FCC Test Report

Report No.: AGC16786250701FR01

FCC ID	:	2BENK-BLE62
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	AloT Module
BRAND NAME	:	N/A
MODEL NAME	:	ROOT_BLE_62
APPLICANT	:	Shenzhen Root Innovation Technology Co., Ltd.
DATE OF ISSUE	:	Aug. 04, 2025
STANDARD(S)	:	FCC Part 15 Subpart C §15.247
REPORT VERSION	:	V1.0

***A**ttestation Of **G**lobal **C**ompliance (Shenzhen) Co., Ltd*

Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Aug. 04, 2025	Valid	Initial Release

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1. General Information

Applicant	Shenzhen Root Innovation Technology Co., Ltd.
Address	#2-201, Floor2, Hasee Computer Building, No.2 Beier Rd, Bantian Street, Longgang, Shenzhen, Guangdong, China, 518129
Manufacturer	Shenzhen Root Innovation Technology Co., Ltd.
Address	#2-201, Floor2, Hasee Computer Building, No.2 Beier Rd, Bantian Street, Longgang, Shenzhen, Guangdong, China, 518129
Factory	N/A
Address	N/A
Product Designation	AIoT Module
Brand Name	N/A
Test Model	ROOT_BLE_62
Series Model(s)	N/A
Difference Description	N/A
Date of receipt of test item	Jul. 15, 2025
Date of Test	Jul. 15, 2025 to Aug. 04, 2025
Deviation from Standard	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Test Report Form No	AGCER-FCC-BLE-V1

Note: The test results of this report relate only to the tested sample identified in this report.

Prepared By	Thea Huang Thea Huang (Project Engineer)	Aug. 04, 2025
Reviewed By	Bibo zhang Bibo Zhang (Reviewer)	Aug. 04, 2025
Approved By	Angela Li Angela Li (Authorized Officer)	Aug. 04, 2025

2. Product Information

2.1 Product Technical Description

Technology Type	Bluetooth Low Energy
Frequency Band	2400MHz-2483.5MHz
Operation Frequency Range	2402MHz-2480MHz
Bluetooth Version	V5.4
Modulation Type	BLE ☒GFSK 1Mbps ☒GFSK 2Mbps ☒GFSK 125Kbps ☒GFSK 500Kbps
Number of channels	40
Carrier Frequency of Each Channel	40 Channels (37 Data channels + 3 Advertising channels)
Channel Separation	2 MHz
Maximum Transmitter Power	Bluetooth BLE GFSK 1Mbps: 5.506dBm; Bluetooth BLE GFSK 2Mbps: 5.505dBm; Bluetooth BLE GFSK 125Kbps: 5.481dBm; Bluetooth BLE GFSK 500Kbps: 5.486dBm
Hardware Version	V2
Software Version	V0.6
Antenna Designation	PCB Antenna
Antenna Gain	-0.489dBi
Power Supply	DC 3.3V

2.2 Test Frequency List

Frequency Band	Channel Number	Test Frequency
2400~2483.5MHz	0	2402 MHz
	1	2404 MHz
	:	:
	19	2440MHz
	:	:
	38	2478 MHz
	39	2480 MHz
Note: f = 2402 + 2*k MHz, k = 0, …, 39 f is the operating frequency (MHz); k is the operating channel.		

2.3 Related Submittal(S) / Grant (S)

This submittal(s) (test report) is intended for FCC ID: **2BENK-BLE62,** filing to comply with Part 2, Part 15 of the Federal Communication Commission rules.

2.4 Test Methodology

The tests were performed according to following standards:

No.	Identity	Document Title
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 15	Radio Frequency Devices
3	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
4	KDB 558074 D01 15.247 Meas Guidance v05r02	Guidance for compliance measurements on Digital Transmission Systems, Frequency Hopping Spread Spectrum system, and Hybrid system devices operating under Section 15.247 of the FCC rules

2.5 Special Accessories

Not available for this EUT intended for grant.

2.6 Equipment Modifications

Not available for this EUT intended for grant.

2.7 Antenna Requirement

Standard Requirement
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. **15.247(b) (4) requirement:** The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi
EUT Antenna
The non-detachable antenna inside the device cannot be replaced by the user at will. The gain of the antenna is -0.489dBi.

3. Test Environment

3.1 Address of the Test Laboratory

Laboratory: Attestation of Global Compliance (Shenzhen) Co., Ltd.

Address: 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L5488

Attestation of Global Compliance (Shenzhen) Co., Ltd. has been assessed and proved to follow CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories).

A2LA-Lab Cert. No.: 5054.02

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to follow ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC-Registration No.: 975832

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files with Registration 975832.

IC-Registration No.: 24842 (CAB identifier: CN0063)

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the Certification and Engineering Bureau of Industry Canada. The acceptance letter from the IC is maintained in our files with Registration 24842.

3.3 Environmental Conditions

	Normal Conditions
Temperature range (℃)	15 - 35
Relative humidity range	20 % - 75 %
Pressure range (kPa)	86 - 106
Power supply	DC 3.3V

3.4 Measurement Uncertainty

The reported uncertainty of measurement y ±U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

Item	Measurement Uncertainty
Uncertainty of Conducted Emission for AC Port	U_c = ±2.9 dB
Uncertainty of Radiated Emission below 1GHz	U_c = ±3.9 dB
Uncertainty of Radiated Emission above 1GHz	U_c = ±4.9 dB
Uncertainty of total RF Power, Conducted	U_c = ±0.8 dB
Uncertainty of RF Power Density, Conducted	U_c = ±2.6 dB
Uncertainty of Spurious Emissions, Conducted	U_c = ±2 %
Uncertainty of Occupied Channel Bandwidth	U_c = ±2 %
Uncertainty of Dwell Time	U_c = ±2 %

3.5 List of Equipment Use

● RF Conducted Test System							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☒	AGC-ER-E036	Spectrum Analyzer	Agilent	N9020A	MY49100060	2025-01-14	2026-01-13
☒	AGC-ER-A007	6dB Fixed Attenuator	Mini circuits	BW-S6-2W263A+	N/A	2025-01-30	2026-01-29
☒	N/A	RF Connection Cable	N/A	1#	N/A	Each time	N/A
☒	N/A	RF Connection Cable	N/A	2#	N/A	Each time	N/A

● Radiated Spurious Emission							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☒	AGC-EM-E046	EMI Test Receiver	R&S	ESCI	100096	2025-01-14	2026-01-13
☐	AGC-EM-E116	EMI Test Receiver	R&S	ESCI	100034	2025-05-08	2026-05-07
☒	AGC-EM-E061	Spectrum Analyzer	Agilent	N9010A	MY53470504	2025-05-08	2026-05-07
☒	AGC-EM-E086	Loop Antenna	ZHINAN	ZN30900C	18051	2024-03-05	2026-03-04
☒	AGC-EM-E001	Wideband Antenna	SCHWARZBECK	VULB9168	D69250	2025-03-14	2027-03-13
☒	AGC-EM-E029	Broadband Ridged Horn Antenna	ETS	3117	00034609	2025-03-27	2026-03-26
☒	AGC-EM-E082	Horn Antenna	SCHWARZBECK	BBHA 9170	#768	2023-09-24	2025-09-23
☒	AGC-EM-E146	Pre-amplifier	ETS	3117-PA	00246148	2024-07-24	2026-07-23
☒	AGC-EM-A119	2.4GHz Filter	SongYi	N/A	N/A	2025-05-16	2026-05-15
☒	AGC-EM-A138	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2025-05-16	2027-05-15
☐	AGC-EM-A139	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2025-05-16	2027-05-15

● AC Power Line Conducted Emission							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☒	AGC-EM-E116	EMI Test Receiver	R&S	ESCI	100034	2025-05-08	2026-05-07
☒	AGC-EM-A171	Attenuator	Mini-Circuits	UNAT-10A+	DC-6GZ	2024-02-01	2026-01-31
☒	AGC-EM-E023	AMN	R&S	ESH2-Z5	100086	2025-05-08	2026-05-07

● Test Software					
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Version Information
☒	AGC-EM-S001	CE Test System	R&S	ES-K1	V1.71
☐	AGC-EM-S003	RE Test System	FARA	EZ-EMC	VRA-03A
☒	AGC-EM-S004	RE Test System	Tonscend	TS^{+} Ver2.1(JS32-RE)	4.0.0.0
☒	AGC-ER-S012	BT/WIFI Test System	Tonscend	JS1120-2	2.6
☒	AGC-EM-S011	RSE Test System	Tonscend	TS+-Ver2.1(JS36-RSE)	4.0.0.0

4. System Test Configuration

4.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

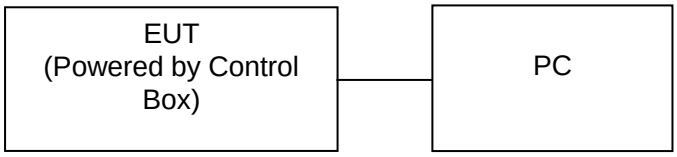
4.2 EUT Exercise

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

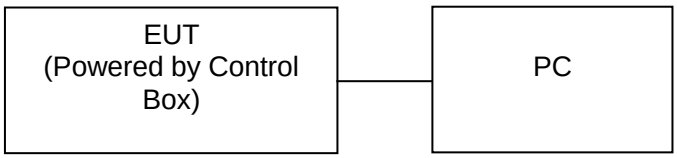
4.3 Configuration of Tested System

4.3 Configuration of Tested System

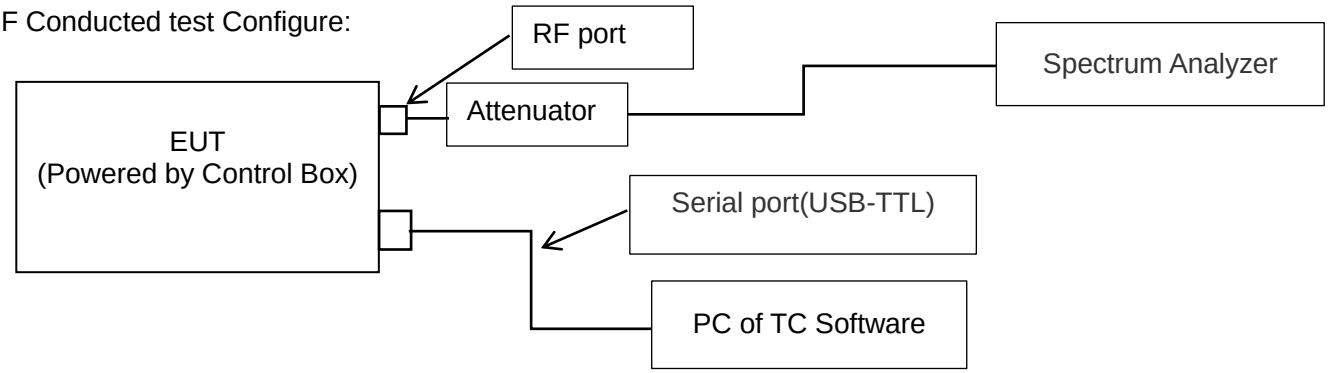
Radiated Emission Configure:



Conducted Emission Configure:



RF Conducted test Configure:



4.4 Equipment Used In Tested System

The following peripheral devices and interface cables were connected during the measurement:

☒ Test Accessories Come From The Laboratory

No.	Equipment	Manufacturer	Model No.	Specification Information	Cable
1	Redmi Notebook PC	Redmi	XMA2002-AB	N/A	1.2m,unshielded
2	Adapter	Xiaomi	MDY-16-EA	Input: AC 100-240V 50/60Hz, 2.5A Output: DC 5V/3A, DC 9V/3A, DC 11V/6.1A, DC 20V/5A, DC 20V/6A	N/A
3	Control Box	RISYM	USB-TTL	--	--

☐ Test Accessories Come From The Manufacturer

No.	Equipment	Manufacturer	Model No.	Specification Information	Cable
1	--	--	--	--	--

4.5 Summary of Test Results

Item	FCC Rules	Description of Test	Result
1	§15.203&15.247(b)(4)	Antenna Equipment	Pass
2	§15.247 (b)(3)	RF Output Power	Pass
3	§15.247 (a)(2)	6 dB Bandwidth	Pass
4	§15.247 (e)	Power Spectral Density	Pass
5	§15.247 (d)	Conducted Band Edge and Out-of-Band Emissions	Pass
6	§15.209	Radiated Emission& Band Edge	Pass
7	§15.207	AC Power Line Conducted Emission	Pass

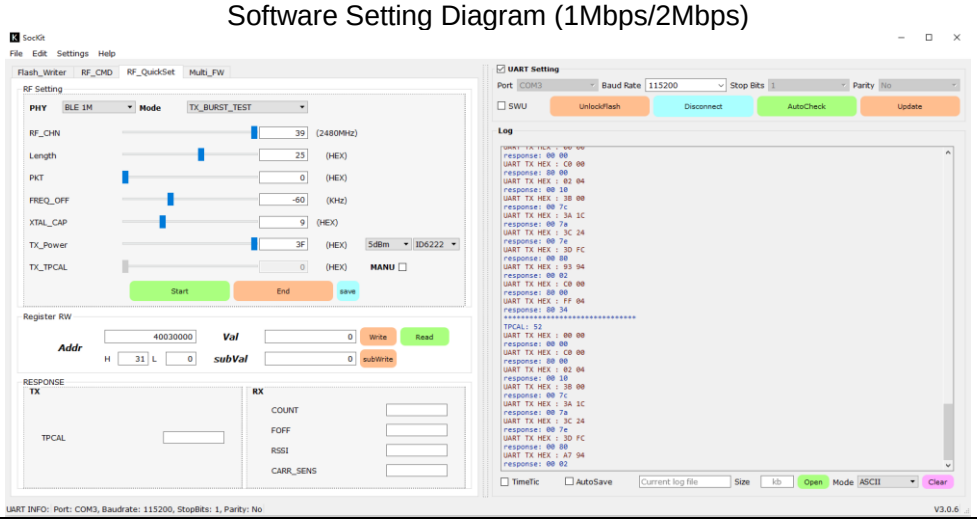
5. Description of Test Modes

Summary Table of Test Cases	
Test Item	Data Rate / Modulation
	Bluetooth–LE(1Mbps/2Mbps/125Kbps/500Kbps)/GFSK
Radiated & Conducted Test Cases	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps (Connect to the PC) Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps (Connect to the PC) Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps (Connect to the PC) Mode 4: Bluetooth Tx CH00_2402 MHz_2Mbps (Connect to the PC) Mode 5: Bluetooth Tx CH19_2440 MHz_2Mbps (Connect to the PC) Mode 6: Bluetooth Tx CH39_2480 MHz_2Mbps (Connect to the PC) Mode 7: Bluetooth Tx CH00_2402 MHz_125Kbps (Connect to the PC) Mode 8: Bluetooth Tx CH19_2440 MHz_125Kbps (Connect to the PC) Mode 9: Bluetooth Tx CH39_2480 MHz_125Kbps (Connect to the PC) Mode 10: Bluetooth Tx CH00_2402 MHz_500Kbps (Connect to the PC) Mode 11: Bluetooth Tx CH19_2440 MHz_500Kbps (Connect to the PC) Mode 12: Bluetooth Tx CH39_2480 MHz_500Kbps (Connect to the PC)
AC Conducted Emission	Mode 1: Bluetooth Link (Connect to the PC)

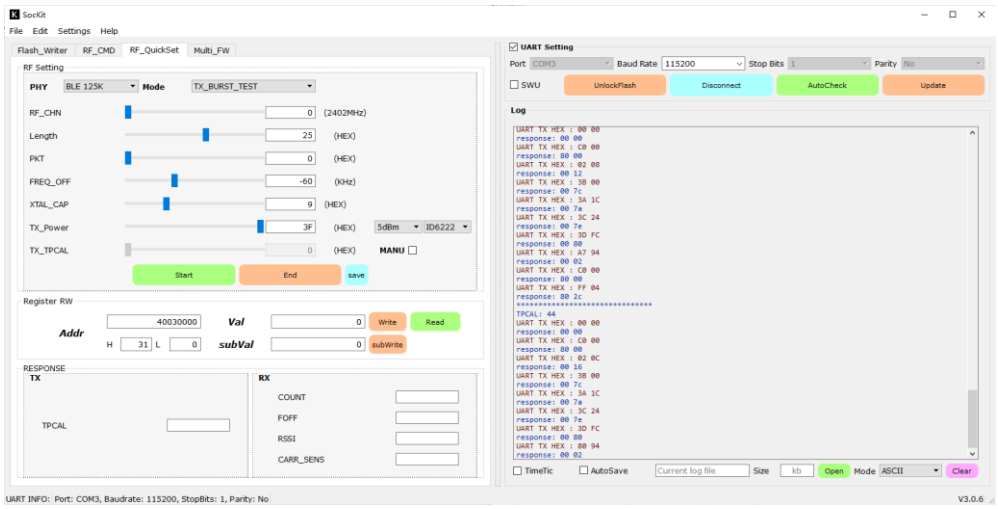
Note:

1. Only the result of the worst case was recorded in the report, if no other cases.
2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
3. For Conducted Test method, a temporary antenna connector is provided by the manufacture.
4. The manufacturer of RF external cable claims that the cable loss is 0.5dB, and the cable loss and attenuator have been compensated into the Corrections Configuration of measuring equipment.
5. Input correction factor includes external cable loss and attenuator amplitude compensation. The formula is: Input compensation coefficient (dB) = Cable Loss (dB) + Attenuator attenuation value (dB)

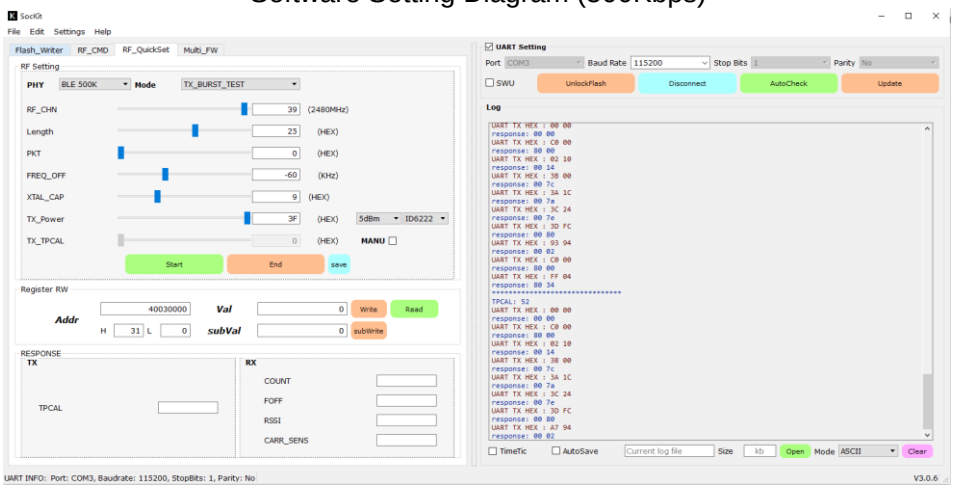
Software Setting Diagram (1Mbps/2Mbps)



Software Setting Diagram (125Kbps)



Software Setting Diagram (500Kbps)



6. Duty Cycle Measurement

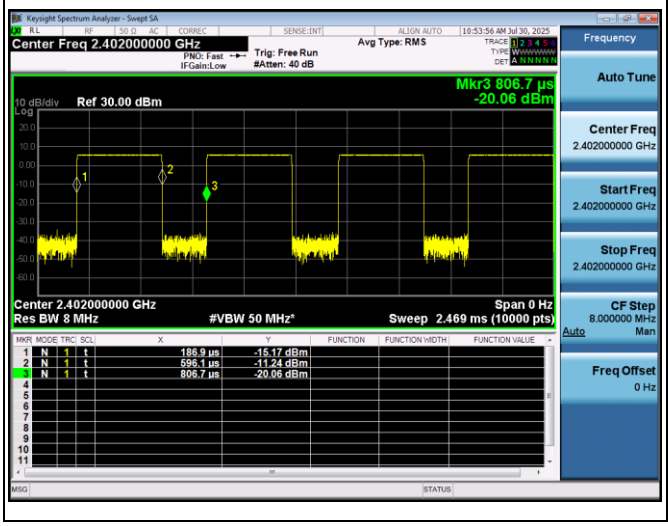
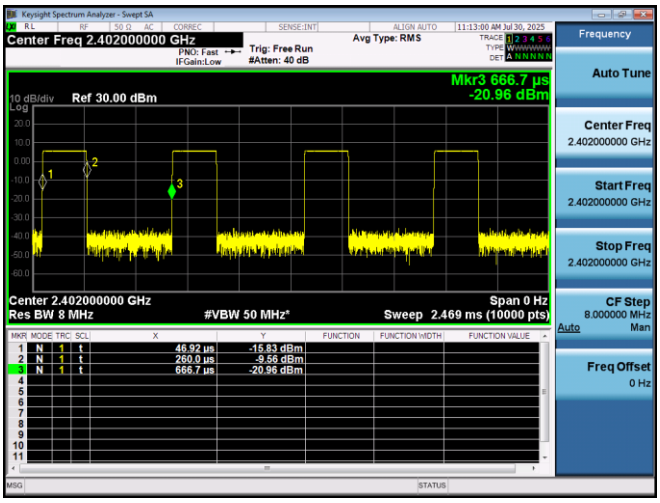
The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = Peak. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

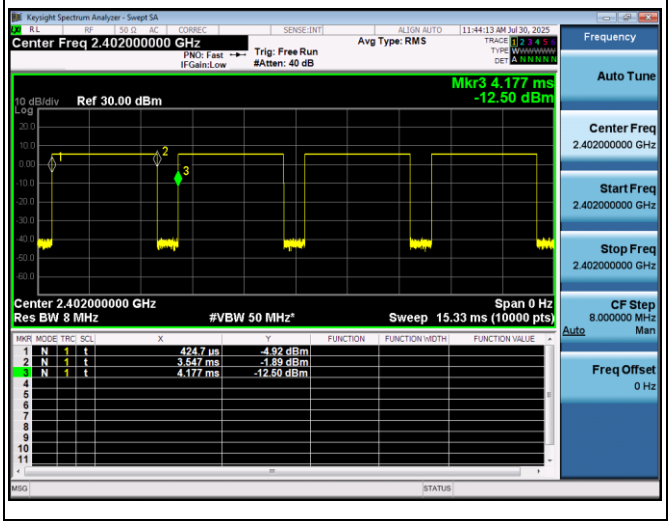
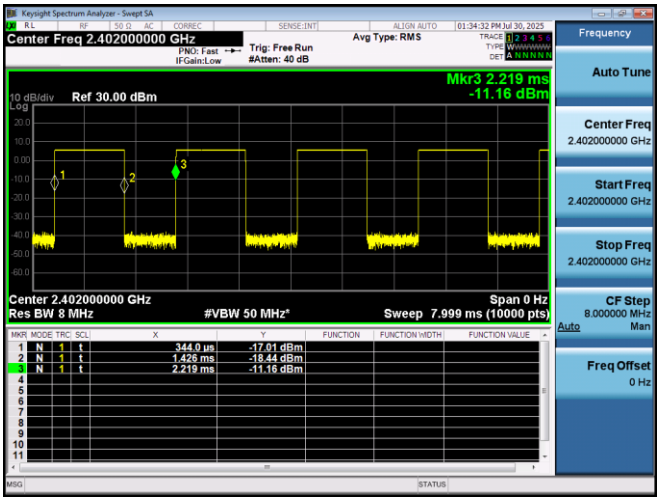
Operating mode	T(μs)	Duty Cycle (%)	Duty Cycle Factor (dB)	1/ T Minimum VBW (kHz)
BLE_1Mbps	409.2	66.02	1.80	2.44
BLE_2Mbps	213.08	34.38	4.64	4.69
BLE_125Kbps	3122.3	83.21	0.80	0.32
BLE_500Kbps	1082	57.71	2.39	0.92

Remark:

1. Duty Cycle factor = 10 * log (1/ Duty cycle)
2. The duty cycle of each frequency band mode reflects the determination requirements of the low channel measurement value

- The test plots as follows:

Bluetooth–LE for 1Mbps	Bluetooth–LE for 2Mbps
	

Bluetooth–LE for 125Kbps	Bluetooth–LE for 500Kbps
	

7. RF Output Power Measurement

7.1 Provisions Applicable

For DTSs employing digital modulation techniques operating in the bands 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W.

