



FCC CFR47 PART 15 SUBPART C

Bluetooth

C2PC CERTIFICATION TEST REPORT

FOR

WCDMA/LTE Watch + Bluetooth/BLE and DTS b/g/n

MODEL NUMBER : SM-R765T, SM-R765A

FCC ID: A3LSMR765U

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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	12/12/16	Initial issue	Junwhan Lee
V2	12/13/16	Addressed TCB's questions	Junwhan Lee

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION: WCDMA/LTE Watch + Bluetooth/BLE and DTS b/g/n
MODEL NUMBER: SM-R765T, SM-R765A
SERIAL NUMBER: R3AH80076HN, R3AH80078JW, R3AH800781V (RADIATED)
DATE TESTED: DEC 07, 2016 - DEC 11, 2016

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass

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:



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Tested By:



Junwhan Lee
Suwon Lab Engineer
UL Korea, Ltd.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15.

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	
<input checked="" type="checkbox"/>	Chamber 1
<input type="checkbox"/>	Chamber 2

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at <http://www.iasonline.org/PDF/TL/TL-637.pdf>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

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	2.32 dB
Radiated Disturbance, Below 1GHz	4.14 dB
Radiated Disturbance, Above 1 GHz	5.97 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a WCDMA/LTE Watch + Bluetooth/BLE and DTS b/g/n.
 This test report addresses the DSS (BT) operational mode.

SM-R765T and SM-R765A are same H/W and only difference is supported band.
 Band4 (LTE and WCDMA) of SM-R765A are disabled by S/W.
 SM-R765T was used for the test.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

Frequency Range [MHz]	Mode	Power Mode	Output Power [dBm]	Output Power [mW]
2402 - 2480	Basic GFSK	Average	14.475	28.022
		Peak	14.856	30.591
	Enhanced Pi/4-DPSK	Average	13.544	22.615
		Peak	13.707	23.480
	Enhanced 8PSK	Average	13.386	21.807
		Peak	13.576	22.782

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain of -4.5 dBi.

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 Z orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Z orientation.

Note: 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. For average power data please refer to section 8.6.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Adapter	SAMSUNG	ETA0U60JBE	RT2H608ES/7-E	N/A
Data Cable	SAMSUNG	ECB-DU2EBE	N/A	N/A
Wireless Charger	SAMSUNG	EP-YO760	RF7HA2DVAYVCIS	A3LEPYO760

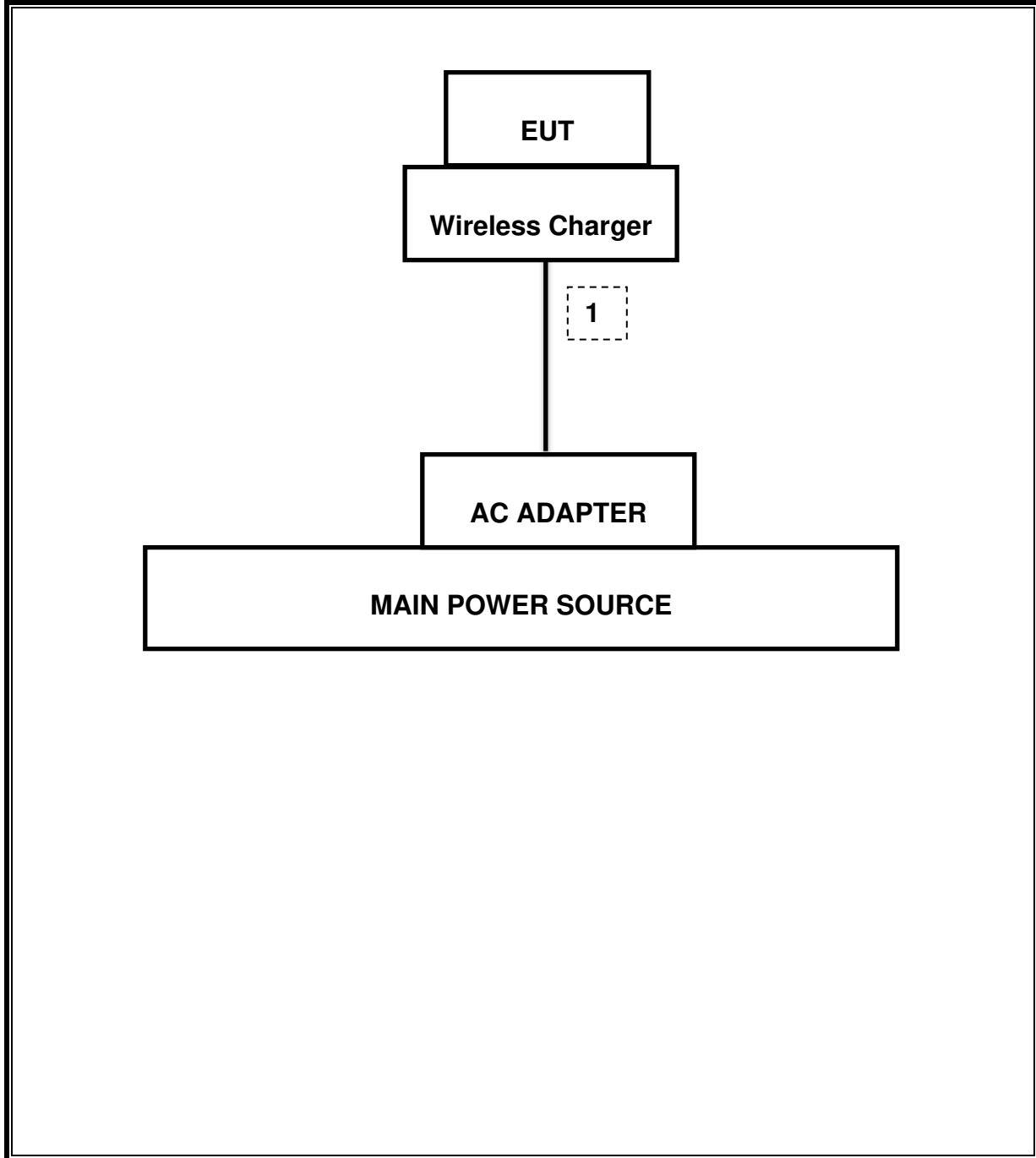
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	Mini-USB	Shielded	0.8m	N/A

TEST SETUP

The EUT is continuously communicating to the Bluetooth tester during the tests. EUT was set in the Hidden menu mode to enable BT communications.

SETUP DIAGRAM FOR TESTS



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	749	04-25-17
Antenna, Horn, 18 GHz	ETS	3115	00161451	05-17-17
Antenna, Horn, 18 GHz	ETS	3117	00168724	06-17-17
Antenna, Horn, 18 GHz	ETS	3117	00168717	06-17-17
Antenna, Horn, 40 GHz	ETS	3116C	00166155	11-30-17
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	12-15-17
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-17-17
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-16-17
Preamplifier	ETS	3115-PA	00167475	08-17-17
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-16-17
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-17-17
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-16-17
Bluetooth Tester	TESCOM	TC-3000C	3000C000546	08-18-17
Average Power Sensor	R&S	NRZ-Z91	102681	08-16-17
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-17-17
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-17-17
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-16-17
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-16-17
Attenuator / Switch driver	HP	11713A	3748A04272	N/A
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	08-17-17
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	08-16-17
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	08-17-17
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	08-16-17
High Pass Filter 6GHz	Micro-Tronics	HPM17542	009	08-17-17
High Pass Filter 6GHz	Micro-Tronics	HPM17542	016	08-16-17
LISN	R&S	ENV-216	101836	08-16-17
LISN	R&S	ENV-216	101837	08-16-17
Attenuator	PASTERNAK	PE7087-10	A009	08-16-17
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	11-25-17

7. SUMMARY TABLE

C2PC Reason

: The changes of this C2PC model are two matching component of Bluetooth/Wi-Fi antenna.
 So we tested only conducted output power, Bluetooth/Wi-Fi radiated and AC conducted emission items.

