

ISED CABid: ES1909

Lab. Company Number: 4621A

Test Report No:
74747RRF.003

Partial Test Report

USA FCC Part 15.247, 15.209

CANADA RSS-247, RSS-Gen

(*) Identification of item tested	TETRA portable radio
(*) Trademark	SEPURA
(*) Model and /or type reference	SC2028
Other identification of the product	FCC ID: XX6SC2028M IC: 8739A-SC2028M
(*) Features	TETRA, BT, Wi-Fi, GNSS HW version: PLX-2516515-02 (mod state 11) SW version: 000193455092880
Applicant	Sepura Limited 9000 Cambridge Research Park, Beach Drive, Waterbeach, Cambridge CB25 9TL, UK
Test method requested, standard	USA FCC Part 15.247 (10-1-21 Edition): Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz. USA FCC Part 15.209 (10-1-21 Edition): Radiated emission limits; general requirements. CANADA RSS-247 Issue 2 (February 2017). CANADA RSS-Gen Issue 5 amendment 1 (March 2019). Guidance for Performing Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid Systems Devices Operating Under Section 15.247 of the FCC Rules. 558074 D01 Meas Guidance v05r02 dated April 2, 2019. ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
Approved by (name / position & signature)	José Manuel Gómez Galván EMC Consumer & RF Lab. Manager
Date of issue	2023-10-09
Report template No	FDT08_24 (*) "Data provided by the client"

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Acronyms

Acronym ID	Acronym Description
# of Tx Chains	Number of Transmission Chains
Avg Power	Maximum Average Conducted Output Power
Equipment	Equipment Type
Freq	Frequency
Freq Rng	Frequency Range
Mod	Modulation
Port	Active Port
Unwanted Freq	Unwanted Emissions Frequency
Unwanted Lvl	Unwanted Emissions Level
EIRP	Effective Isotropic Radiated Power

Competences and guarantees

DEKRA Testing and Certification S.A.U. is a testing laboratory accredited by the National Accreditation Body (ENAC -Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 51/LE 147.

DEKRA Testing and Certification is an FCC-recognized accredited testing laboratory with appropriate scope of accreditation that covers the performed tests in this report.

DEKRA Testing and Certification is an ISED-recognized accredited testing laboratory, CABid: ES1909, Company Number: 4621A, with the appropriate scope of accreditation that covers the performed tests in this report.

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification S.A.U. has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification S.A.U. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Testing and Certification S.A.U. at the time of performance of the test.

DEKRA Testing and Certification S.A.U. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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General conditions

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2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
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4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Testing and Certification S.A.U. and the Accreditation Bodies.

Uncertainty

Uncertainty (factor $k=2$) was calculated according to the DEKRA Testing and Certification S.A.U. internal document PODT000.

The total uncertainty of the measurement system for the conducted testing of EUT is:

RF Peak Output Power: Measurement uncertainty $\leq \pm 0,80$ dB

RF Average Output Power: Measurement uncertainty $\leq \pm 0,99$ dB

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").
2. The sample consists of a SC2028 hand-held portable radios are TETRA enabled radios with Bluetooth and Wi-Fi and GNSS capability.

Usage of samples

Samples undergoing test have been selected by: The client.

Id	Control Number	Description	Model	Serial Nº	Date of Reception	Application
S/01	74747_9	Portable radio	SC2028	1PR002337GKM908	2023-09-26	Element Under Test
S/01	74747_5	Battery	-	-	2023-06-13	Element Under Test
S/01	74747_3	USB Cable	-	-	2023-06-13	Element Under Test

Notes referenced to samples during the project:

Id	Type
S/01	Conducted

Test sample description

Ports..... :	Port name and description	Cable					
		Specified max length [m]	Attached during test	Shielded	Coupled to patient ⁽³⁾		
Supplementary information to the ports..... :							
Rated power supply	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	☐	AC:	☐	☐	☐	☐	☐
	☒	DC: 7.4 V Battery operated					
Rated Power							
Clock frequencies..... :							
Other parameters							
Software version	000193455092880						
Hardware version	PLX-2516515-02 (mod state 11)						
Dimensions in cm (W x H x D)	Height: 122.5 mm (excluding antenna and rotary) Width: 60mm (54mm) Depth – standard batte						
Mounting position	☐	Table top equipment					
	☐	Wall/Ceiling mounted equipment					
	☐	Floor standing equipment					
	☒	Hand-held equipment					
	☒	Other: Body worn					
Modules/parts..... :	Module/parts of test item		Type		Manufacturer		
	BT/Wi-Fi		1LV		Murata		
Accessories (not part of the test item)	Description		Type		Manufacturer		
Documents as provided by the applicant..... :	Description		File name		Issue date		

⁽³⁾ Only for Medical Equipment

Identification of the client

Sapura Limited
9000 Cambridge Research Park, Beach Drive, Waterbeach, Cambridge CB25 9TL, UK

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2023-10-03
Date (finish)	2023-10-05

Document history

Report number	Date	Description
74747RRF.003	09-10-2023	First release.

Environmental conditions

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %

Remarks and comments

The tests have been performed by the technical personnel: Sergio Carrasco.

Used instrumentation:

Control No.	Equipment	Model	Manufacturer	Next Calibration
7796	EXTENSION FOR OPEN SWITCH UNIT UP TO 40GHz	OSP-B157Wx	ROHDE AND SCHWARZ	2024-03-16
6668	SIGNAL AND SPECTRUM ANALYZER 10Hz-40GHz	FSV40	ROHDE AND SCHWARZ	2024-12-14
8848	OPEN SWITCH UNIT UP TO 7.5 GHz	OSP-B157W8 PLUS	ROHDE & SCHWARZ	2024-12-21
6793	SHIELDED ROOM	S101	ETS LINDGREN	N/A
7798	WMS32	WMS32	ROHDE AND SCHWARZ	N/A
5850	DIGITAL MULTIMETER	179	FLUKE	2023-11-02

Testing verdicts

Fail	F
Inconclusive	I
Not applicable	N/A
Not measured	N/M
Pass	P

Summary

Bluetooth EDR

Requirement – Test case	FCC PART 15 PARAGRAPH / RSS-247	Verdict	Remark
RSS-247 5.1 (b) / FCC 15.247 (a) (1) 20 dB Bandwidth		N/M	(1)
RSS-247 5.1 (d) / FCC 15.247 (a) (1) (iii) Time of Occupancy (Dwell Time)		N/M	(1)
RSS-247 5.4. (b) / FCC 15.247 (b) Maximum peak output power and antenna gain		P	
RSS-247 5.1 (d) / FCC 15.247 (a) (1) (iii) Number of hopping channels		N/M	(1)
RSS-247 5.5 / FCC 15.247 (d) Band-edge emissions compliance (Transmitter)		N/M	(1)
RSS-247 5.5 / FCC 15.247 (d) Emission limitations radiated (Transmitter)		N/M	(1)
<u>Supplementary information and remarks:</u> (1) Test not requested			

Bluetooth Low Energy

FCC PART 15 PARAGRAPH/ RSS-247			
Requirement – Test case		Verdict	Remark
FCC 15.247 (a)(2) / RSS-247 5.2. (a)	6 dB Bandwidth	N/M	(1)
FCC 15.247 (b) / RSS-247 5.4. (d)	Maximum output power and antenna gain	P	
FCC 15.247 (d) / RSS-247 5.5.	Band-edge emissions compliance (Transmitter)	N/M	(1)
FCC 15.247 (e) / RSS-247 5.2. (b)	Power spectral density	N/M	(1)
FCC 15.247 (d) / RSS-247 5.5.	Emission limitations radiated (Transmitter)	N/M	(1)
<u>Supplementary information and remarks:</u> (1) Test not requested			

Appendix A: Test results. Bluetooth EDR

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RSS-247 5.4 (b) / FCC 15.247 (b) (1) [Pkcp] Maximum Peak Conducted output power	12

TEST CONDITIONS

(*): Data provided by the client.

