Light Weight, Compact, Battery Operated Spectrum Analyzer

U3641/3641N/3641PHS

- **Ultra-compact and lightweight**
  Main unit: 7 kg or less
  With battery: 9 kg or less
- **Frequency range: 9 kHz to 3GHz**
- **Display dynamic range: 100 dB**
- **Many measuring functions provided as standard**
  - **Internal pre-amp with 0dB gain**
  - **Reduced dB measurement**
  - **ACP**
  - **OBW**
  - **Power calculation function (AVE, TOTAL POWER)**
- **Input Impedance**
  50 Ω : U3641
  75 Ω : U3641N
- **U3641PHS: ID discrimination by PHS control channel demodulation**

(Photo is U3641)

U3641/3641N/3641PHS
Spectrum Analyzer

The U3641/3641N is a 3-GHz synthesized spectrum analyzer ideal for field use. With a lightweight, compact size and three-way power supply including battery operation, the U3641/3641N has been designed specifically for field installation and maintenance applications. In addition, with the inclusion of a synthesized local oscillator, the U3641/3641N allows high-precision and high-stability measurements with a minimum resolution bandwidth of 100 Hz. A fast zero span sweep speed of 50 μs allows characterization of burst signal rising and falling edges and the measurement of power during on and off periods. The U3641/3641N/3641PHS are portable analyzers which can be used for maintenance on various aspects of CATV and PHS/PDC.

■ At 7 kg (Max.), the Lightest Field Analyzers in Their Class

The U3641/3641N are light and compact (6.8kg or less without the battery pack or 9 kg or less with the pack). The easy-to-attach strap allows the analyzer to be worn on the shoulder and easily carried.

■ Battery Provides 1.5 Hours of Operation. Three Power Sources to Choose From

The U3641/3641N operate not only on 100/200 V AC power but also on +10 to +16 V DC power or the battery pack. The battery pack can be easily attached or removed. It allows 1.5 hour continuous operation at a full charge, making it easier to perform logistically wide-ranging measurements such as maintenance and installation work. Rapid 1 hour battery charging time.

■ High-stability Measurement by Means of Synthesized Operation

The U3641/3641N 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) at the upper left portion of the screen. The ratio of the obtained power to the total power can be specified in the range from 10.0 to 99.8%.

■ 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 GSM, IS-136, PDC and PHS and perform detailed analysis through magnified display of burst rising and falling waveforms.

■ Variety of Measurement Functions

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

■ Diverse Option Configuration: *OEP = OPT. available

	OPT.15 Controller	OPT.20 High-stability Reference Source	OPT.26 RBW100Hz, 300Hz	OPT.72 TV Image/Audio Demodulation	OPT.74 TG	OPT.78 Channel Input Setting
U3641	Yes	Yes	Yes	Yes	Yes	Yes
U3641N	Yes	Yes	Yes	Yes	Yes	Yes
U3641PHS	Yes		Yes		Yes	

Frequency Range: 9 kHz to 3 GHz

U3641/3641N/3641PHS

Specifications

Frequency	
Frequency Range	9 kHz to 3 GHz
Frequency Readout Accuracy	(Start, Stop, CF, Marker)
	± (freq readout × freq ref error + 5% × span + 15% × RBW + 10 Hz)
Count Frequency Marker	
Resolution	1 Hz to 1 kHz
Count Accuracy	± (marker freq × freq reference accuracy + 1 LSD ±5 Hz)
Accuracy	(S/N ≥ 25 dB, RBW ≥ 3 kHz, 1 kHz ≤ SPAN ≤ 200 MHz)
Frequency Reference	$\pm 2 \times 10^{-6}$/year
Accuracy	$\pm 1 \times 10^{-5}$(at 0 to 50°C)
Frequency Span	
Range	1 kHz to 3.2 GHz, 0 Hz (ZERO span)
Accuracy	≤ ± 5% (SPAN)
Frequency Stability	
Residual FM	≤60 Hz_{p-p}/100 ms (ZERO span)
Frequency Drift	<150 Hz/min (SPAN ≤10kHz)
Noise Sidebands	≤-105 dBc, at 20 kHz offset
	≤-100 dBc, at 10 kHz offset
Resolution Bandwidth	(3 dB)
Range	1 kHz to 3 MHz 1-3 sequence
	100 Hz, 300 Hz (OPT.25)
Bandwidth Accuracy	≤± 20% (1 kHz to 1 MHz)
	≤± 25% (3 MHz)
Selectivity	< 15:1 (60 dB : 3 dB, RBW ; 1kHz to 3MHz)
Video Bandwidth	10 Hz to 3 MHz (1-3 step)

