RWC5070M

BLE Tester



GENERAL DESCRIPTION

The RWC5070M is a cutting-edge Bluetooth Low Energy(BLE) Signaling, and Non-Signaling Tester meticulously engineered to support the entire product lifecycle, from RF PHY validation in the lab to automated manufacturing test on the production line, as well as thorough chipset evaluation. It supports all BLE physical layers, including 1M, 2M, and Coded PHY. The advantage of the RWC5070M is that it enables high-speed parallel testing by setting two RF channels as transmit (TX) and receive (RX), respectively, to simultaneously generate and analyze signals. Furthermore, it incorporates advanced RF analysis functions—like Spectrum, Power-Time, Modulation-Time, and Adjacent Channel Power (ACP)—to provide deep characterization of device performance.

The automated RF-PHY test function rapidly and accurately verifies the transmit and receive performance of the Device Under Test (DUT) based on standard RF physical layer test specifications defined by the Bluetooth SIG. Through built-in automation algorithms, users can execute various standard test scenarios with a single click, without complex configuration, and immediately verify that the device complies with the standards.

The RWC5070M is capable of generating a reference audio signal, which can be output through its RCA ports located on the rear panel. This feature further enhances the RWC5070M's versatility, allowing users to utilize it for various kinds of audio testing purposes . In addition, it provides an audio analyzer function that can measure audio signal quality (SINAD, THD, and SNR) and frequency, as well as display audio waveforms and audio spectra.

KEY FEATURES

GENERAL

- Adjustable TX Power & Frequency
- 2 Port RF support: TRX, RX only
- Audio In: RCA(L+/L-/R+/R-), AUX
- Audio Out: RCA(L+/L-/R+/R-), AUX
- PC Application

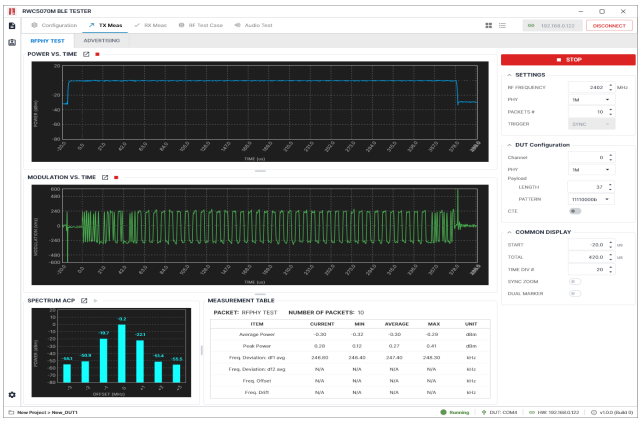
BLE

- Supports BLE PHY: 1M, 2M, Coded S=2/S=8
- Built-in packet generator: LE test packets, CW
- Supports CTE (Constant Tone Extension)
- Supports DTM (Direct Test Mode)
- Supports OTA Test (Advertising packet)
- Supports Dirty TX mode:
  CFO, Modulation Index, Symbol Timing Error, Drift
- Non-signaling TX RF measurements:
  Power-Time, Modulation-Time, ACP
- Non-signaling RX RF Measurement:
  PER test automation
- Supports fully automated RF Test Case (RFPHY):
  Based on core specification V5.x
- Bluetooth Core Specification 6.x support: TBU
- Automated Audio Performance Test: TBU

RF MEASUREMENTS

POWER vs. TIME

The power versus time measurement function precisely visualizes RF power changes of BLE packets transmitted from the DUT based on a high-resolution time axis in 0.1 microsecond (µs) units. Through an intuitive graphical interface, users can analyze not only the overall profile of the packet but also transient phenomena in specific sections in detail. By displaying dual markers on the graph, you can easily calculate the time difference and power difference between specific points.



MODULATION vs. TIME

BLE uses Gaussian Frequency Shift Keying (GFSK). This test verifies that the frequency deviations representing '0' and '1' are accurate and stable. To accurately track the instantaneous frequency, the tester oversamples the 1Mbps or 2Mbps signal. This allows it to detect subtle Peak Frequency Deviations and Frequency Drift across the packet.

