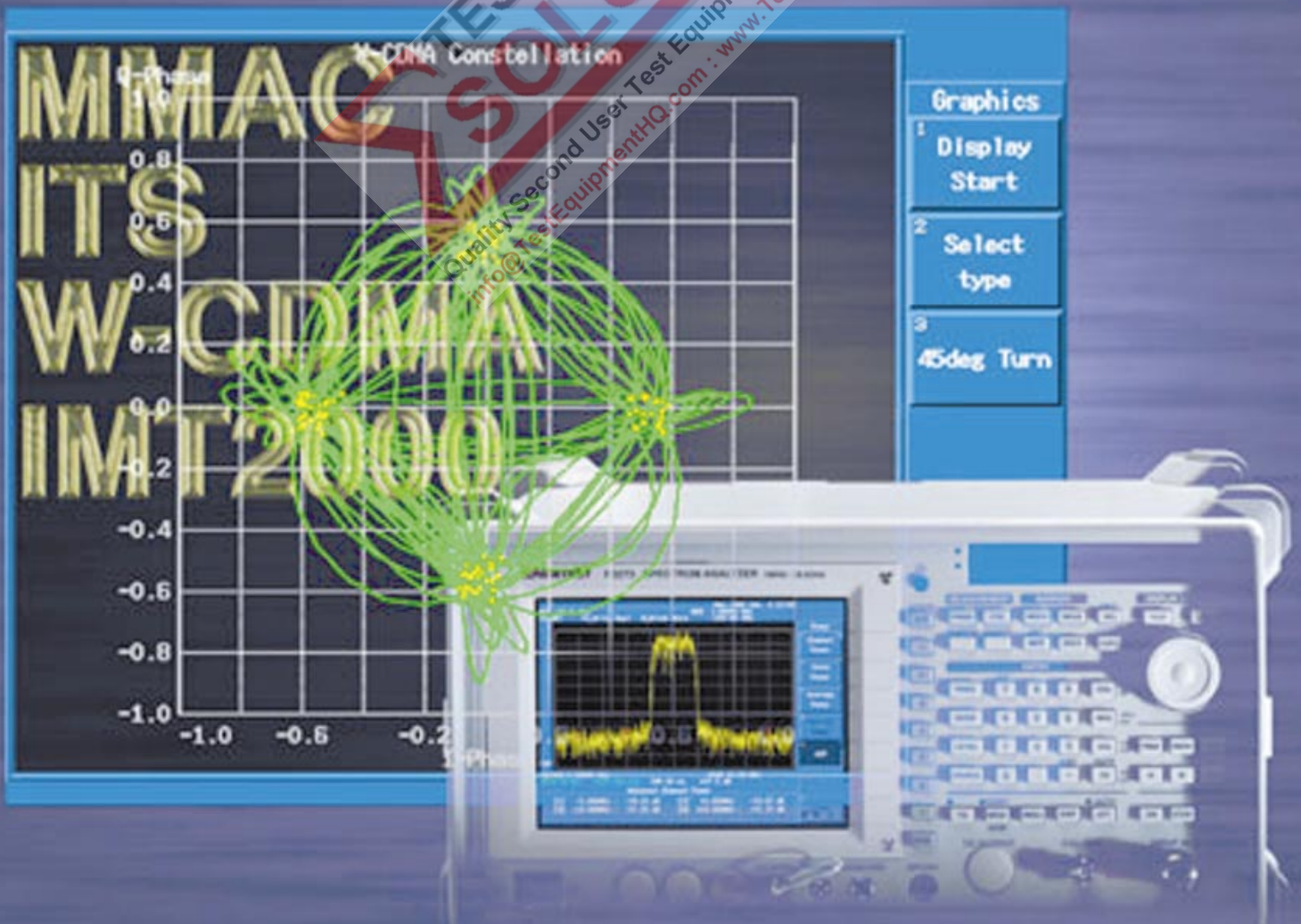
**ADVANTEST**

R3267/3273  
Spectrum Analyzers

For 3rd-Generation Mobile Communications  
Present Digital Communication standards  
(W-CDMA, PDC, PHS, IS-136, GSM, DECT, cdmaOne...)



R3267/3273





New communication technologies such as 3rd Generation Mobile (IMT 2000), microwave digital broadcast, high-speed multimedia mobile access (MMAC), and satellite-based services require the latest in spectrum and modulation measurement capabilities. Furthermore, these new services must be introduced in less time and for more users than ever before.

The R3267/3273 is a high-performance spectrum analyzer designed to meet these needs.

for evaluating/testing wide bands, high frequencies, and high-quality digital modulation signals required in these next-generation communication systems.