Amplitude Range	U3641/3641PHS	U3641N
Amplitude Range	+20 dBm to displayed Average Noise Level	+130 dBµV to displayed Average Noise Level
Maximum Input Level	± 50 V DC max.	
Preamplifier OFF (Input atten ≥10 dB)	+27 dBm	+134 dBµV
Preamplifier ON (Input atten ≥10 dB)	+13 dBm	+120 dBµV
Display Range		
Log	10 × 10 div 10, 5, 2, 1 dB/div	
Linear	10% of reference level/div, RBW ≥3kHz	
Reference Level Range		
Preamplifier OFF	(Input Atten 0 dB to 50 dB)	
Log	-64 to +40 dBm (0.1 dB step)	+46 dBµV to +150 dBµV
Linear	+141.1µV to +22.36 V	+198.4 µV to +31.44V
Preamplifier ON	(Input Atten 0 dB to 10 dB)	
Log	-89 to -25 dBm (0.1 dB step)	+21 dBµV to +85 dBµV
Linear	+7.934µV to +12.57 mV	+11.16 µV to +17.68mV
Input Attenuator Range	0 to 50 dB (10 dB step)	

Sweep	
Sweep Time	50 ms to 1000s
	50 µs to 1000s (ZERO span)
Accuracy	≤±5%
Trigger mode	FREE RUN, SINGLE, VIDEO, EXT, TV

Demodulation	
Spectrum Demodulation	
Modulation Type	AM and FM (FM is at RBW ≥3kHz)
Audio Output	Speaker and phone jack with volume control

Dynamic Range	U3641/3641PHS	U3641N
Displayed Average Noise Level	(RBW 1 kHz, VBW 10 Hz, Input atten 0 dB, f ≥1 MHz)	
Preamplifier OFF	-117 dBm+ 2.7f (GHz) dB	-8 dBµV+ 2.7f (GHz) dB
Preamplifier ON	-135 dBm + 4.3f (GHz) dB	-26 dBµV + 4.3f (GHz) dB
Gain Compression	(1 dB)	
Preamplifier OFF (mixer input level, f ≥ 10 MHz)	> -10 dBm	> +100 dBµV
Preamplifier ON (RF input level, f ≥ 10 MHz)	> -40 dBm (ATT = 0)	> +70 dBµV
Spurious Response	(Input atten 0 dB, f ≥10MHz)	
Preamplifier OFF		
Second Harmonic Distortion	≤-70 dB(-30 dBm input)	≤-70 dB(+78 dBµV input)
Third Order Intermodulation Distortion	≤-70 dB(-30 dBm input)	≤-70 dB(+78 dBµV input)
Residual Responses	(Input atten 0 dB, f ≥10MHz)	
Preamplifier OFF	≤-100 dBm, 50Ω	≤+10 dBµV, 75Ω
Preamplifier ON	≤-105 dBm, 50Ω	≤+5 dBµV, 75Ω

