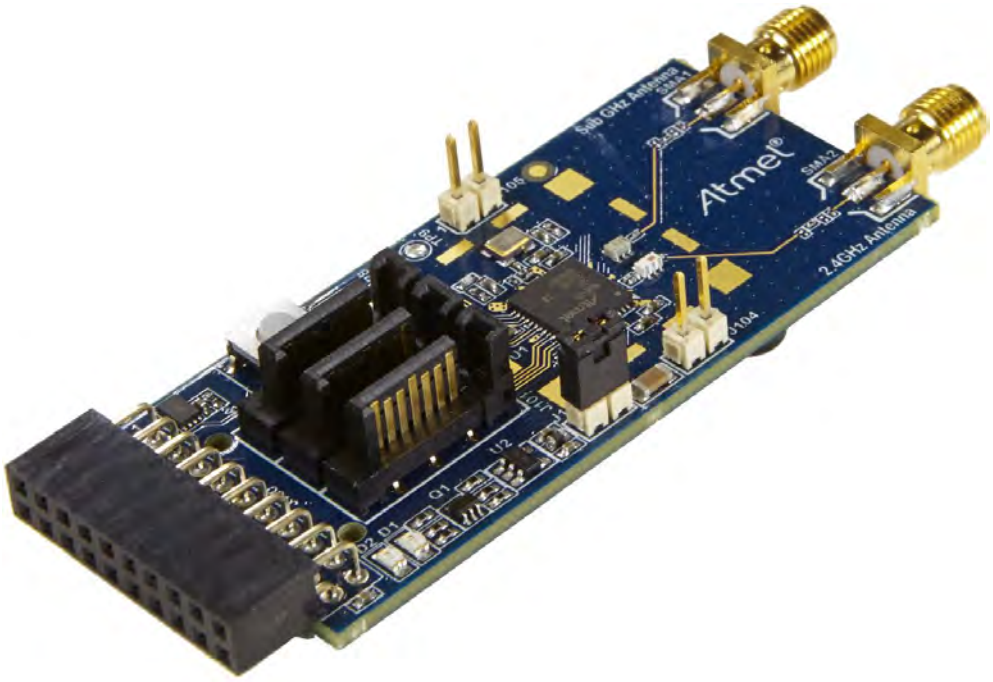
ATREB215-XPRO-A Test User Manual

ATREB215-XPRO-A Extension Board



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1. Introduction

Scope

The scope of this document is to explain how to install and setup up the required hardware and programming tool for test.

Figure 1: Atmel ATREB215-XPRO-A board

2. Hardware Setup

1. ATREB215-XPRO-A Boards - 2 Nos
2. SAM4L-XplainedPro Boards - 2 Nos
3. micro USB cable - 2 Nos
4. 2.4GHz Stubby Antenna (M01-SS2) - 2No
5. 1/4 wave whip Antenna (CTA 868/0/WS/SM/H1) -2No

Note: SMA cables not included in the box

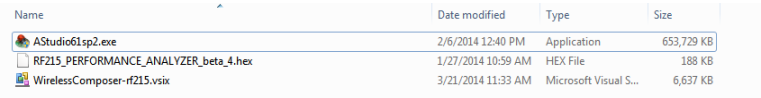
3. Software Setup

1. Atmel Studio 6.2 (no need to install again if it is already available in Test PC)
2. SAM4L-XplainedPro Drivers - Installed automatically

4. Software Installation

Note: If Atmel Studio 6.2 is already available in Test PC, jump to step 5 in this section and install wireless composer

1. Open the DVD containing the Atmel Studio 6.2 Software package.
2. Click the AStudio61sp2.exe icon to launch Atmel Studio Installation.



Name	Date modified	Type	Size
AStudio61sp2.exe	2/6/2014 12:40 PM	Application	653,729 KB
RF215_PERFORMANCE_ANALYZER_beta_4.hex	1/27/2014 10:59 AM	HEX File	188 KB
WirelessComposer-rf215.vsix	3/21/2014 11:33 AM	Microsoft Visual S...	6,637 KB

Figure 3: Atmel Studio Installer

3. Now Atmel Studio will begin the installation

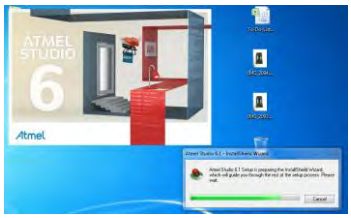
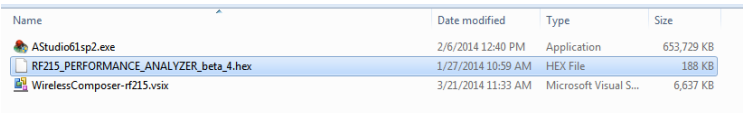


Figure 4: Atmel Studio Installation

4. Follow the on-screen instructions to complete the installation

Figure 5: Atmel Studio Installation

5. Next install the Wireless Composer extension by clicking the wireless-composer-vsix-stable icon found in the DVD as shown in the following figure.



Name	Date modified	Type	Size
AStudio61sp2.exe	2/6/2014 12:40 PM	Application	653,729 KB
RF215_PERFORMANCE_ANALYZER_beta_4.hex	1/27/2014 10:59 AM	HEX File	188 KB
WirelessComposer-rf215.vsix	3/21/2014 11:33 AM	Microsoft Visual S...	6,637 KB

Figure 6: Wireless Composer Installation

5. Hardware and Driver Installation

1. Connect one ATREB215-XPRO-A board to EXT1 connector of the SAM4L-Xplained Pro Board as shown in the figure

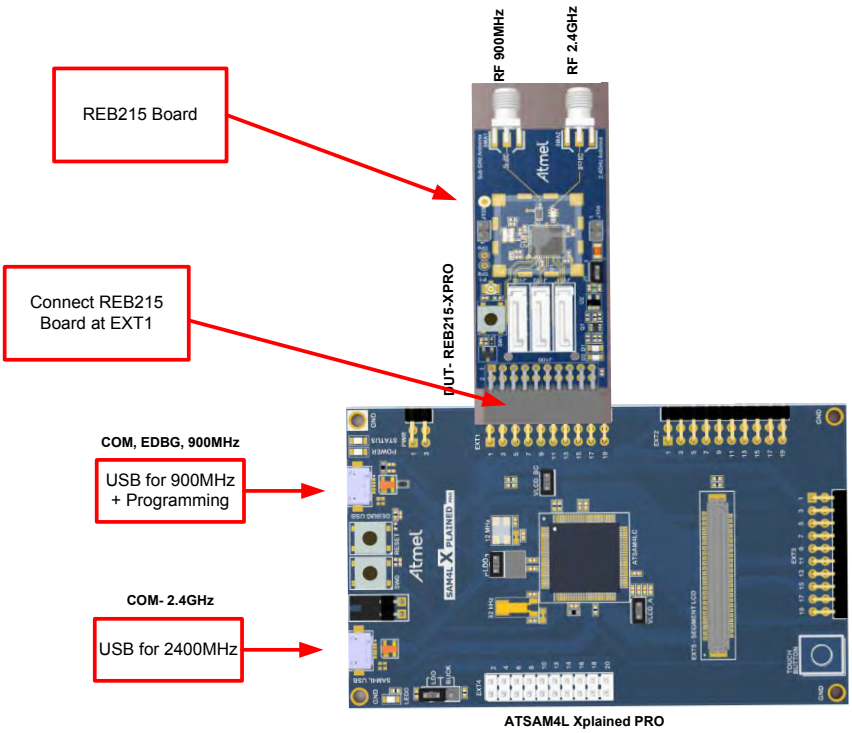


Figure 7: Hardware Setup

2. Connect a micro USB cable from PC to the Debug USB port (USB for 900MHz) for 863MHz EU/915MHz US ISM band operation
3. Connect a micro USB cable from PC to SAM4L USB (USB for 2400MHz) for 2.4GHz ISM band operation.
4. Connect 2.4GHz λ/4 Monopole Antenna (PSTG0-2400HS) with RF 2.4GHz port and connect Rubber Stubby Antenna with SMA Male Straight (IJ28-SS) with RF 900MHz port
5. Next, EDBG Virtual COM port driver installation will begin automatically

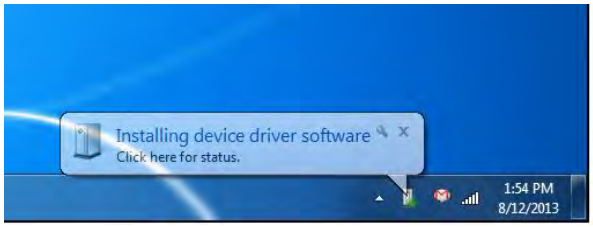


Figure 8: EDBG Virtual COM PORT Driver installation

6. Click the taskbar notification. When the driver installation is successfully completed, there will be a notificaion as shown below.

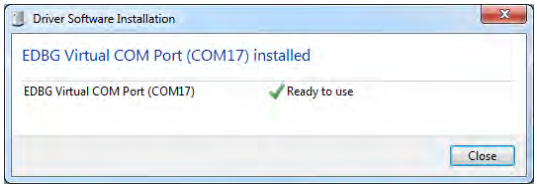
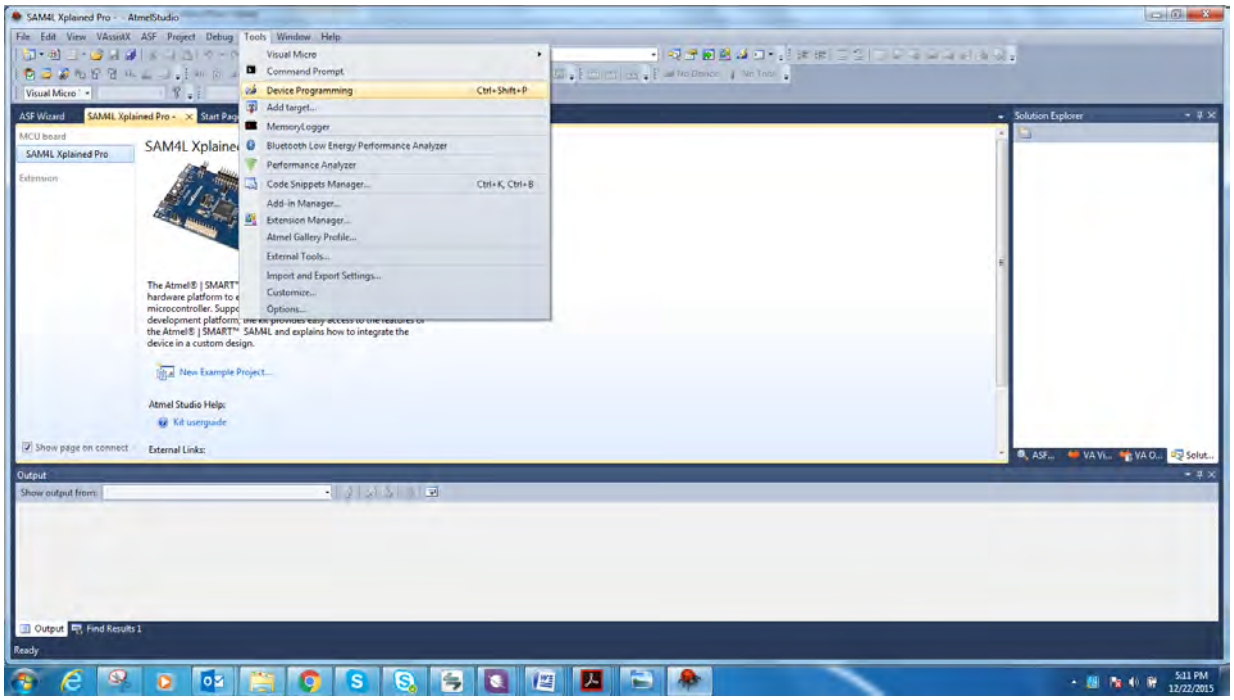


Figure 9: EDBG Virtual COM PORT Driver installation

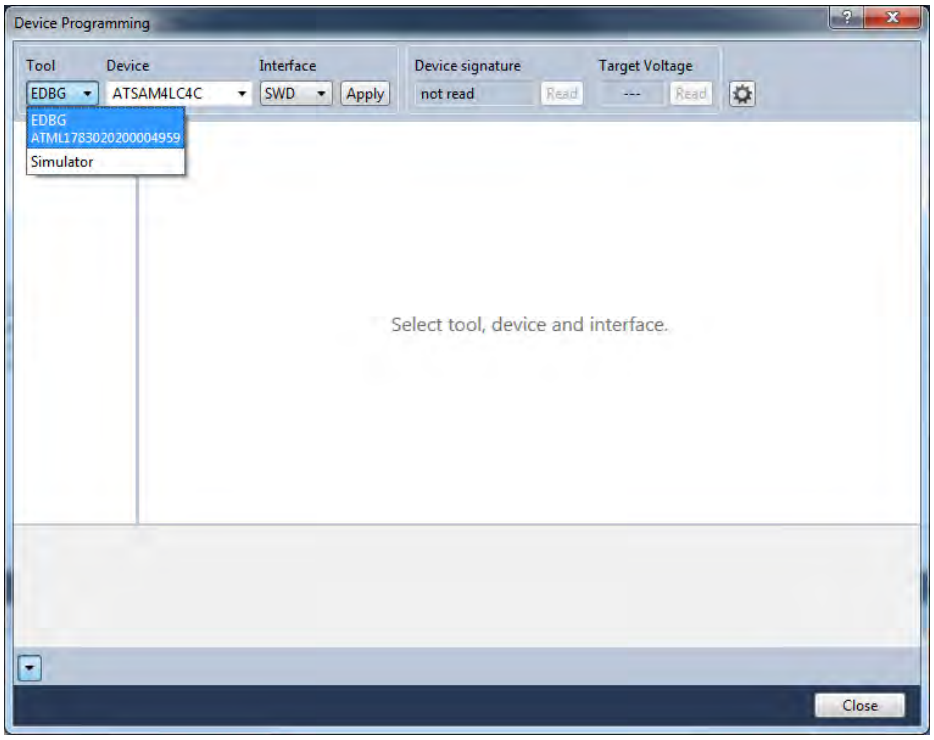
Note: COM17 from the above figure is an example. The COM Port number varies depending upon the PC.

6. Programming SAM4L Xpro board to connect with ATREB215-Xpro-A

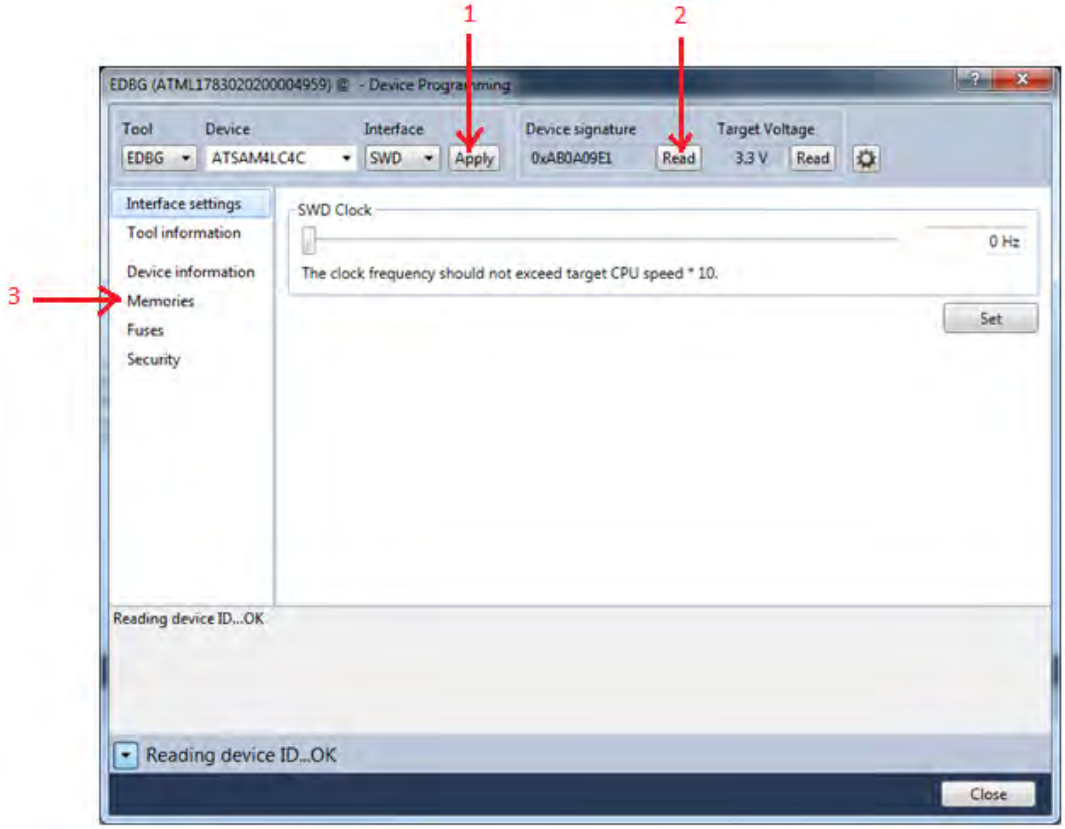
a. program the Test setup as follows: Open Atmel studio and Go to Tools menu and click Device Programming



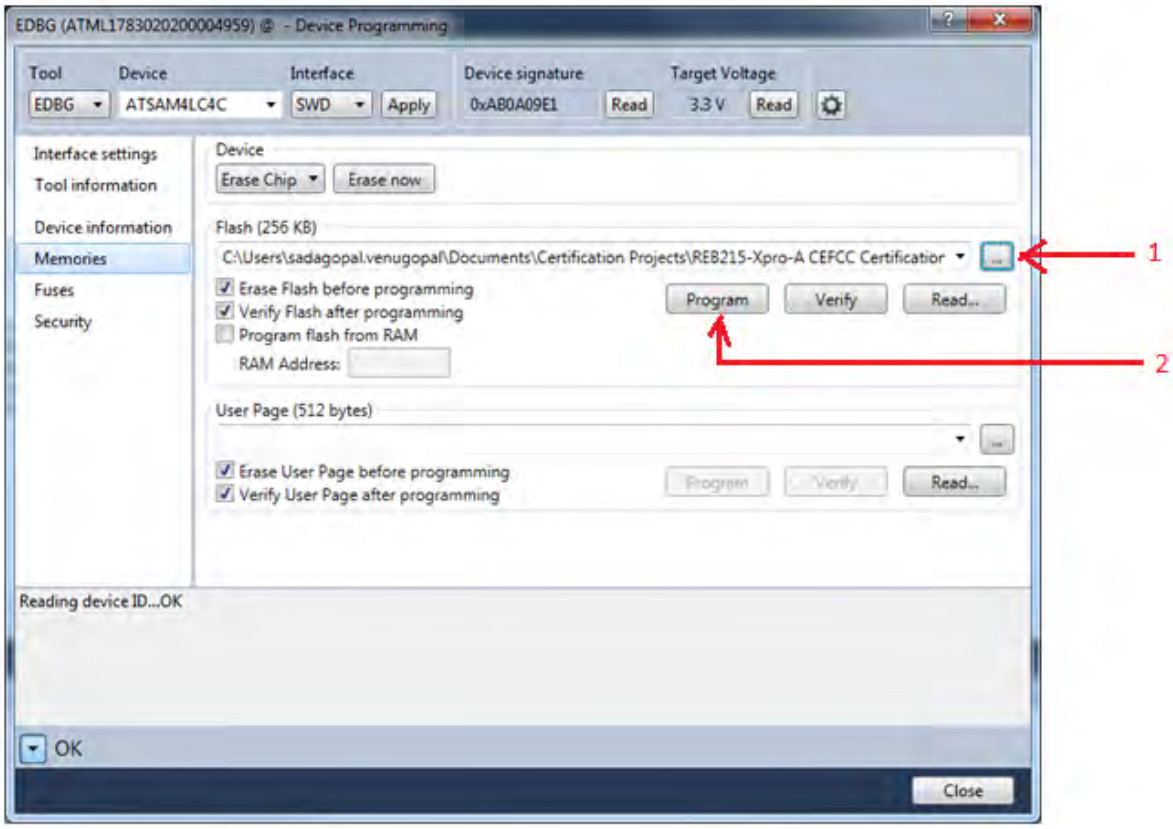
b. Select the tool as EDBG as shown below



c. Click “Apply”, Status LED (yellow color) which is near to power LED starts to glow. Click “Read” which reads Device signature and Target voltage. Next, Click memories for programming. Steps are shown below in sequence



d. Save the "PERFORMANCE_ANALYZER_2_SAM4L_RF215v3.hex" file into your PC and choose the correct path of the saved hex file in Atmel Studio and click programming. Steps are shown below in sequence. After programming, close the below window and start using Performance Analyzer.



