Spectrum Analyzers
U3641/N • U4342 • U4941/N

Features

U3641/U3641N

- 9 kHz to 3 GHz Frequency Range
- Ultra-Compact and Light Weight – 15 lbs.
- Three-way Power Supply – AC Line, External DC, and Optional Battery Pack
- 6 in. TFT Color LCD Display
- Synthesized Local Oscillator Yields High-Stability Measurements
- Two PCMCIA Memory Card Slots
- Switchable Preamp for High-Sensitivity Measurements
- Optional Internal Tracking Generator
- Built-In Adjacent Channel Power, Occupied Bandwidth, and Channel Power Measurements

U4941/U4941N SAME AS U3641/U3641N EXCEPT:

- 9 kHz to 2.2 GHz Frequency Response
- Does Not Include Synthesized Local Oscillator

U4342 SAME AS U4941 PLUS:

- Built-In Internal Tracking Generator

Applications

U3641/U3641N

- Digital Mobile Communications Field Measurements (TDMA or CDMA, PCS and Cellular)
- Spectrum Monitoring
- RF Component Testing with Internal Tracking Generator Option
- Fault Location in Antenna Feeds with BasePak Software

U4941/U4941N/U4342 SAME AS U3641 PLUS:

- EMC Field Measurements

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See Tektronix on the World Wide Web: http://www.tek.com

GPIB IEEE-488 *Product(s) complies with IEEE Standard 488.2-1987.*

ADVANTEST

Advantest's quality system complies with the DIN ISO 9002 standard and has been certified by TUV Product Service GMBH.

U3641/U3641N Field Portable Spectrum Analyzers

The U3641/N is a 3 GHz synthesized spectrum analyzer ideal for applications where portability is a must. With a base unit weight of 15 lbs. and the ability to run from AC, DC, or optional battery power sources, the U3641/N has been designed specifically to meet the needs of field installation and maintenance applications. The synthesized local oscillator allows high-precision and high-stability measurements. Furthermore, the unit features optional resolution bandwidths down to 100 Hz. A fast zero span sweep speed of 50 µs allows characterization of TDMA signals, and its built-in measurement functions allow for easy verification of communication standard compliance.

The U3641/N can be customized for a variety of applications by selecting from a wide range of available options.

U4941/U4941N/U4342 RF Field Analyzers

The U4941/N/U4342 spectrum analyzers provide the same portability and ruggedness as the U3641/N in a more economical, non-synthesized instrument. These analyzers cover a frequency range of 9 kHz to 2.2 GHz, also making them useful for cellular and PCS communications applications. In addition to functions shared with the U3641/N, the U4941/N/U4342 are well suited for EMI measurements with built-in quasi-peak detector and EMC filters.

WIDE ARRAY OF ANALYSIS FUNCTIONS

Along with functions such as a frequency counter with a 1 Hz resolution and a 20 dB gain preamplifier, these analyzers come standard with measurement functions such as third order intermodulation distortion, percent AM, 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.

Using the user-define function, commonly used measurements can be easily assigned to function keys, allowing a user-created custom, easy-to-use menu.

THE LIGHTEST FIELD ANALYZERS IN THEIR CLASS

These analyzers are light and compact – 15 lbs. base unit, under 20 lbs. with battery. The easy-to-attach strap allows the analyzer to be carried on the shoulder for transport or during measurements. The rugged construction meets MIL-T-28800 and stands up to the harsh conditions of field use.

CDMA MEASUREMENTS

Addition of the CDMA Option 60 enables easy one button measurement of CDMA transmission characteristics including in-band spurious, occupied bandwidth, channel power, and adjacent channel power. Measurements are included for both base stations and mobile phones, at cellular and PCS frequencies.

THREE POWER SOURCES TO CHOOSE FROM

The U3641/U3641/N can operate not only on 100/200 V AC power, but also on +10 to +16 V DC or the optional battery pack. Choose the power source that matches your need for portable flexibility.