Amplitude Accuracy	U3641/U3641PHS	U3641N
Freaquency Response	At Input attenuator 10 dB, 20°C to 30°C, referenced to 30 MHz and after calibration	
Preamplifier OFF	≤± 1 dB (100 kHz to 2.7 GHz) ≤± 2 dB (9 kHz to 3.0 GHz)	≤± 1 dB (100 kHz to 2.2 GHz)
Preamplifier ON	≤± 1 dB (100 kHz to 2.7 GHz) ≤± 2 dB (9 kHz to 3.0 GHz)	≤± 1 dB (100 kHz to 2.2 GHz)
Calibration Signal Accuracy	-20 dBm ± 0.3 dB	+90.5dBµV ± 0.3 dB
IF Gain Uncertainty	≤± 0.5 dB (after automatic calibration)	
Scale Fidelity	(after automatic calibration)	
Log	≤± 1.5 dB/90 dB ≤± 1 dB/10 dB ≤± 0.2 dB/1 dB	
Linear	≤± 5% of reference level, RBW ≥3kHz	
Input Attenuator Switching Accuracy	(10dB reference, 20 to 50dB setting) ≤± 1.0 dB (100 kHz to 2.7 GHz) ≤± 1.5 dB (9 kHz to 3.0 GHz)	≤± 1.0 dB (100 kHz to 2.2 GHz)
Resolution Bandwidth Switching Uncertainty	(after automatic calibration) ≤± 1.0 dB at RBW 3 MHz as reference	

Light Weight, Compact, Battery Operated Spetrum Analyzer

U3641/3641N/3641PHS (Continued From Previous Page)

Inputs & Outputs	
RF Input	
Connector	N type jack
Impedance	U3641 : 50Ω(nominal)
	U3641N : 75Ω (nominal)
Preamplifier OFF	VSWR ≤1.5 : 1 (100 kHz to 2 GHz)
	VSWR ≤ 2 : 1
	(9 kHz to 3.0 GHz (U3641)/ 2.2 GHz(U3641N)
	(Input atten ≥10 to 50 dB)
Preamplifier ON	VSWR ≤ 2.5 : 1 (10 MHz to 3.0 GHz(U3641) / 2.2 GHz (U3641N)
10 MHz Reference Input	
Connector	BNC jack, rear panel
Impedance	500Ω (nominal)
Input Range	0 to +16 dBm
Video Output	
Connector	BNC jack, rear panel
Impedance	75Ω (nominal) AC coupled
Amplitude	approx. 1 V_{p-p} 75Ω (Composite video signal)
External Trigger Input	
Connector	BNC jack, rear panel
Impedance	10 kΩ (nominal) DC coupled
Trigger Level	TTL level
Gate Input	
Connector	BNC jack, rear panel
Impedance	10 kΩ (nominal)
Sweep Stop	during TTL low level
Sweep Continue	during TTL high level
Phone Output	
Connector	Subminiature Monophonic jack, front panel
Power Output	0.2 W, 8Ω(nominal)
GPIB interface	IEEE-488, bus Connector
Plotter	HP-GL commands (682-XA)
Printer	PCL commands
RS232	D-SUB 9 pin, rear panel
Power Input	
Battery mounter	AC/DC adapter (A08364) or battery (option)

High-Stability Reference Source (OPT20 only)	
Frequency	10MHz
Frequency Accuracy	± 2×10^{-8} / day
	± 1×10^{-7}/ year

OPT. 20 and OPT. 70 cannot be installed at the same time.

Narrow Band Resolution Bandwidth (OPT26 only)	
Resolution Bandwidth (3dB)	10MHz
Range	100 Hz, 300 Hz
Bandwidth accuracy	≤20%
Selectivity	≤15:1 (60dB : 3dB)

TV Demodulation Function (OPT. 72 only)	
TV demodulation	
Demodulation type	NTSC, PAL, SECAM
TV standard	M, B/G, D/K/K', I, L/L'
Demodulation output	Video, Sound
TV Image Demodulation Output	
Connector	BNC jack, rear panel
Impedance	75Ω (nominal) DC coupled
Amplitude	approx. 1 V_{p-p}, 75Ω
TV Sound Demodulation Output	
Connector	pin jack, rear panel
Impedance	1kΩ (nominal) AC coupled
TV Image Signal Input	
Connector	BNC jack, rear panel
Impedance	75Ω (nominal) AC coupled
Imput level	about 1 V_{p-p}
TV Sound Signal Input	
Connector	pin jack, rear panel
Impedance	1kΩ (nominal) AC coupled

OPT. 72 and OPT. 70 cannot be installed at the same time.

