CERTIFICATION TEST REPORT

Report Number. : 4790406778-E5V3

Applicant : SAMSUNG ELECTRONICS CO., LTD.
129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,
GYEONGGI-DO, 16677, KOREA

Model : SM-A236B/DSN

FCC ID : A3LSMA236BN

EUT Description : GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac and NFC

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C

Date Of Issue:
2022-07-07

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IAS
ACCREDITED
TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2022-06-29	Initial issue	Sungeun Lee
V2	2022-07-06	Updated to address TCB's question	Sungeun Lee
V3	2022-07-07	Updated to address TCB's question	Sungeun Lee

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION:	GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac and NFC
MODEL:	SM-A236B/DSN
SERIAL NUMBER:	R3CT506PHRL (CONDUCTED); R3CT506PD1T, R3CT506PDCD (RADIATED);
DATE TESTED:	2022-05-12 ~ 2022-06-29

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Complies

UL Korea, Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Korea, Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by IAS, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL Korea, Ltd. By:

Seokhwan Hong
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:

Sungeun Lee
Suwon Lab Engineer
UL Korea, Ltd.

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with following methods.

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. KDB 558074 D01 15.247 Meas Guidance v05r02.
4. ANSI C63.10-2013.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea. Line conducted emissions are measured only at the 218 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

218 Maeyeong-ro
☒ Chamber 1(3m semi-anechoic chamber)
☒ Chamber 2(3m semi-anechoic chamber)
☒ Chamber 3(3m semi-anechoic chamber)
☐ Chamber 4(3m Full-anechoic chamber)
☐ Chamber 5(3m Full-anechoic chamber)

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at https://www.iasonline.org/wp-content/uploads/2017/05/TL-637-cert-New.pdf.

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4. DECISION RULES AND MEASUREMENT UNCERTAINTY

4.1. METROLOGICAL TRACEABILITY

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.02 dB
Radiated Disturbance, 30 MHz to 1 GHz	4.05 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.78 dB
Radiated Disturbance, 18 GHz to 40 GHz	5.58 dB

Uncertainty figures are valid to a confidence level of 95%.

4.4. DECISION RULES

Decision rule for statement(s) of conformity is based on Procedure 2, Clause 4.4.3 in IEC Guide 115:2007.

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5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

The EUT is a GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac and NFC.
This test report addresses the BT(DSS) operational mode.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range [MHz]	Mode	Power Mode	Output Power [dBm]	Output Power [mW]
2 402 ~ 2 480	Basic GFSK	Peak	**17.649**	**58.197**
		Average	17.395	54.891
	Enhanced Pi/4-DPSK	Peak	14.710	29.580
		Average	12.766	18.906
	Enhanced 8PSK	Peak	15.279	33.721
		Average	12.886	19.436

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 shall be considered sufficient to comply with the provisions of this section.

The internal antenna was Permanently attached.
Therefore this E.U.T Complies with the requirement of §15.203.

The radio utilizes an internal antennas with ANT maximum gain of -4.70 dBi

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5.4. WORST-CASE CONFIGURATION AND MODE

Radiated emission below 1GHz and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Radiated emission above 1GHz was performed with the EUT set to transmit low/mid/high channels.

The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

GFSK, Pi/4-DQPSK, 8PSK average Power are all investigated, The GFSK & 8PSK Power are the worst case. Testing is based on this mode to showing compliance.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Charger	SAMSUNG	EP-TA800	R37MANQ1E72SE3	N/A
Data Cable	SAMSUNG	EP-DN980	GH39-02115A BWE	N/A
Earphone	SAMSUNG	GH59-15055A	EHS64AVFWE	N/A

I/O CABLE

I/O Cable List						
Cable No.	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	DC Power	1	C Type	Shielded	1.0 m	N/A
2	Audio	2	Mini-Jack	Unshielded	0.7 m	N/A

TEST SETUP

The EUT is continuously communicating to the Bluetooth tester during the tests.
Test software enable BT communications.

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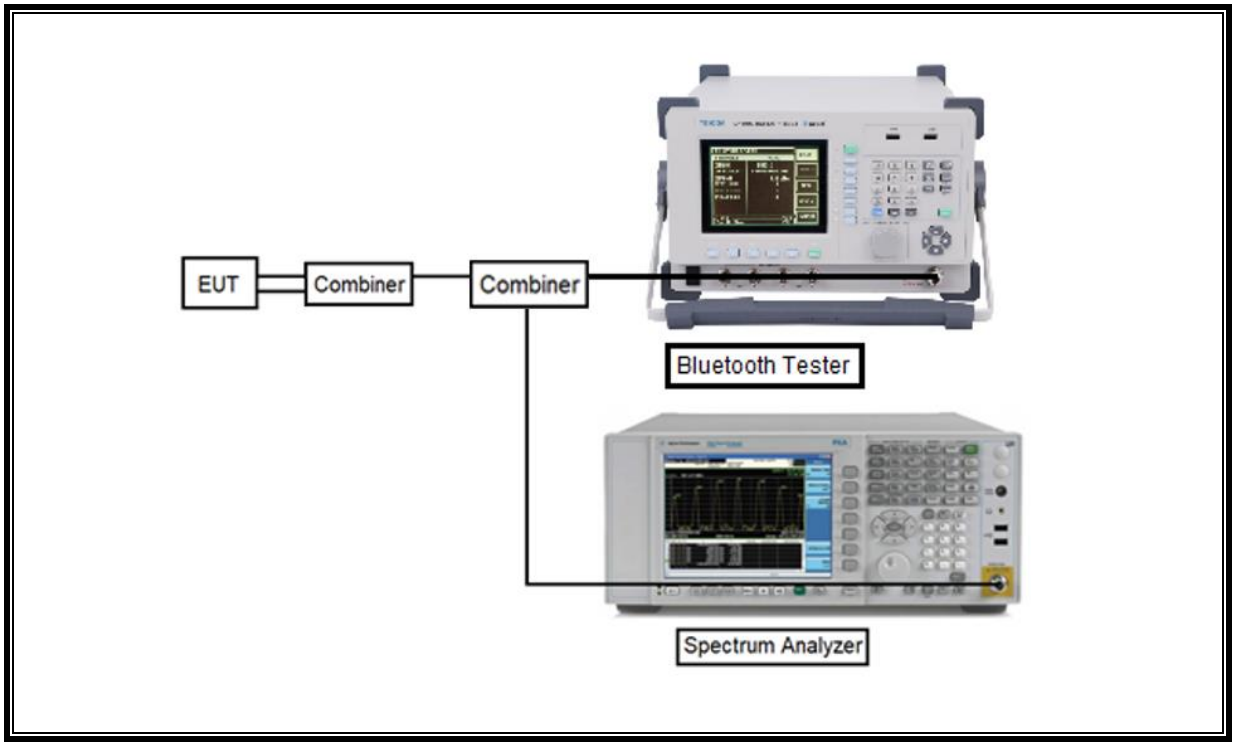
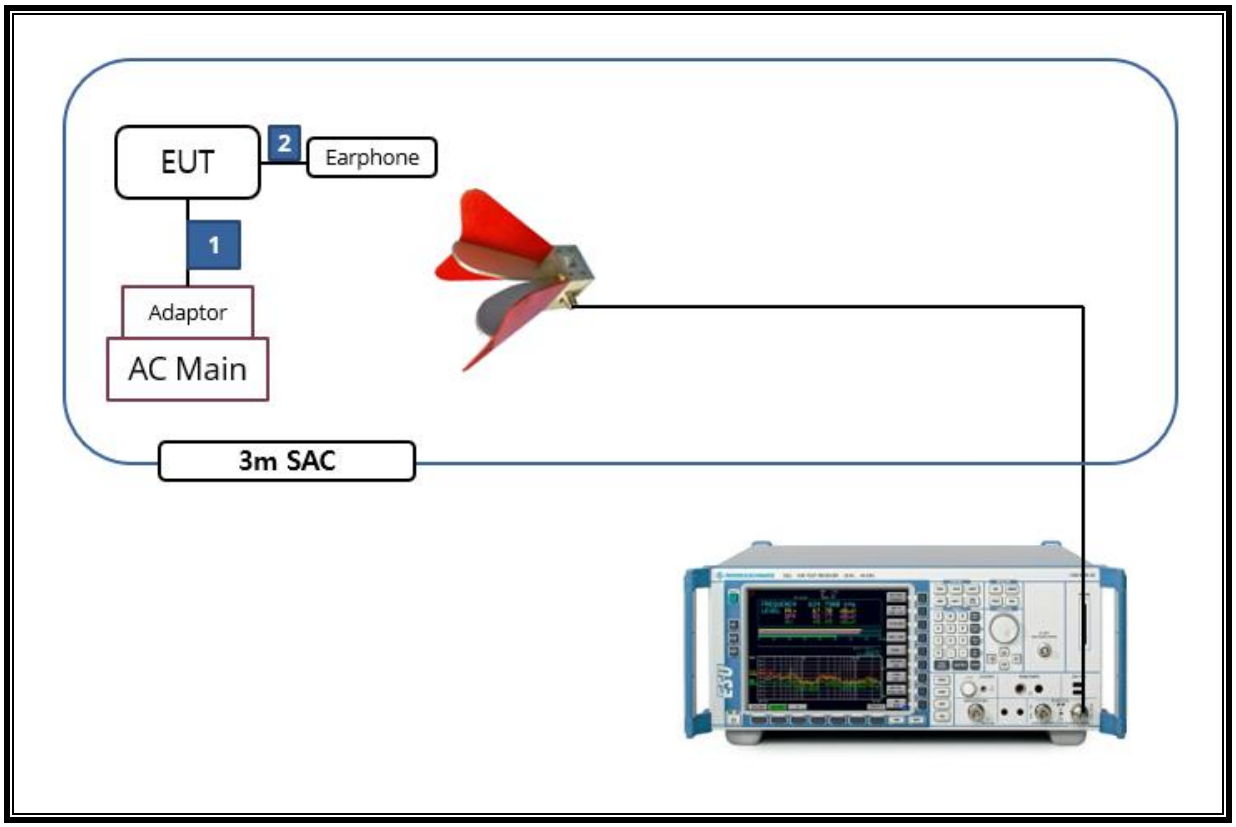
SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



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6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List				
Description	**Manufacturer**	**Model**	**S/N**	**Cal Due**
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	2022/08/19
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	2022/08/13
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	2022/08/13
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	2023/10/06
Antenna, Horn, 18 GHz	ETS	3115	00167211	2022/07/27
Antenna, Horn, 18 GHz	ETS	3115	00161451	2022/08/15
Antenna, Horn, 18 GHz	ETS	3117	00168724	2022/07/27
Antenna, Horn, 18 GHz	ETS	3117	00168717	2022/08/15
Antenna, Horn, 40 GHz	ETS	3116C	00166155	2022/08/04
Preamplifier	ETS	3116C-PA	00168841	2022/08/04
Directional Antenna	Cobham	FPA3-0.8-6.0R/1329	80108-0004	N/A
Directional Antenna	Cobham	FPA3-0.8-6.0R/1329	110367-0003	N/A
Preamplifier, 1000 MHz	Sonoma	310N	341282	2022/08/02
Preamplifier, 1000 MHz	Sonoma	310N	351741	2022/08/02
Preamplifier, 1000 MHz	Sonoma	310N	370599	2022/08/02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	2022/08/02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	2022/08/02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029168	2022/08/02
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	2022/08/04
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	2022/08/04
Average Power Sensor	Agilent / HP	U2000	MY54270007	2022/08/04
Average Power Sensor	Agilent / HP	U2000	MY54260010	2022/08/04
Bluetooth Tester	TESCOM	TC-3000C	3000C000546	2022/08/04
Power Splitter	MINI-CIRCUITS	WA1534	UL003	2023/01/11
Power Splitter	MINI-CIRCUITS	WA1534	UL004	2023/01/11
Attenuator	PASTERNACK	PE7087-10	A009	2022/08/03
Attenuator	PASTERNACK	PE7087-10	A001	2022/08/03
Attenuator	PASTERNACK	PE7087-10	A008	2022/08/03
Attenuator	PASTERNACK	PE7004-10	2	2022/08/02
EMI Test Receive, 40 GHz	R&S	ESU40	100439	2022/08/02
EMI Test Receive, 40 GHz	R&S	ESU40	100457	2022/08/02
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	2022/08/02
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	2022/08/02
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	019	2022/08/02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	2022/08/02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	2022/08/02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	020	2022/08/02
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	2022/08/02
High Pass Filter 6GHz	Micro-Tronics	HPS17542	016	2022/08/02
High Pass Filter 6GHz	Micro-Tronics	HPS17542	020	2022/08/02
LISN	R&S	ENV-216	101837	2022/08/05
Termination	WEINSCHEL	M1406A	T09	2022/08/03
UL Software				
Description	**Manufacturer**	**Model**	**Version**	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

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7. TEST RESULTS SUMMARY

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result
2.1051, 15.247(d)	Band Edge / Conducted Spurious Emission	-20 dBc	Conducted	PASS
15.247 (b)(1)	TX conducted output power	< 21 dBm		PASS
15.247 (a)(1)	Hopping frequency separation	> two-thirds of the 20 dB bandwidth		PASS
15.247 (a)(1)(iii)	Number of Hopping channels	More than 15 non-overlapping channels		PASS
15.247 (a)(1)(iii)	Avg Time of Occupancy	< 8 dBm		PASS
15.207(a)	AC Power Line conducted emissions	Section 11	Power Line conducted	PASS
15.205, 15.209	Radiated Spurious Emission	< 54dBuV/m(Av)	Radiated	PASS

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8. MEASUREMENT METHODS

20dB BW : ANSI C63.10, Section 6.9.2

99% BW : ANSI C63.10, Section 6.9.3

HOPPING FREQUENCY SEPARATION : ANSI C63.10, Section 7.8.2

NUMBER OF HOPPING CHANNELS : ANSI C63.10, Section 7.8.3

AVERAGE TIME OF OCCUPANCY : ANSI C63.10, Section 7.8.4

OUTPUT POWER : ANSI C63.10, Section 7.8.5.

Out-of-band EMISSIONS (Conducted) : ANSI C63.10, Section 7.8.6, 7.8.8

Out-of-band EMISSIONS IN NON-RESTRICTED BANDS: ANSI C63.10, Section 6.

Out-of-band EMISSIONS IN RESTRICTED BANDS : ANSI C63.10, Section 6.

AC Power Line Conducted Emission : ANSI C63.10-2013, Section 6.2.

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9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

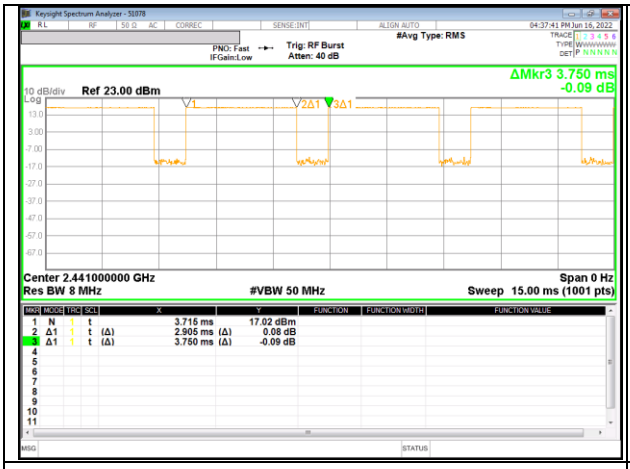
LIMITS

None; for reporting purposes only.

