# Product information



# **6104** Digital Radio Test Set

- Easy to use, fully integrated test set optimized for maintenance and servicing of GSM850, GSM900, GSM1800 and GSM1900 mobiles
- GPRS single slot receiver BLER
- Fast and accurate measurements taken at the touch of a button
- Modulation analyzer for alignment and diagnostics
- Supports Full Rate, Half Rate and Enhanced Full Rate speech and 3 digit MNC for North America
- Runs customer designed test sequences
- Supports dual-band handover
- "No button start" for ultimate simplicity of operation

# **GENERAL DESCRIPTION**

The Racal Instruments Wireless Solutions (RIWS) 6104 Digital Radio Test Set, has been purposely designed for mobile test. It is a high performance, portable, fully integrated instrument designed for the service and repair of modern digital mobile telephones. Aimed at GSM850, GSM900, GSM1800 and GSM1900 the 6104 gives fast, accurate results. The user controls have been carefully designed to allow operators of any skill level to successfully test and fault find mobile phones. A 'no button start" feature allows them to be tested rapidly without even touching the instrument. Another mode provides all key measurements to be viewed simultaneously with any reading out of limits being highlighted, making adjustment simplicity itself. The 6104 offers six testing modes to suit any user and application.

### SINGLE TESTS

- Single Tests Include Call Set-up, Call Terminate, Handover, Transmitter, Receiver, Sensitivity, Voice Loopback, Speech, Power Level Steps and Timing Advance Tests.
- Easily modified parameters.
- Test results are viewed using clear numerical and graphical displays.
- Pass or fail indicator given.

# GPRS

The following tests are provided for GPRS mobiles:

- Full GPRS attach and detach.
- Support for the four GPRS packet data coding schemes.
- GPRS BLER (Block Error Ratio) verifies the ability of the mobile to correctly determine the integrity of received data packets.

#### AUTOMATIC SEQUENCES

- Fully automatic Go/No-Go fault finding. Using the 6104 built in tests increases the speed of testing and increases throughput.
- Step by step fault finding to determine the exact nature of the fault.
- User defined sequences can be easily produced either from the front panel through a special learning mode or via a PC running a text editor. For the user's convenience the sequences can then be stored on a PCMCIA memory card and then run from one of the test set's 2 memory card slots.

# MULTIMODE

- Provides continuously updated numeric and graphic displays of all key transmitter and receiver measurements. The results are compared to the normal GSM test limits and if a reading exceeds these limits it becomes highlighted.
- Parameters can be changed interactively and any protocol necessary to perform the changes is automatically generated making the 6104 very intuitive to operate.

# UNSYNCHRONISED MODE

- Unsynchronized mode turns the 6104 into a signal generator and tuned receiver which provides the user with all the diagnostic facilities for testing RF modules and partially functioning phones, without using the Layer 2/ Layer 3 protocols.
- IQ modulation can be used for optimizing a mobile's modulator settings.
- Unsynchronized mode can be used to calibrate and realign the mobile; it should be noted that the 6104 unsynchronized mode is supported by all the leading manufacturers' service software.





#### **REMOTE OPERATION**

- 6104 offers full IEEE488 (GPIB) remote control of all tests and readings, including graph data.
- Remote control of 'Multimode' means that transmitter and receiver measurements can be performed concurrently and parameters and settings are quickly changed with simple commands. This vastly increases the speed of gathering the relevant test information.

The use of a large LCD display, coupled with intuitive streamlined soft keys, ensures that the user can select the required operation, change parameter values and read test results quickly and clearly without the need for an external PC or monitor. The use of soft keys and a spinwheel also allows the user to move quickly and logically through the menu structure and select the desired operation without any ambiguity.

# THE FUTURE

RIWS has a policy of ongoing product enhancement. As a result, the instrument firmware is periodically updated to reflect changes in standards and new market requirements. A software support scheme enables customers' units to be automatically updated as soon as new facilities become available.

# **COMPREHENSIVE SIGNALING PROTOCOL**

All signaling between the Test Set and the mobileunder-test is completely automatic so that the user does not need to have detailed knowledge of signaling standards. The 6104 even knows when to use phase 2 protocol. Individual signaling procedures can be invoked including:

- Location updating
- Call set-up, MO & MT
- Call termination, MO & MT
- Call lost
- Handover (inc. Dual-Band)
- Emergency calls
- Frequency hopping
- Timing advance
- Calling party identity

#### SUPPLEMENTARY FEATURES

- Dual Band Handover With the introduction of dual-band mobiles and with networks operating on both bands, it is essential that the phones can Camp-on to the correct BCCH and be handed over from one band to another. The 6104 can simulate a BCCH on either band whilst handing over TCH in either direction.
- Auxiliary RF Port
- Synchronization Output For synchronizing external equipment.
- Test SIM Every 6104 is supplied with one Test SIM, additional Test SIMs may be purchased, see Option 70.
- Extended SMS 14.4k data.