Tracking Generator Function (OPT. 74 only)	
Frequency range	100 kHz to 2.2 GHz
Output level range	U3641/3641PHS ; 0 dBm to -31 dBm, 1 dB steps
	U3641N ; 105 to 74 dBμV, 1 dB step
Output level accuracy	≤± 0.5 dB (at 30 MHz, -10 dBm(U3641/3641PHS)
	/95dBμV(U3641N), 20 to 30°C)
Output level flatness	≤± 0.7 dB (100 kHz to 1 GHz)
	≤± 1.5 dB (100 kHz to 2.2 GHz)
	(U3641/3641PHS ; at -10 dBm, 30 MHz reference)
	(U3641N ; at 95 dBμV, 30 MHz reference)
Output level switching accuracy	≤± 1.0 dB (100 kHz to 1 GHz)
	≤± 2.0 dB (100 kHz to 2.2 GHz)
	(U3641/3641PHS ; at -10 dBm reference)
	(U3641 ; at 95 dBμV reference)
Output spurious	Harmonic < -20 dBc
	Non-harmonic < -30 dBc
TG leakage	U3641/3641PHS ; ≤-95 dBm
	U3641N ; ≤16 dBμV
TG output	
Connector	N type jack
Impedance	U3641/3641PHS ; 50Ω (nominal)
(≤10 dBm output)	U3641N ; 75Ω (normal)
	VSWR ≤1.5 (100 kHz to 2 GHz)
	VSWR ≤2.0 (100 kHz to 2.2 GHz)
	(U3641 ; ≤-10 dBm output)
	(U3641N ; ≤95 dBμV output)

Channel Input Setting (OPT. 78 only)	
Channel setting	Channel setting for VHF, UHF, CATV, BS and CS.
	Two user channels are available and 99 channels can be registered for each channel

OPT 78 is included in OPT. 72.

U3641/3641N/3641PHS

General Specifications	
Environment Temperature	
Operating Temperature	0 to 50°C, humidity 85% or less
Non-operating Temperature	-20 to +60°C
Power Supply	
External DC Input	Connector XLR 4 pin
	Voltage +10 to +16V
AC Input	Automatically selections
	between 100 VAC and 200 VAC
	Operation at 100 VAC
	Voltage 100 to 120 V
	Frequency 50 Hz/60 Hz
	Operation at 220 VAC:
	Voltage 220 to 240 V
	Frequency 50 / 60 Hz
	Operation at DC : Max. 60 W
Power consumption	AC adaptor use : Max. 100VA
Mass	(Without options, accessories, carrying belts, batteries)
	6.9 kg or less
Dimensions	approx. 148(H) × 291(W) × 330(D) mm
	(without feet or connector)
IC Memory Card	2 slots
connector	JEIDA-Ver.4.1 PCMCIA Rel.2.0
	Type 1

Standard accessories:

- Power cable : A01402
- N-BNC connector adaptor : JUG-201A/U (U3641; One)
- NC-BNC connector adaptor : BA-A165 (U3641N; One)
- N-C15 connector adaptor : NCP-NFJK (U3641N; One)
- AC-DC adaptor : A08364
- Carrying belt
- Operation manual

PHS-ID Demodulator Function (U3641PHS only)	
Signal Reception	
Radio access format	TDMA-TDD
Modulation format	π/4 DQPSK
Transmission speed	384K bits/second
Signal channel	Logic control channel code
	configuration conforms to RCR STD-28
Level Measurement Range	
Reception performance	level measurement SWP = 400 ms max.
	Preamplifier OFF : (input atten = 10 dB)
	52 dBµV to 107 dBµV
	Preamplifier ON : (input atten = 0 dB)
	16 dBµV to 67 dBµV
Sweep trigger modes	FREE RUN, VIDEO, ID
Measurement Function	
ID list displays	CI, CS-ID, PS-ID, level, time
ID-MKR	Display of specified signal ID
	in waveform display mode
Period measurement	Measurement of specified CS-ID
Burst Error Rate	The number of error slots/The measured (Set) number
Level measurement	Center value processing
operations	Average value processing
	Max./min. value processing

Specifications

Options (sold sparately)