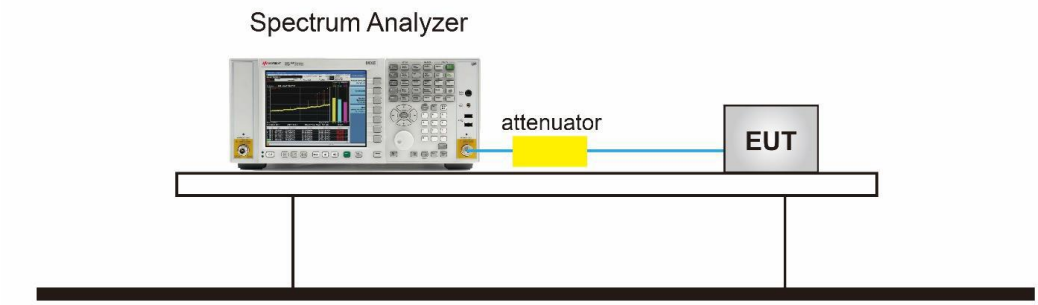
7.2 Measurement Procedure

☒ For Peak Power, the testing follows ANSI C63.10 Section 11.9.1.1 Method Max peak power:

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the RBW≥DTS bandwidth
3. Set the VBW≥[3 × RBW].
4. Span≥[3 × RBW].
5. Sweep= auto couple.
6. Detector Function= Peak.
7. Trace mode= Max hold.
8. Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power, after any corrections for external attenuators and cables.

7.3 Measurement Setup (Block Diagram of Configuration)

☒For peak power test setup

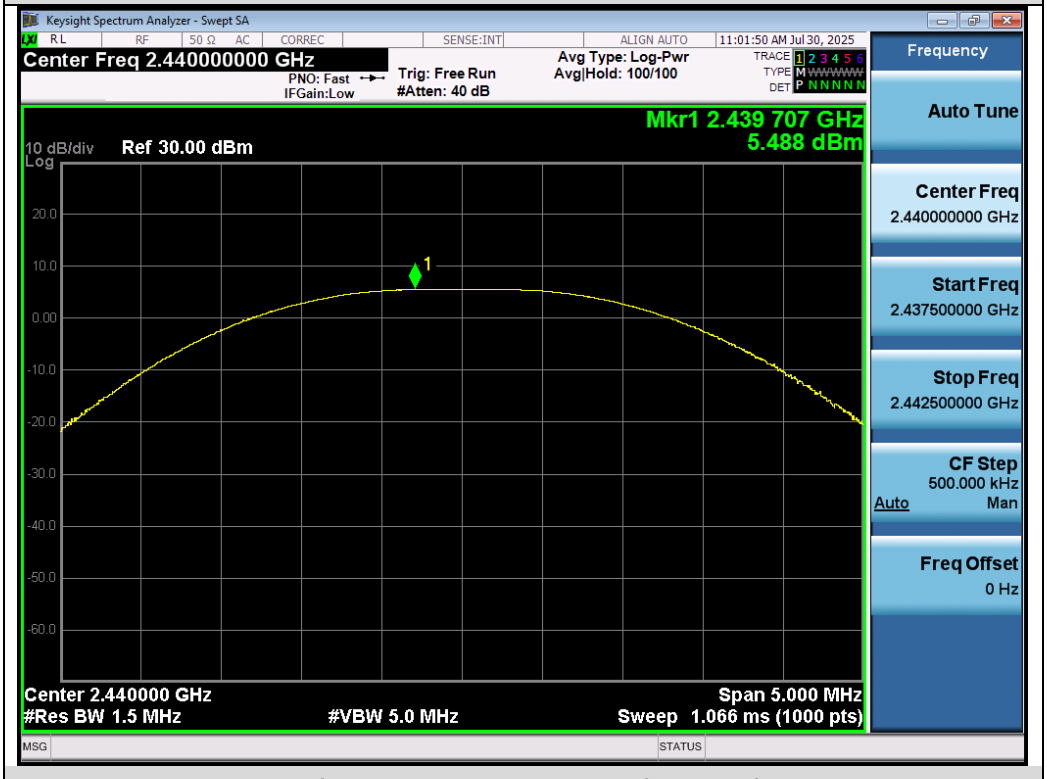


7.4 Measurement Result

Test Data of Conducted Output Power				
Test Mode	Test Frequency (MHz)	Peak Power (dBm)	Limits (dBm)	Pass or Fail
GFSK_1Mbps	2402	5.506	≤30	Pass
	2440	5.488	≤30	Pass
	2480	5.395	≤30	Pass
GFSK_2Mbps	2402	5.505	≤30	Pass
	2440	5.479	≤30	Pass
	2480	5.386	≤30	Pass

Test Graphs of Conducted Output Power

Test_Graph_LE1M_ANT1_2402_1Mbps_Peak Power



Test_Graph_LE1M_ANT1_2440_1Mbps_Peak Power

Test_Graph_LE1M_ANT1_2480_1Mbps_Peak Power

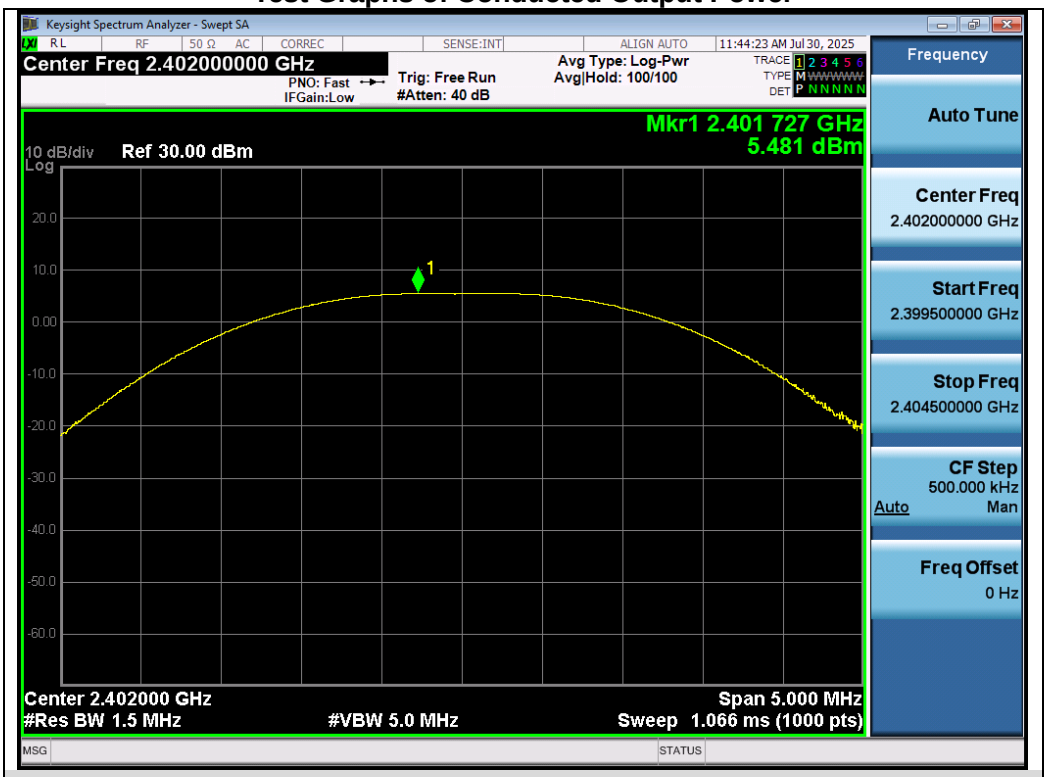
Test_Graph_LE2M_ANT1_2402_2Mbps_Peak Power

Test_Graph_LE2M_ANT1_2440_2Mbps_Peak Power

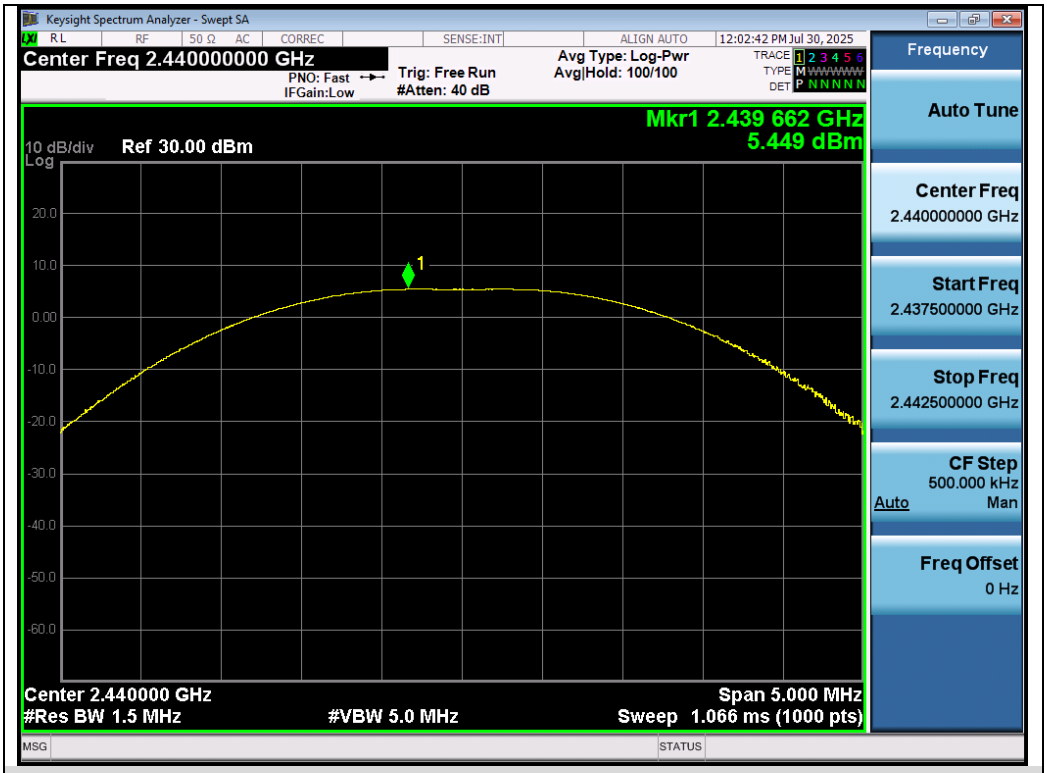
Test_Graph_LE2M_ANT1_2480_2Mbps_Peak Power

Test Data of Conducted Output Power				
Test Mode	Test Frequency (MHz)	Peak Power (dBm)	Limits (dBm)	Pass or Fail
GFSK_125Kbps	2402	5.481	≤30	Pass
	2440	5.449	≤30	Pass
	2480	5.382	≤30	Pass

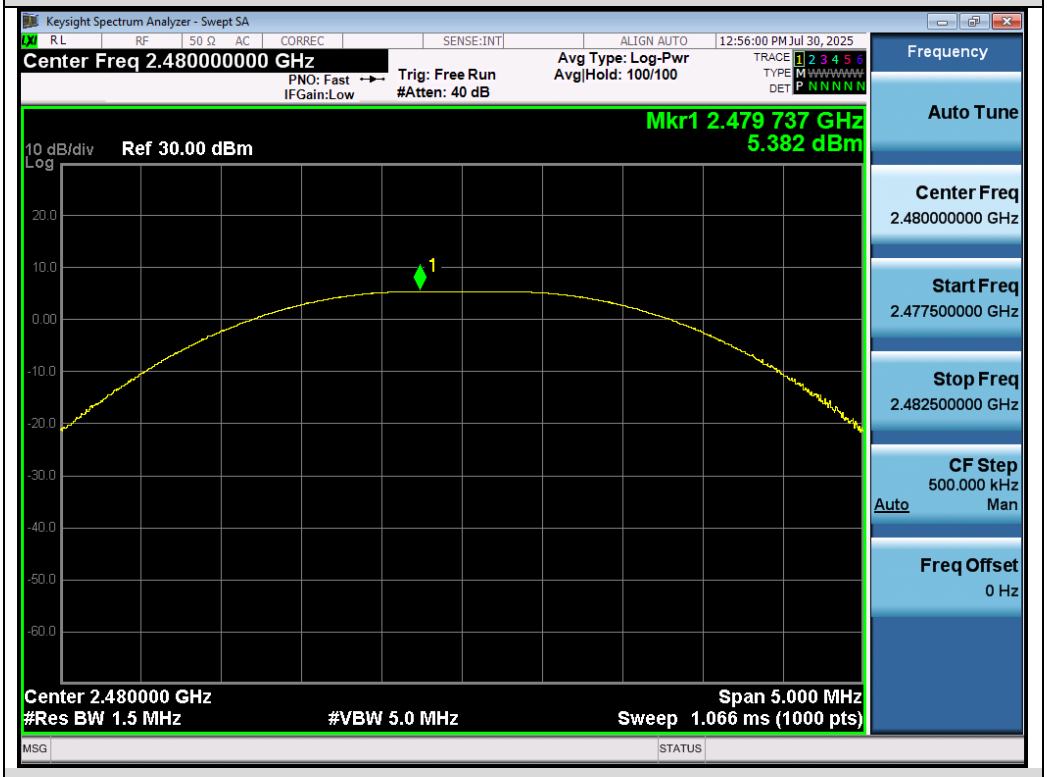
Test Graphs of Conducted Output Power



Test_Graph_GFSK_ANT1_2402_125Kbps_Peak Power



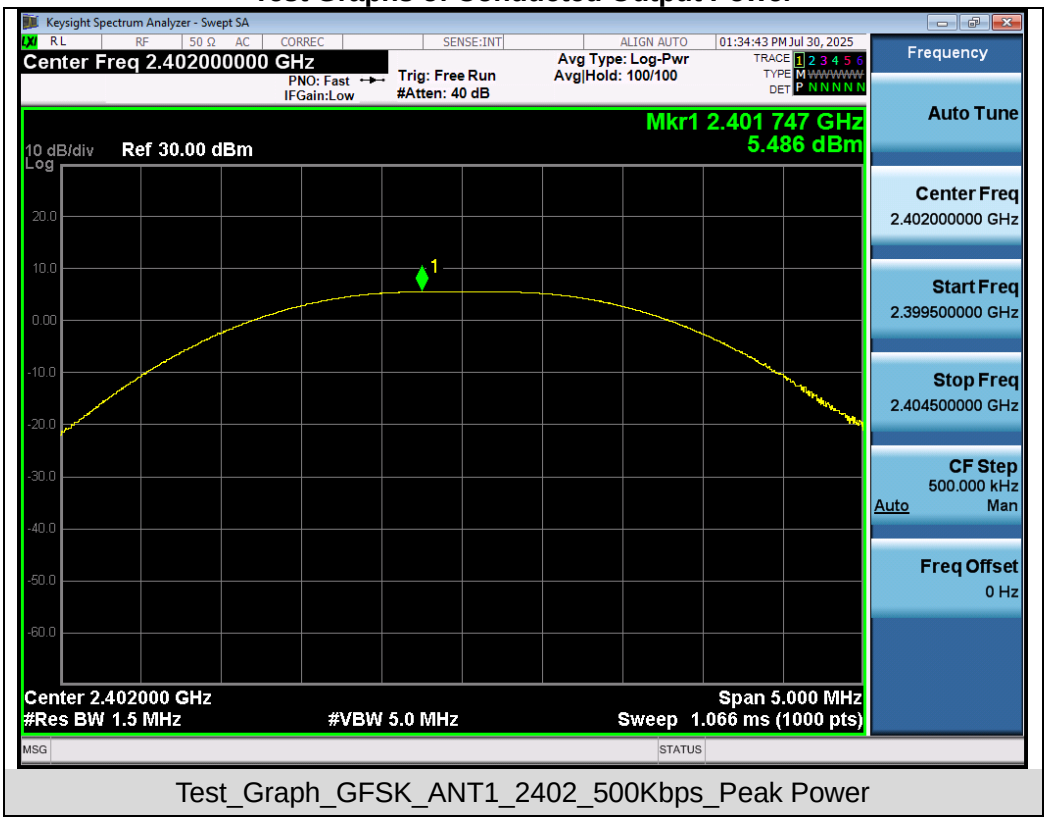
Test_Graph_GFSK_ANT1_2440_125Kbps_Peak Power



Test_Graph_GFSK_ANT1_2480_125Kbps_Peak Power

Test Data of Conducted Output Power				
Test Mode	Test Frequency (MHz)	Peak Power (dBm)	Limits (dBm)	Pass or Fail
GFSK_500Kbps	2402	5.486	≤30	Pass
	2440	5.480	≤30	Pass
	2480	5.390	≤30	Pass

Test Graphs of Conducted Output Power



Test_Graph_GFSK_ANT1_2402_500Kbps_Peak Power

Test_Graph_GFSK_ANT1_2440_500Kbps_Peak Power

Test_Graph_GFSK_ANT1_2480_500Kbps_Peak Power

8. 6dB Bandwidth Measurement

8.1 Provisions Applicable

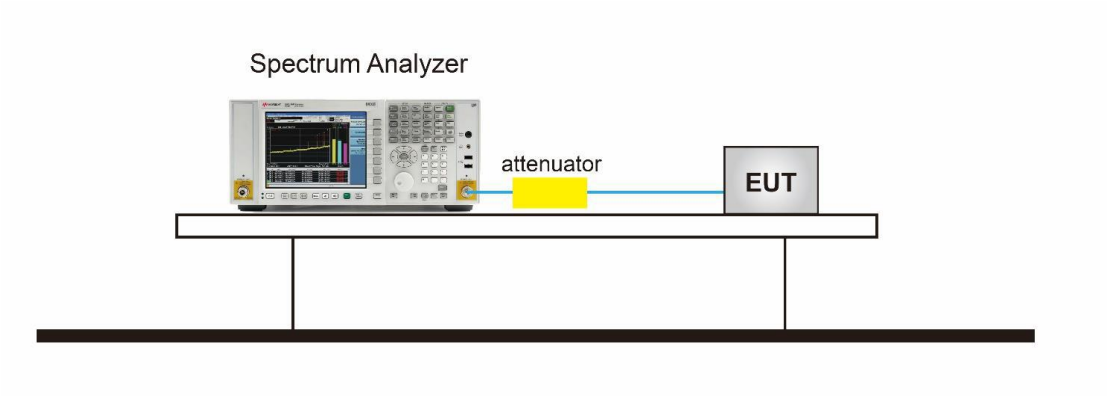
The minimum 6dB bandwidth shall be 500 kHz.

8.2 Measurement Procedure

■ The testing follows the ANSI C63.10 Section 6.9.3 (OBW) and 11.8.1 (6dB BW).

1. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
4. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1-5% of the OBW and set the Video bandwidth (VBW) ≥ 3 * RBW.
5. Measure and record the results in the test report.