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LARGE COLOR TFT LCD DISPLAY
The 6 in. color TFT LCD display enhances viewing of complex measurements. A built-in tilt mechanism allows adjusting the viewing angle ±15 degrees to improve visibility and efficiency.

COMPUTER AND INTERFACE FRIENDLY
These analyzers are well suited for computer-based applications. Two PCMCIA memory card slots allow you to store and recall instrument settings and measurements. This data can also be transferred directly to a computer in CSV (comma separated variable) and BMP screen image formats. The memory card slots incorporate a dust-proof shutter and an eject mechanism for reliable operation even in difficult outdoor working conditions.

RS-232C and GPIB ports are also standard. This allows you to print hardcopies of spectrum information and to control the instruments from and external computer as well as send/retrieve data.

Composite video out jacks are standard. The output of these spectrum analyzers can be easily projected for better viewing in meetings or training sessions.

Characteristics

FREQUENCY RELATED
Frequency Range –
U3641: 9 kHz to 3 GHz.
U4941/U4342: 9 kHz to 2.2 GHz.

Frequency Readout Accuracy – (Start, Stop, CF, Marker)
U3641/N: ±(marker frequency x frequency reference error + 5% x span + 15% x RBW + 10 Hz).
U4941/N/U4342: ±(span x span accuracy + 0.15 x RBW + 50 kHz).

Count Frequency Marker –
Resolution:
U3641/N: 1 Hz to 1 kHz.
U4941/N/U4342: 1 Hz to 1 kHz.
Count Accuracy:
U3641/N (S/N ≥25 dB, RBW ≥3 kHz, 1 kHz ≤ SPAN ≤200 MHz): ±(marker frequency x frequency reference accuracy +1 LSD ± 5 Hz).
U4941/N/U4342: (S/N ≥ 25 dB, 50 kHz ≤ span ≤ 10 MHz, RBW ≥ 100 kHz): ±(marker frequency x frequency reference accuracy +1 LSD ± 5 Hz).

Frequency Reference Accuracy – ±2 x 10^{-6}/year ±1 x 10^{-5} (at 0°C to 50 °C).

Frequency Span –
Range:
U3641/N: 1 kHz to 3.2 GHz,
0 Hz (Zero Span).
U4941/U4342/N: 1 kHz to 2.4 GHz,
(Zero Span).
Accuracy:
U3641/N: ≤±5% (SPAN).
U4941/U4342/N: ≤±5% (SPAN ≥ 100 kHz).

Frequency Stability –
U3641/N:
Residual FM: ≤60 Hzp-p/100 ms (ZERO span).
Frequency Drift: <150 Hz/min (SPAN ≤10 kHz).

Frequency Stability –
U4941/4342/N:
Residual FM: ≤3 kHz p-p/100 ms.
Frequency Drift (50 ms to 5 s sweep time): <10 kHz after 30 min. warm-up.

Noise Sidebands –
U3641/N:
20 kHz Offset: ≤–105 dBc.
10 kHz Offset: ≤–100 dBc.
U4941/4342/N: ≤–100 dBc/Hz at 20 kHz offset.

Resolution Bandwidth (3 dB) –
Range: 1 kHz to 3 MHz, 1-3 sequence.
U3641, Opt. for 100, 300 Hz.
Bandwidth Accuracy:
1 kHz to 1 MHz: ≤±20%.
3 MHz: ≤±25%.
Selectivity: <15:1 (60 dB to 3 dB, RBW 1 kHz to 3 MHz).
Bandwidth (6 dB) (U4941/N): 9 kHz, 120 kHz (conforming to CISPR standard).

Video Bandwidth – 10 Hz to 3 MHz (1-3 step).

AMPLITUDE RELATED
Amplitude Range –
U3641: +20 dBm to displayed Average Noise Level.
U3641N: +130 dBµV to displayed Average Noise Level.
U4941/N: +20 dBm to displayed Average Noise Level: +130 dBµV to displayed Average Noise Level.