OPT3641 + 15	
OPT3641N + 15	
OPT3641 + 20	High-stability reference option
OPT3641N + 20	High-stability reference option
OPT3641 + 26	
OPT3641N + 26	
OPT3641 + 72	TV demodulation option
OPT3641N + 72	TV demodulation option
OPT3641 + 74	Tracking generator option
OPT3641N + 74	Tracking generator option
OPT3641 + 78	Channel input setting option
OPT3641N + 78	Channel input setting option
OPT3641PHS + 15	
OPT3641PHS + 26	
OPT3641PHS + 74	

Accessories (sold sparately)

R16072	Transit case
R16216A	Carrying case
R16601	Display hood
A02806	Front cover
PROPAC14BATT	Batteries
DUAL240/CHARGER	Chargers
A09507	64K byte SRAM memory card
A09508	256K byte SRAM memory card
A09509	2M byte SRAM memory card
A01434	External DC power cable
A04210	1.9 GHz BPF
HRM-554S	N-SMA converter adapter
TCF-358HAA1500	1.5 m SMA cable
TCF-358HAA2000	2.0 m SMA cable
4XAM1001	Antenna connector
3XAM1618	PHS antenna
MAGNET-KIDAI	Magnetic antenna mount for use on vehicles

Application Softwares (sold sparately)

PU3641 0300-IC	for GSM/PCN Mobile station
PU3641 0310-IC	for GSM/PCN Base station
PU3641 0500-IC	for DCS 1900 Mobile station
PU3641 0510-IC	for DCS 1900 Base station

CDMA (IS-95/J-STD-008) Transmission Characteristic Measurements

U3641/3641N/3641PHS

CDMA Option (OPT60)

When the CDMA option (OPT60) is added to the Spectrum Analyzers U3641, the CDMA transmission characteristics specified by IS-95/J-STD-008 can be measured through a single key operation.
This option allows a single spectrum analyzer to cover cellular and PCS base stations and mobile stations.
With a compact, lightweight main unit of 7kg, a three-way power supply including battery, and a standard built-in pre-amp indispensable for field measurement, the U3641/3641N + OPT60 enables high-sensitivity measurements ideal for field use.

■ Features

- Automatic internal setting of CDMA parameters
- High-stability CDMA channel power measurement function
- Channels for CDMA systems
- High-sensitivity power measurement by built-in pre-amp

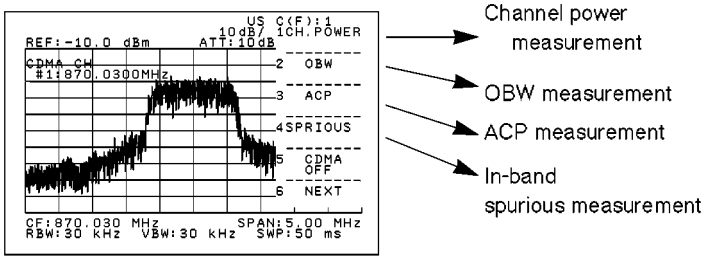
■ Applicable Communication Systems

- CDMA cellular (IS-95) - BS/MS
- CDMA-PCS (J-STD-008) - BS/MS

■ Measurement Items

- Channel power
- OBW
- ACP (spectrum mask)
- Spurious emission (in-band)

■ Easy Measurement Operation by Only Selecting an Item



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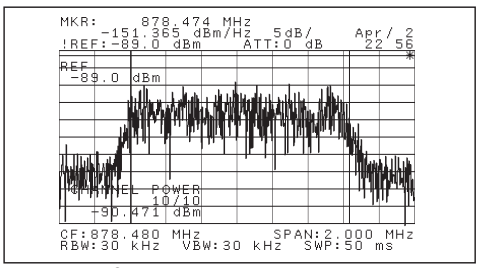
■ High-stability CDMA Channel Power Measurement

- Stability : ≤ ± 0.2dB/24H
(same settings, 15 to 35 deg.C)
- Absolute accuracy: .... ≤ ± 2.0dB (15 to 35 deg.C)
≤ ± 2.5dB (0 to 50 deg.C)
- Relative accuracy:..... ≤ ± 0.5dB (15 to 35 deg.C)
≤ ± 0.8dB (0 to 50 deg.C)