7. Performance Analyzer

1. Launch Atmel Studio tool by clicking the Atmel Studio icon

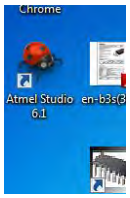


Figure 10: Launch Atmel Studio 6.1

2. For the first time launch, Atmel studio will show the below error for Wireless Composer. Click Ok.

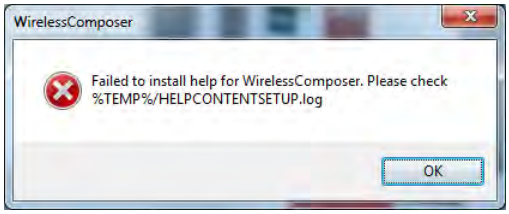


Figure 11: Wirless composer Error

3. From the Atmel Studio Start page, launch Performance Analyzer utility by clicking the icon as shown in below figure.

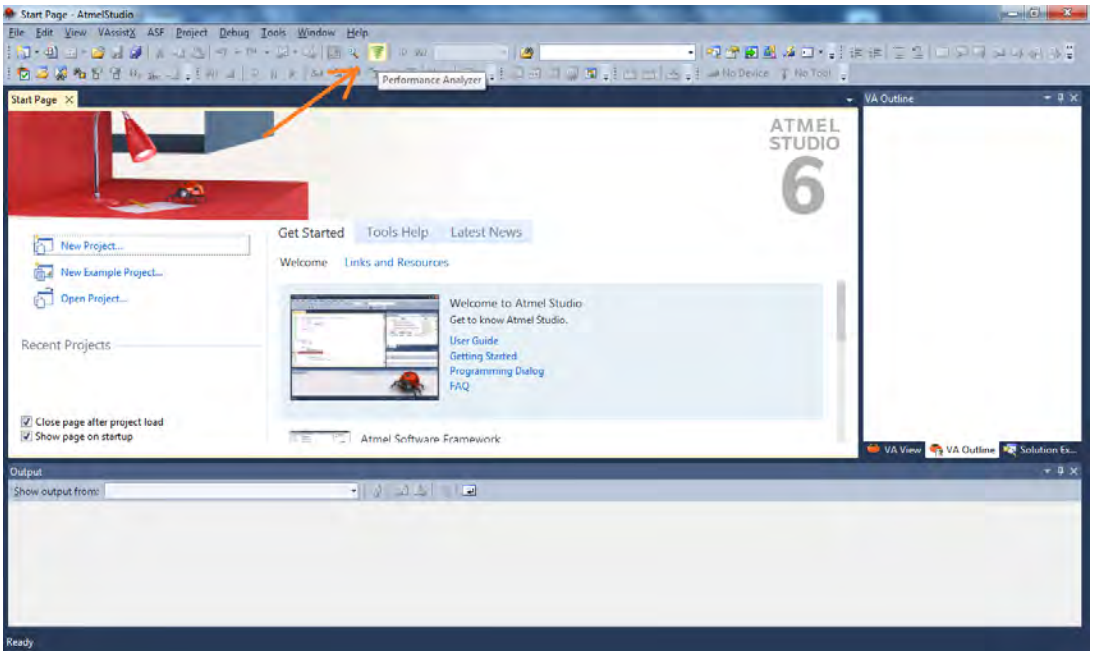


Figure 12: Atmel Studio 6.1 – Start Page

4. After clicking the Performance Analyzer icon, Performance Analyzer window will open as shown in the following figure.

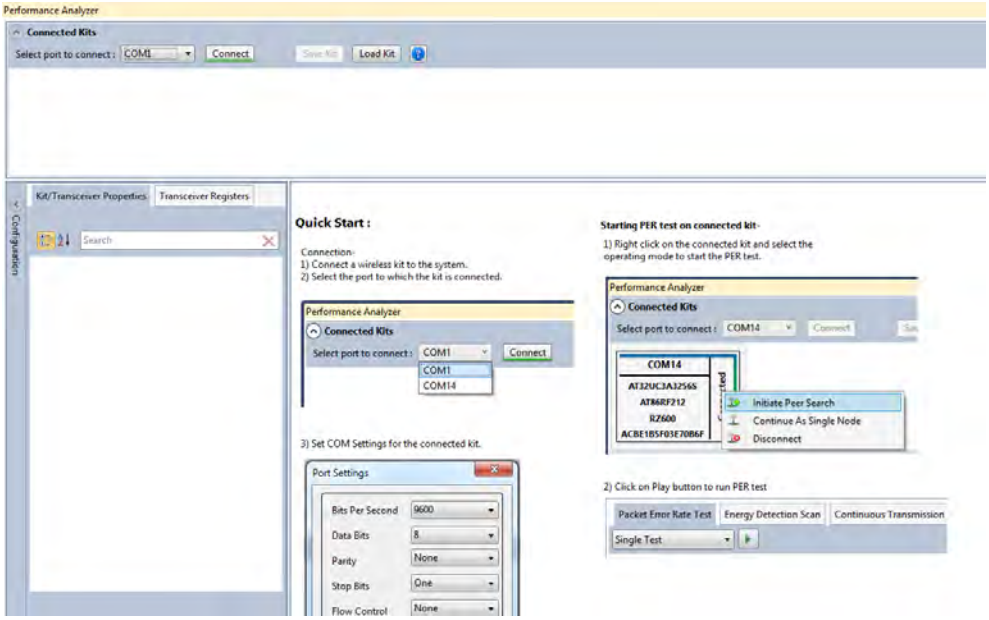


Figure 13: Performance Analyzer

Ensure the DuT is connected to the PC as explained in Section 5 and step 1

8. Tx Test (Single node / Continuous Transmission) for Sub-1GHz CE Testing

1. Select the COM Port from the dropdown menu and select a COM port to which the kit to be connected and click “Connect”

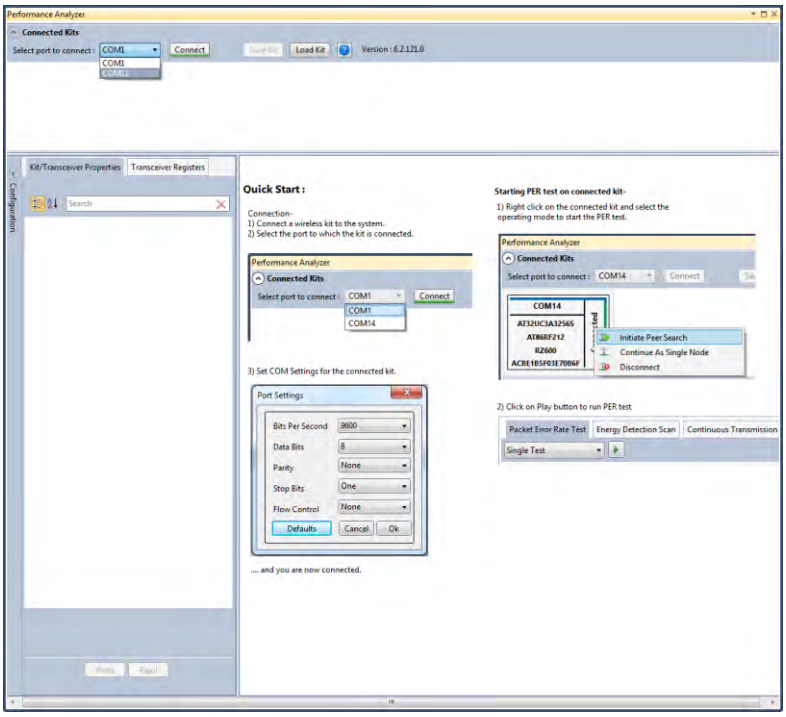


Figure 14: Performance Analyzer – COM Port Selection

Note: COM17 from the above figure is an example. The COM Port number varies depending upon the PC.

2. Set the COM settings from the pop-up window. Click “Defaults” and then click “OK”
3. To check “transmit only” functionality; right click on the Kit information area select “Continue as a single node”. This setting is used for continuous transmission.

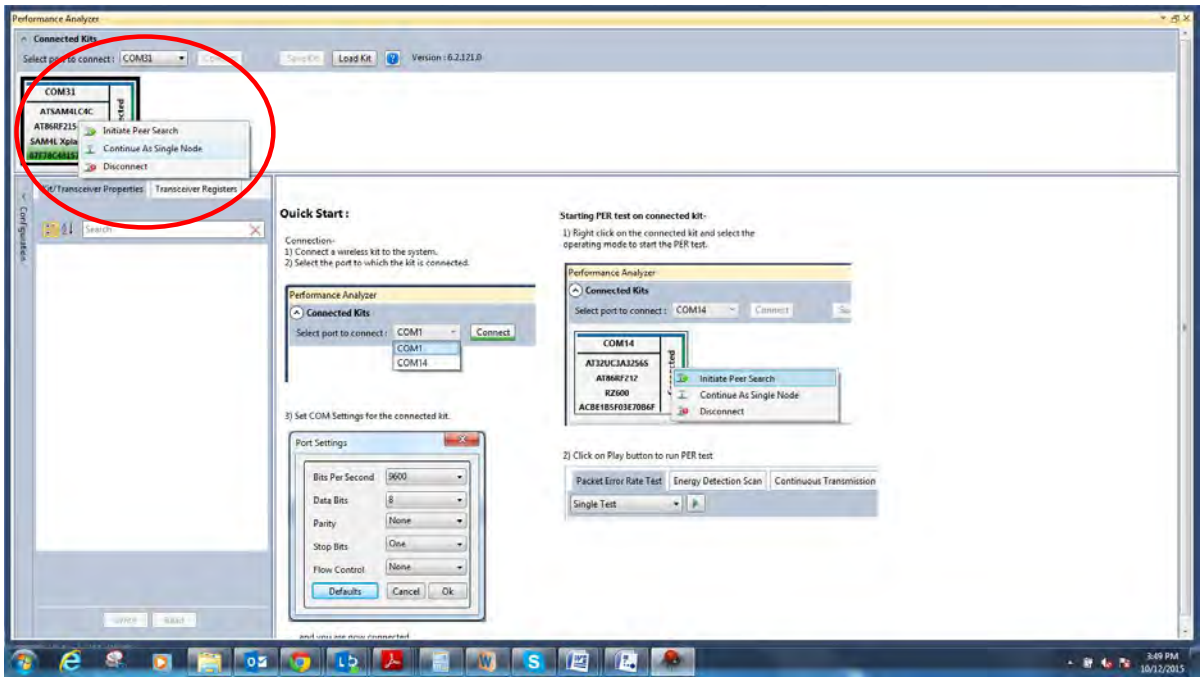


Figure 15: Performance Analyzer – Kit Information

4. Kit / Transceiver properties, Channel Page, Frequency Band, Channel Number, Modulation Scheme and Power level can also be changed in the Performance Analyzer window.

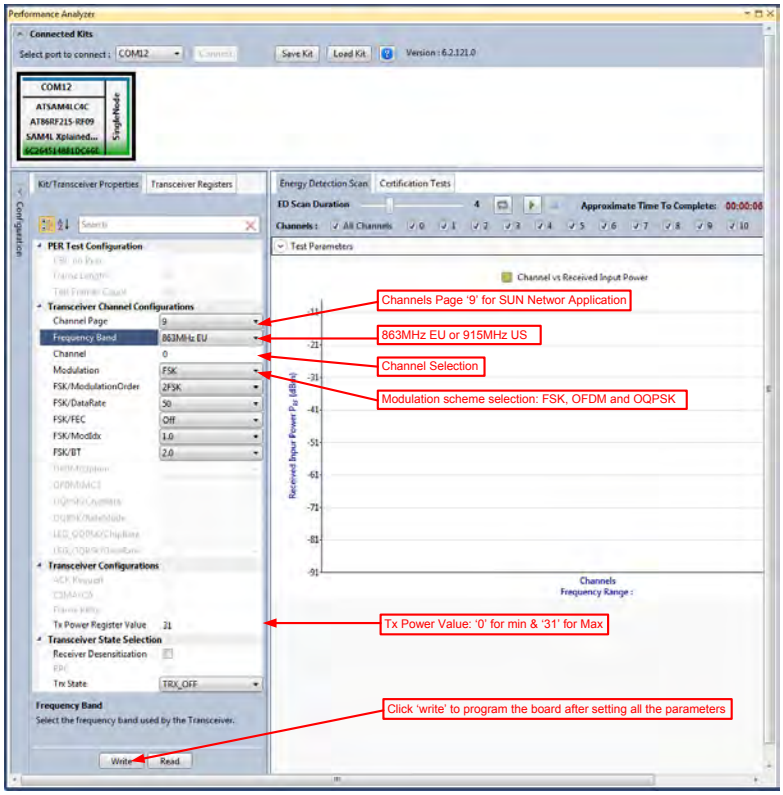


Figure 16: Performance Analyzer – Transceiver configuration

5. To Transmit CW mode or PRBS mode, click on Certification tab and Continuous transmission and CW or PRBS

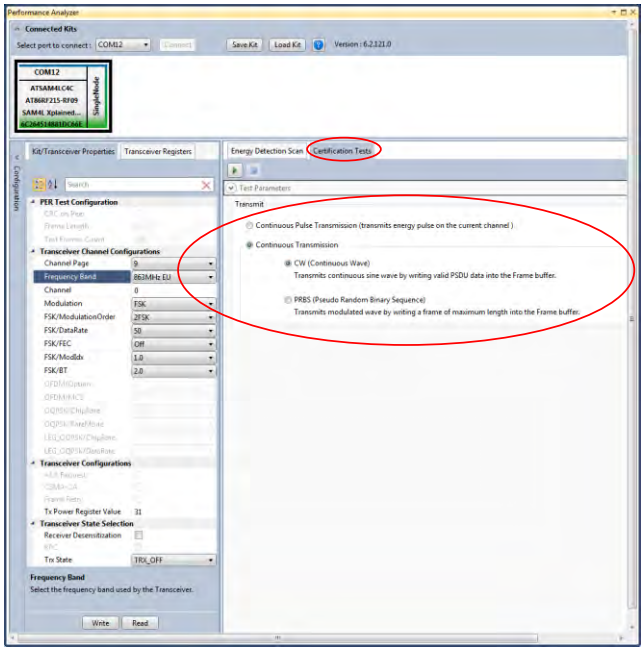


Figure 17: Performance Analyzer – Continuous Tx mode configuration

The center frequency of the MR-FSK, OFDM and OQPSK channels (***except the OQPSK operating in the 868–870 MHz***) band is defined as follows:

$$ChanCenterFreq = ChanCenterFreq_0 + NumChan \times ChanSpacing$$

where $ChanCenterFreq_0$ is the first channel center frequency in MHz, $ChanSpacing$ is the separation between adjacent channels in MHz, $NumChan$ is the channel number from 0 to $TotalNumChan-1$, and $TotalNumChan$ is the total number of channels for the available frequency band.

8.1 Tx Test: MR-FSK operating mode #1, 50kbit/s, 14dBm

Performance Analyzer configuration settings are

Table 1:- Board setting

Performance Analyzer Parameter	Setting for MR-FSK operating mode #1
Channel Page	9
Frequency band	863MHz EU (863MHz to 870MHz)
Channel	0 to 33
Modulation	FSK
FSK/ModulationOrder	2FSK
FSK/DataRate	50 kb/s
FSK/FEC	On
FSK/ModIdx	1.0
FSK/BT	Leave at default value; this is applicable only for GFSK mode
Tx Power Register Value	'31' for Max Power (14dBm)

Table 2:

Frequency band (MHz)	Parameter	MR-FSK Operating mode #1
(863MHz to 870MHz)	Channel spacing (kHz)	200
	ChanCenterFreq0 (MHz)	863.125

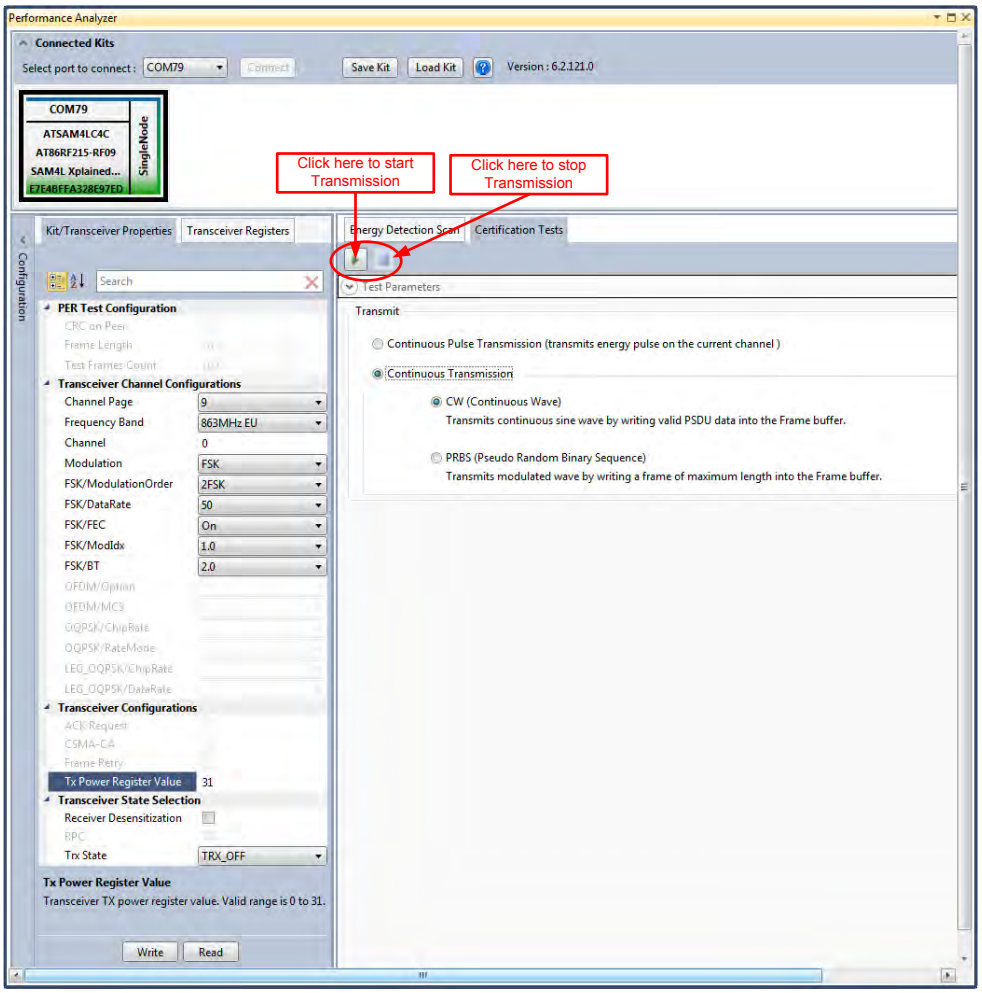


Figure 18: MR-FSK operating mode #1– Countinous transmit mode configuration

8.2 Tx Test: OFDM Option 4, MCS3, 14dBm

Performance Analyzer configuration settings are

Table 3:- Board setting

Performance Analyzer Parameter	Setting for OFDM Option 4, MCS3
Channel Page	9
Frequency band	863MHz EU (863MHz to 870MHz)
Channel	0 to 33
Modulation	OFDM
OFDM/Option	Option4
OFDM/MCS	MCS3
Tx Power Register Value	'31' for Max Power (14dBm)

