ADVANTEST

U3661
Spectrum Analyzer

For field maintenance of microwave radio facilities,

and digital mobile communication

U3661

www.valuetronics.com

Lightest Weight 26.5 GHz Microwave Spectrum Analyzer

The radio communication field is undergoing fast growth on a global scale, expanding the frequency band usage across the spectrum from the microwave to the millimeter-wave bands. The U3661, at 8.5 kg, is the lightest weight microwave spectrum analyzer in the world.* It accommodates the diverse needs of these various communication systems. As well as enhanced basic performance as a spectrum analyzer, the U3661 is equipped with many standard functions such as power calculation and high-speed sweep.

The compact, lightweight design of the U3661 utilizes a three-way power source system which includes battery; it is an optimum analyzer for field measurement. This unit also has a built-in RC232 interface for a personal computer, facilitating flexible data management using standard memory cards.

* *April 1998*

Ultra-compact and light weight
(Main unit: 8.5 kg or less With battery: 10.8 kg or less)

Frequency range: 9 kHz to 26.5 GHz

Display dynamic range: 100 dB

Three-way power supply with battery operation

(100/200 VAC, external DC, and battery pack)

1-hour operation is possible with the specialized battery

TFT 6-inch color LCD and memory card

High-stability measurement by means of synthesized operation

50-µs high-speed sweep function

Diverse options including

TV video/audio demodulation, tracking generator, high-stability reference source, narrow RBW, channel input setting, CDMA setting

Variety of measurement functions

20-dB gain preamplifier, 1-Hz resolution counter, occupied frequency bandwidth, adjacent-channel leakage power, and audio monitoring

Option Guide

	Option No.	
High-stability reference source	OPT 20	High-stability reference oscillator with an aging rate of ±2 X 10^{-8}/day
Narrow RBW	OPT 26	Adds 100 Hz and 300 Hz resolution bandwidths
CDMA setting*	OPT 60	Allows channel power, ACP, OBW, and spurious emission (in-band) measurement.
TV demodulation*	OPT 72	Frequency tuning function by channel input, TV video/audio demodulation function
Tracking generator	OPT 74	Filter evaluation function/LOSS measurement function for the frequency range from 100 kHz to 2.2 GHz
Channel input setting*	OPT 78	VHF, UHF, CATV, BS, CS channels of various countries and user channel can be set

* *TV Demodulation (OPT 72) and Channel Input Setting (OPT 78) cannot be installed with CDMA Measurement (OPT 60).*

8.5 kg or less, lightest in its class

The U3661 is light and compact (8.5 kg or less without the battery pack or 10.8 kg or less with the pack). The easy-to-attach strap allows the analyzer to be worn on the shoulder and easily carried.
The U3661 is rugged enough to satisfy the requirements of vibration, shock and drop tests, allowing them to be used safely under harsh field conditions.

Battery Provides 1 Hours of Operation. Three Power Sources to Choose From

The U3661 operates not only on 100/200 V AC power but also on +10 to +16 V DC power or the Battery Pack.
The Battery Pack allows 1 hour continuous operation at a full charge, making it easier to perform logistically wide-ranging measurements such as maintenance and installation work.
Rapid two- hour battery charging time.

Large Color TFT LC Display

The U3661 employ a 6 inch color TFT LCD display and a tilt mechanism that allows a angle of ±15 degrees, remarkably improving the visibility and efficiency of analysis work.

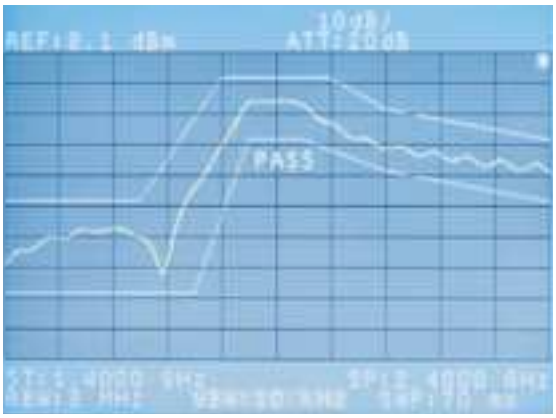
Full Range of Features for Application Support

2 -Slots Memory Card Drive

Having two memory card drives conforming to JEIDA-Ver. 4.1/PCMCIA Rel. 2.0 as standard, measurement condition setup, and data recording can be performed while two memory cards are loaded in the drives.
There are three different record formats for memory card: binary, bit map, and text (CSV). In particular, the text (CSV) format is handy for data analysis and report creation using spreadsheet software on a personal computer.

Wide Array of Analysis Functions

Along with basic functions such as a frequency counter with a 1 Hz resolution and a 20 dB gain preamplifier, the U3661 comes standardly equipped with analysis functions for measuring items such as dB down, third order intermodulation distortion, AM modulation, occupied bandwidth, and adjacent channel leakage power. GO-NO GO evaluations of the displayed waveform can also be easily performed using the limit line and PASS/FAIL functions which allow upper and lower limits to be set on the screen.



Example of PASS / FAIL evaluation.

Selectable Data Save Format

When the standard installed memory card is used, data can be stored in three types of data formats.