POWER SUPPLY (*):

Vnominal:	7.4 V DC
Type of Power Supply:	Battery

ANTENNA (*):

Type of Antenna:	Internal PIFA antenna
Maximum Declared Antenna Gain:	+2.5 dBi

CONDUCTED TEST FREQUENCIES (*):

Low Channel:	2402 MHz
Middle Channel:	2441 MHz
High Channel:	2480 MHz

MODULATION (*):

- BTEDR GFSK 1-DH5
- BTEDR PI4-DQPSK 2-DH5
- BTEDR 8DPSK 3-DH5

CONDUCTED MEASUREMENTS:

The equipment under test was set up in a shielded room and it is connected to the TS8997 using a low loss RF cable. The reading of the spectrum analyser is corrected taking into account the cable loss.



TEST CASES DETAILS

RSS-247 5.4 (b) / FCC 15.247 (b) (1) [Pkcp] Maximum Peak Conducted output power

Limits

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels: 1 watt (30 dBm).

The e.i.r.p. shall not exceed 4 W (36 dBm) (RSS-247).

Results

The maximum peak conducted output power level of the fundamental emission was measured according to clause 7.8.5 “Output power test procedure for frequency-hopping spread-spectrum (FHSS) devices” of ANSI C63.10-2013.

The EIRP power (dBm) is calculated by adding the maximum declared antenna gain to the measured conducted power.

Maximum Declared Antenna Gain: 2.5 dBi

Modulation: BT (GFSK 1-DH5)

Freq (MHz)	Equipment	BW (MHz)	# of Tx Chains	Port	Peak Power (dBm)	E.I.R.P. (dBm)
2402.000	Frequency Hopping Spread Spectrum systems (DSS)	1	1	1	9,32	11,82
2441.000	Frequency Hopping Spread Spectrum systems (DSS)	1	1	1	9,73	12,23
2480.000	Frequency Hopping Spread Spectrum systems (DSS)	1	1	1	8,41	10,91

Modulation: BT (PI4-DQPSK 2-DH5)

Freq (MHz)	Equipment	BW (MHz)	# of Tx Chains	Port	Peak Power (dBm)	E.I.R.P. (dBm)
2402.000	Frequency Hopping Spread Spectrum systems (DSS)	1	1	1	7,92	10,42
2441.000	Frequency Hopping Spread Spectrum systems (DSS)	1	1	1	8,04	10,54
2480.000	Frequency Hopping Spread Spectrum systems (DSS)	1	1	1	7,14	9,64

Modulation: BT (8DPSK 3-DH5)

Freq (MHz)	Equipment	BW (MHz)	# of Tx Chains	Port	Peak Power (dBm)	E.I.R.P. (dBm)
2402.000	Frequency Hopping Spread Spectrum systems (DSS)	1	1	1	7,59	10,09
2441.000	Frequency Hopping Spread Spectrum systems (DSS)	1	1	1	8,43	10,93
2480.000	Frequency Hopping Spread Spectrum systems (DSS)	1	1	1	7,75	10,25

Verdict

Pass

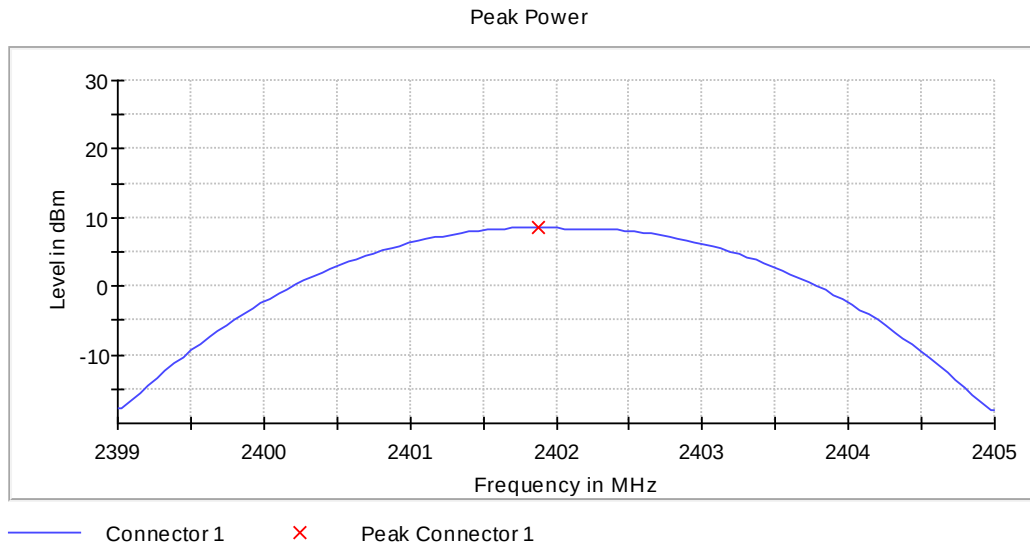
Attachments

Frequency MHz = 2402.00000

Bandwidth MHz = 1 Modulation = BT (GFSK 1-DH5)