Table 4:

Frequency band (MHz)	Parameter	OFDM Option 4, MCS 3 mode
(863MHz to 870MHz)	Nominal bandwidth (KHz)	156
	Data rate	100 kb/s
	Channel spacing (kHz)	200
	ChanCenterFreq0 (MHz)	863.125

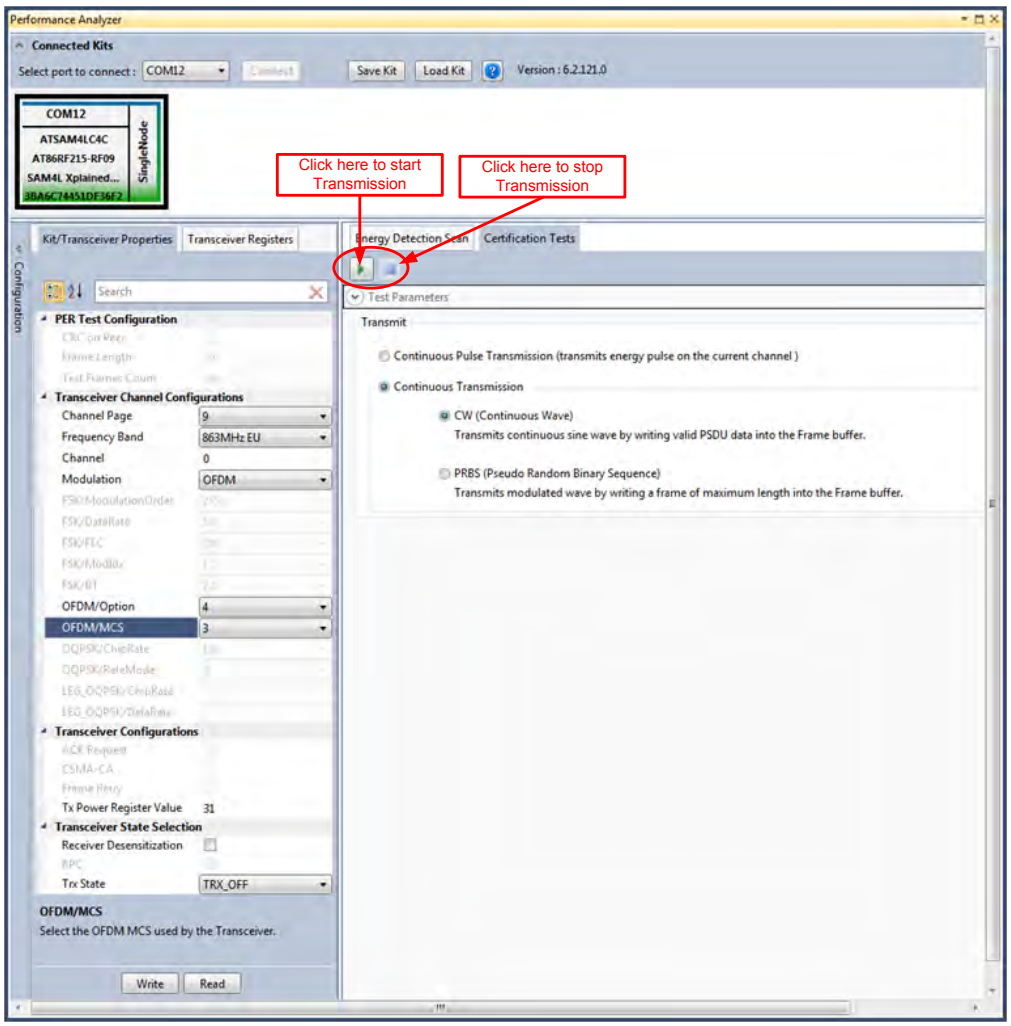


Figure 19: OFDM option 4, MCS3 – Countinous transmit mode configuration

8.3 Tx Test: O-QPSK RateMode 0, 14dBm

Performance Analyser configuration settings are

Table 5

Performance Analyzer Parameter	Setting for O-QPSK RateMode 0
Channel Page	9
Frequency band	863MHz EU (868MHz to 870MHz)
Channel	0, 1 and 2
Modulation	OQPSK
OQPSK/ChipRate	ChipRate 100
OQPSK/RateMode	RateMode 0
Tx Power Register Value	'31' for Max Power

Table 6:

Frequency band	Channel Number	Channel Center Frequency (MHz)
(868MHz to 870MHz)	0	868.3
	1	868.95
	2	869.525

Data Rate: 6.25 kb/s

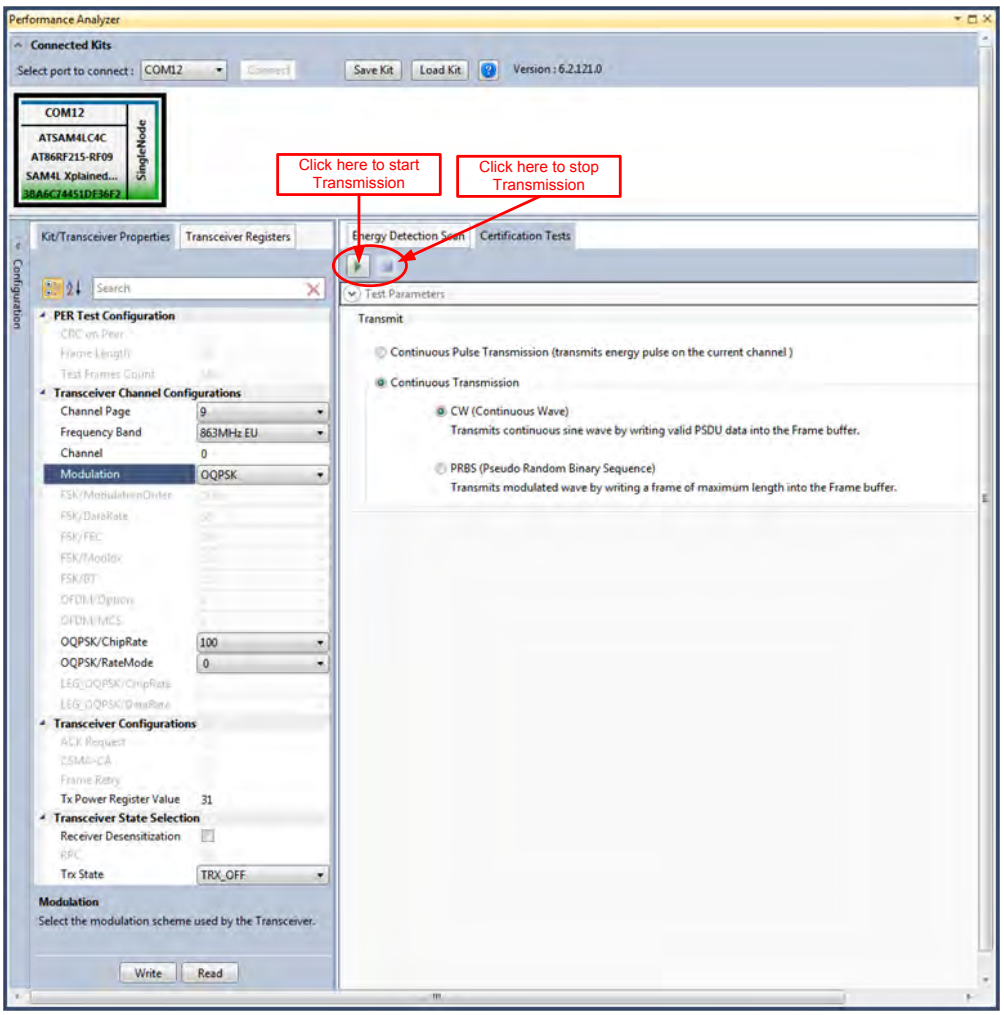


Figure 20: O-QPSK RateMode 0 – Countinous transmit mode configuration

8.4 Tx Test: O-QPSK RateMode 3, 14dBm

Performance Analyser configuration settings are

Table 7

Performance Analyzer Parameter	Setting for O-QPSK RateMode 3
Channel Page	9
Frequency band	863MHz EU (868MHz to 870MHz)
Channel	0, 1 and 2
Modulation	OQPSK
OQPSK/ChipRate	ChipRate 100
OQPSK/RateMode	RateMode 3
Tx Power Register Value	'31' for Max Power

Table 8:

Frequency band	Channel Number	Channel Center Frequency (MHz)
(868MHz to 870MHz)	0	863.3
	1	868.95
	2	869.525

Data Rate: 50 kb/s

Figure 21: O-QPSK RateMode 3 – Countinous transmit mode configuration

9. Tx Test (Single node / Continuous Transmission) for Sub-1GHz FCC Testing

9.1 Tx Test: MR-FSK operating mode #1, 50kbit/s, 14dBm

Performance Analyzer configuration settings are

Table 9:- Board setting

Performance Analyzer Parameter	Setting for MR-FSK operating mode #1
Channel Page	9
Frequency band	915MHz US (902MHz to 928MHz)
Channel	1 to 127
Modulation	FSK
FSK/ModulationOrder	2FSK
FSK/DataRate	50 kb/s
FSK/FEC	on
FSK/ModIdx	1.0
FSK/BT	Leave at default value; this is applicable only for GFSK mode
Tx Power Register Value	'31' for Max Power (14dBm)

Table 10:

Frequency band (MHz)	Parameter	MR-FSK Operating mode #1
915MHz ISM Band	Channel spacing (kHz)	200
	ChanCenterFreq1 (MHz)	902.4

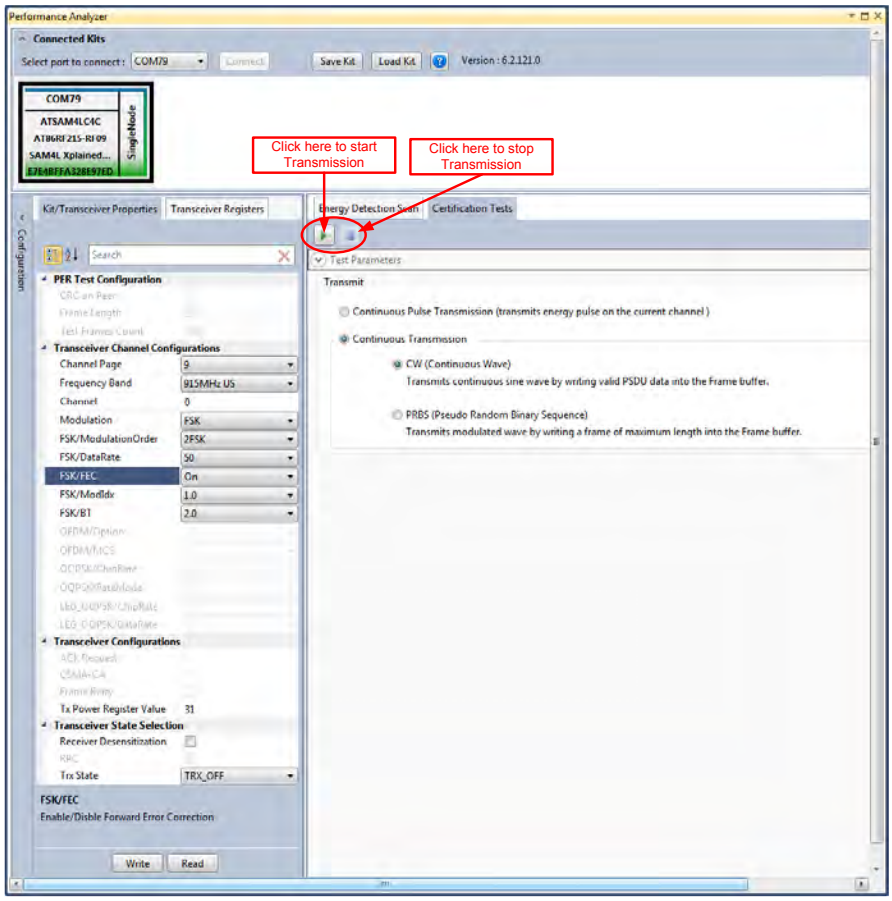


Figure 22: MR-FSK operating mode #1– Countinous transmit mode configuration

9.2 Tx Test: OFDM Option 1, MCS3, 14dBm

Performance Analyzer configuration settings are

Table 11:- Board setting

Performance Analyzer Parameter	Setting for OFDM Option 1, MCS3
Channel Page	9
Frequency band	915MHz US (902MHz to 928MHz)
Channel	0 to 19
Modulation	OFDM
OFDM/Option	Option1
OFDM/MCS	MCS3
Tx Power Register Value	'31' for Max Power (14dBm)

Table 12:

Frequency band (MHz)	Parameter	OFDM Option 1, MCS 3 mode
915MHz ISM Band	Nominal bandwidth (KHz)	1094
	Data rate	800 kb/s
	Channel spacing (kHz)	1200
	ChanCenterFreq0 (MHz)	903.2

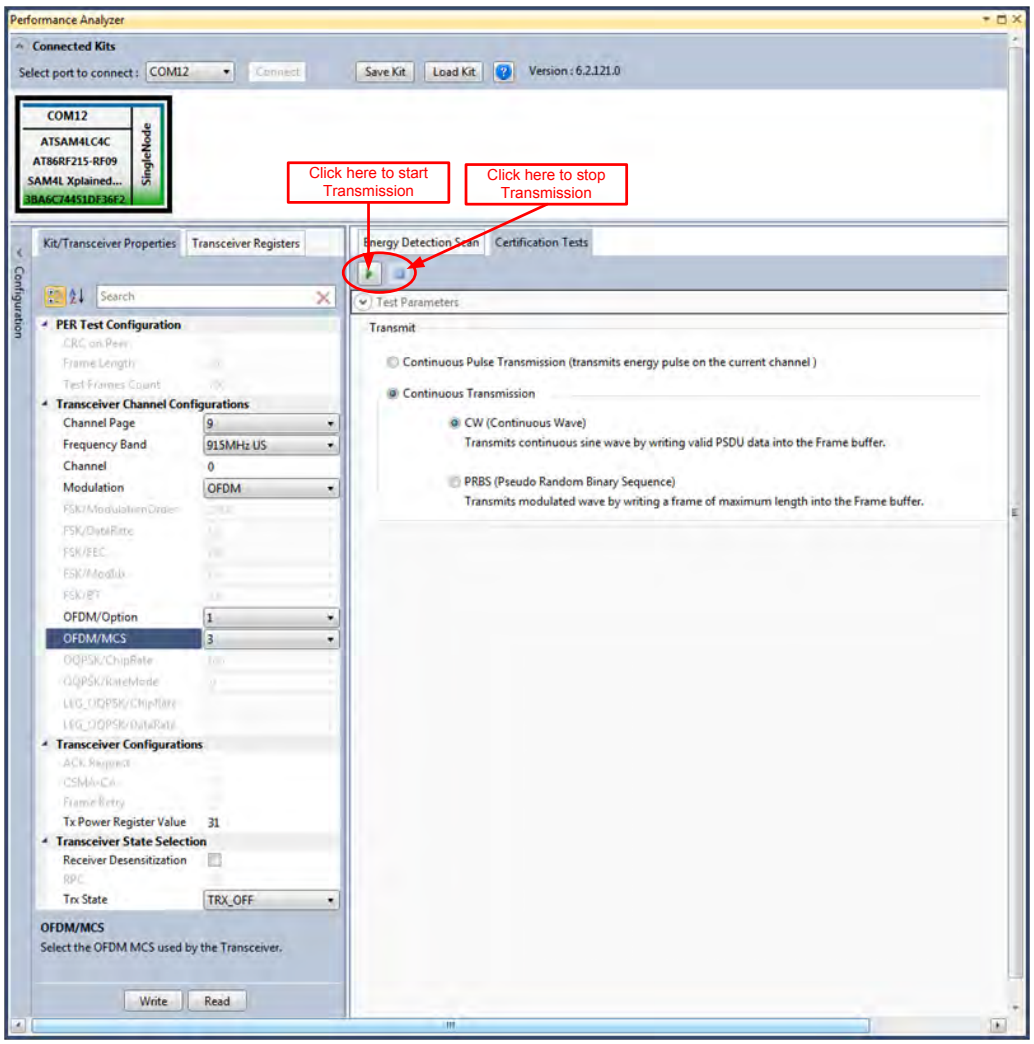


Figure 23: OFDM option1, MCS3 – Countinous transmit mode configuration

9.3 Tx Test: O-QPSK RateMode 0, 14dBm

Performance Analyser configuration settings are

Table 13

Performance Analyzer Parameter	Setting for O-QPSK RateMode 0
Channel Page	9
Frequency band	915MHz US (902MHz to 928MHz)
Channel	0 to 11
Modulation	OQPSK
OQPSK/ChipRate	ChipRate 1000
OQPSK/RateMode	RateMode 0
Tx Power Register Value	'31' for Max Power

Table 14:

Frequency band (MHz)	Parameter	O-QPSK RateMode 0
915MHz ISM Band	Channel spacing (MHz)	2
	ChanCenterFreq0 (MHz)	904