Maximum Input Level (±50 V DC maximum) –
Preamplifier OFF (Input Atten ≥10 dB):
U3641: +27 dBm.
U3641N: +134 dBµV.
U4941/N: +27 dBm, +134 dBµV.
Preamplifier ON (input atten ≥10 dB):
U3641: +13 dBm.
U3641N: +120 dBµV.
U4941/N: +13 dBm, +120 dBµV.

Display Range –
Log: 10 x 10 div, 10, 5, 2, 1 dB/div.
Linear: 10% of reference level/div,
RBW gt;/=3 kHz.
QP Log (U4941/N): 40 dB (5 dB/div).

Reference Level Range (U3641/N) –
Preamplifier OFF (Input Atten 0 dB to 50 dB):
Log: U3641, –64 dBm to +40 dBm;
U3641N, +46 dBµV to +150 dBµV.
Linear: U3641, +141.1 µV to +22.36 V;
U3641N, +198.4 µV to 31.44 V.
Preamplifier ON (Input Atten 0 dB to 10 dB):
Log: U3641, –89 dBm to –25 dBm (0.1 dB step); U3641N, +21 dBµV to +85 dBµV.
Linear: U3641, +7.934 µV to +12.57 mV;
U3641N, +11.16 µV to 17.68 mV.

Reference Level Range (U4941/U4342/N) –
Preamplifier OFF: Log, –64 dBm to +40 dBm (0.1 step); +46 dBµV to +150 dBµV
Linear, +141.1 µV to +22.36 V; 199.5 µV to 31.62 V.
Preamplifier ON: Log, –84 dBm to +10 dBm (0.1 dB step); +26 dBµV to +120 dBµV.
Linear, 14.11 µV to 707.1 mV, 19.95 µV to 1 V.

Input Attenuator Range – 0 to 50 dB (10 dB step).

SWEEP RELATED
Sweep Time –
U3641/N: 50 µs to 1000 s and manual sweep.
U4941/4342/N: 50 ms to 1000 s and manual sweep.

Accuracy – ≤±5%.

Trigger Mode – Free Run, Single, Video, Ext, TV.

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

DYNAMIC RANGE
Displayed Average Noise Level (RBW 1 kHz, VBW 10 Hz) –
Preamplifier OFF:
U3641: –117 dBm + 2.7 f (GHz) dB.
U3641/N: –8 dBµV + 2.7 f (GHz) dB.
U4941/N: –117 dBm + 2.7 f (GHz) dB; -8 dBµV + 2.7 f (GHz) dB.
Preamplifier ON:
U3641: –135 dBm + 4.3 f (GHz) dB.
U3641/N: –26 dBµV + 4.3 f (GHz) dB.
U4941/N: –132 dBm + 3.3 f (GHz) dB; -23 dBµV + 3.3 f (GHz) dB.

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Gain Compression (1 dB) –
Preamplifier OFF (mixer input level, f ≥10 MHz):
U3641: >–10 dBm.
U3641/N: >+100 dBµV.
U4941/N: >–10 dBm (mixer input level, f ≥10 MHz); >+100 dBµV.
Preamplifier ON (RF input level, f ≥10 MHz):
U3641 (ATT = 0): >–40 dBm.
U3641/N: >+70 dBµV.
U4941/N: >–40 dBm (RF input level, f ≥10 MHz): >+70 dBµV.

Spurious Response (Input Atten 0 dB,f ≥10 MHz) –
Preamplifier OFF:
Second Harmonic Distortion:
U3641: ≤–70 dB (–30 dBm input).
U3641/N: ≤–70 dB (+78 dBµV input).
U4941/N: ≤–70 dB (–30 dBm input).
Third Order Intermodulation Distortion:
U3641: ≤–70 dB (–30 dBm input).
U3641/N: ≤–70 dB (+78 dBµV input).
U4941/N: ≤–70 dB (–30 dBm input).