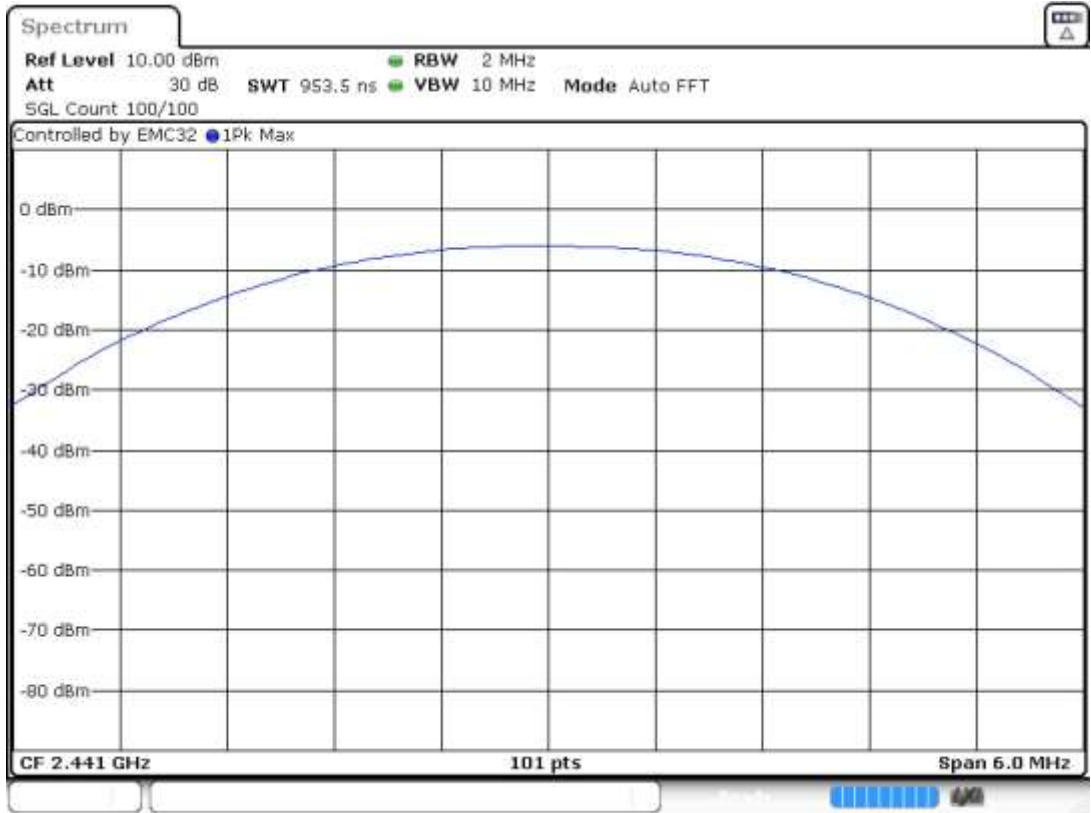
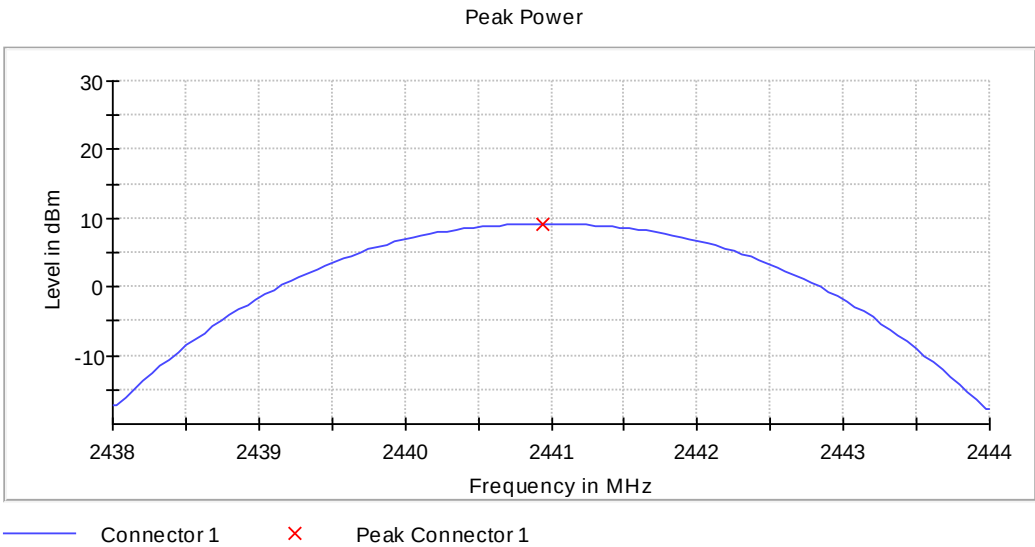
Number of Transmission Chains = 1 Active Port = 1

Images:



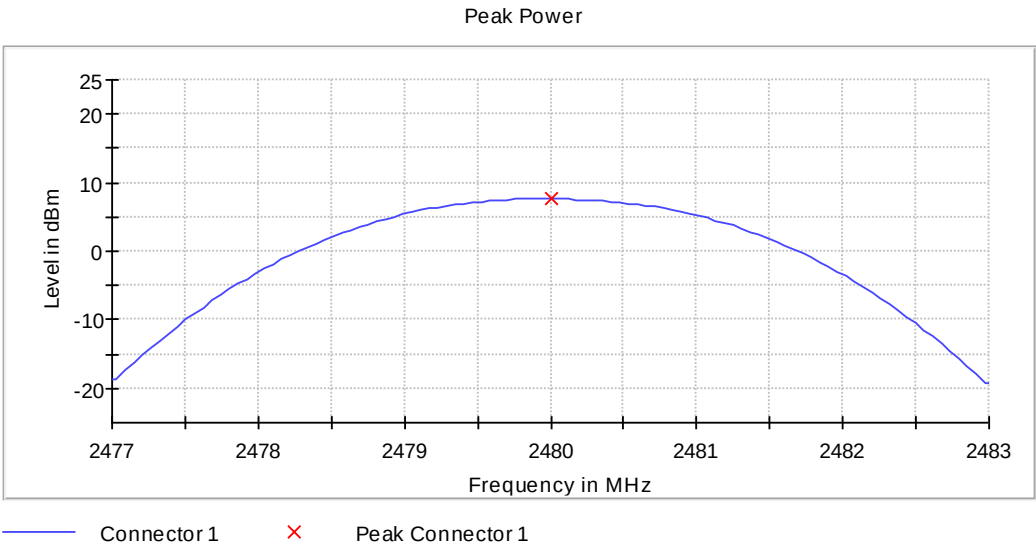
Frequency MHz = 2441.00000
Bandwidth MHz = 1 Modulation = BT (GFSK 1-DH5)
Number of Transmission Chains = 1 Active Port = 1

Images:



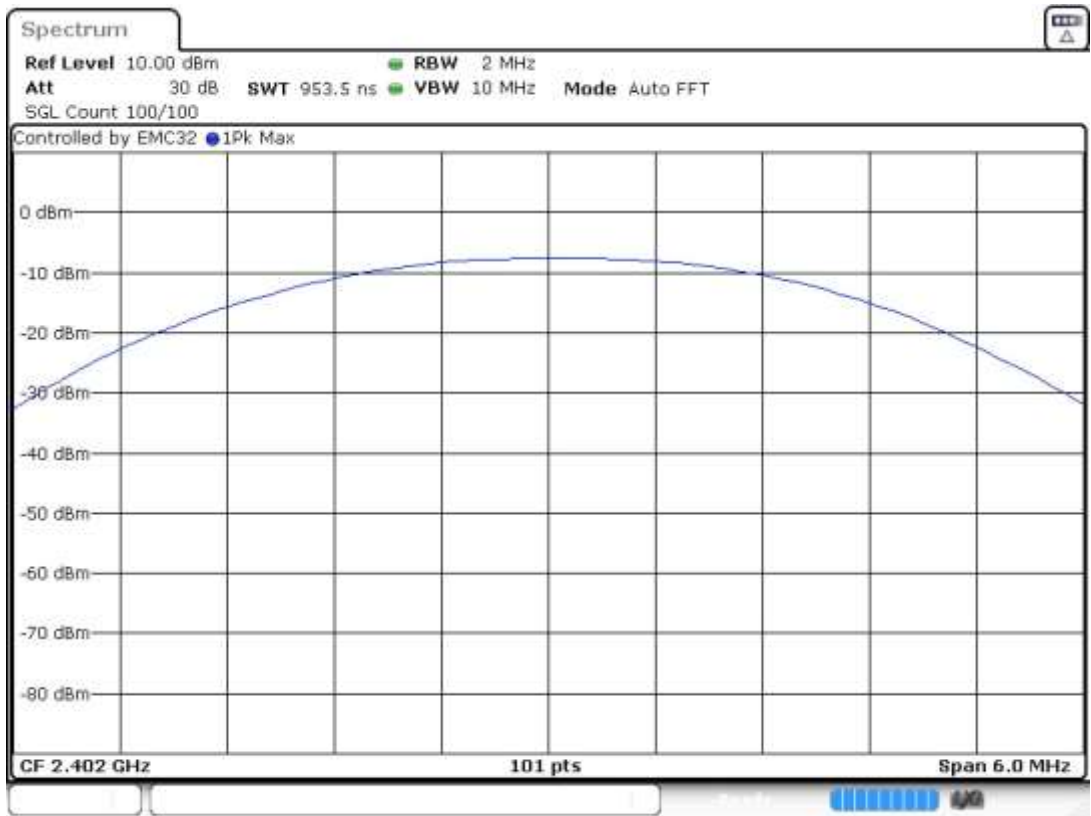
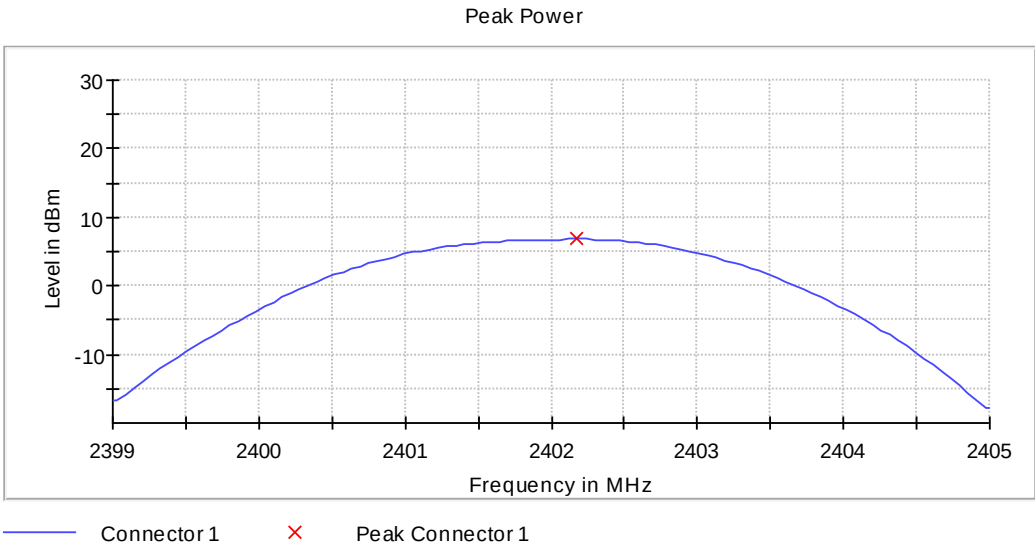
Frequency MHz = 2480.00000
Bandwidth MHz = 1 Modulation = BT (GFSK 1-DH5)
Number of Transmission Chains = 1 Active Port = 1

Images:



Frequency MHz = 2402.00000
Bandwidth MHz = 1 Modulation = BT (PI4-DQPSK 2-DH5)
Number of Transmission Chains = 1 Active Port = 1

Images:

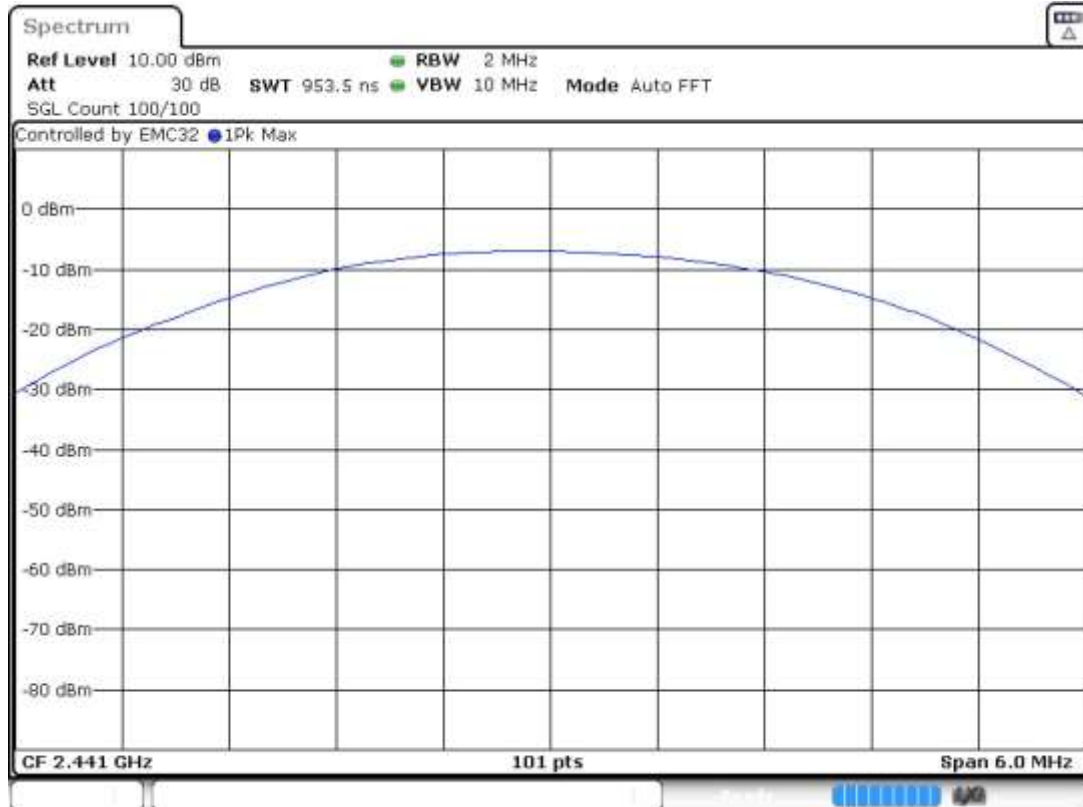
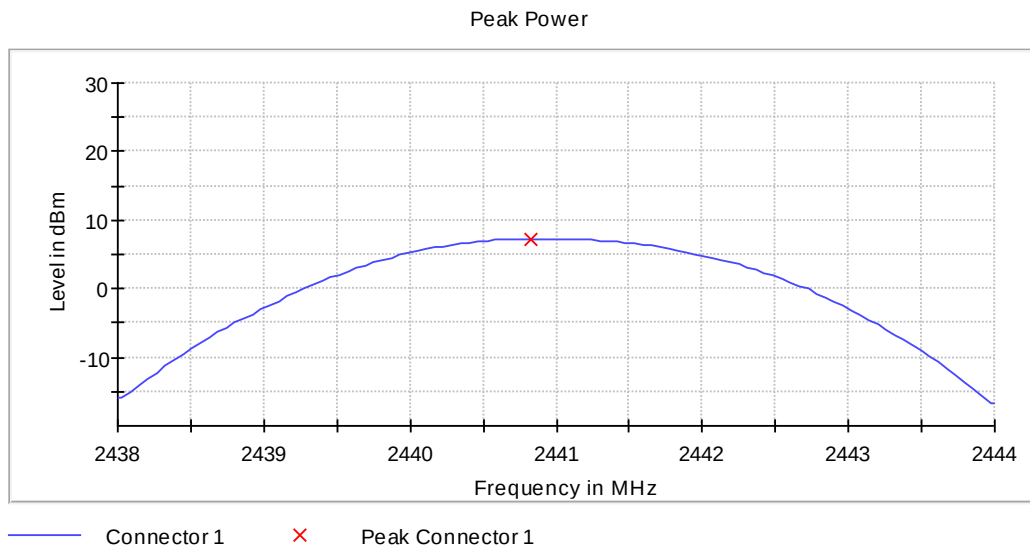