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result	Worst Case
2.1049	Occupied Band width (99%)	N/A	Conducted	Pass	See original
2.1051, 15.247 (d)	Band Edge / Conducted Spurious Emission	-20dBc		Pass	See original
15.247 (b)(1)	TX conducted output power	<21dBm		Pass	14.856 dBm (Pk)
15.247 (a)(1)	Hopping frequency separation	> 25KHz		Pass	See original
15.247 (a)(1)(iii)	Number of Hopping channels	More than 15 non-overlapping channels		Pass	See original
15.247 (a)(1)(iii)	Avg Time of Occupancy	< 0.4sec		Pass	See original
15.207 (a)	AC Power Line conducted emissions	Section 10	Power Line conducted	Pass	45.32 dBuV (Pk)
15.205, 15.209	Radiated Spurious Emission	< 54dBuV/m	Radiated	Pass	40.17 dBuV/m (Av)

8. OUTPUT POWER

LIMIT

§15.247 (b) (1)

The maximum antenna gain is less than 6 dBi, therefore the limit is 21 dBm.

TEST PROCEDURE

DA 00-705: 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

8.1.1. BASIC DATA RATE GFSK MODULATION

Channel	Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
Low	2402	14.856	21	-6.144
Middle	2441	13.707	21	-7.293
High	2480	13.576	21	-7.424
Worst		14.856	21	-6.144

8.1.2. ENHANCED DATA RATE Pi/4-DPSK MODULATION

Channel	Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
Low	2402	11.835	21	-9.165
Middle	2441	10.404	21	-10.596
High	2480	10.428	21	-10.572
Worst		11.835	21	-9.165

8.1.3. ENHANCED DATA RATE 8PSK MODULATION

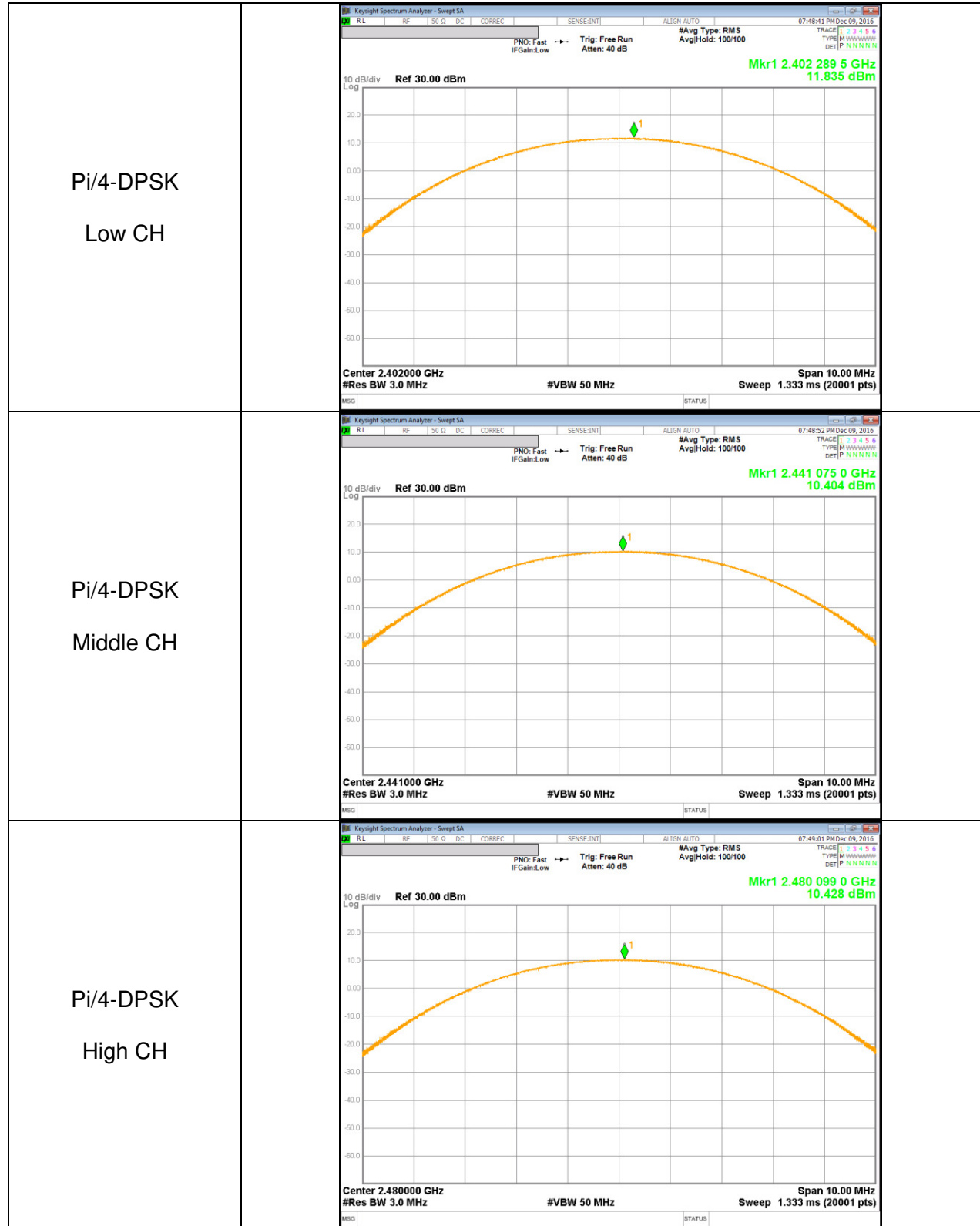
Channel	Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
Low	2402	12.428	21	-8.572
Middle	2441	11.122	21	-9.878
High	2480	11.071	21	-9.929
Worst		12.428	21	-8.572