SAVE in Binary Format

All measurement conditions and waveform data are stored on the memory card. The stored data can be reproduced on the U3661. Multiple measurement conditions can be saved, and can be recalled at any time, thus, complicated operations may be repeated automatically by simplified recall from memory. The saved measurement conditions can also be utilized to manage a large amount of waveform data.

SAVE in CSV Format (Numeric Format)

The data stored in CSV format can be directly read on a PC. For example, if a CSV file is opened with spreadsheet software on the PC, measurement data can be edited and managed on the PC.

COPY in BITMAP Format

Basically, this function outputs a screen image directly to the printer or plotter. However, when the memory card is specified for the copy target, the graphic image data from the screen is saved on the memory card in BITMAP format. This data file can also be opened on a PC for managing screen image files.

* *The data stored in CSV or BITMAP format cannot be reproduced on the U3661 main unit.*

SAVE Item Display

Spreadsheet Software (CSV Format)

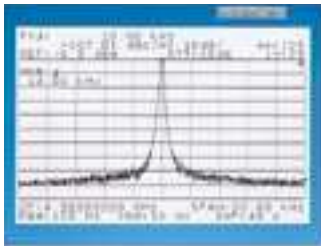
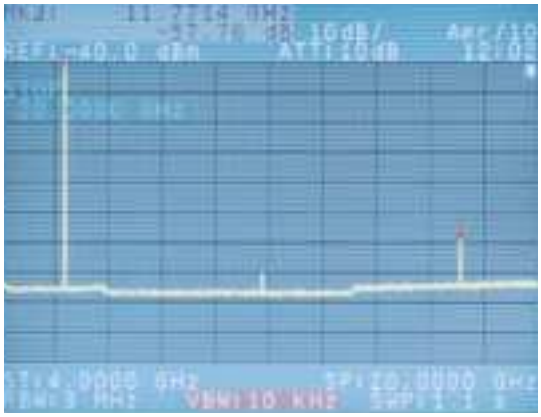


Image Edit Software (BITMAP Format)

Excellent Basic Performance and Measurement Applications

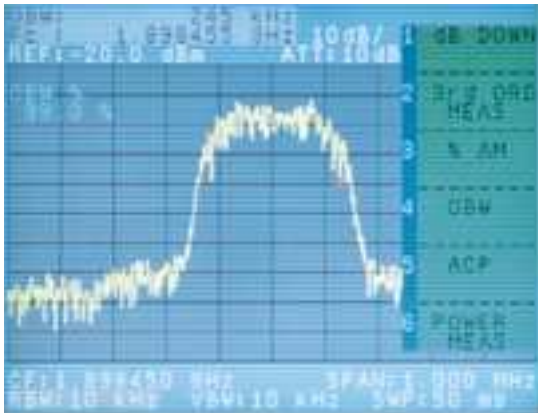
Wide-band Sweep

The U3661 can continuously sweep the frequency bandwidth from 9 kHz to 26.5 GHz on a single screen. It enables easy relative comparison with the basic wave for harmonic measurements in a wide band or for spurious signal measurement.



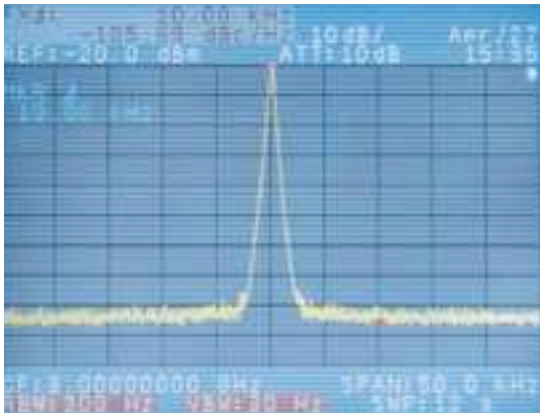
Occupied frequency bandwidth

The U3661 calculates the bandwidth for the specified power ratio from measured spectrum data and then displays it with the marker. In addition, it displays the occupied frequency bandwidth (OBW) and carrier frequency (FC) .



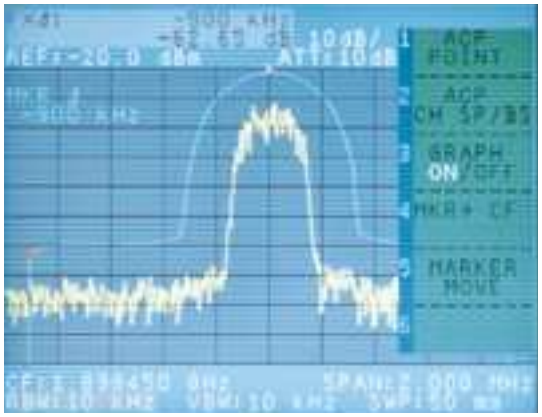
Excellent Signal Purity

Equipped with a precise synthesizer, the local oscillator of the U3661 achieves a signal purity of -100 dBc/Hz (frequency ≤ 3.2 GHz, at 10 kHz offset frequency). The unit accommodates wide-ranging needs from adjacent channel leakage power measurements of radio facilities to microwave device evaluation.



Adjacent-channel leakage power

The U3661 obtains the total power from the measured data on the screen. Then it integrates the power with respect to the specified bandwidth (BS) to obtain its ratio to total power. ACP POINT and ACP GRAPH measurement methods can be selected.