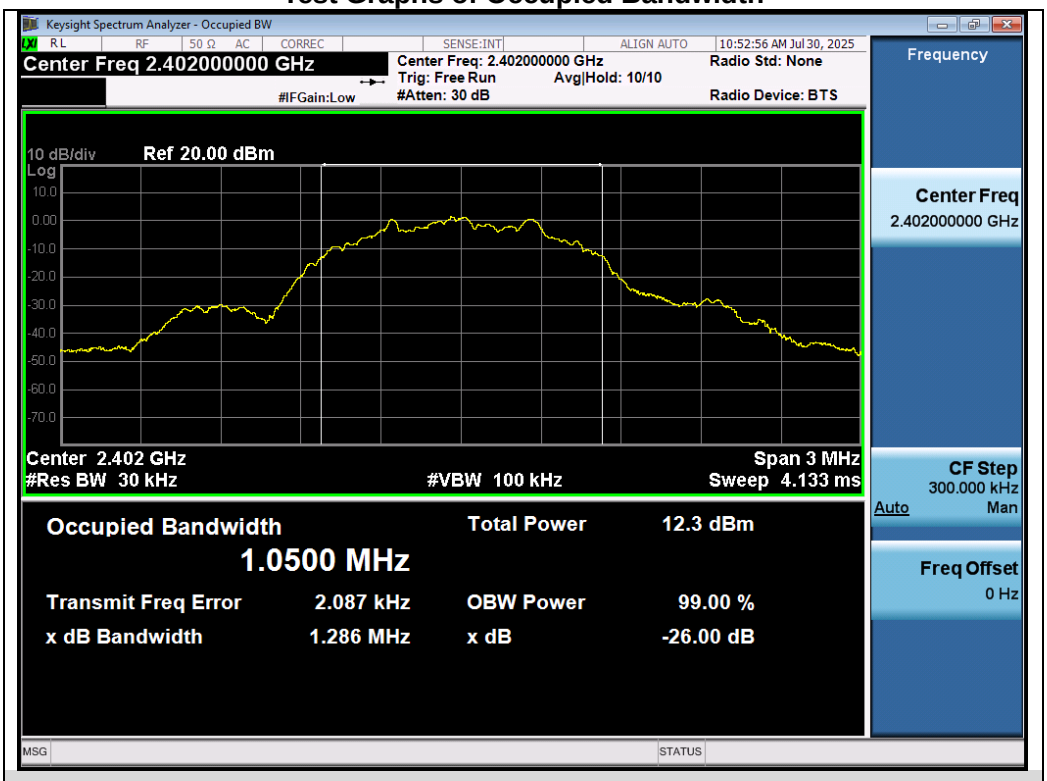
8.3 Measurement Setup (Block Diagram of Configuration)



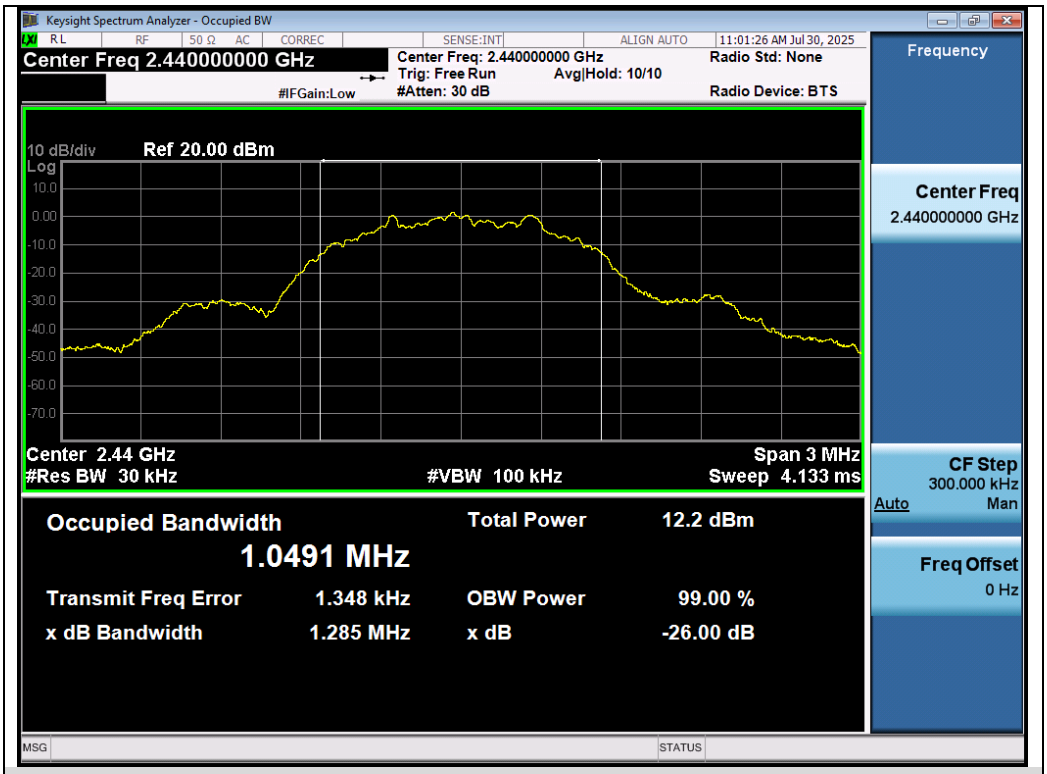
8.4 Measurement Results

Test Data of Occupied Bandwidth and DTS Bandwidth					
Test Mode	Test Frequency (MHz)	Occupied Bandwidth (MHz)	DTS BW (MHz)	DTS BW Limits	Pass or Fail
GFSK_1Mbps	2402	1.050	0.706	≥0.5	Pass
	2440	1.049	0.704	≥0.5	Pass
	2480	1.048	0.709	≥0.5	Pass
GFSK_2Mbps	2402	2.044	1.165	≥0.5	Pass
	2440	2.050	1.174	≥0.5	Pass
	2480	2.040	1.175	≥0.5	Pass

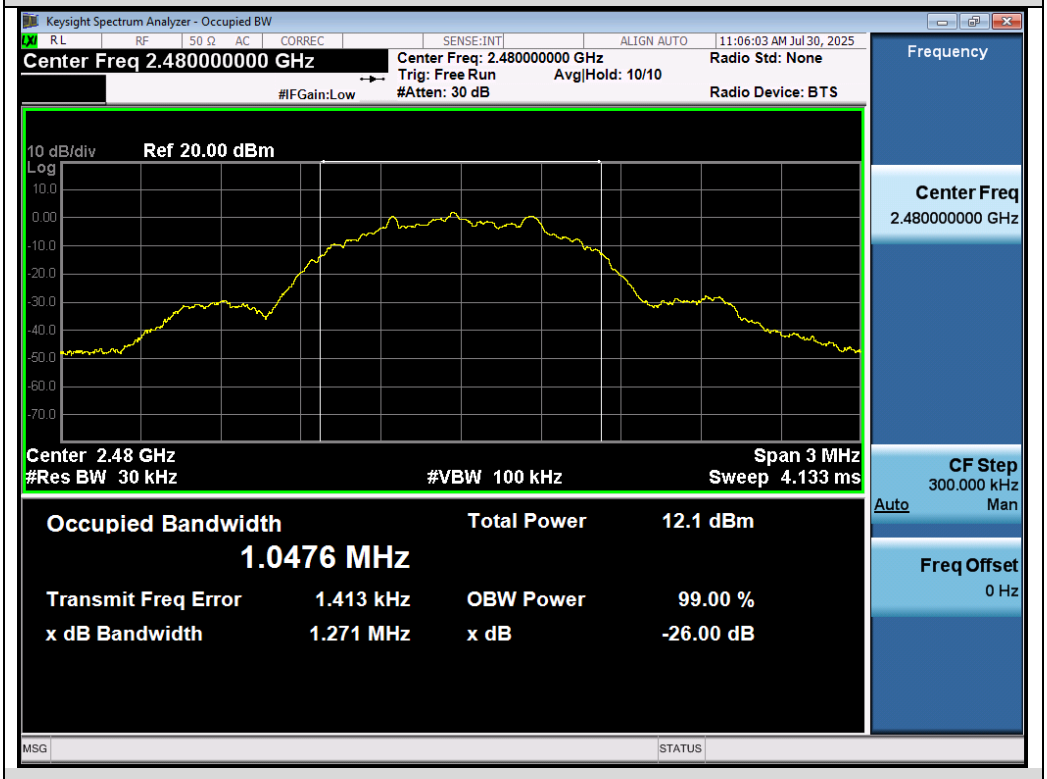
Test Graphs of Occupied Bandwidth



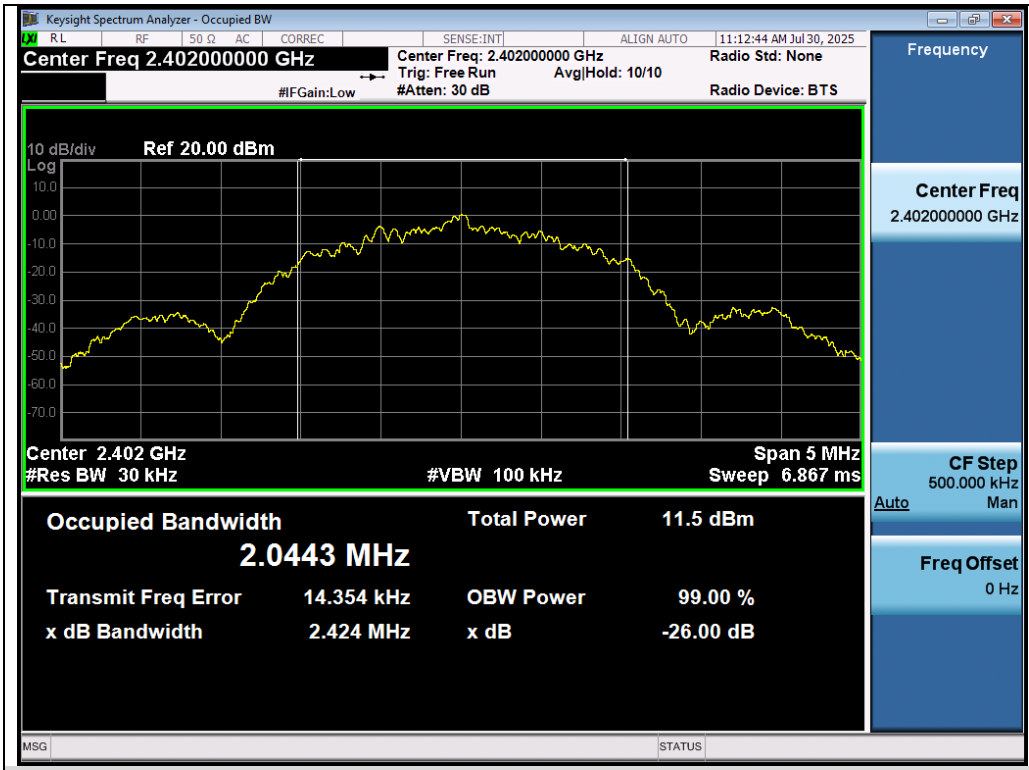
Test_Graph_LE1M_ANT1_2402_1Mbps_OBW



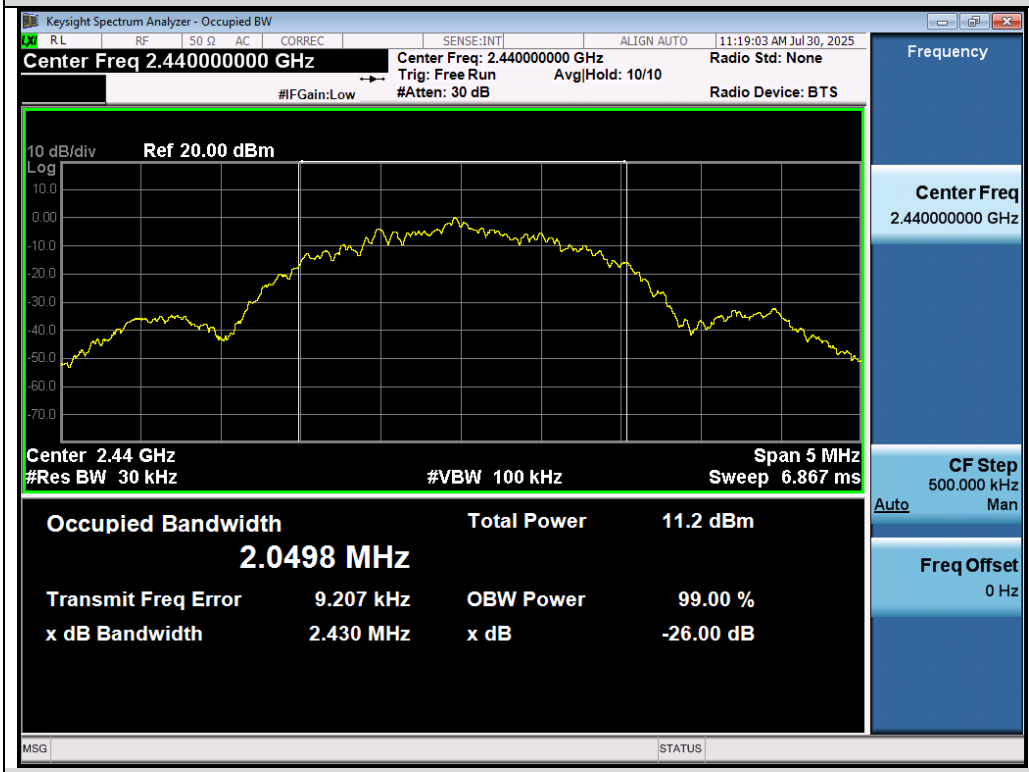
Test_Graph_LE1M_ANT1_2440_1Mbps_OBW



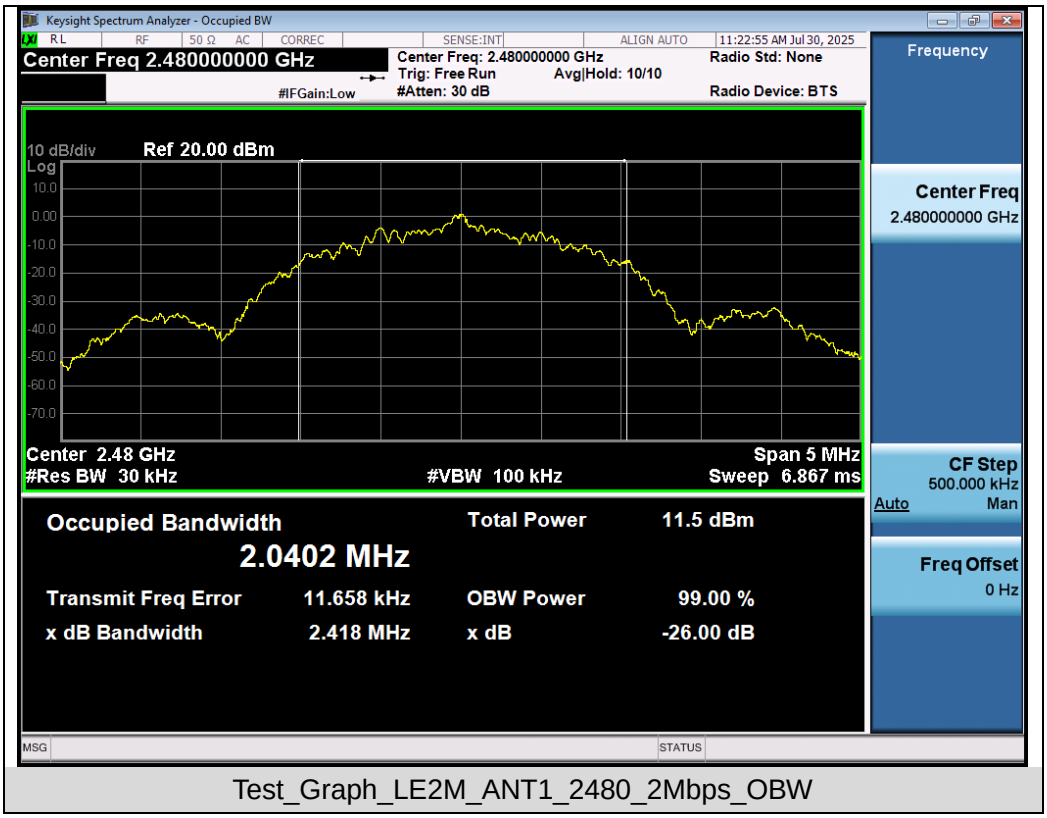
Test_Graph_LE1M_ANT1_2480_1Mbps_OBW



Test_Graph_LE2M_ANT1_2402_2Mbps_OBW

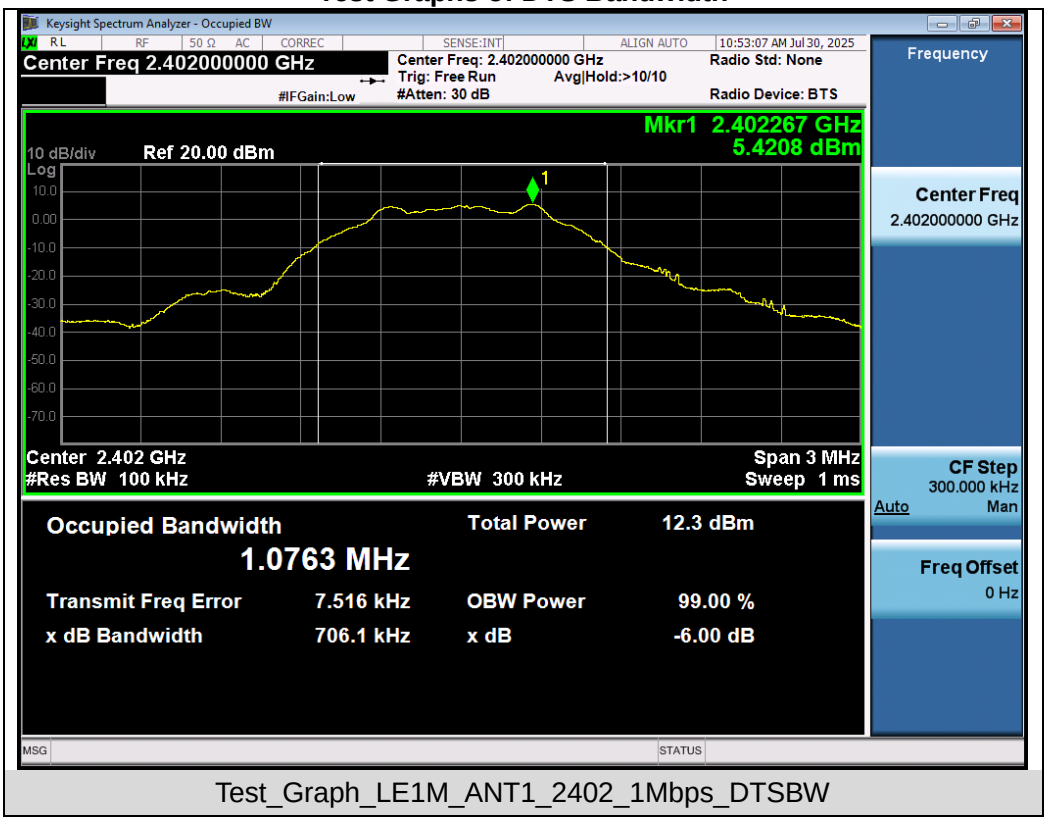


Test_Graph_LE2M_ANT1_2440_2Mbps_OBW

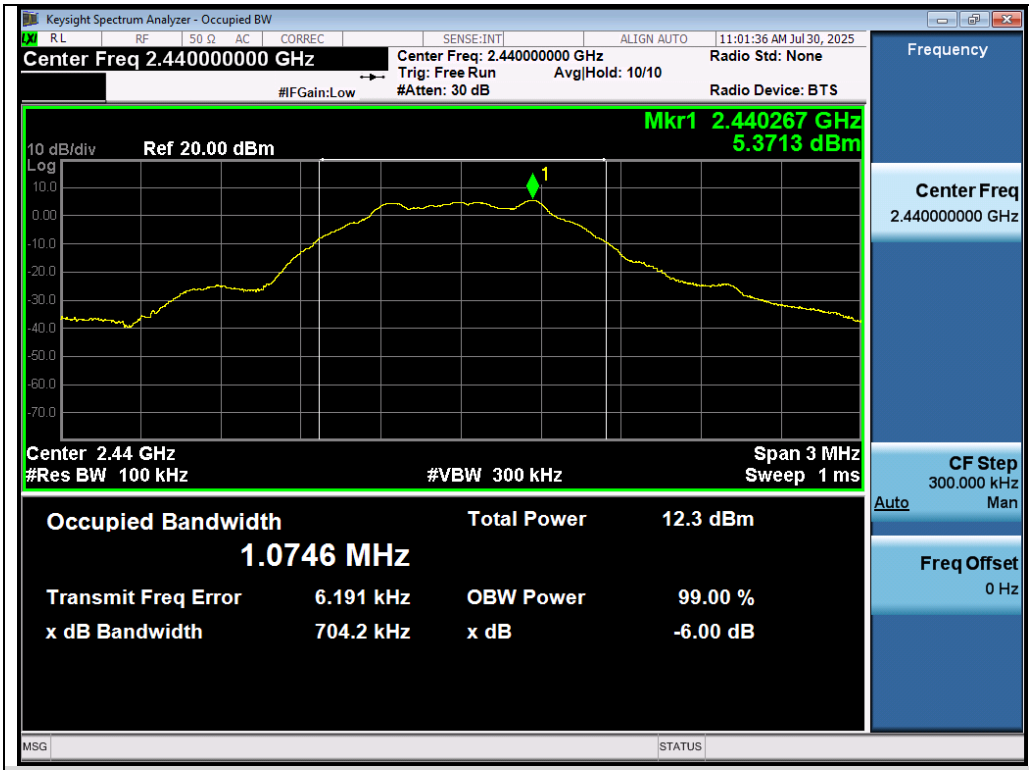


Test_Graph_LE2M_ANT1_2480_2Mbps_OBW

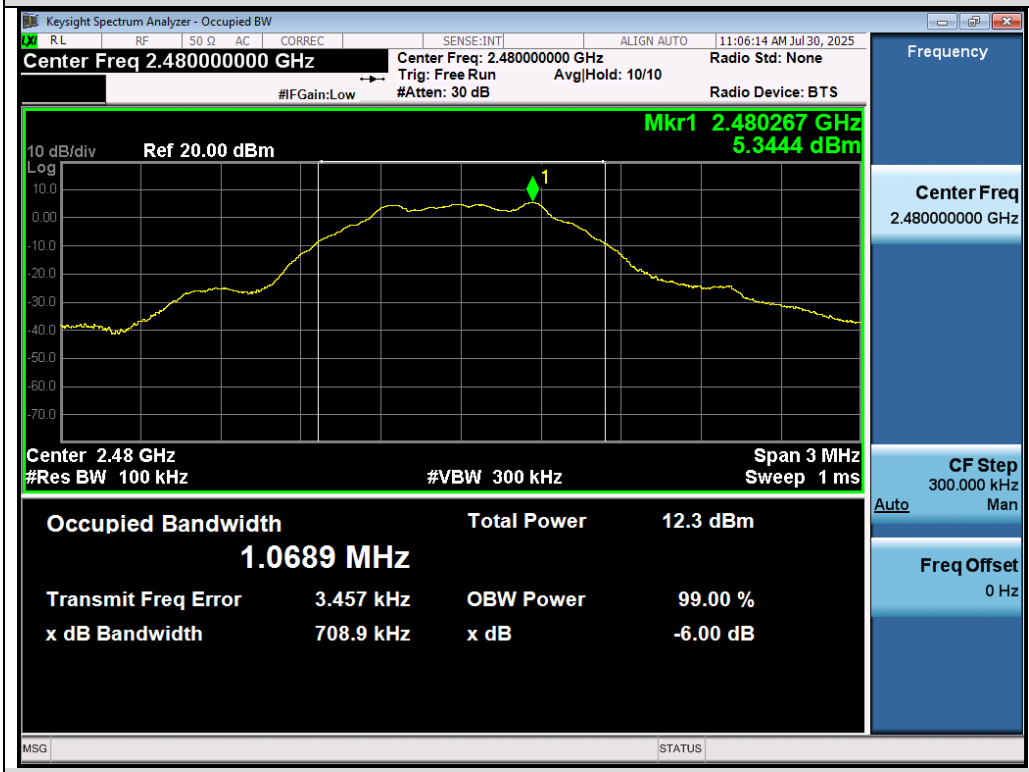
Test Graphs of DTS Bandwidth



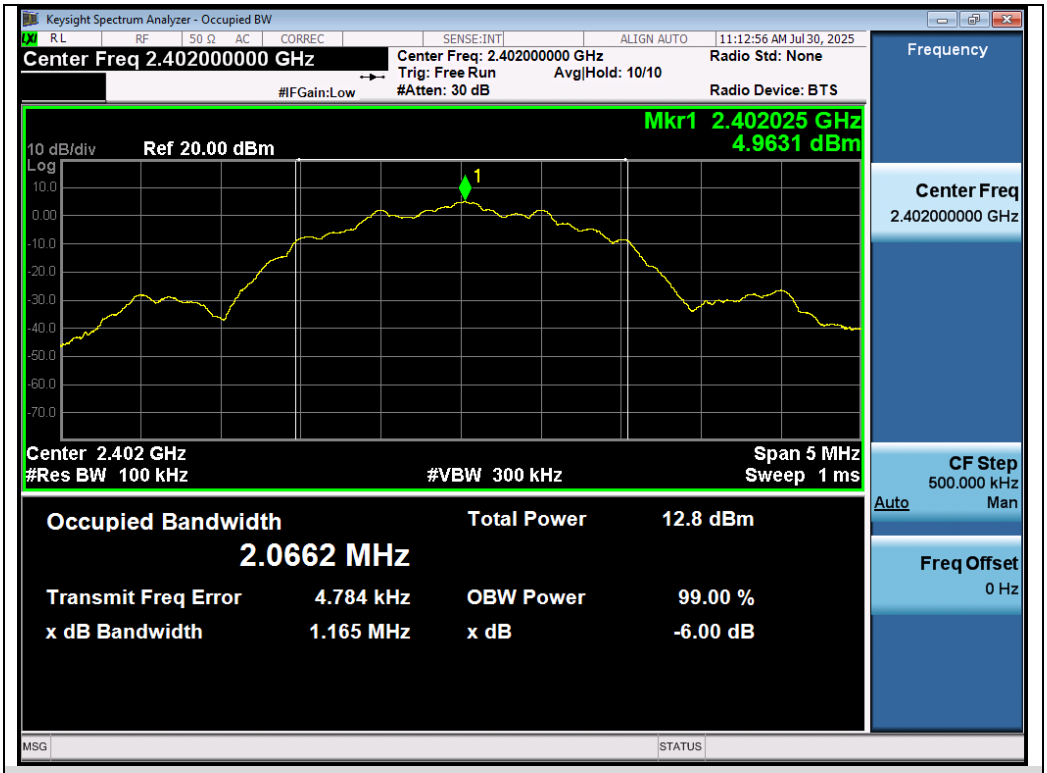
Test_Graph_LE1M_ANT1_2402_1Mbps_DTSBW



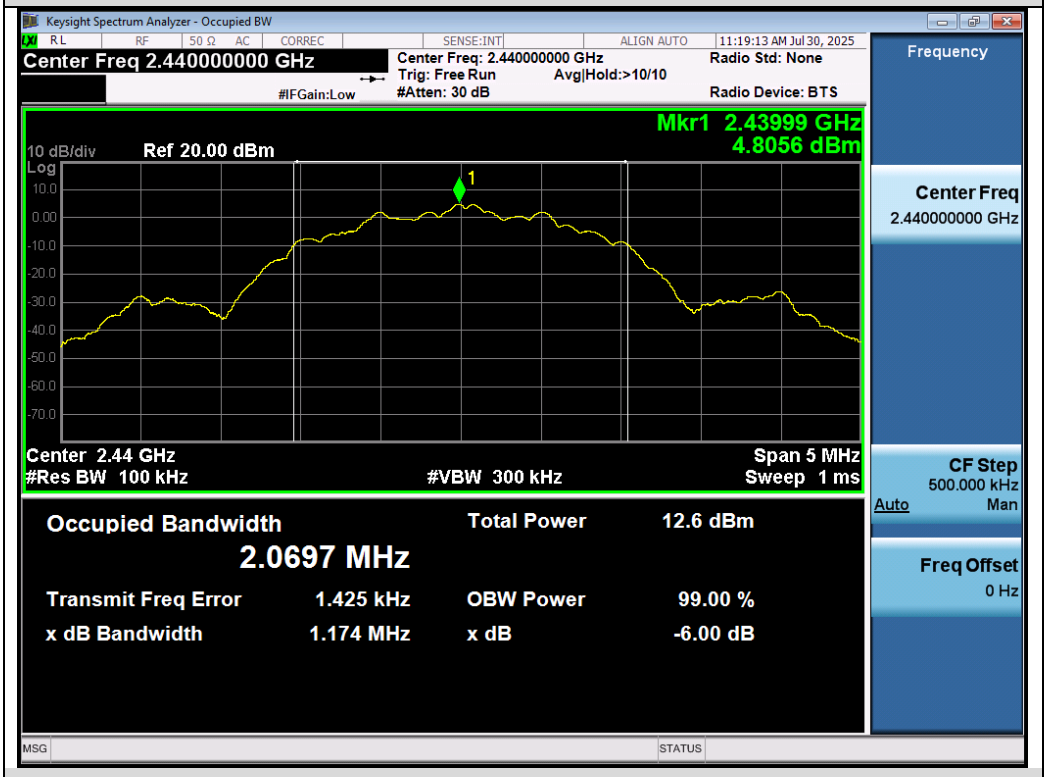
Test_Graph_LE1M_ANT1_2440_1Mbps_DTSBW



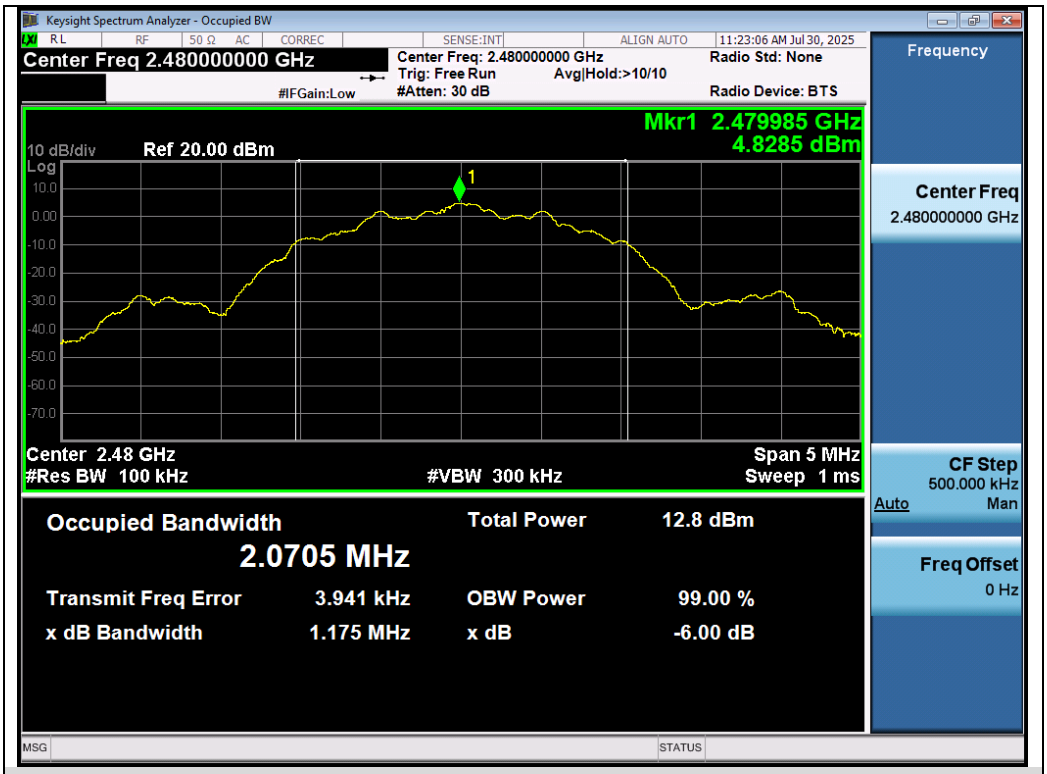
Test_Graph_LE1M_ANT1_2480_1Mbps_DTSBW



Test_Graph_LE2M_ANT1_2402_2Mbps_DTSBW



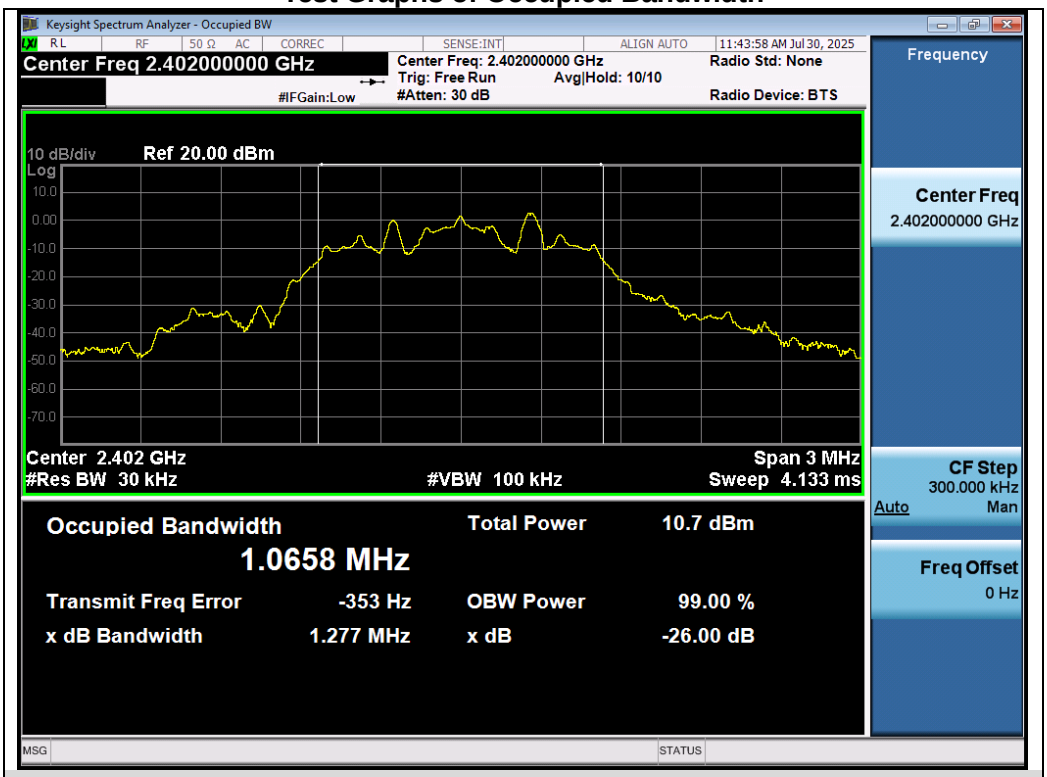
Test_Graph_LE2M_ANT1_2440_2Mbps_DTSBW



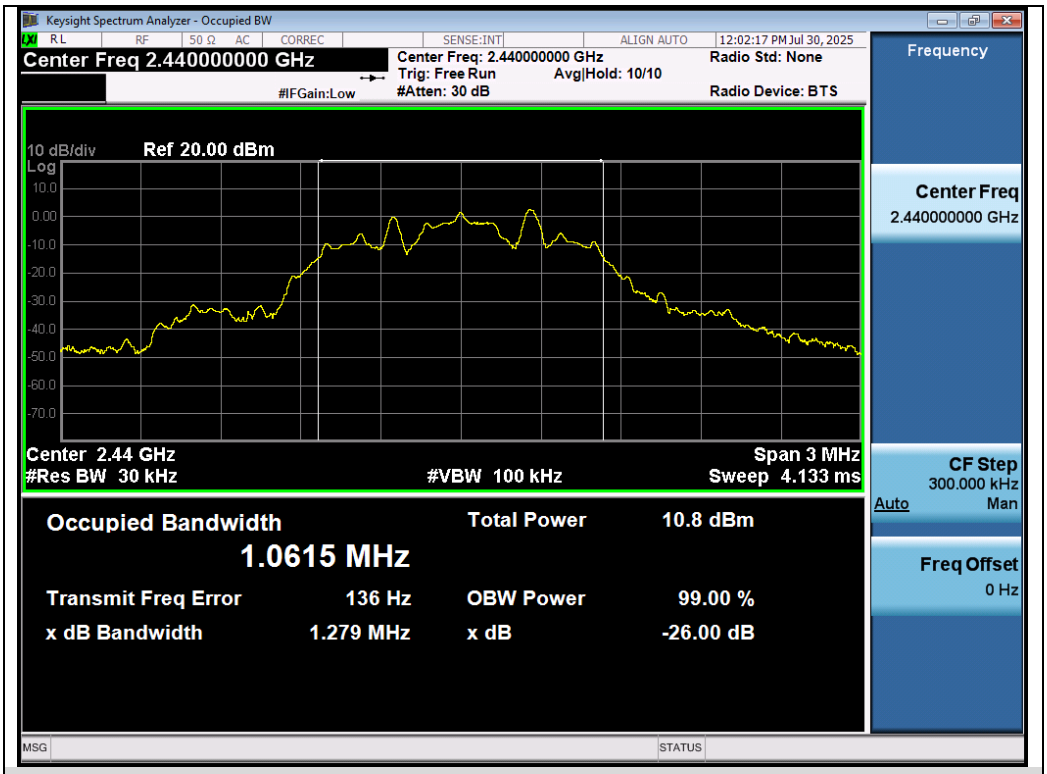
Test_Graph_LE2M_ANT1_2480_2Mbps_DTSBW

Test Data of Occupied Bandwidth and DTS Bandwidth					
Test Mode	Test Frequency (MHz)	Occupied Bandwidth (MHz)	DTS BW (MHz)	DTS BW Limits	Pass or Fail
GFSK_125Kbps	2402	1.066	0.651	≥0.5	Pass
	2440	1.061	0.650	≥0.5	Pass
	2480	1.069	0.650	≥0.5	Pass

