

**ADVANTEST**<sup>®</sup>

Spectrum Analyzers

# U3771/3772

Handling frequencies of up to 43 GHz!! Our new microwave spectrum analyzer, ideal for field use, is now available.



# A New Standard for Microwave and Millimeter-wave Spectrum Analyzers

for **Field**

**31.8**

The world's smallest and lightest\* microwave spectrum analyzer handles frequencies of up to 43 GHz.

As the pace of radio communications development worldwide continues to increase daily, operating frequency bands have widened from microwave bands to include millimeter-wave bands. The U3771/3772 sets a new standard for microwave spectrum analyzers. An analyzer that combines portability, a quality required for inspecting and servicing different types of communication systems, with maximum functionality in the field. Making full use of the newest digital circuit and software technology in the world's smallest and lightest (less than 6 kg) form factor, the U3771/3772 achieves dramatic advances in level measurement accuracy and stability. Employing leading edge software technologies to provide image suppression capabilities and an array of data analysis functions as standard features This field-use spectrum analyzer employs 3-way power operation (battery, DC and AC), warms up quickly (within 5 minutes) and has a USB interface enabling the use of large-capacity memory for data storage.

\*: As of March 2006

**43GHz**



**U3751/3771/3772 Web Demonstration**

More detailed information on the U3771/3772 and an interactive demonstration is available on the ADVANTEST website at

[http://green.advantest.co.jp/techinfo\\_e/www\\_e/demonstration\\_e/U3751/demo\\_index.html](http://green.advantest.co.jp/techinfo_e/www_e/demonstration_e/U3751/demo_index.html)

## Compact Size

- Size and weight half that of existing spectrum analyzers with similar features
- Optimized for use in field maintenance tasks and surveys



5  
min.

U3771/3772

Stable  
Measurement

Our conventional  
model

## 5 min. Warm-up

- All but eliminates preheat time considerations
- Reaches operational specifications (level measurement accuracy) within just 5 minutes

# 8GHz



## USB Interface

- Support for USB for printer and memory  
Storage Image formats: PNG, BMP  
Configuration file: BIN, XML



## Operating with Battery

- Includes a detachable battery pack
- Can operate continuously for up to 2 hours after a full-charge time of 5.5 hours

# Basic Performance with Powerful Features

## High-input Sensitivity

As measured frequencies become higher, noise level degradation places limits on measurement dynamic range. The latest RF technologies are incorporated in the U3771/3772 to reduce the noise floor level.

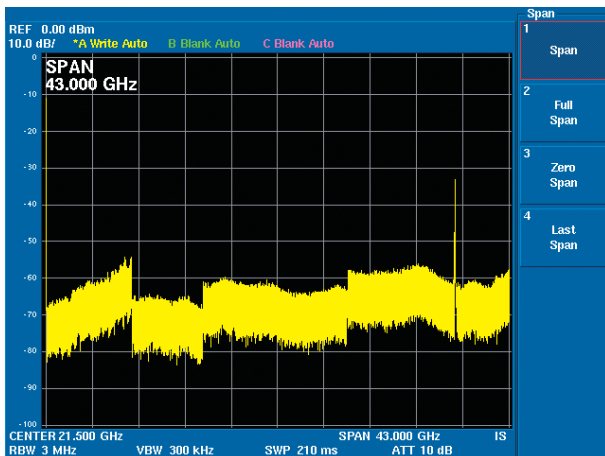
-117 dBm@34 GHz (typ.)



Displayed average noise level (typ.)