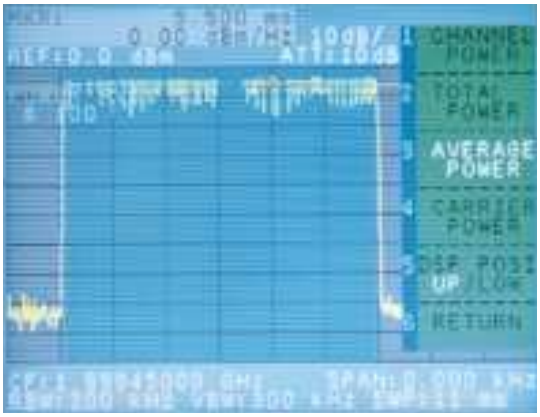


Varied Measurement Applications (1)

Power measurement functions

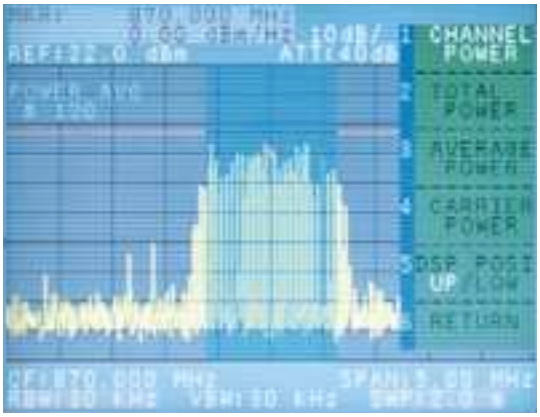
Average power

The modulation modes used for digital mobile communication systems handle signals with large amplitude variation. Therefore, an average power calculation function is incorporated, allowing power measurement for signals with amplitude variation.



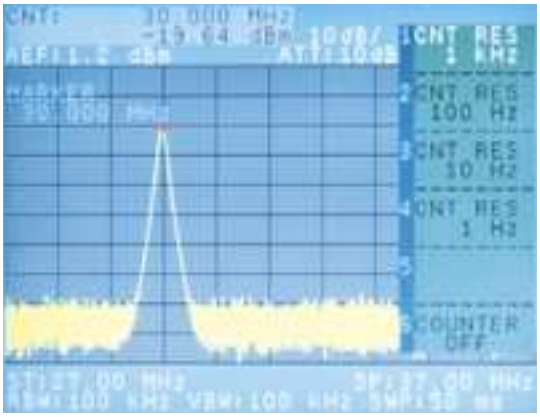
Total power

For Spread spectrum signals, used in CDMA or wireless LAN, the total power measurement function is crucial. This function includes two modes: one is the channel mode which measures the in-band power specified from the measuring window and the other is the total power mode which measures the total power over the entire measurement span.



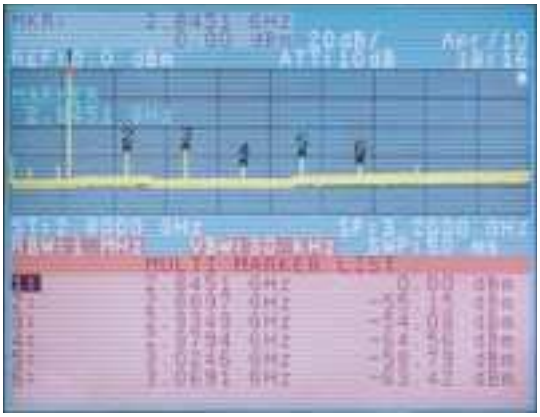
1 Hz Resolution Frequency Counter

Just by adjusting the counter marker to the spectrum, the U3661 can display a frequency counter with a minimum resolution of 1 Hz. This function is extremely useful in multi-carrier frequency measurements, such as mobile radio or CATV systems, which are difficult with conventional frequency counters.



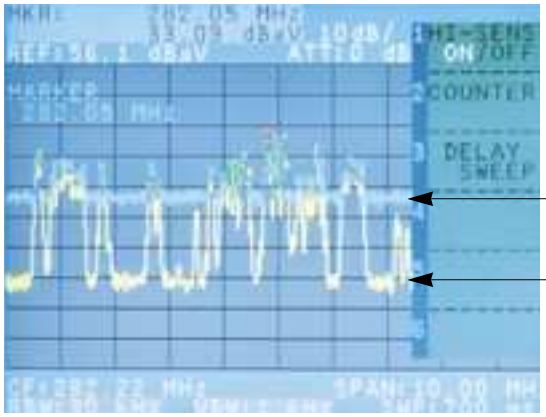
Multi-marker

Up to six markers can be set on a single screen, with the respective markers specified for any frequency. The multi-marker function enables automatic detection of peaks and displaying a frequency list ordered by either level or frequency.



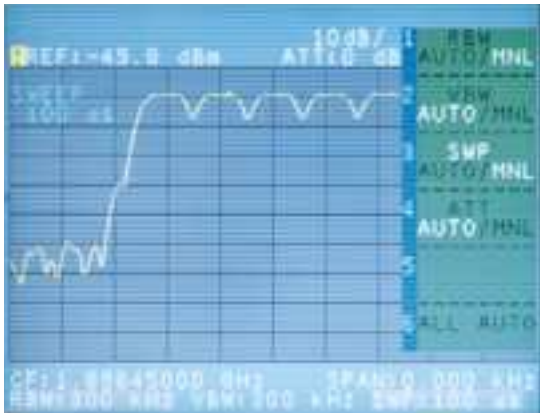
Pre-Amp 20 dB Gain

Equipped with pre-amp gain of 20 dB or more for bandwidths ranging from 9 kHz to 3.2 GHz, even very weak signals of -130 dBm or less can be analyzed. Since level calibration is also executed within the bandwidth when the pre-amp is turned ON, the measured level can be directly read.