8.1.4. OUTPUT POWER PLOTS

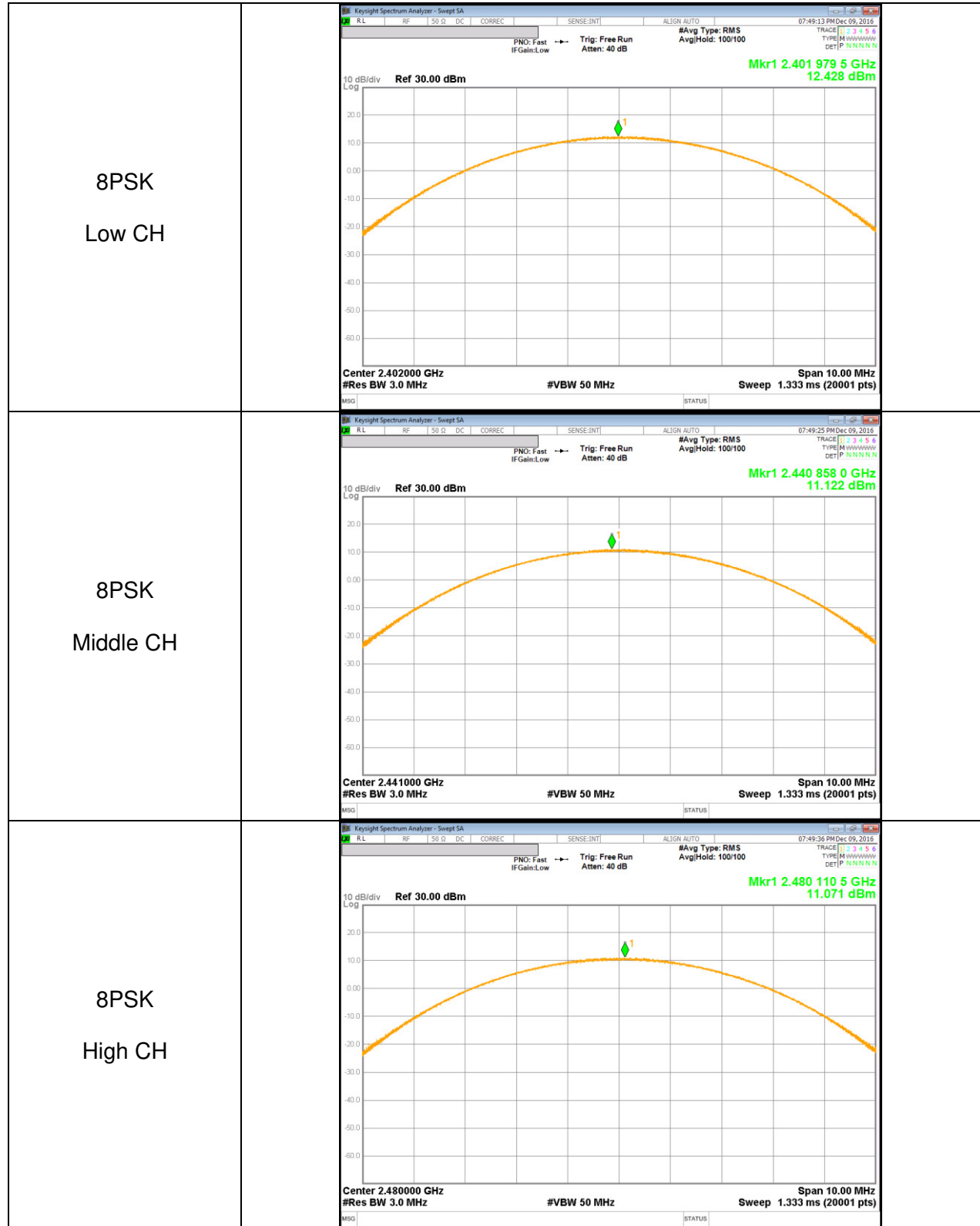
GFSK OUTPUT POWER

<p>GFSK Low CH</p>	<p>Key parameters for GFSK Low CH:</p> <ul style="list-style-type: none"> Center: 2.402000 GHz Res BW: 3.0 MHz Span: 10.00 MHz VBW: 50 MHz Sweep: 1.333 ms (20001 pts) Peak Power (Mkr1): 2.402 038 5 GHz, 14.856 dBm Reference: 30.00 dBm
<p>GFSK Middle CH</p>	<p>Key parameters for GFSK Middle CH:</p> <ul style="list-style-type: none"> Center: 2.441000 GHz Res BW: 3.0 MHz Span: 10.00 MHz VBW: 50 MHz Sweep: 1.333 ms (20001 pts) Peak Power (Mkr1): 2.440 932 5 GHz, 13.707 dBm Reference: 30.00 dBm
<p>GFSK High CH</p>	<p>Key parameters for GFSK High CH:</p> <ul style="list-style-type: none"> Center: 2.480000 GHz Res BW: 3.0 MHz Span: 10.00 MHz VBW: 50 MHz Sweep: 1.333 ms (20001 pts) Peak Power (Mkr1): 2.479 768 5 GHz, 13.576 dBm Reference: 30.00 dBm

Pi/4-DPSK OUTPUT POWER



8PSK OUTPUT POWER



8.2. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

DA 00-705: The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 10.1 dB (including 10 dB pad and 0.1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

8.2.1. BASIC DATA RATE GFSK MODULATION

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2402	14.475	28.02
Middle	2441	13.544	22.62
High	2480	13.386	21.81

8.2.2. DATA RATE PI/4-DQPSK MODULATION

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2402	9.091	8.11
Middle	2441	7.728	5.93
High	2480	7.845	6.09

8.2.3. ENHANCED DATA RATE 8PSK MODULATION

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2402	9.122	8.17
Middle	2441	7.770	5.98
High	2480	7.901	6.17

9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits ($\mu\text{V}/\text{m}$)	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.

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.

$$\text{GFSK} = 1/T = 1 / 0.0029\text{S} = 350\text{Hz}.$$

The minimum VBW was 350Hz, but test receiver(ESU40) couldn't set value 350Hz. 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.

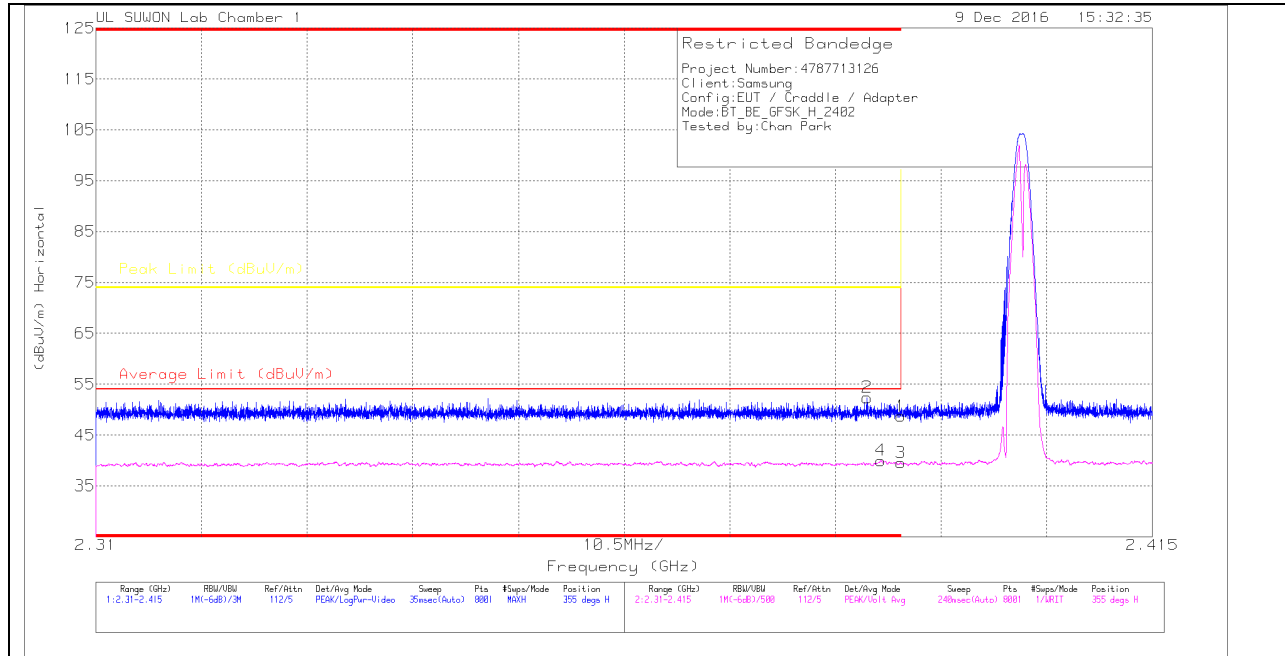
Formula for converting the filed strength from uV/m to dBuV/m is:
Limit (dBuV/m) = 20 log limit (uV/m)

