

NetTek® Analyzer

► YBT250 Base Station Transmitter and Interference Analyzer

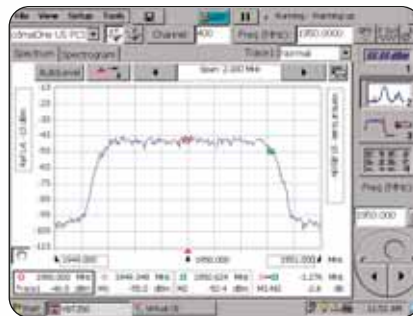


Affordable, Portable, Ready for the Field

Digital and Analog Transmitter Verification with Outstanding Interference Resolution Capabilities

The Tektronix NetTek analyzer is a revolutionary portable field tool. The YBT250 test module tailors this system for fast trouble resolution and easy transmitter verification of cellular, DCS/PCS and 3G base stations and Node Bs.

The NetTek analyzer with the YBT250 test module is not an expensive, do-everything solution; instead, the YBT250 test module is optimized to perform the day-to-day RF and demodulation measurement tasks that occupy the majority of a technician's time. Further, the YBT250 test module offers this capability at a surprisingly low price, in a rugged, easy-to-use package, suitable for all field environments.



Multi-standard

Now, only one tool is needed for RF transmitter maintenance, with specific measurements for GSM/GPRS, EDGE, W-CDMA/UMTS/HSDPA, cdmaOne, cdma2000 1xRTT, cdma2000 1xEV-DO, TDMA and analog.

► Features & Benefits

Handheld, Multi-standard Base Station Transmitter Field Tester

Measure Power and Verify the Most Important RF Transmitter Functions of GSM/GPRS, EDGE, W-CDMA/UMTS, HSDPA, cdmaOne, cdma2000 1xRTT, cdma2000 1xEV-DO, TDMA and Analog Base Stations

Interference Analyst with High Sensitivity, Including AM and FM Demodulation, Helps Identify Interference Problems

Modular Instrument for Handheld NetTek® Platform which Allows for Easy Future Expansion for New Functions

Measure cdmaOne, cdma2000, 1xEV-DO, GSM/GPRS/EDGE and W-CDMA/UMTS/HSDPA RF Performance Over-the-Air

Scan for Coverage of cdmaOne, cdma2000, 1x EV-DO, GSM/GPRS/EDGE, and W-CDMA/HSDPA Signals

► Applications

Base Station Transmitter Troubleshooting in the Field

Resolve Interference Problems

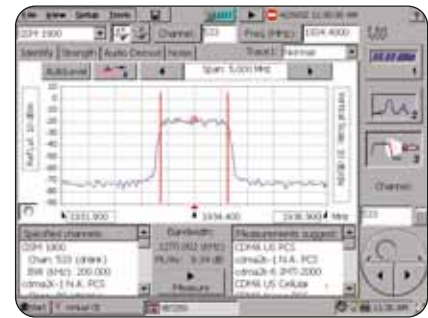
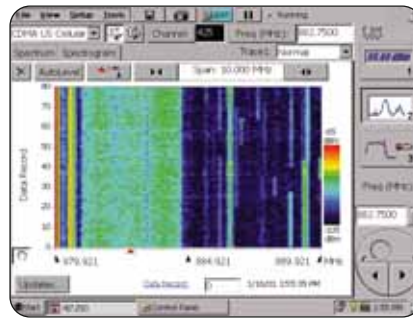
Maintenance and Installation Checks

RF QoS Monitoring

W-CDMA and RF Field Strength Measurements

NetTek® Analyzer

► YBT250 Base Station Transmitter and Interference Analyzer



Easy to Use

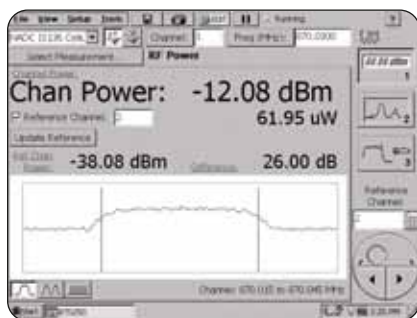
The NetTek analyzer is based around the familiar Windows CE operating system. As a result, users will spend less time learning the instrument and more time troubleshooting the network. The YBT250 test module puts measurement functions just a point of the finger away. Furthermore, built-in help guides speed the measurement process.