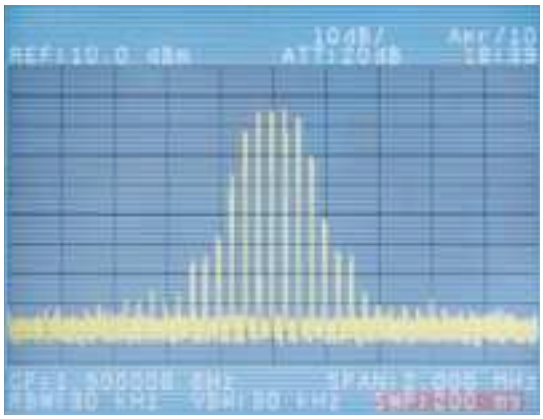
50 µs High-speed sweep function

In ZERO SPAN mode (fixed tuning mode without frequency sweep), the sweep time can be set up to 50 µs. This makes it possible to observe TDMA waveforms for digital mobile communication systems and perform detailed analysis through magnified display of burst rising and falling waveforms.

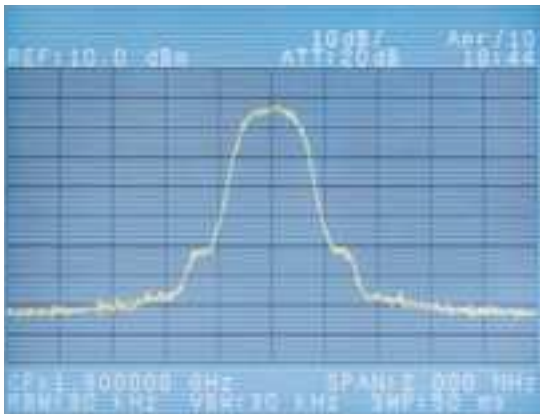


Gated Sweep

The U3661 can perform spectral analysis of bursted signals utilizing an external trigger signal. The trigger synchronizing the burst measurement is applied to the "GATE IN" connector on the rear panel. In addition, the gate position and gate width timing can be generated with the externally input trigger signal as the start point, so that the gated sweep range on the time axis can be set for the burst signal.



GATED SWEEP OFF



GATED SWEEP ON

Ideal For Analysis of TV Transmissions

OPT 72
TV Demodulation

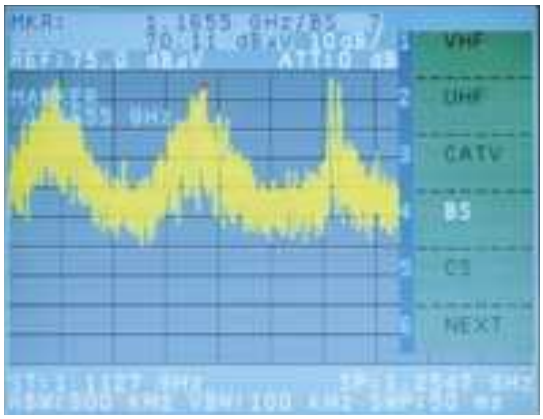
Video/Audio Demodulation

The PICTURE KEY switches from a spectrum display to a TV image display. Sound demodulation is provided simulataneously to compare easily the spectrum waveform and the images. The equipment can be used as a demodulator for arbitrary frequencies as in a TV relay station's IF bands or CATV uplink image checking.

TV picture demodulation

TV Channel Input

Selecting the TV KEY provides channel input frequency tuning. VHF, UHF, CATV, BS and CS channel tables are prestored in the base memory, and these tables can be custumized by users. The marker function allows channel band display as well as frequency/level indication.



Conforms with World TV Standards

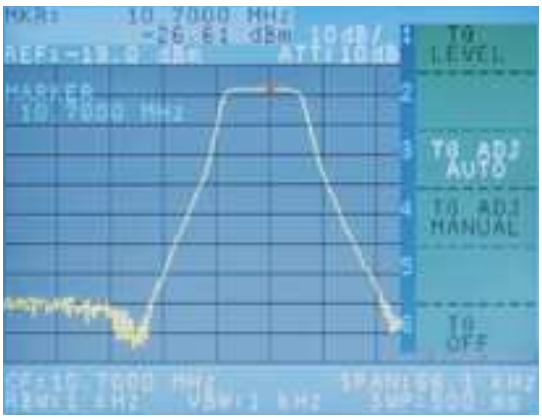
TV demodulation option(OPT 72) covers worldwide TV standards: NTSC, PAL and SECAM colors and M, B/G, D/K/K', I and L/L' systems are selectable.

Tracking Generator for Filter Evaluation, Loss Measurement

OPT 74
Tracking Generator

Frequency Characteristics Evaluations of Filters and Amplifiers

Tracking generator option(OPT 74) can generate a sine wave signal in synch to the frequency sweep of a spectrum analyzer in a range of 100 kHz to 2.2 GHz, enabling direct measurement of frequency characteristics.