#### **SUPPORT**

Not only is the 6104 good value for money, but it has also been designed to be simple and economic to maintain. The pre-calibrated modules and self diagnostic capabilities mean that repair times and costs are minimized. This is further backed up by a world-wide network of service centers offering a full range of repair, calibration and support facilities, RIWS has a growing library of pre-written test sequences and software modules available free to 6104 customers. Library sequences are a good way to see what is possible and a good point to start programming from.

Further information about the range of hardware and software support options can be found at www.aeroflex.com

### **OPTIONS**

The 6104 in its basic form is a complete integrated test set capable of performing the full range of measurements on a GSM mobile. To complement this RIWS can supply a range of options and accessories which significantly enhance the applications of the 6104.





# **Product** information

# **TECHNICAL SPECIFICATION**

Functional Tests:Call Set up - MO & MT Call Termination - MO, MT Call Termination - MO, MT Call Termination - MO, MT Call Set up - MO & MT Call Set up - MO & MT Call Termination - MO, MT & Call tost Synchronized Handover Transmitter Tests:Range: +46dBm to -1dl Absolute Accuracy:+46dBm to -1dl +46dBm to -1dl +46dBm to -1dl <th< th=""><th>Test Capability</th><th></th><th>Power Level</th><th></th></th<>	Test Capability		Power Level	
Call Termination - MO, MT & Call Iost Synchronized HandoverAbsolute Accuracy <t+1.08l (egs<br=""></t+1.08l> (SM1900)2Transmitter Tests:Tx Test - Power, Phase & Frequency Error, Power Profile Modulation Spectrum, Burst Receiver Tests:Pulse Profile Pulse Profile Pulse Profile>48dBReceiver Tests:Rx Test - Cil & CiD BER, FER, RXOUAL, RXLEV, GPRS BLER Senstilvity (Absolute)Modulation Spectrum, Dynamic Range: Accuracy:>48dBSpeech Tests:Voice Loopback Senstilvity (Absolute)Dynamic Range: Frequency Senstilvity (Absolute)>52dBSignal SourceSimS/E-SMS Data 2.4T - 14.4T & 2.4NT - 14.4NT FaxMemory Card: Card size: Card size: Card size: Card size:2 sockets, PCM Type 1.2 or 3 Card types supported: Synchronization Output:Frequency Frequency Frequency Receiver Bands:GMSK & CWCorl Synchroniz equipment such to 124.975 to 1023. 1.390 - 1.990GHz (GSM1800) Channels from 512 to 885. 1.390 - 1.990GHz (GSM1900)^2 2.20 dB (DC131800)^2 2.20 dB (DC31800)^2 2.20 dB (DC		Call Set up - MO & MT		+46dBm to -1dl
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SMS/data & Fax: SMS/E-SMS Card types supported: SRAM, ATA fla hard disk   Data 2.4T - 14.4T & 2.4NT - 14.4NT Fax Synchronization Output: For synchronization Putput:   Signal Source GPIB: ANS/IE-EE 488   Modulation: GMSK & CW Compatibility Subset: SH1, AH1, T5, PPP, DC1, DT0   Frequency 869-894 MHz (GSM 850) Channels from 512 to 1023. RS232 Interfaces: 2 configurable f and control 9 w   Frequency 869-894 MHz (GSM 1800) Parallel Printer: 25 way female   1.805 - 1.800GHz (GSM1900) Frequency range: 45 - 66Hz   Channels from 512 to 885. Voltage ranges: 85 - 130V and   1.930 - 1.990GHz (GSM1900) Frequency range: 45 - 66Hz   Channels from 512 to 8810. Power consumption: 170VA maximu   Resolution: 1Hz Frequency standard 110t/04 maximu   Range: -20 dB (GSM1900)^{1/2} External frequencies: 10MHz 2 to 7 (0pt   Auxiliary RF 0.1 dB Output: 10MHz 2 to 7 3M   Input/Output Level 824 - 849MHz (GSM 850) Channels Height: 210mm   Range: -25dBm to -105dBm Dimensions and Env		Send speech	Memory Card:	2 sockets, PCM
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Signal SourceGPIB:ANSİ/IEEE 488Modulation:GMSK & CWCompatibility Subset:SH1, AH1, T5, PP0, DC1, DTCFrequency869-894 MHz (GSM 850) Channels 925-960MHz(E-GSM) Channels from 0 to 124,975 to 1023.RS232 Interfaces:2 configurable j and control 9 w and control 9 wI.805 - 1.806Hz (GSM1800)GeneralChannels from 512 to 885.Voltage ranges:85 - 130V and 1Nos - 1.806Hz (GSM1900) Channels from 512 to 8810.Power consumption:170VA maximuResolution:1HzVoltage ranges:45 - 66HzMain RF Input/Output Level Range:-40dBm to -120dBm ± 1.5 dB (E-GSM)^{1/2} ± 2.0 dB (DCS1800)^{1/2} ± 2.0 dB (GSM1900)^{1/2} ± 2.0 dB (GSM1900)^{1/2} ± 2.0 dB (GSM1900)^{1/2} ± 2.0 dB (GSM1900)^{1/2} ± 1.5 dB (E-GSM)^{1/2} ± 2.0 dB (GSM1900)^{1/2} ± 1.0 dBExternal frequencies:10MHz ± 2.5 pr (13MHz, Optior -2dBm to +19dlResolution:0.1dBOutput:10MHz or 13Ml (Option 04E/04F)10MHz or 13Ml +9dBm nominaInput/Output Level Range:824 - 849MHz (GSM 850) Channels 880 - 915MHz (E-GSM)Height:210mm Midth:Frequency Bands:824 - 849MHz (GSM 850) Channels 880 - 915MHz (E-GSM)Height:210mm Midth:Main RF Input/Output Impedance:50 ohms, nominal 1.710 - 1.756Hz (DCS1800) 1.710 - 1.756Hz (DCS1800) Depth:Depth:420mm 1.850 - 1.910GHz (GSM1900)Main RF Input/Output Impedance:50 ohms, nominal 1.311EMC:Comples with EN61326-1199Main RF Input/Output Impedance:50 ohms, nominal 1.311EMC:				
Modulation: Modulation:GMSK & CWCompatibility Subset: PPO, DC1, DTC PPO, DC1, DTC Prequency Bands:Range: Frequency Bands:-40dBm to -105dBm 824 - 849MHz (GSM 850) Channels 880 - 915MHz (E-GSM) 1.710 - 1.785GHz (DCS1800) 1.710 - 1.785GHz (DCS1800) Peth: 1.850 - 1.910GHz (GSM1900)Utput: Weight: Vidth: PHOL Power Peth: PHOL Power Peth: Peth				,
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Resolution: Main RF Input/Output Level Range:Channels from 512 to 810. 1HzPower consumption: Frequency Standard Internal:170VA maximu frequency Standard Internal:Range:-40dBm to -120dBm ± 1.5 dB (E-GSM)^{1.2} ± 2.0 dB (DCS1800)^{1.2} ± 2.0 dB (DCS1800)^{1.2} ± 2.0 dB (GSM1900)^{1.2}(all sources of error)±1 x 10°6 ± 1.2 x 10°7 (Opt ± 3.5 x 10°8 (Opt (13MHz, Optior -2dBm to +19dI 10MHz or 13MI (Option 04E/04F)Resolution: Auxiliary RF Input/Output Level Range:0.1dBOutput: (Option 04E/04F)10MHz or 13MI +9dBm nominalMeasuring Receiver Frequency Bands:824 - 849MHz (GSM 850) Channels 880 - 915MHz (E-GSM)Height: Width: 210mm Width:210mm 420mm 420mmMain RF Input/Output Impedance:50 ohms, nominal 1.311Depth: Calibration Period:12kg approx. 1 yearMain RF Input/Output Impedance:50 ohms, nominal 1.311Calibration Period: EMC:1 year Complies with EN61326-11198Max. PowerN Type female + 46dBm to -1dBm PEPCalibration Period: 400W PEP; 100W continuousEN61326-11198				
Resolution: Main RF Input/Output Level1HzFrequency Standard Internal: $\pm 1 \times 10^6$ Range:-40dBm to -120dBm $\pm 1.5 dB (E-GSM)^{1/2}$ $\pm 2.0 dB (DCS1800)^{1/2}$ (all sources of error) $\pm 1.2 \times 10^7 (Opt)$ $\pm 3.5 \times 10^8 (Opt)$ Resolution: Auxiliary RF Input/Output Level0.1dBExternal frequencies: (13MHz, Optior 2dBm to +19dIRange:0.1dBOutput: (Option 04E/04F)Range: Range:-25dBm to -105dBmDimensions and EnvironmentalFrequency Bands:824 - 849MHz (GSM 850) Channels 880 - 915MHz (E-GSM)Height: Width: Operating Temperature: Operating Temperature: Operating Temperature: Operating Temperature:210mm 420mm 0 to 50° CMain RF Input/Output50 ohms, nominal 1.31Calibration Period: EMC:1 year EN61326-1:196Main RF Input/OutputN Type female +46dBm to -1dBm PEPEMC: Comples with EN61326-1:196Calass B (emiss) Class B (emiss)Max. Power80W PEP; 10W continuousEMC:Comples fursion Class B (emiss)				
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$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Range:		(all sources of error)	±1.2 x 10 <sup>-/</sup> (Opt
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Max. Power 80W PEP; 10W continuous EN61326-1:199				
				•