Common measurements have been optimized for quick, repeatable results. For example, novice users can display spectrum analyzer results with straightforward Windows-like zoom and resize controls. The Sequencer allows users to do a customized selection of the RF Power Carrier Frequency, Occupied Bandwidth, Code Domain Signal Quality and Code Domain Power measurements.

Interference Analyst Option

The YBT250 test module helps locate and identify stray signals that cause dropped calls and poor quality service. To better see what signals may be polluting a Base Station receiver, the optional interference package allows measurements to -134 dBm. This sensitivity also makes the unit ideal for site surveys. The YBT250 test module also includes a spectrogram display, allowing the user to capture spectrum activity while displaying frequency, power level and time information. This translates to easier identification of hard-to-find, periodic interference problems. The Interference option includes a built-in modulation ID function. Simply touch a signal and the instrument will offer information on the likely modulation type, differentiating between CDMA, W-CDMA, GSM, IS-136 and analog transmissions. A strength meter can then help find the location of the interferer.

In addition to interference identification and location capability, the interference option also includes the capability to measure RF Field Strength, allowing the measurement of RF emissions at any given location. Also available is the capability to measure multiple W-CDMA C-PICH (Ec) field strengths, identified by scrambling codes. This is essential when checking emission limits of W-CDMA Node Bs.



Power Measurement

This portable instrument does not sacrifice accuracy. The YBT250 test module allows you to measure channel power for common CDMA, GSM, TDMA and analog systems. Measurement accuracy is ± 0.75 dB.

Furthermore, peak-to-average power characteristics can be reported for digital carriers.

Burst power can also be measured automatically with the YBT250 test module for GSM systems.

For cdma2000 1x EV-DO systems, the YBT250 provides an idle and non-idle time domain mask as well as Pilot/MAC power and Idle Activity.



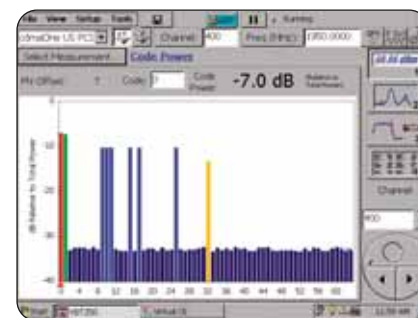
Maintenance Tx Checks

The YBT250 test module's combination of measurements means the unit is up to the task of performance monitoring and troubleshooting.

Measurement results can be saved into Windows-compatible formats and results can be overlaid on the instrument to yield insight into system degradation.

Furthermore, the spectrogram formats allow the user to easily monitor transmitter performance over time, with user defined sample intervals.

Channel power and frequency error measurements can be performed on multiple radios with just a few taps.



Optional cdmaOne Demodulation

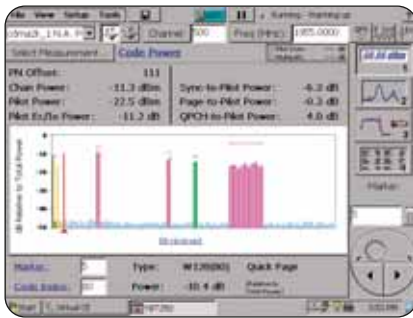
The cdmaOne test suite adds to the extensive capabilities of the YBT250 test module to include cdmaOne operators.

With this option, the instrument can perform code domain power, pilot, PN offset, CDMA Carrier Frequency, ρ and carrier feedthrough measurements.

For performance monitoring of cdmaOne systems, the spectrogram functions have been broadened to include cdmaOne Walsh codes. As a result, code performance can be graphically monitored over time.