Example of Band Pass Filter Meas.

Circuit Network Loss Measurement

Tracking generator option (OPT 74) can easily measure the insertion loss of high frequency devices and equipment, or their connected cables, in a wide frequency range of 100 kHz to 2.2 GHz.

Impedance Matching Measurement

With a SWR bridge (optional accessory), Tracking generator option (OPT 74) can measure return loss, enabling simple evaluation of DUT impedance matching.

Recommended SWR Bridge: ZRB2VAR-52/53/73 (ROHDE & SCHWARZ)

Normalization Function Enables High Precision Measurement

When used with a tracking generator, Tracking generator option (OPT 74) have a normalization function which cancels out all frequency characteristics of the measuring devices. This function allows characteristics evaluation to be made of only the DUT.

The U3661 Allows Channel Setting for Communication Systems of Major Countries

OPT 78
Channel input setting

Most communication systems employ the FDMA(Frequency Division Multiple Access) method. When observing the signals using the U3661, each carrier frequency band to be measured can be registered in the built-in table as a user channel. This allows the center frequency to be called by means of the channel number, resulting in improved work efficiency.
Channel numbers from 1 to 99 can be registered and two tables are provided. For TV broadcasting wave, frequencies are preset according to the VHF, UHF, CATV BS, and CS band designations of major countries.

(The OPT 78 is included in the OPT 72.)

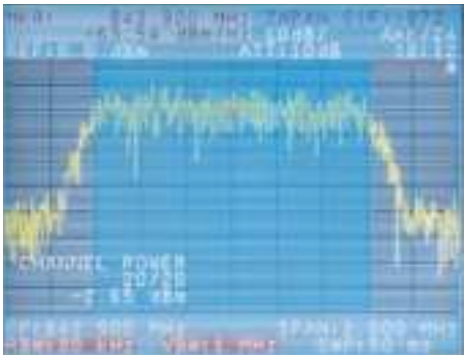
CDMA Option

OPT 60
CDMA Measurement

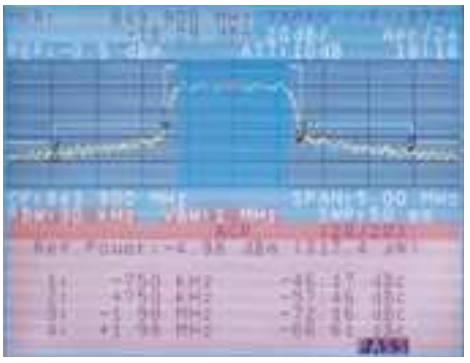
When the CMDA option (OPT 60) is added to the U3661, the CDMA transmission characteristic specified by Standard IS-95 and J-STD-008 can be measured in a single operation.

Features
- **Automatic internal setting of CDMA parameters**
- **Frequency tuning setting by channel No.**
- **High-stability CDMA channel power measurement function**
- **High-sensitivity power measurement by the built-in pre-amp**

Measurement Items
- **Channel power measurement**
- **OBW measurement**
- **ACP (spectrum mask) measurement**
- **Spurious emission (In-band) measurement**



Channel Power Measurement



ACP Measurement

U3661 Specifications

Frequency

Frequency range: 9 kHz to 26.5 GHz

Frequency	Frequency band	Harmonic order N
9 kHz to 3.2 GHz	0	1
3.0 GHz to 7.1 GHz	1	1
6.7 GHz to 14.5 GHz	2	2
13.7 GHz to 26.5 GHz	4	4
Preamplifier 9 kHz to 3.2 GHz (Band 0)		

Frequency read accuracy (Start, stop, center frequency, marker frequency): ±(Frequency reading x Frequency reference accuracy + 5% x Span + 15% x RBW + 60 Hz x N)

Marker frequency counter
Resolution: 1 Hz to 1 kHz
Accuracy: ±(Marker frequency x Frequency reference accuracy + 1LSD ± 5 Hz x N)
(S/N ≥ 25 dB, 1 kHz ≤ span ≤ 200 MHz, RBW ≥ 3 kHz)

Frequency reference accuracy
Aging rate: $\pm 2 \times 10^{-6}$/year
Temperature stability: $\pm 1 \times 10^{-5}$ (0 °C to 50 °C)

Frequency span
Range: 1 kHz to 26.7 GHz, 0 Hz (zero span)
Accuracy: 5% of span or less

Residual FM (zero span): ≤ 60 Hzp-p x N/100 ms

Frequency drift (at a fixed temperature, 30 minutes after power-on)
Span ≤ 10 kHz: <150 Hz x N x (Sweep time/min)

Side-band noise
20 kHz offset: Frequency ≤ 7.1 GHz (Band 0, Band 1) ; ≤ -105 dBc
Frequency > 6.7 GHz ; ≤ (-105+20 logN) dBc
10 kHz offset: Frequency ≤ 7.1 GHz (Band 0, Band 1) ; ≤ -100 dBc
Frequency > 6.7 GHz; ≤ (-100+20 logN) dBc

Resolution bandwidth (3 dB)
Range: 1 kHz to 3 MHz, 1 to 3 sequences
100 Hz, 300 Hz (with OPT 26)
Accuracy: < ±20% (1 kHz to 1 MHz)
(100 Hz, 300 Hz OPT 26)
< ±25% (3 MHz)
Selectivity: <15:1 (60 dB : 3 dB)