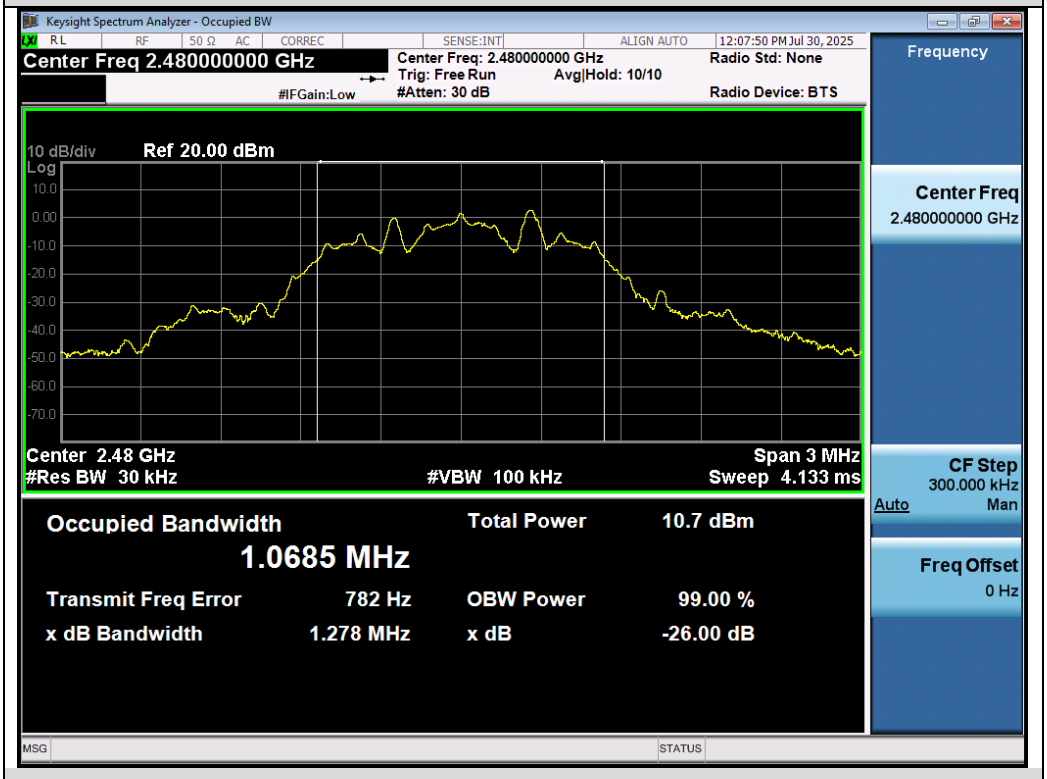
Test Graphs of Occupied Bandwidth



Test_Graph_GFSK_ANT1_2402_125Kbps_OBW

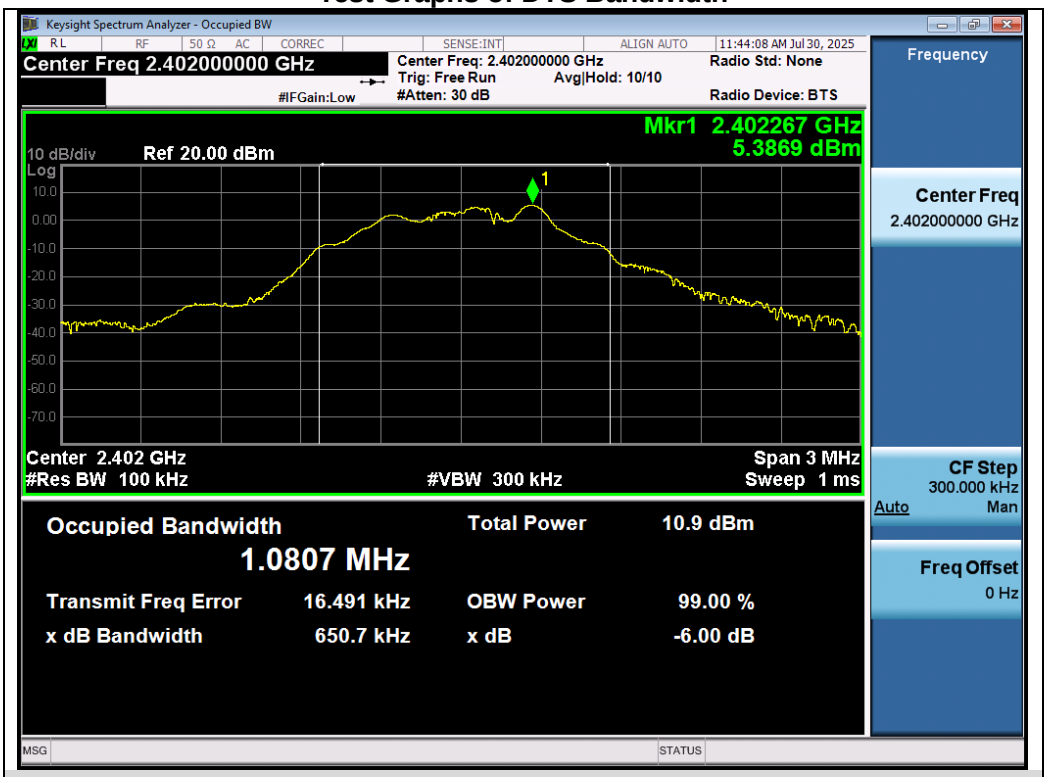


Test_Graph_GFSK_ANT1_2440_125Kbps_OBW

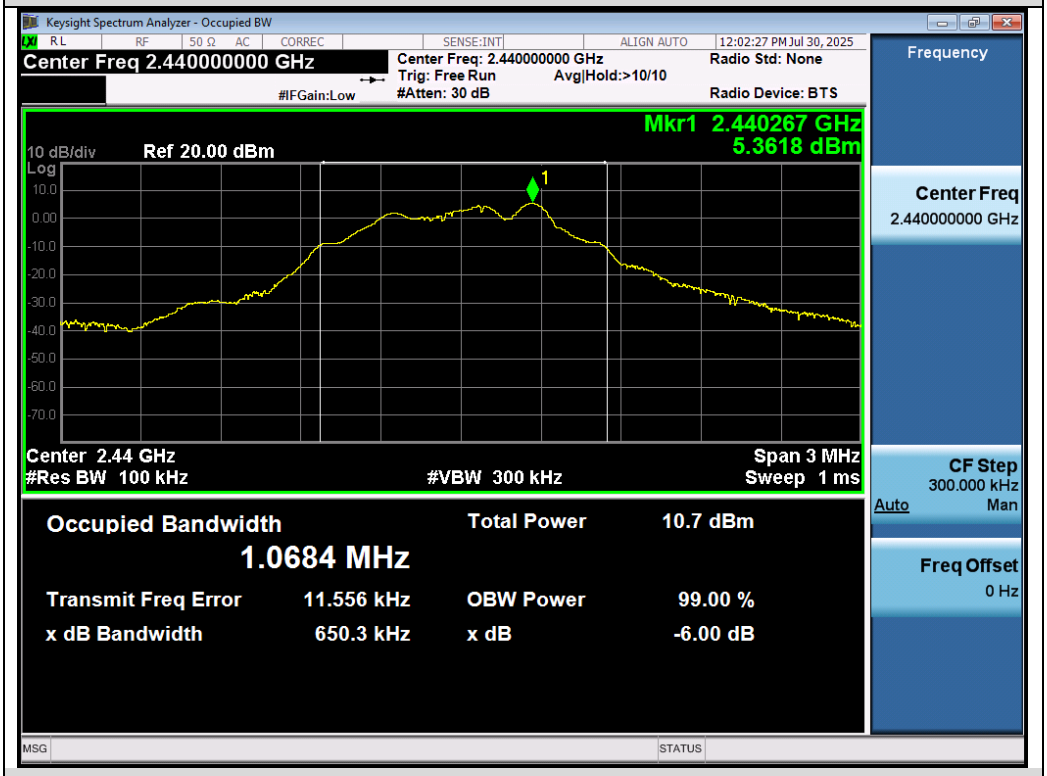


Test_Graph_GFSK_ANT1_2480_125Kbps_OBW

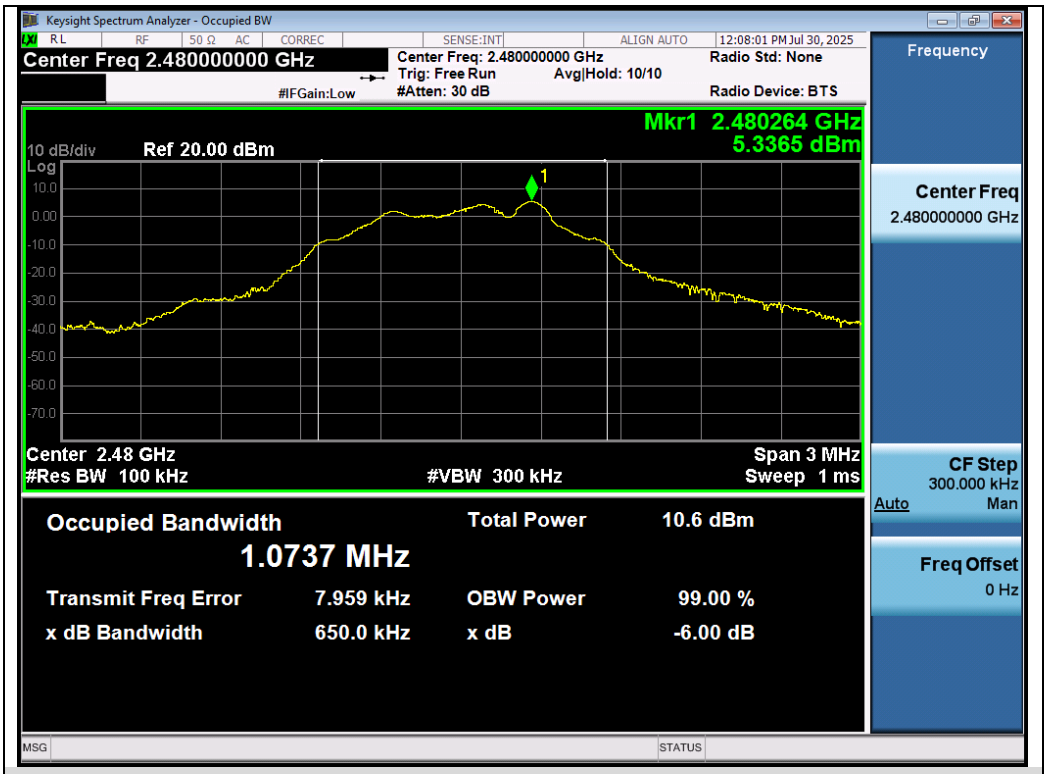
Test Graphs of DTS Bandwidth



Test_Graph_GFSK_ANT1_2402_125Kbps_DTSBW



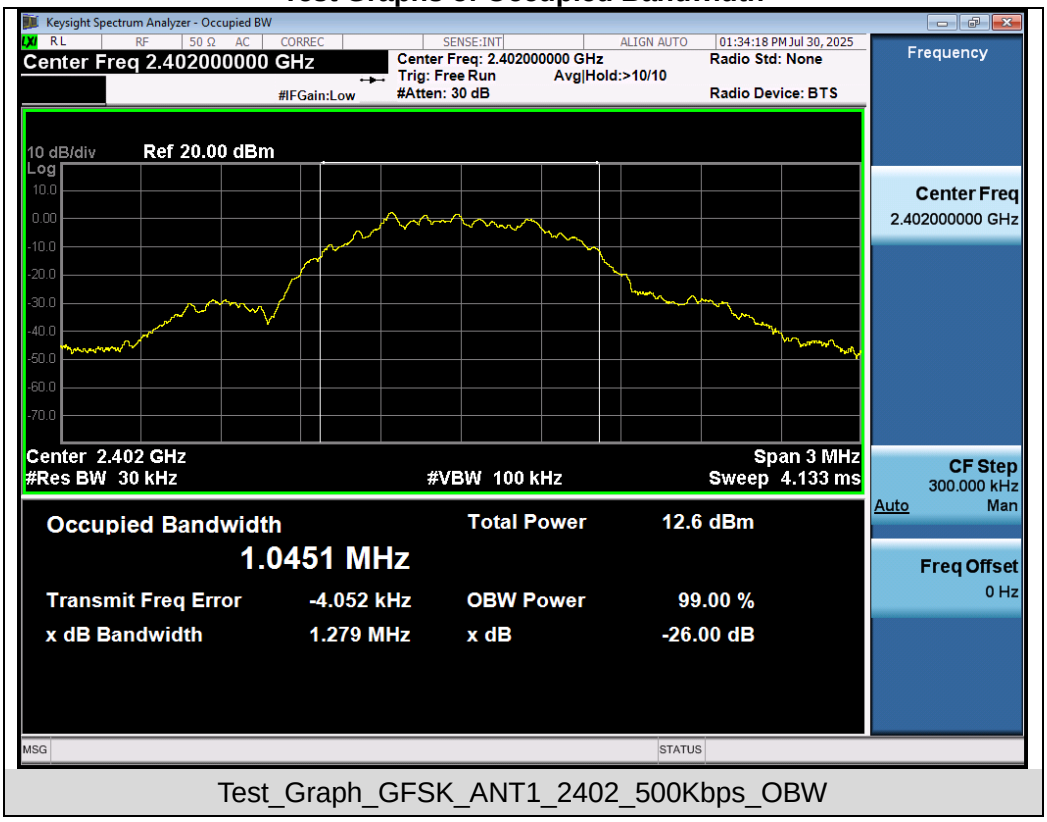
Test_Graph_GFSK_ANT1_2440_125Kbps_DTSBW



Test_Graph_GFSK_ANT1_2480_125Kbps_DTSBW

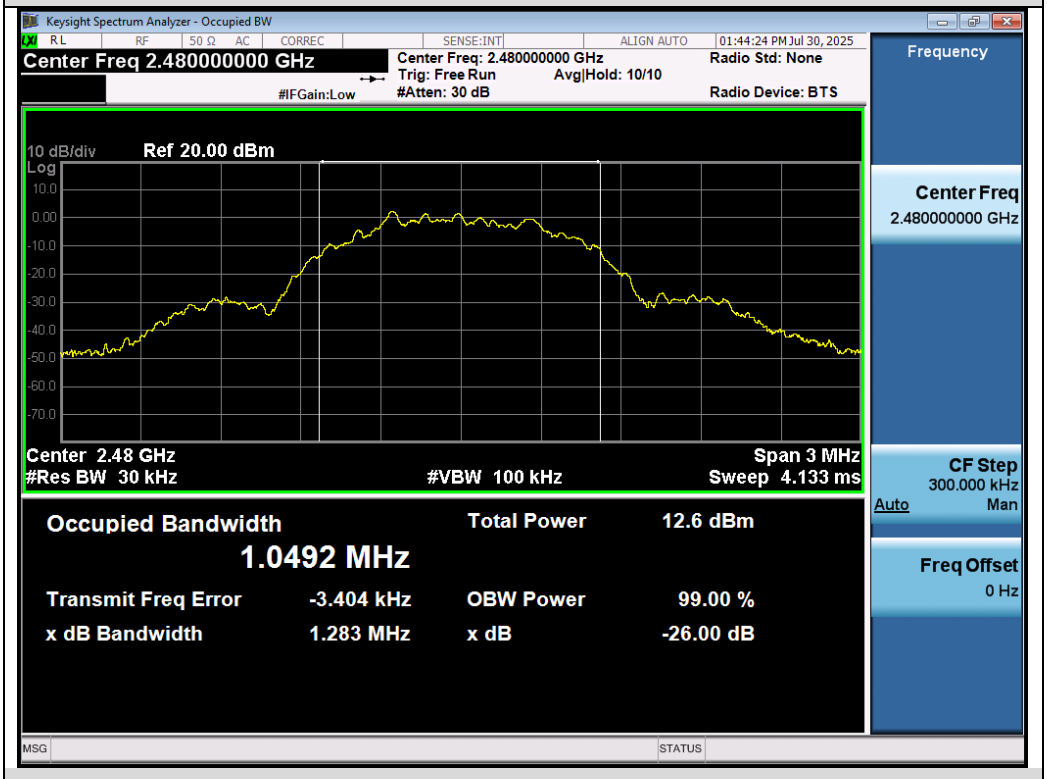
Test Data of Occupied Bandwidth and DTS Bandwidth					
Test Mode	Test Frequency (MHz)	Occupied Bandwidth (MHz)	DTS BW (MHz)	DTS BW Limits	Pass or Fail
GFSK_500Kbps	2402	1.045	0.705	⩾0.5	Pass
	2440	1.042	0.705	⩾0.5	Pass
	2480	1.049	0.712	⩾0.5	Pass

Test Graphs of Occupied Bandwidth



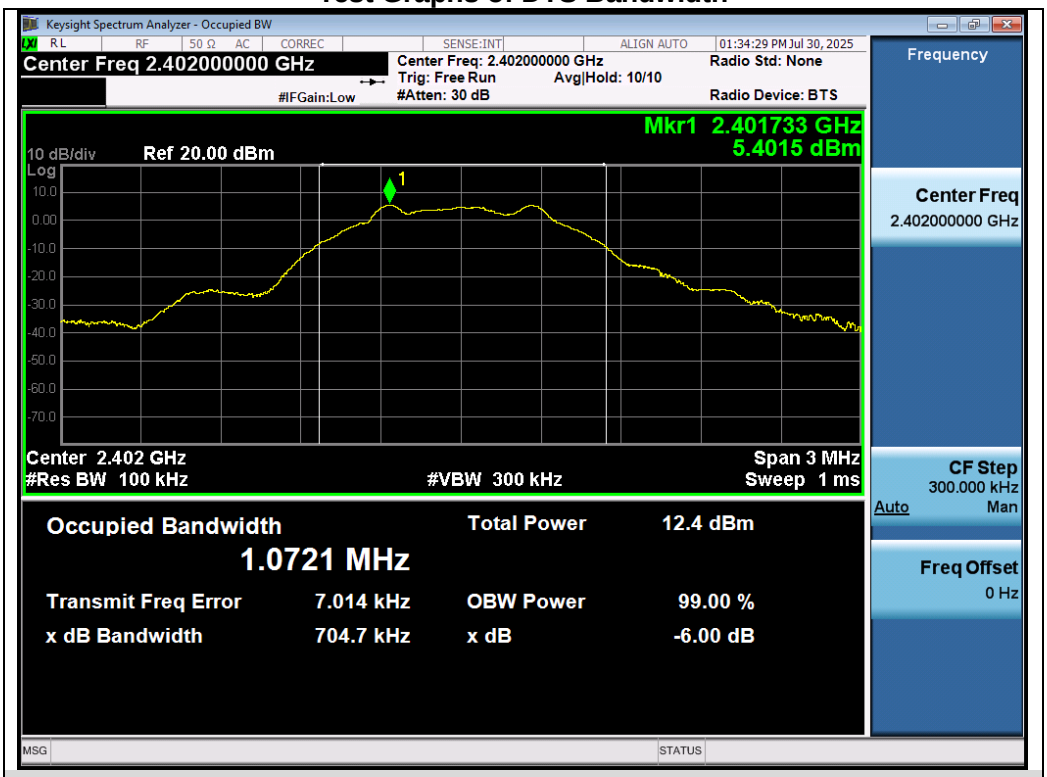
Test_Graph_GFSK_ANT1_2402_500Kbps_OBW

Test_Graph_GFSK_ANT1_2440_500Kbps_OBW

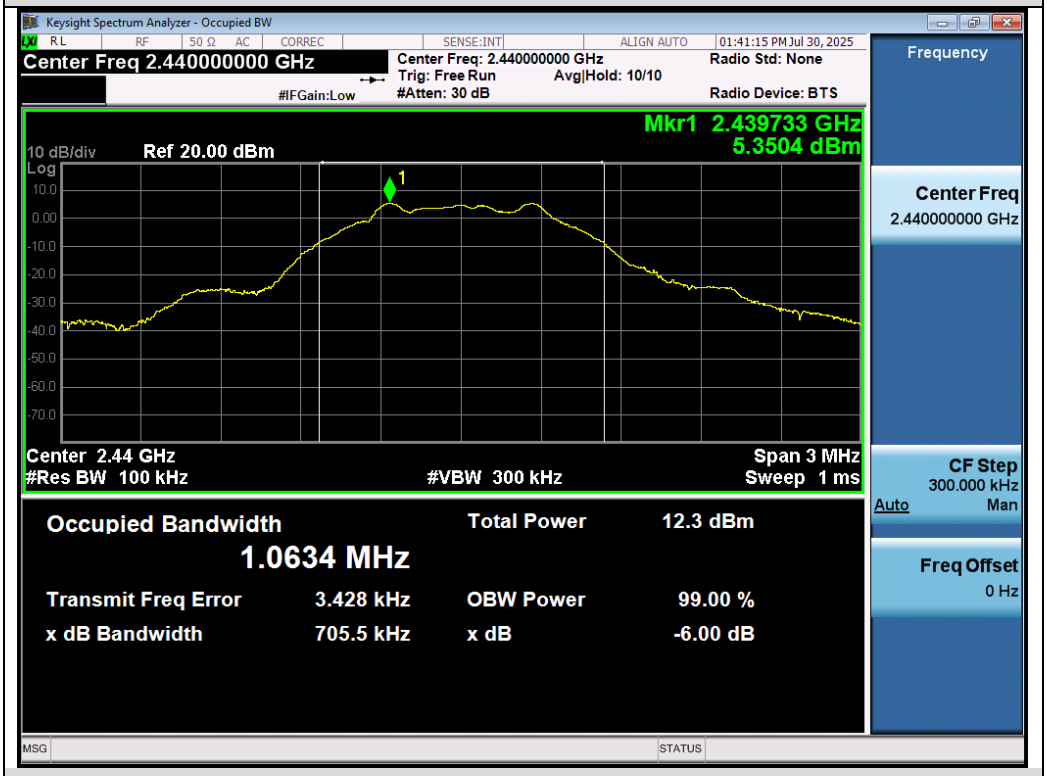


Test_Graph_GFSK_ANT1_2480_500Kbps_OBW

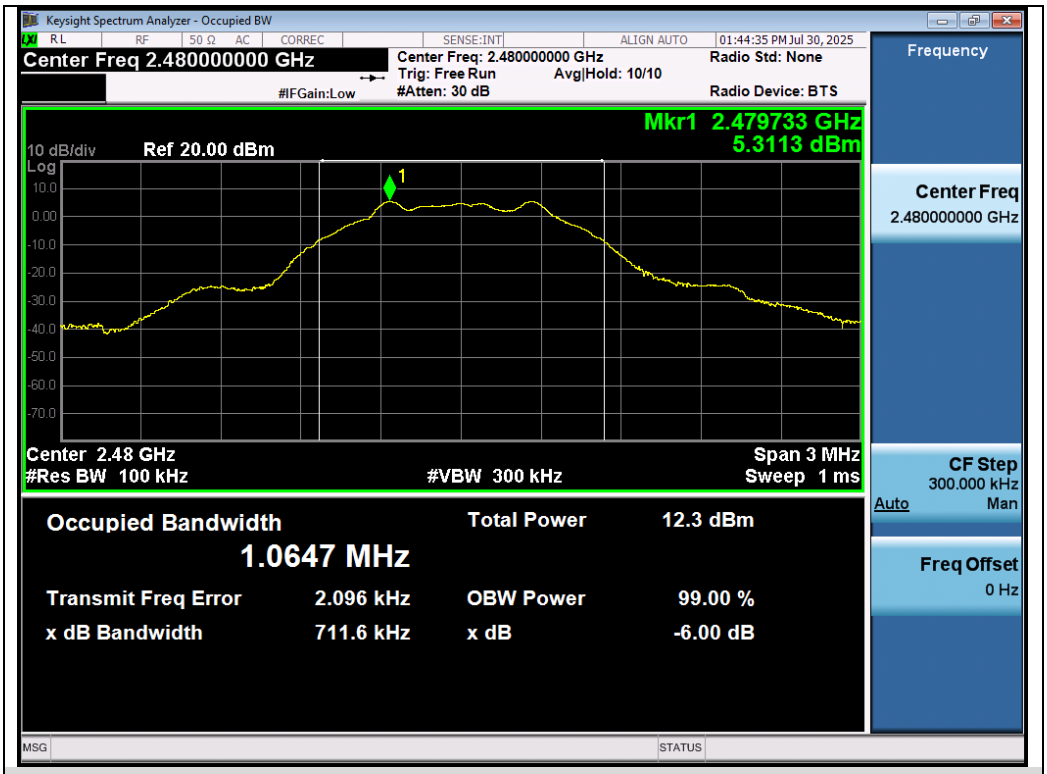
Test Graphs of DTS Bandwidth



Test_Graph_GFSK_ANT1_2402_500Kbps_DTSBW



Test_Graph_GFSK_ANT1_2440_500Kbps_DTSBW



Test_Graph_GFSK_ANT1_2480_500Kbps_DTSBW

9. Power Spectral Density Measurement

9.1 Provisions Applicable

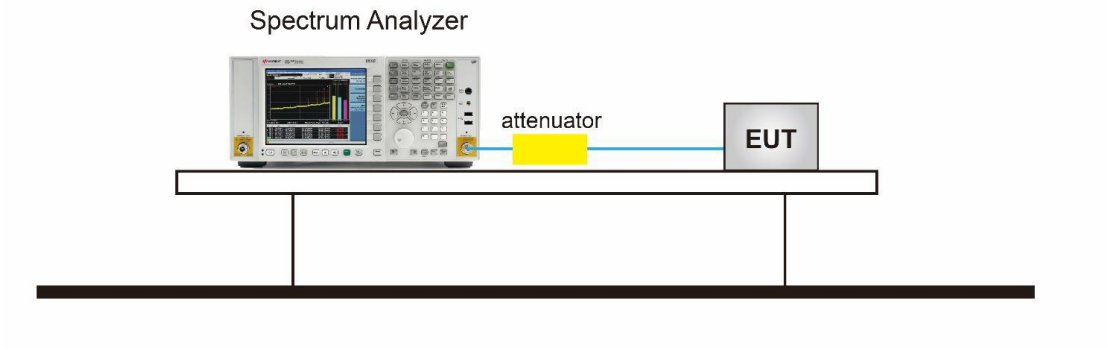
The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

9.2 Measurement Procedure

■ The testing follows the ANSI C63.10 Section 11.10.2 Method PKPSD.

1. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz in order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
4. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
5. Measure and record the results in the test report.
6. The Measured power density (dBm)/ 100kHz is a reference level and used as 20dBc down limit line for Conducted Band Edges and Conducted Spurious Emission.