Residual Responses (Input Atten 0 dB, f ≥10 MHz) –
Preamplifier OFF:
U3641: ≤–100 dBm, 50 Ω.
U3641/N: ≤+10 dBµV, 75 Ω.
U4941/N: ≤–100 dBm; ≤+10 dBµV.
Preamplifier ON:
U3641: ≤–105 dBm, 50 Ω.
U3641/N: ≤+5 dBµV, 75 Ω.
U4941/N: ≤–115 dBm; ≤-5 dBµV.

AMPLITUDE ACCURACY
Frequency Response (Input Atten 10 dB, 20°C to 30°C, referenced to 30 MHz, after calibration) –
Preamplifier OFF:
U3641: ≤±1 dB (100 kHz to 2.7 GHz); ≤2 dB (9 kHz to 3.0 GHz).
U3641/N: ≤±1 dB (100 kHz to 2.7 GHz).
U4941/N: ≤±1 dB (100 kHz to 2.0 GHz); ≤2 dB (9 kHz to 2.2 GHz).
Preamplifier ON:
U4342: ≤±1 dB (100 kHz to 2.7 GHz).
U3641: ≤±2 dB (9 kHz to 3.0 GHz).
U3641/N: ≤±1 dB (100 kHz to 2.2 GHz).
U4941/N: ≤±1 dB (100 kHz to 2 GHz); ≤2 dB (9 kHz to 2.2 GHz).

Calibration Signal Accuracy –
U3641: –20 dBm ±0.3 dB.
U3641/N: +90.5 dBµV ±0.3 dB.
U4941/N: –20 dBm ±0.3 dB; + 90.5 dBµV ±0.3 dB.

IF GAIN UNCERTAINTY (after automatic calibration) –
≤±0.5 dB.

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 3 kHz.

Input Attenuator Switching Accuracy (10 dB reference, 20 dB to 50 dB setting) –
U3641:
100 kHz to 2.7 GHz: ≤±1.0 dB.
9 kHz to 3.0 GHz: ≤±1.5 dB.
U3641/N:
100 kHz to 2.2 GHz: ≤±1.0 dB.
U4941/N:
100 kHz to 2 GHz: ≤±1.0 dB.
9 kHz to 2.2 GHz: ≤±1.5 dB.

Resolution Bandwidth Switching Uncertainty (after automatic calibration) –
≤ ± 1.0 dB at RBW 3 MHz.

INPUTS AND OUTPUTS
RF Input –
Connector: N-type jack.
Impedance:
U3641/U4941/U4342: 50 Ω (nominal).
U3641/N/U4941/N/U4342/N: 75 Ω (nominal).
VSWR:
Preamplifier OFF:
100 kHz to 2 GHz: ≤1.5:1.
9 kHz to 3.0 GHz (2.2 GHz U3641/N/U4941/U4941/N): ≤2:1.
Preamplifier ON:
10 MHz to 3.0 GHz (2.2 GHz U3641/N): ≤2.5:1.
10 MHz to 2.0 GHz (U4941/N): ≤2:1.

10 MHz Reference Input –
Connector: BNC jack, rear panel.
U3641/N/U4342:
Impedance: 50 Ω (nominal).
Input Range: 0 dBm to +16 dBm.
U4941/N:
Impedance: 50 Ω (nominal).
Input Range: +8 dBm to +16 dBm.

Video Output –
Connector: BNC jack, rear panel.
Impedance: 75 Ω (nominal), AC coupled.
Amplitude: Approx. 1 Vp-p, 75 Ω (composite video signal).

External Trigger Input –
Connector: BNC jack, rear panel.
Impedance 10 KΩ (nominal), DC coupled.
Trigger Level: TTL level.

Gate Input –
Impedance: 10 KΩ (nominal).
Sweep Step: During TTL low level.
Sweep Continue: During TTL high level.

Phone Output –
Connector: Subminiature monophonic jack, front panel.
Power Output: 0.2 W into 8 Ω (nominal).

GPIB Interface –
Connector: IEEE-488 bus.
Plotter: HP-GL commands (682-XA).
Printer: PCL commands.

RS-232 –
Connector: D-SUB 9-Pin, rear panel.