Video bandwidth: 10 Hz to 3 MHz, 1 to 3 sequences

Amplitude range

Measurement range: +30 dBm to (Average display noise level)

Maximum input level (Input attenuator ≥ 10 dB)
Preamplifier OFF: +30 dBm, 0 VDCmax
Preamplifier ON: +13 dBm, 0 VDCmax

Display range
Log: 10 x 10 div 10, 5, 2, 1 dB/div
Linear: 10%/div of reference level (RBW ≥ 3 kHz)

Reference level range
Preamplifier OFF: (Input attenuator 0 to 50 dB)
Log: -64 dBm to +40 dBm (0.1 dB steps)
Linear: 141.1 µV to 22.36 V
Preamplifier ON: (Input attenuator 0 to 10 dB)
Log: -89 dBm to -25 dBm (0.1 dB steps)
Linear: 7.934 µV to 12.57 mV

Input attenuator range: 0 dB to 50 dB (10 dB steps)

Dynamic range

Average display noise level: RBW 1 kHz, VBW 10 Hz, input attenuator 0 dB, frequency ≥ 1 MHz

Preamplifier OFF:

Frequency band	Noise level
0	-{117 - 2 f[GHz]} dBm
1	-105 dBm
2	-110 dBm
4	-105 dBm

Preamplifier ON: -132 dBm + 3 f[GHz] dBm (1 MHz to 3.2 GHz (Band 0))

1dB gain compression Input attenuator 0 dB, frequency 10 MHz or more
Preamplifier OFF: >-10 dBm (mixer input level)
Preamplifier ON: >-30 dBm (preamplifier input level)

Spurious response: Preamplifier OFF, input attenuator 0 dB

2nd order harmonic distortion:

Frequency range	Mixer level	Distortion level
10 MHz to 1.7 GHz	-30 dBm	≤ -70 dBc
I.7 GHz to 3.2 GHz	-10 dBm	≤ -80 dBc
>3.2 GHz	-10 dBm	≤ -100 dBc

3rd order distortion: ≤ -70 dBc (Mixer input level -30 dBm, 2-signal difference > 10 kHz)

Image/multiple/ out-band response: <-50 dBc

Residual response: Input 50 ohm termination, input attenuator 0 dB
Preamplifier OFF: ≤ -100 dBm (1 MHz ≤ Frequency ≤ 3.2 GHz)
≤ -90 dBm (Frequency > 3.2 GHz)
Preamplifier ON: ≤ -105 dBm (1 MHz ≤ Frequency ≤ 3.2 GHz)

Amplitude accuracy

Frequency response: Automatic calibration, after pre-selector peak execution
Preamplifier OFF: 100 kHz to 2.7 GHz; ≤ ±1 dB
9 kHz to 3.2 GHz; ≤ ±2 dB
3 GHz to 7 GHz; ≤ ±1.5 dB
7 GHz to 14.4 GHz; ≤ ±3.5 dB
14.4 GHz to 26.5 GHz; ≤ ±4.0 dB
Preamplifier ON: 100 kHz to 2.7 GHz; ≤ ±1 dB
(Band 0) 9 kHz to 3.2 GHz; ≤ ±2 dB

Calibration signal level accuracy (30 MHz): -20 dBm±0.3 dB

IF gain error: < ±0.5 dB (After automatic calibration)

Scale display accuracy: After automatic calibration
Log: ≤ ±1.5 dB/90 dB
≤ ±1 dB/10 dB
≤ ±0.2 dB/1 dB
Linear: ±5% of reference level (RBW ≥ 3 kHz)

Input attenuator switching accuracy: Referenced to 10 dB, 0 dB to 50 dB
9 kHz to 12 GHz; ≤ ±1.1 dB
12 GHz to 20 GHz; ≤ ±1.3 dB
20 GHz to 26.5 GHz; ≤ ±1.8 dB

Resolution bandwidth switching error: After automatic calibration
< ±1.0 dB (RBW referenced to 3 MHz)

Sweep

Sweep time: 50 ms to 1000 s
50 µs to 1000 s (zero span)
manual sweep
Accuracy: < ±5%

Trigger mode: FREE RUN, SINGLE, VIDEO, EXT, TV

Demodulation

Audio demodulation
Modulation type: AM, FM (FM operates at RBW ≥ 3 kHz)
Audio output: Speaker and earphone jacks (with volume control)