9.2. TRANSMITTER ABOVE 1 GHz

9.2.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

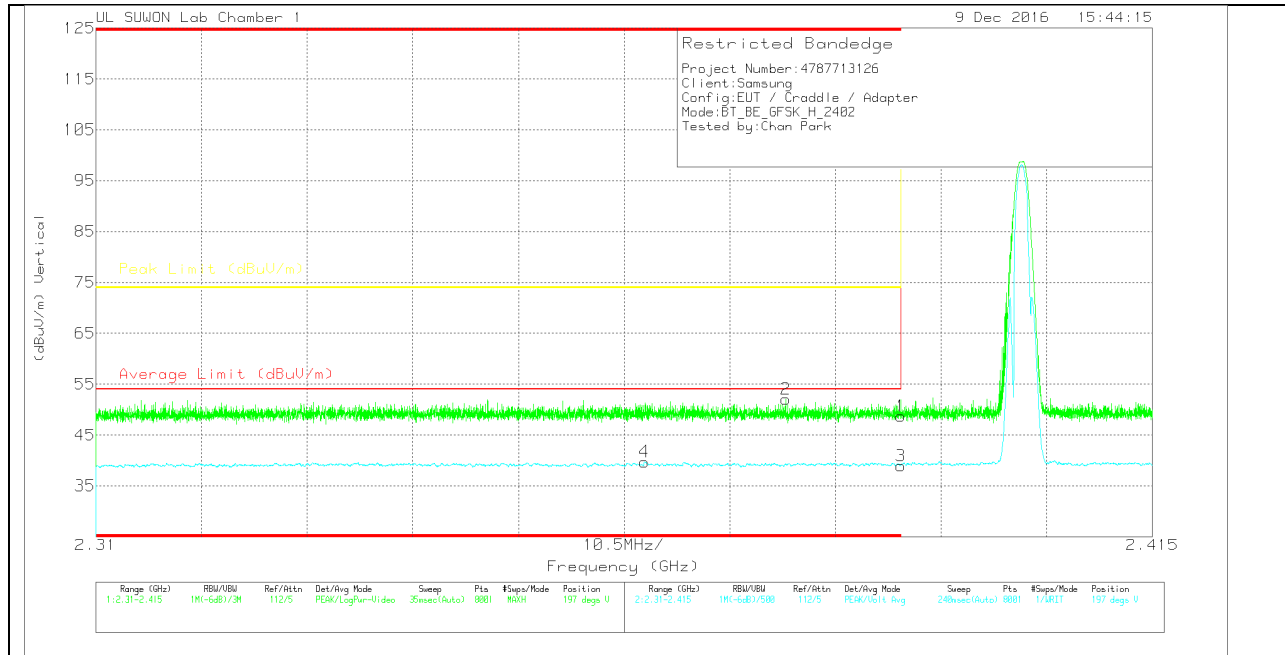
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	10dB[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	45.35	Pk	31.8	-28.4	48.75	-	-	74	-25.25	355	247	H
2	* 2.387	49.07	PK	31.8	-28.5	52.37	-	-	74	-21.63	355	247	H
3	* 2.39	36.16	VA1T	31.8	-28.4	39.56	54	-14.44	-	-	355	247	H
4	* 2.388	36.6	VA1T	31.8	-28.4	40	54	-14	-	-	355	247	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average $V_B=1/T_{on}$ where: T_{on} is transmit duration

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	10dB[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	45.31	Pk	31.8	-28.4	48.71	-	-	74	-25.29	197	112	V
2	* 2.379	48.75	Pk	31.8	-28.5	52.05	-	-	74	-21.95	197	112	V
3	* 2.39	35.58	VA1T	31.8	-28.4	38.98	54	-15.02	-	-	197	112	V
4	* 2.365	36.35	VA1T	31.8	-28.4	39.75	54	-14.25	-	-	197	112	V

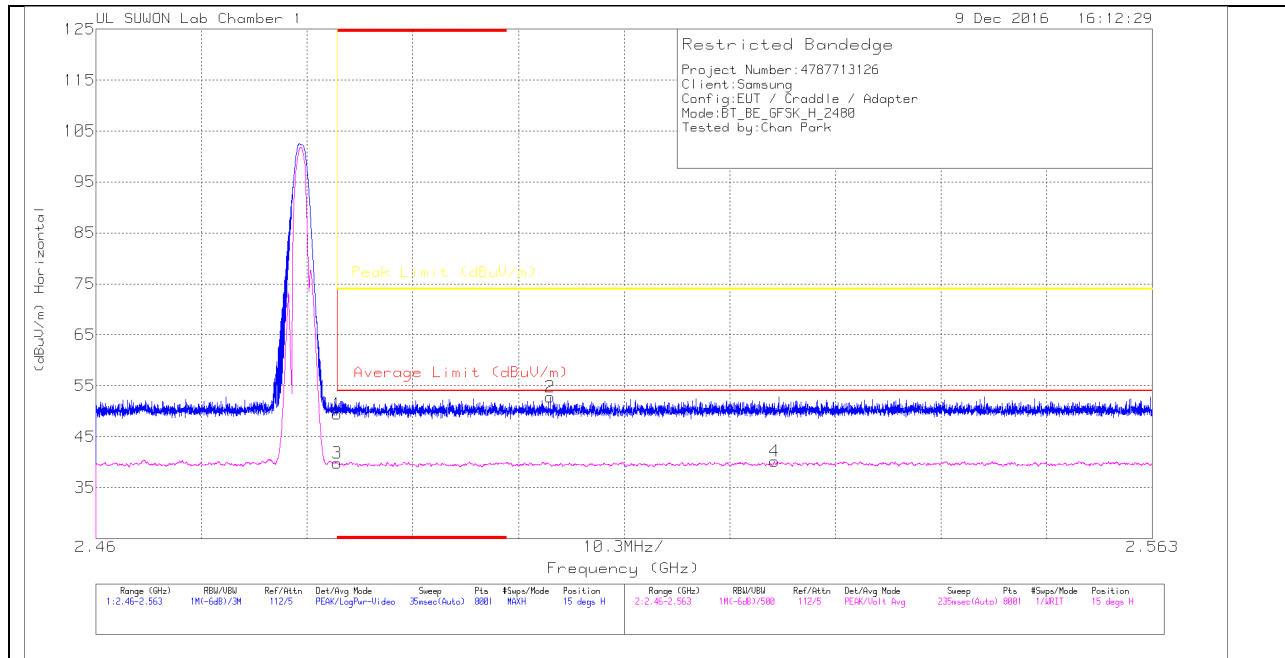
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average $VB=1/Ton$ where: Ton is transmit duration