Data Rate: 31.25 kb/s

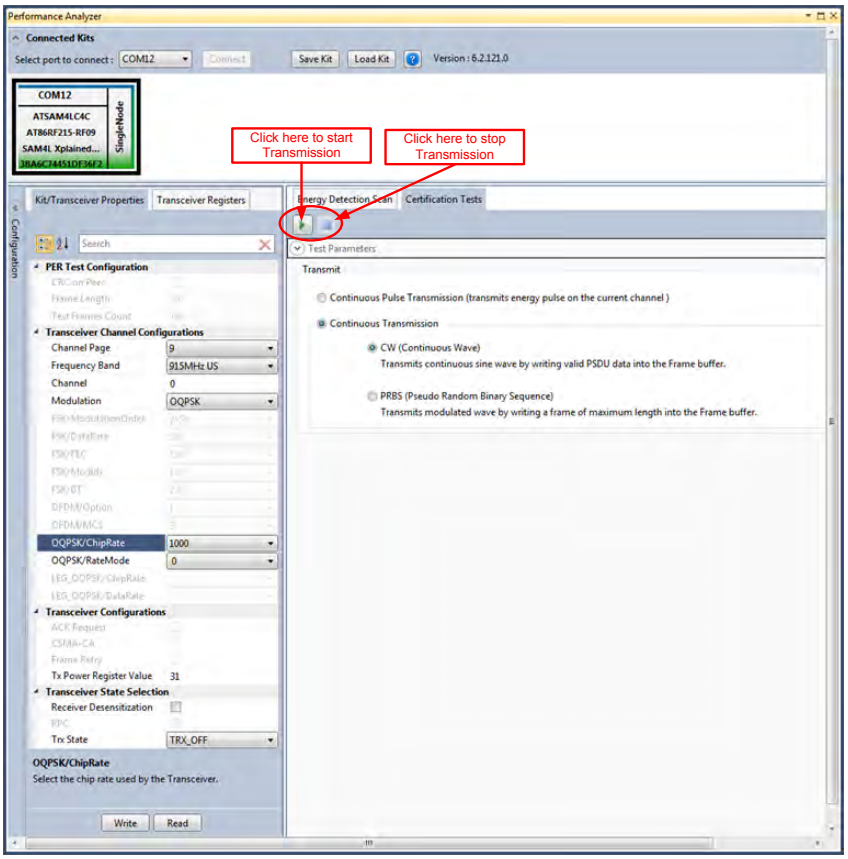


Figure 24: O-QPSK RateMode 0 – Countinous transmit mode configuration

10. Tx Test for 2.4GHz Band (Single node / Continuous Transmission (CW/PRBS))

1. Select the COM Port from the dropdown menu and select a COM port to which the kit to be connected and click “Connect”

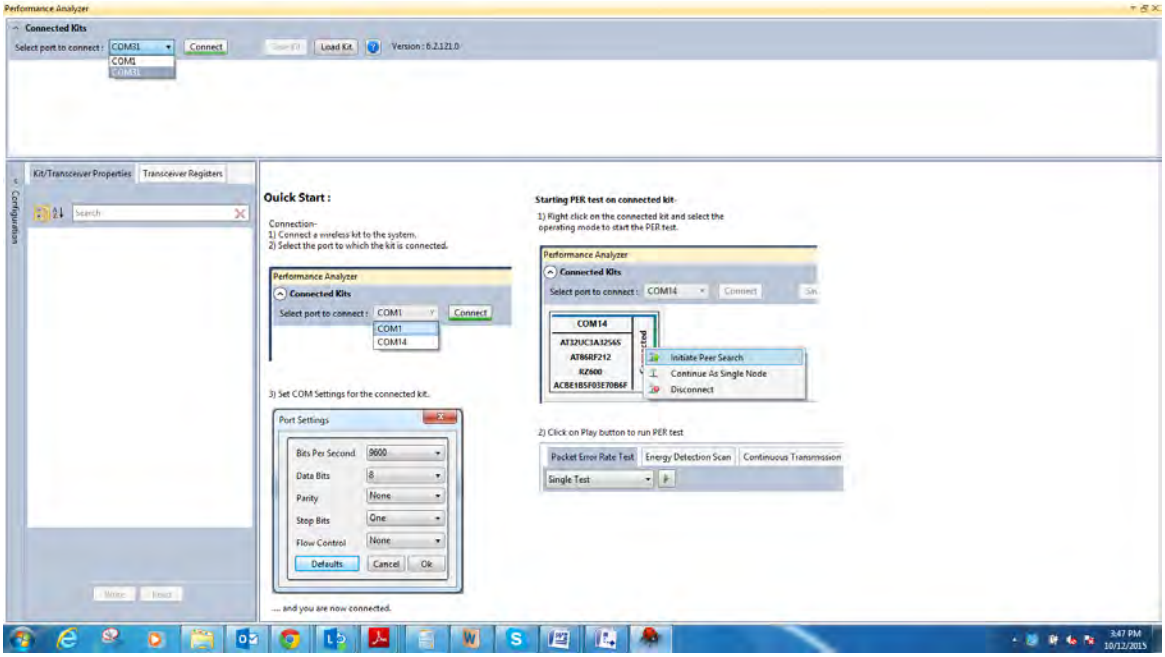


Figure 14: Performance Analyzer – COM Port Selection

Note: COM17 from the above figure is an example. The COM Port number varies depending upon the PC.

2. Set the COM settings from the pop-up window. Click “Defaults” and then click “OK”
3. To check “transmit only” functionality; right click on the Kit information area select “Continue as a single node”. This setting is used for continuous transmission.

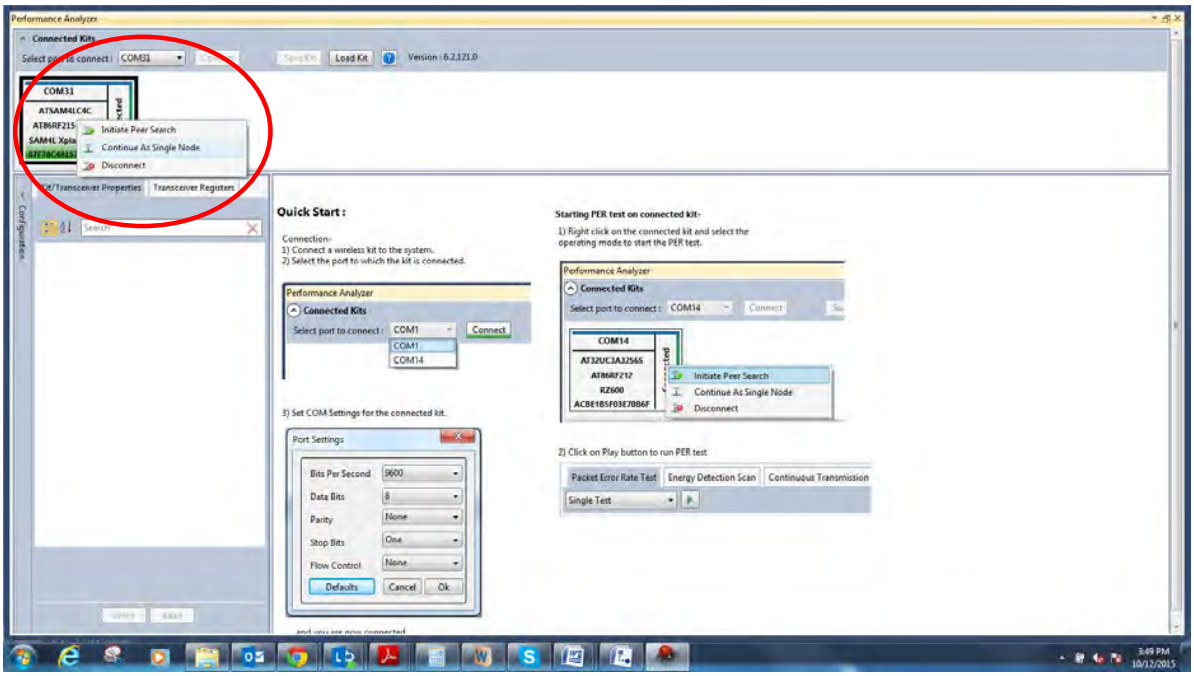


Figure 15: Performance Analyzer – Kit Information

4. Kit / Transceiver properties, Channel Page, Frequency Band, Channel Number, Modulation Scheme and Power level can also be changed in the Performance Analyzer window.

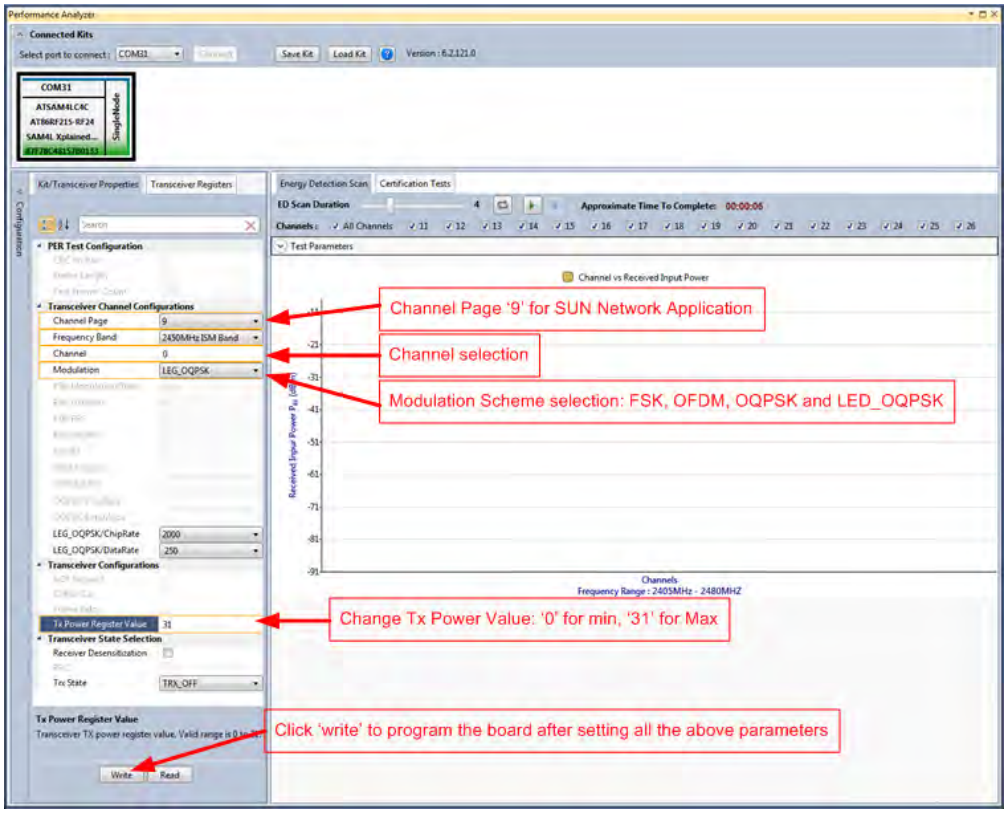


Figure 16: Performance Analyzer – Transceiver configuration

5. To Transmit CW mode or PRBS mode, click on Certification tab and Continuous transmission and CW or PRBS

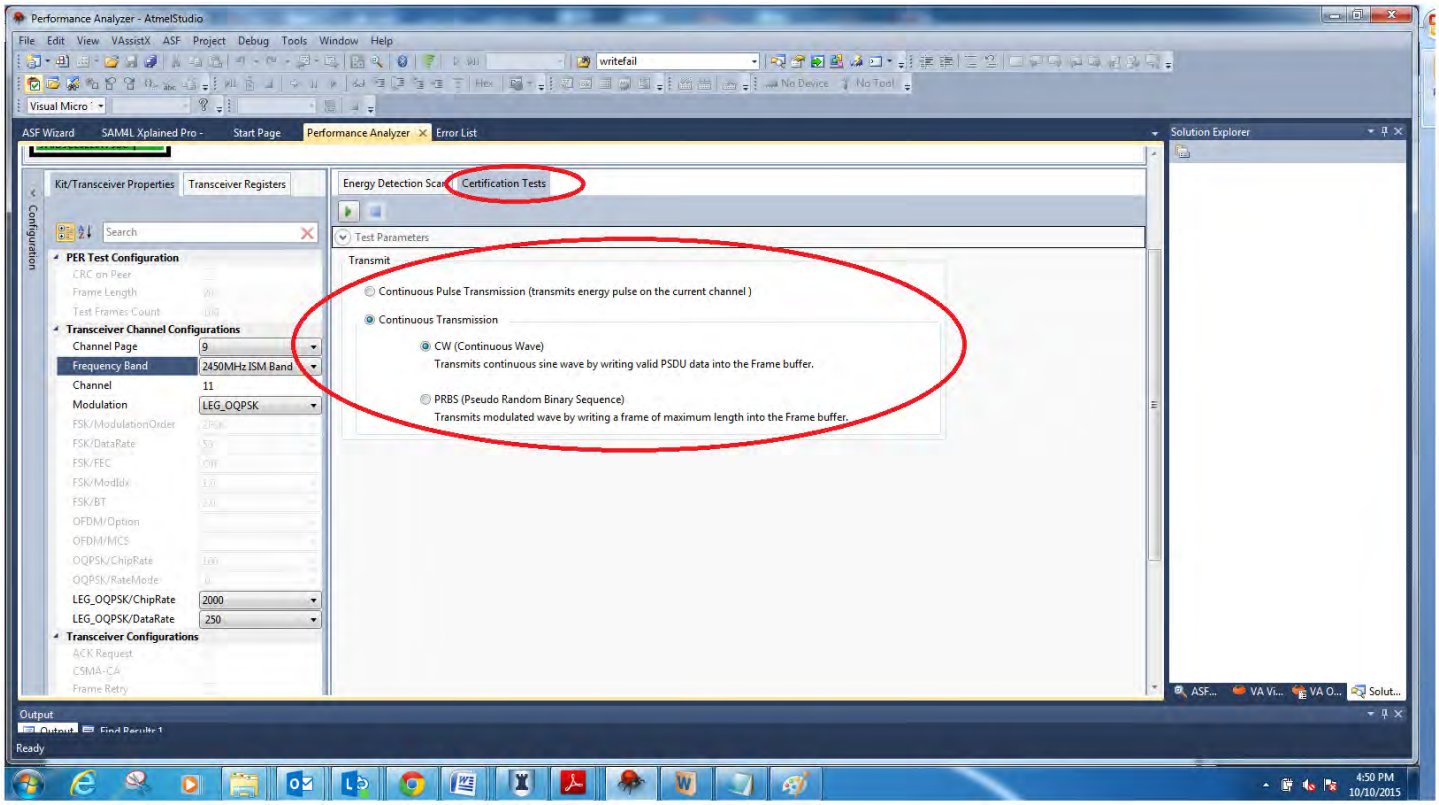


Figure 17: Performance Analyzer – Continuous Tx mode configuration

10.1 Tx Test - Legacy O-QPSK, 14dBm

Performance Analyzer configuration settings are

Table 15

Channel Page	9
Frequency band	2450MHz ISM Band
Channel	11 to 26 (2400MHz to 2483.5MHz)
Modulation	LEG_OQPSK
LEG_OQPSK/ChipRate	2000
LEG_OQPSK/DataRate	250
Tx Power Register Value	'31' for Max Power (14dBm)

Table 16:

Frequency band (MHz)	Parameter	Legacy O-QPSK mode
2400–2483.5 (Worldwide)	Channel spacing	5MHz

The center frequency of the Legacy O-QPSK channels is defined as follows:

$$F_c = 2405 + 5\ (k - 11) \text{ in MHz, for } k = 11, 12\ldots 26$$

Where, k is the channel number.

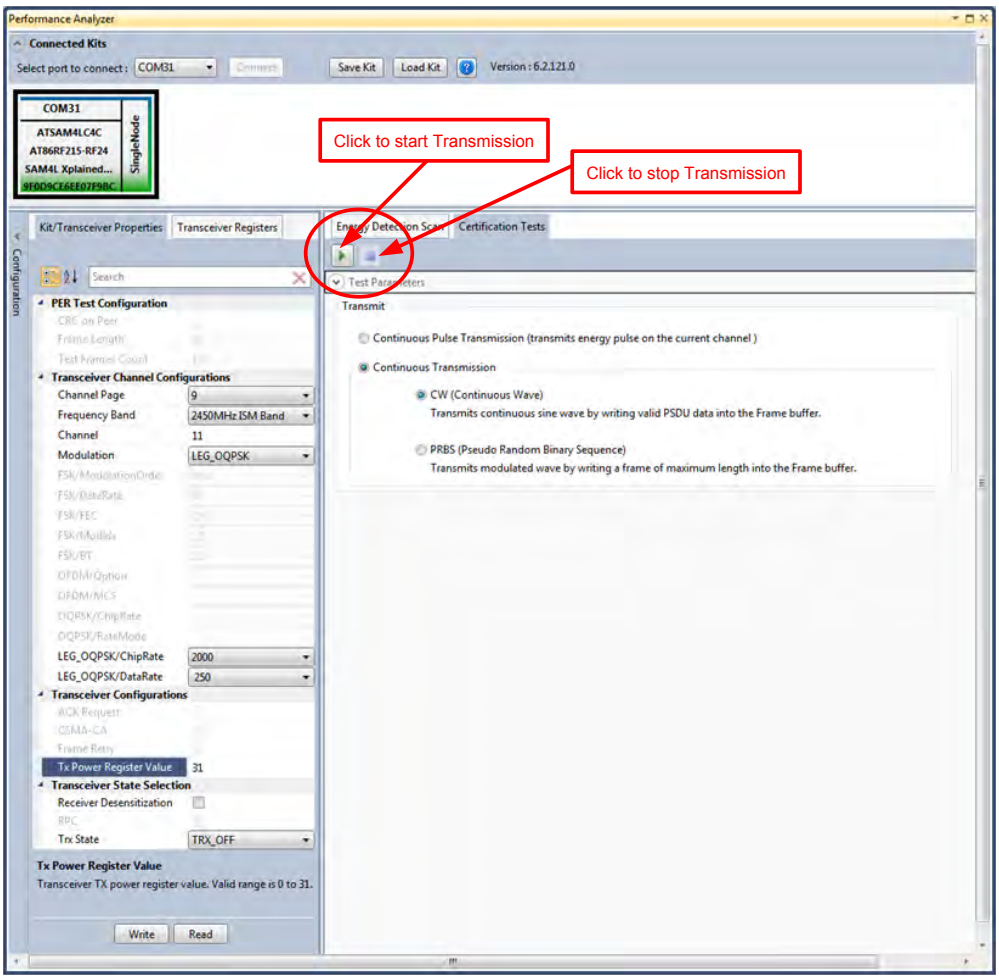


Figure 18: Legacy O-QPSK - Countinous transmit mode configuration

10.2 Tx Test – MR-FSK operating mode #1, 50kbit/s, 14dBm

Performance Analyzer configuration settings are

Table 17:- Board setting

Channel Page	9
Frequency band	2450MHz ISM Band
Channel	3 to 409 (2400MHz to 2483.5MHz)
Modulation	FSK
FSK/ModulationOrder	2FSK
FSK/DataRate	50
FSK/FEC	off
FSK/ModIdx	1.0
FSK/BT	Leave at default value; this is applicable only for GFSK mode
Tx Power Register Value	'31' for Max Power (14dBm)

Table 18:

Frequency band (MHz)	Parameter	MR-FSK Operating mode #1
2400–2483.5 (Worldwide)	Channel spacing (kHz)	200
	ChanCenterFreq0 (MHz)	2400.2

The center frequency of the MR-FSK and OFDM channels is defined as follows:

$$ChanCenterFreq = ChanCenterFreq_0 + NumChan \times ChanSpacing$$

where $ChanCenterFreq_0$ is the first channel center frequency in MHz, $ChanSpacing$ is the separation between adjacent channels in MHz, $NumChan$ is the channel number from 0 to $TotalNumChan-1$, and $TotalNumChan$ is the total number of channels for the available frequency band.