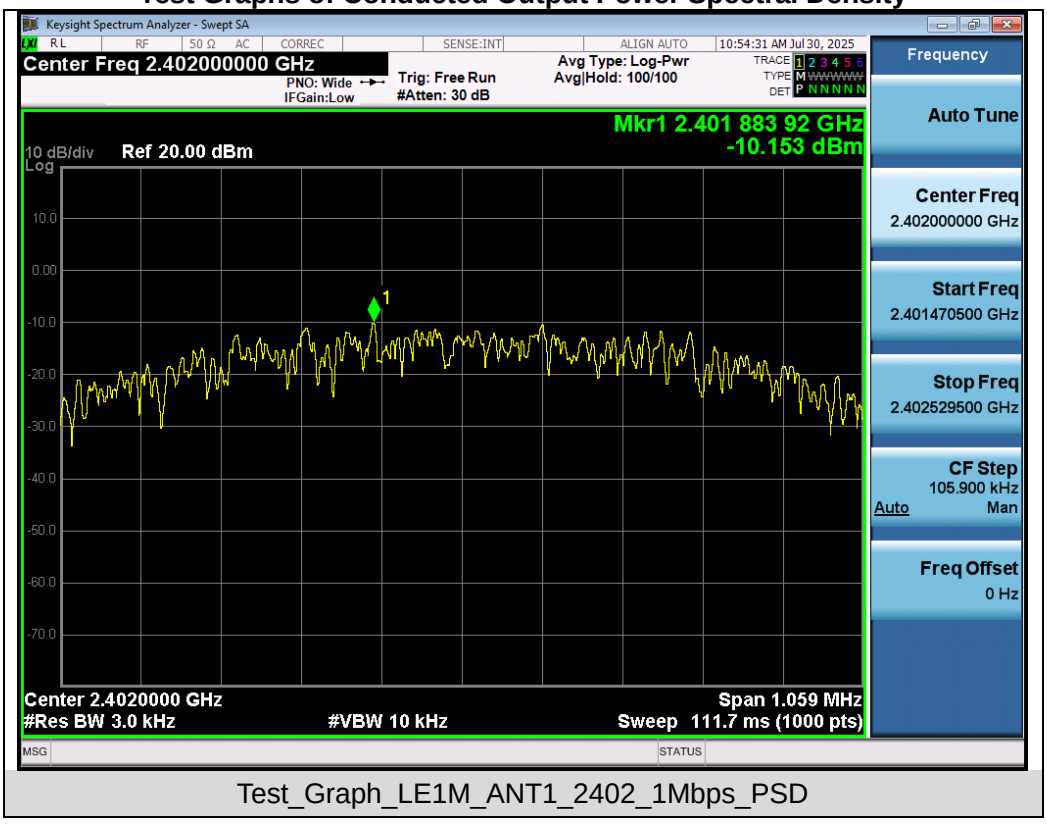
9.3 Measurement Setup (Block Diagram of Configuration)



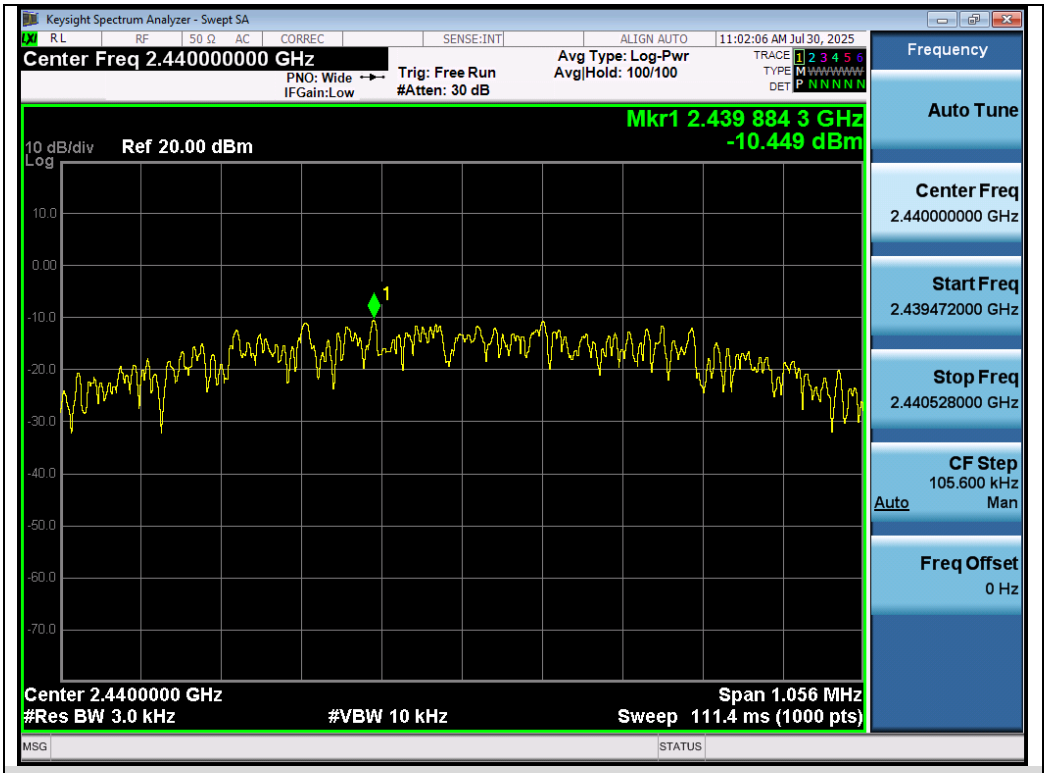
9.4 Measurement Results

Test Data of Conducted Output Power Spectral Density				
Test Mode	Test Frequency (MHz)	Power density (dBm/3kHz)	Limit (dBm/3kHz)	Pass or Fail
GFSK_1Mbps	2402	-10.153	≤8	Pass
	2440	-10.449	≤8	Pass
	2480	-10.379	≤8	Pass
GFSK_2Mbps	2402	-12.514	≤8	Pass
	2440	-12.740	≤8	Pass
	2480	-12.844	≤8	Pass

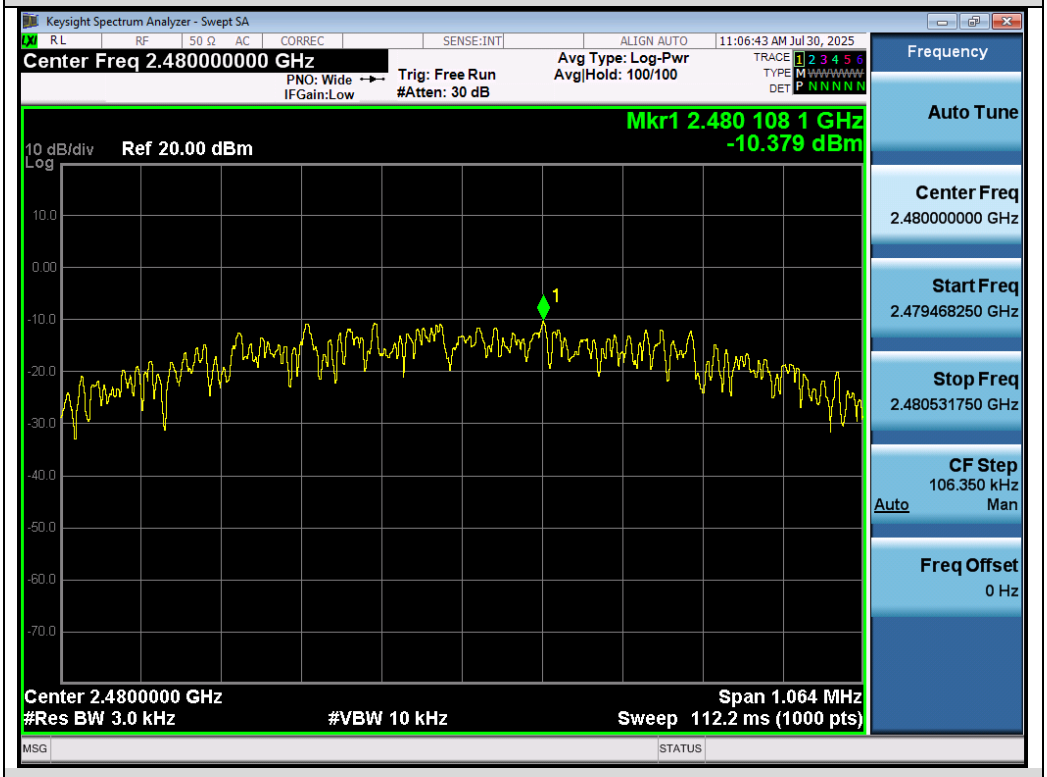
Test Graphs of Conducted Output Power Spectral Density



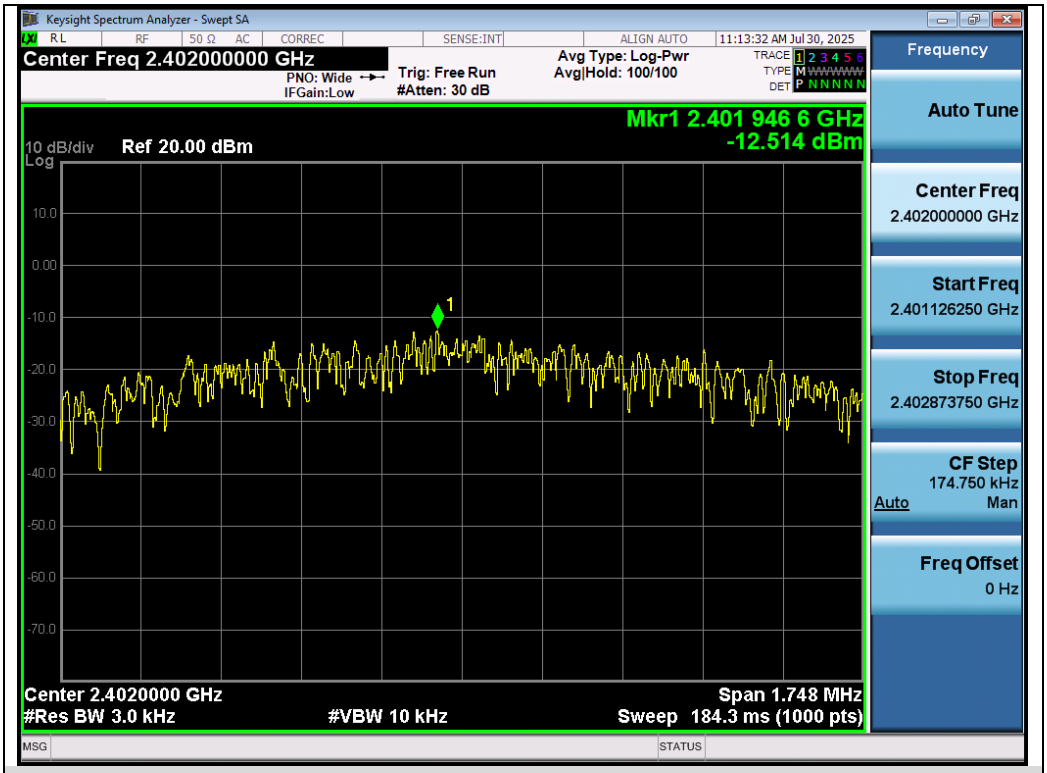
Test_Graph_LE1M_ANT1_2402_1Mbps_PSD



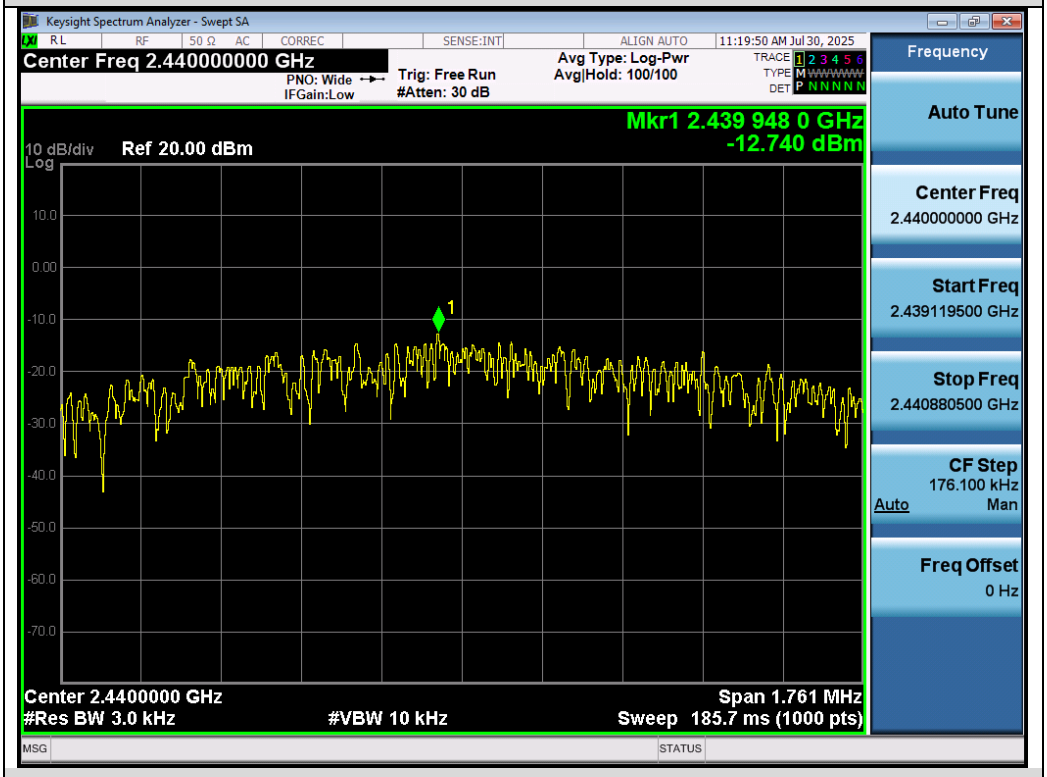
Test_Graph_LE1M_ANT1_2440_1Mbps_PSD



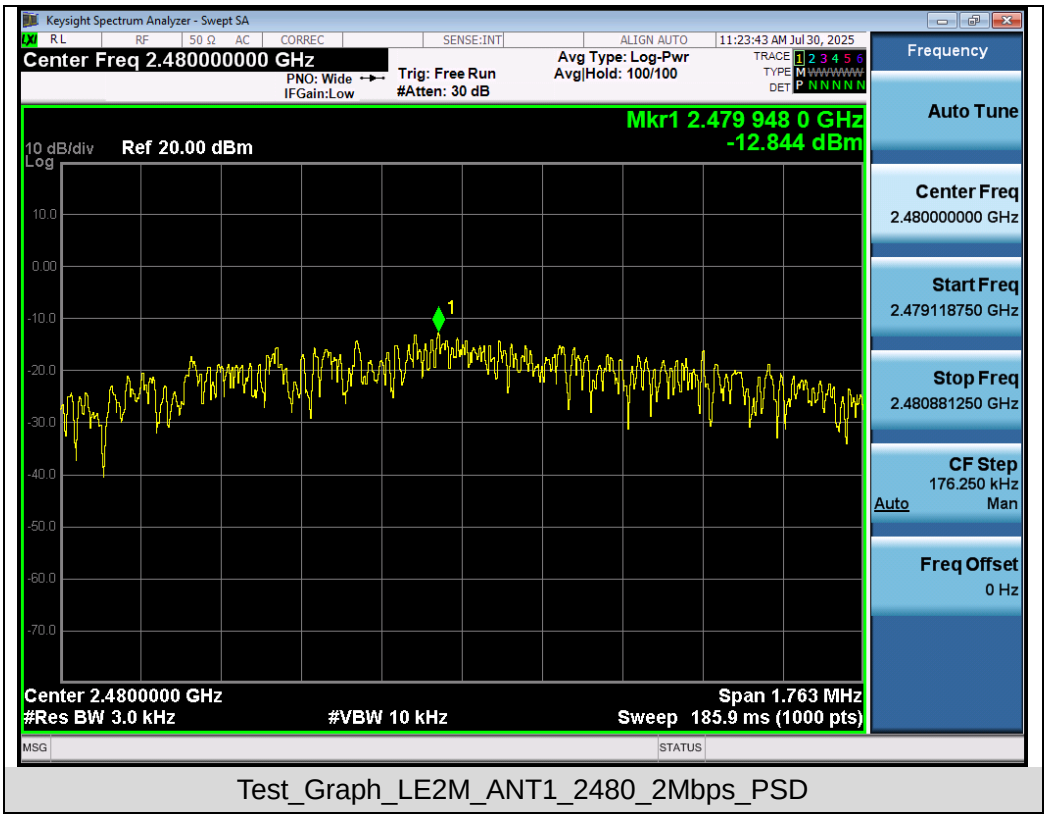
Test_Graph_LE1M_ANT1_2480_1Mbps_PSD



Test_Graph_LE2M_ANT1_2402_2Mbps_PSD



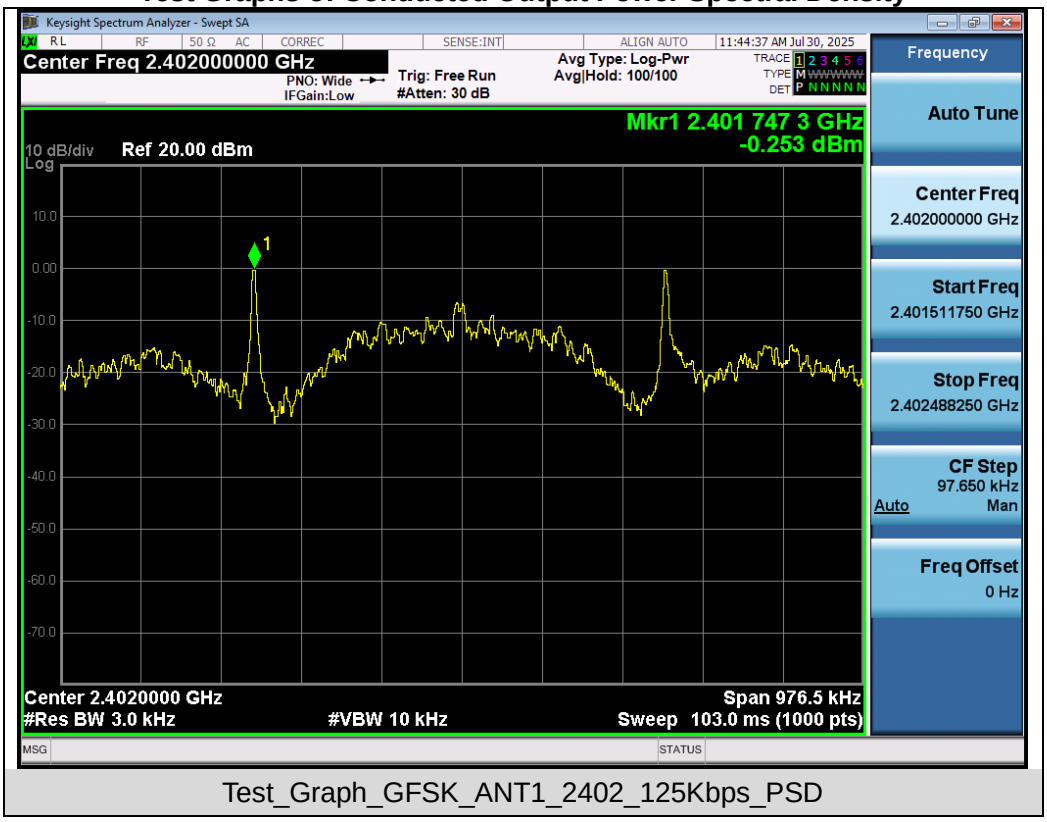
Test_Graph_LE2M_ANT1_2440_2Mbps_PSD



Test_Graph_LE2M_ANT1_2480_2Mbps_PSD

Test Data of Conducted Output Power Spectral Density				
Test Mode	Test Frequency (MHz)	Power density (dBm/3kHz)	Limit (dBm/3kHz)	Pass or Fail
GFSK_125Kbps	2402	-0.253	≤8	Pass
	2440	-0.349	≤8	Pass
	2480	-0.358	≤8	Pass