Frequency MHz = 2441.00000

Bandwidth MHz = 1 Modulation = BT (PI4-DQPSK 2-DH5)

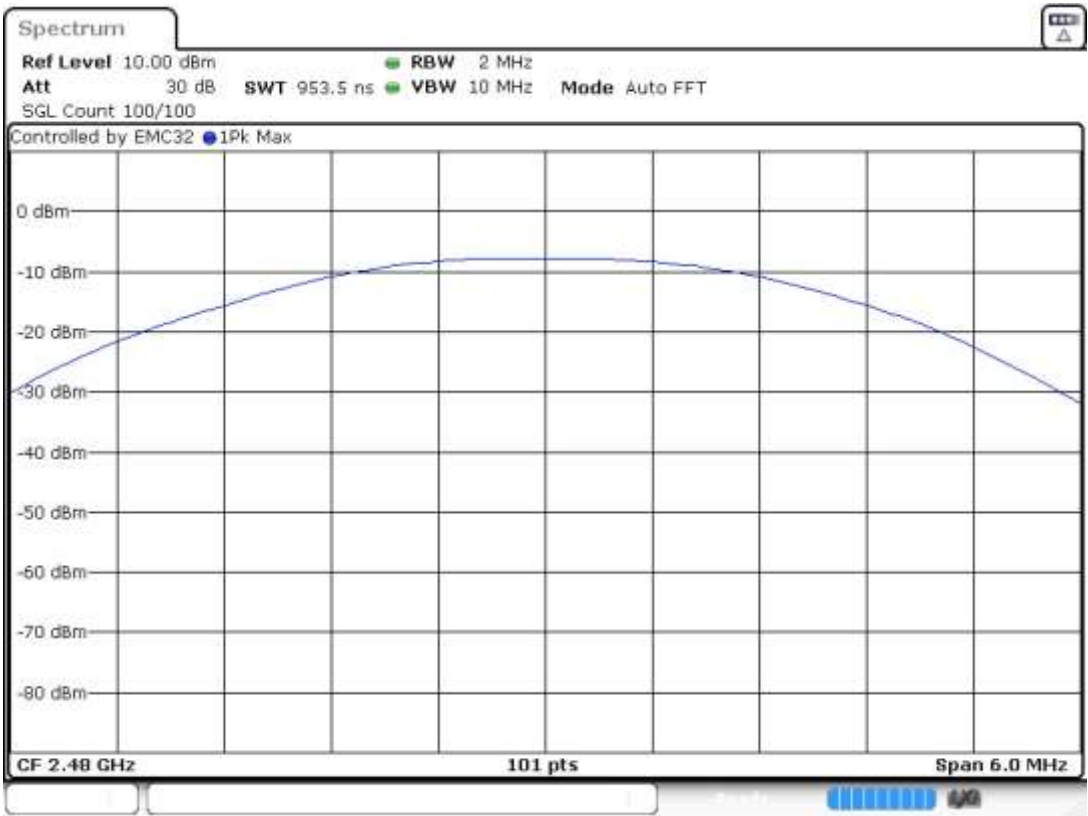
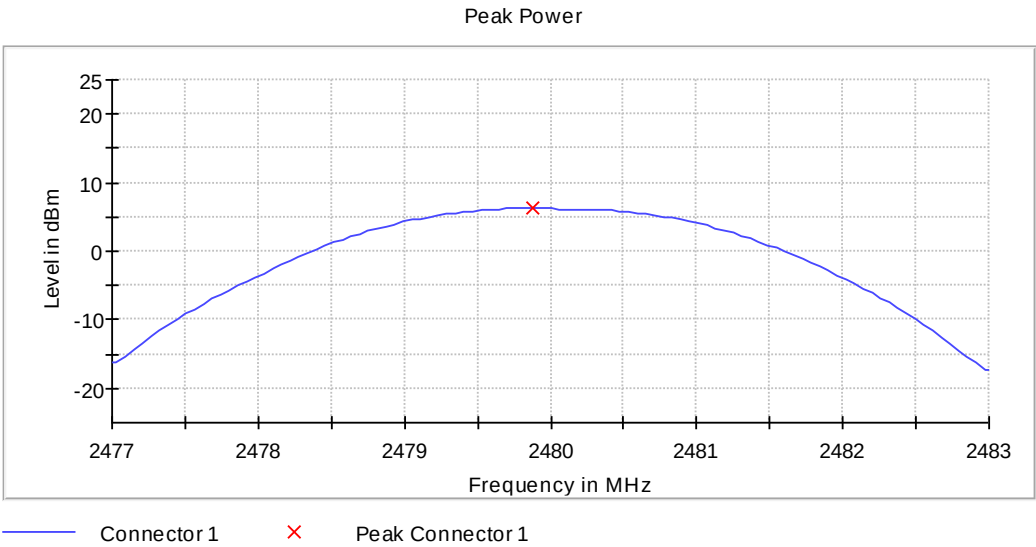
Number of Transmission Chains = 1 Active Port = 1

Images:



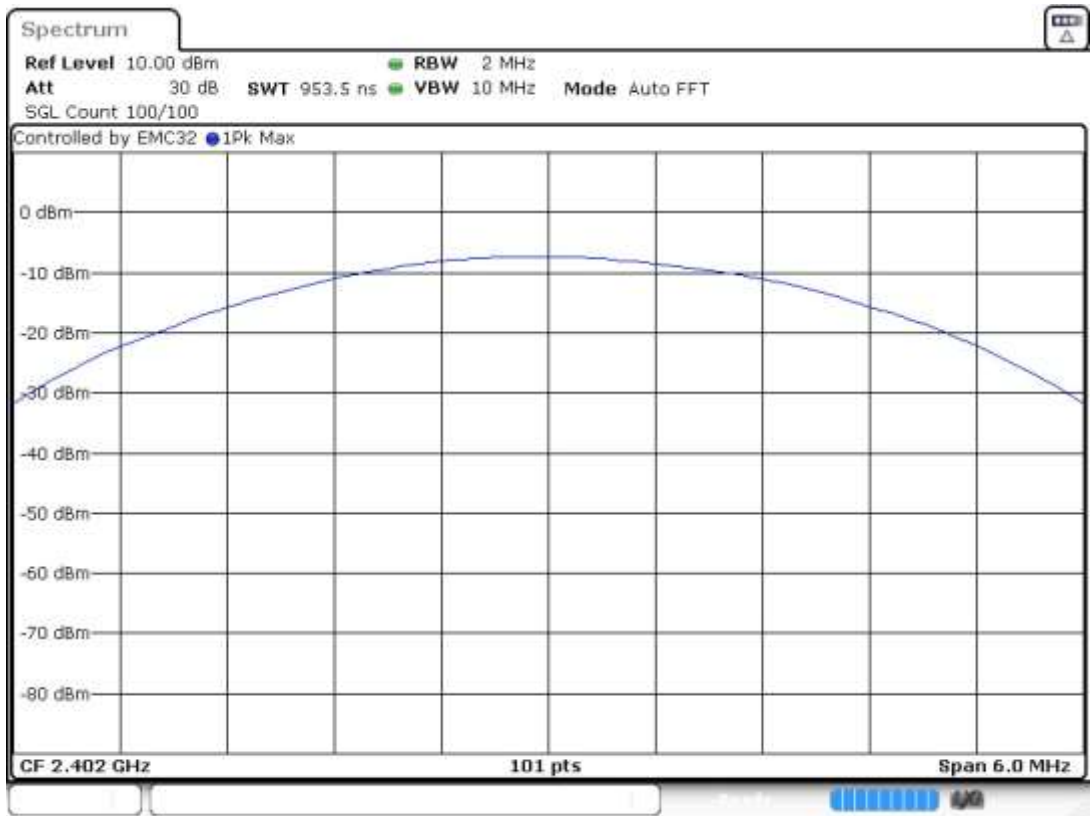
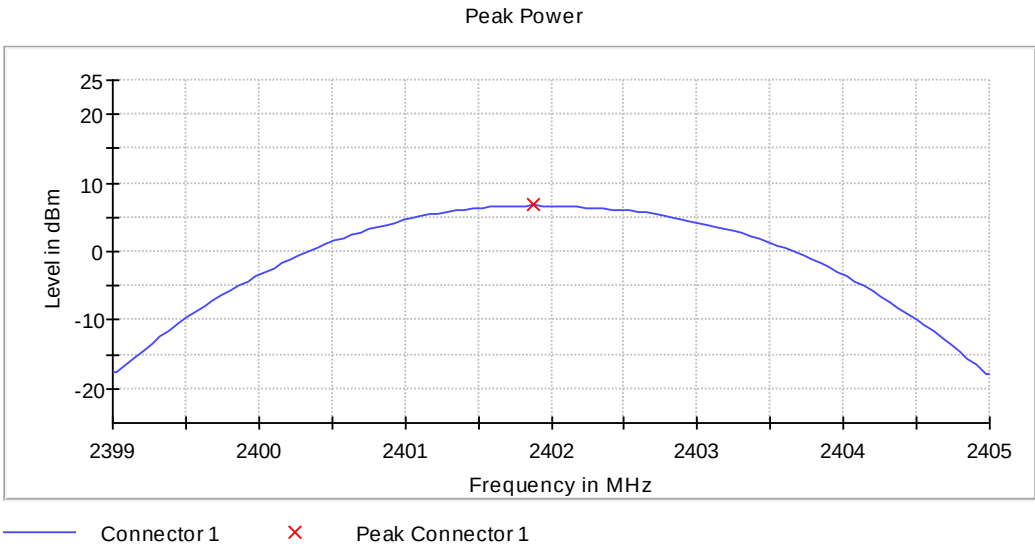
Frequency MHz = 2480.00000
Bandwidth MHz = 1 Modulation = BT (PI4-DQPSK 2-DH5)
Number of Transmission Chains = 1 Active Port = 1

Images:



Frequency MHz = 2402.00000
Bandwidth MHz = 1 Modulation = BT (8DPSK 3-DH5)
Number of Transmission Chains = 1 Active Port = 1

Images:

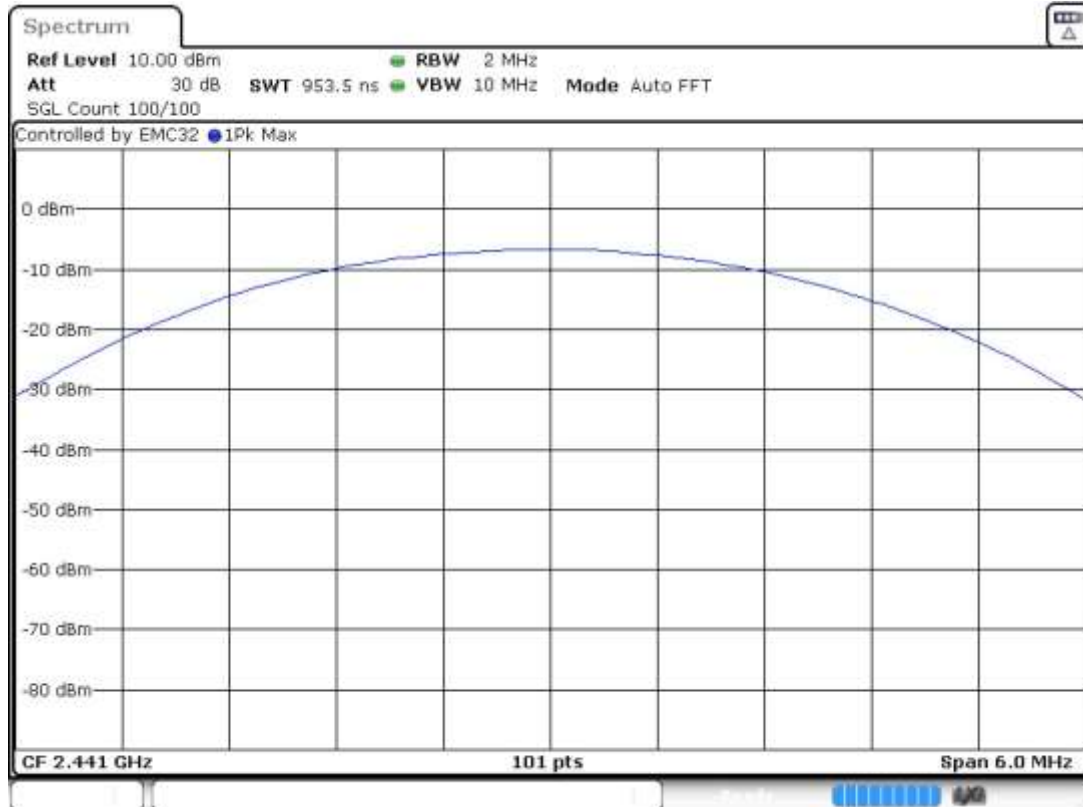
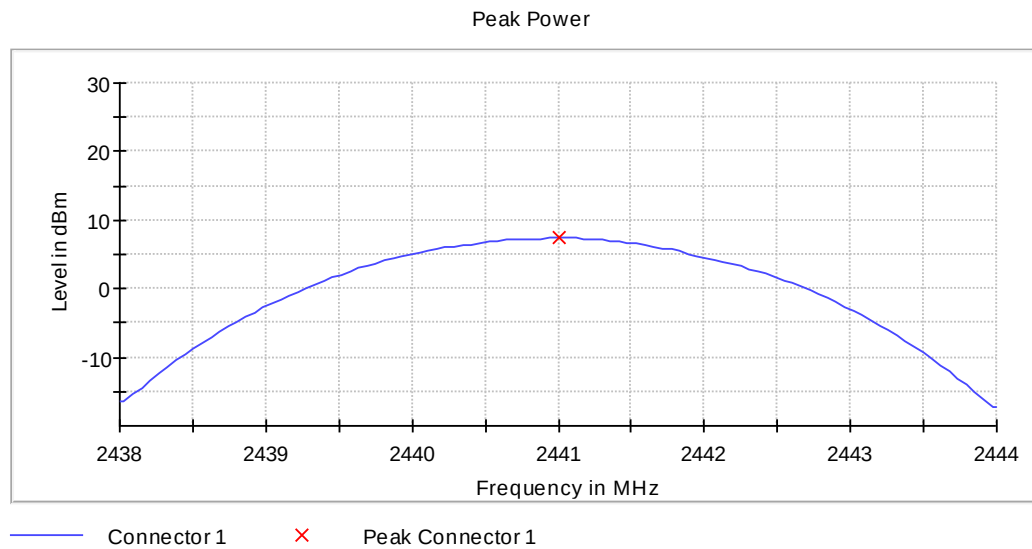