The 3267/3273 features a frequency span accuracy within  $\pm 1\%$  and a dynamic range of  $-154$  dBc/Hz (typ) in the 2 GHz band to allow accurate, repeatable measurements for high-quality digital signals. Further, its 10 Hz to 10 MHz resolution band with filter and ability to perform a 70 dB (typ, at 5 MHz offset) ACP measurement on W-CDMA makes it ideal for testing of wide band signals. Finally, with a frequency range from 100 Hz to 8 or 26.5 GHz, the R3267/3273 allow comprehensive measurements of even high frequency systems.

In addition, the optional digital modulation analysis option offers one-button testing of modulation parameters for communication systems including PHS, PDC, IS-136, DECT, GSM, and IS-95 as well as W-CDMA and CDMA-2000.

The R3267/3273 provides excellent value with its combination of spectrum and optional modulation analyzer, so that it can be used with applications ranging from research and development of communication devices, modules, to production line and deployment testing of communication infrastructure equipment. The R3267 and R3273: a new family of analyzers to test today's, and tomorrow's communication systems.

### High Frequency and Wide Bandwidth Measurements

- Frequency range: R3267 100 Hz to 8 GHz  
R3273 100 Hz to 26.5 GHz
- Resolution bandwidth: 10 Hz to 10 MHz
- Span accuracy:  $\pm 1\%$  or better (for all spans)

### High Dynamic Range Measurements

- Dynamic range:  $-154$  dBc/Hz (2 GHz band, typ.)  
70 dB or better (5 MHz offset, typ.)  
for W-CDMA ACP measurement
- Outstanding Signal purity:  $-113$  dBc/Hz (10 kHz offset)
- Input attenuator: 75 dB in 5 dB steps (R3267)
- 1 dB gain compression: 0 dBm
- 3rd order intermodulation distortion:  $-80$  dBc or less

### High Speed Measurements

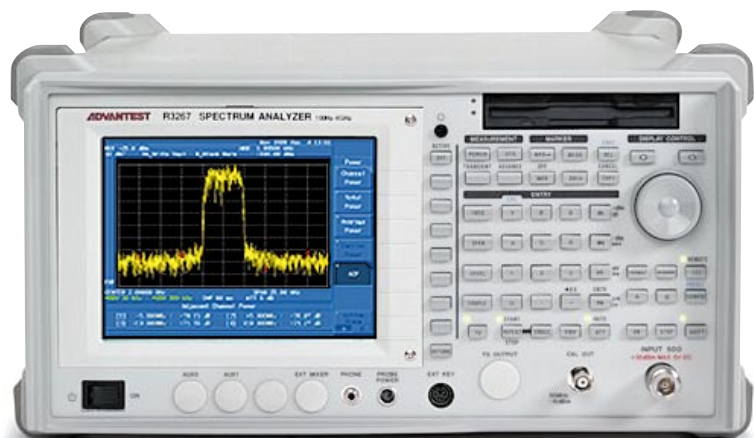
- Trace update rate: up to 20 times/sec.
- $1\mu$ s fast zero-span sweep

### Simplified, Automated Measurements for Mobile Communications

- ACP (adjacent channel leakage power) measurement
- OBW (occupied bandwidth) measurement
- Channel and total power measurement
- Harmonics measurement
- Spurious emission measurement
- 2-trace simultaneous measurement
- Delayed sweep/Gated sweep functions
- Peak list function
- Noise/Hz measurement
- XdB down measurement
- 3rd-order measurement
- %AM measurement
- 1 Hz resolution frequency counter

### Simple Connectivity

- 6.5-inch TFT color LCD
- 3.5-inch MS-DOS compatible floppy disk drive
- Standard I/O interfaces for integration:  
 GPIB, RS232, Parallel, and VGA





## Enhanced Options

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**OPT.01** Digital Modulation Analysis Option

**OPT.61** cdmaOne Analysis Software

**OPT.62** W-CDMA Analysis Software

**OPT.63** GSM/DECT Analysis Software

**OPT.64** PDC/PHS/IS-136 Analysis Software

**OPT.73** FM Deviation Analysis Software

*Note: Each of the above software options requires modulation analysis option OPT.01.*