## Broadband Sweep

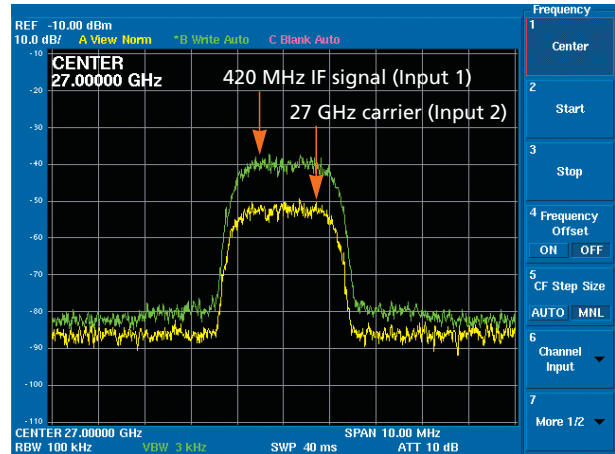
The U3771/3772 continuously sweeps across a frequency band of 10 MHz to 31.8 or 43 GHz allowing high-speed sampling of data on a single screen, simplifying broadband signal monitoring and harmonics measurement tasks.



Full-span measurement

## Two-channel Input

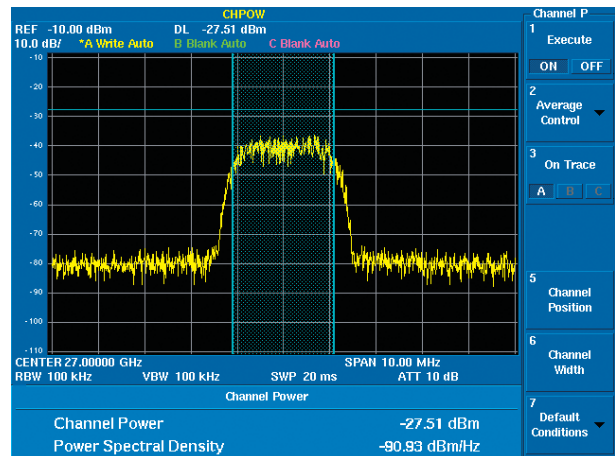
The U3771/3772 supports two input ports that can be easily switched: RF Input 1 (9 kHz to 8 GHz) and RF Input 2 (10 MHz to 31.8 or 43 GHz). With signals applied to both Input 1 and Input 2, two signals such as an IF signal and a carrier can quickly be measured.



Two-channel input measurement sample

## RMS Detector

The U3771/3772 include an RMS detector in addition to the traditional sample detector to increase its accuracy in broadband modulated signal power measurements. The RMS detector, the digital IF, and the software calibration function work together to provide higher-stability power measurement.



Channel power measurement

# Functions That Are Simple and Easy to Use ..... 1

## Image Suppression Function Useful for removing Images

Software pre-selector technology has been incorporated into the U3771/3772 to make a compact, lightweight, and inexpensive spectrum analyzer. The Image Suppression (IS) function allows you to identify and delete images easily. The U3771/3772 comes with the IS function enabled by default for operation as easy as that of a conventional model.

*Note: The IS function is intended to determine whether the signal under test is a true or image signal. Set the IS function to OFF for detailed signal or modulated signal analysis, or for high-speed measurement.*

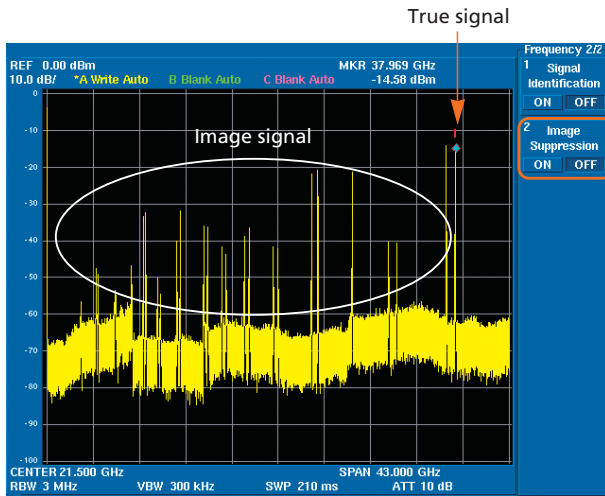


Image Suppression OFF

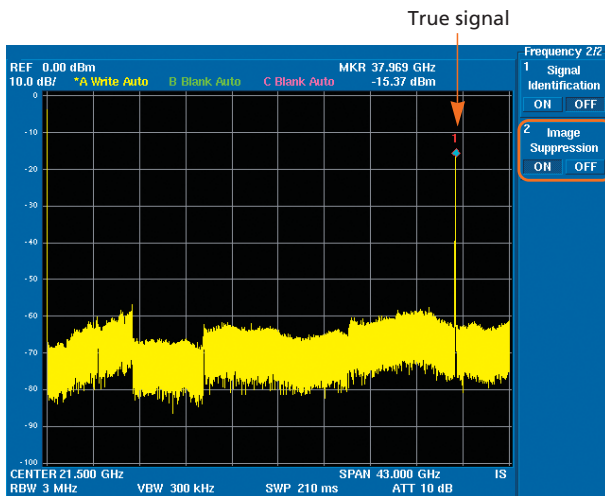
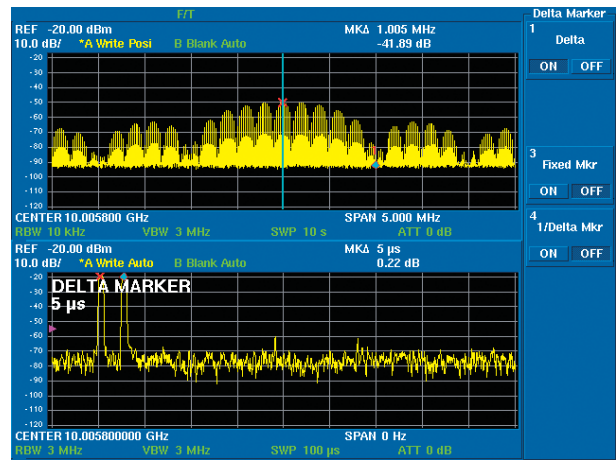


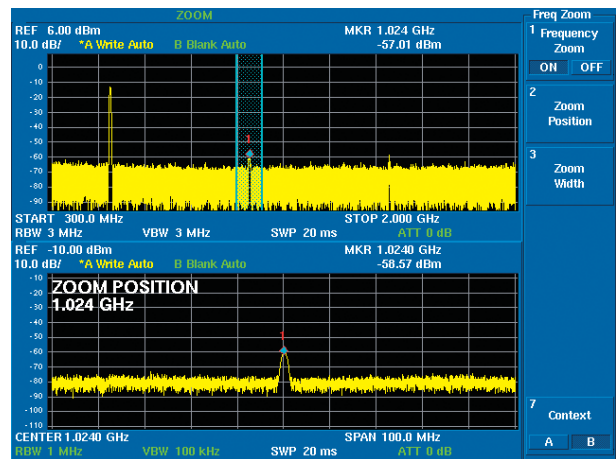
Image Suppression ON

## Zoom Function

An example of a pulsed RF signal measured with the Frequency-Time (F-T) mode analysis feature of the zoom function is shown below. The U3771/3772 displays the pulse envelope (frequency domain) of double pulses (5- $\mu$ s delay) having a pulse width of 1  $\mu$ s and a pulse waveform (time domain) on separate screens. Additional features provided by the U3771/3772 support a wide variety of analysis tasks including Frequency-Zoom mode, in which different frequency spectra are displayed, and T-T display mode, which is useful for displaying expanded views of the time domain.



F-T mode analysis

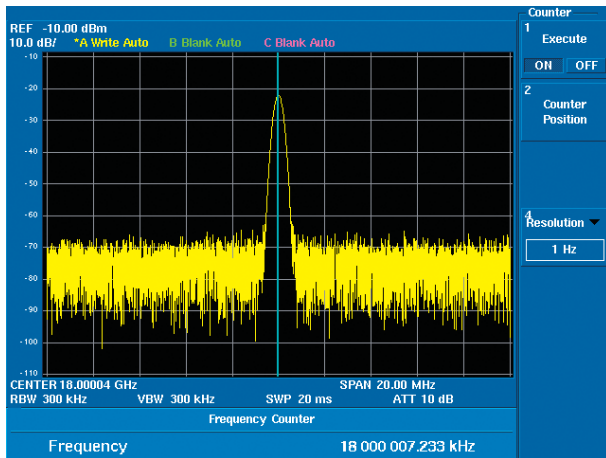


Freq. Zoom mode analysis

# Functions That Are Simple and Easy to Use ..... 2

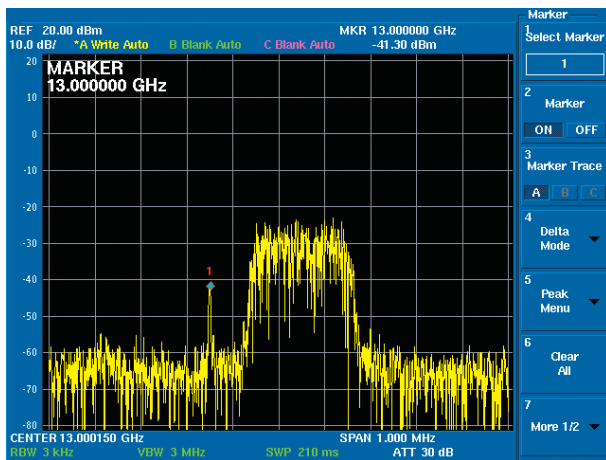
## Millimeter-wave Frequency Measurement

Place the marker on the signal of interest, and the U3771/3772 works as a frequency counter covering a range of 500 kHz to 31.8 or 43 GHz, with a selectable resolution ranging from 1 Hz to 1 kHz.



Frequency counter measurement

Using the marker counter function, which makes use of span accuracy, makes possible high-speed signal frequency confirmation when checking millimeter-wave modulation frequencies. (Resolution is determined by span setting.)



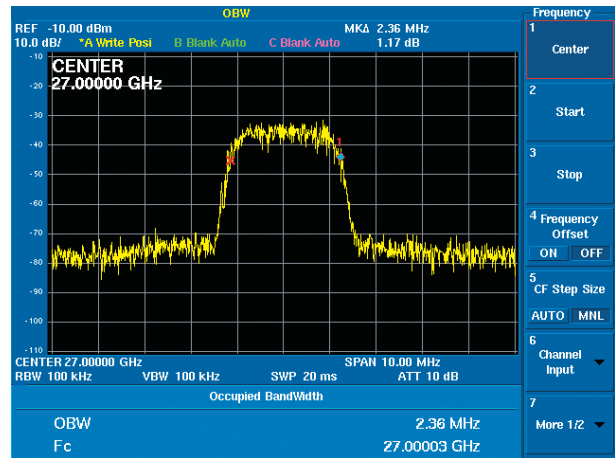
Marker counter measurement

## Other Measurement Functions

- Channel power
- Total power
- Average power
- Spurious measurement
- Frequency counter
- Adjacent channel leakage power measurement
- Spectrum emission mask
- Noise-Hz conversion
- XdB down
- Intermodulation
- Dual-screen display

## OBW Measurement Function

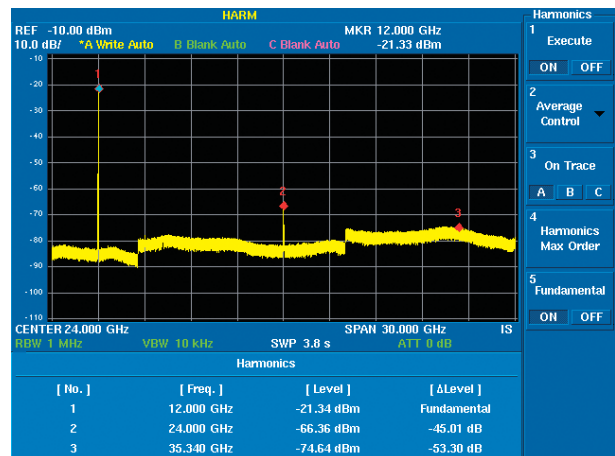
The U3771/3772 computes the bandwidth of a specified power ratio from measured spectrum data and displays the occupied bandwidth (OBW) and the center frequency (Fc). The OBW of 10 to 99.8% of total power can be chosen.



OBW measurement

## Harmonics Measurement Function

The harmonics measurement function is optimal for measuring spurious response for wireless applications. To measure harmonic spurious response, simply entering or place a marker on the fundamental frequency. Up to 10 orders of harmonics can be measured and displayed.



Harmonic spurious response measurement

## Diverse Detector Types

- Normal
- Positive peak
- Negative peak
- Sample
- RMS

## Marker Function

- Multimarker (10 markers)
- Delta marker
- Peak search



## Specifications

### Frequency

Frequency range (RF input 1):	9 kHz to 8 GHz
Frequency band:	9 kHz to 3.1 GHz (band 0) 3 to 8 GHz (band 1)
Preamplifier:	10 MHz to 8 GHz
Frequency range (RF input 2):	10 MHz to 31.8 GHz (U3771) 10 MHz to 43 GHz (U3772)
Frequency band:	10 MHz to 3.1 GHz (band 0 (N=1)) 3.0 to 8.0 GHz (band 1 (N=1)) 7.8 to 14.573 GHz (band 2 (N=2)) 14.4288 to 28.0 GHz (band 3 (N=4)) 27.8 to 31.8 GHz (band 4 (N=6)) (U3771) 27.8 to 43.0 GHz (band 4 (N=6)) (U3772)
Frequency readout accuracy:	$\pm(\text{Marker readout} \times \text{Frequency reference accuracy} + \text{SPAN} \times \text{SPAN accuracy} + \text{Residual FM})$
Frequency reference	
Aging:	$2 \times 10^{-6}/\text{year}$
Temperature stability:	$2.5 \times 10^{-5}$ (0 to 50°C)
Frequency counter	
Resolution:	1 Hz to 1 kHz (RBW: <100 kHz; mixer level: >-50 dBm; CW and single signal)
Accuracy:	$\pm(\text{Counter readout} \times \text{Frequency reference accuracy} + \text{Residual FM} + 1\text{LSB})$
Frequency stability	
Residual FM (zero-span):	<60 Hz x N p-p/100 ms (internal frequency reference)
Frequency span	
Range:	5 kHz to full, zero-span
Accuracy:	< $\pm 1\%$
Spectrum purity:	(-85 + 20 logN) dBc/Hz offset: 10 kHz; span: <200 kHz
Resolution bandwidth	
Range:	100 Hz to 3 MHz (1-3 step)
RBW accuracy:	< $\pm 12\%$
Video bandwidth	
Range:	10 Hz to 3 MHz (1-3 step)

### Sweep

Sweep time	
Sweep time:	20 ms to 1000s (spectrum mode) 50 $\mu$ s to 1000 s (zero-span)
Accuracy:	< $\pm 2\%$ (zero-span)
Sweep mode:	REPEAT, SINGLE
Trigger	
Source:	Free, Video, EXT, IF

### Amplitude range

Measurement range	
RF input 1:	Noise to +30 dBm
RF input 2:	Noise to +10 dBm
Maximum input level	
RF input 1:	+30 dBm (attenuator: $\geq 10$ dB; preamplifier off) +13 dBm (attenuator: 0 dB; preamplifier on) $\pm 15$ VDC max.
RF input 2:	+10 dBm (attenuator: 0 dB) $\pm 25$ VDC max.
Input attenuator range	
RF input 1:	0 to 50 dB (10 dB step)
RF input 2:	0 to 30 dB (10 dB step)
Display range:	100, 50, 20, 10, 5 dB, Linear
Unit:	dBm, dBmV, dB $\mu$ V, dB $\mu$ Vemf, dBpW, W, V
Reference level range	
RF input 1:	-140 dBm to +40 dBm
RF input 2:	-140 dBm to +20 dBm
Detector:	Normal, Posi-peak, Nega-peak, Sample, Average (RMS, Video)

## Amplitude accuracy

Calibration signal	
Frequency:	20 MHz
Level:	-20 dBm
Accuracy:	$\pm 0.3$ dB
Scale fidelity	
Log:	$\pm 0.5$ dB/10 dB $\pm 0.5$ dB/80 dB $\pm 0.2$ dB/1 dB
Level measurement accuracy:	After calibration, image suppression: off; preamplifier off; temperature range: 20 to 30 °C; input attenuator: 10 dB; Ref: 0 dBm; and input signal level: -10 to -50 dBm
RF input 1	
Band 0:	$\pm 0.8$ dB (frequency: 10 MHz to 3.1 GHz)
Band 1:	$\pm 1$ dB (frequency: 3.1 to 8 GHz) $\pm 1.5$ dB (frequency: 9 kHz to 10 MHz)
RF input 2	
Band 0:	$\pm 0.8$ dB (frequency: 10 MHz to 3.1 GHz)
Band 1:	$\pm 1$ dB (frequency: 3.1 to 8 GHz)
Band 2:	$\pm 3.0$ dB (frequency: 7.8 to 14.573 GHz)
Band 3:	$\pm 3.5$ dB (frequency: 14.4288 to 28.0 GHz)
Band 4:	$\pm 4.5$ dB (frequency: 27.8 to 31.8 GHz) (U3771) $\pm 4.5$ dB (frequency: 27.8 to 43 GHz) (U3772)

## Dynamic range

Displayed average noise level:	Frequency: >10 MHz; Ref level: <-45 dBm; and RBW: 100 Hz
RF input 1	
Band 0, preamplifier off:	-123 dBm + 2f (GHz) dB
Band 1, preamplifier off:	-122 dBm + 1.2f (GHz) dB
Band 0, preamplifier on:	-138 dBm + 3f (GHz) dB
Band 1, preamplifier on:	-139 dBm + 1.4f (GHz) dB
RF input 2	
Band 0:	-121 dBm + 2f (GHz) dB
Band 1:	-120 dBm + 1.5f (GHz) dB
Band 2:	-111 dBm (typical: -118 dBm)
Band 3:	-109 dBm (typical: -117 dBm)
Band 4:	-105 dBm (typical: -112 dBm)
Gain compression (1 dB):	Frequency: >10 MHz
Preamplifier off:	>-8 dBm
Preamplifier on:	>-25 dBm
Second harmonic distortion:	Preamplifier off
RF input 1:	<-70 dBc (mixer level: -40 dBm; frequency: >200 MHz) <-75 dBc (typical) (mixer level: -30 dBm; frequency: >300 MHz)
RF input 2:	-40 dBc (mixer level: -30 dBm; frequency: >300 MHz)
Third order intermodulation:	-50 dBc (frequency: >10 MHz; preamplifier: off; mixer level: -20 dBm; and 2-signal separation: 1 MHz)
Image/Multiple/Out-of-band response:	<60 dBc (image suppression: on; SPAN: <5 GHz)
Residual response:	-80 dBm (frequency: >10 MHz; preamplifier off)

## Inputs/Outputs

<b>RF input 1</b>	
Connector:	N type female
Impedance:	50Ω (nominal)
VSWR:	<1.7 : 1 (Band 0, input attenuator: >10 dB) <2.0 : 1 (Band 1, input attenuator: >10 dB)
<b>RF input 2</b>	
Connector:	K type female
Impedance:	50Ω (nominal)
VSWR:	<1.7 : 1 (typical) (Band 0, input attenuator: >10 dB) <2.0 : 1 (typical) (Band 1, Band 2, Band 3, input attenuator: >10 dB) <2.5 : 1 (typical) (Band 4, input attenuator: >10 dB)
<b>Calibration output</b>	
Connector:	BNC female
Impedance:	50Ω (nominal)
Frequency:	20 MHz
Level:	-20 dBm
<b>Frequency reference input</b>	
Connector:	BNC female
Impedance:	50Ω (nominal)
Frequency:	1, 1.544, 2.048, 5, 10, 12.8, 13, 13.824, 14.4, 15.36, 15.4, 16.8, 19.2, 19.44, 19.6608, 19.68, 19.8, 20, 26
Level:	0 to +16 dBm
<b>External trigger input</b>	
Connector:	BNC female
Impedance:	10 kΩ (nominal), DC coupled
Trigger level:	0 to +5 V
<b>21.4 MHz IF output</b>	
Connector:	BNC female
Impedance:	50Ω (nominal)
Level:	Approx. mixer input level: +10 dB at 20 MHz
<b>Battery mount</b>	
Connector:	Antonbauer QR mount
<b>External DC input</b>	
Connector:	XLR-4
Voltage range:	+11 to +17 V
GPIB:	IEEE-488 bus connector
USB:	USB1.1
<b>Video output</b>	
Connector:	D-sub 15 pin female
<b>LAN</b>	
Connector:	RJ45 type, 10/100 base -T

