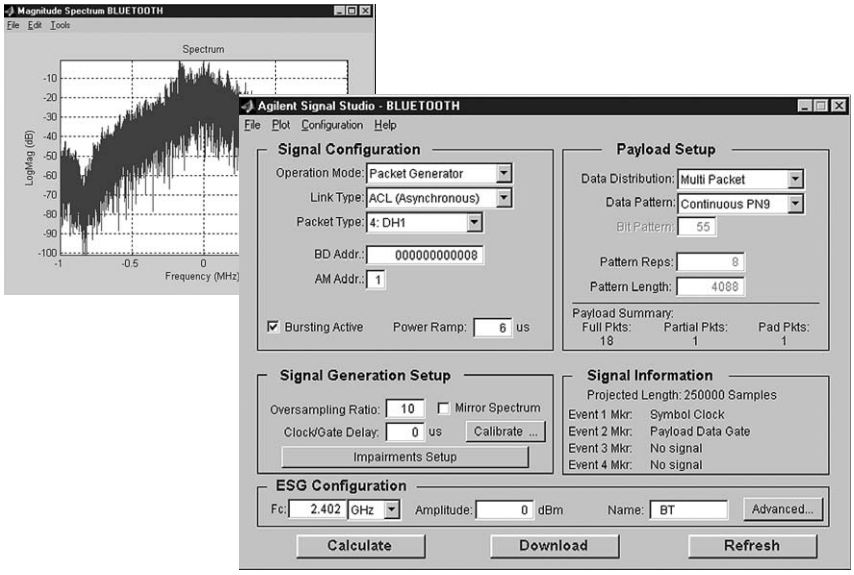
Agilent
Signal Studio for *Bluetooth*™
E4438C ESG Vector Signal Generator

Option 406
Technical Overview



Bluetooth test signals

Signal Studio for *Bluetooth* software is a powerful tool for creating *Bluetooth* v1.1 baseband I/Q waveforms for use with the Agilent E4438C ESG vector signal generator.

Main features

- Intuitive user interface
- Fully-coded *Bluetooth* packets and *Bluetooth* modulated data streams
- Packet types: DH1, DH3, DH5, DM1, DM3, DM5, AUX1, HV1, HV2, HV3, NULL, POLL, ID
- Add a user file as the payload data pattern
- Standards-based dirty transmitter impairment setup for receiver sensitivity tests
- Custom impairments: carrier frequency offset and drift, symbol timing error, modulation index, AWGN
- Simplifies BER testing
- Plot BER vs. clock/gate delay
- 10B/T LAN and GPIB connectivity

Try before you buy!

Go to **www.agilent.com/find/signalstudio** and download Signal Studio for *Bluetooth* software to your PC. The signal configuration and plotting capabilities of the software can be evaluated. A license key is required to load the waveforms created by the software into the ESG. The license key can be ordered through your sales engineer or the nearest sales office, which can be found at **www.agilent.com/find/assist.**

Benefits

Rather than spending valuable time creating your own proprietary *Bluetooth* test signals, use the Studio Signal software to create fully-coded *Bluetooth* packets and *Bluetooth* modulated data streams.

Dirty transmitter impairments

Simulate a realistic *Bluetooth* device and verify the demodulation capabilities of your receiver by adding dirty transmitter impairments to your test signal. The ESG combined with Signal Studio software is a versatile solution for receiver development and *Bluetooth* module verification that provides unrivaled impairment flexibility.

BER measurements

To facilitate receiver BER measurements, an automated clock/gate delay calibration utility is provided. Using the utility, the data, clock, and gate signal timing alignment at the input of the ESG internal BER analyzer can be easily determined and modified for proper operation.

I/Q waveform generation

Bluetooth Signal Studio software is a Windows®- based utility that simplifies the creation of *Bluetooth* I/Q waveforms. It is intended for use with the E4438C ESG vector signal generator's baseband generator operating in arbitrary waveform mode.

Configuring and building *Bluetooth* I/Q waveforms is made possible via Signal Studio's easy-to-use graphical interface. The configured I/Q waveform is downloaded to the ESG and the signal generator automatically begins generating the modulated RF signal.

Recommended configuration

E4438C ESG with the following options:

E4438C-602*	64 MSa baseband generator
E4438C-406*	Signal Studio for *Bluetooth*
E4438C-503	3 GHz frequency range
E4438C-1E5	High-stability timebase
E4438C-005	6 GB internal hard drive

Other configurations possible.

* Required options. The baseband generator may be either Option E4438C-001, -002, -601, or -602.

Upgrade kits

If you currently own an E4438C ESG vector signal generator and are interested in obtaining an upgrade kit only (license key), order: E4438CK and E4438CK-406.

Bluetooth Signal Studio software features[1]

Data streams	0s, 1s, 01s, 10s, 8-bit pattern, PN9, PN15
Packet types	
ACL	DH1, DH3, DH5, DM1, DM3, DM5, AUX1
SCO	HV1, HV2, HV3, DM1
Control	NULL, POLL, ID
***Bluetooth* device address**	Valid range: 0000 0000 0000 to FFFF FFFF FFFF Hex
Active member address	Valid range: 0 to 7
Payload data patterns	0s, 1s, 01s, 10s, 8-bit pattern, PN9, PN15, user file
Burst power ramp	Power ramp valid range: 1 to 10 µs Ramp settling valid range: 1 to 20 µs (cannot be more than 10 µs greater than the power ramp setting) Dirty transmitter test menu Power ramp valid range: 1 to 100 µs Ramp settling valid range: 1 to 120 µs (cannot be more than 20 µs greater than the power ramp setting) Resolution: 1 µs
Impairments	
Frequency offset	Valid range: –100 kHz to 100 kHz Dirty transmitter test valid range: –150 to 150 kHz Resolution: 1 kHz
Frequency drift	
Linear	Valid range: –100 kHz to 100 kHz Resolution: 1 kHz
Sinusoidal	Valid range: –100 kHz to 100 kHz Resolution: 1 kHz Rate: 300 Hz, 500 Hz, 1.6 kHz
Modulation index	Valid range: 0.250 to 0.400 Dirty transmitter test valid range: 0.200 to 0.400 Resolution: 0.001
Symbol timing error	Valid range: –50 ppm to 50 ppm Dirty transmitter test valid range: –150 ppm to 150 ppm Resolution: 1 ppm
AWGN	C/N valid range: 10 dB to 40 dB Resolution: 1 dB Seed valid range: 1 to 65535
Clock and gate delay	Valid range: 0 to 100 µs Resolution: (1 µs/oversampling ratio)
Oversampling ratio	Valid range: 2 to 20

1 Features subject to change.

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