**OPT.02** Memory Card Drive (instead of disk drive)

**OPT.05** Audio Demodulation Output Option (AM, FM)

**OPT.10** Level Tuning Option (for PDC-BS)

**OPT.16** External Mixer Option (26.5 to 40 GHz, for R3273 only)

**OPT.17** External Mixer Option (40 to 60 GHz, for R3273 only)

**OPT.21** High-stability Frequency Reference Option ( $\pm 5 \times 10^{-9}$ /day)

**OPT.74** Tracking Generator Option (with attenuator)

**OPT.79** Tracking Generator Option (without attenuator)

## R3267 Specifications

### Frequency

Frequency range: 100 Hz to 8 GHz

| Frequency Bandwidth | Frequency Band | Harmonics Order N |
|---------------------|----------------|-------------------|
| 100 Hz to 3.5 GHz   | 0              | 1                 |
| 1.6 to 3.5 GHz      | 1              | 1                 |
| 3.5 to 7 GHz        | 2              | 1                 |
| 6.9 to 8 GHz        | 3              | 1                 |

YIG-tuned Preselector built in for 1.6 to 8 GHz

### Frequency read accuracy

$\pm$  (Frequency reading x Frequency reference accuracy + Span x Span accuracy + 0.15 x Resolution bandwidth + 10 Hz)

### Marker frequency counter (Span < 1 GHz)

|                     |   |
|---------------------|---|
| Resolution          | 1Hz to 1kHz   |
| Accuracy (S/N>25dB) | $\pm$ (Marker frequency x Frequency reference accuracy + 5 Hz x N + 1LSD) |
| Delta counter       | $\pm$ (Delta frequency x Frequency reference accuracy + 10 Hz x N + 2LSD) |

### Frequency reference accuracy

|           |                              |                                       |
|-----------|------------------------------|---------------------------------------|
| Stability | $\pm 3 \times 10^{-8}$ /day  | $\pm 5 \times 10^{-9}$ /day (OPT.21)  |
|           | $\pm 1 \times 10^{-7}$ /year | $\pm 8 \times 10^{-8}$ /year (OPT.21) |

### Frequency stability

|                         |                             |                    |
|-------------------------|-----------------------------|--------------------|
| Residual FM (zero span) | <3 Hz x Np-p/0.1sec.        | N: Harmonics order |
| Frequency drift         | Same as the reference value |                    |

(After 60 min. warm-up)

### Signal purity (dBc/Hz)

| Frequency Band  | Offset |        |         |       |
|-----------------|--------|--------|---------|-------|
|                 | 1 kHz  | 10 kHz | 100 kHz | 1 MHz |
| 100 Hz to 1 GHz | -100   | -113   | -118    | -135  |
| 1 to 2.6 GHz    | -100   | -110   | -118    | -135  |
| 2.6 to 8 GHz    | -98    | -108   | -112    | -135  |

### Frequency span

Range 200 Hz to 8 GHz, zero span

Accuracy  $\pm 1\%$

### Resolution bandwidth (3 dB)

Range 10 Hz to 10 MHz (1, 3, or 10 sequences), 5 MHz

Accuracy  $\pm 25\%$ : Resolution bandwidth = 3 MHz, 5 MHz  
 $\pm 15\%$ : Resolution bandwidth = 100 Hz to 1 MHz  
 $\pm 25\%$  (25°C  $\pm 10^\circ$ C): Resolution bandwidth = 30 Hz

Selectivity <15:1 (Resolution bandwidth = 100 Hz to 5 MHz)  
 <20:1 (Resolution bandwidth = 30 Hz)

### Video bandwidth

Range 1 Hz to 10 MHz (1, 3, or 10 sequences), 5 MHz

### Frequency sweep

Sweep time Zero span: 1  $\mu$ s to 1000 s  
 Span > 0 Hz: 20 ms to 1000 s

Accuracy  $\pm 3\%$

Trigger Free run, line, video, external, IF

### Gated sweep

Gate position/resolution 100 ns to 1 s/100 ns

Gate value/resolution 1  $\mu$ s to 1 s/100 ns

Trigger IF (Mixer input -40 dBm or more), external trigger, external gate

### Delayed sweep

Delay time/resolution 100 ns to 1 s/100 ns

## Amplitude range

### Measurement range

+30 dBm - Average noise level

### Max. safety input

Average continuous power (input ATT >10 dB) +30 dBm (1 W)  
 DC input 0 V

### Display range: 10 x 10 div.

Log mode 10,5,2,1,0.5 dB/div  
 Linear mode 10% of the reference level/div.