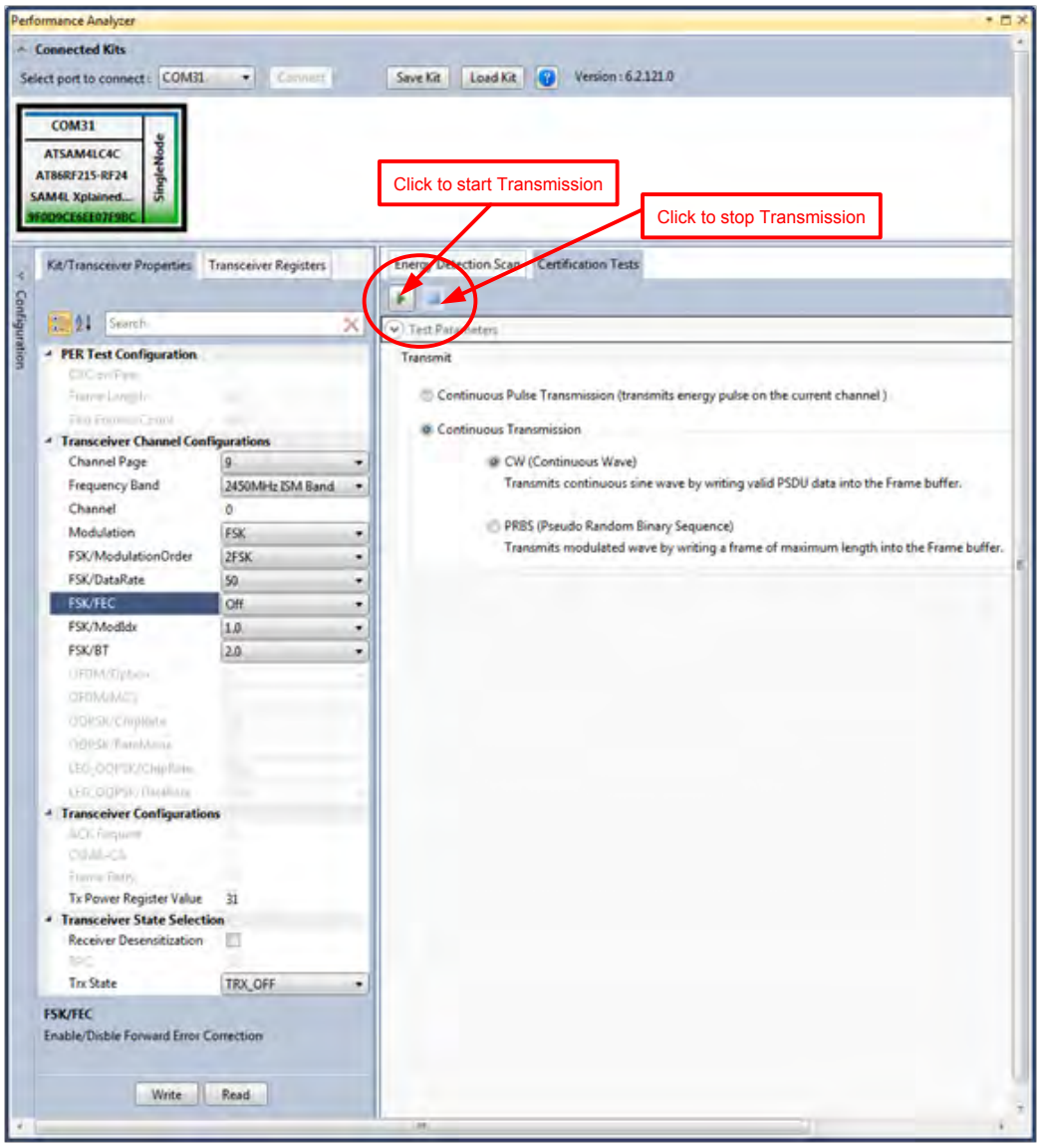


Figure 19: MR-FSK operating mode #1– Countinous transmit mode configuration

10.3 Tx Test - OFDM Option 1, MCS3, 14dBm

Performance Analyzer configuration settings are

Table 19:- Board setting

Channel Page	9
Frequency band	2450MHz ISM Band
Channel	0 to 63 (2400MHz to 2483.5MHz)
Modulation	OFDM
OFDM/Option	Option1
OFDM/MCS	MCS3
Tx Power Register Value	'31' for Max Power (14dBm)

Table 20:

Frequency band (MHz)	Parameter	OFDM Option 1, MCS 3 mode
2400–2483.5 (Worldwide)	Nominal bandwidth (KHz)	1094
	Data rate	800Kbps
	Channel spacing (kHz)	1200
	ChanCenterFreq0 (MHz)	2401.2

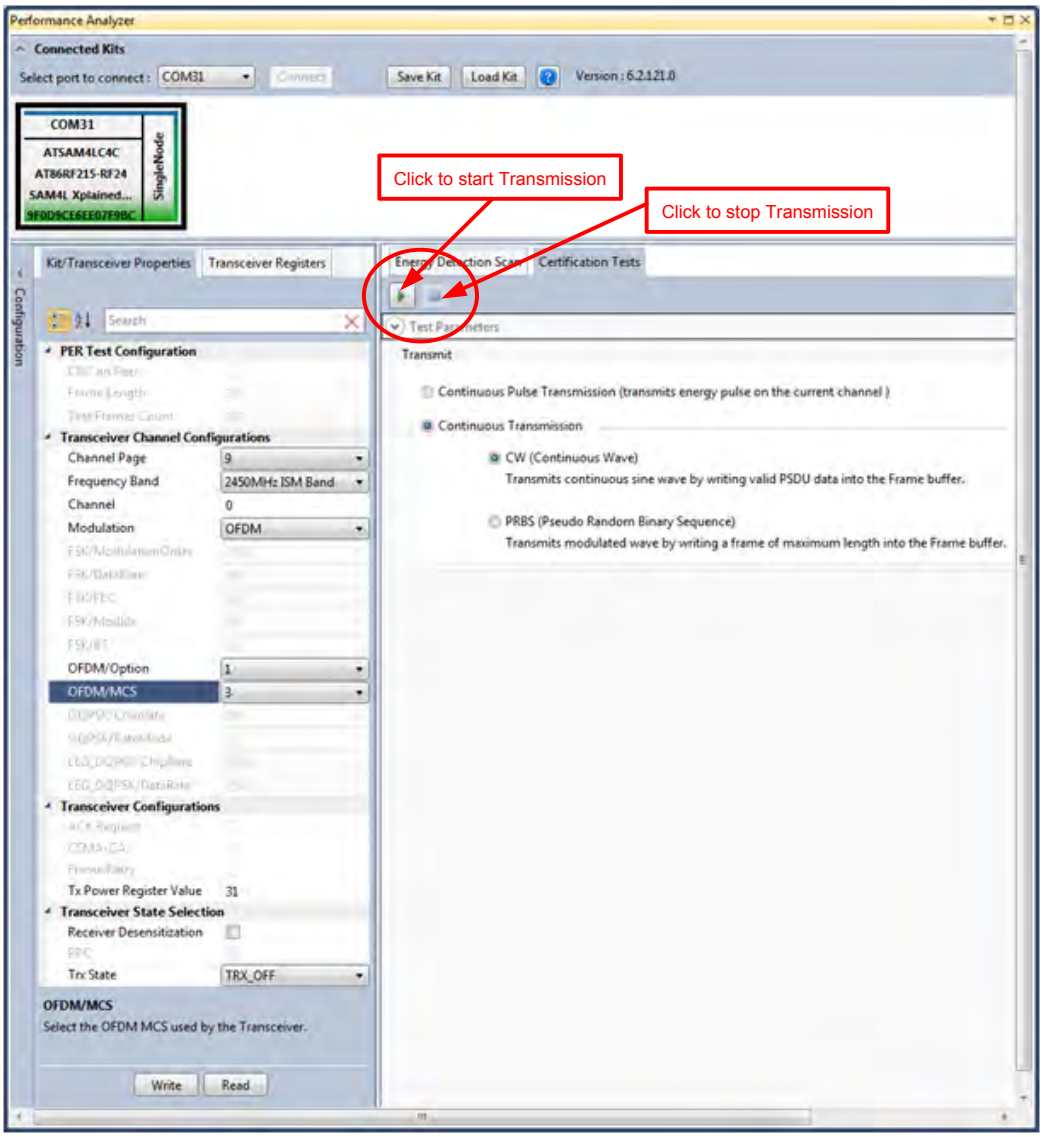


Figure 20: OFDM option1– Countinous transmit mode configuration

10.4 Tx Test - OFDM Option 2, MCS3, 14dBm

Performance Analyzer configuration settings are

Table 21:- Board setting

Channel Page	9
Frequency band	2450MHz ISM Band
Channel	0 to 96 (2400MHz to 2483.5MHz)
Modulation	OFDM
OFDM/Option	Option 2
OFDM/MCS	MCS 3
Tx Power Register Value	'31' for Max Power (14dBm)

Table 22:

Frequency band (MHz)	Parameter	OFDM Option 2, MCS 3 mode
2400–2483.5 (Worldwide)	Nominal bandwidth (KHz)	552
	Data rate	400Kbps
	Channel spacing (kHz)	800
	ChanCenterFreq0 (MHz)	2400.8

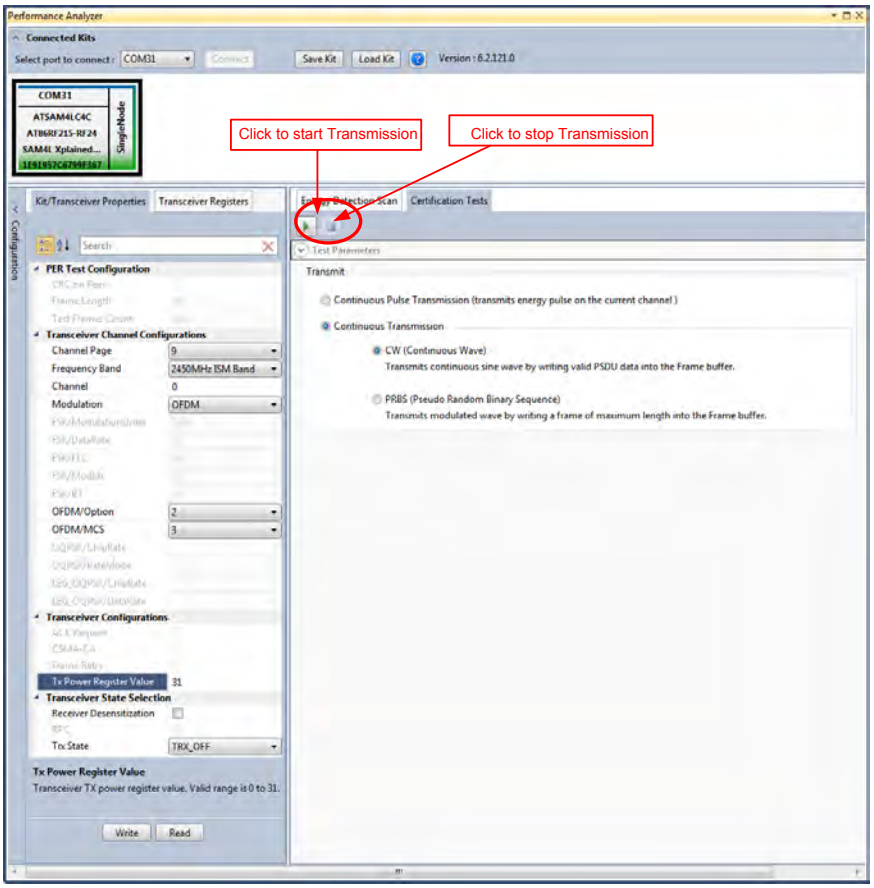


Figure 21: OFDM option2– Countinous transmit mode configuration

11. Tx-Rx Test (Transmit and Receive test) for Sub-1GHz CE Testing

1. Connect two DuTs with PC by USB cables to Debug USB for 863MHz EU/915 MHz US ISM band operations and connect with SAM4L USB for 2.4GHz operation.
2. Select one COM Port and click ‘connect’ the device corresponding to that COM port is connected and select “Initiate Peer Search” So other device connect by RF (RF Pairring). (Device connected to COM Port is transmitter and other device is receiver)

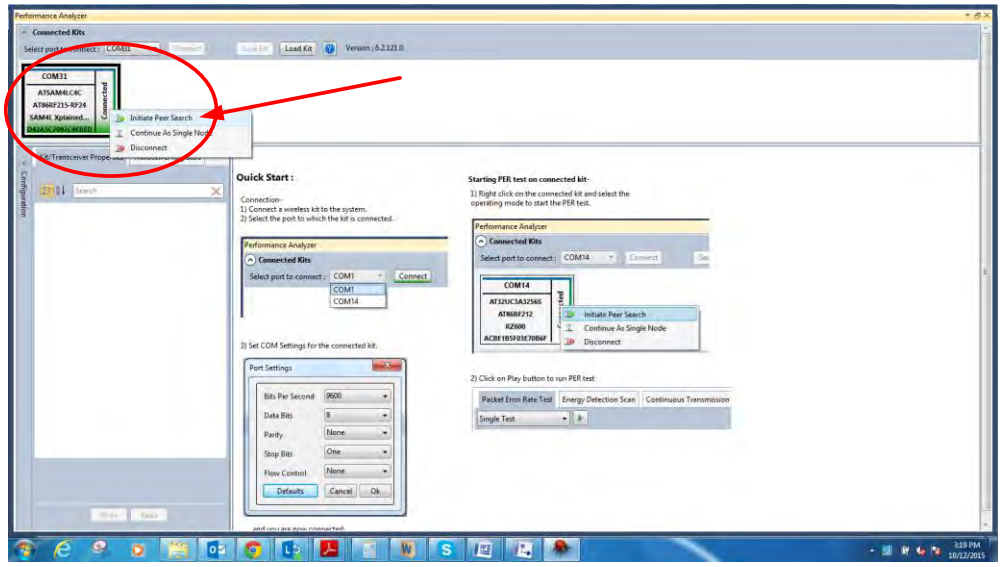


Figure 25: Performance Analyzer – Paring devices

3. When both the devices are paired, the following window appears and it is ready to perform PER (Packet Error Rate) test. Tranmitting channel, number of frames (packets); Tx Power value can be configured from the left side of the window.

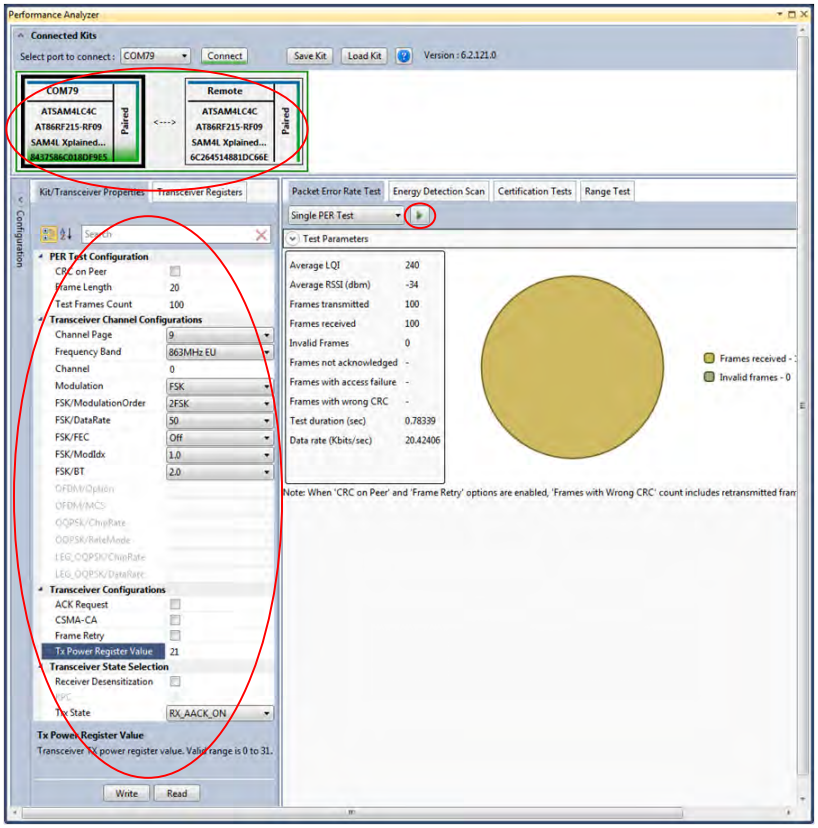


Figure 26: Performance Analyzer – PER Test Configuration

4. PER test is Transmit and Receive test. Number of transmit packets can be set by changing “Test Frames Count”

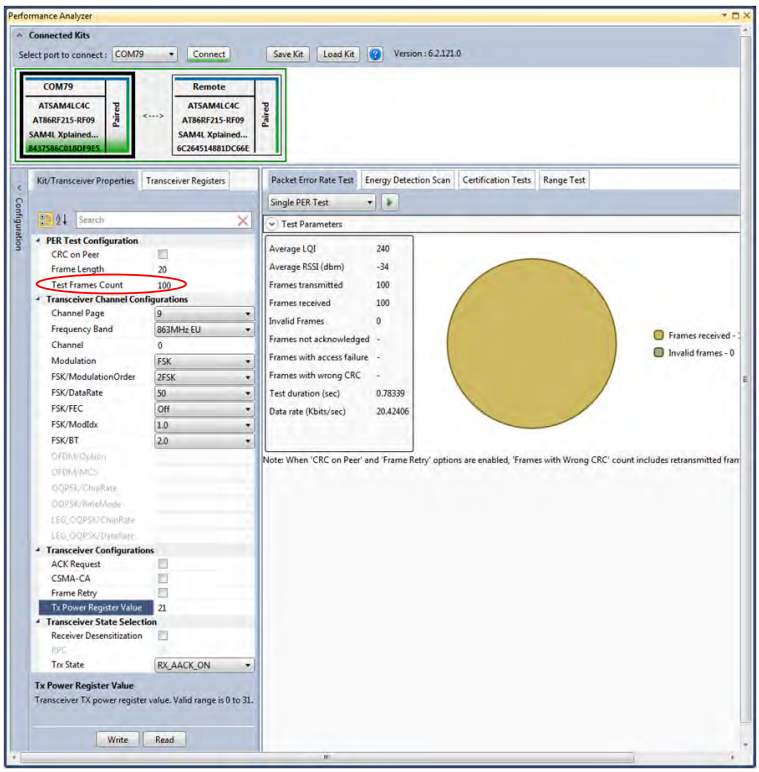


Figure 27: Performance Analyzer – Transmit Packets

5. Run Single PER Test. Test parameter window display the Transmit packets (Frames transmitted), Receive packets (Frames received) and RSSI (receive signal strength)