www

Input/output

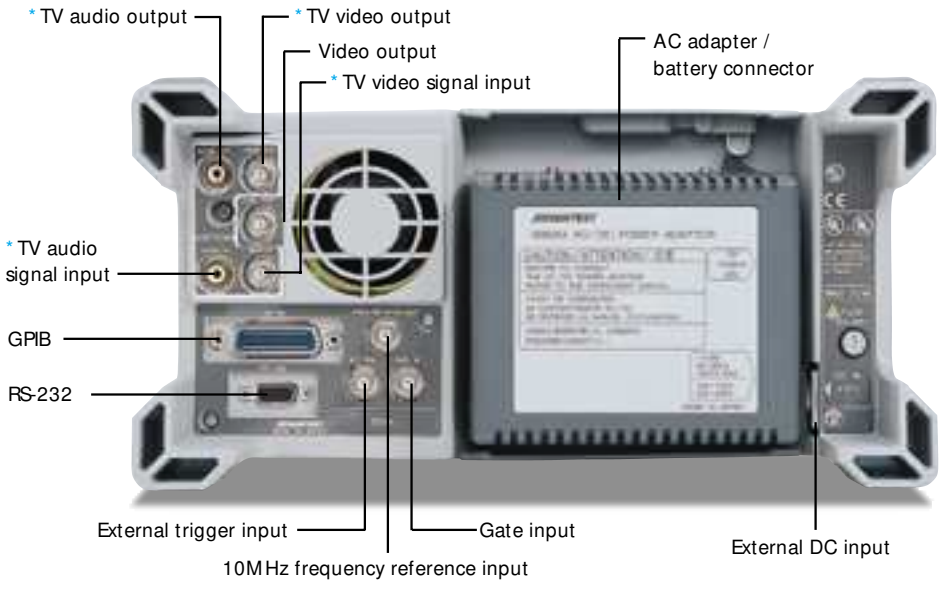
RF input	
Connector:	Type N, female (or Type SMA)
Impedance:	50 ohm (nominal)
VSWR preamplifier OFF:	Input attenuator 10 dB to 50 dB <1.5:1 (100 kHz to 3 GHz) <2:1 (3 GHz to 26.5 GHz)
VSWR preamplifier ON: (Band 0)	<2.5:1 (9 kHz to 3.2 GHz)
10MHz frequency reference input	
Connector:	BNC female, rear panel
Impedance:	75 ohm (nominal)
Input range:	0 dBm to +16 dBm
Video output	
Connector:	BNC female, rear panel
Impedance:	75 ohm (nominal), AC-coupled
Amplitude:	Approx. 1 Vp-p, 75 ohm termination (composite video signal)
External trigger input	
Connector:	BNC female, rear panel
Impedance:	10k ohm (nominal), DC-coupled
Trigger level:	TTL level
Gated input	
Connector:	BNC female, rear panel
Impedance:	10k ohm (nominal)
Sweep stop:	During LOW at TTL level
Sweep:	During HIGH at TTL level
Audio output	
Connector:	Compact monophonic jack, top panel
Power output:	0.2 W, 8 ohm (nominal)
GPIB interface	
Plotter:	IEEE-488, bus connector R9833, HP7470A, HP7475A, HP7440A, HP7550A, 682-XA
Printer:	HP2225A
RS-232:	D-SUB 9-pin, rear panel
Power input	
When battery mounter is applied:	AC input ; AC/DC adapter A08364 (automatic 100 V/200 VAC switching) (Advantest) Battery ; Pro Pac 14 battery (nominal 60 Wh) (Anton Bauer)
TV video	
demodulation output:	OPT 72
Connector:	BNC female, rear panel
Impedance:	75 ohm (nominal), DC-coupled
Amplitude:	Approx. 1 Vp-p, 75 ohm termination
TV audio	
demodulation output:	OPT 72
Connector:	Pin female, rear panel
Impedance:	1k ohm (nominal), AC-coupled
TV video signal input:	OPT 72
Connector:	BNC female, rear panel
Impedance:	75 ohm (nominal), AC-coupled
Input level:	Approx. 1 Vp-p
TV audio signal input:	OPT 72
Connector:	BNC female, rear panel
Impedance:	1k ohm (nominal), AC-coupled

General specifications

Temperature	
Operating temperature:	0 ºC to 50 ºC
Relative humidity:	85% or less
Storage temperature:	-20 ºC to 60 ºC
Power requirements	
External DC input:	Connector; XLR 4 pins Input range; +10 V to +16 V
With AC adapter:	Automatic 100 V/200 VAC switching
100 VAC operation:	Voltage; 100 V to 120 V Frequency; 50 Hz/60 Hz
220 VAC operation:	Voltage: 220 V to 240 V Frequency; 50 Hz/60 Hz
Power consumption:	External DC input; 70 W maximum With AC adapter; 120 VA maximum
Weight	
Main unit:	8.5 kg or less (accessories, carrying strap, and battery not included)
AC/DC adapter (A08364):	1.1 kg
Pro Pac 14 battery:	2.3 kg
Dimensions:	Approx. 148mm (H) x Approx. 291mm (W) x 330mm (D) (Stand, connectors, and other protrusions not included)
External memory	
Memory card drive:	2 slots, top panel
Connector:	JEIDA Ver. 4.1, PCMCIA Rel. 2.0

Accessories

- AC/DC adapter: A08364
- Power cable: A01402
- Power fuse: 326010
- N-BNC conversion adapter: JUG-201A/U
- N-SMA conversion adapter: FLA-H-SA7
- Carrying strap
- Instruction manual



Rear panel

** OPT72 only*

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Option Specifications

OPT 20 High-Stability Frequency Reference Source

Frequency:	10 MHz
Frequency stability:	±2x10^{-8}/day ±1x10^{-7}/year

OPT 26 Narrow RBW 100/300 Hz

Resolution bandwidth (3 dB)	
Range:	100 Hz, 300 Hz
Bandwidth accuracy:	≤ +20%
Selectivity:	≤ 15:1 (60 dB:3 dB)