### Reference level range

Log mode -140 to +60 dBm (0.1 dB steps)  
 Linear mode 22.4 nV to 223 V  
 (steps of approx. 1% of the full scale)

### Input attenuator range

0 to 75 dB (5 dB steps)

## Dynamic range

Average noise level (Resolution bandwidth 100 Hz, input attenuator 0 dB, video bandwidth 1 Hz)

| Frequency         | Frequency Band | Average Noise Level  |
|-------------------|----------------|----------------------|
| 1 kHz             | 0              | -90 dBm              |
| 10 kHz            | 0              | -100 dBm             |
| 100 kHz           | 0              | -101 dBm             |
| 1 MHz             | 0              | -125 dBm             |
| 10 MHz to 3.5 GHz | 0              | - (130 - f(GHz)) dBm |
| 1.6 to 3.5 GHz    | 1              | -125 dBm             |
| 3.5 to 7 GHz      | 2              | -125 dBm             |
| 6.9 to 8 GHz      | 3              | -125 dBm             |

### 1 dB gain compression

10 to 100 MHz -3 dBm  
 100 MHz to 8 GHz 0 dBm

### Spurious response

#### Secondary harmonics distortion

|          | Frequency         | Range Frequency Band | Mixer Level |
|----------|-------------------|----------------------|-------------|
| <-70 dBc | 10 MHz to 3.5 GHz | 0                    | -30 dBm     |
| >-90 dBc | > 1.6 GHz         | 1,2,3                | -10 dBm     |

#### 3rd order intermodulation distortion

|          | Frequency        | Range Frequency Band | Mixer Level |
|----------|------------------|----------------------|-------------|
| <-70 dBc | 10 to 100 MHz    | 0                    | -30 dBm     |
| <-80 dBc | 100 MHz to 1 GHz | 0                    | -30 dBm     |
| <-85 dBc | 1 to 3.5 GHz     | 0                    | -30 dBm     |
| <-90 dBc | 1.6 to 8 GHz     | 1,2,3                | -30 dBm     |

### Image/Multiple/Out-of-band response

<-70 dBc (10 MHz to 8 GHz)

### Residual response (no input, input ATT 0 dB, 50 ohm termination)

<-100 dBm 1 MHz to 3.5 GHz  
 <-90 dBm 300 kHz to 8 GHz





## Amplitude accuracy

### Frequency response

(input ATT 10 dB, after Preselector synchronization, for Band 1 to 3)

| Frequency Range    | Frequency Band | In-band Flatness (correlation value) |
|--------------------|----------------|--------------------------------------|
| 100 MHz to 3.5 GHz | 0              | ±1.5 dB                              |
| 50 MHz to 2.6 GHz  | 0              | ±1.0 dB                              |
| 1.6 to 3.5 GHz     | 1              | ±1.5 dB                              |
| 3.5 to 7.0 GHz     | 2              | ±1.5 dB                              |
| 6.9 to 8.0 GHz     | 3              | ±1.5 dB                              |

Additional error by band switching ±0.5 dB

Flatness with 30 MHz calibration signal as reference ±3.0 dB (100 Hz to 8.0 GHz)

### Calibration signal accuracy (30 MHz)

-10 dBm ±0.3 dB

### IF gain error (after auto calibration)

0 to -50 dBm ±0.5 dB  
0 to -80 dBm ±0.7 dB

### Scale display accuracy (after auto calibration)

|             |   |
|-------------|---|
| Log mode    | 0 to -90 dB<br>Max. ±0.85 dB<br>±0.2 / 1 dB |
| Linear mode | ±5% of reference level                      |

### Input attenuator switching error (10 dB as reference, at 15 to 75 dB)

| Frequency Range | Error                           |
|-----------------|---------------------------------|
| 100 Hz to 8 GHz | ±1.1 dB/5 dB steps, max. 2.0 dB |

### Resolution bandwidth switching error

(Resolution bandwidth: 300 kHz reference, after auto calibration)

<±0.3 dB (resolution bandwidth = 100 Hz to 5 MHz)  
<±1.0 dB (resolution bandwidth = 30 Hz)

## Input/Output

### RF input

|   |  |
|---|--|
| Connector                                 | N-type female  |
| Impedance                                 | 50 ohm (nominal)   |
| VSWR (input ATT >10 dB, at set frequency) | <1.5:1 (<3.5 GHz) (nominal)<br><2.1:1 (>3.5 GHz) (nominal) |

### Calibration signal output

|           |   |
|-----------|---|
| Connector | BNC female, front panel                       |
| Frequency | 30 MHz x (1 ± Frequency reference determined) |
| Impedance | 50 ohm (nominal)                              |
| Amplitude | -10 dBm ±0.3 dB                               |

### 10 MHz frequency reference output

|                           |                                       |
|---------------------------|---------------------------------------|
| Connector                 | BNC female, front panel               |
| Output impedance          | 50 ohm (nominal)                      |
| Output frequency accuracy | 10 MHz x Frequency reference accuracy |
| Output amplitude range    | 0 ±5 dBm                              |

### 10 MHz frequency reference input

|                       |                        |
|-----------------------|------------------------|
| Connector             | BNC female, rear panel |
| Input impedance       | 50 ohm (nominal)       |
| Input amplitude range | -5 to +5 dBm           |

### Probe power source

±12.6 V (100 mA) (nominal)

### 21.4 MHz IF output

|           |                        |
|-----------|------------------------|
| Connector | BNC female, rear panel |
| Impedance | 50 ohm (nominal)       |

### 421.4 MHz IF output

|           |                        |
|-----------|------------------------|
| Connector | BNC female, rear panel |
| Impedance | 50 ohm (nominal)       |

## Video output

|           |   |
|-----------|---|
| Connector | VGA (15-pin, female), rear panel, equivalent to 640 x 480 dot VGA |
|-----------|---|

## X-axis output

|           |                              |
|-----------|------------------------------|
| Connector | BNC female, rear panel       |
| Impedance | 1 kohm (nominal), DC-coupled |
| Amplitude | Approx. -5 to +5 V           |

## Y-axis output

|           |  |
|-----------|--|
| Connector | BNC female, rear panel                 |
| Impedance | 220 ohm (nominal)                      |
| Amplitude | Approx. 2 V (at 10 dB/div.) full scale |

## External trigger input

|               |                               |
|---------------|-------------------------------|
| Connector     | BNC female, rear panel        |
| Impedance     | 10 kohm (nominal), DC-coupled |
| Trigger level | TTL level                     |

## External gate input

|            |                               |
|------------|-------------------------------|
| Connector  | BNC female, rear panel        |
| Impedance  | 10 kohm (nominal), DC-coupled |
| Sweep stop | During LOW on TTL level       |
| Sweep      | During HIGH on TTL level      |

## Trigger output

|           |                        |
|-----------|------------------------|
| Connector | BNC female, rear panel |
| Amplitude | TTL level              |

## Sound output (demodulation audio): OPT.05

|              |  |
|--------------|--|
| Connector    | Miniature monophonic jack, front panel |
| Power output | Max. 0.2 W, 32 ohm (nominal)           |

## I/O

|                            |                                    |
|----------------------------|------------------------------------|
| GPIB                       | IEEE-488 bus connector, rear panel |
| RS232                      | D-SUB 9-pin, rear panel            |
| Printer                    | D-SUB 25-pin, rear panel           |
| Peripheral unit I/O        | D-SUB 25-pin, rear panel           |
| 3.5-inch floppy disk drive |                                    |

## Direct print

Output by ESC/P, PCL, or ESC/P raster command

## General Specifications

### Temperature

|                       |                                  |
|-----------------------|----------------------------------|
| Operating temperature | 0 to 50°C                        |
| Storage temperature   | -20 to 60°C                      |
| Humidity              | RH 85% or less (no condensation) |

### Power supply: Auto switching between 100 VAC and 220 VAC systems

|                   | 100 VAC operation | 220 VAC operation |
|-------------------|-------------------|-------------------|
| Voltage           | 100 V - 120 V     | 220 V - 240 V     |
| Power consumption | 300 VA or less    | 300 VA or less    |
| Frequency         | 50/60 Hz          | 50/60 Hz          |

### Mass

18 kg or less (excluding options, front cover, and accessories)

### Dimensions

Approx. 177 mm (H) x 350 mm (W) x 420 mm (D) (excluding handle, feet, and front cover)

### Accessories

| Product Name     | Model Name  |
|------------------|-------------|
| Power cable      | A01412      |
| Input cable      | A01036-0150 |
| N to BNC adapter | JUG-201A/U  |
| Fuse             | T6.3A/250V  |
| Front cover      |             |

## R3273 Specifications

### Frequency

Frequency range: 100 Hz to 26.5 GHz  
26.5 to 60 GHz (external mixer used,  
synchronization available up to 325 GHz)

| Frequency Bandwidth | Frequency Band | Harmonics Order N |
|---------------------|----------------|-------------------|
| 100 Hz to 3.5 GHz   | 0              | 1                 |
| 3.5 to 7.5 GHz      | 1              | 1                 |
| 7.4 to 15.4 GHz     | 2              | 2                 |
| 15.2 to 26.5 GHz    | 3              | 4                 |

YIG-tuned Preselector built in for 3.5 to 26.5 GHz

### Frequency read accuracy

$\pm$  (Frequency reading x Frequency reference accuracy + Span x Span accuracy + 0.15 x Resolution bandwidth + 10 Hz)