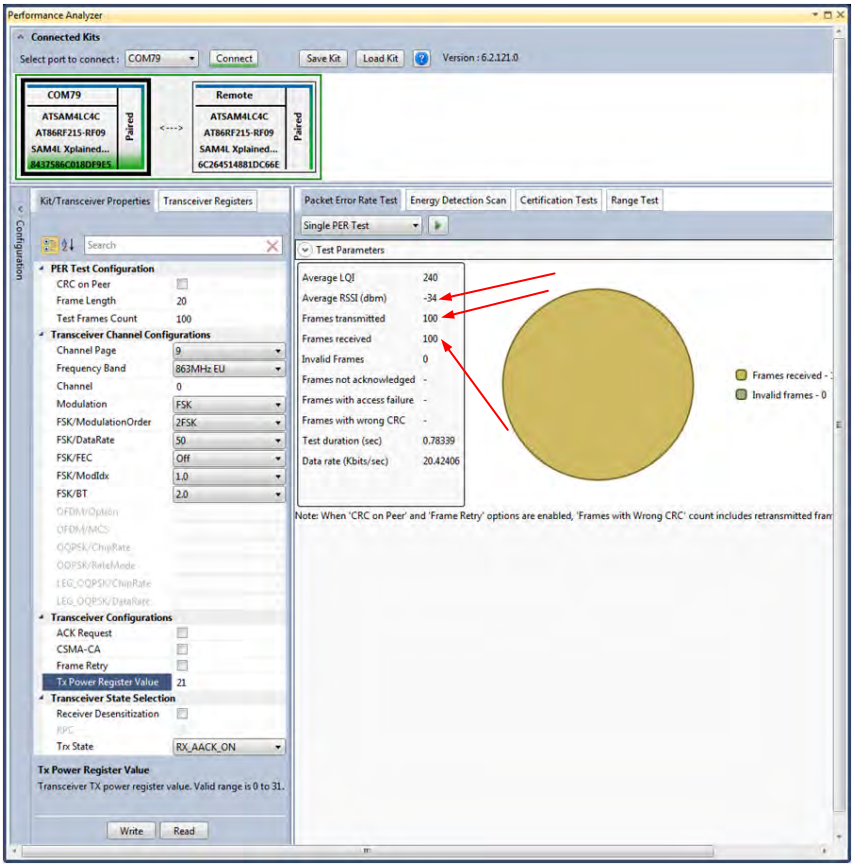


Figure 28: Performance Analyzer – PER Test

9.1 Tx-Rx Test: MR-FSK operating mode #1, 50kbit/s, 14dBm

Performance Analyzer configuration settings for transmit and receive test

Table 23:- Board setting

Performance Analyzer Parameter	Setting for MR-FSK operating mode #1
Frame length	20
Test Frames count	100
Channel Page	9
Frequency band	863MHz EU (863MHz to 870MHz)
Channel	0 to 33
Modulation	FSK
FSK/ModulationOrder	2FSK
FSK/DataRate	50 kb/s
FSK/FEC	on
FSK/ModIdx	1.0
FSK/BT	Leave at default value; this is applicable only for GFSK mode
Tx Power Register Value	'31' for Max Power (14dBm)

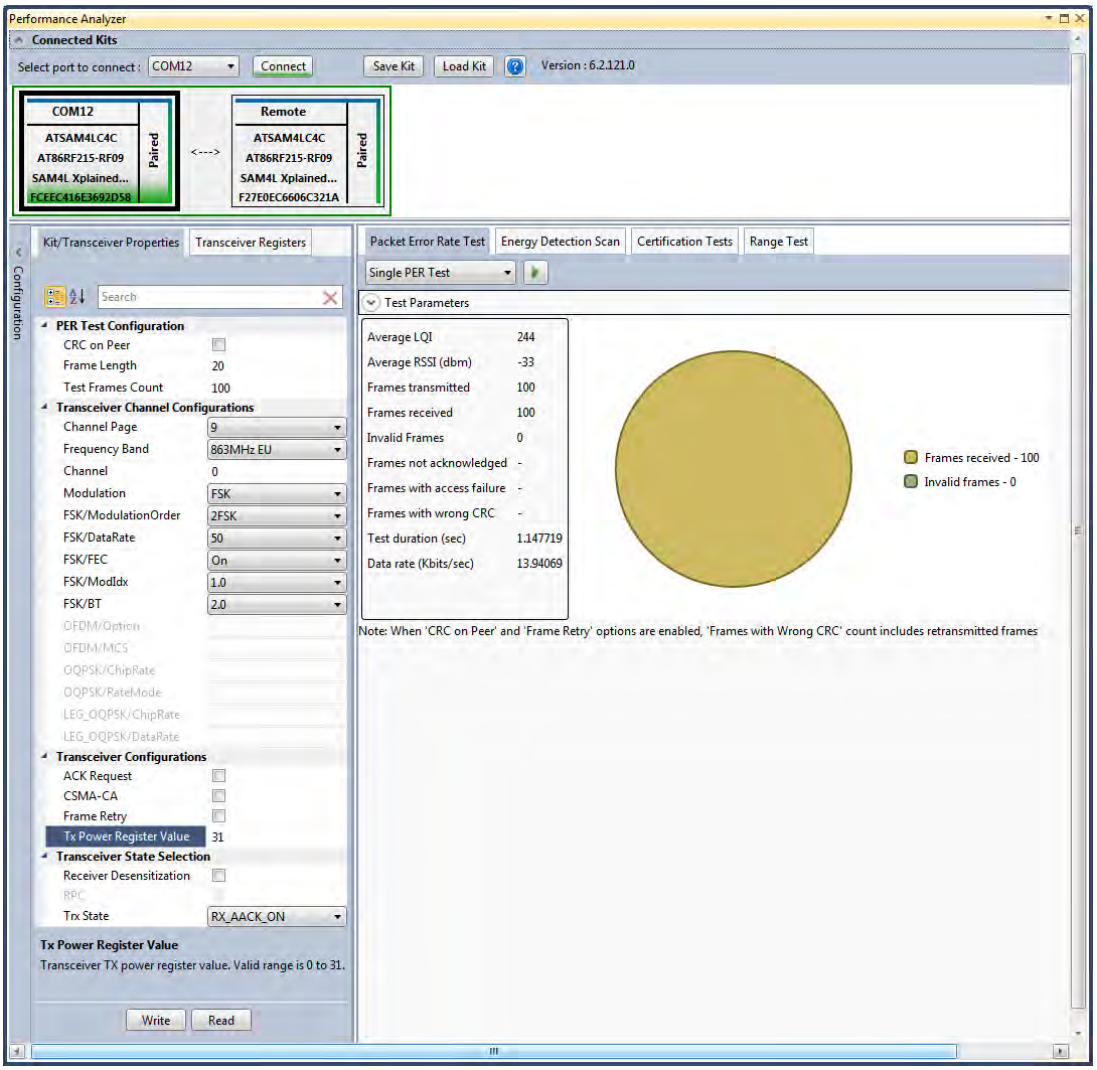


Figure 29: MR-FSK operating mode #1- PER Test

9.2 Tx-Rx Test: OFDM Option 4, MCS3, 14dBm

Performance Analyzer configuration settings for transmit and receive test

Table 24:- Board setting

Performance Analyzer Parameter	Setting for OFDM Option 4, MCS3 mode
Frame length	20
Test Frames count	100
Channel Page	9
Frequency band	863MHz EU (863MHz to 870MHz)
Channel	0 to 33
Modulation	OFDM
OFDM/Option	Option4
OFDM/MCS	MCS3
Tx Power Register Value	'31' for Max Power (14dBm)

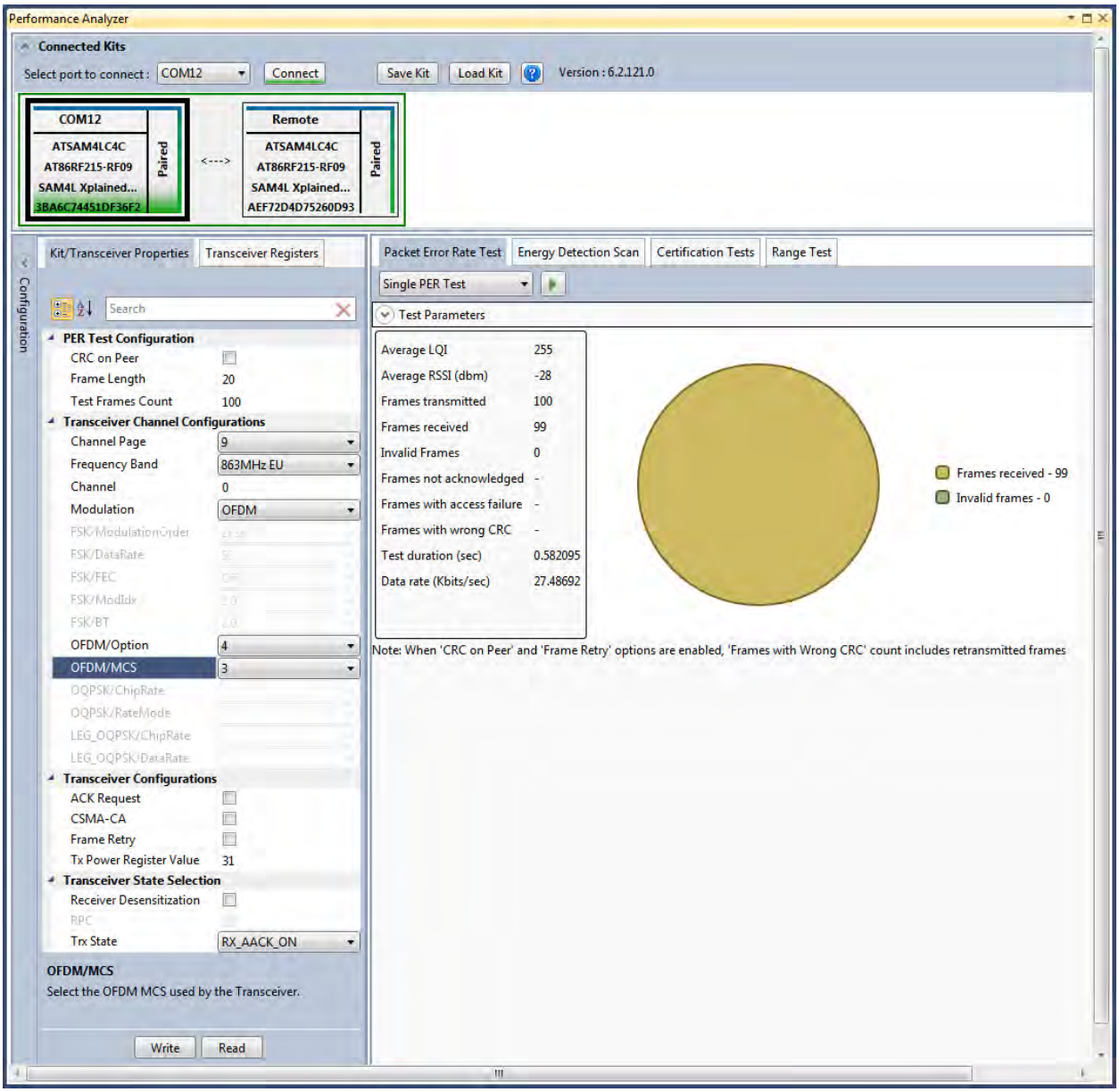


Figure 30: OFDM Option4, MCS3 mode - PER Test

9.3 Tx-Rx Test: OQPSK, RateMode 0, 14dBm

Performance Analyser configuration settings for transmit and receive test

Table 25:- Board setting

Performance Analyzer Parameter	Setting for OQPSK, RateMode 0
Frame Length	20
Test Frames count	100
Channel Page	9
Frequency band	863MHz EU (868MHz to 870MHz)
Channel	0, 1 and 2
Modulation	OQPSK
OQPSK/ChipRate	ChipRate 100
OQPSK/RateMode	RateMode 0
Tx Power Register Value	31

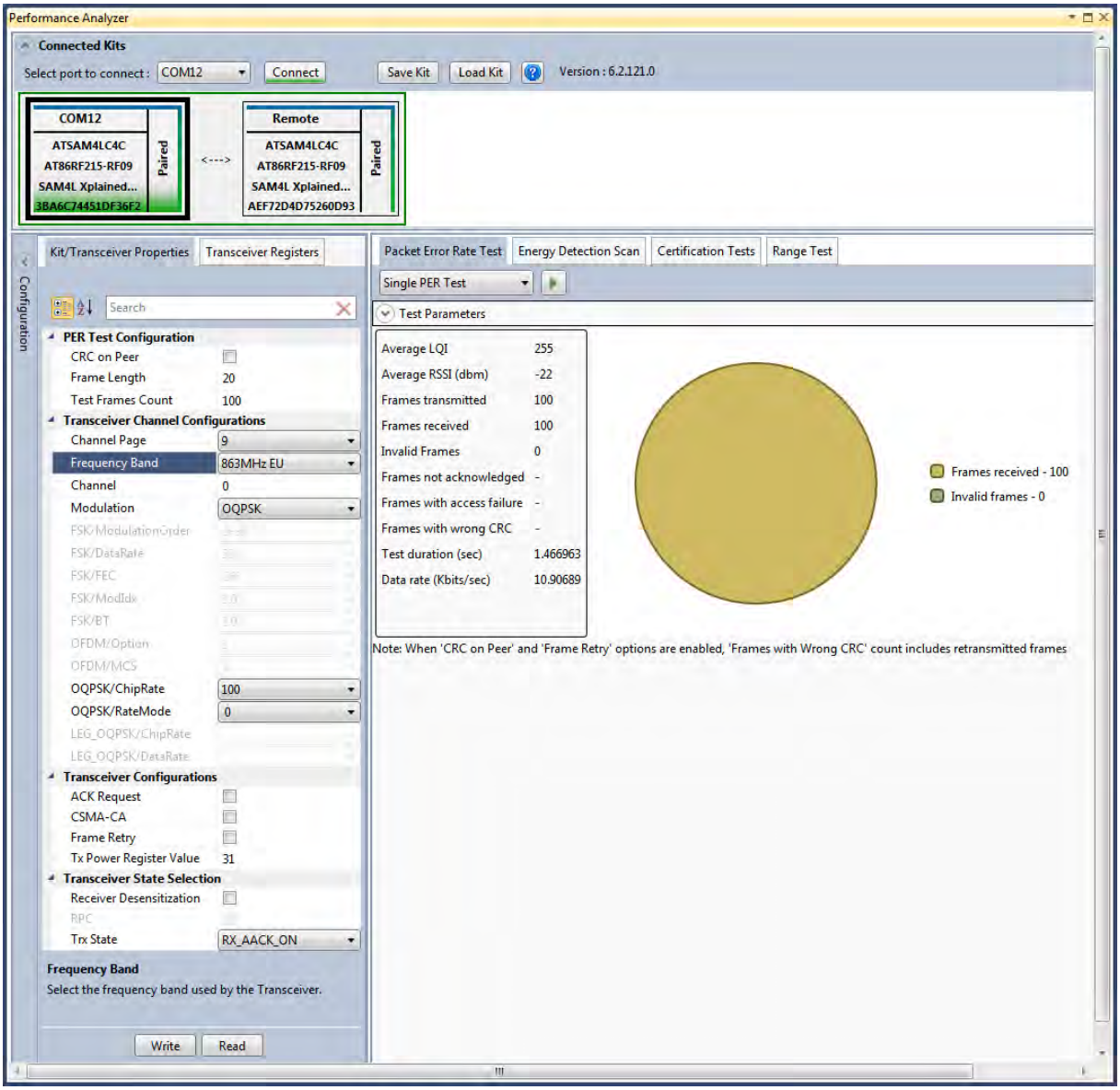


Figure 31: OQPSK, RateMode 0 - PER Test

9.4 Tx-Rx Test: OQPSK, RateMode 3, 14dBm

Performance Analyser configuration settings for transmit and receive test

Table 26:- Board setting

Performance Analyzer Parameter	Setting for OQPSK, RateMode 3
Frame Length	20
Test Frames count	100
Channel Page	9
Frequency band	863MHz EU (868MHz to 870MHz)
Channel	0, 1 and 2
Modulation	OQPSK
OQPSK/ChipRate	ChipRate 100
OQPSK/RateMode	RateMode 3
Tx Power Register Value	31

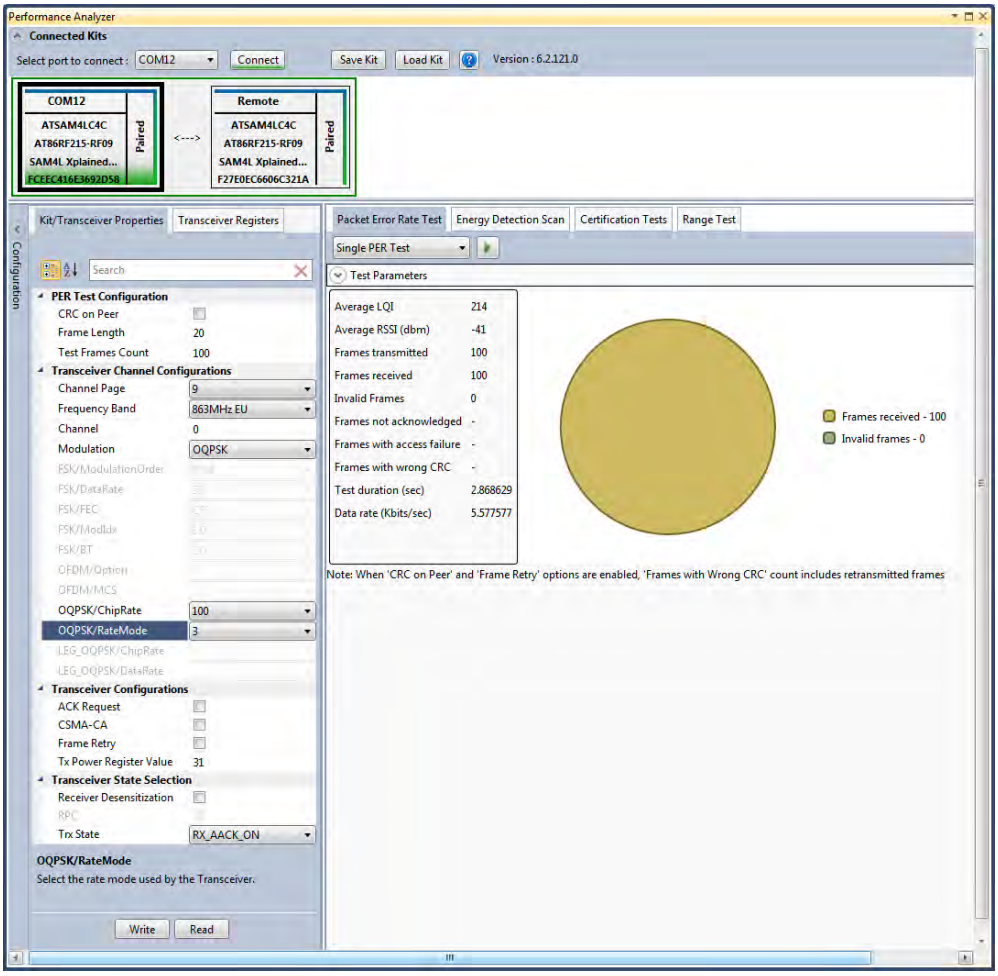


Figure 32: OQPSK, RateMode 3 - PER Test

12. Tx-Rx Test (Transmit and Receive test) for Sub-1GHz FCC Testing

12.1 Tx-Rx Test: MR-FSK operating mode #1, 50kbit/s, 14dBm

Performance Analyzer configuration settings for transmit and receive test

Table 27:- Board setting

Performance Analyzer Parameter	Setting for MR-FSK operating mode #1
Frame length	20