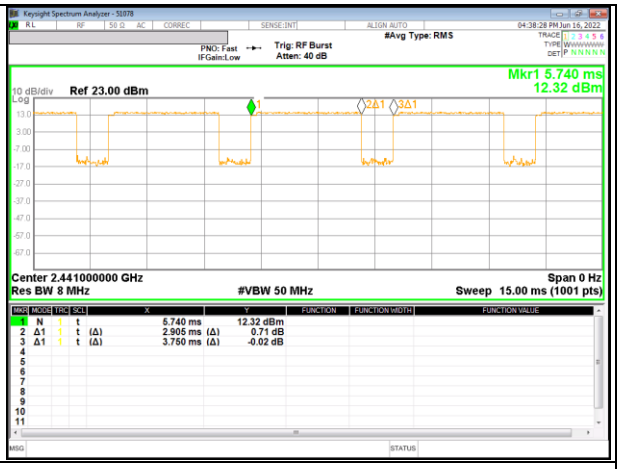
PROCEDURE

ANSI C63.10, Section 11.6 : Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS



1-DH5



3-DH5

Mode	On time [msec]	Period [msec]	Duty Cycle [%]	Duty Cycle Correction Factor[dB]	1/T Minimum VBW [kHz]
2 400 ~ 2 483.5 MHz Band					
BDR	2.905	3.750	77.467	1.11	0.344
EDR	2.905	3.750	77.467	1.11	0.344

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9.2. 20 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

RESULTS

9.2.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Channel	Frequency [MHz]	20 dB Bandwidth [kHz]
0	**2 402**	**930.3**
39	2 441	924.9
78	2 480	927.2
Worst		**930.3**

9.2.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Channel	Frequency [MHz]	20 dB Bandwidth [MHz]
0	2 402	1.260
39	2 441	1.258
78	**2 480**	**1.272**
Worst		**1.272**

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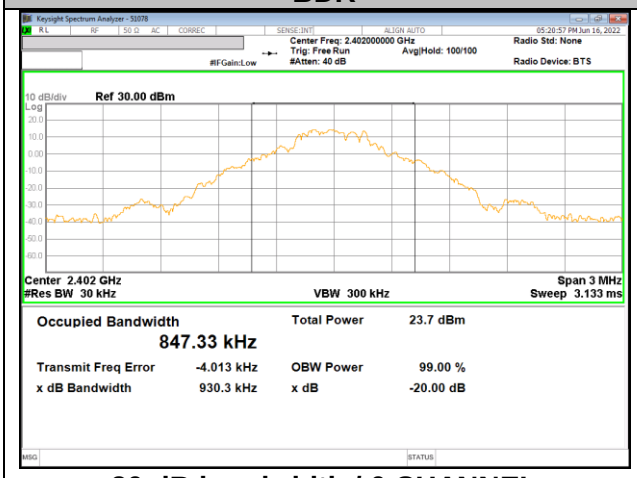
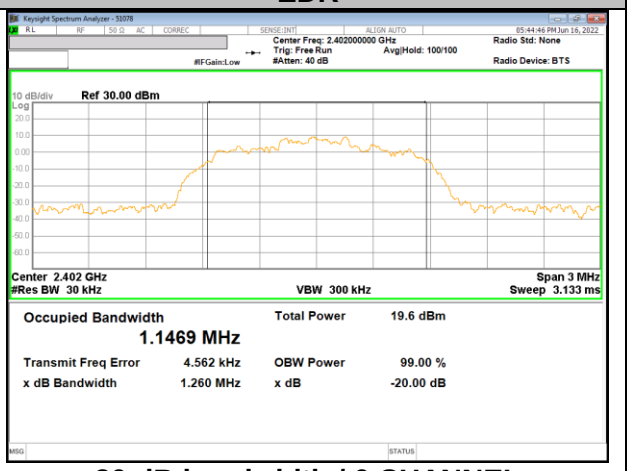
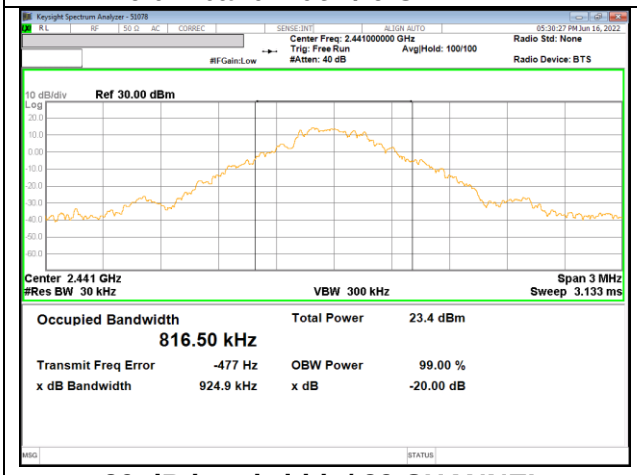
BDR	EDR



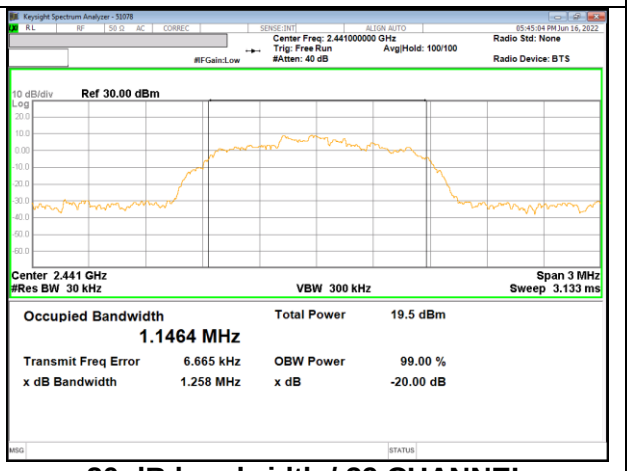
20 dB bandwidth / 0 CHANNEL



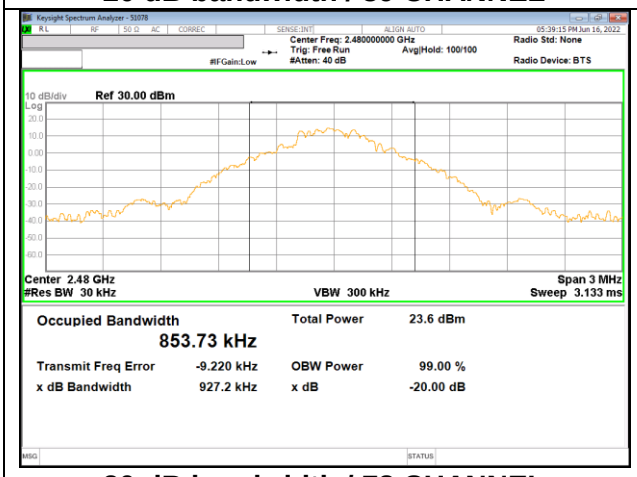
20 dB bandwidth / 0 CHANNEL



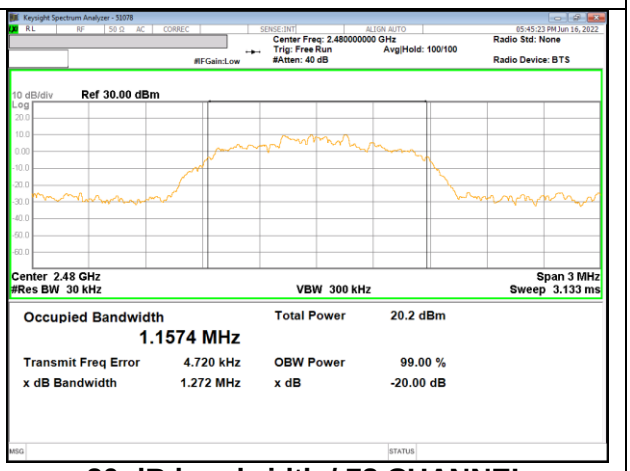
20 dB bandwidth / 39 CHANNEL



20 dB bandwidth / 39 CHANNEL



20 dB bandwidth / 78 CHANNEL



20 dB bandwidth / 78 CHANNEL

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9.3. HOPPING FREQUENCY SEPARATION

LIMITS

FCC §15.247 (a) (1)

RSS-247 (5.1) (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to VBW >= RBW. The sweep time is coupled.

RESULTS

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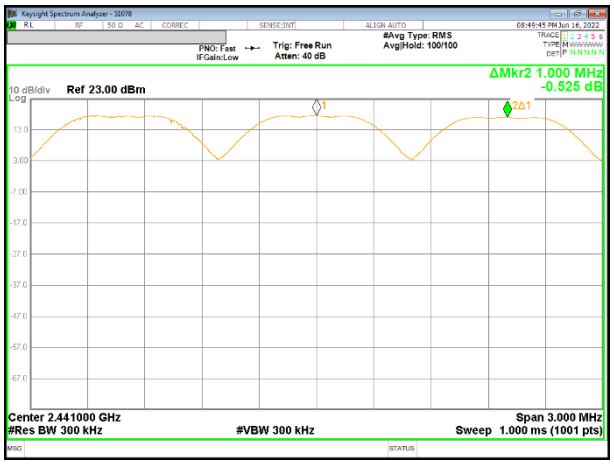
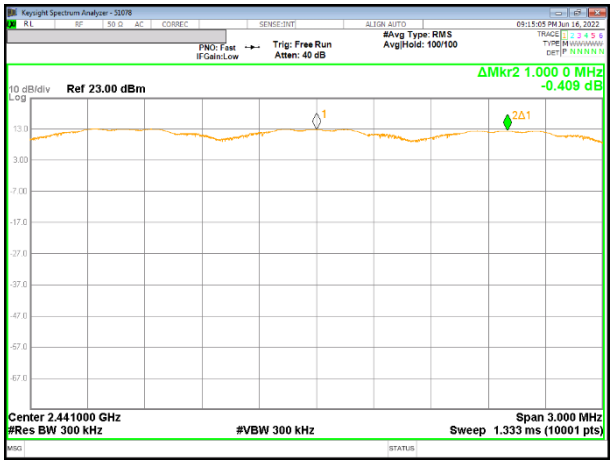
9.3.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION



9.3.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION



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9.4. NUMBER OF HOPPING CHANNELS

LIMITS

FCC §15.247 (a) (1) (iii)

RSS-247 (5.1) (d)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

Normal Mode: All Channels Observed

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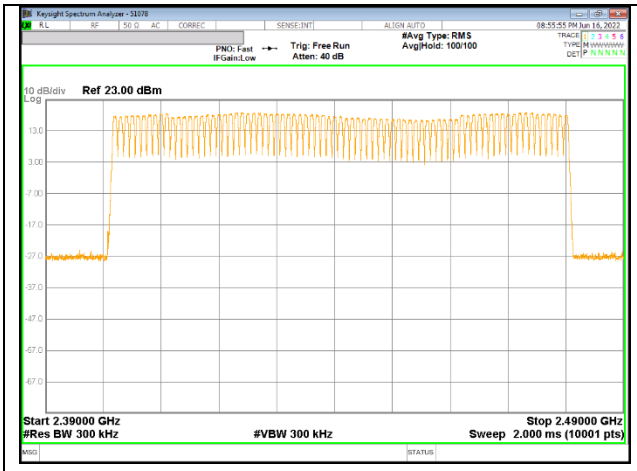
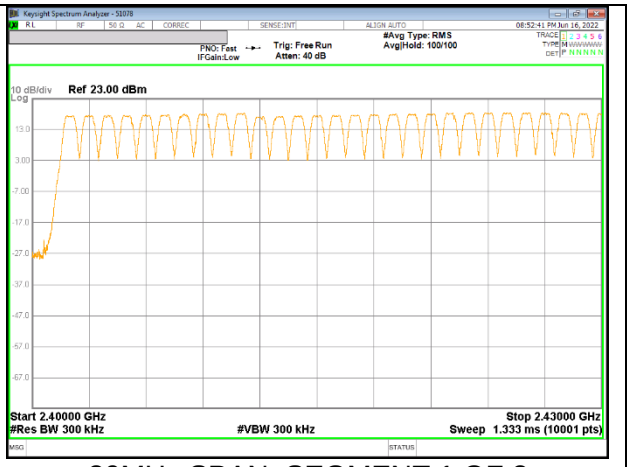
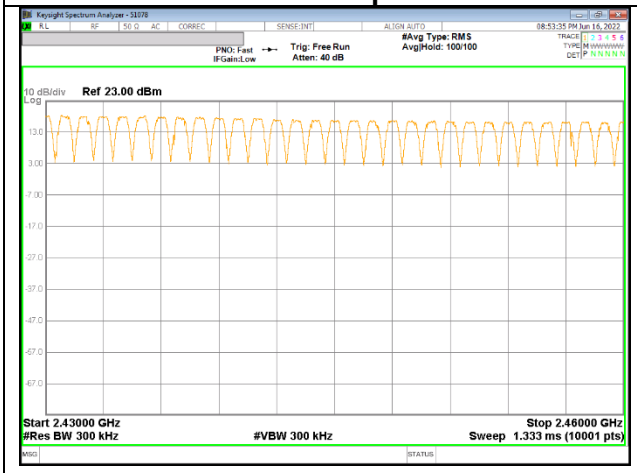
9.4.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION



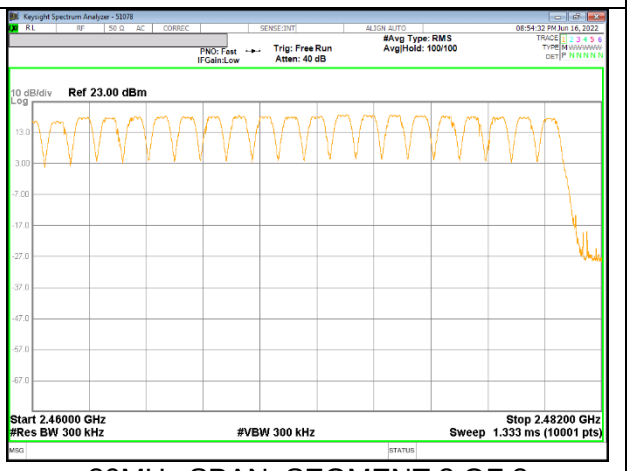
100 MHz Span



30MHz SPAN, SEGMENT 1 OF 3



30MHz SPAN, SEGMENT 2 OF 3



30MHz SPAN, SEGMENT 3 OF 3

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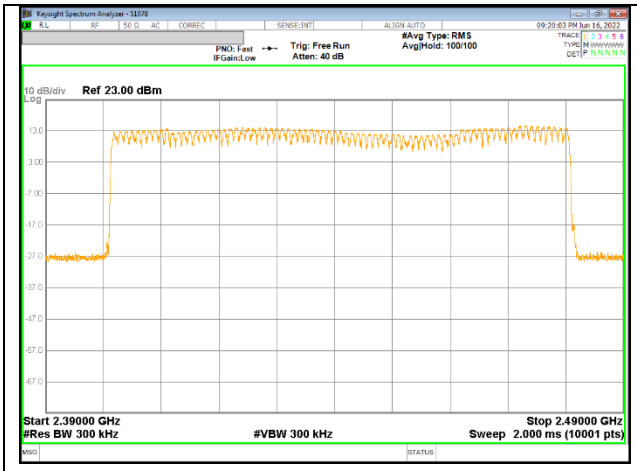
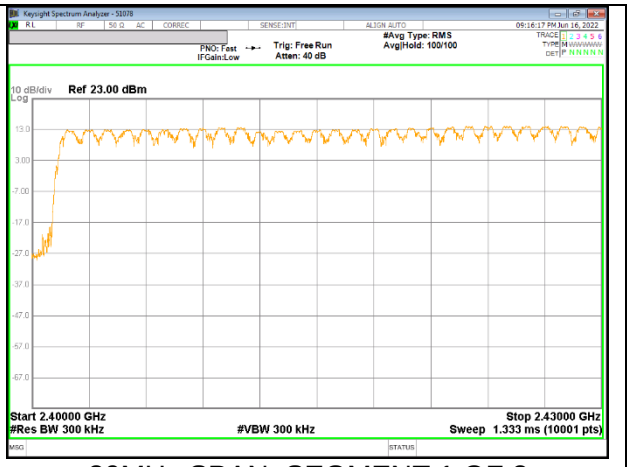
9.4.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION



100 MHz Span



30MHz SPAN, SEGMENT 1 OF 3

30MHz SPAN, SEGMENT 2 OF 3

30MHz SPAN, SEGMENT 3 OF 3

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9.5. AVERAGE TIME OF OCCUPANCY

LIMITS

FCC §15.247 (a) (1) (iii)

RSS-247 (5.1) (d)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 3.16 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

For AFH mode, the average time of occupancy in the specified 8 second period (20 channels * 0.4 seconds) is equal to 10 * (# of pulses in 0.8 s) * pulse width.

RESULTS

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9.5.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

DH Packet	Pulse Width [msec]	Number of Pulses in 3.16 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
GFSK Normal					
DH1	0.381	32	0.122	0.4	-0.278
DH3	1.636	17	0.278	0.4	-0.122
DH5	2.883	12	0.346	0.4	-0.054
DH Packet	**Pulse Width [msec]**	**Number of Pulses in 0.8 seconds**	**Average Time of Occupancy [sec]**	**Limit [sec]**	**Margin [sec]**
GFSK AFH					
DH1	0.381	8	0.030	0.4	-0.370
DH3	1.636	4	0.070	0.4	-0.330
DH5	2.883	3	0.086	0.4	-0.314

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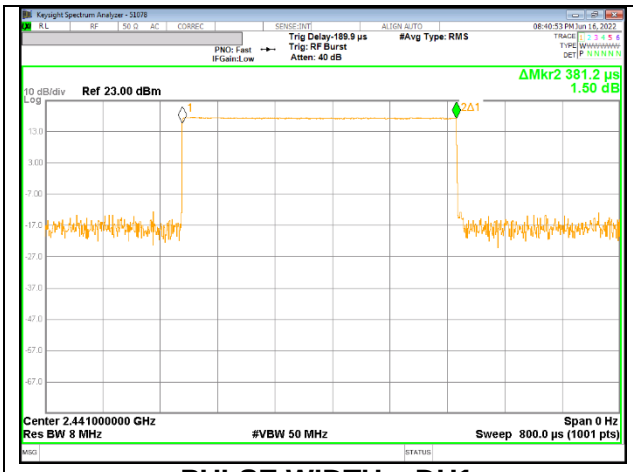
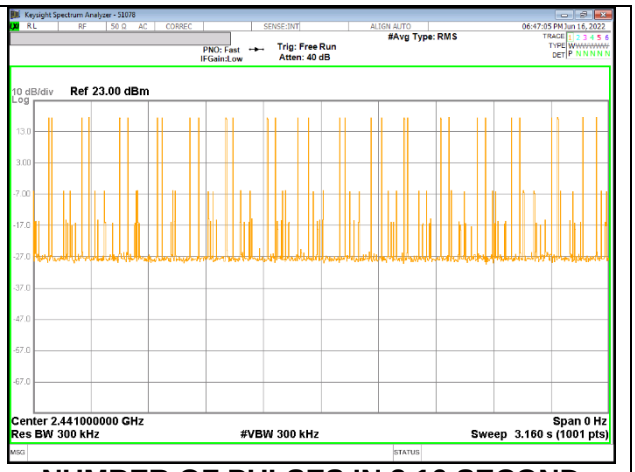
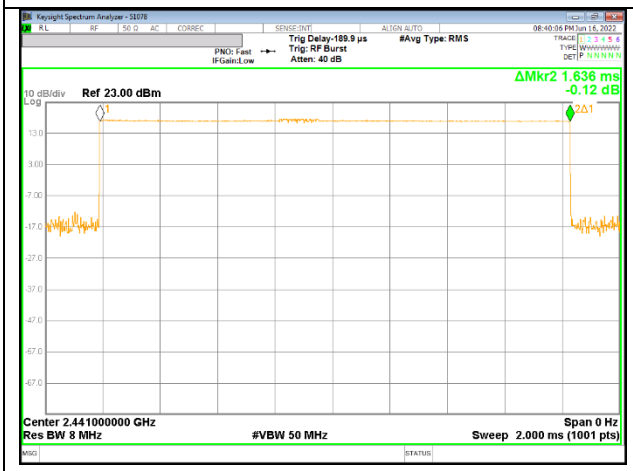


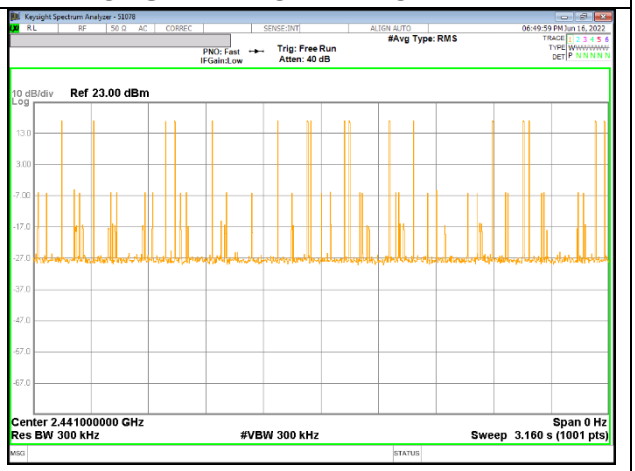
PULSE WIDTH – DH1



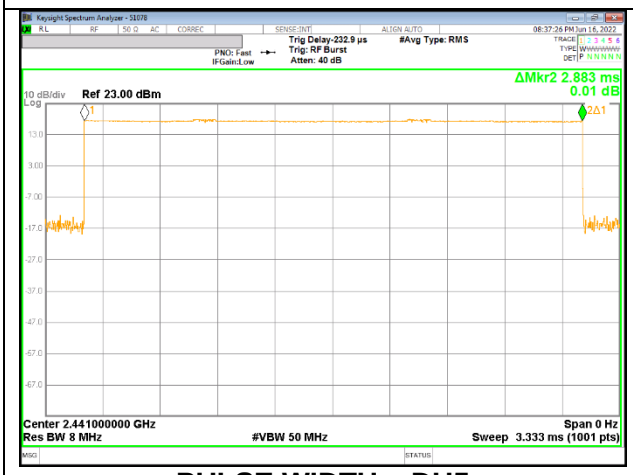
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



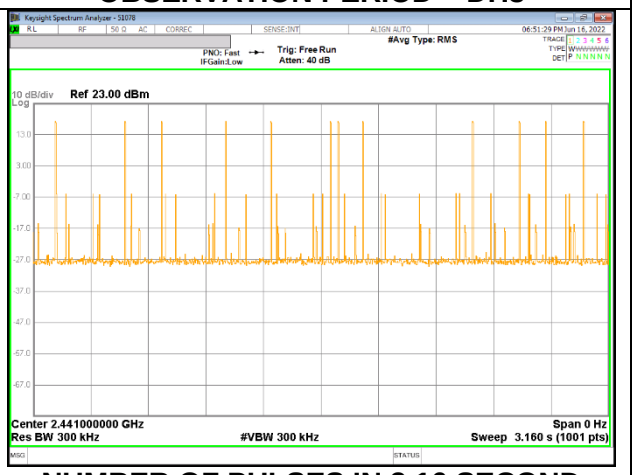
PULSE WIDTH – DH3



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5

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9.5.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

DH Packet	Pulse Width [msec]	Number of Pulses in 3.16 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
8PSK Normal					
DH1	0.385	32	0.123	0.4	-0.277
DH3	1.636	15	0.245	0.4	-0.155
DH5	2.880	12	0.346	0.4	-0.054
DH Packet	**Pulse Width [msec]**	**Number of Pulses in 0.8 seconds**	**Average Time of Occupancy [sec]**	**Limit [sec]**	**Margin [sec]**
8PSK AFH					
DH1	0.385	8	0.031	0.4	-0.369
DH3	1.636	4	0.061	0.4	-0.339
DH5	2.880	3	0.086	0.4	-0.314

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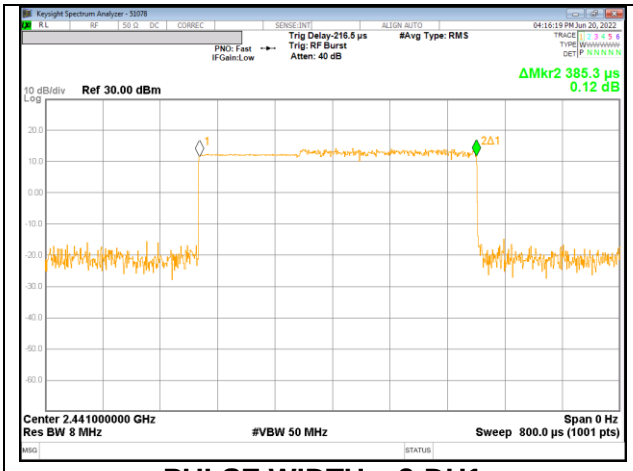
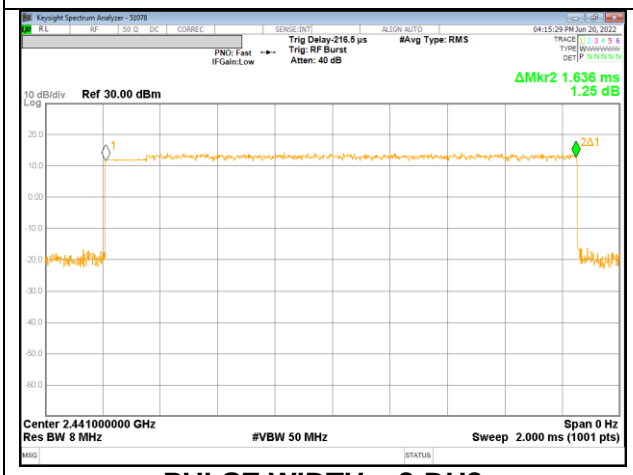
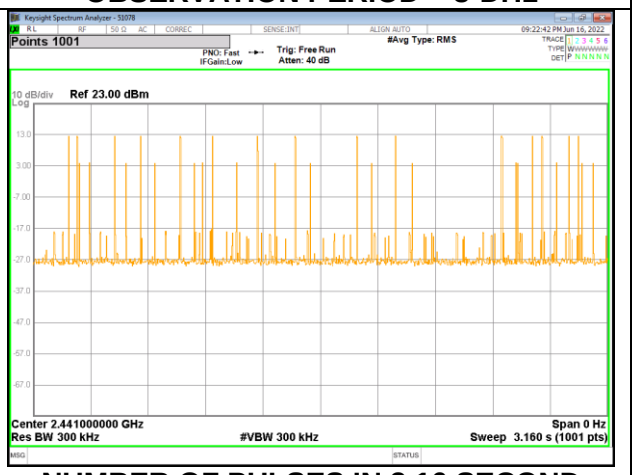


PULSE WIDTH – 3-DH1

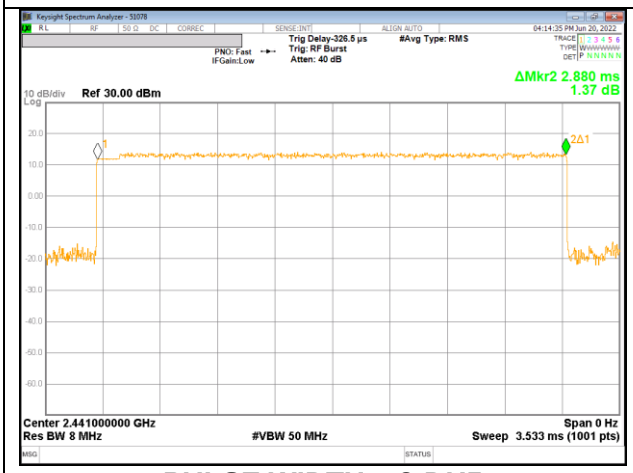
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3-DH1



PULSE WIDTH – 3-DH3



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3-DH3



PULSE WIDTH – 3-DH5

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3-DH5

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9.6. OUTPUT POWER

LIMITS

§15.247 (b) (1)
The maximum antenna gain is less than 6 dBi, therefore the limit is 21 dBm.

TEST PROCEDURE
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

RESULTS

9.6.1. BASIC DATA RATE GFSK MODULATION

Channel	Frequency [MHz]	Peak Output Power [dBm]	Limit [dBm]	Margin [dB]
0	2 402	17.329	21.000	-3.671
39	2 441	17.201		-3.799
78	**2 480**	**17.649**		**-3.351**
Worst		**17.649**		**-3.351**

9.6.2. ENHANCED DATA RATE Pi/4-DPSK MODULATION

Channel	Frequency [MHz]	Peak Output Power [dBm]	Limit [dBm]	Margin [dB]
0	2 402	14.378	21.000	-6.622
39	2 441	14.110		-6.890
78	2 480	14.710		-6.290
Worst		**14.710**		**-6.290**

9.6.3. ENHANCED DATA RATE 8PSK MODULATION

Channel	Frequency [MHz]	Peak Output Power [dBm]	Limit [dBm]	Margin [dB]
0	2 402	14.886	21.000	-6.114
39	2 441	14.848		-6.152
78	2 480	15.279		-5.721
Worst		**15.279**		**-5.721**

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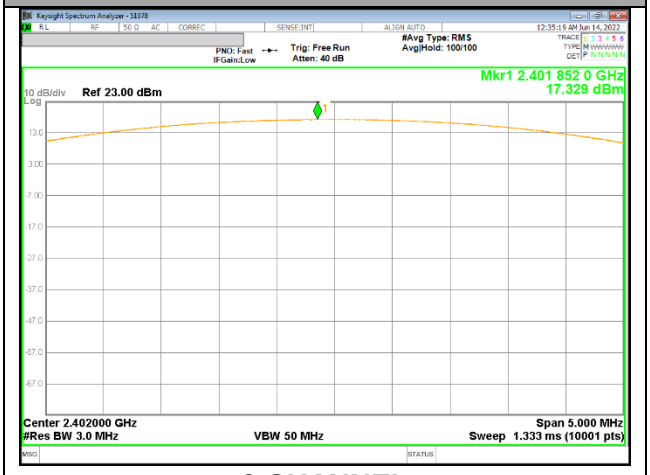
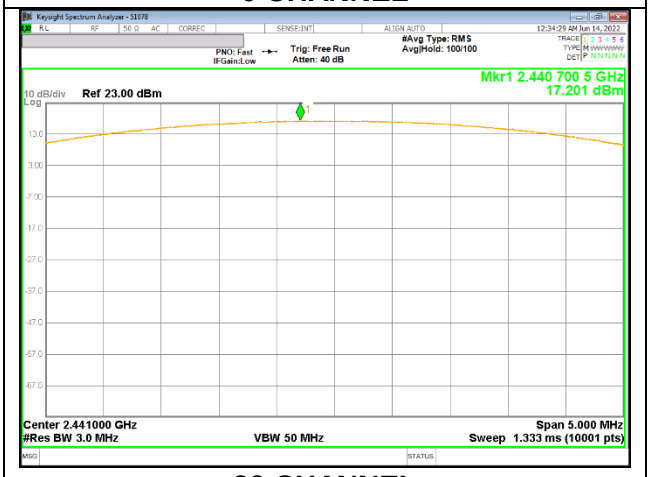
9.6.4. OUTPUT POWER PLOTS

PEAK OUTPUT POWER

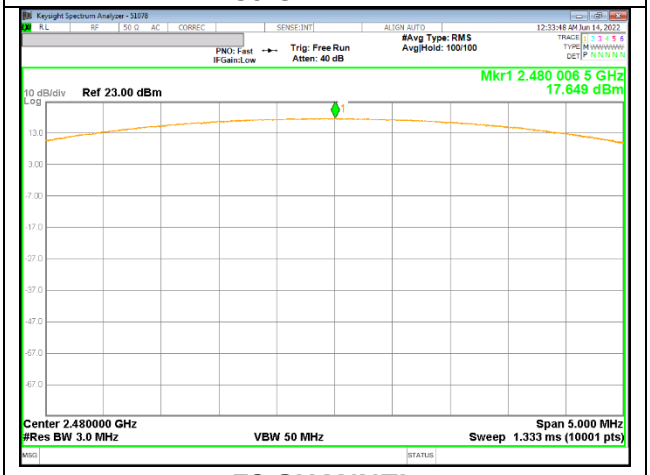
GFSK



0 CHANNEL



39 CHANNEL



78 CHANNEL

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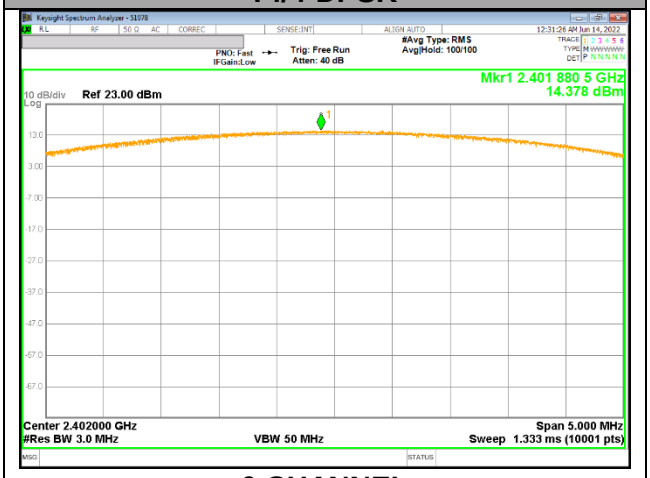
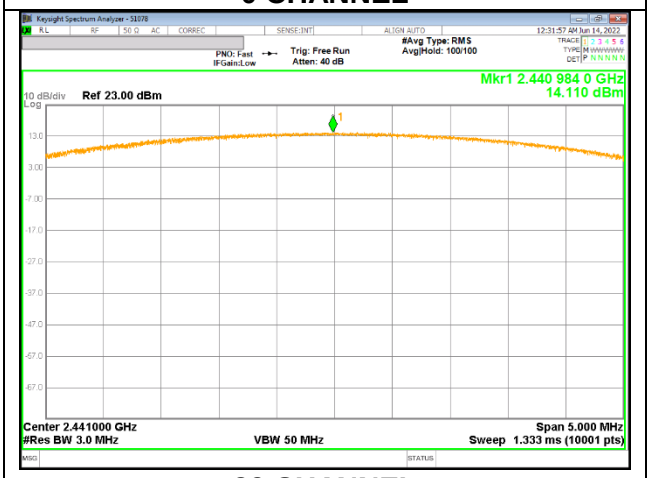
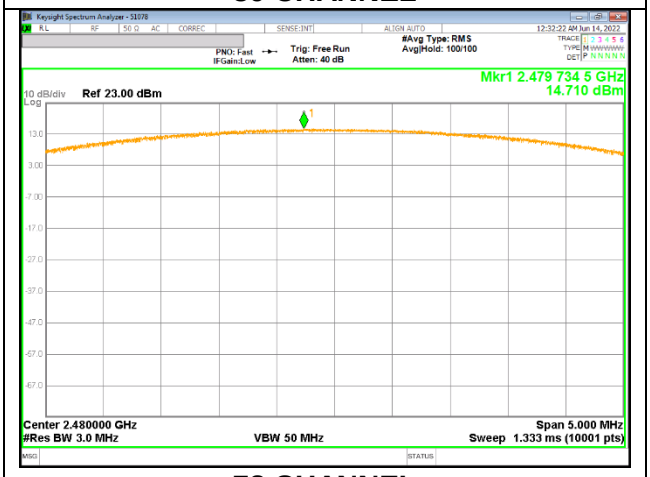
Pi/4-DPSK



0 CHANNEL



39 CHANNEL



78 CHANNEL

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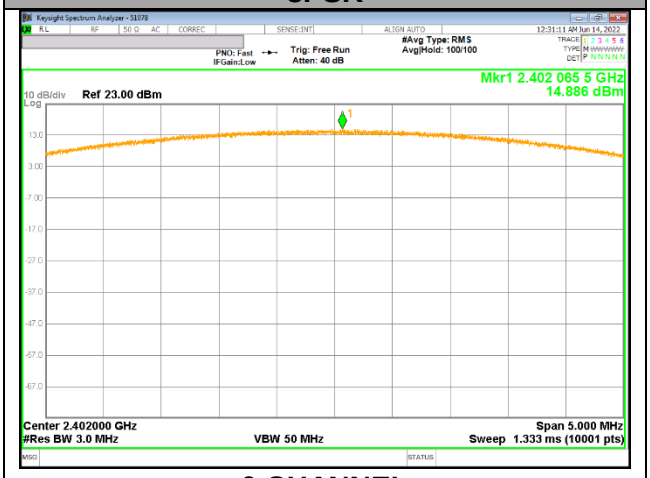
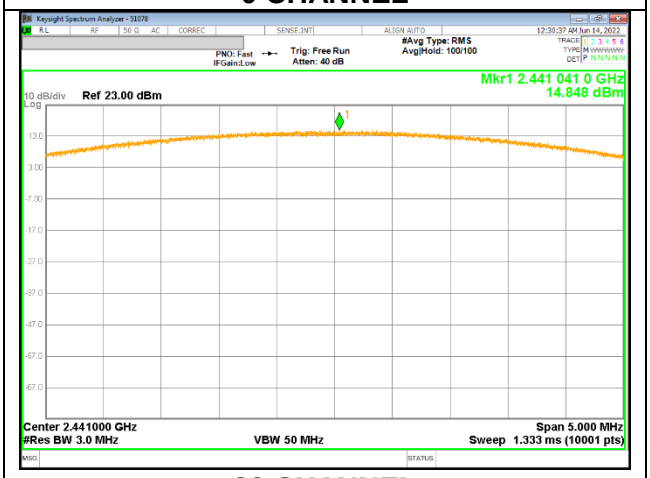
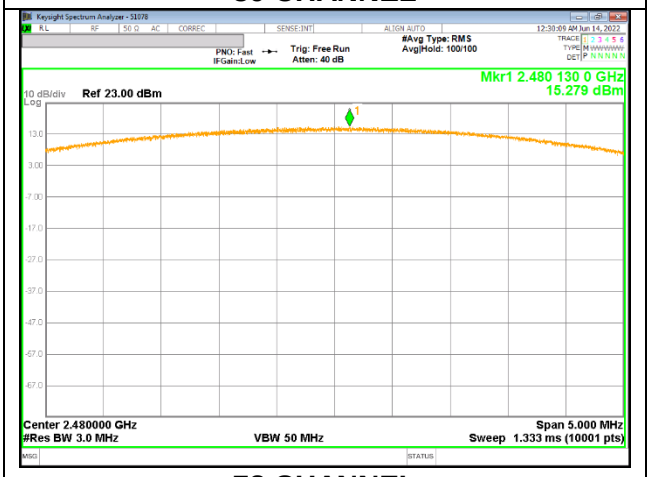
8PSK



0 CHANNEL



39 CHANNEL



78 CHANNEL

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9.7. AVERAGE POWER

LIMITS

None; for reporting purposes only

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.
The cable assembly insertion loss was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

9.7.1. BASIC DATA RATE GFSK MODULATION

Channel	Frequency [MHz]	Average Output Power [dBm]	Average Output Power [mW]
0	2 402	17.158	51.976
39	2 441	16.908	49.068
78	2 480	17.395	54.891

9.7.2. ENHANCED DATA RATE PI/4-DQPSK MODULATION

Channel	Frequency [MHz]	Average Output Power [dBm]	Average Output Power [mW]
0	2 402	12.019	15.918
39	2 441	11.945	15.649
78	2 480	12.766	18.906

9.7.3. ENHANCED DATA RATE 8PSK MODULATION

Channel	Frequency [MHz]	Average Output Power [dBm]	Average Output Power [mW]
0	2 402	12.167	16.470
39	2 441	12.035	15.977
78	2 480	12.886	19.436

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9.8. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

Limit = -20 dBc

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The band-edges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

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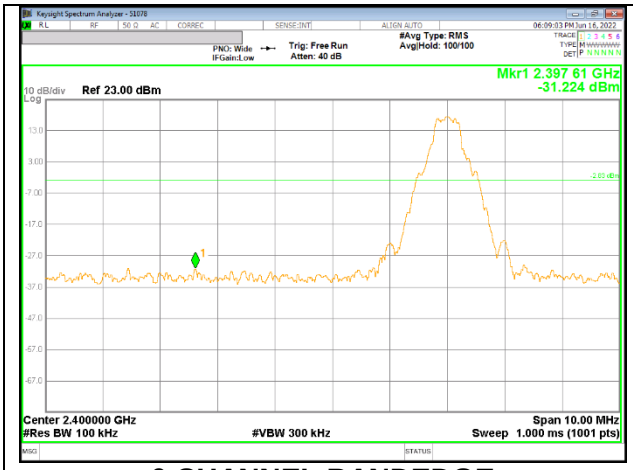
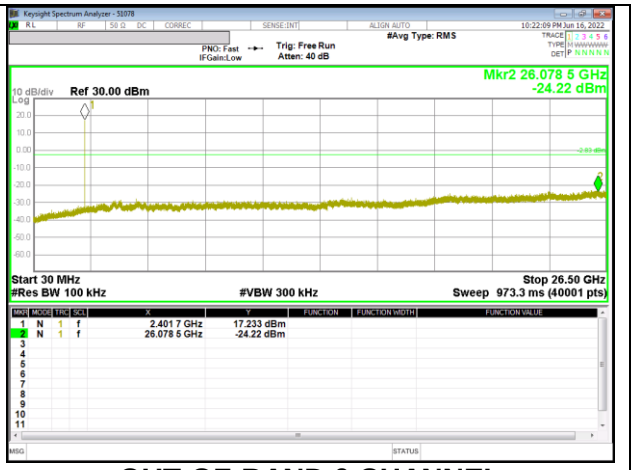
9.8.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

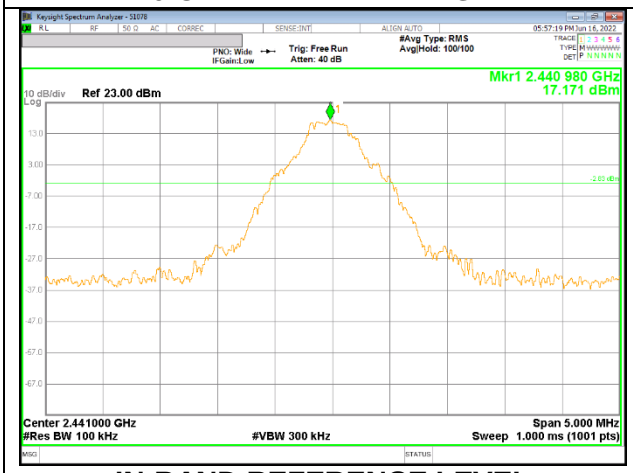
SPURIOUS EMISSIONS, NON-HOPPING



0 CHANNEL BANDEDGE

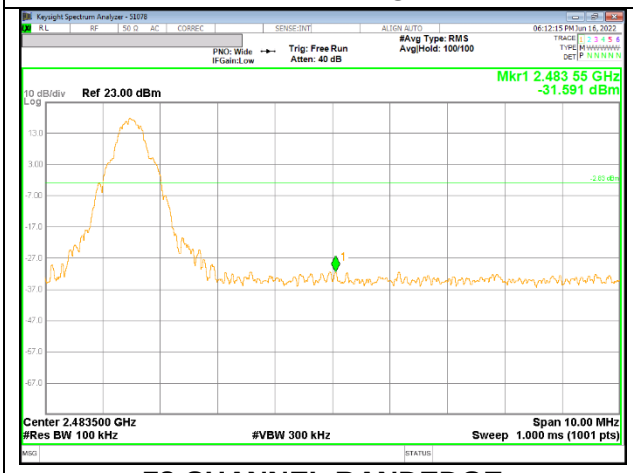


OUT-OF-BAND 0 CHANNEL

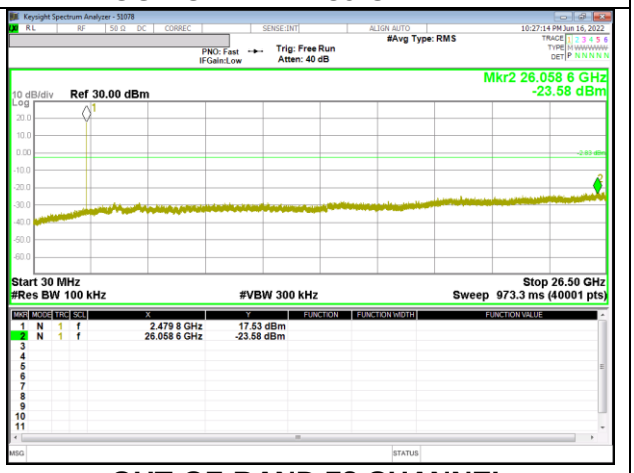


IN-BAND REFERENCE LEVEL

OUT-OF-BAND 39 CHANNEL



78 CHANNEL BANDEDGE



OUT-OF-BAND 78 CHANNEL

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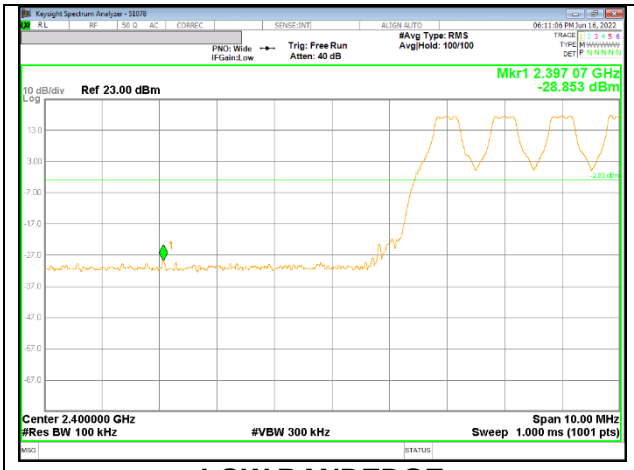
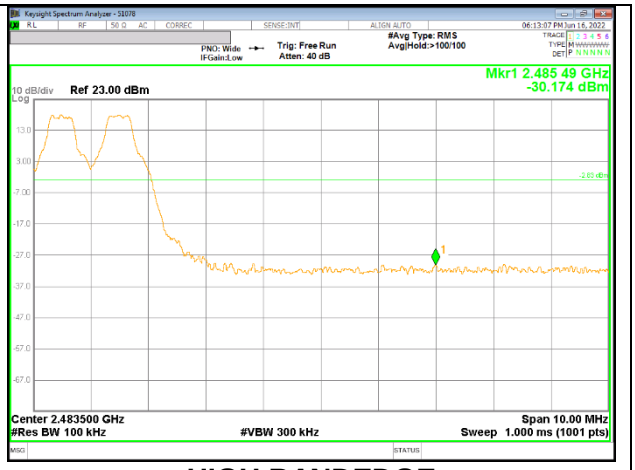
SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



LOW BANDEDGE



HIGH BANDEDGE

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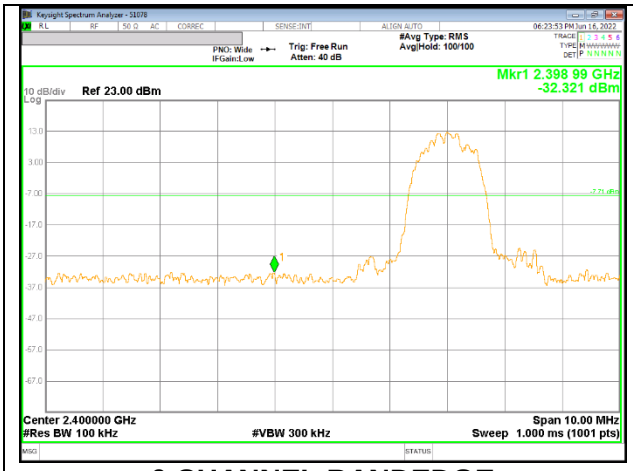
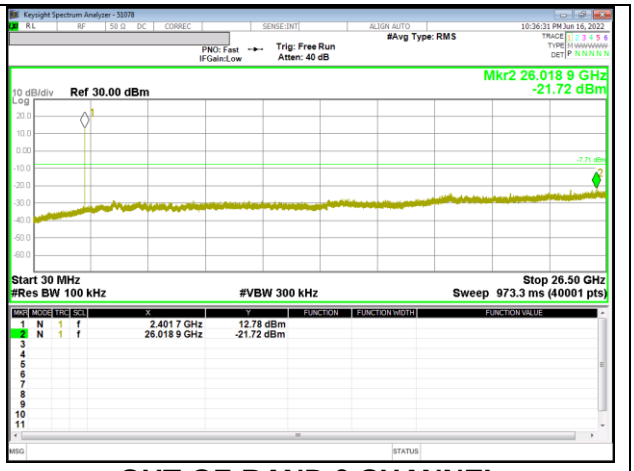
9.8.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

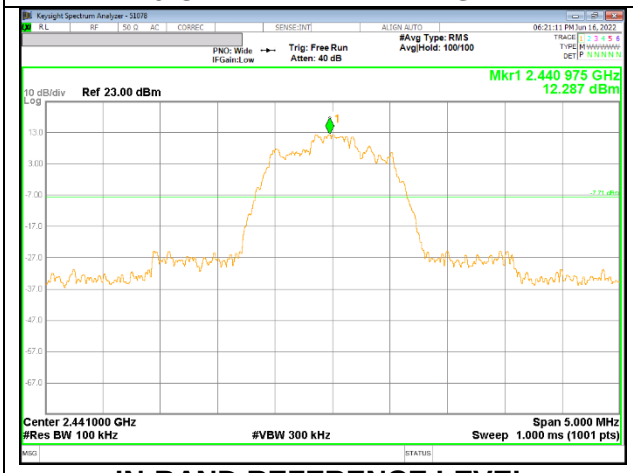
SPURIOUS EMISSIONS, NON-HOPPING



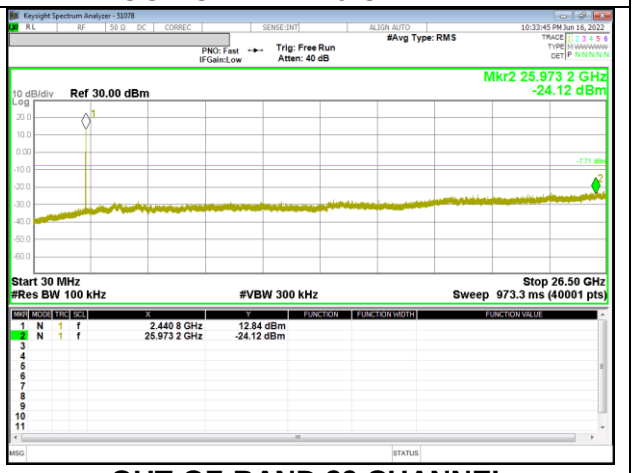
0 CHANNEL BANDEDGE



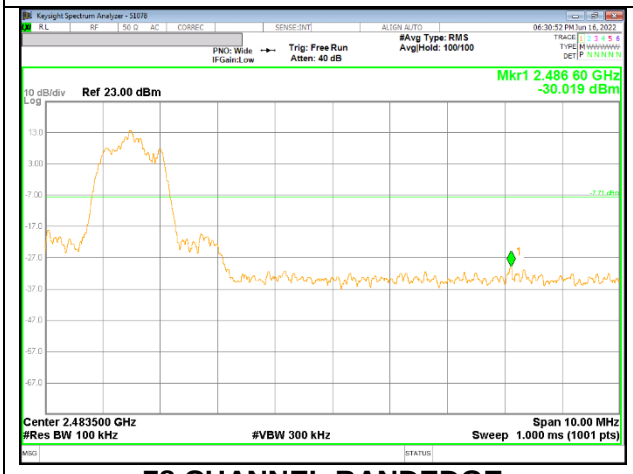
OUT-OF-BAND 0 CHANNEL



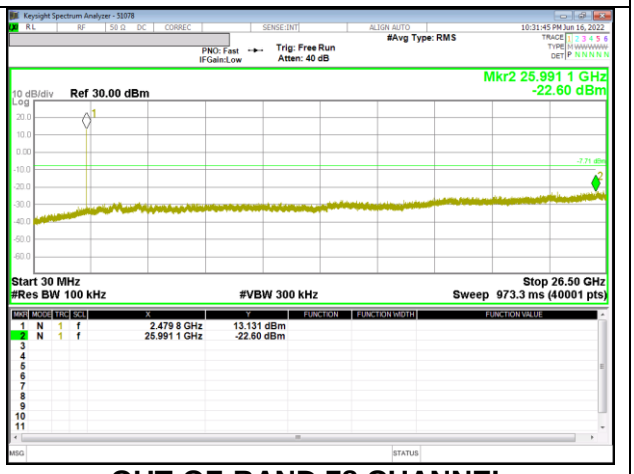
IN-BAND REFERENCE LEVEL



OUT-OF-BAND 39 CHANNEL



78 CHANNEL BANDEDGE



OUT-OF-BAND 78 CHANNEL

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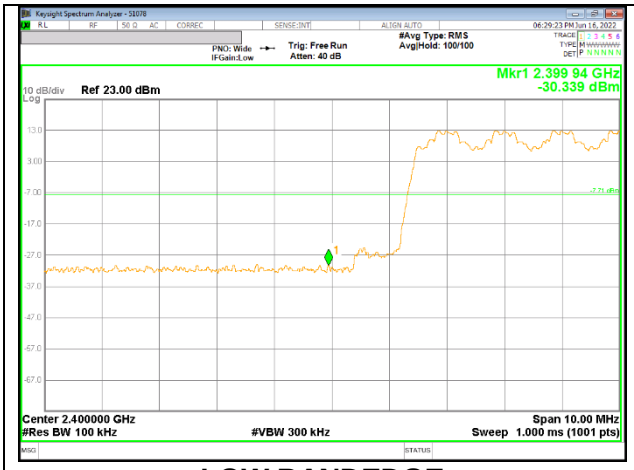
SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



LOW BANDEDGE

HIGH BANDEDGE

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10. RADIATED TEST RESULTS

LIMITS

FCC §15.205 and §15.209

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (µV/m)	Measurement Distance (m)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30 – 88	100**	3
88 - 216	150**	3
216 – 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.

FCC Part 15.205 (a) : Only spurious emissions are permitted in any of the frequency bands listed below :

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	5.35 ~ 5.46	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~ 12.52025	149.9 ~ 150.05	1645.5 ~ 1646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.57675 ~ 12.57725	156.52475 ~	1660 ~ 1710	8.025 ~ 8.5	22.01 ~ 23.12
4.17725 ~ 4.17775	13.36 ~ 13.41	156.52525	1718.8 ~ 1722.2	9.0 ~ 9.2	23.6 ~ 24.0
4.20725 ~ 4.20775	16.42 ~ 16.423	156.7 ~ 156.9	2200 ~ 2300	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	16.69475 ~ 16.69525	162.0125 ~	2310 ~ 2390	10.6 ~ 12.7	36.43 ~ 36.5
6.26775 ~ 6.26825	16.80425 ~ 16.80475	167.17	2483.5 ~ 2500	13.25 ~ 13.4	Above 38.6
6.31175 ~ 6.31225	25.5 ~ 25.67	167.72 ~ 173.2	2655 ~ 2900		
8.291 ~ 8.294	37.5 ~ 38.25	240 ~ 285	3260 ~ 3267		
8.362 ~ 8.366	73 ~ 74.6	322 ~ 335.4	3332 ~ 3339		
8.37625 ~ 8.38675	74.8 ~ 75.2	399.90 ~ 410	3345.8 ~ 3358		
		608 ~ 614	3600 ~ 4400		
		960 ~ 1240			

▪ FCC Part 15.205(b) : The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

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TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz and 150 cm for above 1GHz. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements. (Pre-scans to detect harmonic and spurious emissions, the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 kHz for peak measurements.)

For band edge measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1/T (on time) for average measurement.

GFSK = 1/T = 1 / 0.00288s = 347Hz.

The minimum VBW was 347Hz, but test receiver(ESU40) couldn’t set value 347Hz. Due to this reason, testing VBW was set to 500Hz(Worst cases).

The spectrum from 1GHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.
(From 30MHz to 1GHz, test was performed with the EUT set to transmit at the channel with highest output power)

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

Note : Emission was pre-scanned from 9kHz to 30MHz; No emissions were detected which was at least 20dB below the specification limit (consider distance correction factor).
Per FCC part 15.31(o), test results were not reported.

Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open are test site.
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field based on KDB 414788.

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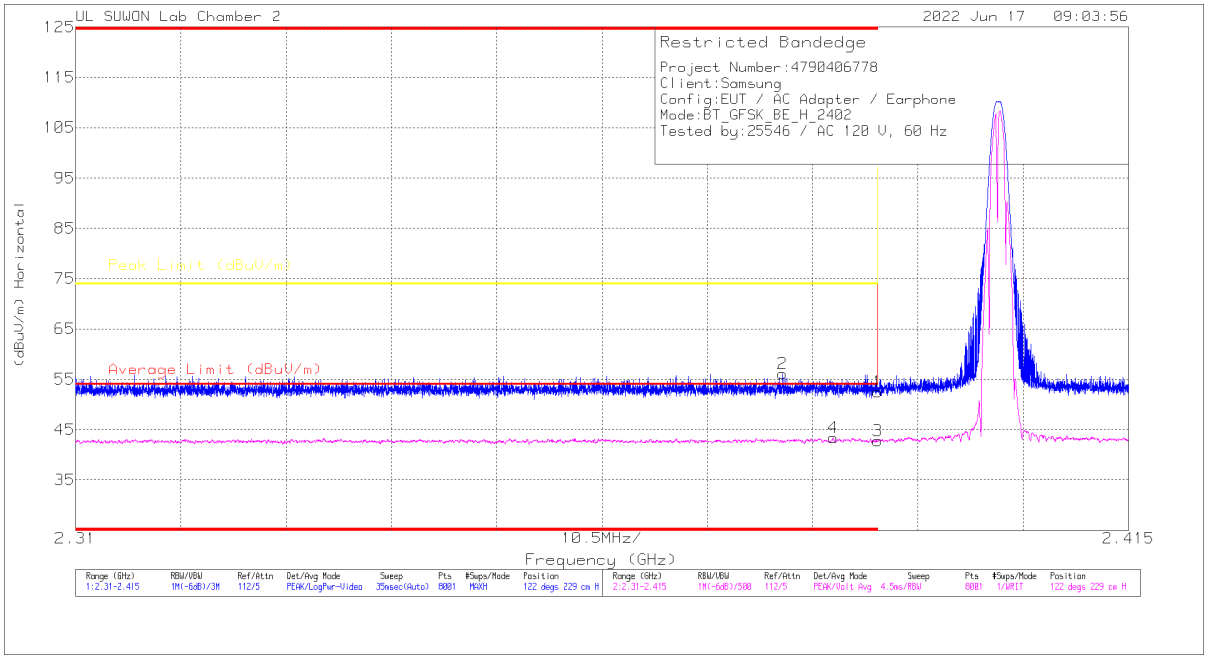
10.1. TRANSMITTER ABOVE 1 GHz

10.1.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

BANDEDGE (0 CHANNEL)

HORIZONTAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	40.27	Pk	31.9	-19.7	52.47	-	-	74	-21.53	122	229	H
2	* 2.38051	43.78	Pk	31.9	-19.6	56.08	-	-	74	-17.92	122	229	H
3	* 2.39	30.57	VA1T	31.9	-19.7	42.77	54	-11.23	-	-	122	229	H
4	* 2.38552	31.09	VA1T	31.9	-19.6	43.39	54	-10.61	-	-	122	229	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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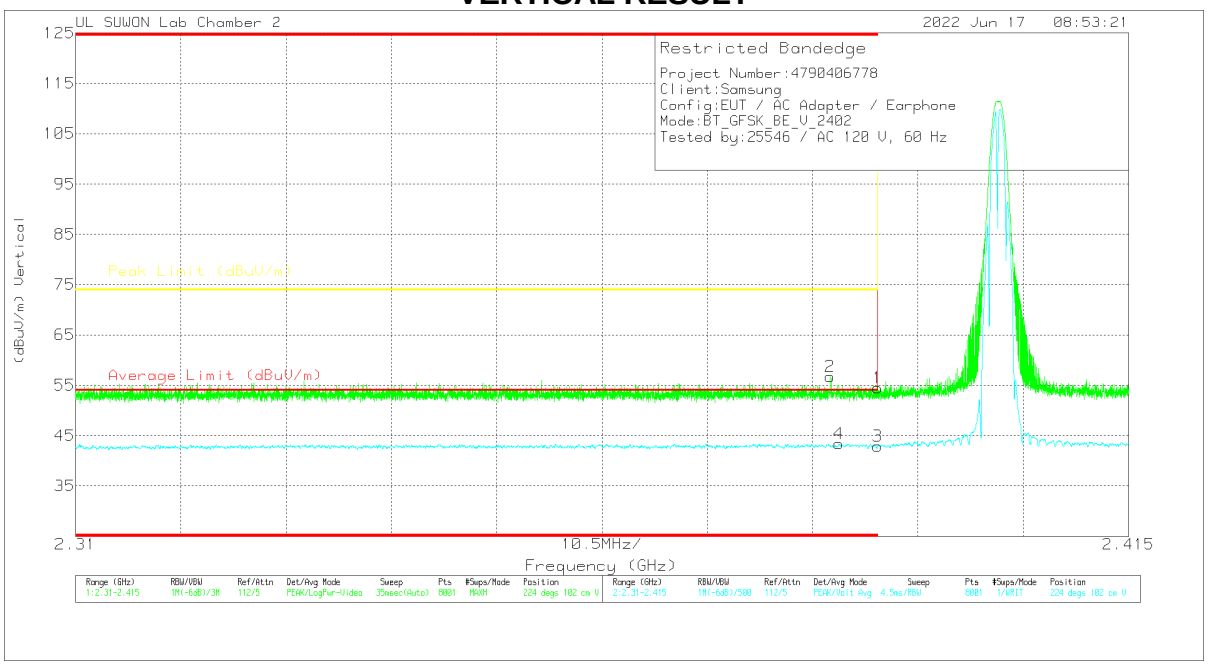
VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	42.25	Pk	31.9	-19.7	54.45	-	-	74	-19.55	224	102	V
2	* 2.38523	44.46	Pk	31.9	-19.6	56.76	-	-	74	-17.24	224	102	V
3	* 2.39	30.7	VA1T	31.9	-19.7	42.9	54	-11.1	-	-	224	102	V
4	* 2.38611	31.1	VA1T	31.9	-19.6	43.4	54	-10.6	-	-	224	102	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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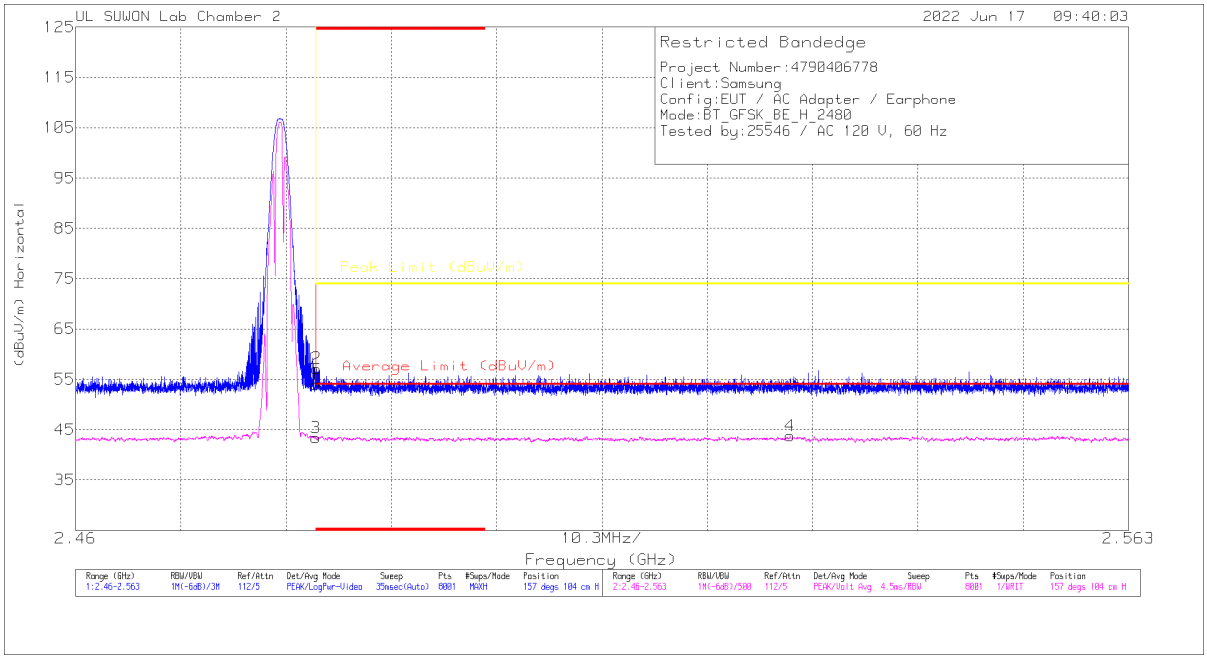
BANDEDGE (78 CHANNEL)

HORIZONTAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	41.64	Pk	32	-19.6	54.04	-	-	74	-19.96	157	104	H
2	* 2.48354	44.77	Pk	32	-19.6	57.17	-	-	74	-16.83	157	104	H
3	* 2.48351	30.95	VA1T	32	-19.6	43.35	54	-10.65	-	-	157	104	H
4	2.52989	30.92	VA1T	32.1	-19.3	43.72	54	-10.28	-	-	157	104	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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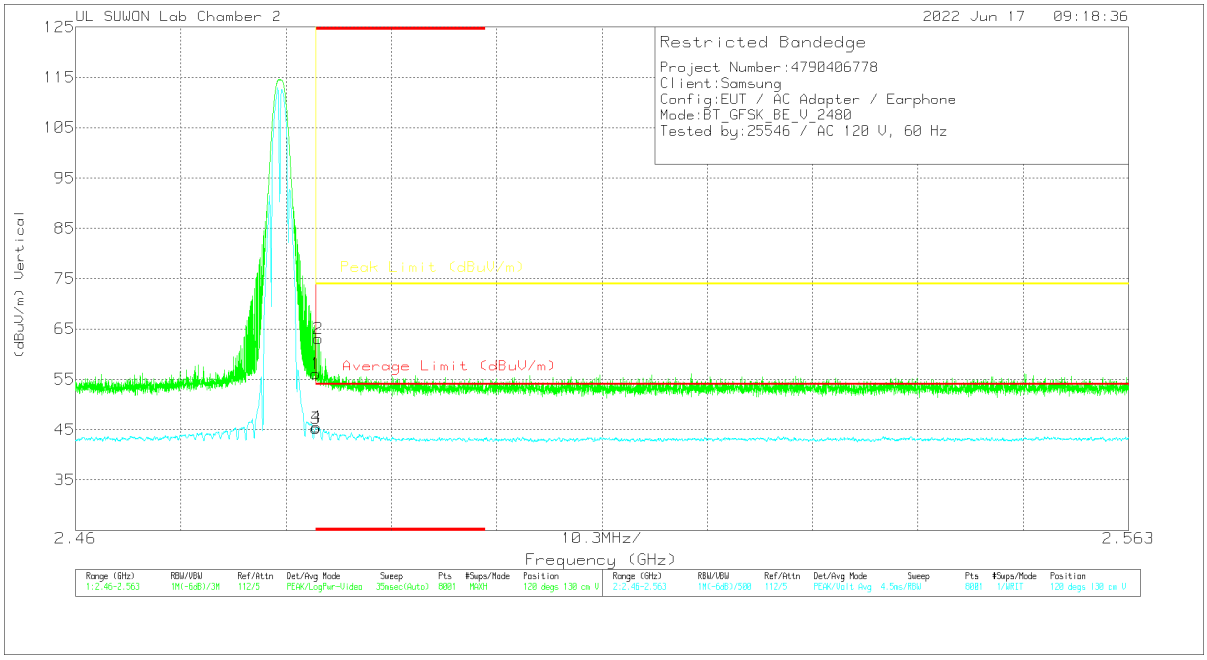
VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	43.66	Pk	32	-19.6	56.06	-	-	74	-17.94	120	130	V
2	* 2.48375	50.67	Pk	32	-19.6	63.07	-	-	74	-10.93	120	130	V
3	* 2.48351	32.9	VA1T	32	-19.6	45.3	54	-8.7	-	-	120	130	V
4	* 2.48356	33.17	VA1T	32	-19.6	45.57	54	-8.43	-	-	120	130	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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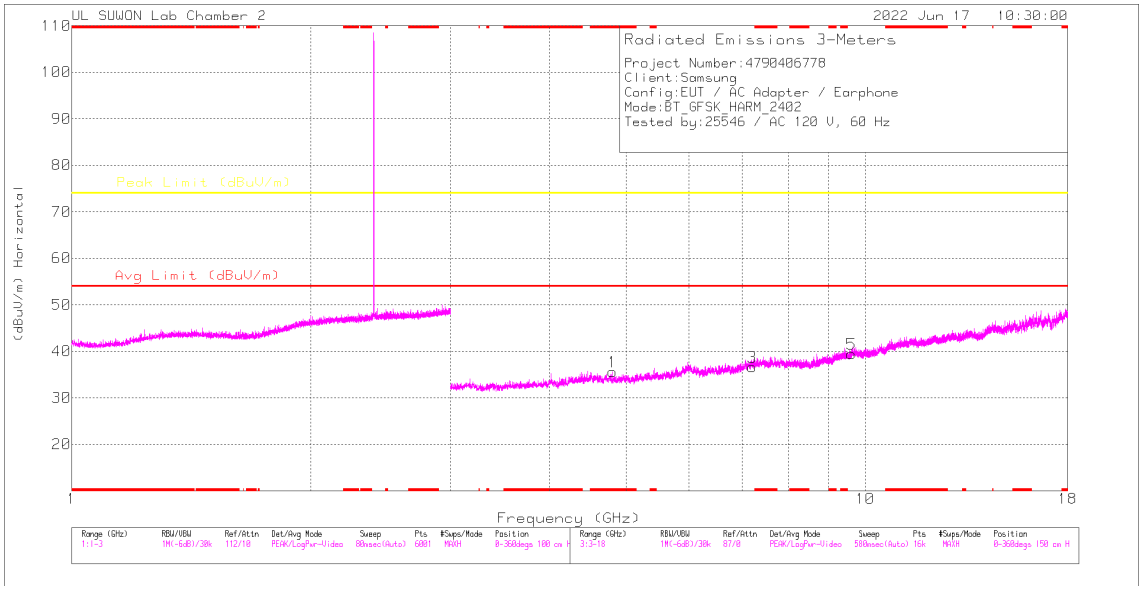
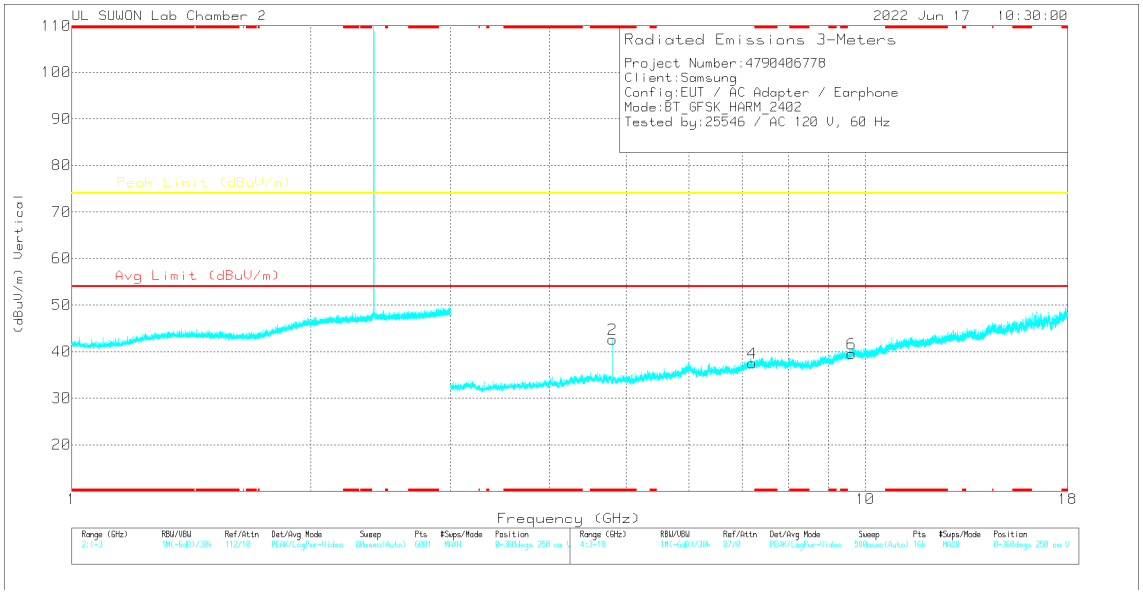
HARMONICS AND SPURIOUS EMISSIONS

0 CHANNEL RESULTS



HORIZONTAL



VERTICAL

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.80404	35.46	PKFH	34.1	-27.7	41.86	-	-	74	-32.14	143	100	H
* 4.80403	27.02	VA1T	34.1	-27.7	33.42	54	-20.58	-	-	143	100	H
* 4.80456	41.1	PKFH	34.1	-27.7	47.5	-	-	74	-26.5	187	118	V
* 4.80393	35.62	VA1T	34.1	-27.7	42.02	54	-11.98	-	-	187	118	V
7.19692	33.92	PKFH	36.2	-25	45.12	-	-	74	-28.88	0	100	H
7.19775	34.04	PKFH	36.2	-25	45.24	-	-	74	-28.76	0	100	V
9.60847	32.22	PKFH	37	-21.3	47.92	-	-	74	-26.08	0	100	H
9.61694	31.9	PKFH	37	-21.2	47.7	-	-	74	-26.3	0	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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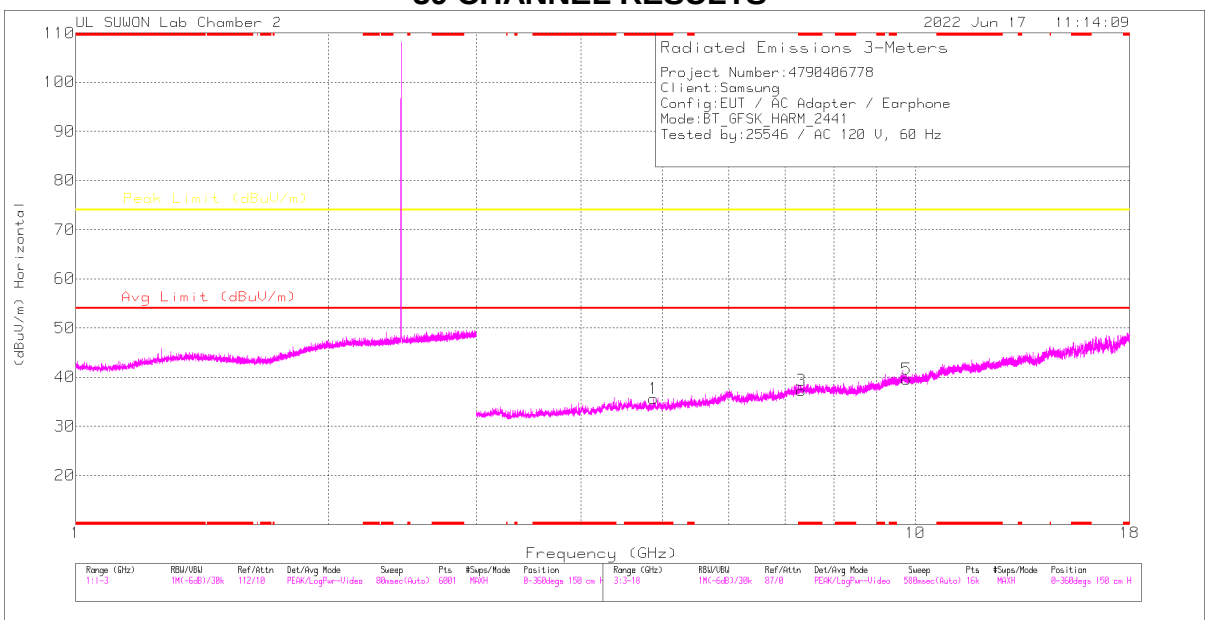
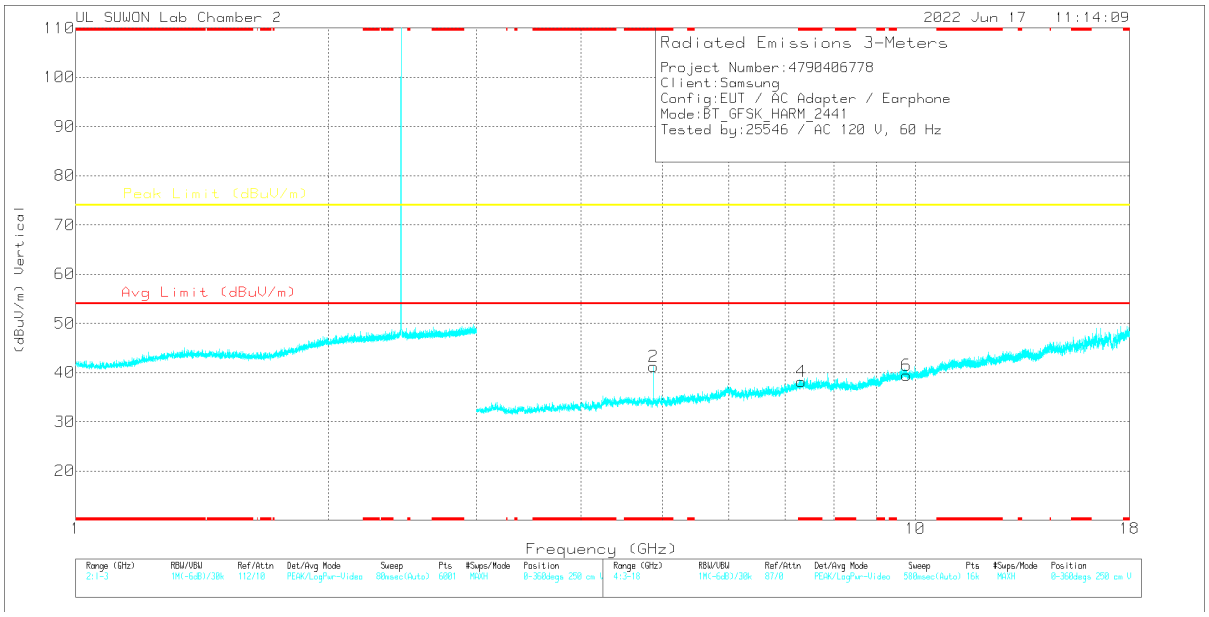
39 CHANNEL RESULTS



HORIZONTAL



VERTICAL

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.88196	36.31	PKFH	34.1	-27.6	42.81	-	-	74	-31.19	143	100	H
* 4.88203	26.83	VA1T	34.1	-27.6	33.33	54	-20.67	-	-	143	100	H
* 4.88231	40.74	PKFH	34.1	-27.6	47.24	-	-	74	-26.76	226	100	V
* 4.88202	34.51	VA1T	34.1	-27.6	41.01	54	-12.99	-	-	226	100	V
* 7.3179	34.2	PKFH	36.1	-24.6	45.7	-	-	74	-28.3	0	100	H
* 7.31516	34.07	PKFH	36.1	-24.6	45.57	-	-	74	-28.43	0	100	V
9.76675	31.69	PKFH	37.2	-21	47.89	-	-	74	-26.11	0	100	H
9.76237	31.51	PKFH	37.2	-21	47.71	-	-	74	-26.29	0	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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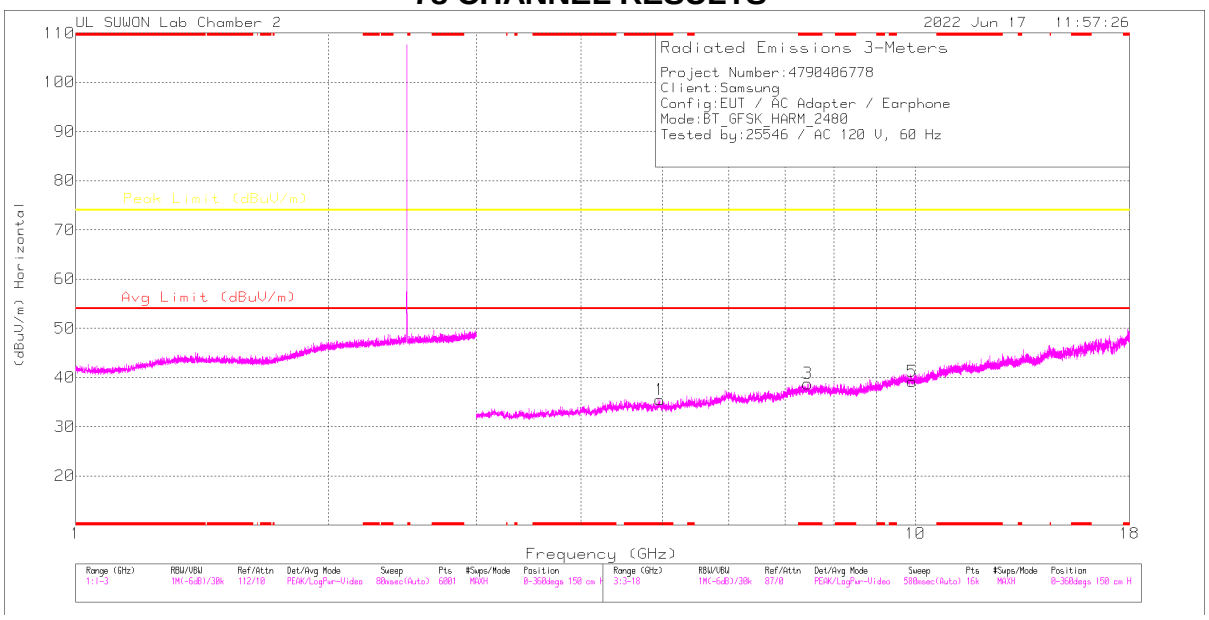
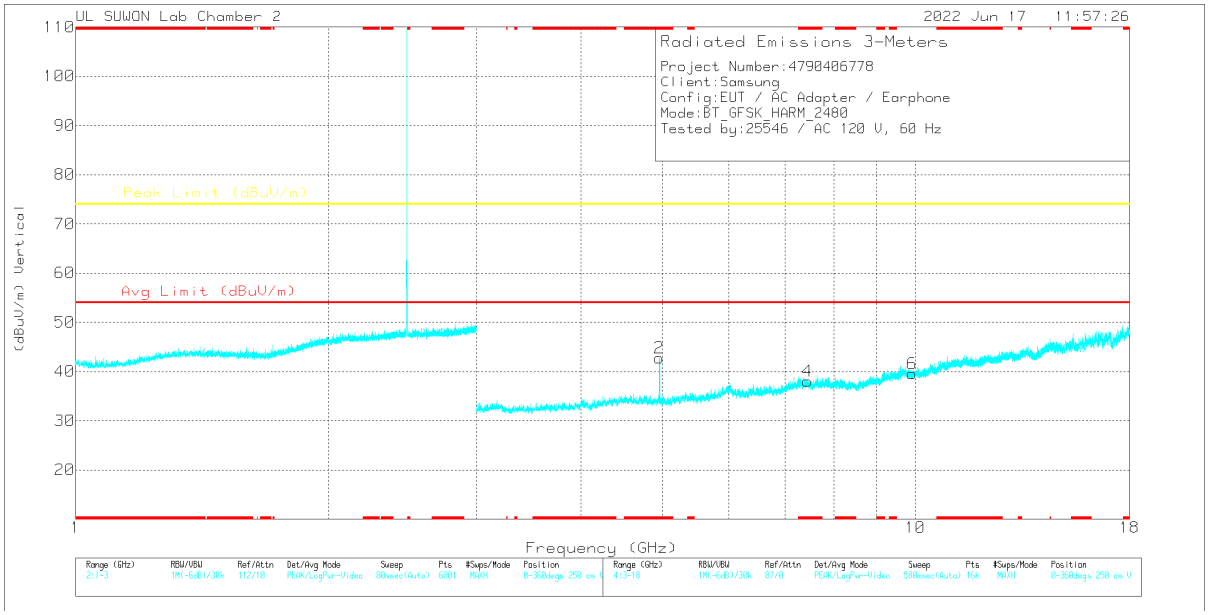
78 CHANNEL RESULTS



HORIZONTAL



VERTICAL

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.96001	35.99	PKFH	34.1	-27	43.09	-	-	74	-30.91	108	395	H
* 4.95994	26.59	VA1T	34.1	-27	33.69	54	-20.31	-	-	108	395	H
* 4.96023	40.18	PKFH	34.1	-27	47.28	-	-	74	-26.72	217	100	V
* 4.95999	35.55	VA1T	34.1	-27	42.65	54	-11.35	-	-	217	100	V
* 7.44306	33.89	PKFH	36	-23.7	46.19	-	-	74	-27.81	0	100	H
* 7.44661	32.98	PKFH	36	-23.8	45.18	-	-	74	-28.82	0	100	V
9.91426	30.66	PKFH	37.4	-21.1	46.96	-	-	74	-27.04	0	100	H
9.91449	31.09	PKFH	37.4	-21.1	47.39	-	-	74	-26.61	0	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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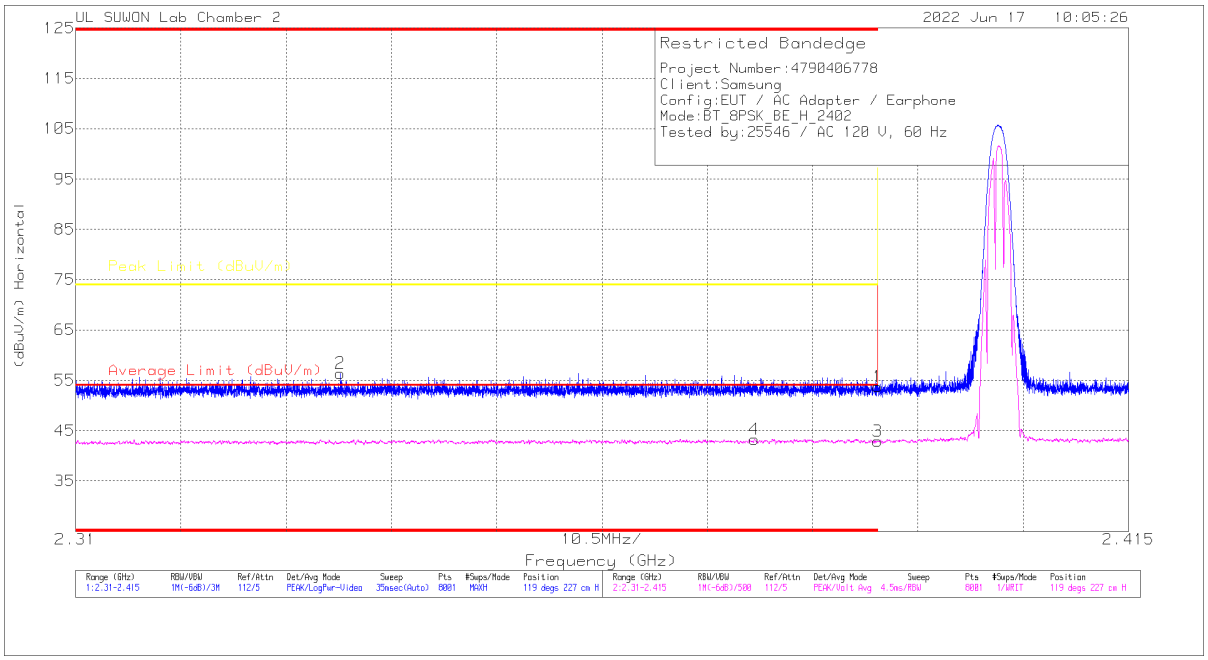
10.1.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

BANDEDGE (0 CHANNEL)

HORIZONTAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.49	Pk	31.9	-19.7	53.69	-	-	74	-20.31	119	227	H
2	* 2.33641	44.22	Pk	31.8	-19.6	56.42	-	-	74	-17.58	119	227	H
3	* 2.39	30.67	VA1T	31.9	-19.7	42.87	54	-11.13	-	-	119	227	H
4	* 2.37769	30.92	VA1T	31.9	-19.5	43.32	54	-10.68	-	-	119	227	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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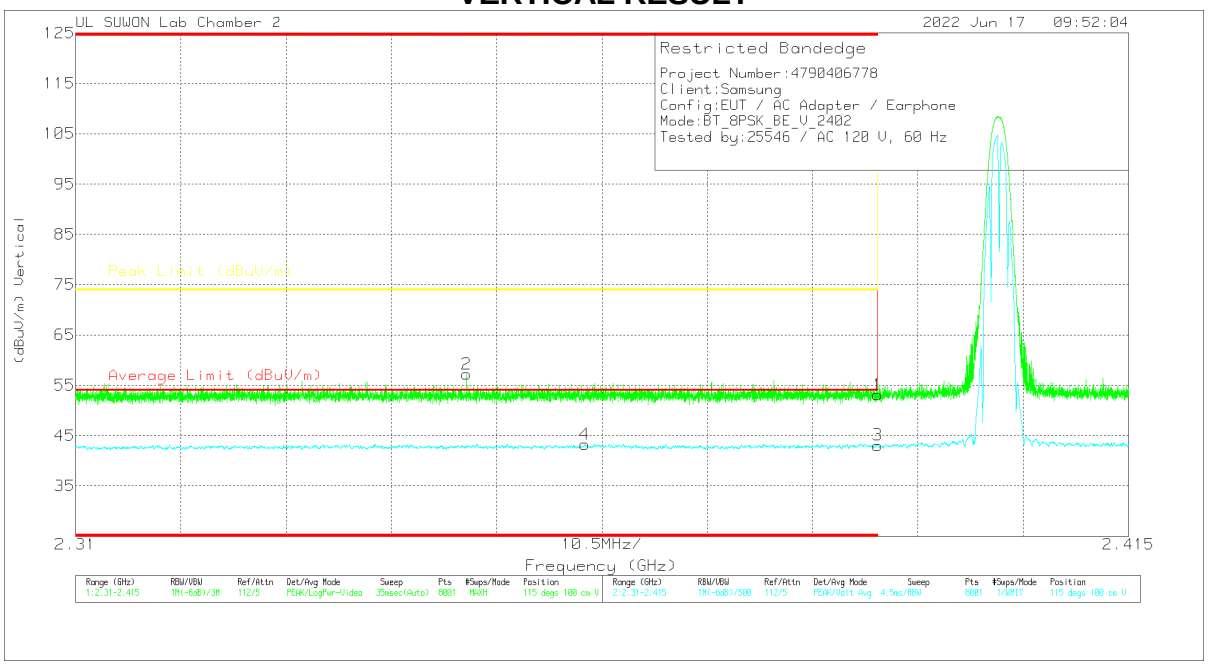
VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	40.89	Pk	31.9	-19.7	53.09	-	-	74	-20.91	115	100	V
2	* 2.34898	45.04	Pk	31.8	-19.6	57.24	-	-	74	-16.76	115	100	V
3	* 2.39	30.89	VA1T	31.9	-19.7	43.09	54	-10.91	-	-	115	100	V
4	* 2.36079	31.13	VA1T	31.8	-19.6	43.33	54	-10.67	-	-	115	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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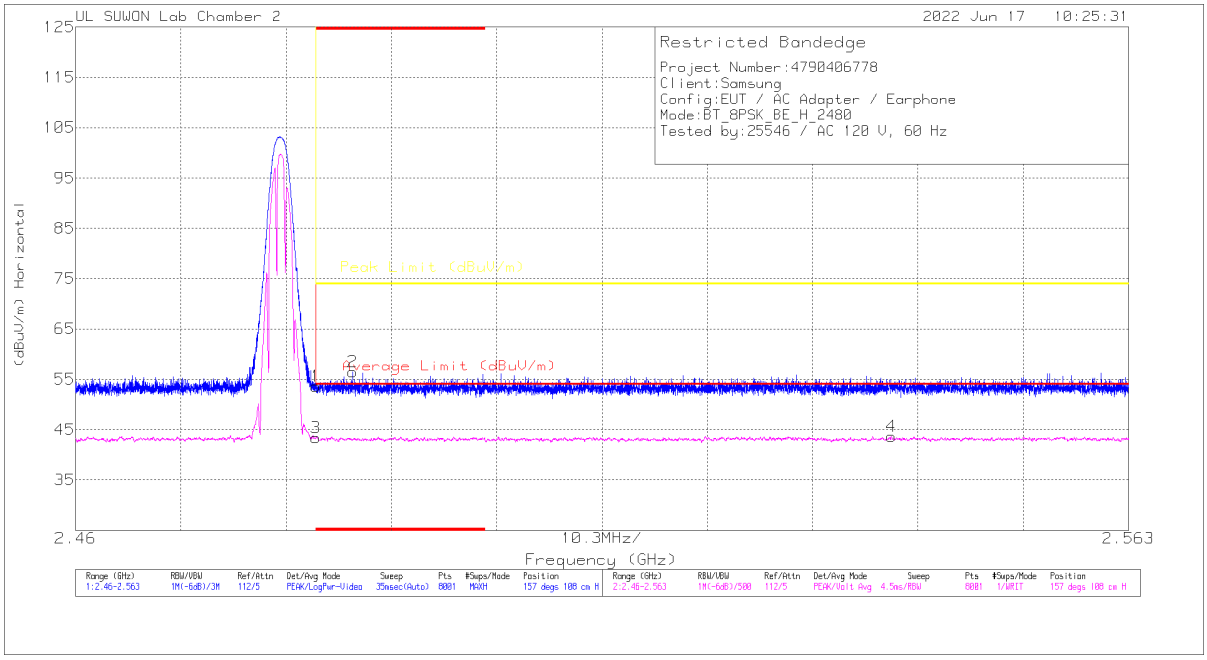
BANDEDGE (78 CHANNEL)

HORIZONTAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	41.22	Pk	32	-19.6	53.62	-	-	74	-20.38	157	108	H
2	* 2.48709	44.13	Pk	32	-19.6	56.53	-	-	74	-17.47	157	108	H
3	* 2.48351	31.04	VA1T	32	-19.6	43.44	54	-10.56	-	-	157	108	H
4	2.53979	31	VA1T	32.1	-19.4	43.7	54	-10.3	-	-	157	108	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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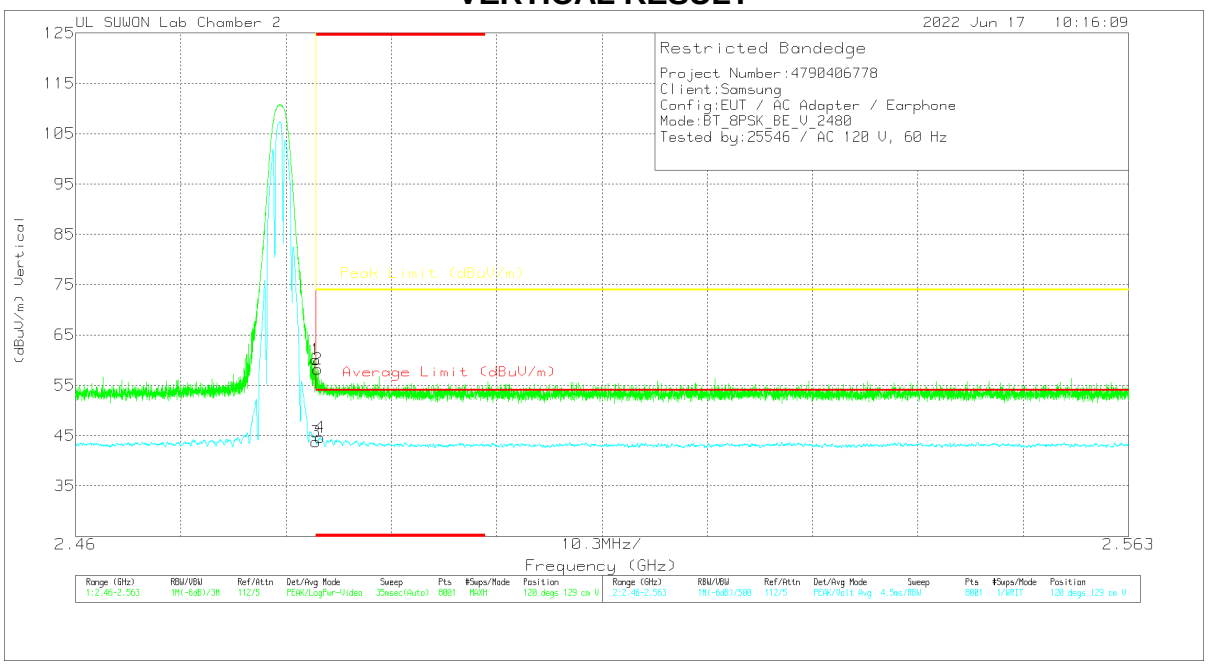
VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	47.72	Pk	32	-19.6	60.12	-	-	74	-13.88	120	129	V
2	* 2.48366	45.8	Pk	32	-19.6	58.2	-	-	74	-15.8	120	129	V
3	* 2.48351	31.32	VA1T	32	-19.6	43.72	54	-10.28	-	-	120	129	V
4	* 2.48393	32.28	VA1T	32	-19.6	44.68	54	-9.32	-	-	120	129	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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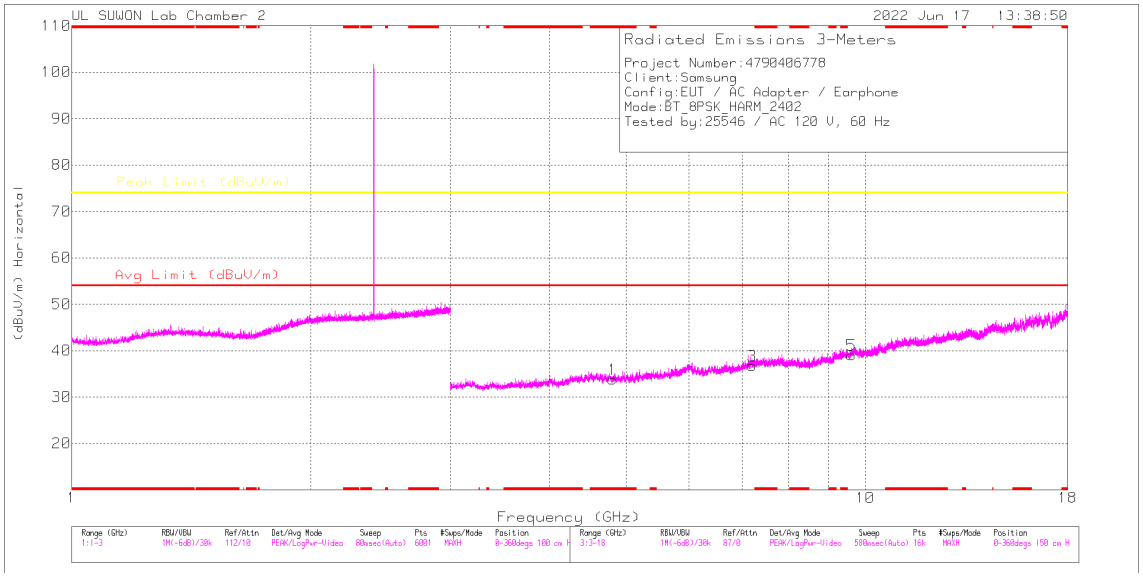
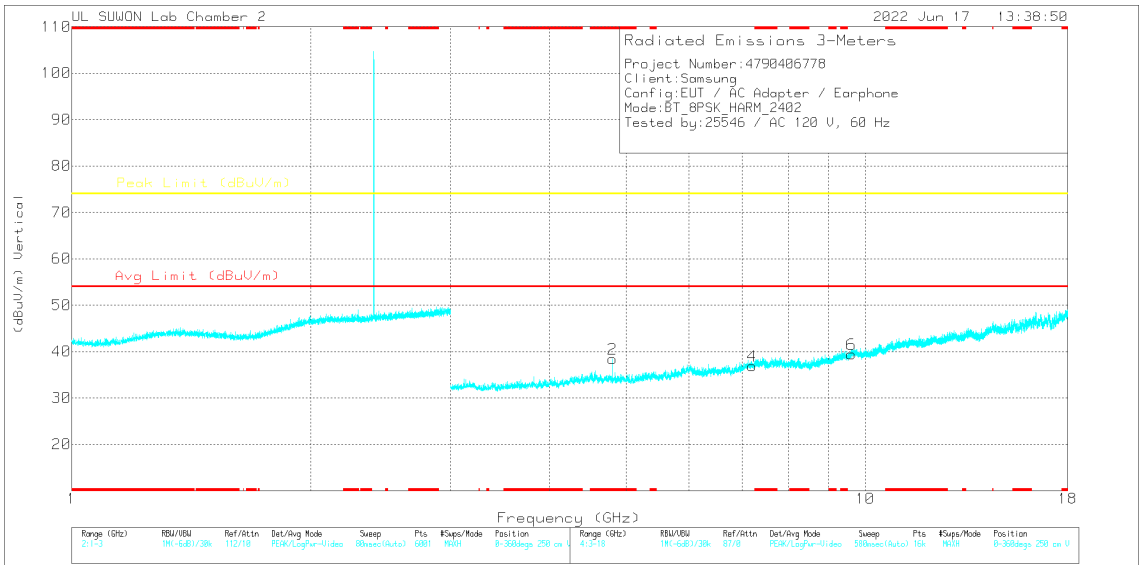
HARMONICS AND SPURIOUS EMISSIONS

0 CHANNEL RESULTS



HORIZONTAL



VERTICAL

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.80397	35.39	PKFH	34.1	-27.7	41.79	-	-	74	-32.21	142	101	H
* 4.80407	24.84	VA1T	34.1	-27.7	31.24	54	-22.76	-	-	142	101	H
* 4.80377	39.11	PKFH	34.1	-27.7	45.51	-	-	74	-28.49	187	118	V
* 4.80406	29.96	VA1T	34.1	-27.7	36.36	54	-17.64	-	-	187	118	V
7.20301	33.73	PKFH	36.2	-25	44.93	-	-	74	-29.07	0	100	H
7.21334	33.46	PKFH	36.2	-25.1	44.56	-	-	74	-29.44	0	100	V
9.60011	32.58	PKFH	37	-21.4	48.18	-	-	74	-25.82	0	100	H
9.61231	30.9	PKFH	37	-21.3	46.6	-	-	74	-27.4	0	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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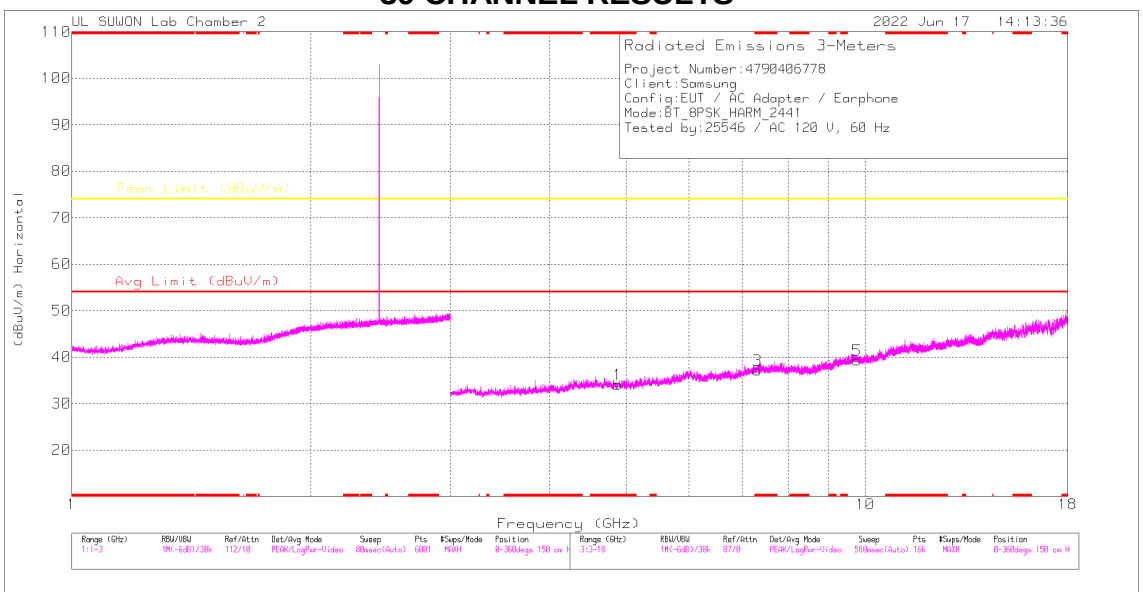
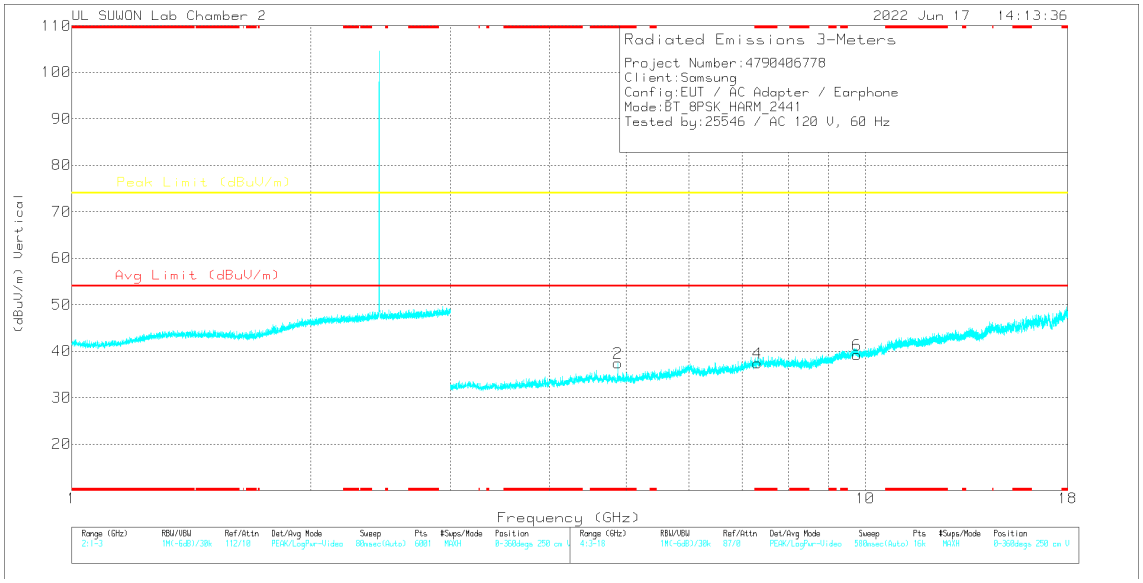
39 CHANNEL RESULTS



HORIZONTAL



VERTICAL

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.88121	35.73	PKFH	34.1	-27.6	42.23	-	-	74	-31.77	142	100	H
* 4.8821	24.55	VA1T	34.1	-27.6	31.05	54	-22.95	-	-	142	100	H
* 4.88172	37.69	PKFH	34.1	-27.6	44.19	-	-	74	-29.81	218	100	V
* 4.88202	28.97	VA1T	34.1	-27.6	35.47	54	-18.53	-	-	218	100	V
* 7.32591	33.74	PKFH	36.1	-24.4	45.44	-	-	74	-28.56	0	100	H
* 7.32003	33.31	PKFH	36.1	-24.6	44.81	-	-	74	-29.19	0	100	V
9.76355	31.68	PKFH	37.2	-21	47.88	-	-	74	-26.12	0	100	H
9.75462	32.17	PKFH	37.2	-20.9	48.47	-	-	74	-25.53	0	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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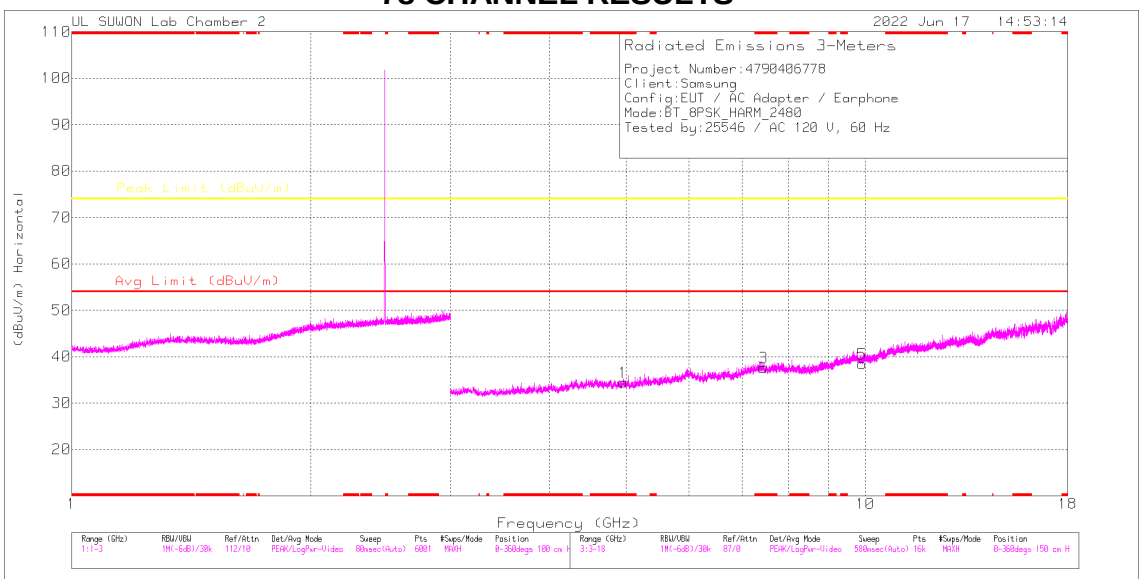
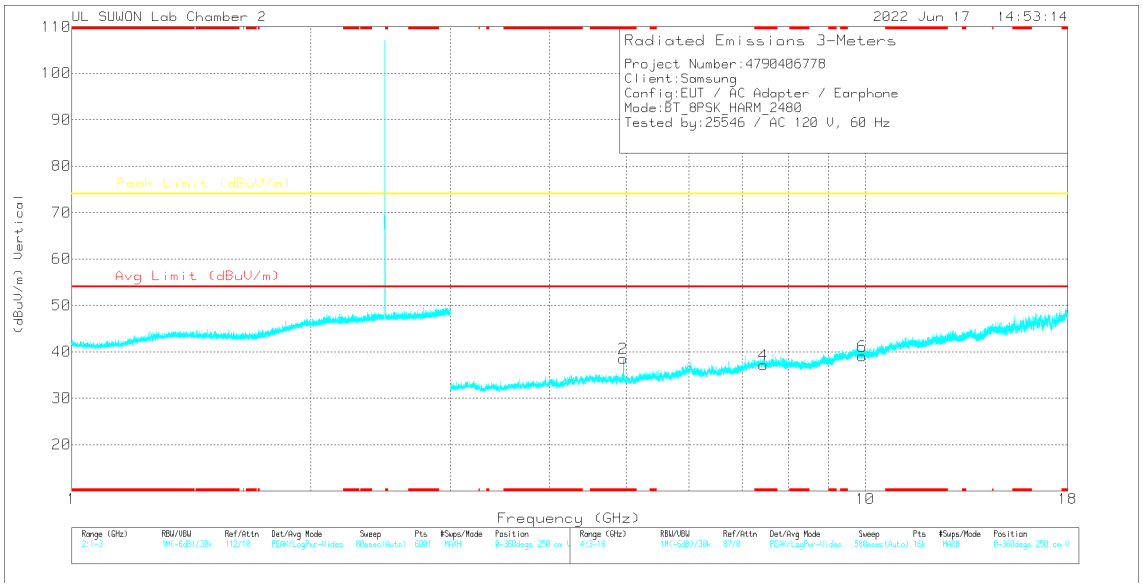
78 CHANNEL RESULTS



HORIZONTAL



VERTICAL

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.95854	35.12	PKFH	34.1	-27	42.22	-	-	74	-31.78	107	393	H
* 4.96005	24.59	VA1T	34.1	-27	31.69	54	-22.31	-	-	107	393	H
* 4.95976	38.42	PKFH	34.1	-27	45.52	-	-	74	-28.48	217	100	V
* 4.95999	29.96	VA1T	34.1	-27	37.06	54	-16.94	-	-	217	100	V
* 7.43853	33.13	PKFH	36	-23.7	45.43	-	-	74	-28.57	0	100	H
* 7.44993	33.29	PKFH	36	-23.8	45.49	-	-	74	-28.51	0	100	V
9.92383	31.05	PKFH	37.4	-21	47.45	-	-	74	-26.55	0	100	H
9.92355	31.01	PKFH	37.4	-21	47.41	-	-	74	-26.59	0	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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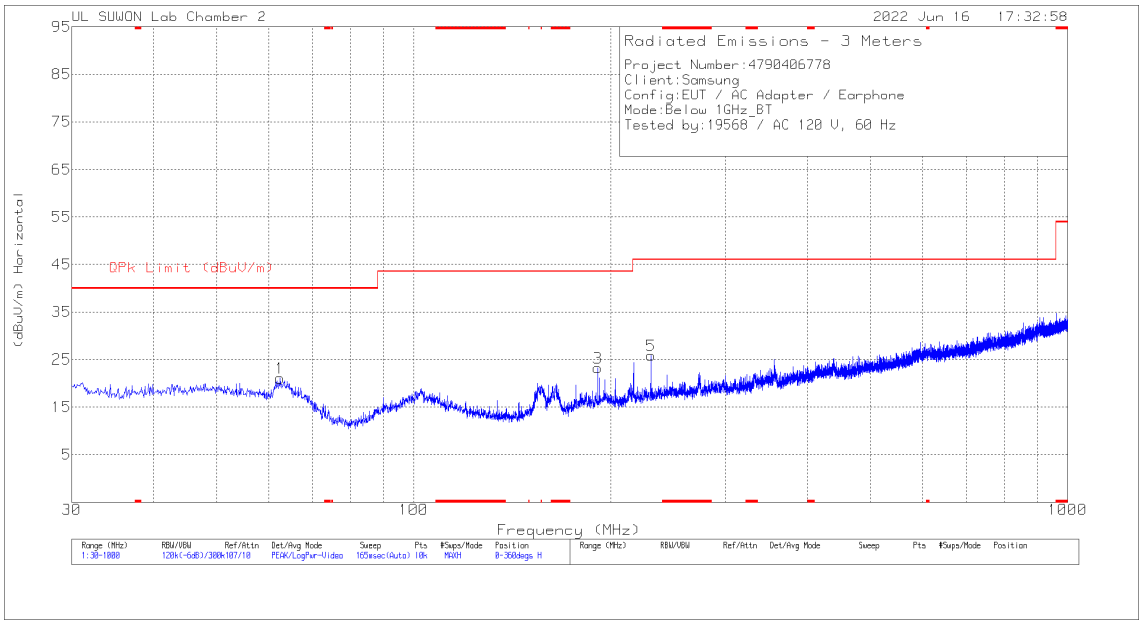
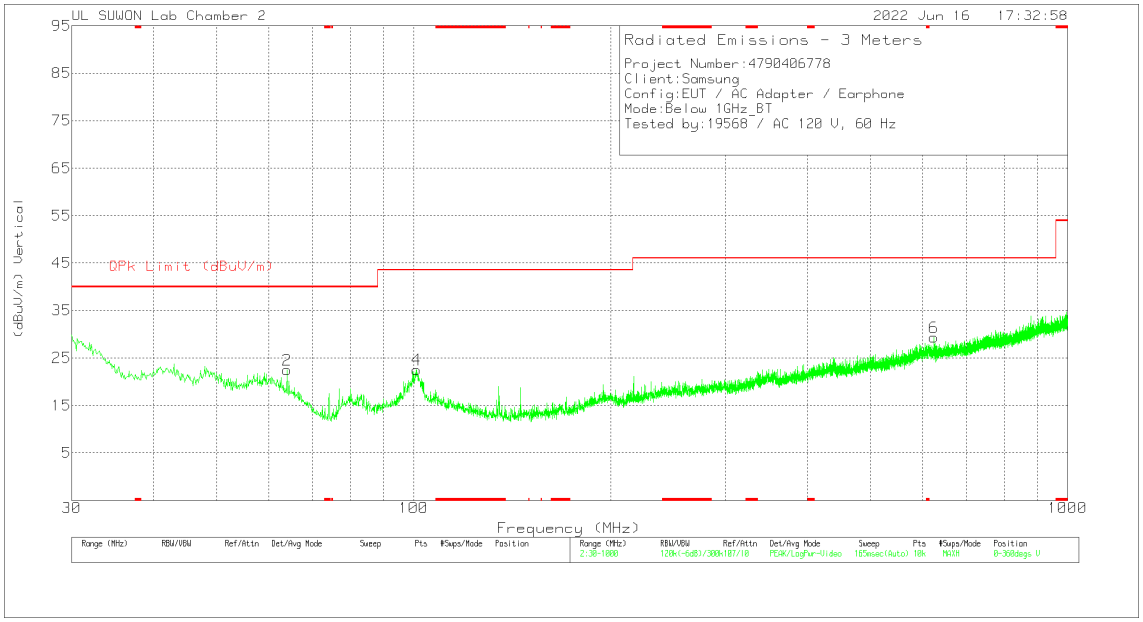
10.2. WORST CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)



HORIZONTAL



VERTICAL

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below 1G[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	62.495	34.27	Pk	17.9	-31.1	0	21.07	40	-18.93	0-360	300	H
3	191.117	36.46	Pk	16.6	-29.8	0	23.26	43.52	-20.26	0-360	100	H
5	230.499	37.78	Pk	17.6	-29.5	0	25.88	46.02	-20.14	0-360	100	H
2	64.047	36.15	Pk	17.4	-31.1	0	22.45	40	-17.55	0-360	100	V
4	101.101	35.66	Pk	17.5	-30.6	0	22.56	43.52	-20.96	0-360	100	V
6	624.804	31.81	Pk	25	-27.4	0	29.41	46.02	-16.61	0-360	100	V

Pk - Peak detector

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11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10:2013.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

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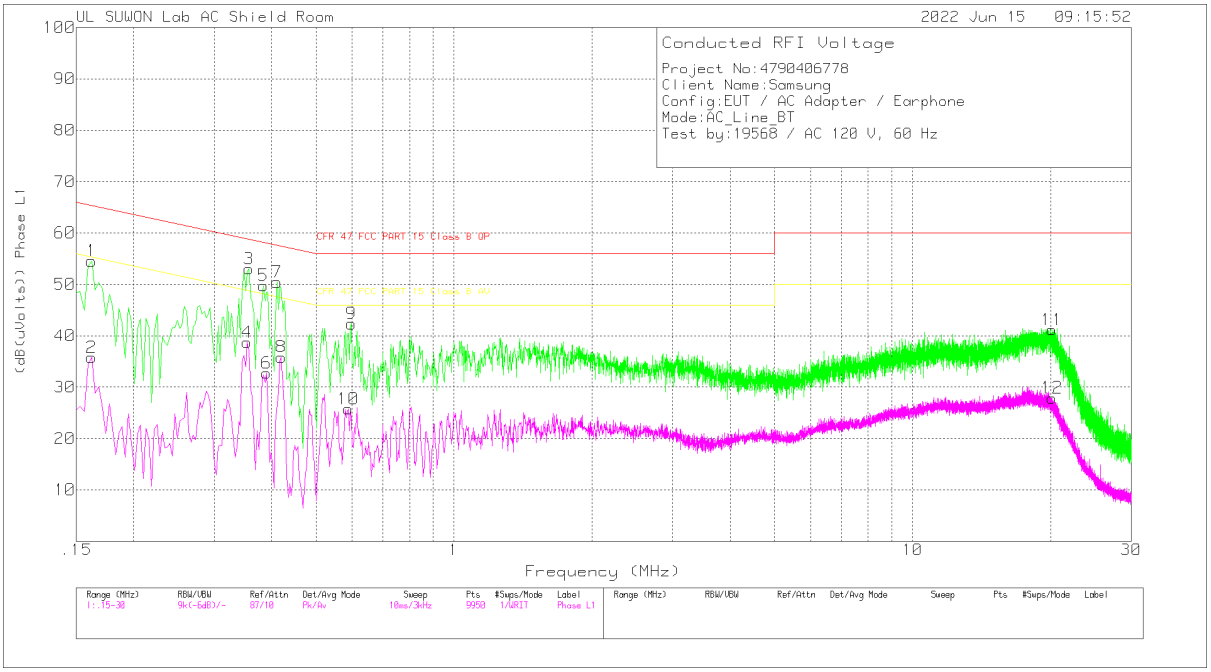
11.1. AC Power Line

LINE 1 RESULTS



Trace Markers

Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_L1[dB]	CABLELOSS(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
1	.162	44.57	Pk	9.9	.1	54.57	65.36	-10.79	-	-
2	.162	25.78	Av	9.9	.1	35.78	-	-	55.36	-19.58
3	.357	43.02	Pk	9.8	.2	53.02	58.8	-5.78	-	-
4	.354	28.73	Av	9.8	.2	38.73	-	-	48.87	-10.14
5	.384	39.75	Pk	9.8	.2	49.75	58.19	-8.44	-	-
6	.39	22.72	Av	9.8	.2	32.72	-	-	48.06	-15.34
7	.411	40.43	Pk	9.8	.2	50.43	57.63	-7.2	-	-
8	.42	25.85	Av	9.8	.2	35.85	-	-	47.45	-11.6
9	.597	32.35	Pk	9.8	.2	42.35	56	-13.65	-	-
10	.588	15.75	Av	9.8	.2	25.75	-	-	46	-20.25
11	20.154	30.56	Pk	10.2	.4	41.16	60	-18.84	-	-
12	20.154	17.3	Av	10.2	.4	27.9	-	-	50	-22.1

Pk - Peak detector
Av - Average detection

Quasi-Peak Emissions

Range 1: Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_L1[dB]	CABLELOSS(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
.16215	42.58	Qp	9.9	.1	52.58	65.35	-12.77	-	-
.35625	40.59	Qp	9.8	.2	50.59	58.82	-8.23	-	-
.38475	37.38	Qp	9.8	.2	47.38	58.18	-10.8	-	-
.41175	33.23	Qp	9.8	.2	43.23	57.61	-14.38	-	-

Qp - Quasi-Peak detector

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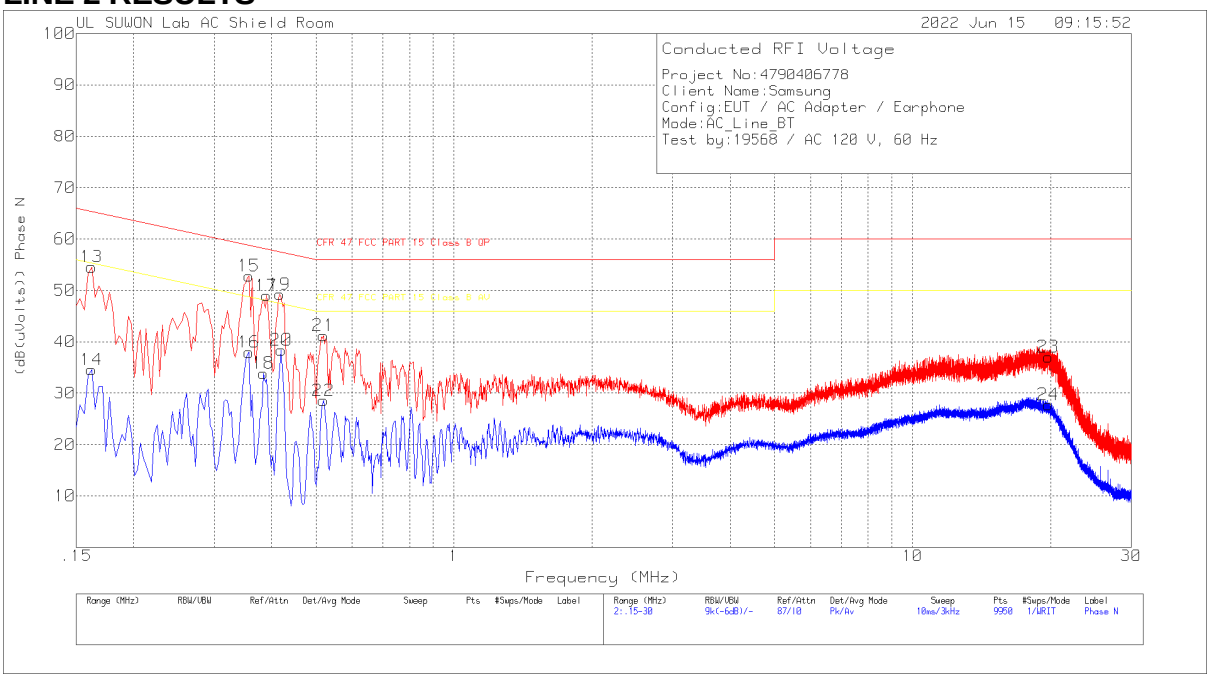
LINE 2 RESULTS



Trace Markers

Range 2: Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_N[dB]	CABLELOSS(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
13	.162	44.57	Pk	9.9	.1	54.57	65.36	-10.79	-	-
14	.162	24.55	Av	9.9	.1	34.55	-	-	55.36	-20.81
15	.357	42.81	Pk	9.8	.2	52.81	58.8	-5.99	-	-
16	.357	27.95	Av	9.8	.2	37.95	-	-	48.8	-10.85
17	.39	38.98	Pk	9.8	.2	48.98	58.06	-9.08	-	-
18	.384	23.87	Av	9.8	.2	33.87	-	-	48.19	-14.32
19	.417	39.25	Pk	9.8	.2	49.25	57.51	-8.26	-	-
20	.42	28.37	Av	9.8	.2	38.37	-	-	47.45	-9.08
21	.519	31.11	Pk	9.9	.2	41.21	56	-14.79	-	-
22	.519	18.46	Av	9.9	.2	28.56	-	-	46	-17.44
23	19.776	26.46	Pk	10.2	.4	37.06	60	-22.94	-	-
24	19.776	17.14	Av	10.2	.4	27.74	-	-	50	-22.26

Pk - Peak detector
Av - Average detection

Quasi-Peak Emissions

Range 2: Phase N .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_N[dB]	CABLELOSS(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
.16125	41.92	Qp	9.9	.1	51.92	65.4	-13.48	-	-
.35625	40.32	Qp	9.8	.2	50.32	58.82	-8.5	-	-
.38475	36.78	Qp	9.8	.2	46.78	58.18	-11.4	-	-
.41775	36.4	Qp	9.8	.2	46.4	57.49	-11.09	-	-

Qp - Quasi-Peak detector

END OF TEST REPORT

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