### Marker frequency counter (Span <1 GHz)

|                       |   |  |  |
|-----------------------|---|--|--|
| Resolution            | 1 Hz to 1 kHz   |  |  |
| Accuracy (S/N >25 dB) | $\pm$ (Marker frequency x Frequency reference accuracy + 5 Hz x N + 1LSD) |  |  |
| Delta counter         | $\pm$ (Delta frequency x Frequency reference accuracy + 10 Hz x N + 2LSD) |  |  |

### Frequency reference accuracy

|           |                              |                                       |
|-----------|------------------------------|---------------------------------------|
| Stability | $\pm 3 \times 10^{-9}$ /day  | $\pm 5 \times 10^{-9}$ /day (OPT.21)  |
|           | $\pm 1 \times 10^{-7}$ /year | $\pm 8 \times 10^{-8}$ /year (OPT.21) |

### Frequency stability

Residual FM (zero span) <3 Hz x Np-p/0.1 sec. N: Harmonics order  
Frequency drift Same as the reference source

(After 60 min. warm-up)

### Signal purity (dBc/Hz)

| Frequency Band   | Offset |        |         |       |
|------------------|--------|--------|---------|-------|
|                  | 1 kHz  | 10 kHz | 100 kHz | 1 MHz |
| 100 Hz to 1 GHz  | -100   | -113   | -118    | -135  |
| 1 to 2.6 GHz     | -100   | -110   | -118    | -135  |
| 2.6 to 7.5 GHz   | -98    | -108   | -112    | -135  |
| 7.4 to 15.4 GHz  | -89    | -102   | -106    | -129  |
| 15.2 to 26.5 GHz | -83    | -96    | -100    | -123  |

### Frequency span

|          |                               |
|----------|-------------------------------|
| Range    | 200 Hz to 26.5 GHz, zero span |
| Accuracy | $\pm 1\%$                     |

### Resolution bandwidth (3 dB)

|             |   |
|-------------|---|
| Range       | 10 Hz to 10 MHz (1, 3, or 10 sequences), 5 MHz  |
| Accuracy    | $\pm 25\%$ : Resolution bandwidth = 3 MHz, 5 MHz<br>$\pm 15\%$ : Resolution bandwidth = 100 Hz to 1 MHz<br>$\pm 25\%$ (25 °C $\pm$ 10 °C): Resolution bandwidth = 30 Hz |
| Selectivity | <15:1 (Resolution bandwidth = 100 Hz to 5 MHz)<br><20:1 (Resolution bandwidth = 30 Hz)  |

### Video bandwidth

|       |   |
|-------|---|
| Range | 1 Hz to 10 MHz (1, 3, or 10 sequences), 5 MHz |
|-------|---|

### Frequency sweep

|            |   |
|------------|---|
| Sweep time | Zero span: 1 $\mu$ s to 1000 s<br>Span >0 Hz: 20 ms to 1000 s |
| Accuracy   | $\pm 3\%$   |
| Trigger    | Free run, line, video, external, IF                           |

### Gated sweep

|                          |  |
|--------------------------|--|
| Gate position/resolution | 100 ns to 1 s/100 ns   |
| Gate width/resolution    | 1 $\mu$ s to 1 s/100 ns  |
| Trigger                  | IF (Mixer input -40 dBm or more),<br>external trigger, external gate |

### Delayed sweep

|                       |                      |
|-----------------------|----------------------|
| Delay time/resolution | 100 ns to 1 s/100 ns |
|-----------------------|----------------------|

## Amplitude range

### Measurement range

+30 dBm - Average noise level

### Max. safety input

|  |               |
|--|---------------|
| Average continuous power (input ATT>10 dB) | +30 dBm (1 W) |
| DC input                                   | 0 V           |

### Display range: 10 x 10 div.

|             |                                 |
|-------------|---------------------------------|
| Log mode    | 10, 5, 2, 1, 0.5 dB/div.        |
| Linear mode | 10% of the reference level/div. |

### Reference level range

|             |  |
|-------------|--|
| Log mode    | -140 to +60 dBm (0.1 dB steps)                           |
| Linear mode | 22.4 nV to 223 V (steps of approx. 1% of the full scale) |

### Input attenuator range

0 to 70 dB (10 dB steps)

## Dynamic range

Average noise level  
(Resolution bandwidth 100 Hz, input attenuator 0 dB, video bandwidth 1 Hz)

| Frequency         | Frequency Band | Average Noise Level |
|-------------------|----------------|---------------------|
| 1 kHz             | 0              | -90 dBm             |
| 10 kHz            | 0              | -100 dBm            |
| 100 kHz           | 0              | -101 dBm            |
| 1 MHz             | 0              | -125 dBm            |
| 10 MHz to 3.5 GHz | 0              | -(130 - f(GHz)) dBm |
| 3.5 to 7.5 GHz    | 0              | -125 dBm            |
| 7.4 to 15.4 GHz   | 2              | -122 dBm            |
| 15.2 to 22.0 GHz  | 3              | -120 dBm            |
| 22.0 to 26.5 GHz  | 3              | -117 dBm            |