Test Frames count	100
Channel Page	9
Frequency band	915MHz US (902MHz to 928MHz)
Channel	1 to 127
Modulation	FSK
FSK/DataRate	50 kb/s
FSK/ModulationOrder	2FSK
FSK/FEC	on
FSK/ModIdx	1.0
FSK/BT	Leave at default value; this is applicable only for GFSK mode
Tx Power Register Value	'31' for Max Power (14dBm)

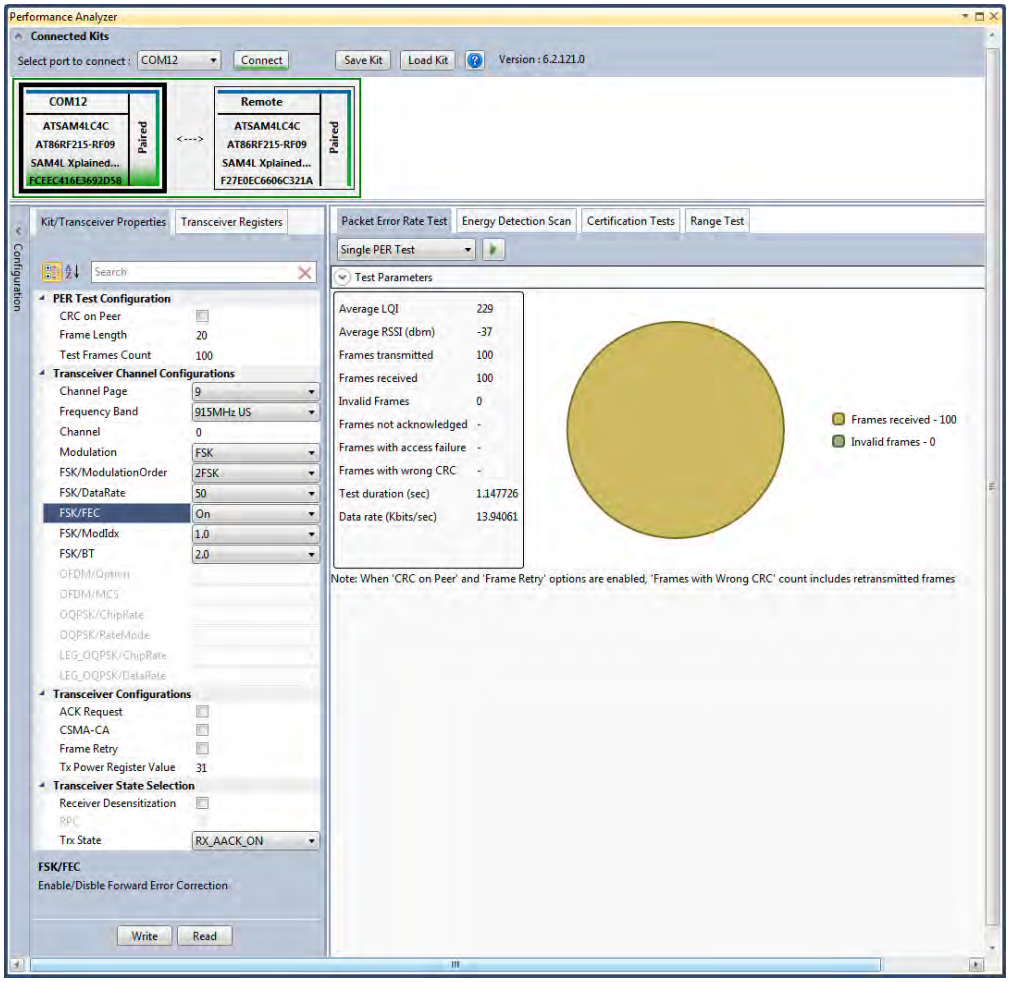


Figure 33: MR-FSK operating mode #1- PER Test

12.2 Tx-Rx Test: OFDM Option 1, MCS3, 14dBm

Performance Analyzer configuration settings for transmit and receive test

Table 28:- Board setting

Performance Analyzer Parameter	Setting for OFDM Option 1, MCS3 mode
Frame length	20
Test Frames count	100
Channel Page	9

Frequency band	915MHz US (902MHz to 928MHz)
Channel	0 to 19
Modulation	OFDM
OFDM/Option	Option1
OFDM/MCS	MCS3
Tx Power Register Value	'31' for Max Power (14dBm)

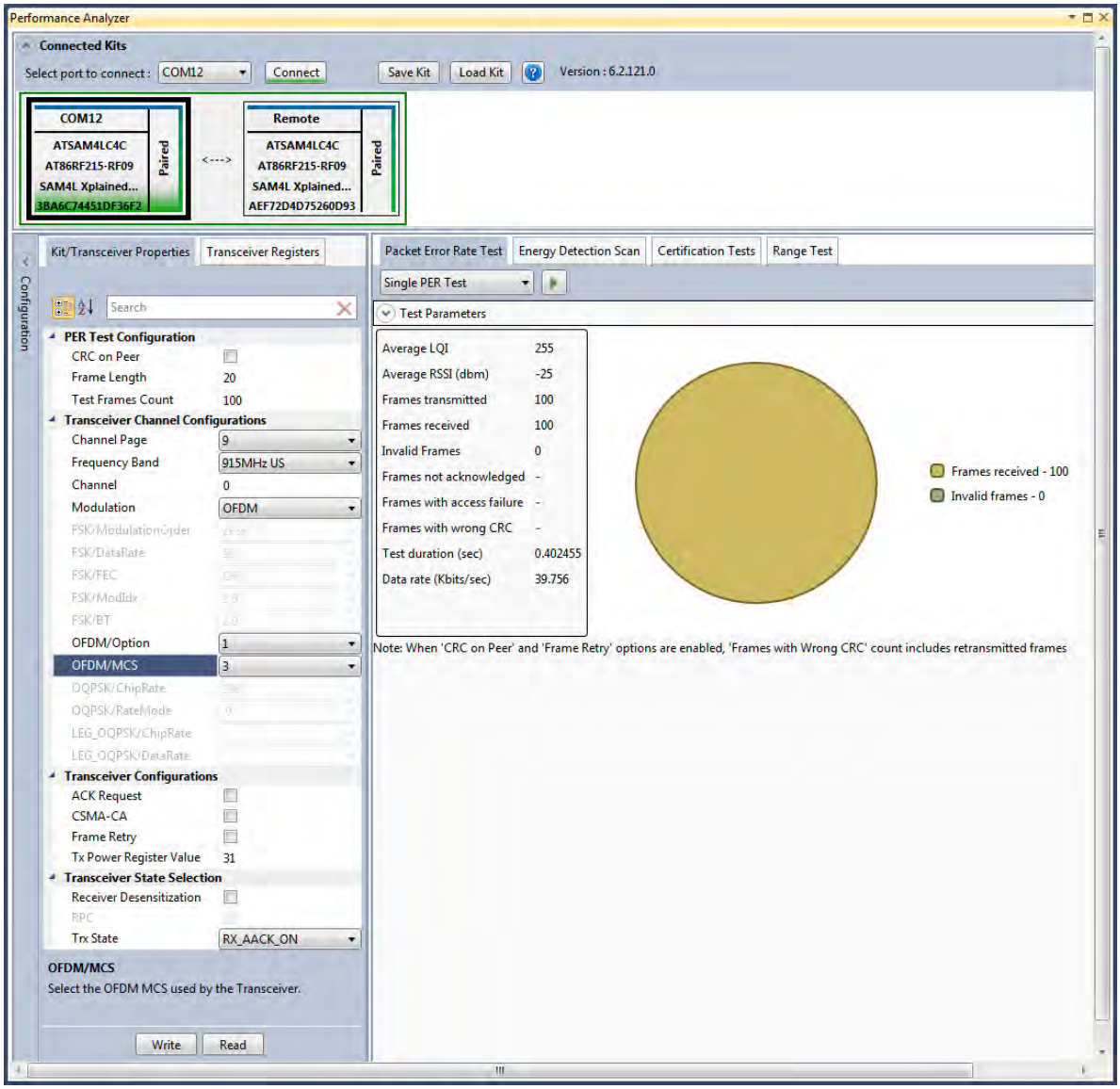


Figure 34: OFDM Option 1, MCS3 mode - PER Test

12.3 Tx-Rx Test: OQPSK, RateMode 0, 14dBm

Performance Analyser configuration settings for transmit and receive test

Table 29:- Board setting

Performance Analyzer Parameter	Setting for O-QPSK RateMode 0
Frame Length	20
Test Frames count	100
Channel Page	9
Frequency band	915MHz US (902MHz to928MHz)
Channel	0 to 11

Modulation	OQPSK
OQPSK/ChipRate	ChipRate 1000
OQPSK/RateMode	RateMode 0
Tx Power Register Value	31

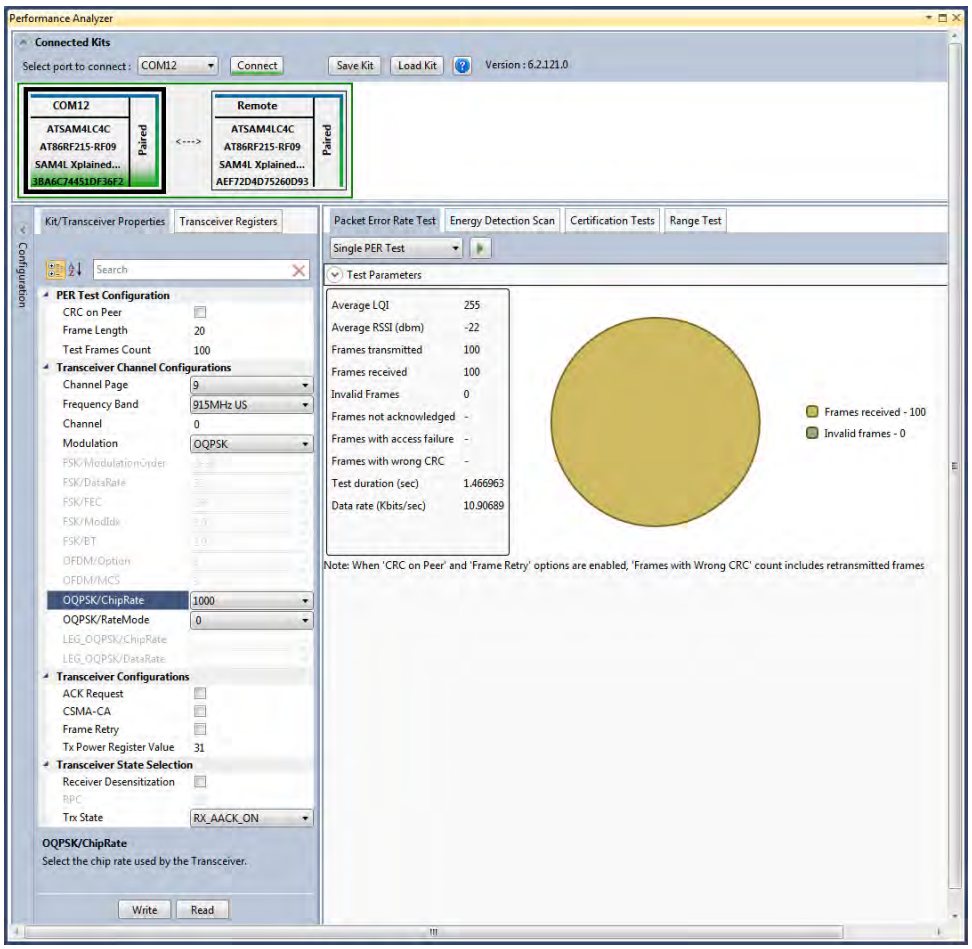


Figure 35: OQPSK, RateMode 0 - PER Test

13. Tx-Rx Test for 2.4GHz Band (Transmit and Receive test)

1. Connect two devices with PC by USB cables and so both are power up.
2. Select one COM Port and click ‘connect’ the device corresponding to that COM port is connected and select “Initiate Peer Search” So other device connect by RF (RF Pairring). (Device connected to COM Port is transmitter and other device is receiver)

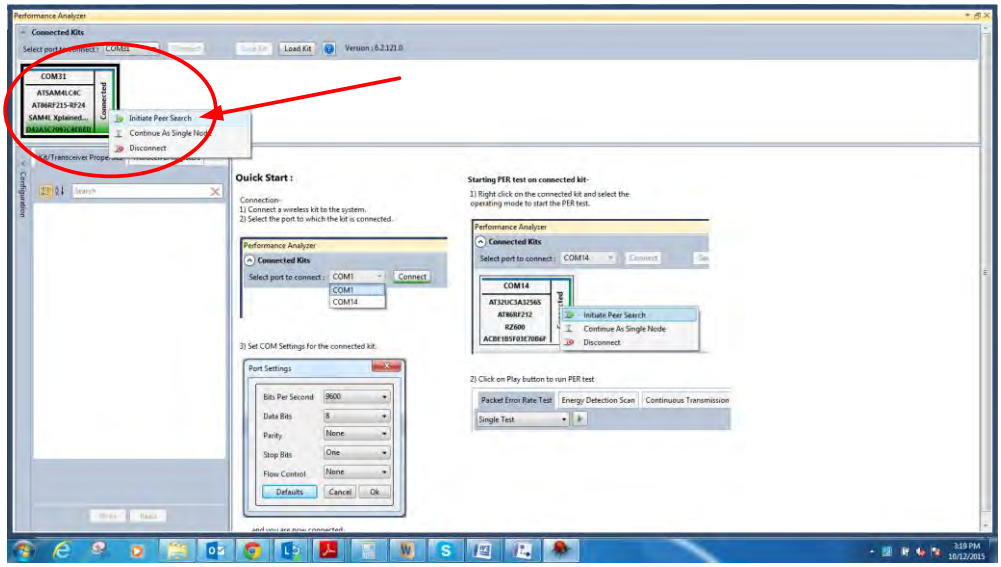


Figure 22: Performance Analyzer – Paring devices

3. When both the devices are paired, the following window appears and it is ready to perform PER (Packet Error Rate) test. Tranmitting channel, number of frames (packets), Tx Power value can be configured from the left side of the window.

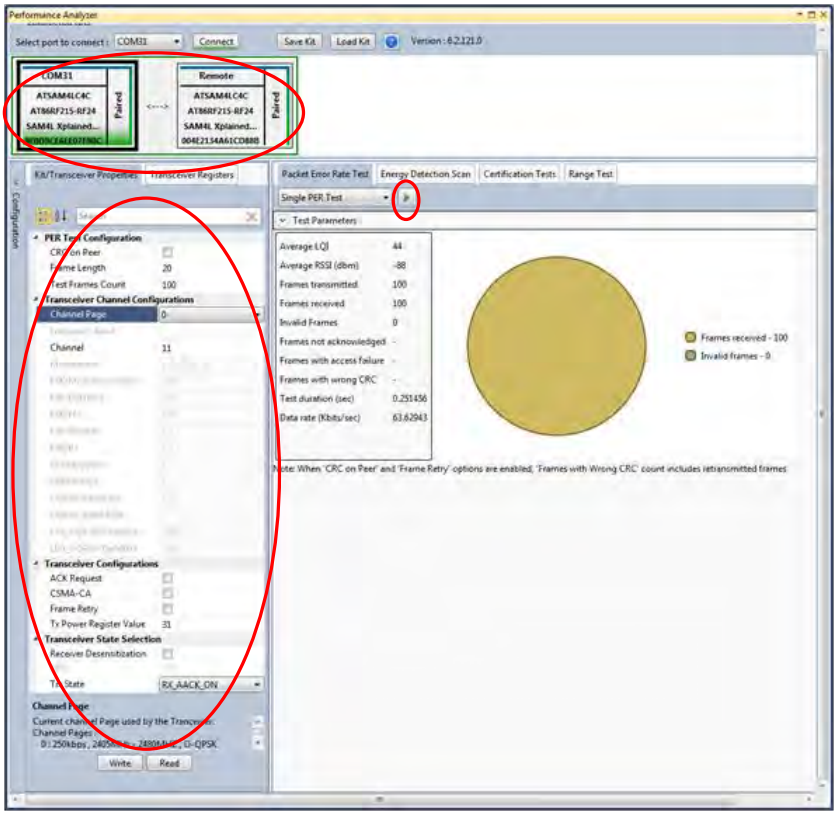


Figure 23: Performance Analyzer – PER Test Configuration

4. PER test is Transmit and Receive test. Number of transmit packets can be set by changing “Test Frames Count”

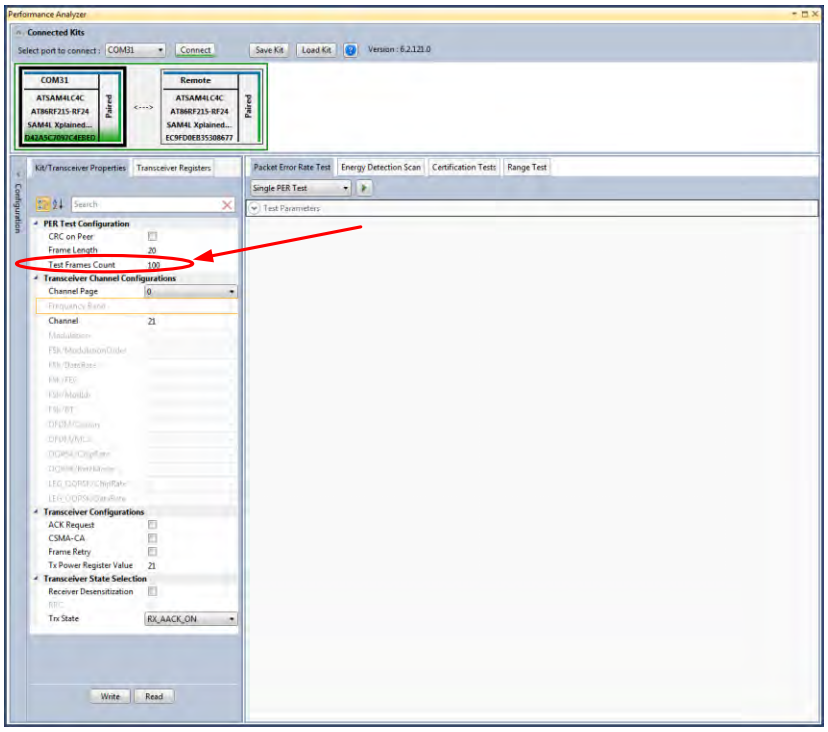


Figure 24: Performance Analyzer – Transmit Packets

5. Run Single PER Test. Test parameter window display the Transmit packets (Frames transmitted), Receive packets (Frames received) and RSSI (receive signal strength)