## General specifications

<b>Operating environment range</b>	
Temperature:	0 to +50°C
Humidity:	Relative humidity: 85% or less (without condensation)
<b>Storage environment range:</b>	-20 to +60°C, relative humidity: 85% or less
<b>AC input power source:</b>	Automatic switching to 100 VAC or 200 VAC 100 VAC: 100 to 120 VAC, 50/60Hz 200 VAC: 200 to 240 VAC, 50/60Hz
<b>DC power input:</b>	+11 to +17 VDC
<b>Power consumption:</b>	100 VA or less (A.C. operation) 70 W or less (D.C. operation)
<b>Mass:</b>	6 kg or less (without option)
<b>Dimensions:</b>	Approx. 308 (W) x 175 (H) x 209 (D) mm (without protrusion) Approx. 337 (W) x 190 (H) x 307 (D) mm (with feet and handles)

## OPT.20 High stability frequency reference

<b>Reference frequency stability</b>	
Aging:	±2 x 10 <sup>-8</sup> /day ±1 x 10 <sup>-7</sup> /year
<b>Warm-up drift (nominal):</b>	±5 x 10 <sup>-8</sup> (+25°C, 10min. after turning power on)
<b>Temperature drift:</b>	±5 x 10 <sup>-8</sup> (0 to +40°C, with reference to 25°C)

## OPT.74 Tracking Generator

<b>Frequency range:</b>	10 MHz to 3 GHz
<b>Frequency offset</b>	
Range:	0 to 1 GHz
Resolution:	1 kHz
Accuracy:	±200 Hz
<b>Output level range:</b>	0 to -30 dBm (0.5 dB step)
<b>Output level accuracy:</b>	±0.5 dB (20 MHz, -10 dBm, +20 to +30 °C)
<b>Output level flatness:</b>	Reference signal level: -10 dBm; frequency: 20 MHz ±1.0 dB (10 MHz to 1 GHz) ±1.5 dB (10 MHz to 3 GHz)
<b>Output level</b>	
switching uncertainly:	Reference level: -10 dBm ±1.0 dB (10 MHz to 1 GHz) ± 2.0 dB (10 MHz to 2.6 GHz)
<b>Frequency offset off:</b>	±3.0 dB (10 MHz to 3 GHz)
<b>Frequency offset on:</b>	±5.0 dB (10 MHz to 3 GHz)
<b>Spurious output:</b>	Output level: -10 dBm
Harmonic:	≤-20 dBc
Non-harmonic:	≤-25 dBc (frequency offset off)
<b>TG leakage:</b>	≤-80 dBm (input attenuator: 0 dB)
<b>Output impedance:</b>	50Ω (nominal)
<b>VSWR:</b>	≤2.0 : 1 (output level: ≤-10 dBm)
<b>Maximum allowable input:</b>	+10 dBm, ±10 VDC

## Ordering information

<b>Main units</b>	
Spectrum analyzer:	U3771
Spectrum analyzer:	U3772
<b>Accessories</b>	
Power cable:	A01402
N-BNC adapter:	JUG-201A/U
K-K adapter:	HE-A-PJ
Input cable:	A01037-0300
BNC-SMA adapter:	HRM-517
<b>Options</b>	
High-stability frequency reference crystal:	OPT.20
Tracking generator:	OPT.74
<b>Accessories (optional)</b>	
Battery pack:	A870008
50Ω-75Ω impedance converter:	ZT-130NC
Carrying bag:	A129001
Charger:	A870009
DC power cable:	A114020
Transit case:	A129002



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