### 1 dB gain compression

|                    |         |
|--------------------|---------|
| 10 to 100 MHz      | -3 dBm  |
| 100 MHz to 3.5 GHz | 0 dBm   |
| 3.5 to 7.5 GHz     | -10 dBm |
| 7.5 to 26.5 GHz    | -3 dBm  |

### Spurious response

#### Secondary harmonics distortion

|           | Frequency Range   | Frequency Band | Mixer Level |
|-----------|-------------------|----------------|-------------|
| <-70 dBc  | 10 MHz to 3.5 GHz | 0              | -30 dBm     |
| <-100 dBc | >3.5 GHz          | 1,2,3          | -10 dBm     |

#### 3rd order intermodulation distortion

|          | Frequency Range  | Frequency Band | Mixer Level |
|----------|------------------|----------------|-------------|
| <-70 dBc | 10 to 100 MHz    | 0              | -30 dBm     |
| <-80 dBc | 100 MHz to 1 GHz | 0              | -30 dBm     |
| <-85 dBc | 1 to 3.5 GHz     | 0              | -30 dBm     |
| <-70 dBc | 3.5 to 7.5 GHz   | 1              | -30 dBm     |
| <-75 dBc | 7.5 to 26.5 GHz  | 2,3            | -30 dBm     |

#### Image/Multiple/Out-of-band response

<-70 dBc (10 MHz to 18 GHz)  
<-60 dBc (10 MHz to 23 GHz)  
<-50 dBc (10 MHz to 26.5 GHz)

#### Residual response (no input, input ATT 0 dB, 50 ohm termination)

|           |                     |
|-----------|---------------------|
| <-100 dBm | 1 MHz to 3.5 GHz    |
| <-90 dBm  | 300 kHz to 26.5 GHz |

Please be sure to read the product manual thoroughly before using the products.  
Specifications may change without notification.

## Amplitude accuracy

### Frequency response

(input ATT 10 dB, after Preselector synchronization, for Band 1 to 3)

| Frequency Range   | Frequency Band | In-band Flatness (correlation value) |
|-------------------|----------------|--------------------------------------|
| 100 Hz to 3.5 GHz | 0              | ±1.5 dB                              |
| 50 MHz to 2.6 GHz | 0              | ±1.0 dB                              |
| 3.5 to 7.5 GHz    | 1              | ±1.5 dB                              |
| 7.4 to 15.4 GHz   | 2              | ±3.5 dB                              |
| 15.4 to 26.5 GHz  | 3              | ±4.0 dB                              |

Additional error by band switching ±0.5 dB

Flatness with 30 MHz calibration signal as reference ±5.0 dB (100 Hz to 26.5 GHz)

### Calibration signal accuracy (30 MHz)

-10 dBm ±0.3 dB

### IF gain error (after auto calibration)

|              |         |
|--------------|---------|
| 0 to -50 dBm | ±0.5 dB |
| 0 to -80 dBm | ±0.7 dB |

### Scale display accuracy (after auto calibration)

|             |   |
|-------------|---|
| Log mode    | 0 to -90 dB<br>Max. ±0.85 dB<br>±0.2/1 dB |
| Linear mode | ±5% of reference level                    |

### Input attenuator switching error (10 dB as reference, at 20 to 70 dB)

| Frequency Range    | Error                         |
|--------------------|-------------------------------|
| 100 Hz to 12.4 GHz | ±1.1/10 dB steps, max. 2.0 dB |
| 12.4 to 18 GHz     | ±1.3/10 dB steps, max. 2.5 dB |
| 18 to 26.5 GHz     | ±1.8/10 dB steps, max. 3.5 dB |

### Resolution bandwidth switching error

(Resolution bandwidth: 300 kHz reference, after auto calibration)

<±0.3 dB (resolution bandwidth = 100 Hz to 5 MHz)

<±1.0 dB (resolution bandwidth = 30 Hz)

## Input/Output

### RF input

|  |  |
|--|--|
| Connector                                | N-type female (changeable to SMA)                          |
| Impedance                                | 50 ohm (nominal)   |
| VSWR (input ATT>10 dB, at set frequency) | <1.5:1 (<3.5 GHz) (nominal)<br><2.1:1 (>3.5 GHz) (nominal) |