- df_{1_avg} : Average deviation of '11110000' pattern
- df_{2_avg} : Average deviation of '10101010' pattern
- Frequency offset : Max. difference between the frequencies (f_1 to f_k) in the payload and the transmit frequency (f_{TX})
- Frequency drift : Max. difference between the initial frequency f_0 and the frequencies (f_2 to f_k) in the payload.

SPECTRUM ADJACENT CHANNEL POWER (ACP)

It shows the absolute channel power of a center as well as three upper and three lower channels. This performs ACP measurements in compliance with the in-band emission of the BLE RF test case.

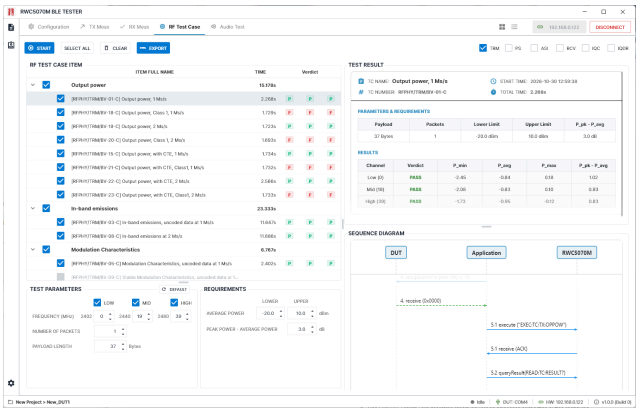
SENSITIVITY TEST

Automatically calculates Packet Error Rate (PER) against varying input levels and visualizes results through sensitivity curves. This feature supports testing both RFPHY test packets and ad packets. In DTM mode, measurements can be taken via wired control, while in OTA mode, tests can be performed without wired control.

RF TEST CASES

BLUETOOTH SIG COMPLIANCE

This product fully supports the core transmit/receive test cases specified in the latest Bluetooth LE core specifications (LE 1M, LE 2M, LE Coded PHY).



INTEGRATED DTM CONTROL

The DUT is automatically controlled via UART or a 2-wire interface using standard Direct Test Mode (DTM) commands. Channel switching, packet transmission, and receive mode switching are performed seamlessly without manual user operation.

CUSTOMIZABLE BATCH TESTING

Optimizes test time by providing a sequence editing function that allows you to select only the necessary items from the entire provided test case set and execute them sequentially.

INTUITIVE PASS/FAIL REPORTING

This system clearly provides pass/fail results for each test item based on the criteria defined in the specifications.

SUPPORTED BLE RF-PHY TEST CASES

(Compliant with LE Radio Physical Layer(RF-PHY) Test Suite)

Category	Test Case Name	Supported PHY
TRM Transmitter	Output Power	1M, 2M, Coded (S=2, S=8)
	In-Band Emissions	1M, 2M
	Modulation Characteristics	1M, 2M, Coded S=8
	Carrier Frequency Offset and Drift	1M, 2M, Coded S=8

	Tx Power Stability, Antenna switching integrity	AoD Transmitter
RCV Receiver	Receiver Sensitivity (PER)	1M, 2M, Coded(S=2, S=8)
	Maximum Input Signal Level	1M, 2M
	PER Report Integrity	1M, 2M, Coded S=2, S=8)
	IQ Samples Coherency, IQ Samples Dynamic Range	AoA Receiver, AoD Receiver

Note: Bluetooth Core Specification 6.0 Channel Sounding (CS) automated test cases are supported via optional software upgrade (05070M-04).

AUDIO ANALYZER & GENERATOR



The RWC5070M integrates a high-precision audio analyzer and generator for comprehensive electro-acoustic testing.

PRECISION AUDIO SIGNAL MEASUREMENT

It enables accurate, real-time measurement of SNR, SINAD, THD, and THD+N for both left and right channels, providing reliable and consistent results for audio performance evaluation.

VISUAL ANALYSIS

It provides visual analysis through dual-channel (Left and Right) real-time waveform monitoring and FFT spectrums featuring Max Hold and Multiple Marker Functions.