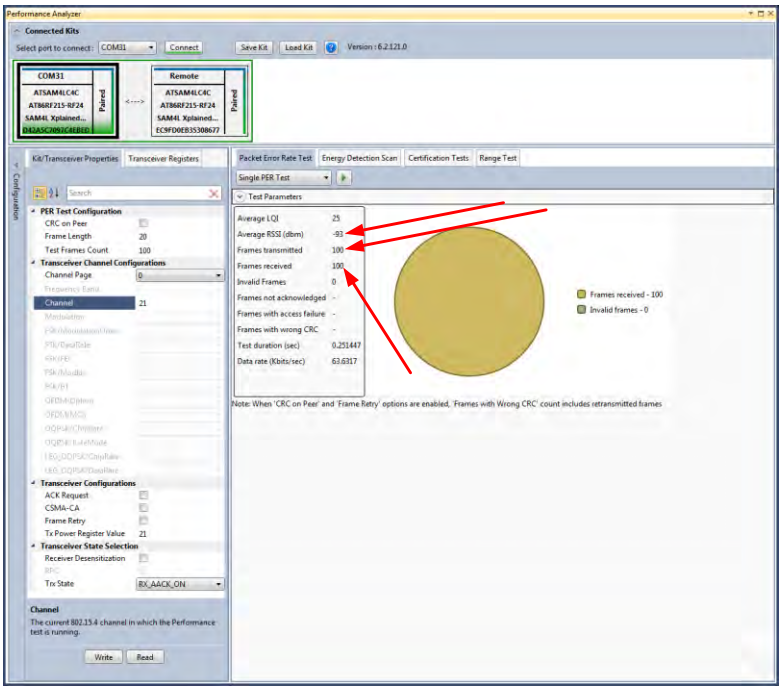


Figure 25: Performance Analyzer – PER Test

9.5 Rx Test – Legacy O-QPSK, 14dBm

Performance Analyzer configuration settings for transmit and receive test

Table 30:- Board setting

Frame Length	20
Test Frames count	100

Channel Page	9
Frequency band	2450MHz ISM Band
Channel	11 to 26 (2400MHz to 2483.5MHz)
Modulation	LEG_OQPSK
LEG_OQPSK/ChipRate	ChipRate 2000
LEG_OQPSK/DataRate	DataRate 250
Tx Power Register Value	'31' for Max Power (14dBm)

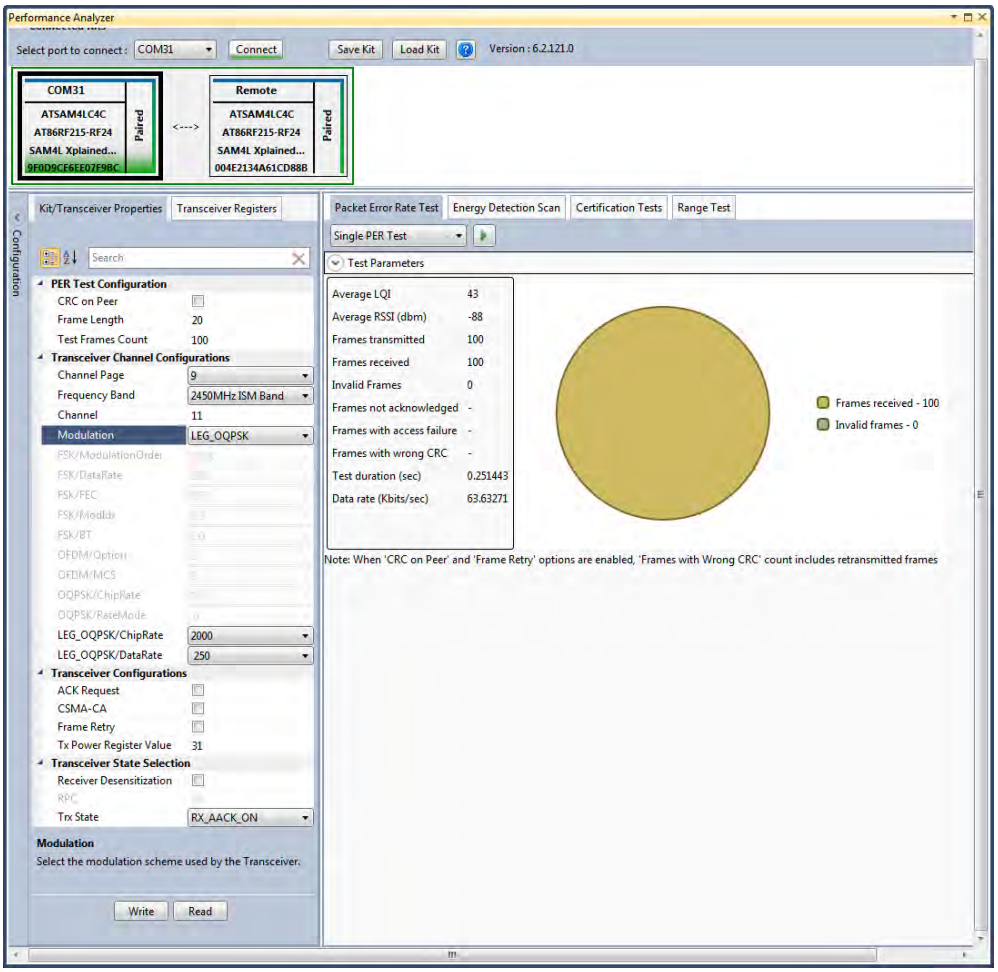


Figure 26: Legacy O-QPSK PER Test

9.6 Rx Test: MR-FSK operating mode #1, 50kbit/s, 14dBm

Performance Analyzer configuration settings for transmit and receive test

Table 31:- Board setting

Frame length	20
Test Frames count	100
Channel Page	9
Frequency band	2450MHz ISM Band
Channel	3 to 409 (2400MHz to 2483.5MHz)
Modulation	FSK
FSK/DataRate	50Kbps
FSK/ModulationOrder	2FSK

FSK/FEC	off
FSK/ModIdx	1.0
FSK/BT	Leave at default value; this is applicable only for GFSK mode
Tx Power Register Value	'31' for Max Power (14dBm)

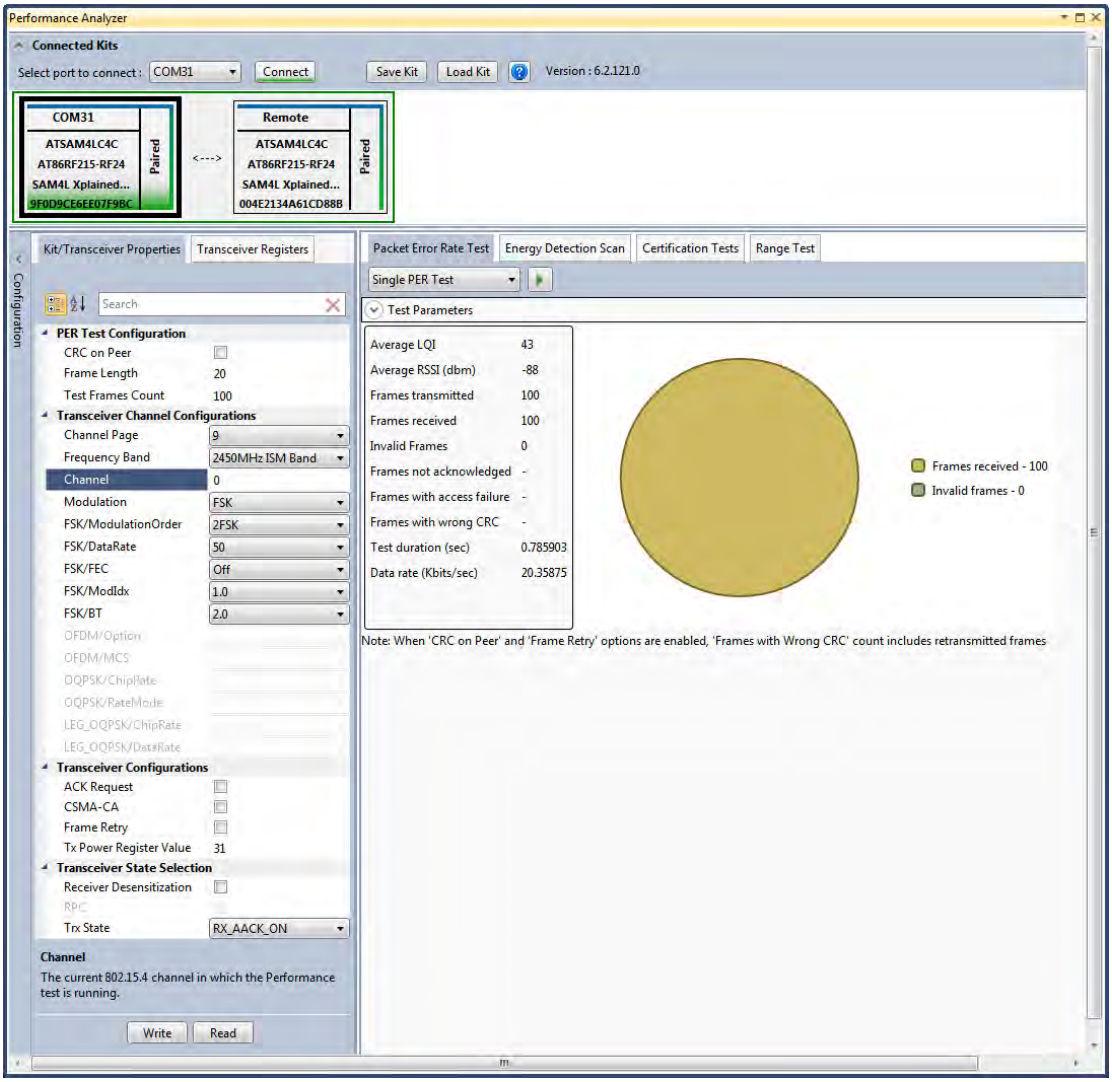


Figure 27: MR-FSK operating mode #1- PER Test

9.7 Rx Test - OFDM Option 1, MCS3, 14dBm

Performance Analyzer configuration settings for transmit and receive test

Table 32:- Board setting

Frame length	20
Test Frames count	100
Channel Page	9
Frequency band	2450MHz ISM Band
Channel	0 to 63 (2400MHz to 2483.5MHz)
Modulation	OFDM
OFDM/Option	Option1
OFDM/MCS	MCS3
Tx Power Register Value	'31' for Max Power (14dBm)

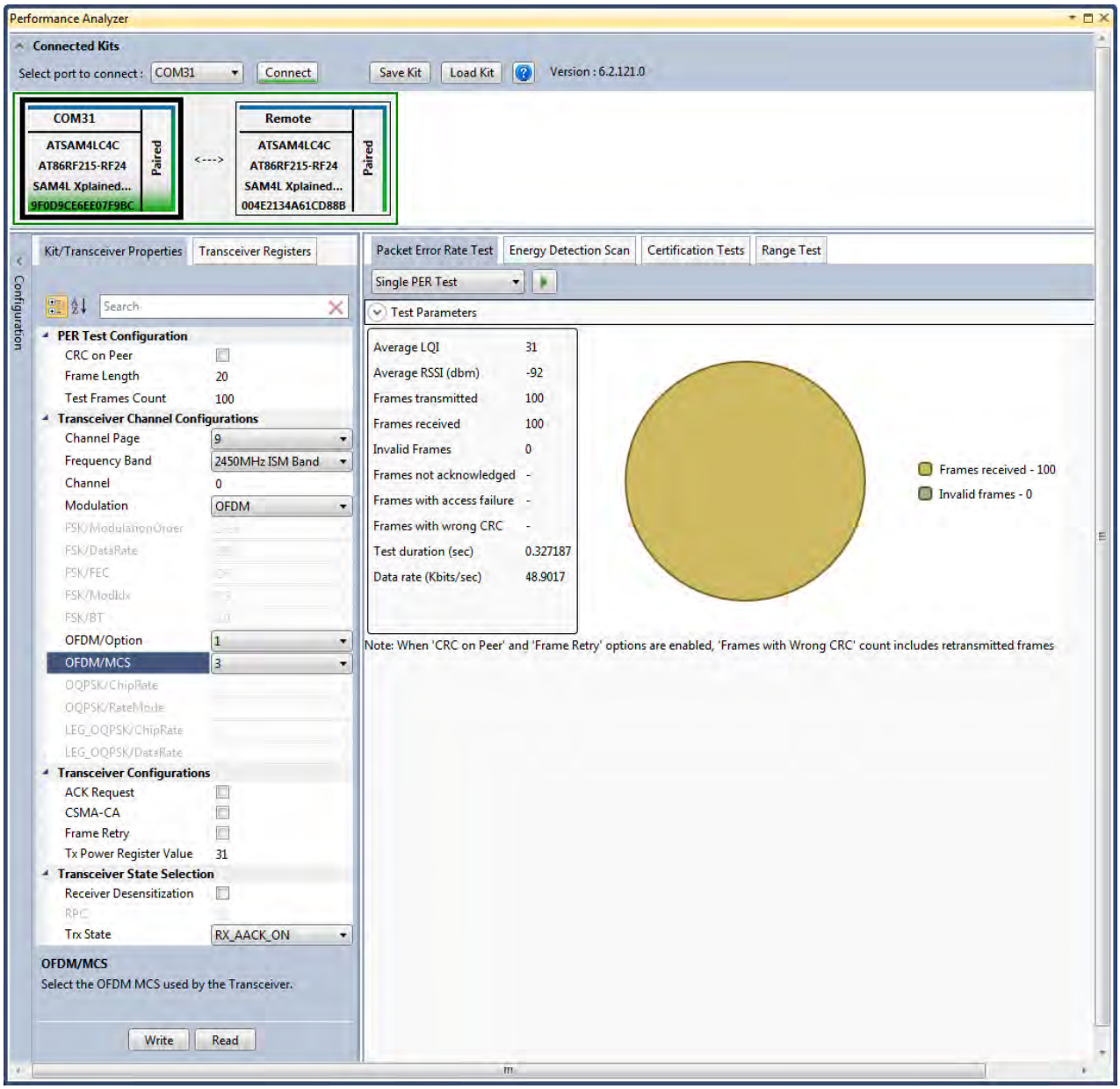


Figure 28: OFDM Option1- PER Test

9.8 Rx Test - OFDM Option 2, MCS 3, 14dBm

Performance Analyzer configuration settings for transmit and receive test

Table 33:- Board setting

Frame Length	20
Test Frames count	100
Channel Page	9
Frequency band	2450MHz ISM Band
Channel	0 to 96 (2400MHz to 2483.5MHz)
Modulation	OFDM
OFDM/Option	Option2
OFDM/MCS	MCS 3
Tx Power Register Value	'31' for Max Power (14dBm)

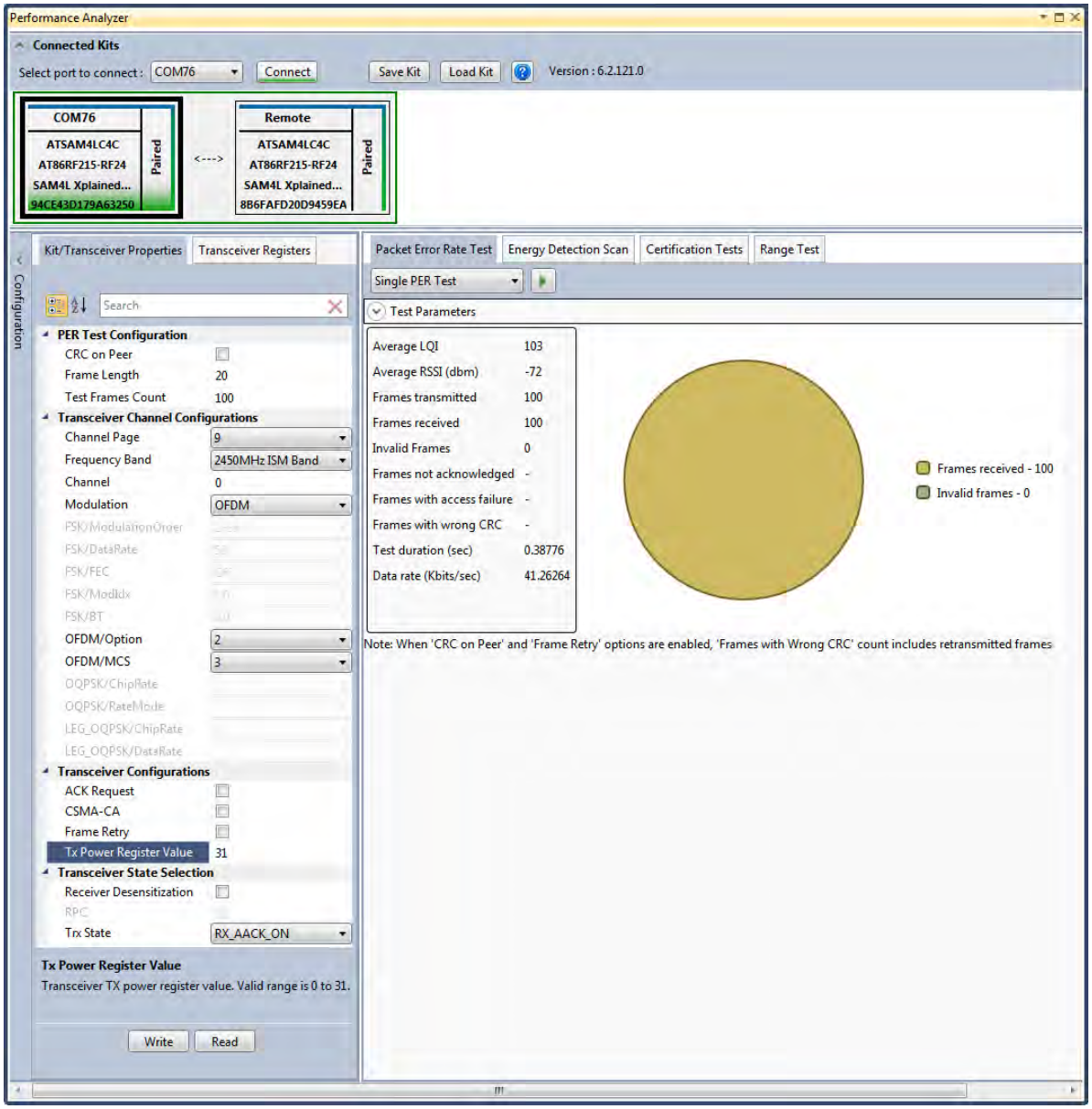


Figure 29: OFDM Option2- PER Test

FCC Caution:

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This module is intended for OEM integrator. The OEM integrator is still responsible for the FCC compliance requirement of the end product, which integrates this module
The final end product must be labeled in a visible area with the following" Contains
FCC ID: VM4A092353

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for uncontrolled environment .This equipment should be installed and operated with minimum distance 20cm between the radiator& your body.
This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

IC Warning:

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:
(1) This device may not cause interference, and
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :
(1) l'appareil nedoit pas produire de brouillage, et
(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

The device been tested is compliance with RF field strength limits, users can obtain Canadian information on RF exposure and compliance.The minimum distance from body to use the device is 20cm.
Le présent appareil est conforme
Après examen de ce matériel aux conformité ou aux limites d'intensité de champ RF,
les utilisateurs peuvent sur l'exposition aux radiofréquences et la conformité and compliance d'acquérir
les informations correspondantes. La distance minimale du corps à utiliser le dispositif est de 20cm.

Contains transmitter module IC: 11019A-092353
Where 11019A-092353 is the module's certification number.

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