Test Graphs of Conducted Output Power Spectral Density



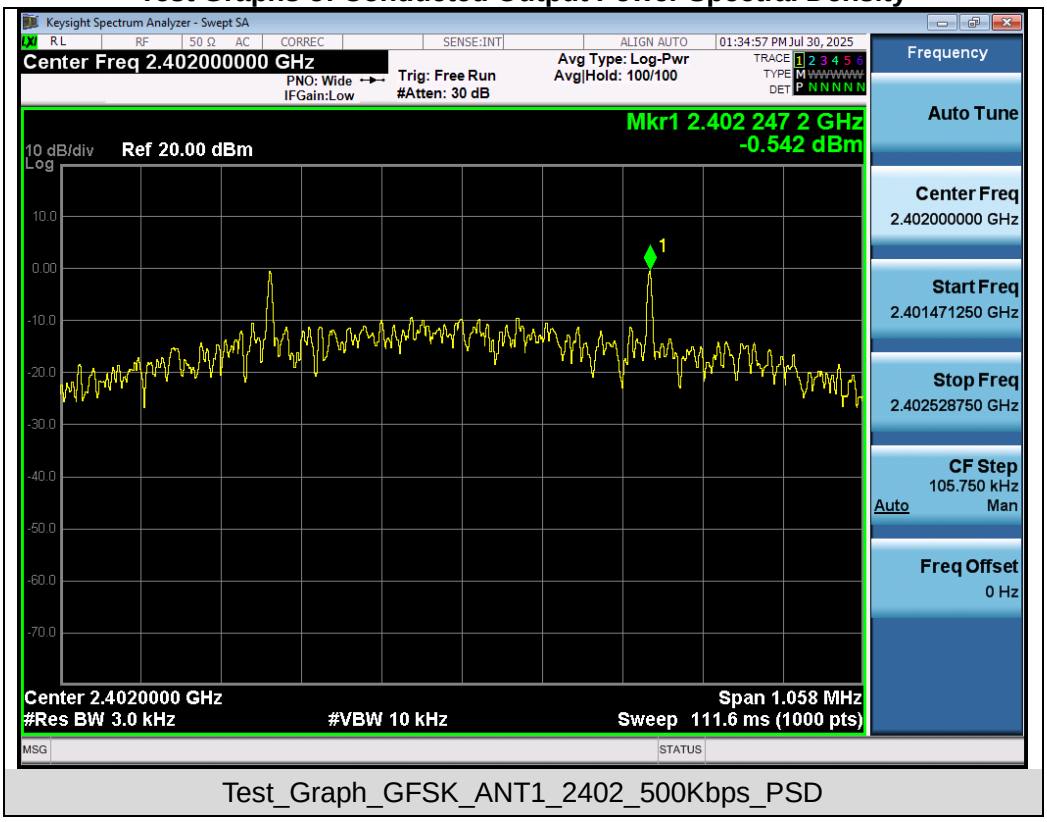
Test_Graph_GFSK_ANT1_2402_125Kbps_PSD

Test_Graph_GFSK_ANT1_2440_125Kbps_PSD

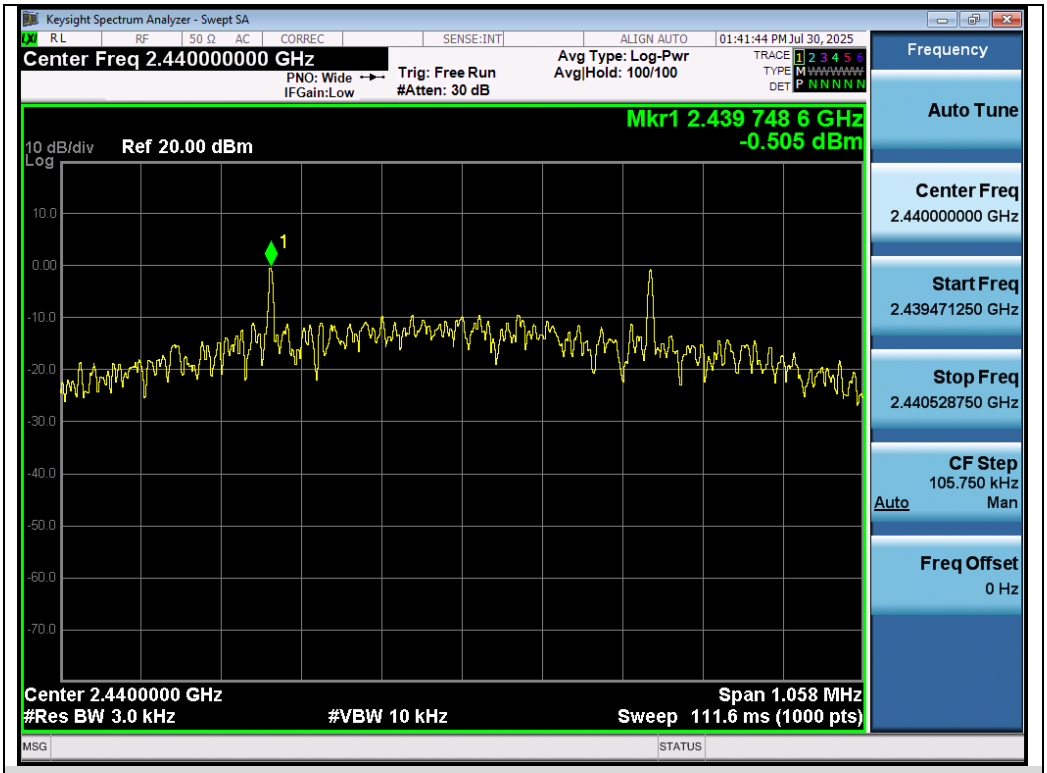
Test_Graph_GFSK_ANT1_2480_125Kbps_PSD

Test Data of Conducted Output Power Spectral Density				
Test Mode	Test Frequency (MHz)	Power density (dBm/3kHz)	Limit (dBm/3kHz)	Pass or Fail
GFSK_500Kbps	2402	-0.542	≤8	Pass
	2440	-0.505	≤8	Pass
	2480	-0.522	≤8	Pass

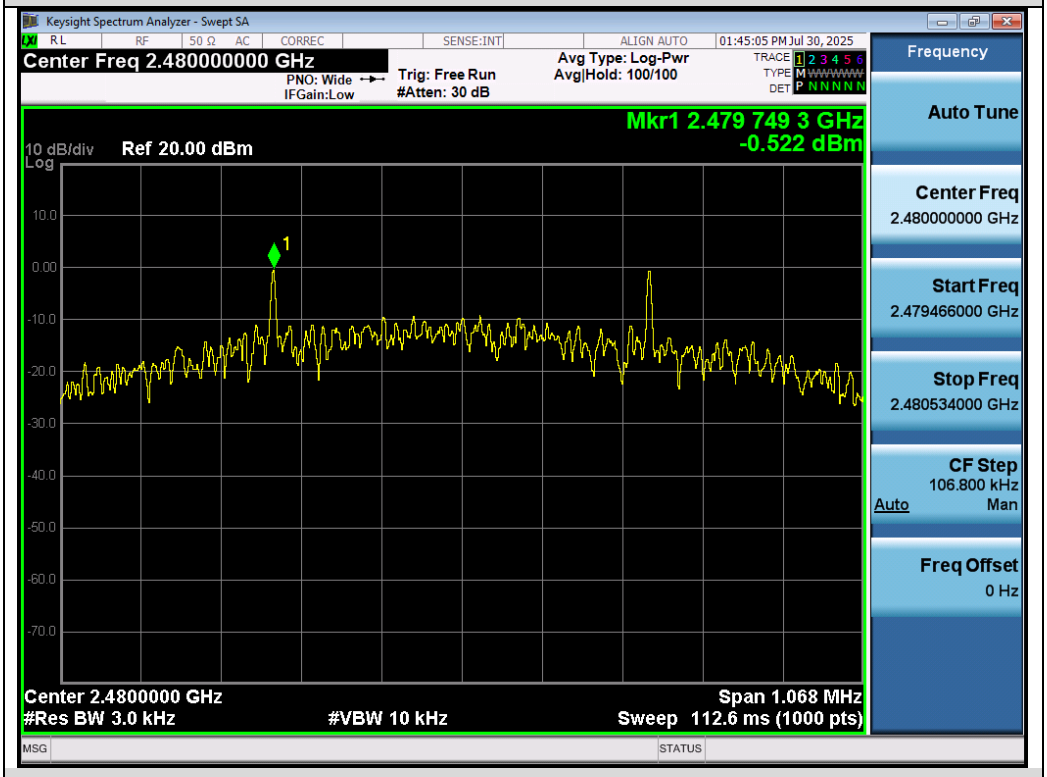
Test Graphs of Conducted Output Power Spectral Density



Test_Graph_GFSK_ANT1_2402_500Kbps_PSD



Test_Graph_GFSK_ANT1_2440_500Kbps_PSD



Test_Graph_GFSK_ANT1_2480_500Kbps_PSD

10. Conducted Band Edge and Out-of-Band Emissions

10.1 Provisions Applicable

The limit for out-of-band spurious emissions at the band edge is 20dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100kHz bandwidth per the PSD procedure.

10.2 Measurement Procedure

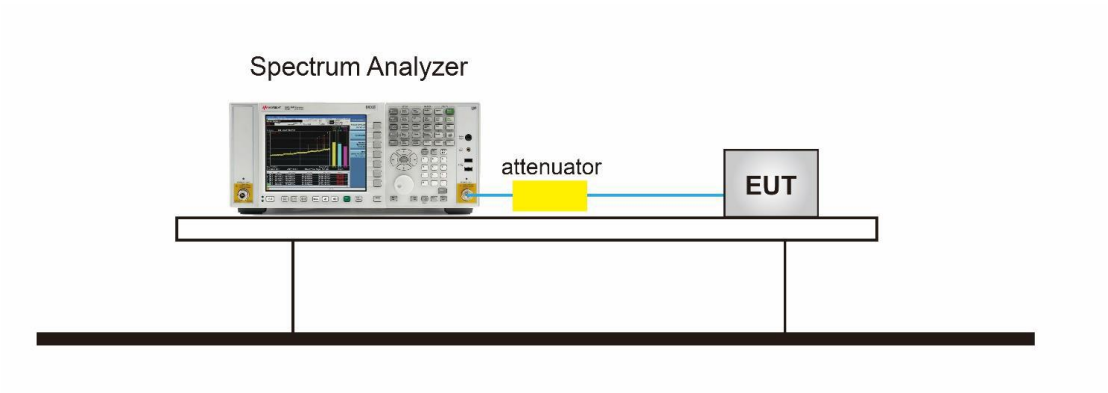
- Reference level measurement

1. Set instrument center frequency to DTS channel center frequency
2. Set the span to ≥ 1.5 times the DTS bandwidth
3. Set the RBW = 100 kHz
4. Set the VBW ≥ 3 x RBW
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. Allow trace to fully stabilize
9. Input compensation coefficient (dB) = Cable Loss (dB) + Attenuator attenuation value (dB)

- Emission level measurement

1. Set the center frequency and span to encompass frequency range to be measured
2. RBW = 100kHz
3. VBW = 300kHz
4. Detector = Peak
5. Trace mode = max hold
6. Sweep time = auto couple
7. The trace was allowed to stabilize
8. Input compensation coefficient (dB) = Cable Loss (dB) + Attenuator attenuation value (dB)

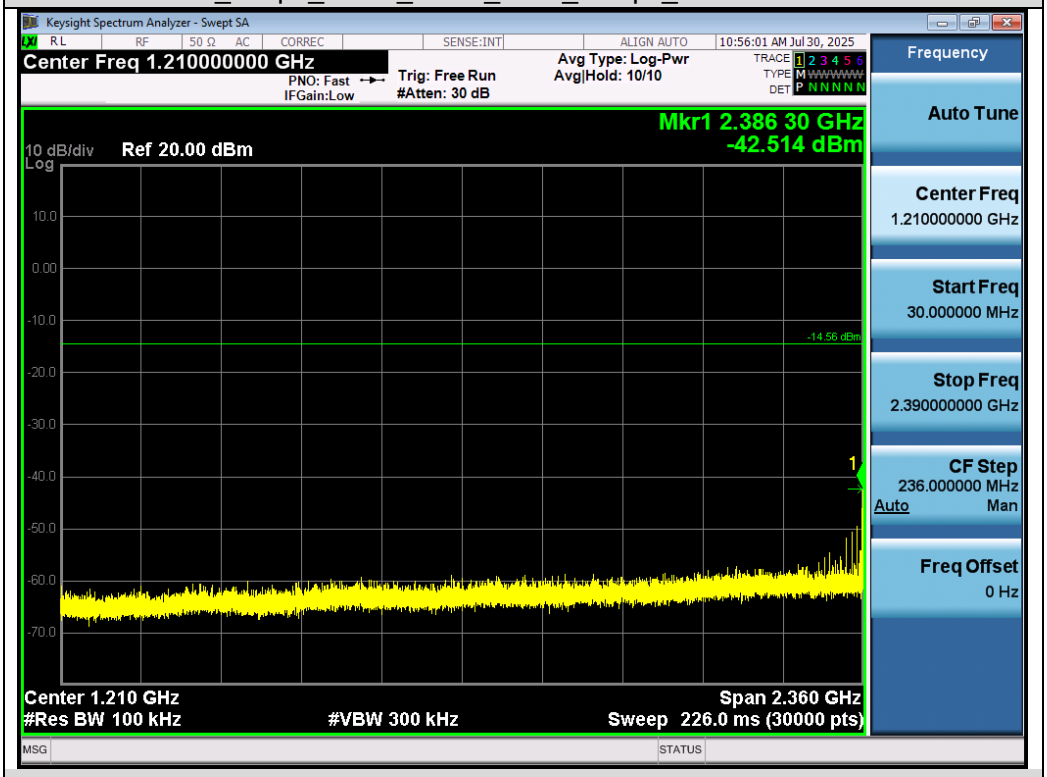
10.3 Measurement Setup (Block Diagram of Configuration)



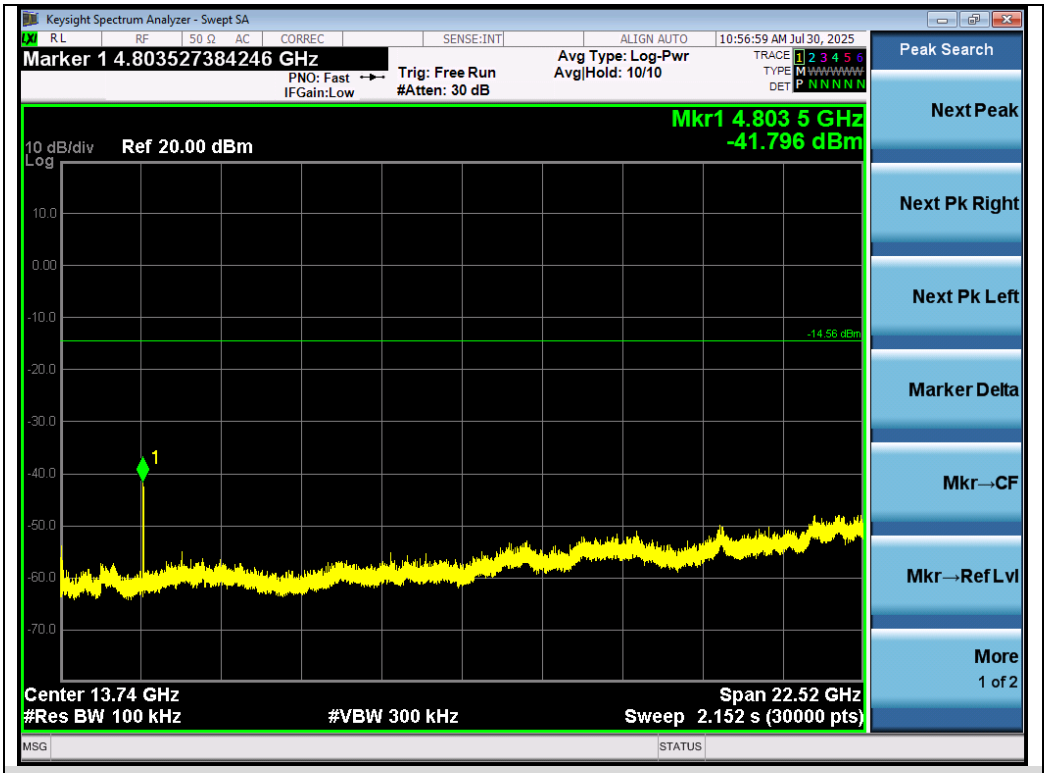
10.4 Measurement Results

Test Graphs of Spurious Emissions in Non-Restricted Frequency Bands

Test_Graph_LE1M_ANT1_2402_1Mbps_Reference Level

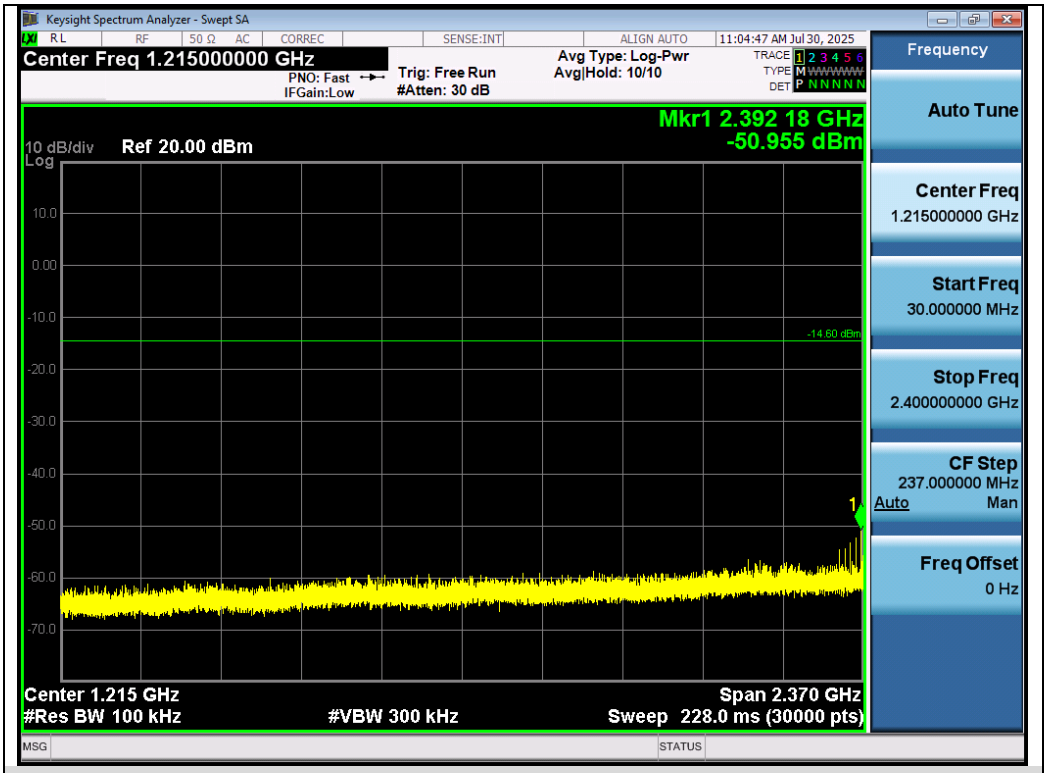


Test_Graph_LE1M_ANT1_2402_1Mbps_Lower Band Emissions



Test_Graph_LE1M_ANT1_2402_1Mbps_Higher Band Emissions

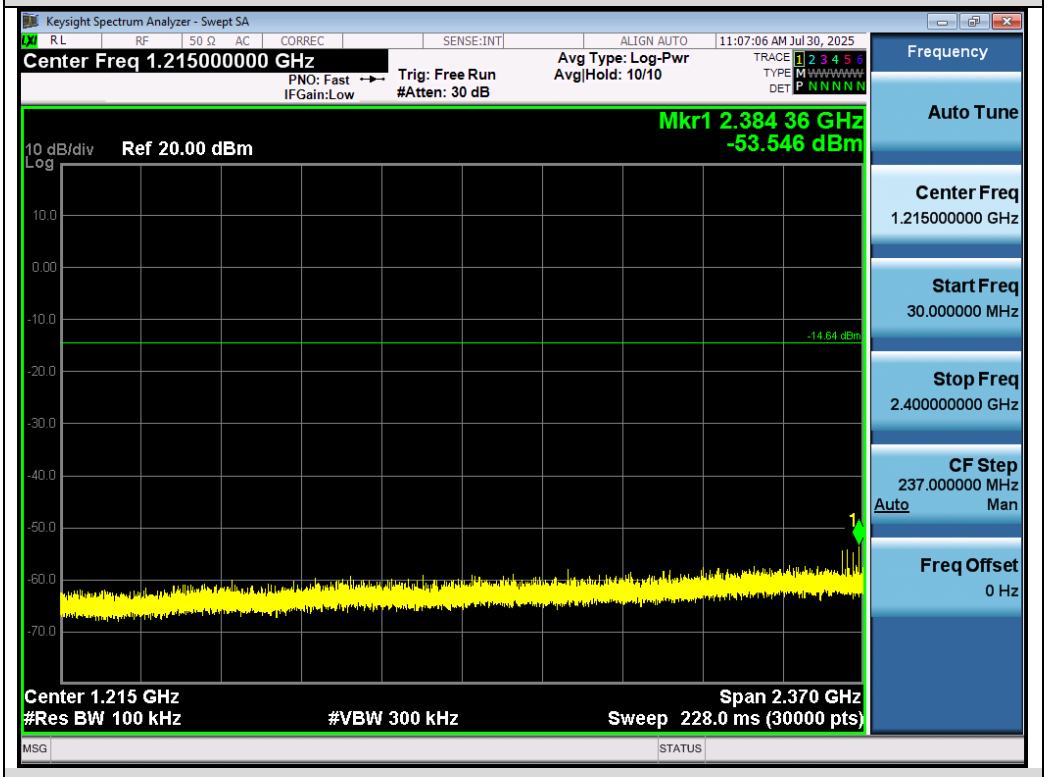
Test_Graph_LE1M_ANT1_2440_1Mbps_Reference Level