Auxiliary RF Input/Output Connector type: Input Level Range:

#### Max. power: **Measurements**

Phase Error Range: Accuracy RMS: Accuracy Peak: Frequency Error Range: Accuracy:

TNC female ±31dBm to -16dBm PEP 2.5W PEP; 0.3W continuous

10° RMS, ±30° peak <±0.3° at 5° <±7.2°

±2.5kHz ±6.5Hz + freq. Std. Safety: Notes: 1. 2.

dBm PEP SM)<sup>2</sup> S1800,

nels)

MCIA V2.0 lash EEPROM and zing external ch as a spectrum 38.2 - 1987 5, L4, SR1, RL1, 0, C0, E1 ports for printing way male D-Type e D-Type

180 - 262V AC านm

ption 04E) ption 04F) ppm on 04E/04F) dBm into 50 ohm ИНz al into 50 ohm

997+A1:1998 sions) 997+Á1:1998 able 1 (immunity) BS EN50082-1 (immunity) Complies with BS EN61010-1 For signals >-110dBm Valid for 15°C to 35°C





Product information

#### **ORDERING INFORMATION**

#### 6104 **Digital Radio Test Set**

#### **Radio Systems**

Option 01	GSM 900 operation
Option 02	GSM 1800 operation
Option 03	GSM 1900 operation
Option 06	GSM 1900, 1800 and 1900
Option 08	GSM 850 operation

#### **Frequency Standards**

Option 04T	Normal Frequency Standard
Option 04E	High Stability Frequency Standard
Option 04F	Very High Stability Frequency Standard

#### Encryption

Option 10R Encryption, factory fit

#### **Software Options**

- Option 313 GPRS single slot receiver testing software
- Option 314 Voice Quality Analysis (VQA)
- Option 320 Enhances Short Message Service and Cell Broadcast Software
- Option 330 14.4 kbs Data Functionality
- Option 340 Vodaphone Fixed Sequence
- Option 341 Nokia Fixed Sequence
- Option 342 Ericsson Fixed Sequence

# ACCESSORIES

- Option 61 Soft padded carrying case with shoulder strap and accessory pocket. Option 62 Rigid transit case for heavy duty use (exceeds ATA 300 Category 1) Front Panel Protection Cover Option 64 Option 70 Test SIM GSM/DCS1800/GSM1900 (supplied and miniature SIM and full size adapter)
- Option 77 2M byte SRAM memory card
- Option 79 2G byte Hard disk drive
- Option 90 Test Set / PC RS232 download cable, (9 way D-type)
- Option 91 Test Set / Printer RS232 cable (25 way D-type)
- Option 92 Test Set / Printer parallel cable





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#### SUPPORT OPTIONS

- Option S1 1 year Software support Option S2 2 years Software support Option S3 3 years Software support Option C0 Calibration certificate 1 annual Calibration Option C1 Option C2 2 annual Calibrations Option C3 3 annual Calibrations Option W1 1 year Extended warranty 2 years Extended warranty Option W2 Option W3 3 years Extended warranty Option Si0 Enhanced Silver service contract during initial warranty period **Option Si1** 1 year Silver service contract **Option Si2** 2 years Silver service contract Option Si3 3 years Silver service contract Option G0
  - Enhanced Gold service contract during initial warranty period
- Option G1 1 year Gold service contract
- Option G2 2 years Gold service contract
- Option G3 3 years Gold service contract