Memory Card – Two memory card slots, JEIDA-Ver.4.1, PCMCIA Rel. 2.0, Type 1.

HIGH STABILITY REFERENCE SOURCE (OPT. 20 ONLY, U3641/N)
Frequency – 10 MHz.

Frequency Accuracy –
$\pm 2 \times 10^{-8}$/day.
$\pm 1 \times 10^{-7}$/year.

PHS-ID DEMODULATOR FUNCTION (OPT. 70 ONLY, U3641)
Opt. 20 and Opt. 70 cannot be installed simultaneously.

Signal Reception –
Radio Access Format – TDMA-TDD.
Modulation Format: pi/4 DQPSK.
Transmission Speed: 384 Kbits/s
Signal Channel: Logic control channel code configuration conforms to RCR STD-28.

Level Measurement Range –
Reception Performance:
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 Functions –
ID List Displays: CI, CS-ID, PS-ID, level, time.
ID-MKR: Display of specified signal ID.
Period Measurement: Measurement of specified CS-ID.

Burst Error Rate – The number of error slots/The measured (Set) number.

Level Measurement Operations –
Center value processing.
Average value processing.
Max.min. value processing.

TV DEMODULATION FUNCTION (OPT. 72 ONLY) U3641/N
TV Demodulation –
Demodulation Type: NTSC, PAL, SECAM.
TV Standard: M, B/G, D/K/K', I, L/L'.
Output: Video, sound.

TV Image Demodulation Output –
Connector: BNC jack, rear panel.
Impedance: 75 Ω (nominal), DC coupled.
Amplitude: Approx. 1 V_{p-p}, 75 Ω.

TV Sound Demodulation Output –
Connector: Pin jack, rear panel.
Impedance: 1 KΩ (nominal), AC coupled.

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TV Image Signal Input –
Connector: BNC jack, rear panel.
Impedance: 75 Ω (nominal), AC coupled.
Input Level: About 1 V_{p-p}.

TV Sound Signal Input –
Connector: Pin jack, rear panel.
Impedance: 1 KΩ (nominal), AC coupled.

TRACKING GENERATOR FUNCTION
Opt for U3641/N. STD for U4342.

Frequency Range – 100 kHz to 2.2 GHz.

Output Level Range –
0 dBm to –31 dBm, 1 dB steps.
N Version: 105 dBµV to 74 dBµV, 1 dB steps.

Output Level Accuracy –
(at 30 MHz, –10 dBm: ≤0.5 dB.
N Version (at 30 MHz, 95 dBµV: ≤0.5 dB.

Output Level Flatness –
(at –10 dBm, 30 MHz reference):
100 kHz to 1 GHz: ≤±0.7 dB.
100 kHz to 2.2 GHz: ≤±1.5 dB.
N Version (at 95 dBµV, 30 MHz reference):
100 kHz to 1 GHz: ≤±0.7 dB.
100 kHz to 2.2 GHz: ≤±1.5 dB.

Output Level Switching Accuracy –
(at –10 dBm reference):
100 kHz to 1 GHz: ≤±1.0 dB.
100 kHz to 2.2 GHz: ≤±2.0 dB.
N Version (at 95 dBµV reference):
100 kHz to 1 GHz: ≤±1.0 dB.
100 kHz to 2.2 GHz: ≤±2.0 dB.

Output Spurious –
Harmonic: <–20 dBc.
Non-harmonic: <–30 dBc.

Tracking Generator Leakage –
≤–95 dBm.
N Version: ≤–16 dBµV.

Tracking Generator Output –
Connector: N-type jack.
Impedance:
50 Ω (nominal).
N Version: 75 Ω (nominal).
VSWR:
(≤–10 dBm output): ≤1.5.
N Version (≤-10 dBµV output): ≤2.0.

CHANNEL INPUT SETTING (OPT. 78 ONLY, U3641/N) (Opt. 78 is included in Opt. 72.)