### Calibration signal output

|           |   |
|-----------|---|
| Connector | BNC female, front panel                       |
| Frequency | 30 MHz x (1 ± Frequency reference determined) |
| Impedance | 50 ohm (nominal)                              |
| Amplitude | -10 dBm ±0.3 dB                               |

### 10 MHz frequency reference output

|                           |  |
|---------------------------|--|
| Connector                 | BNC female, rear panel                 |
| Output impedance          | 50 ohm (nominal)                       |
| Output frequency accuracy | 100 MHz x Frequency reference accuracy |
| Output amplitude range    | 0 dBm ±5 dB                            |

### 10 MHz frequency reference input

|                       |                        |
|-----------------------|------------------------|
| Connector             | BNC female, rear panel |
| Input impedance       | 50 ohm (nominal)       |
| Input amplitude range | -5 to +5 dBm           |

### Probe power source

±12.6 V (100 mA) (nominal)

### 21.4 MHz IF output

|           |                        |
|-----------|------------------------|
| Connector | BNC female, rear panel |
| Impedance | 50 ohm (nominal)       |

### 421.4 MHz IF output

|           |                        |
|-----------|------------------------|
| Connector | BNC female, rear panel |
| Impedance | 50 ohm (nominal)       |

### 1st LO output

|                 |                         |
|-----------------|-------------------------|
| Connector       | SMA female, front panel |
| Impedance       | 50 ohm (nominal)        |
| Frequency range | 3.921 to 7.921 GHz      |
| Amplitude       | >+10 dBm                |

### Video output

|           |   |
|-----------|---|
| Connector | VGA (15-pin, female), rear panel, equivalent to 640 x 480 dot VGA |
|-----------|---|

### X-axis output

|           |                              |
|-----------|------------------------------|
| Connector | BNC female, rear panel       |
| Impedance | 1 kohm (nominal), DC-coupled |
| Amplitude | Approx. -5 to +5 V           |

### Y-axis output

|           |  |
|-----------|--|
| Connector | BNC female, rear panel                 |
| Impedance | 220 ohm (nominal)                      |
| Amplitude | Approx. 2 V (at 10 dB/div.) full scale |

### External trigger input

|               |                               |
|---------------|-------------------------------|
| Connector     | BNC female, rear panel        |
| Impedance     | 10 kohm (nominal), DC-coupled |
| Trigger level | TTL level                     |

### External gate input

|            |                               |
|------------|-------------------------------|
| Connector  | BNC female, rear panel        |
| Impedance  | 10 kohm (nominal), DC-coupled |
| Sweep stop | During LOW on TTL level       |
| Sweep      | During HIGH on TTL level      |

### Trigger output

|           |                        |
|-----------|------------------------|
| Connector | BNC female, rear panel |
| Amplitude | TTL level              |

### Sound output (demodulation audio): OPT.05

|              |  |
|--------------|--|
| Connector    | Miniature monophonic jack, front panel |
| Power output | Max. 0.2 W, 32 ohm (nominal)           |

### I/O

|                            |                                    |
|----------------------------|------------------------------------|
| GPIO                       | IEEE-488 bus connector, rear panel |
| RS232                      | D-SUB 9-pin, rear panel            |
| Printer                    | D-SUB 25-pin, rear panel           |
| Peripheral unit I/O        | D-SUB 25-pin, rear panel           |
| 3.5-inch floppy disk drive |                                    |

### Direct print

Output by ESC/P, PCL, or ESC/P raster command

## General Specifications

### Temperature

|                       |                                  |
|-----------------------|----------------------------------|
| Operating temperature | 0 to 50°C                        |
| Storage temperature   | -20 to 60°C                      |
| Humidity              | RH 85% or less (no condensation) |

### Power supply: Auto switching between 100 VAC and 220 VAC systems

|                   | 100 VAC operation | 220 VAC operation |
|-------------------|-------------------|-------------------|
| Voltage           | 100 V - 120 V     | 220 V - 240 V     |
| Power consumption | 300 VA or less    | 300 VA or less    |
| Frequency         | 50/60 Hz          | 50/60 Hz          |

### Mass

18 kg or less (excluding options, front cover, and accessories)

### Dimensions

Approx. 177 mm (H) x 350 mm (W) x 420 mm (D) (excluding handle, feet, and front cover)

### Accessories

|                  |             |
|------------------|-------------|
| Product Name     | Model Name  |
| Power cable      | A01412      |
| Input cable      | A01036-0150 |
| N to BNC adapter | JUG-201A/U  |
| Fuse             | T6.3A/250V  |
| Front cover      |             |