(After calculation, automatic setting, pre-amplifier OFF
Within the input range from -50 dBm/1.23 MHz to +20 dBm/1.23 MHz, and the range of on-screen display of 80 dB)

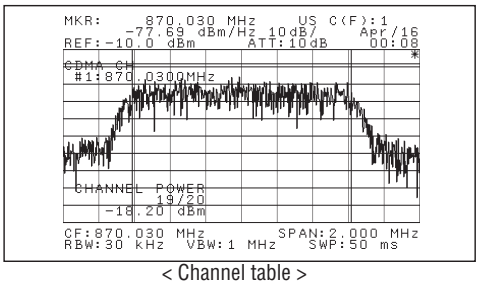
- Factor table enables power value correction



< Channel power measurement >

■ Built-in Channel Table for Each CDMA System

- Center frequency setting by channel No.
- Forward/Reverse channels supported
- Channel No. offset
- User table to input up to 99 channels



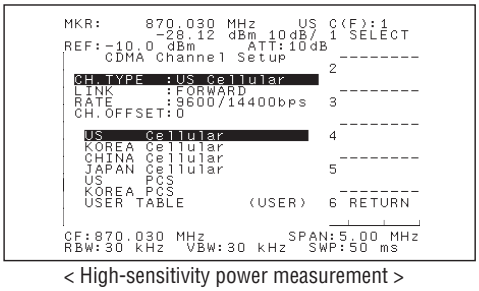
< Channel table >

■ High-sensitivity Power Measurement by Built-in Pre-Amp

- CDMA channel power of -90dBm/1.23MHz or less (Typ.) can be measured with the built-in pre-amp.

* Measurement range: +20 to -90dBm/1.23MHz (Typ.)(Pre-amp ON: -25 to -90dBm/1.23MHz (Typ.))

Built-in pre-amp factors are automatically corrected.



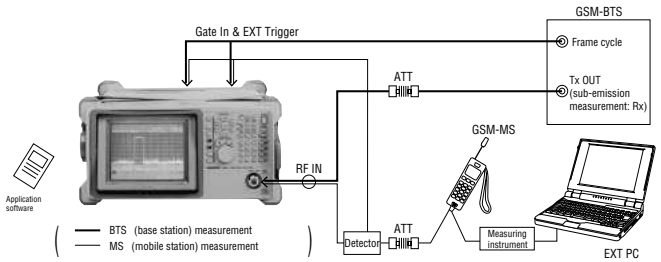
< High-sensitivity power measurement >

Application Software

■ GSM/DCS1800/DCS1900 Measurement Software

By combining the Spectrum Analyzer U3641 or U3641N and the GSM/DCS1800/DCS1900 Measurement Software, transmission characteristic tests can be easily conducted in conformance to GSM-05-05/J-STD-007.

- Conformance to GSM-05-05/J-STD-007 test methods
- GSM/DCS standard measurements and judgment by single-key operation
- Selectable individual item measurement and sequential measurement
- Storage of setting conditions and measurement results on memory card



Measurement Items

Measurement items (GSM/DCS)	Measurement item name (Supported)
Output Power	• Carrier Power • Tx Band Peak Power • Tx Band Total Power
Output RF Spectrum due to the Modulation	• Modulation Swept up to 1.8 MHz • Modulation Multiple up to 1.8 MHz • Modulation Single up to 1.8 MHz • Modulation Swept from 1.8 MHz • Modulation Multiple from 1.8 MHz • Modulation Single from 1.8 MHz
Output RF Spectrum due to Transients	• Transients Swept • Transients Multiple • Transients Single
Spurious Emissions (to3 GHz)	• Trm/Rcv TX Band Excluded • Trm/Rcv TX Band • RX Band
Output Level Dynamic Operation	Power vs Time • Frame • Time Slot

4 types of application software are available for different standards.

Model	Product Name
PU36410300-IC	GSM/DCS1800-MS Software
PU36410310-IC	GSM/DCS1800-BS Software
PU36410500-IC	DCS1900-MS Measurement Software
PU36410510-IC	DCS1900-BS Measurement Software

Note: These applications are available only in the manual (master) mode and require the controller option (OPT.15) for operation.