Test_Graph_LE1M_ANT1_2440_1Mbps_Lower Band Emissions

Test_Graph_LE1M_ANT1_2440_1Mbps_Higher Band Emissions

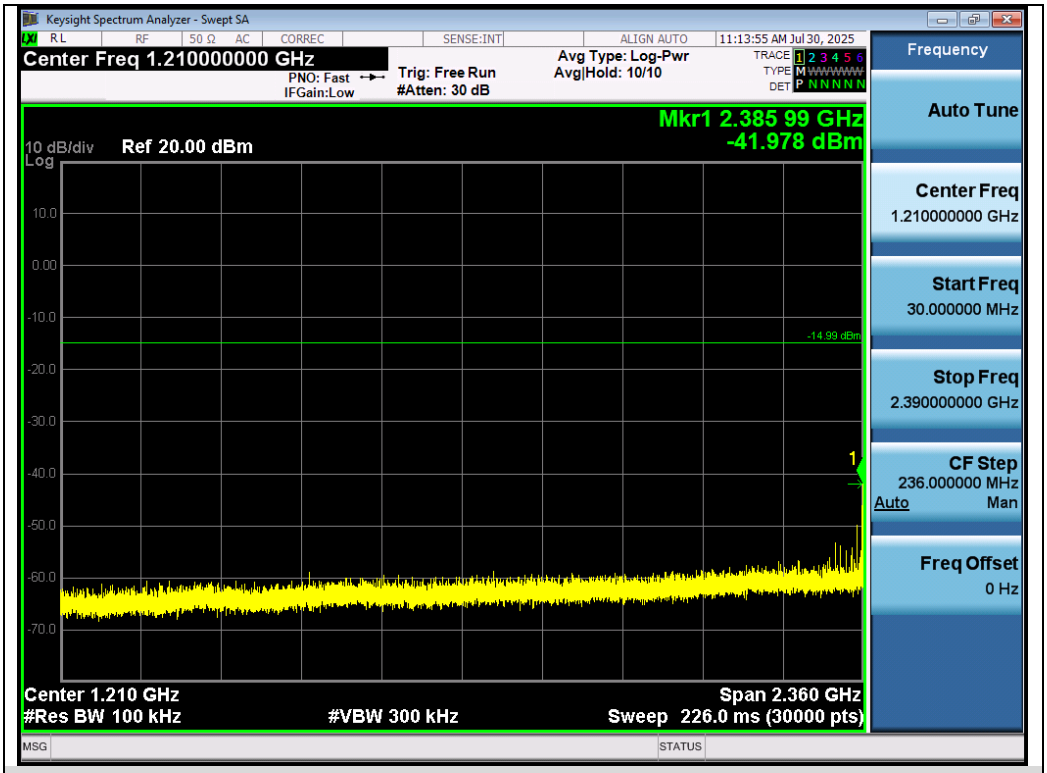
Test_Graph_LE1M_ANT1_2480_1Mbps_Reference Level



Test_Graph_LE1M_ANT1_2480_1Mbps_Lower Band Emissions

Test_Graph_LE1M_ANT1_2480_1Mbps_Higher Band Emissions

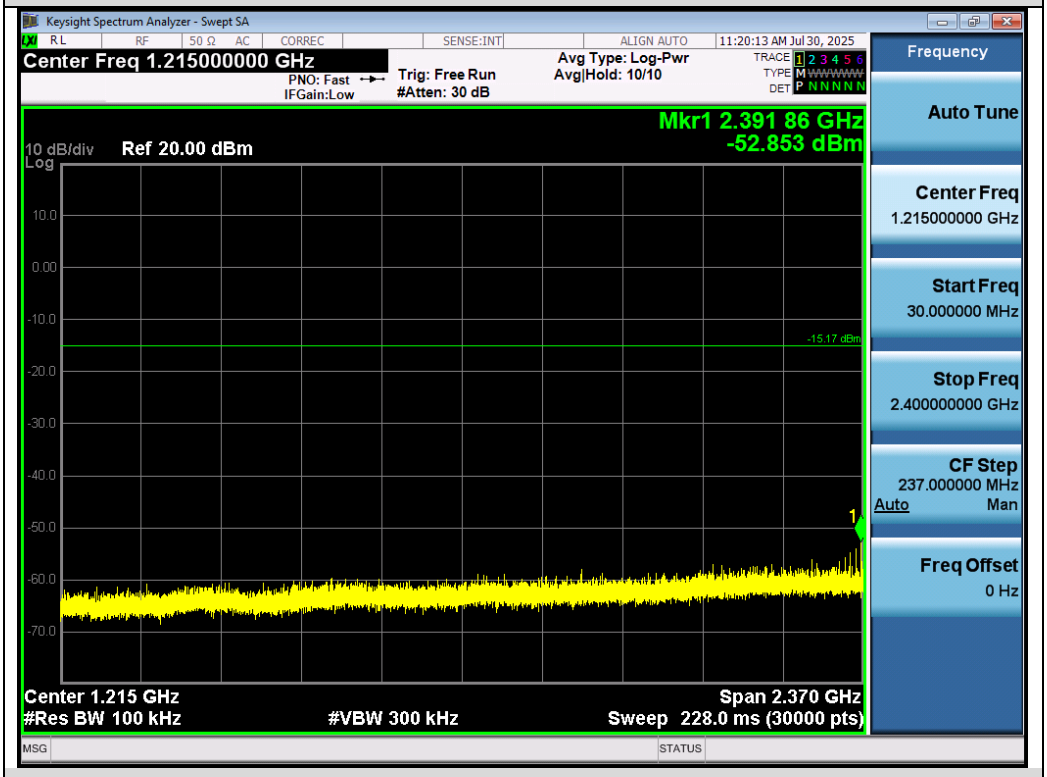
Test_Graph_LE2M_ANT1_2402_2Mbps_Reference Level



Test_Graph_LE2M_ANT1_2402_2Mbps_Lower Band Emissions

Test_Graph_LE2M_ANT1_2402_2Mbps_Higher Band Emissions

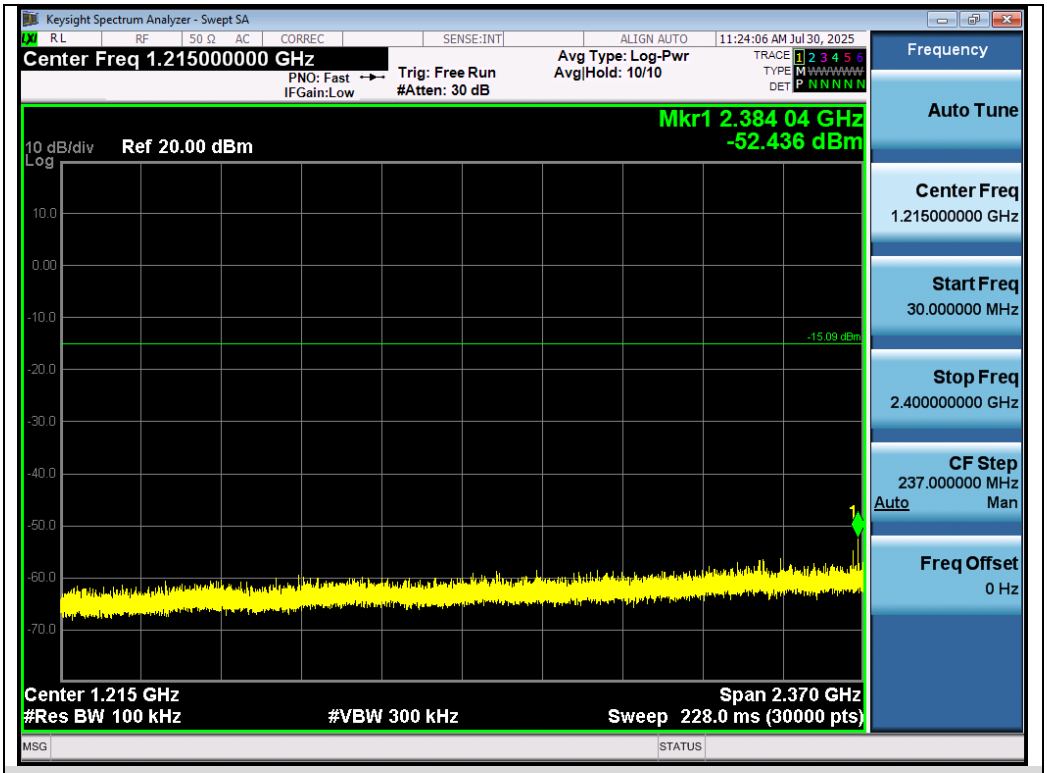
Test_Graph_LE2M_ANT1_2440_2Mbps_Reference Level



Test_Graph_LE2M_ANT1_2440_2Mbps_Lower Band Emissions

Test_Graph_LE2M_ANT1_2440_2Mbps_Higher Band Emissions

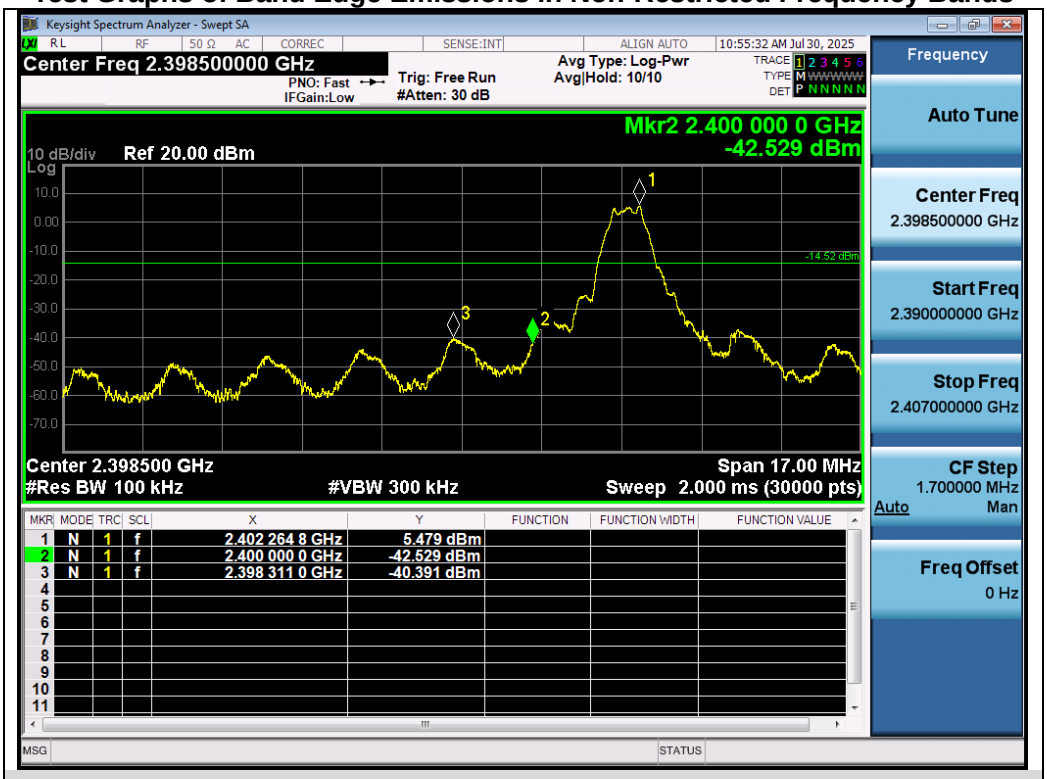
Test_Graph_LE2M_ANT1_2480_2Mbps_Reference Level



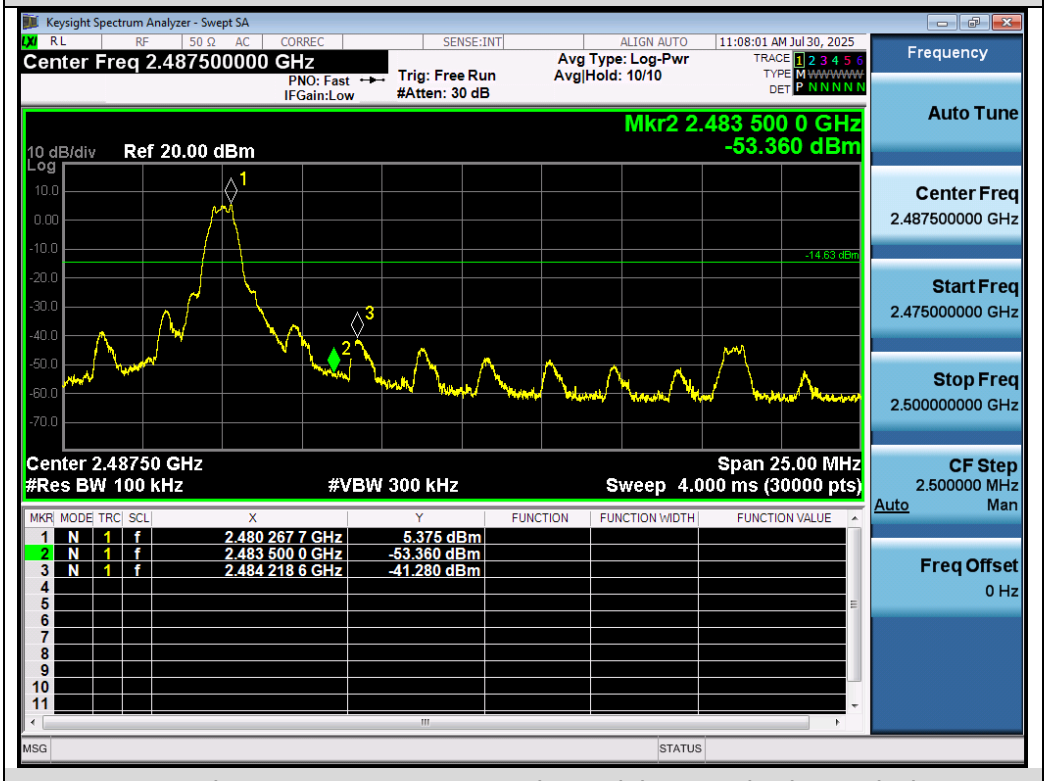
Test_Graph_LE2M_ANT1_2480_2Mbps_Lower Band Emissions

Test_Graph_LE2M_ANT1_2480_2Mbps_Higher Band Emissions

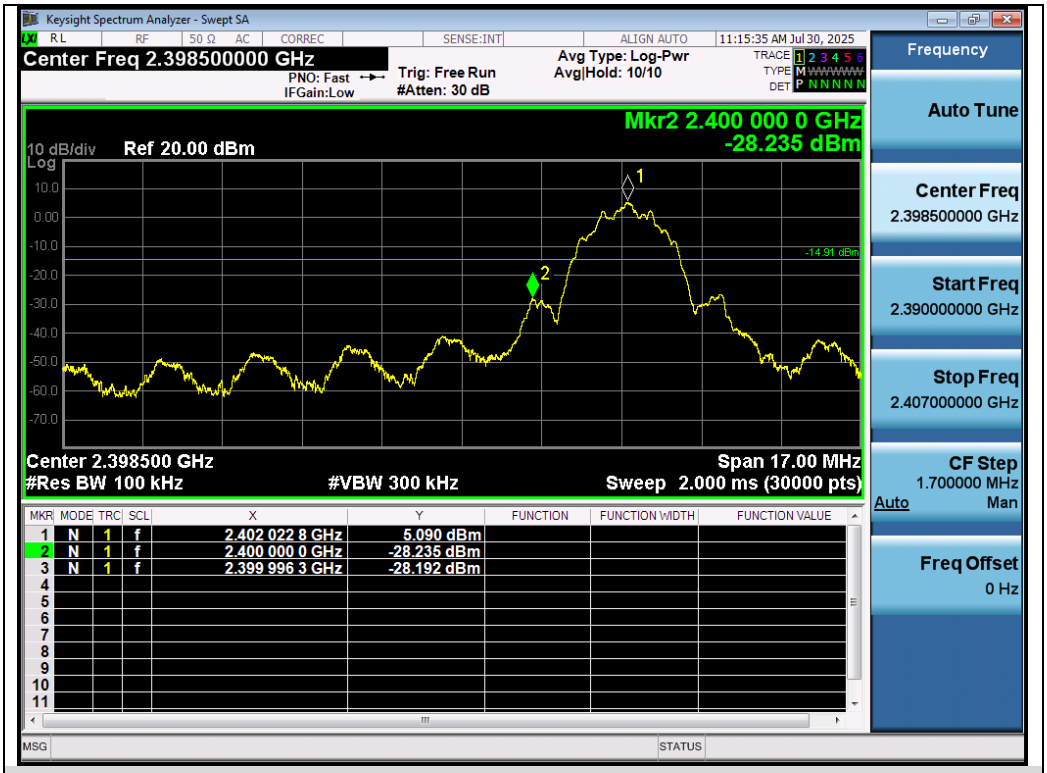
Test Graphs of Band Edge Emissions in Non-Restricted Frequency Bands



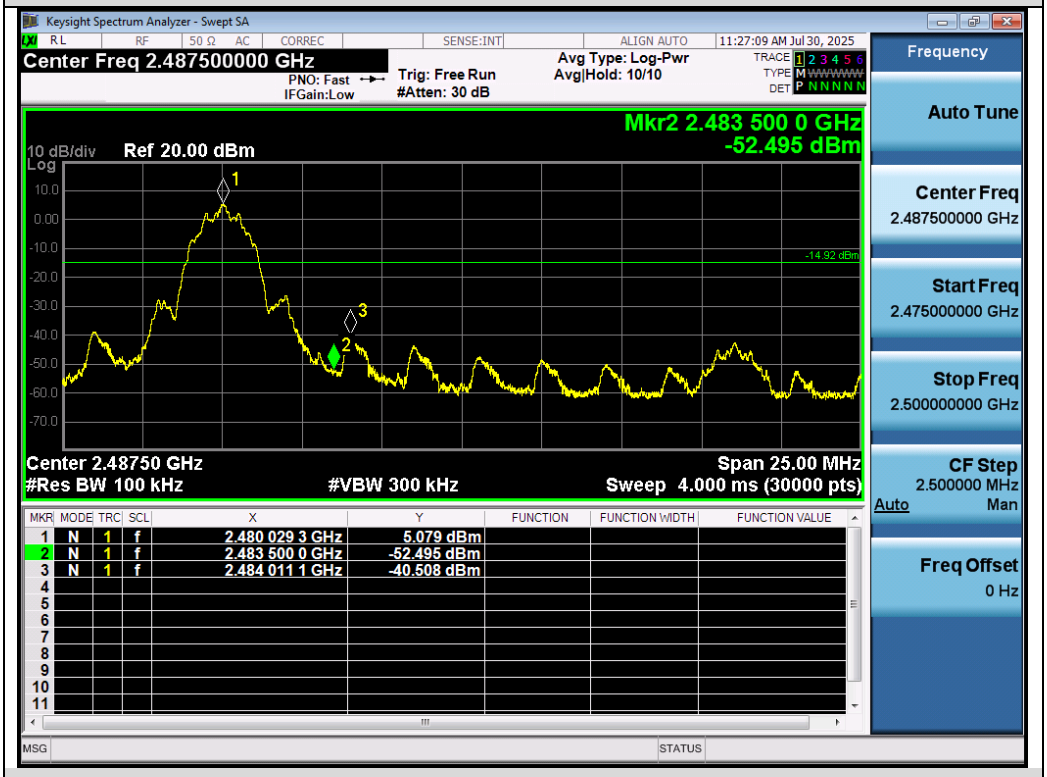
Test_Graph_LE1M_ANT1_2402_1Mbps_Lower Band Edge Emissions



Test_Graph_LE1M_ANT1_2480_1Mbps_Higher Band Edge Emissions



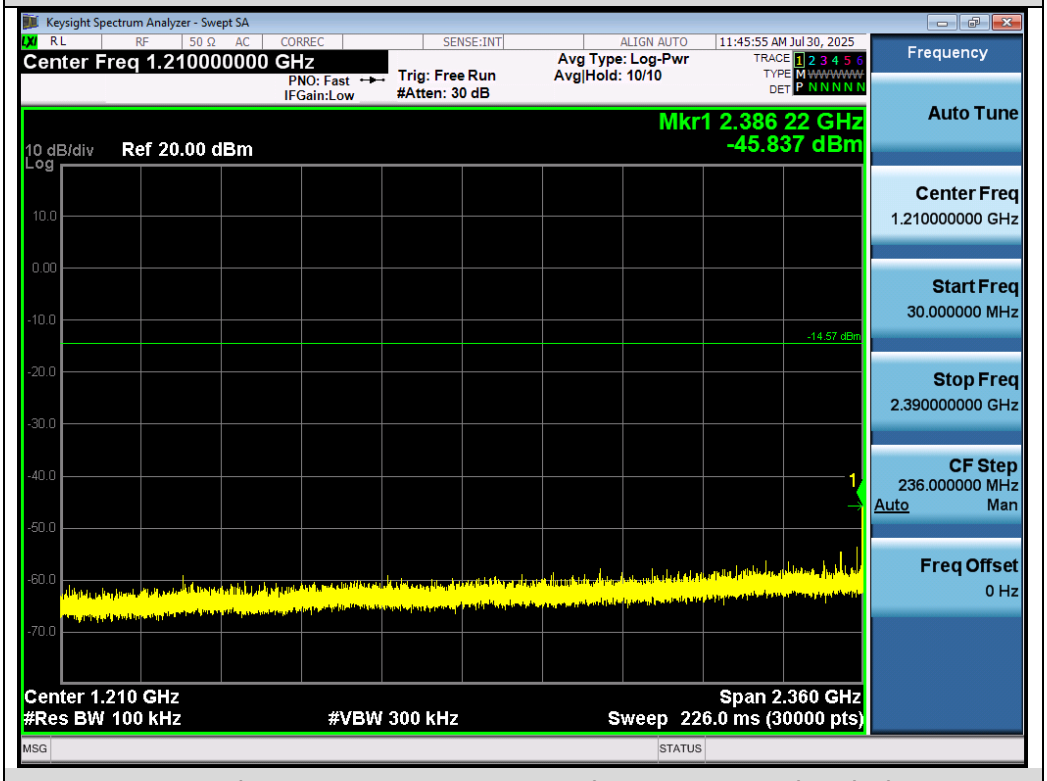
Test_Graph_LE2M_ANT1_2402_2Mbps_Lower Band Edge Emissions



Test_Graph_LE2M_ANT1_2480_2Mbps_Higher Band Edge Emissions

Test Graphs of Spurious Emissions in Non-Restricted Frequency Bands

Test_Graph_GFSK_ANT1_2402_125Kbps_Reference Level



Test_Graph_GFSK_ANT1_2402_125Kbps_Lower Band Emissions

Test_Graph_GFSK_ANT1_2402_125Kbps_Higher Band Emissions

Test_Graph_GFSK_ANT1_2440_125Kbps_Reference Level