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

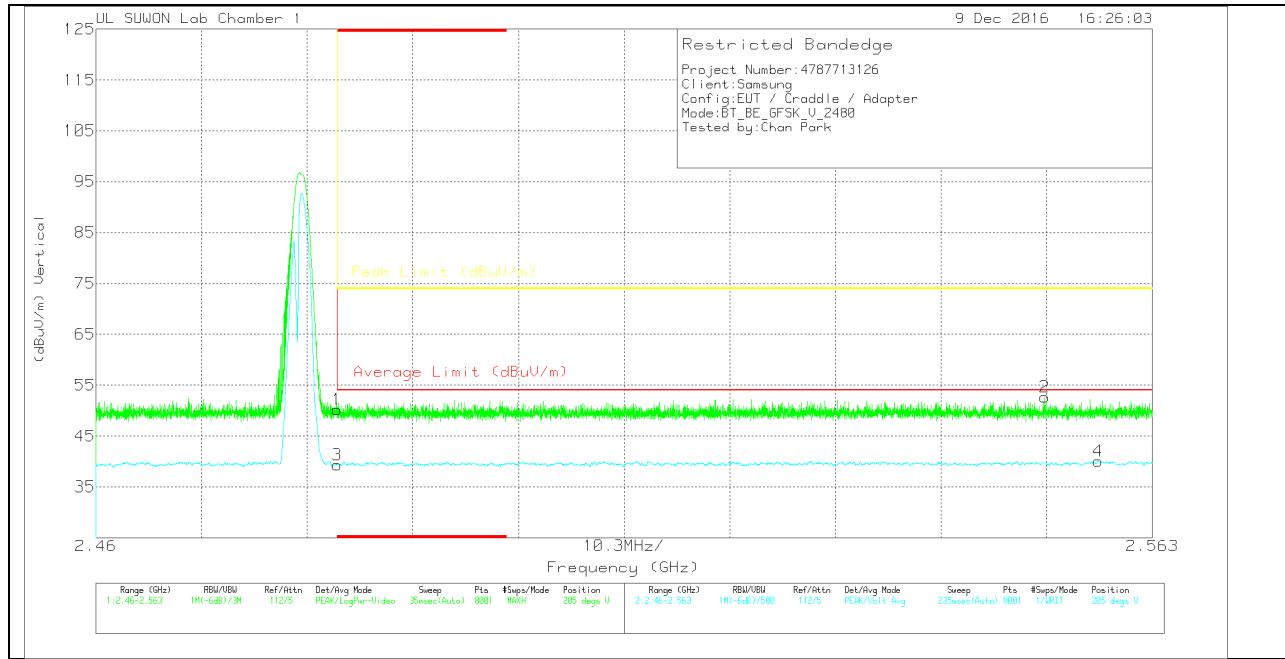
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	10dB[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	45.79	Pk	32	-28.3	49.49	-	-	74	-24.51	15	114	H
2	2.504	49.15	Pk	32	-28.3	52.85	-	-	74	-21.15	15	114	H
3	* 2.484	36.12	VA1T	32	-28.3	39.82	54	-14.18	-	-	15	114	H
4	2.526	36.43	VA1T	32	-28.3	40.13	54	-13.87	-	-	15	114	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average $V_B=1/T_{on}$ where: T_{on} is transmit duration

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	10dB[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	46.53	Pk	32	-28.3	50.23	-	-	74	-23.77	205	101	V
2	2.553	49.03	Pk	32	-28.3	52.73	-	-	74	-21.27	205	101	V
3	* 2.484	35.67	VA1T	32	-28.3	39.37	54	-14.63	-	-	205	101	V
4	2.558	36.39	VA1T	32	-28.3	40.09	54	-13.91	-	-	205	101	V

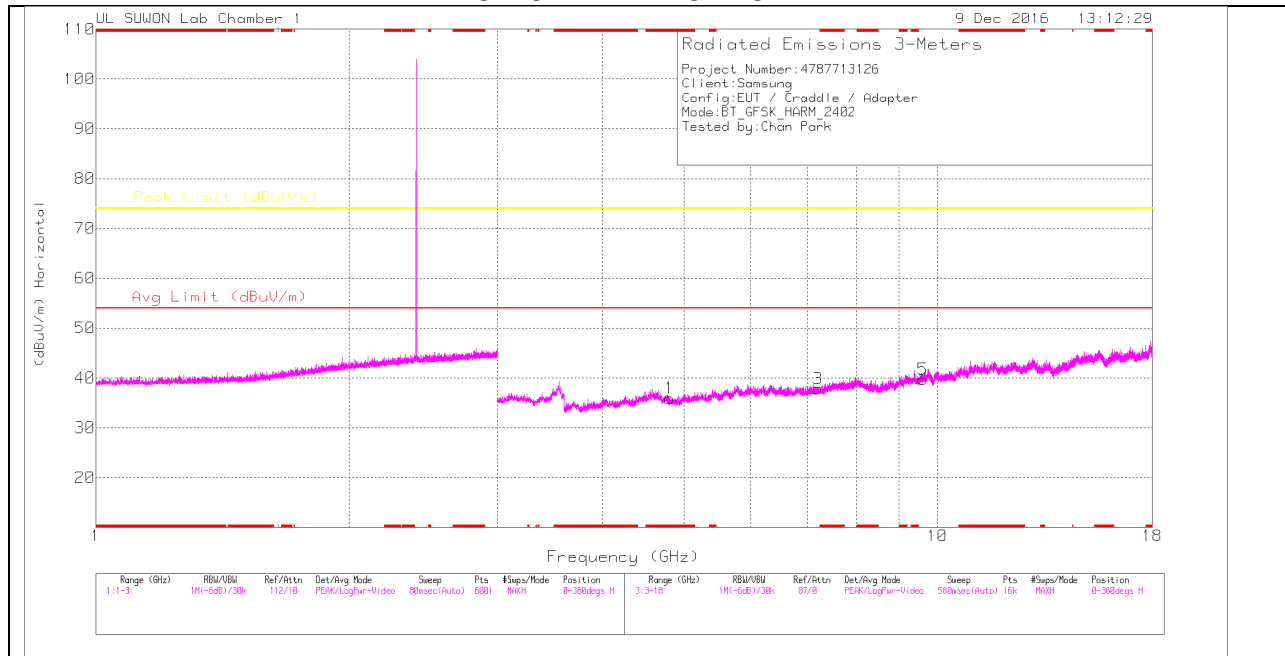
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

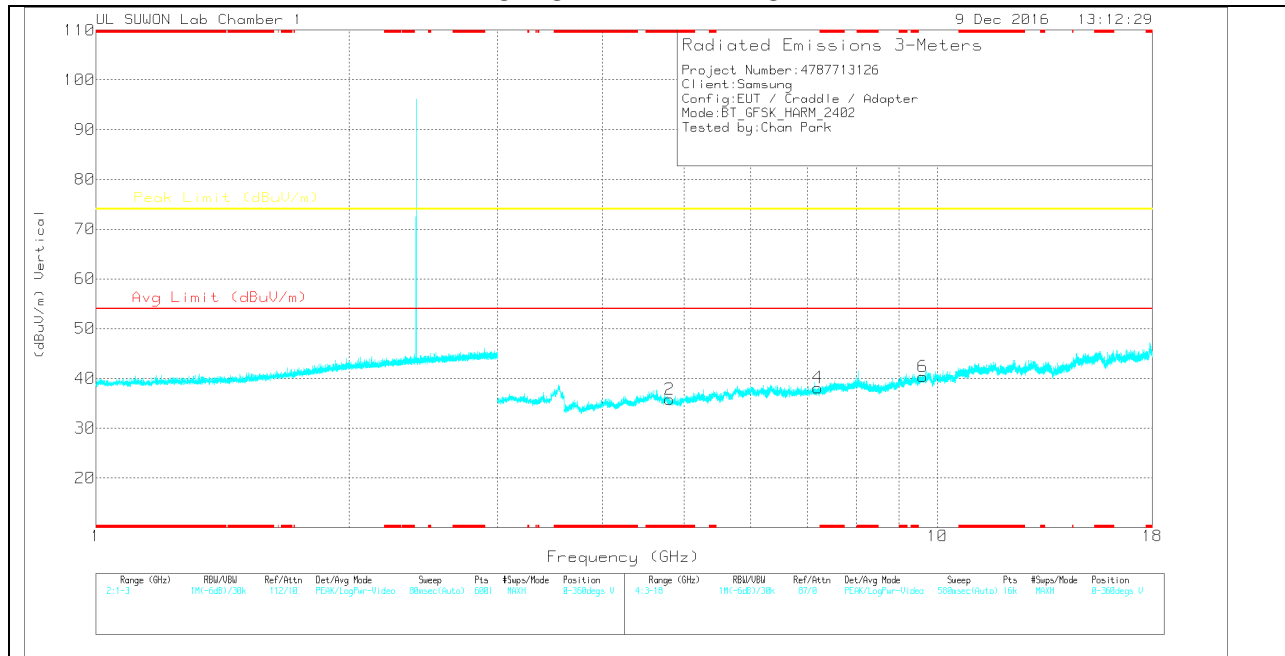
VA1T - FHSS: Linear Voltage Average $VB=1/Ton$ where: Ton is transmit duration

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

LOW CHANNEL DATA

Trace Markers

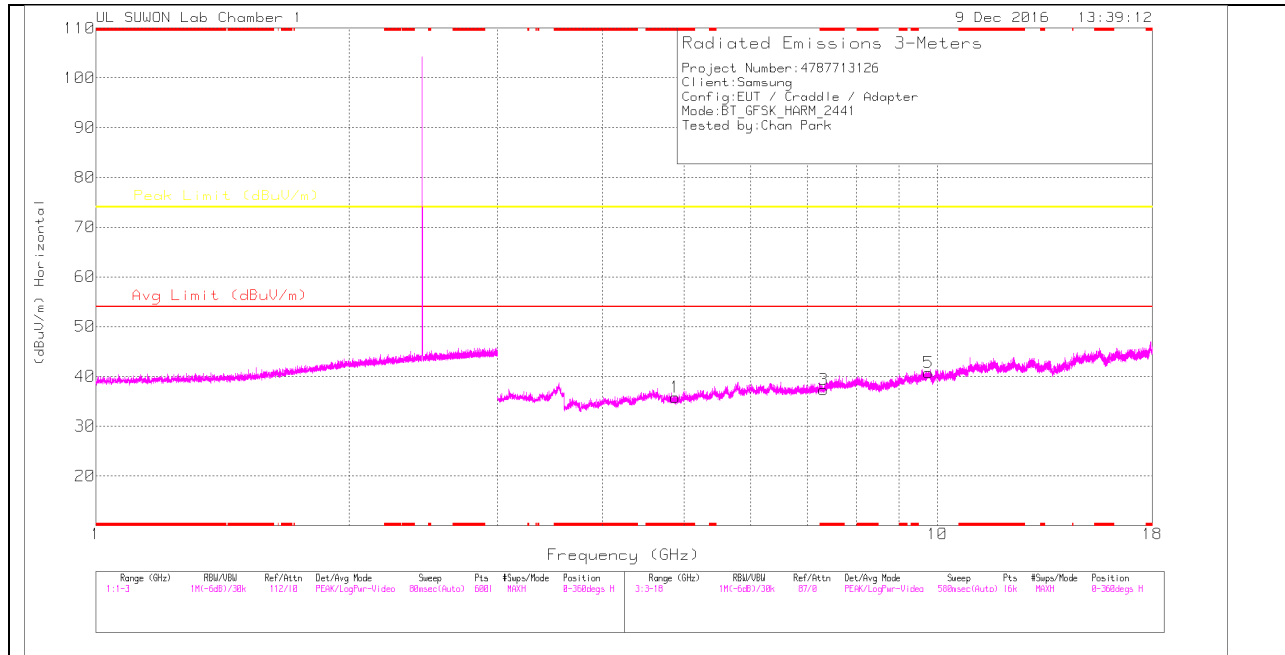
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	3GHz_HP[d B]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.806	35.45	PK	34	-33.5	35.95	-	-	74	-38.05	0-360	150	H
3	7.207	32.74	PK	35.7	-30.6	37.84	-	-	74	-36.16	0-360	150	H
5	9.61	30.12	PK	37	-27.4	39.72	-	-	74	-34.28	0-360	150	H
2	* 4.806	35.28	PK	34	-33.5	35.78	-	-	74	-38.22	0-360	250	V
4	7.205	33.05	PK	35.7	-30.6	38.15	-	-	74	-35.85	0-360	150	V
6	9.608	30.72	PK	37	-27.4	40.32	-	-	74	-33.68	0-360	250	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

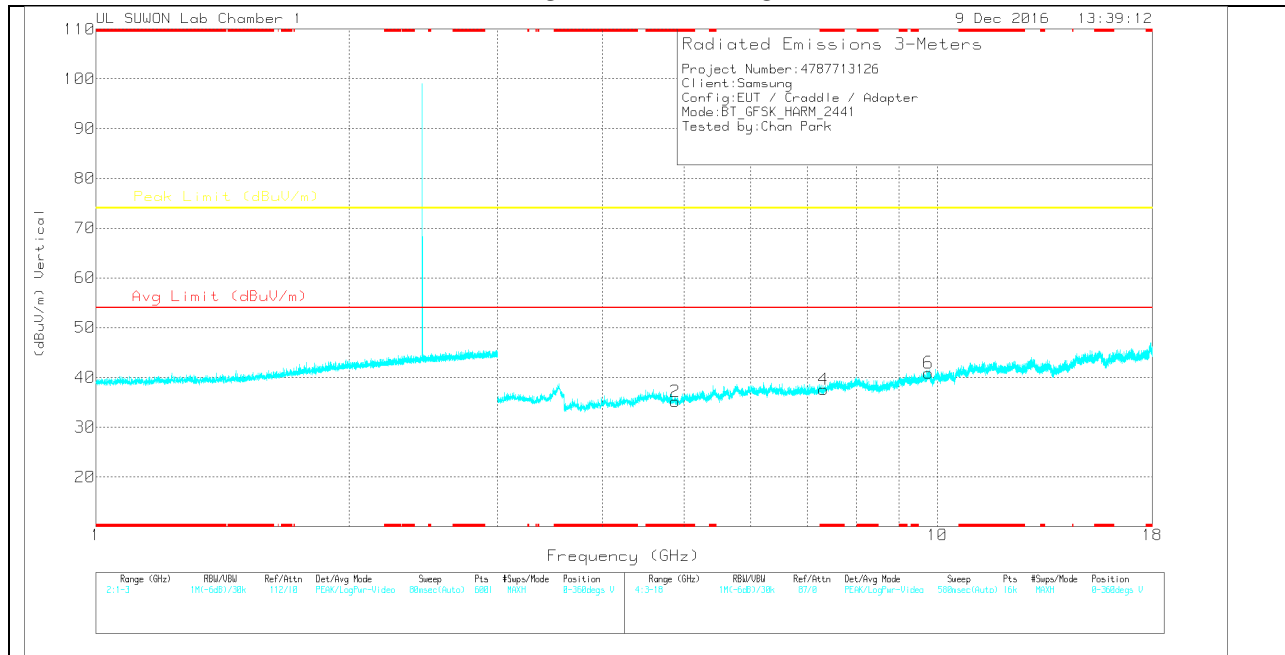
PK – Peak detector

Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limit (54dBuV/m).

MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

MID CHANNEL DATA

Trace Markers

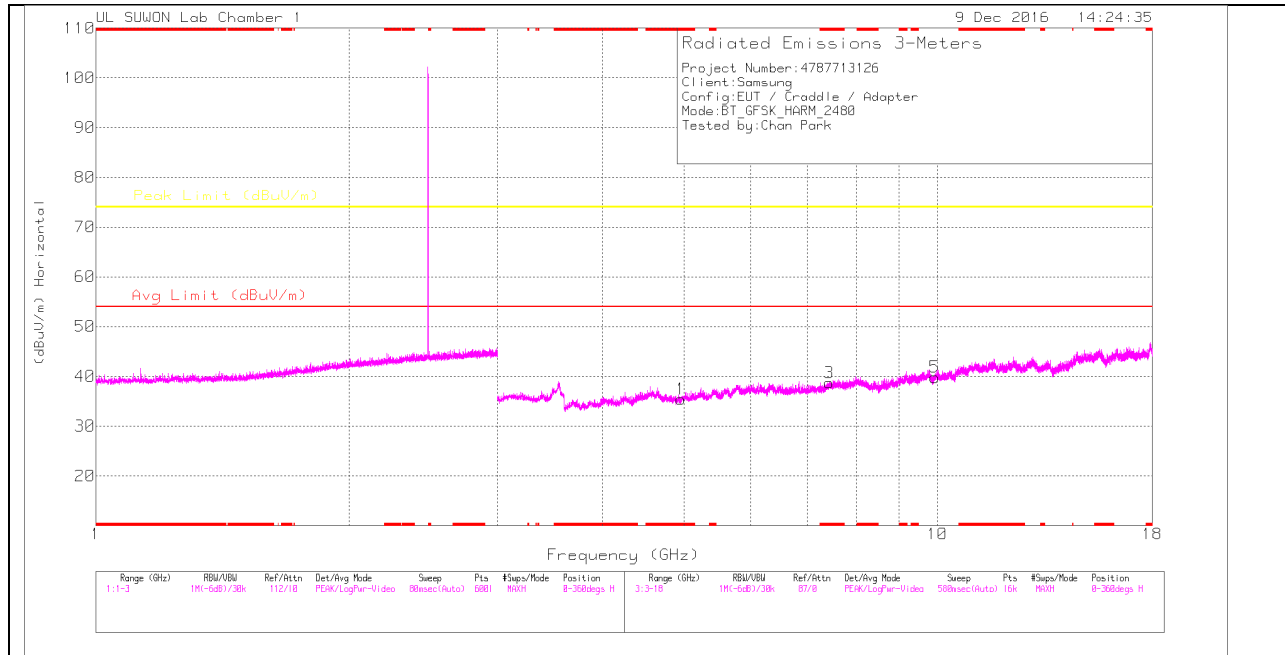
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	3GHz_HP[d B]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.881	35.26	PK	34	-33.5	35.76	-	-	74	-38.24	0-360	150	H
3	* 7.324	32.1	PK	35.8	-30.6	37.3	-	-	74	-36.7	0-360	150	H
5	9.765	30.19	PK	37.2	-26.6	40.79	-	-	74	-33.21	0-360	150	H
2	* 4.881	34.68	PK	34	-33.5	35.18	-	-	74	-38.82	0-360	250	V
4	* 7.323	32.36	PK	35.8	-30.6	37.56	-	-	74	-36.44	0-360	150	V
6	9.764	30.33	PK	37.2	-26.6	40.93	-	-	74	-33.07	0-360	150	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

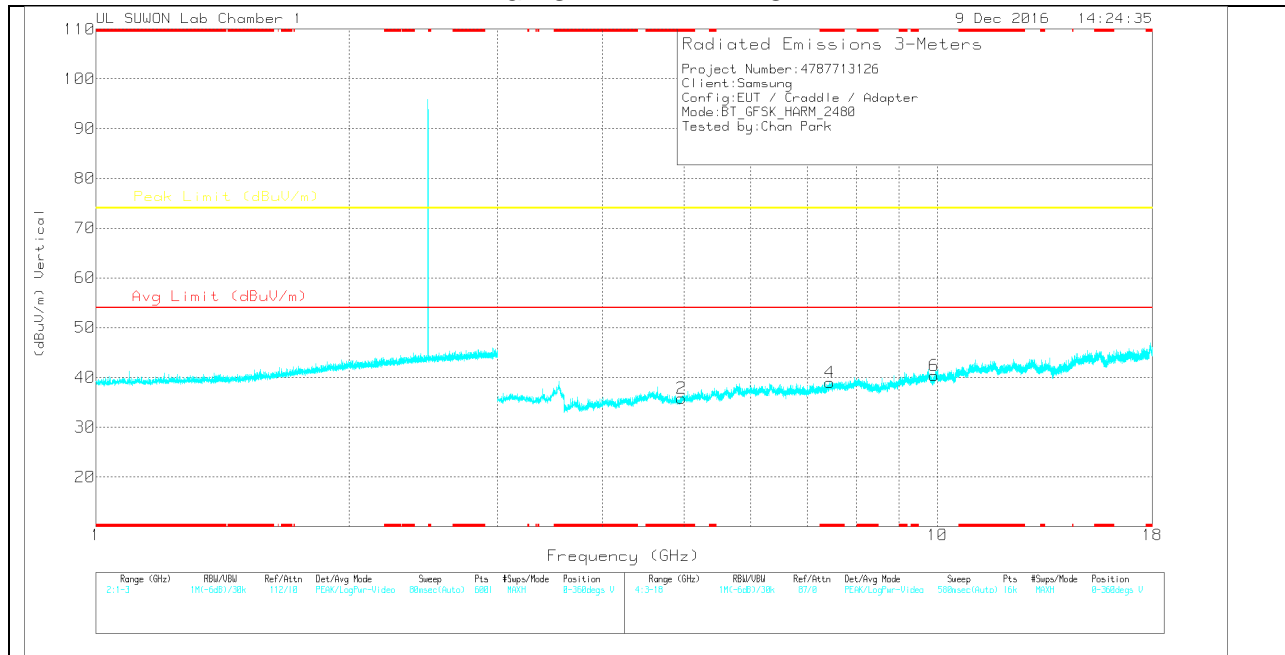
PK – Peak detector

Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limit (54dBuV/m).

HIGH CHANNEL HORIZONTAL



HIGH CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

HIGH CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	3GHz_HP[d B]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.959	34.99	PK	34	-33.6	35.39	-	-	74	-38.61	0-360	150	H
3	* 7.44	33.29	PK	35.8	-30.4	38.69	-	-	74	-35.31	0-360	250	H
5	9.921	29.5	PK	37.4	-27.1	39.8	-	-	74	-34.2	0-360	150	H
2	* 4.963	35.39	PK	34	-33.6	35.79	-	-	74	-38.21	0-360	250	V
4	* 7.443	33.54	PK	35.8	-30.4	38.94	-	-	74	-35.06	0-360	150	V
6	9.917	30.12	PK	37.4	-27.1	40.42	-	-	74	-33.58	0-360	250	V

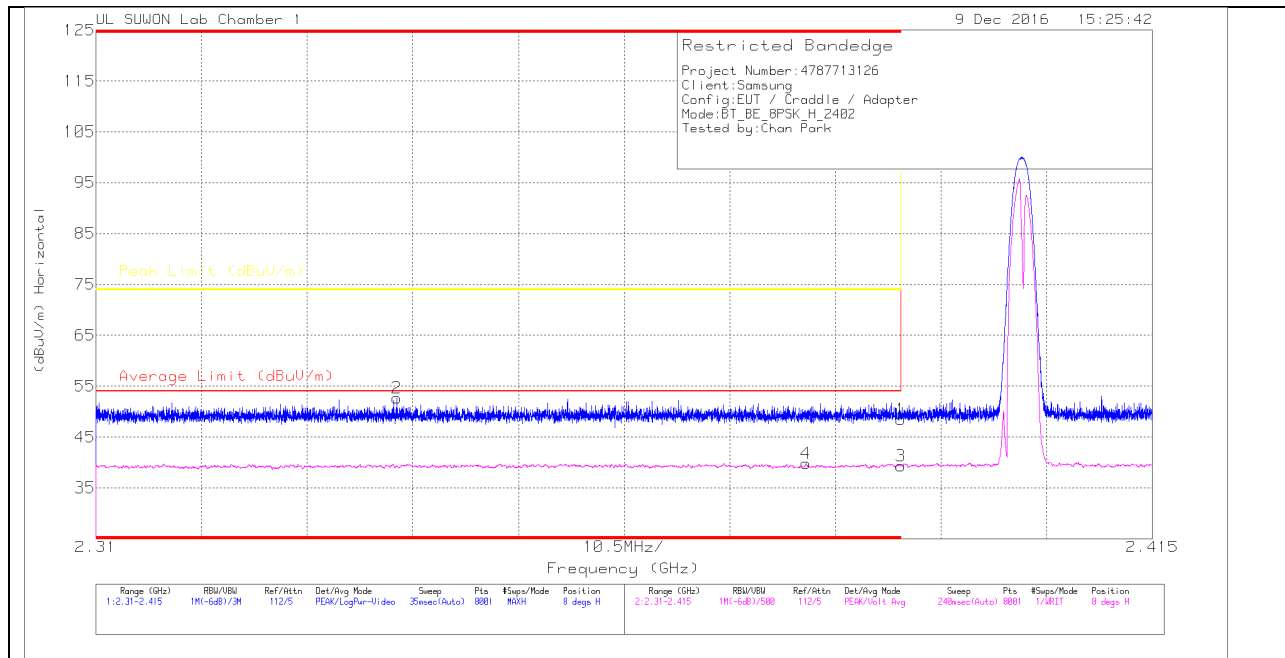
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak detector

Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limit (54dBuV/m).