Frequency MHz = 2441.00000

Bandwidth MHz = 1 Modulation = BT (8DPSK 3-DH5)

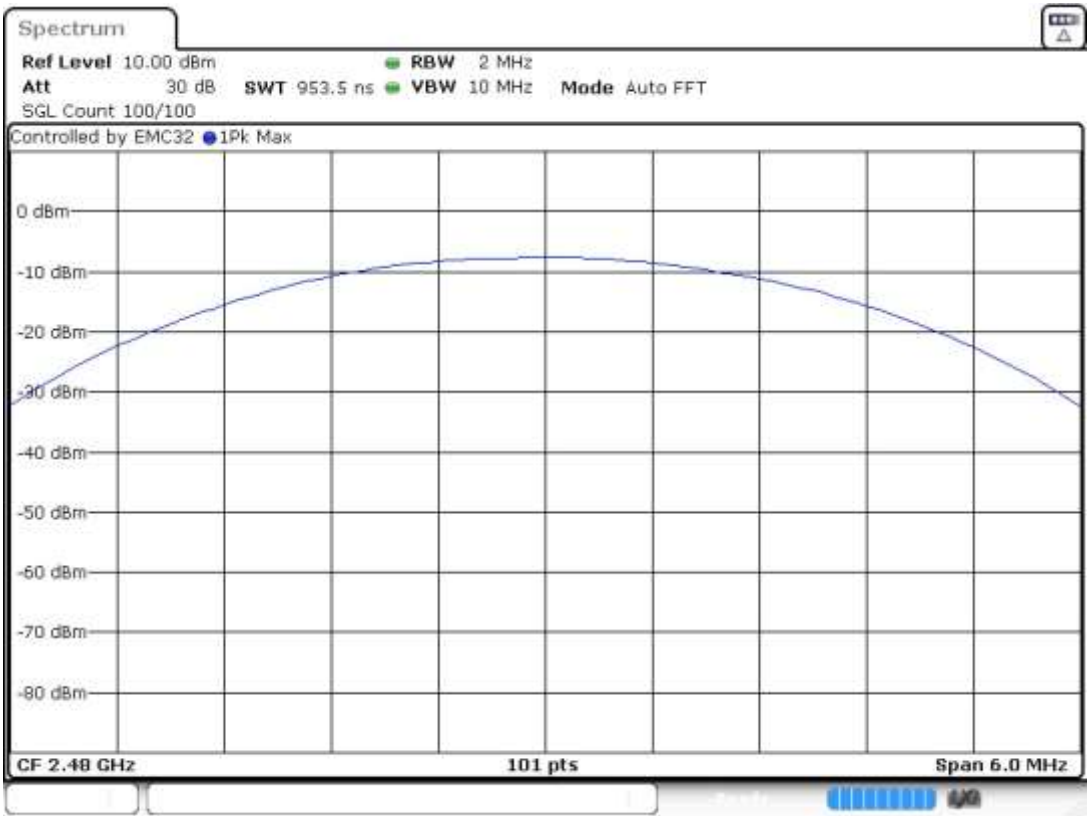
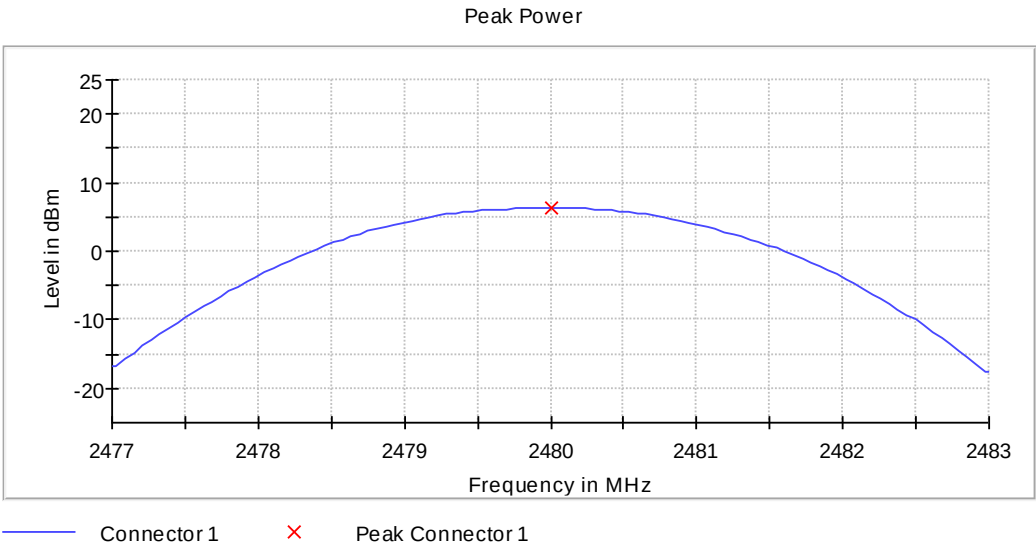
Number of Transmission Chains = 1 Active Port = 1

Images:



Frequency MHz = 2480.00000
Bandwidth MHz = 1 Modulation = BT (8DPSK 3-DH5)
Number of Transmission Chains = 1 Active Port = 1

Images:



Appendix B: Test results. Bluetooth Low Energy

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TEST CONDITIONS

(*): Data provided by the client.

POWER SUPPLY (*):

Vnominal:	7.4 V DC
Type of Power Supply:	Battery

ANTENNA (*):

Type of Antenna:	Internal PIFA antenna
Maximum Declared Antenna Gain:	+2.5 dBi

CONDUCTED TEST FREQUENCIES (*):

Low Channel:	2402 MHz
Mid Channel:	2440 MHz
High Channel:	2480 MHz

MODULATION (*):

BTLE 1Mbit/s GFSK

CONDUCTED MEASUREMENTS:

The equipment under test was set up in a shielded room and it is connected to the TS8997 using a low loss RF cable. The reading of the spectrum analyser is corrected taking into account the cable loss.



TEST CASES DETAILS

RSS-247 5.4 (d) / FCC 15.247 (b) (1) Maximum Peak Conducted output Power

Limits

For systems using digital modulation in the 2400-2483.5 MHz band: 1 watt (30 dBm).

The e.i.r.p. shall not exceed 4 W (RSS-247).

Modulation: BLE 5.0 (GFSK 1 Mbit/s)

Results

The maximum peak conducted output power level in the fundamental emission was measured using the method according to point 11.9.1.1 "RBW ≥ DTS bandwidth" of ANSI C.63.10-2013.

The EIRP power (dBm) is calculated by adding the declared maximum antenna gain to the measured conducted power.