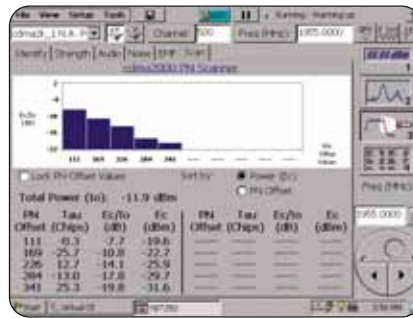
NetTek® Analyzer

► YBT250 Base Station Transmitter and Interference Analyzer



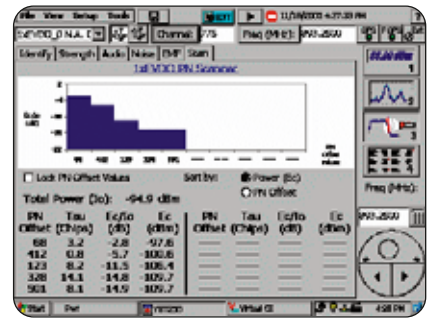
Optional cdma2000 1xRTT Demodulation

This cdma2000 option adds 1x (RC1-RC5) demodulation capabilities to the YBT250. Like option CD1 for cdmaOne, this option provides the user with code domain power, pilot, PN offset, ρ and other cdma2000 specific measurements.



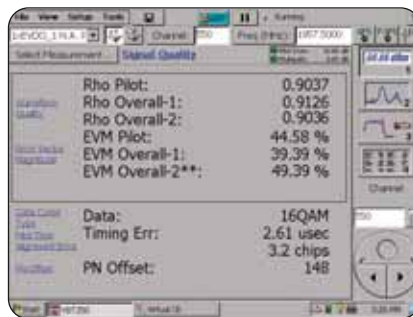
Optional cdma2000 Over-the-Air Measurements

This cdma2000 over-the-air software option adds the capability to make cdma2000 measurements without taking the base station out of service or using a physical test connection. This option also automatically identifies the PN offsets for the ten strongest pilots and graphically displays their power level and timing error. This option monitors pilot dominance and multipath power so users can evaluate their RF measurement environment.



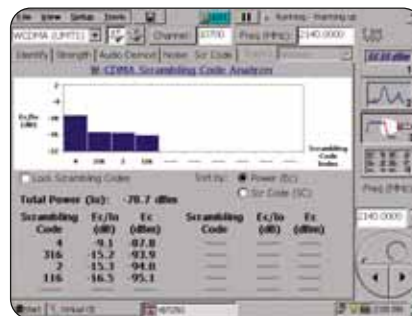
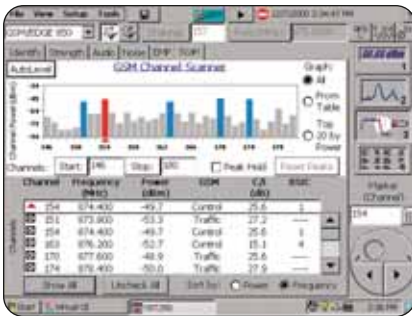
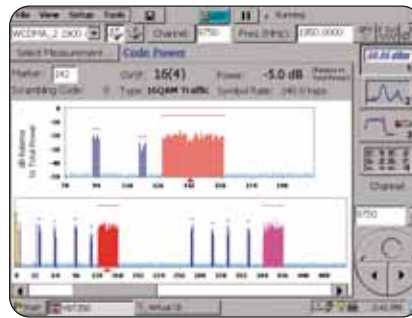
Optional 1xEV-DO Scanner

The 1xEV-DO scanner adds two capabilities. First, it allows BTS maintenance personnel to find the “sweet spot” for Over-the-Air 1xEV-DO signal quality tests. This can now be done without taking the base station out of service, or even hooking up to the BTS. Second, it gives optimization and planning personnel the ability to troubleshoot coverage, interference, and co-channel interference issues with an easy-to-use handheld tool. This option automatically identifies the PN Offsets for the ten strongest pilots and graphically displays their power level, timing error and E_c/I_o . This option also measures pilot dominance and multipath power so users can evaluate their RF measurement environment.



Optional cdma2000 1x EV-DO Demodulation

With this cdma2000 1x EV-DO option, the instrument can perform MAC code domain power, pilot and overall ρ , PN offset, data modulation type identification and other cdma2000 1x EV-DO measurements.



► NetTek platform combined with test modules.

Optional GSM/GPRS EDGE RF and Demodulation Testing

This GSM/GPRS and EDGE measurement suite adds the capability to test EGPRS signals to the YBT250. It provides the user with the most important base station RF measurements. These measurements include RF power measurements for each time slot, Power vs. Time, EVM, Phase Error, Origin Offset, Carrier to Interference ratio and other EDGE measurements.

Optional GSM/GPRS/EDGE Scanner

The GSM/GPRS/EDGE Scanner adds two capabilities. First, it allows BTS maintenance personnel to find the “sweet spot” for Over-the-Air GSM, GPRS or EDGE signal quality tests. This can now be done without taking the base station out of service, or even hooking up to the BTS. Second, it gives optimization and planning personal the ability to troubleshoot coverage, interference and co-channel interference issues with a easy-to-use handheld tool. This option automatically identifies the channel, frequency, power, channel type, C/I and if the signal is a control channel, the BSIC, for channels in the selected range.

Optional W-CDMA/UMTS/HSDPA Demodulation

This W-CDMA/UMTS/HSDPA option adds 3GPP Release 5 demodulation capabilities to the YBT250. It provides the user with code domain power, pilot and sync power, scrambling code, EVM overall, EVM for 16 QAM modulations, Peak Code Domain Error and other W-CDMA specific measurements. In addition, the option includes provision for measurement of Revision 5 signals using Transmit Diversity.

Optional W-CDMA/UMTS/HSDPA Scrambling Code Analyzer

This W-CDMA/UMTS/HSDPA option adds the capability to evaluate the co-channel interference from neighboring Node B base stations. This enables users to determine the effect of making changes to or adding a Node B base station to their network, and evaluate any changes which might contribute to pilot pollution. W-CDMA Field Strength measurements are also available, enabling essential measurement of C-PICH (Ec) emissions.

The Modules and the Platform

The Tektronix NetTek® analyzer platform is required for using NetTek modules and cards. The NetTek platform includes the display, power supply, CPU and battery compartments. Modules can then be attached to the back. Up to four modules can be attached at once. A variety of modules and options allows you to tailor the instrument to service the standards and interfaces in use in your network. The modular design also means that the instrument can easily be upgraded. New measurements or standards can be added with software upgrades, or with additional modules.

NetTek® Analyzer

► YBT250 Base Station Transmitter and Interference Analyzer

► Characteristics

YBT250 Test Module

Operation Modes –

Transmitter Testing.
Interference Analysis.
Spectrum Monitoring.

Measurement Packages

Interference Option IN1

AM/FM Demodulation.
Interference Identification.
Spectrogram with Variable Duration.
Signal Strength.
Noise Floor Measurement.
RF Field Strength.
W-CDMA Field Strength.*1

RF Measurement Options GR1, CR1, CRE, WR1, IR1, AR1, EM1

RF Carrier Frequency –

±10 Hz + Time base Error, 99% Confidence Interval.

Occupied Bandwidth (OBW) –

Bandwidth within which 99% of the power transmitted on a single channel lies.

FM Deviation (Applicable to AR1) –

±10% typical.

For deviations 2 to 10 kHz; usable range to 15 kHz.

Audio frequency = maximum 3 kHz.

RF Channel Power² (CW or Peak Envelope Power) –

±0.75 dB for –20 dBm to +30 dBm
[±0.5 dB typical].

±1.25 dB for –80 dBm to –20 dBm

[±1.0 dB typical].

Burst Power Measurement (Applicable to GR1, CRE, and EM1) –

±1.0 dB for –20 dBm to +30 dBm

[±0.75 dB typical].

±1.5 dB for –80 dBm to –20 dBm

[±1.25 dB typical].

cdmaOne, cdma2000 1x RTT, and cdma2000 1x

EV-DO Demodulation Options CD1, CD2, CDE

Waveform Quality – ±0.005 for $0.9 < \rho < 1.0$.

Code Domain Power –

±1 dB when >–20 dB relative to Tx power.

Code Domain Power display update: 1 s (typical).

Timing Error – ±250 ns, typical.

Carrier Feedthrough –

±2 dB, –50 dBc residual floor (applicable to CD1 and CD2).

Other Measurements –

Codogram, Pilot Power, Error Vector Magnitude, PN Offset.

*1 If ordered with Opt. WS1.

*2 Also applies to RF Field strength.

cdma2000 PN offset Scanner Opt. CS1

Input Signal Range – –120 dBm to +30 dBm.

Resolution –

lo, Ec/lo, Ec: –0.1 dB.

PN Offset: 1 PN index.

Tau: 0.1 chip.

Accuracy –

Ec: ±2 dB for Ec ≥ –95 dBm and Ec/lo ≥ –8 dB,

±3 dB for Ec ≥ –110 dBm and Ec/lo ≥ –12 dB.

Tau: ±0.5 chip, of highest power multipath component of each detected PNOS, relative to input timing reference (ESC or YBGPS1).

1xEV-DO PN Offset Scanner Opt. ES1

Input Signal Range – –120 dBm to +30 dBm.

Resolution –

lo, Ec/lo, Ec: 0.1 dB.

PN Offset: 1 PN Index.

Tau: 0.1 chip of highest power multipath component of each detected PN Offset, relative to input timing reference (ESC or YBGPS1).

GSM/GPRS and EDGE RF and Demodulation Measurements Opt. EM1

Error Vector Magnitude (8-PSK Only) –

±1.5%; $4\% \leq \text{EVM} \leq 10\%$.

Phase Error (GMSK Only) –

±1.0°; $2^\circ \leq \text{Phase Error} \leq 12^\circ$.

RF Power vs. Time –

Resolution: 1 μ s, 1 symbol.

Time Uncertainty: ±0.2 symbol, ±0.8 μ s.

Other Measurements –

Slot Aware Burst Power, RF Carrier Frequency, Occupied Bandwidth, Origin Offset, Carrier to Interference Ratio.

GSM/GPRS/EDGE Channel Scanner Opt. GS1

Input Signal Range – –120 dBm to +30 dBm.

C/I Ratio Range – 0 dB to 50 dB.

Resolution –

Frequency: 0.001 MHz.

Peak Power: 0.1 dBm.

C/I: 0.1 dB.

W-CDMA/UMTS/HSDPA Demodulation Opt. WD2

Error Vector Magnitude – Resolution 0.01%.

Code Domain Power –

±1 dB when >–20 dB relative to Tx power.

Code Domain Power display update: 1 s (typical).

Scrambling Code – Determination 2 s.

Scrambling Code Analyzer for W-CDMA/UMTS/HSDPA Opt. WS1

Input Signal Range – –117 dBm to +30 dBm.

Resolution – 0.1 dB.

Accuracy^{*3} (Ec) –

±2 dB for Ec ≥ –102 dBm and Ec/lo ≥ –12 dB (typical).

±3 dB for Ec ≥ –112 dBm and Ec/lo ≥ –14 dB (typical).

*3 Also applies to W-CDMA field strength.

General Specifications

Frequency Characteristics

Input Range – 30 MHz to 2500 MHz.

Internal Frequency Accuracy (Time Base Error) –

±0.5 ppm (±0.015 ppm typical, after GPS lock).

Requires YBGPS1).

Internal Frequency Aging (Time Base Error) –

±1 ppm/yr.

Available Spans (in Spectrum Monitoring) –

10 kHz to 2470 MHz.

Resolution Bandwidths (automatically set in

Spectrum Monitoring Mode) – 100 Hz to 6 MHz.

Phase Noise – ≤–70 dBc/Hz at 20 kHz offset.

Amplitude Characteristics (CW or peak envelope, measured in 100 kHz span)

Amplitude Range –

–114 dBm to +30 dBm.

–134 dBm to +30 dBm (100 MHz to 2 GHz) with

Interference option IN1.

–132 dBm to +30 dBm (2 GHz to 2.2 GHz) with

Interference option IN1.

RF Input Overload Protection – +30 dBm to 50 W.

Signal Related Spurious Response –

IM3 better than –70 dBc, typical.

2nd harmonic better than –60 dBc, typical.

Amplitude Display – 10 Divisions; 1 to 10 dB per division.

Spectrum Display Modes – Max., min., norm.,

avg., dual trace.

Inputs

RF – 50 Ω , type N.

Frequency Reference –

50 Ω , type BNC (f).

freq_{in} = 2, 4.8, 10, 13, 15, or 19.6608 MHz and others. Automatically detected.

Timing Input – 10 k Ω , type BNC (f).

YBT250 Test Module Weight – 1.4 kg/3.1 lbs.

NetTek Mainframe Weight – 4.1 kg/9.04 lbs.

Operating Temperature –

Specified temperature range: 0 °C to 50 °C.

Functional temperature range: –10 °C to +50 °C.

Storage Temperature – –40 °C to +60 °C.

Calibration – Two year cycle.

Warranty – One year.

Physical Characteristics

Dimensions	mm	in.
Height	187	7.375
Width	241	9.5
Depth	32	1.25
Weight	kg	lbs.
Net	1.4	3.1

► Ordering Information

YBT250

Module without platform. Module must be ordered with 1 standard RF Measurement package. NetTek® analyzer platform is required for using NetTek modules and cards.

Options

Opt. CR1^{*1} – RF measurements for cdmaOne and cdma2000.

Opt. CRE^{*1} – RF measurements for cdma2000 1x EV-DO.

Opt. IR1^{*1} – RF measurements for IS-136.

Opt. AR1^{*1} – RF measurements for Analog.

Opt. IN1^{*3} – Interference Analyst.

Opt. CD1 – Demodulation for cdmaOne.

Opt. CD2^{*4} – Demodulation for cdma2000.

Opt. CS1^{*5} – Over-the-Air Analysis for cdma2000.

Opt. CDE – Demodulation for cdma2000 1x EV-DO.

Opt. ES1^{*4} – 1xEV-DO PN Scanner.

Opt. GR1^{*1} – RF measurements for GSM.

Opt. EM1^{*1,2} – RF and Demodulation measurements for GSM/GPRS and EDGE.

Opt. GS1 – GSM/GPRS/EDGE Scanner.

Opt. WR1^{*1} – RF measurements for W-CDMA/UMTS.

Opt. WD2 – Demodulation for W-CDMA/UMTS/HSDPA.

Opt. WS1^{*3} – Scrambling Code Analyzer for W-CDMA/UMTS.

Opt. LO – English manual for YBT250.

Opt. L10 – Russian manual for YBT250.

^{*1} RF measurement packages. Multiple RF measurement packages can be added as options; one RF package is required.

^{*2} RF and Demodulation measurement package.

^{*3} Provides W-CDMA Field Strength if Opt. WS1 is ordered along with Opt. IN1.

^{*4} YGPS1 is required.

^{*5} YBT250 CD2 and YBGPS1 are required.

Service

Opt. C3 – Calibration Service 3 Years

Opt. C5 – Calibration Service 5 Years

Opt. D1 – Calibration Data Report

Opt. D3 – Calibration Data Report 3 Years (with Opt. C3)

Opt. D5 – Calibration Data Report 5 Years (with Opt. C5)

Opt. R3 – Repair Service 3 Years

Opt. R5 – Repair Service 5 Years

Suggested YBT250 Test Module Accessories

Sniffer Antenna – Order 119-6609-00.

Beam Antenna 824 to 896 MHz – Order 119-6594-00.

Beam Antenna 896 to 960 MHz – Order 119-6595-00.

Magnetic mount 50 Ω Antenna 824 to 2170 MHz – Order 119-6970-00. (Requires 103-0499-00 adapter).

“N” Male to FME Male Adapter, for 119-6970-00 Antenna – Order 103-0449-00.

DC Block Type N – Order 119-6598-00.

Calibrated Coupler “N” 500 to 1000 MHz – Order 119-6600-00.

Directional Coupler “N” 920 to 2200 MHz – Order 119-6601-00.

Power Splitter/Combiner 1 W 200 Mhz to 2.5 GHz – Order 119-7024-00.

1800 MHz Downlink Band Pre-Filter, 1805 to 1880 MHz Passband, Female “N” Connector – Order 119-7021-00.

900 MHz Downlink Band Pre-filter, 921 to 960 MHz Passband, Female “N” Connector – Order 119-7022-00.

850 MHz Downlink Band Enhanced Pre-filter, 869 to 894 MHz Passband, Female “N” Connector – Order 119-7023-00.

2100 MHz Downlink Band Pre-filter, Female “N” Connector – Order 119-6971-00.

1900 MHz Downlink Band Pre-filter, Female “N” Connector – Order 119-6972-00.

50 Ω BNC 3-foot Cable (91 cm) – Order 012-0482-00.

50 Ω Coax cable (50 cm) Straight “N” and Angled “N” connector – Order 174-4977-00.

Cable “N” 3-foot (91 cm) – Order 174-5002-00.

Low-precision “N” 6-foot Cable (1.83 m) – Order 012-0114-00.

Calibrated Precision “N” 10-foot Cable – Order 012-1619-00.

N(F) to N(M) Attenuator 50 W, 20 dB – Order 119-6599-00.

Universal Adapter Kit, 30 pcs – Order 119-6602-00.

“N” Male to BNC Female Adapter – Order 103-0045-00.

“N” Male to “N” Male Adapter – Order 103-0430-00.

Right Angle, “N” Male to “N” Female Adapter – Order 103-0448-00.

Barrel “N” Female – Order 103-0429-00.

7 to 16(F) to N(F) Adapter – Order 103-0431-00.

7 to 16(M) to N(F) Adapter – Order 103-0432-00.

SMB Female to BNC Male – Order 174-3578-00.

BNC Metal Cap – Order 200-0678-00.

“N” Metal Cap – Order 200-4696-00.

NetTek® Analyzer

► YBT250 Base Station Transmitter and Interference Analyzer

Contact Tektronix:

ASEAN / Australasia (65) 6356 3900
Austria +41 52 675 3777
Balkan, Israel, South Africa and other ISE Countries +41 52 675 3777
Belgium 07 81 60166
Brazil & South America 55 (11) 3741-8360
Canada 1 (800) 661-5625
Central East Europe, Ukraine and the Baltics +41 52 675 3777
Central Europe & Greece +41 52 675 3777
Denmark +45 80 88 1401
Finland +41 52 675 3777
France & North Africa +33 (0) 1 69 86 81 81
Germany +49 (221) 94 77 400
Hong Kong (852) 2585-6688
India (91) 80-22275577
Italy +39 (02) 25086 1
Japan 81 (3) 6714-3010
Luxembourg +44 (0) 1344 392400
Mexico, Central America & Caribbean 52 (55) 56666-333
Middle East, Asia and North Africa +41 52 675 3777
The Netherlands 090 02 021797
Norway 800 16098
People's Republic of China 86 (10) 6235 1230
Poland +41 52 675 3777
Portugal 80 08 12370
Republic of Korea 82 (2) 528-5299
Russia & CIS 7 095 775 1064
South Africa +27 11 254 8360
Spain (+34) 901 988 054
Sweden 020 08 80371
Switzerland +41 52 675 3777
Taiwan 886 (2) 2722-9622
United Kingdom & Eire +44 (0) 1344 392400
USA 1 (800) 426-2200

For other areas contact Tektronix, Inc. at: 1 (503) 627-7111

Updated 5 January 2006

Our most up-to-date product information is available at:
www.tektronix.com

Product(s) are manufactured
in ISO registered facilities.



Copyright © 2006, Tektronix. All rights reserved. Tektronix products are covered by U.S. and foreign patents, issued and pending. Information in this publication supersedes that in all previously published material. Specification and price change privileges reserved. TEKTRONIX and TEK are registered trademarks of Tektronix, Inc. All other trade names referenced are the service marks, trademarks or registered trademarks of their respective companies.

1/06 HB/WOW

17W-15749-8

Tektronix
Enabling Innovation