Channel Setting – Channel setting for VHF, UHF, CATV, BS, and CS. Two user tables are available and 99 channels can be registered for each table.

ENVIRONMENTAL
Temperature –
Operating: 0°C to 50°C.
Non-operating: –20°C to +60°C.

Humidity – 85% or less.

POWER REQUIREMENTS
External DC Input –
Connector: XLR 4-Pin.
Voltage Range: +10 V to +16 V.
Power Consumption: 60 W maximum.

AC Input –
Line Voltage: 100 VAC and 200 VAC, auto switching.
Voltage Range:
100 V Operation: 90 V to 120 V.
220 V Operation: 220 V to 240 V.
Line Frequency: 50 Hz/60 Hz.
Power Consumption: 100 VA maximum.

PHYSICAL CHARACTERISTICS

Dimensions (without feet or connectors)

	mm	in.
Height	148	5.75
Width	291	11.375
Depth	330	13.25

Weight (without options, accessories, carrying belt, batteries)

	kg	lbs.
U3641/N/U4342	6.9	15.2
U4941/N	6.5	14.3

ORDERING INFORMATION

For price information: Outside the U.S. contact your local Tektronix representative, inside the U.S. see the price list in the back of this catalog.

U3641
Portable Spectrum Analyzer, 50 Ω Input.

U3641N
Portable Spectrum Analyzer, 75 Ω Input.
Includes: Power Cable (A01402), N-to-BNC Adapter (U3641 – JUG-201A/U), NC-to-BNC Adapter (U3641N – BA-A165), N-C15 Adapter (U3641N – (NCP-NFJK), AC-DC Adaptor (A08364), Carrying Strap, Operation Manual, SRAM card.

U4342
RF Field Analyzer with Tracking Generator, 50 Ω Input.

U4342/N
RF Field analyzer with Tracking Generator, 75 Ω Input.
Includes: Power Cable (A01402), N-to-BNC Adapter (U4342 – JUG-201A/U), NC-to-BNC Adapter (U4342/N – BA-A165), N-C15 Adapter (U4342/N – (NCP-NFJK), AC-DC Adaptor (A08364), Carrying Strap, Operation Manual, SRAM card.

U4941
RF Field Analyzer, 50 Ω Input.

U4941/N
RF Field Analyzer, 75 Ω Input.
Includes: N-to-BNC Adapter (JUG-201A/U), AC-DC Adaptor (A08364), Carrying Strap, Instruction Manual, Quick Guide, SRAM card.

U3641/U3641/N OPTIONS
Opt. 15 – Program controller.
Opt. 20 – High-stability reference (cannot be installed with Opt. 70).
Opt. 26 – Narrow RBW filters (300/100 Hz).
Opt. 60 (U3641 only) – CDMA Measurement IS-95/J-STD-008 TX measurement..
Opt. 70 (U3641 only) – PHS demodulation (cannot be installed with Opt. 20 or Opt. 72).
Opt. 72 – TV demodulation (cannot be installed with Opt. 70, includes Opt. 78).
Opt. 74 – Tracking generator.
Opt. 78 – Channel input setting (included with Opt. 72).

MEASUREMENT SERVICE OPTIONS
U3641/N, U4342/N, U4941/N
Opt. C3 – Three years of Calibration Services.
Opt. C5 – Five years of Calibration Services.
Opt. D3 – Test Data (requires Opt. C3).
Opt. D5 – Test Data (requires Opt. C5).
Opt. R3 – Repair warranty extended to cover three years.
Opt. R5 – Repair warranty extended to cover five years.

RECOMMENDED ACCESSORIES
Battery – Order 146-0111-00 (Requires Charger).
Battery Charger – Order 119-4901-00.
External DC Power Cable – Order A01434.
Memory Card, 64K – Order A09507.
Soft Carrying Case – Order R16216.
Transit Case – Order R16072.
Front Panel Cover – Order A02806.
Carrying Handle – Order A08184.
Display Hood – Order R16601

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ISO 9001 *Tektronix measurement products are manufactured in ISO registered facilities.*

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