Maximum Declared Antenna Gain: 2.5 dBi

Freq (MHz)	Equipment	BW (MHz)	# of Tx Chains	Port	Max RF Output power (dBm)	Max E.I.R.P. (dBm)
2402.00000	Digital Transmission System (DTS)	1	1	1	4,85	7,35
2440.00000	Digital Transmission System (DTS)	1	1	1	4,57	7,07
2480.00000	Digital Transmission System (DTS)	1	1	1	5,21	7,71

Verdict

Pass

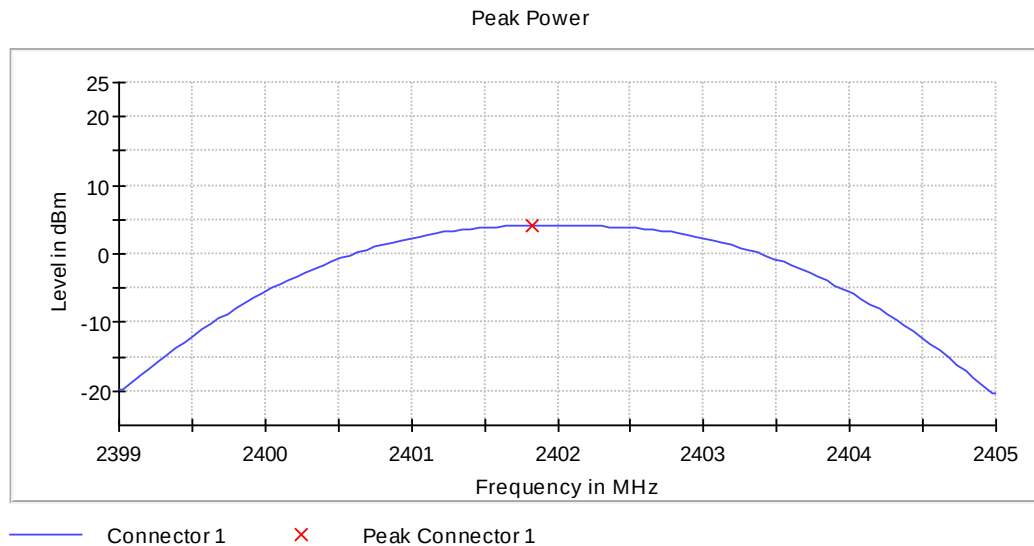
Attachments

Frequency MHz = 2402.00000

Bandwidth MHz = 1 Modulation = BLE 5.0 (GFSK 1 Mbit/s)

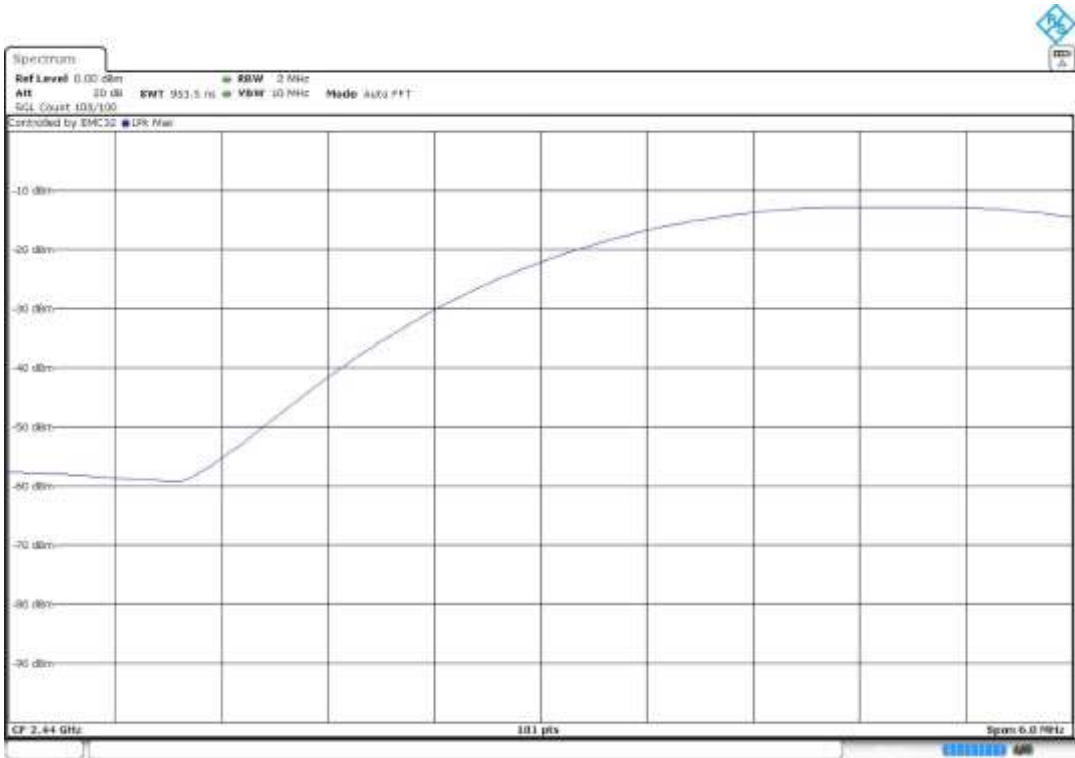
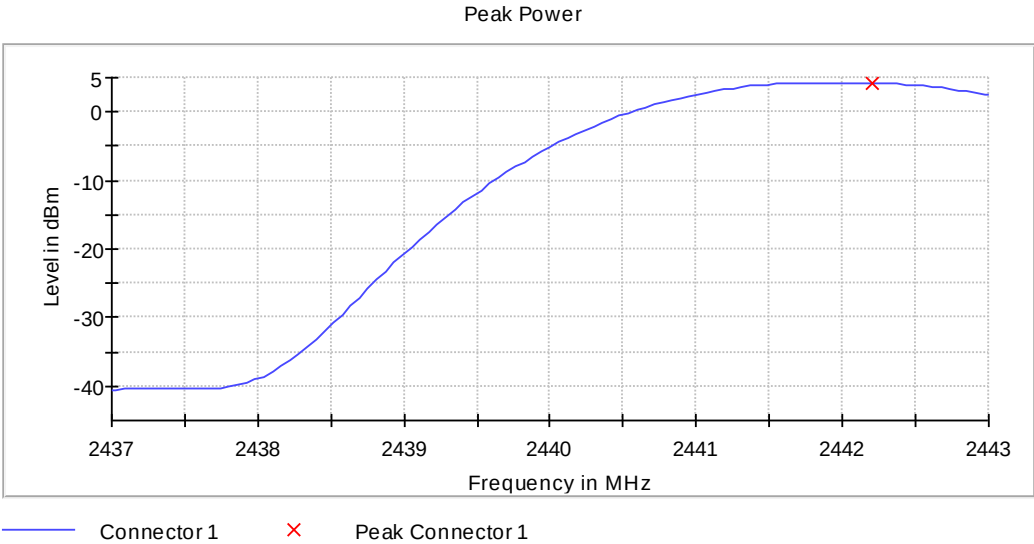
Number of Transmission Chains = 1 Active Port = 1

Images:



Frequency MHz = 2440.00000
Bandwidth MHz = 1 Modulation = BLE 5.0 (GFSK 1 Mbit/s)
Number of Transmission Chains = 1 Active Port = 1

Images:



Number of Transmission Chains = 1 Active Port = 1

Images:

