

**ADVANTEST.**

**U3661**  
Spectrum Analyzer

For field maintenance of microwave radio facilities,  
and digital mobile communication



U3661



U3661

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

## Lightest Weight 26.5 GHz Microwave Spectrum Analyzer

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- $\mu$ s 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



with 100 Hz RBW



## Option Guide

	Option No.	
High-stability reference source ...	<b>OPT 20</b> ..	High-stability reference oscillator with an aging rate of $\pm 2 \times 10^{-8}$ /day
Narrow RBW ...	<b>OPT 26</b> ..	Adds 100 Hz and 300 Hz resolution bandwidths
CDMA setting* ...	<b>OPT 60</b> ..	Allows channel power, ACP, OBW, and spurious emission (in-band) measurement.
TV demodulation* ...	<b>OPT 72</b> ..	Frequency tuning function by channel input, TV video/audio demodulation function
Tracking generator ...	<b>OPT 74</b> ..	Filter evaluation function/LOSS measurement function for the frequency range from 100 kHz to 2.2 GHz
Channel input setting* ...	<b>OPT 78</b> ..	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).

# U3661 Specifications

## Frequency

Frequency range:	9 MHz 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):  $\pm(\text{Frequency reading} \times \text{Frequency reference accuracy} + 5\% \times \text{Span} + 15\% \times \text{RBW} + 60 \text{ Hz} \times \text{N})$

### Marker frequency counter

Resolution: 1 Hz to 1 kHz  
 Accuracy:  $\pm(\text{Marker frequency} \times \text{Frequency reference accuracy} + 1\text{LSD} \pm 5 \text{ Hz} \times \text{N})$   
 (S/N  $\geq 25$  dB, 1 kHz  $\leq$  span  $\leq 200$  MHz, RBW  $\geq 3$  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):  $\leq 60 \text{ Hz-p} \times \text{N}/100 \text{ ms}$

Frequency drift (at a fixed temperature, 30 minutes after power-on)

Span  $\leq 10$  kHz:  $< 150 \text{ Hz} \times \text{N} \times (\text{Sweep time}/\text{min})$

### Side-band noise

20 kHz offset: Frequency  $\leq 7.1$  GHz (Band 0, Band 1) :  $\leq -105$  dBc  
 Frequency  $> 6.7$  GHz :  $\leq (-105 + 20 \log N)$  dBc  
 10 kHz offset: Frequency  $\leq 7.1$  GHz (Band 0, Band 1) :  $\leq -100$  dBc  
 Frequency  $> 6.7$  GHz :  $\leq (-100 + 20 \log N)$  dBc

### Resolution bandwidth (3 dB)

Range: 1 kHz to 3 MHz, 1 to 3 sequences  
 100 Hz, 300 Hz (with OPT 26)

Accuracy:  $< \pm 20\%$  (1 kHz to 1 MHz)  
 (100 Hz, 300 Hz OPT 26)

Selectivity:  $< \pm 25\%$  (3 MHz)  
 $< 15:1$  (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  $\geq 10$  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  $\geq 3$  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  $\mu\text{V}$  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  $\mu\text{V}$  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  $\geq 1$  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	$\leq -70$ dBc
	1.7 GHz to 3.2 GHz	-10 dBm	$\leq -80$ dBc
	$> 3.2$ GHz	-10 dBm	$\leq -100$ dBc

### 3rd order distortion:

$\leq -70$  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:  $\leq -100$  dBm (1 MHz  $\leq$  Frequency  $\leq 3.2$  GHz)

$\leq -90$  dBm (Frequency  $> 3.2$  GHz)

Preamplifier ON:  $\leq -105$  dBm (1 MHz  $\leq$  Frequency  $\leq 3.2$  GHz)

## Amplitude accuracy

### Frequency response:

Automatic calibration, after pre-selector peak execution

Preamplifier OFF: 100 kHz to 2.7 GHz;  $\leq \pm 1$  dB

9 kHz to 3.2 GHz;  $\leq \pm 2$  dB

3 GHz to 7 GHz;  $\leq \pm 1.5$  dB

7 GHz to 14.4 GHz;  $\leq \pm 3.5$  dB

14.4 GHz to 26.5 GHz;  $\leq \pm 4.0$  dB

Preamplifier ON: 100 kHz to 2.7 GHz;  $\leq \pm 1$  dB

(Band 0) 9 kHz to 3.2 GHz;  $\leq \pm 2$  dB

### Calibration signal

level accuracy (30 MHz): -20 dBm  $\pm 0.3$  dB

IF gain error:  $< \pm 0.5$  dB (After automatic calibration)

### Scale display accuracy:

After automatic calibration

Log:  $\leq \pm 1.5$  dB/90 dB

$\leq \pm 1$  dB/10 dB

$\leq \pm 0.2$  dB/1 dB

Linear:  $\pm 5\%$  of reference level (RBW  $\geq 3$  kHz)

### Input attenuator

switching accuracy: Referenced to 10 dB, 0 dB to 50 dB

9 kHz to 12 GHz;  $\leq \pm 1.1$  dB

12 GHz to 20 GHz;  $\leq \pm 1.3$  dB

20 GHz to 26.5 GHz;  $\leq \pm 1.8$  dB

### Resolution bandwidth

switching error: After automatic calibration

$< \pm 1.0$  dB (RBW referenced to 3 MHz)

## Sweep

### Sweep time:

50 ms to 1000 s

50  $\mu\text{s}$  to 1000 s (zero span)

manual sweep

$< \pm 5\%$

### Accuracy:

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

## Demodulation

### Audio demodulation

Modulation type: AM, FM (FM operates at RBW  $\geq 3$  kHz)

Audio output: Speaker and earphone jacks (with volume control)

## Input/output

<b>RF input</b>	
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)
<b>10MHz frequency reference input</b>	
Connector:	BNC female, rear panel
Impedance:	75 ohm (nominal)
Input range:	0 dBm to +16 dBm
<b>Video output</b>	
Connector:	BNC female, rear panel
Impedance:	75 ohm (nominal), AC-coupled
Amplitude:	Approx. 1 Vp-p, 75 ohm termination (composite video signal)
<b>External trigger input</b>	
Connector:	BNC female, rear panel
Impedance:	10k ohm (nominal), DC-coupled
Trigger level:	TTL level
<b>Gated input</b>	
Connector:	BNC female, rear panel
Impedance:	10k ohm (nominal)
Sweep stop:	During LOW at TTL level
Sweep:	During HIGH at TTL level
<b>Audio output</b>	
Connector:	Compact monophonic jack, top panel
Power output:	0.2 W, 8 ohm (nominal)
<b>GPIB interface</b>	
Plotter:	IEEE-488, bus connector R9833, HP7470A, HP7475A, HP7440A, HP7550A, 682-XA HP2225A
Printer:	HP2225A
RS-232:	D-SUB 9-pin, rear panel
<b>Power input</b>	
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)
<b>TV video demodulation output:</b>	
Connector:	OPT 72 BNC female, rear panel
Impedance:	75 ohm (nominal), DC-coupled
Amplitude:	Approx. 1 Vp-p, 75 ohm termination

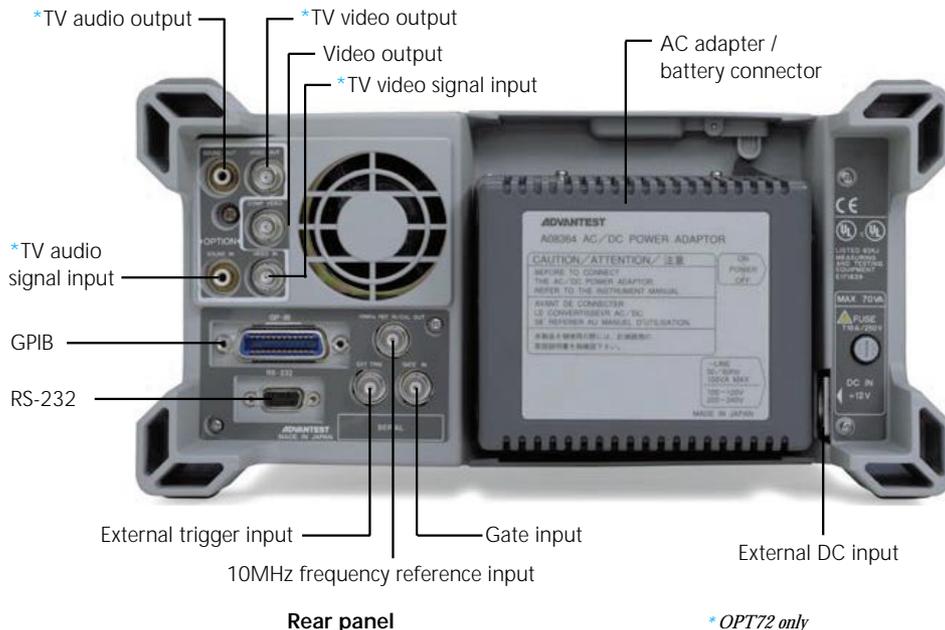
<b>TV audio demodulation output:</b>	
Connector:	OPT 72 Pin female, rear panel
Impedance:	1k ohm (nominal), AC-coupled
<b>TV video signal input:</b>	
Connector:	OPT 72 BNC female, rear panel
Impedance:	75 ohm (nominal), AC-coupled
Input level:	Approx. 1 Vp-p
<b>TV audio signal input:</b>	
Connector:	OPT 72 BNC female, rear panel
Impedance:	1k ohm (nominal), AC-coupled

## General specifications

<b>Temperature</b>	
Operating temperature:	0 °C to 50 °C
Relative humidity:	85% or less
Storage temperature:	-20 °C to 60 °C
<b>Power requirements</b>	
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
<b>Weight</b>	
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
<b>Dimensions:</b>	
	Approx. 148mm (H) x Approx. 291mm (W) x 330mm (D) (Stand, connectors, and other protrusions not included)
<b>External memory</b>	
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	



\* OPT72 only

## Option Specifications

### OPT 20 High-Stability Frequency Reference Source

Frequency:	10 MHz
Frequency stability:	$\pm 2 \times 10^{-9}$ /day $\pm 1 \times 10^{-7}$ /year

### OPT 26 Narrow RBW 100/300 Hz

Resolution bandwidth (3 dB)	
Range:	100 Hz, 300 Hz
Bandwidth accuracy:	$\leq +20\%$
Selectivity:	$\leq 15:1$ (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:  $\leq \pm 2.0$  dB (15 °C to 35 °C)  
 $\leq \pm 2.5$  dB (0 °C to 50 °C)

Relative accuracy:  $\leq \pm 0.5$  dB (15 °C to 35 °C)  
 $\leq \pm 0.8$  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:	$\leq \pm 0.5$ dB (30 MHz, -10 dBm, 20 °C to 30 °C)
Output level flatness:	$\leq \pm 0.7$ dB (100 kHz to 1 GHz) $\leq \pm 1.5$ dB (100 kHz to 2.2 GHz) (at the time of -10 dBm, referenced to 30 MHz)

Output level switching accuracy:  $\leq \pm 1.0$  dB (100 kHz to 1 GHz)  
 $\leq \pm 2.0$  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:  $\leq -95$  dBm

TG output: Connector ; Type N jack  
Impedance ;50 ohm (nominal)  
VSWR  $\leq 1.5$  (100 kHz to 2 GHz)  
VSWR  $\leq 2.0$  (100 kHz to 2.2 GHz)  
 $\leq -10$  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
DUAL2401 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.*