OPT 60 CDMA

Measurement standard:	Conforms to CDMA standard IS95 and J-STD-008
Channel input function	
US cellular:	1 to 799, 990 to 1023
KOREA cellular:	1 to 799, 990 to 1023
CHINA cellular:	0 to 1000, 1329 to 2047
JAPAN cellular:	1 to 799, 801 to 1039, 1041 to 1199
US PCS :	0 to 1199
KOREA PCS:	0 to 1300
USER TABLE:	99 channels can be created.
Channel power measurement:	(After automatic calibration, automatic setting, preamplifier OFF, -50 dBm/1.23 MHz to +20 dBm/ 1.23 MHz, within 80 dB range)
Absolute accuracy:	≤ ±2.0 dB (15 °C to 35 °C) ≤ ±2.5 dB (0 °C to 50 °C)
Relative accuracy:	≤ ±0.5 dB (15 °C to 35 °C) ≤ ±0.8 dB (0 °C to 50 °C)
Occupied frequency bandwidth (OBW) measurement:	Occupation ratio can be set to 10.0% to 99.8%
Adjacent channel leakage power (ACP) measurement:	Template display (After making measurement the specified number of times, calculates the reference power and draws a template.) Standard template, user template selectable PASS/FAIL function
Spurious emission (in-band) measurement (relative value):	Template display (After making measurement the specified number of times, calculates the reference power and draws a template.) Standard template, user template selectable PASS/FAIL function

The OPT 72 and OPT 78 cannot be mounted at the same time.

OPT 72 TV Demodulation

TV demodulation	
Demodulation type:	NTSC, PAL (PAL-M not included), SECAM
TV STD:	M, B/G, D/K/K', I, L/L'
Demodulation output:	Video, audio
TV video demodulation output	
Connector:	BNC jack (rear panel)
Impedance:	75 ohm (nominal), DC-coupled
Amplitude:	Approx. 1 Vp-p, 75 ohm termination
TV audio demodulation output	
Connector:	Pin jack (rear panel)
Impedance:	1k ohm (nominal), AC-coupled
TV video signal input	
Connector:	BNC jack (rear panel)
Impedance:	75 ohm (nominal), DC-coupled
Input level:	Approx. 1 Vp-p
TV audio signal input	
Connector:	Pin jack (rear panel)
Impedance:	1k ohm (nominal), AC-coupled

Cannot be mounted at the same time as the OPT 60.

OPT 74 Tracking Generator

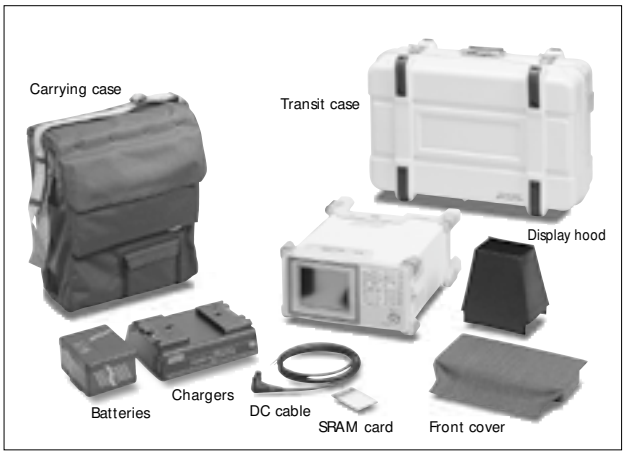
Frequency range:	100 kHz to 2.2 GHz
Output level range:	0 dBm to -31 dBm, in 1 dB steps
Output level accuracy:	≤ ±0.5 dB (30 MHz, -10 dBm, 20 °C to 30 °C)
Output level flatness:	≤ ±0.7 dB (100 kHz to 1 GHz) ≤ ±1.5 dB (100 kHz to 2.2 GHz) (at the time of -10 dBm, referenced to 30 MHz)
Output level switching accuracy:	≤ ±1.0 dB (100 kHz to 1 GHz) ≤ ±2.0 dB (100 kHz to 2.2 GHz) (referenced to the time of -10 dBm)
Output level spurious:	Harmonic < -20 dBc Non-harmonic < -30 dBc
TG leakage:	≤ -95 dBm
TG output:	Connector ; Type N jack Impedance ;50 ohm (nominal) VSWR ≤ 1.5 (100 kHz to 2 GHz) VSWR ≤ 2.0 (100 kHz to 2.2 GHz) ≤ -10 dBm output

OPT 78 Channel Setting

Channel setting:	Channel setting for VHF, UHF, CATV, BS, and CS for various countries Two user channels are available; 99 channels can be registered for each.

The OPT 78 is included in the OPT 72.
Cannot be mounted at the same time as the OPT 60.

Accessories



Options (sold separately)

OPT 3661 + 20	High-stability reference option
OPT 3661 + 26	Narrow RBW option
OPT 3661 + 60	CDMA option
OPT 3661 + 72	TV demodulation option
OPT 3661 + 74	Tracking generator option
OPT 3661 + 78	Channel input setting option

Accessories (sold separately)

R16072	Transit case
R16216A	Carrying case
R16601	Display hood
A02806	Front cover
PROPAC14 BATT	Battery
DUAL2402 CHARGER	Charger
A09507	64K byte SRAM memory card
A09508	256K byte SRAM memory card
A09509	2M byte SRAM memory card
A01434	DC cable

Specifications may change without notification.

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