INTEGRAGED AUDIO SIGNAL GENERATOR

It provides mono and stereo sine wave generation from 20 Hz to 20 kHz, with ultra-low distortion performance of THD less than 0.02%.

AUTOMATED TESTING

It supports automated audio test profiles, including receiver sensitivity and maximum input level, enabling efficient and streamlined production workflows.

SPECIFICATION

RF

System Clock	Accuracy: ±1ppm/yr @ operating temperature Phase Noise: -120dBc/Hz @ 10KHz offset
Frequency	Range: 2400-2500 MHz Resolution: 1.0 kHz
Transmission Power	Range: -110dBm ~ -5dBm Resolution: 0.1dB Accuracy: +/- 1dB
Input Power	Range: +20dBm Max
VSWR	<1.5 (input & output)

BLE

Supported PHYs	1M, 2M, Coded S=2/S=8
Modulation Generator	GFSK BT = 0.5 Modulation Index : 0.40 ~ 0.60 Modulation Index Resolution : 0.01 Payload Pattern : PRBS9, 0xF0, 0xAA, 0xFF
Dirty transmit mode	Carrier Frequency Offset Modulation Index Symbol Timing Error Frequency Drift
Modulation Analyzer	Frequency Deviation Resolution : 100 Hz

AUDIO ANALYZER

Input Level	Max. 8 Vrms
SNR	> 85 dB (@ 1 Vrms)
SINAD	> 75 dB (@ 1 Vrms)
THD	≤ 0.01 %
Flatness	Max. ±0.005 dB
Crosstalk	TBD
Impedance	Balanced: 20 KOhm Unbalanced: 4.7 KOhm Digital out BNC: 110 Ohm

AUDIO GENERATOR

Output Level	MAX. 4 Vrms
Frequency Range	0.02~20 kHz

THD	≤0.02 %
Flatness	Max. ±0.1 dB
Impedance	Balanced: 600 Ohm or 8 Ohm Unbalanced: 75 Ohm Digital out BNC: 110 Ohm

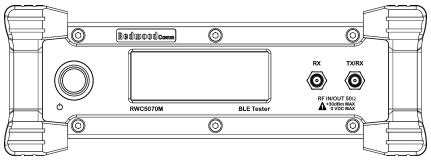
INTERFACES

RF Port	TRX Port: SMA-type, 50 ohm RX Port: SMA-type, 50 ohm
Audio Analyzer Input Port	RCA x 4 (R+/R-/L+/L-), AUX
Audio Generator Output Port	RCA x 4 (R+/R-/L+/L-), AUX
10MHz Reference Clock Input Port	BNC, 50 ohm
Digital IO	RJ45: (10/100/1000)LAN DSUB9: UART(TX/RX), 5V Power, Digital IO

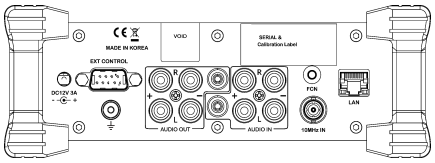
MISCELLANEOUS

Remote Programming Ports	RJ45(Ethernet) RS232
Remote	UDP
Compliance	CE
Mechanical	2.79" Color Graphic LCD Operating temperature: 5 ~ 40℃ Line Voltage: DC 12V3A Weight: 2.5kg Dimension: 200(w)x70(h)x220(d)mm

Front



Rear



Warranty	2 Years

ORDERING INFORMATION

Order Code	Part Name
C5070M-00	BLE Tester - TRXM/RFTC/ATP/CS
C5070M-01	BLE Tester - TRXM
C5070M-02	BLE Tester - TRXM/RFTC
C5070M-03	BLE Tester - TRXM/RFTC/ATP
C5070M-04	BLE Tester - TRXM/RFTC/CS
O5070M-01	Option - RF Test Case Function(RFTC)
O5070M-02	Option - Audio Generator/ Audio Analyzer(AGA)
O5070M-03	Option - Audio Test Profile Function(ATP)
O5070M-04	Option - Channel Sounding(CS)
O5070M-10	Option - Switch Box for MIMO (HW)
O5070M-95	Option - Extended Hardware Warranty
O5070M-98	Option - Calibration
O5070M-99	Option - Annual Maintenance

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