9.2.2. ENHANCED DATA RATE 8PSK MODULATION RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

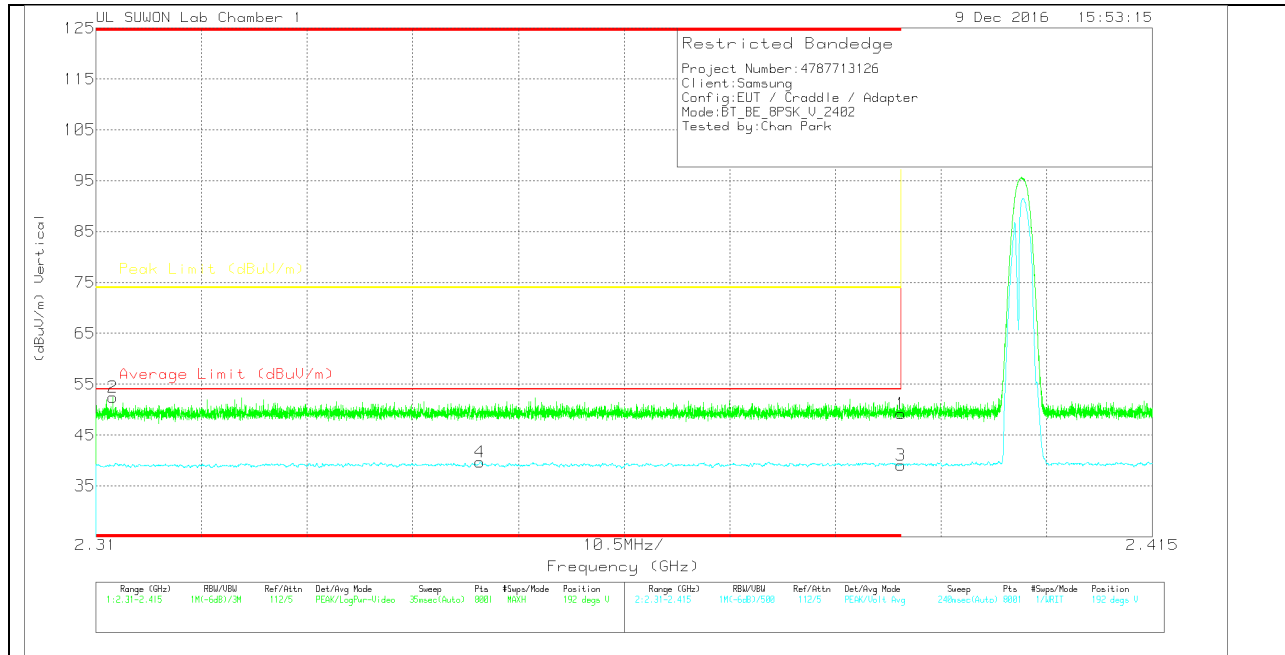
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	10dB[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	45.08	Pk		-28.4	48.48	-	-	74	-25.52	8	121	H
2	* 2.34	49.5	Pk		-28.5	52.7	-	-	74	-21.3	8	121	H
3	* 2.39	35.93	VA1T		-28.4	39.33	54	-14.67	-	-	8	121	H
4	* 2.381	36.51	VA1T		-28.5	39.81	54	-14.19	-	-	8	121	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average $V_B=1/T_{on}$ where: T_{on} is transmit duration

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	10dB[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	45.8	Pk	31.8	-28.4	49.2	-	-	74	-24.8	192	108	V
2	* 2.312	49.27	Pk	31.7	-28.5	52.47	-	-	74	-21.53	192	108	V
3	* 2.39	35.66	VA1T	31.8	-28.4	39.06	54	-14.94	-	-	192	108	V
4	* 2.348	36.5	VA1T	31.7	-28.5	39.7	54	-14.3	-	-	192	108	V

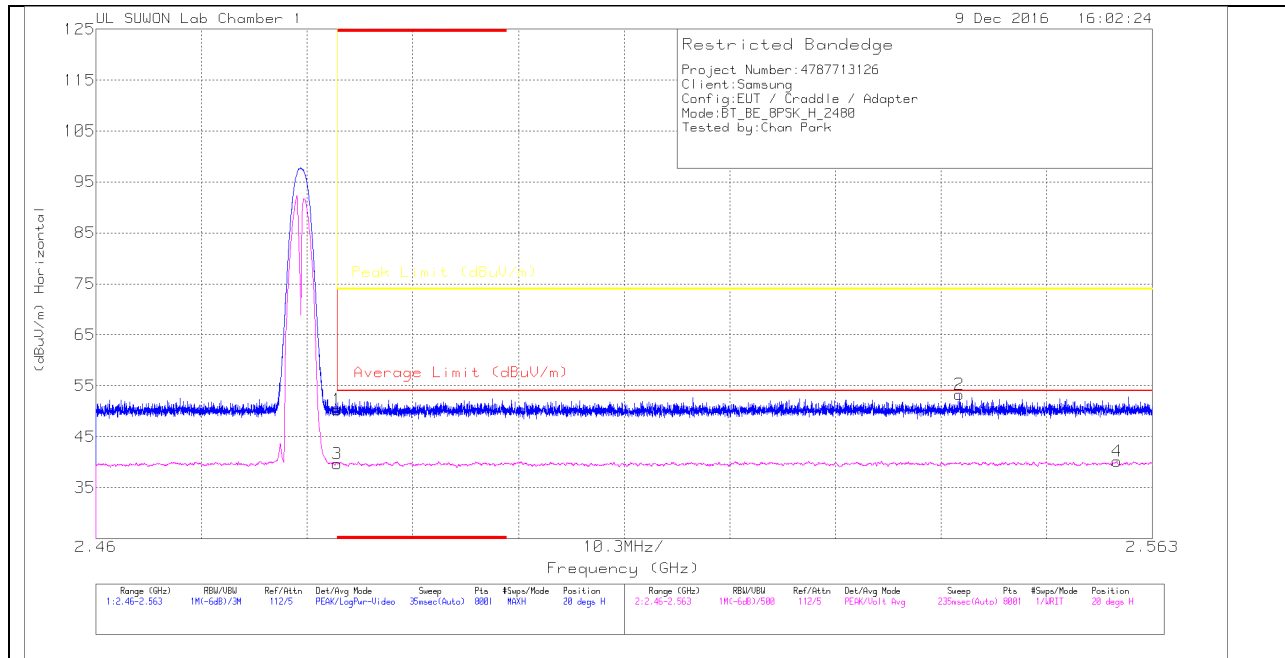
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average $V_B=1/T_{on}$ where: T_{on} is transmit duration

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

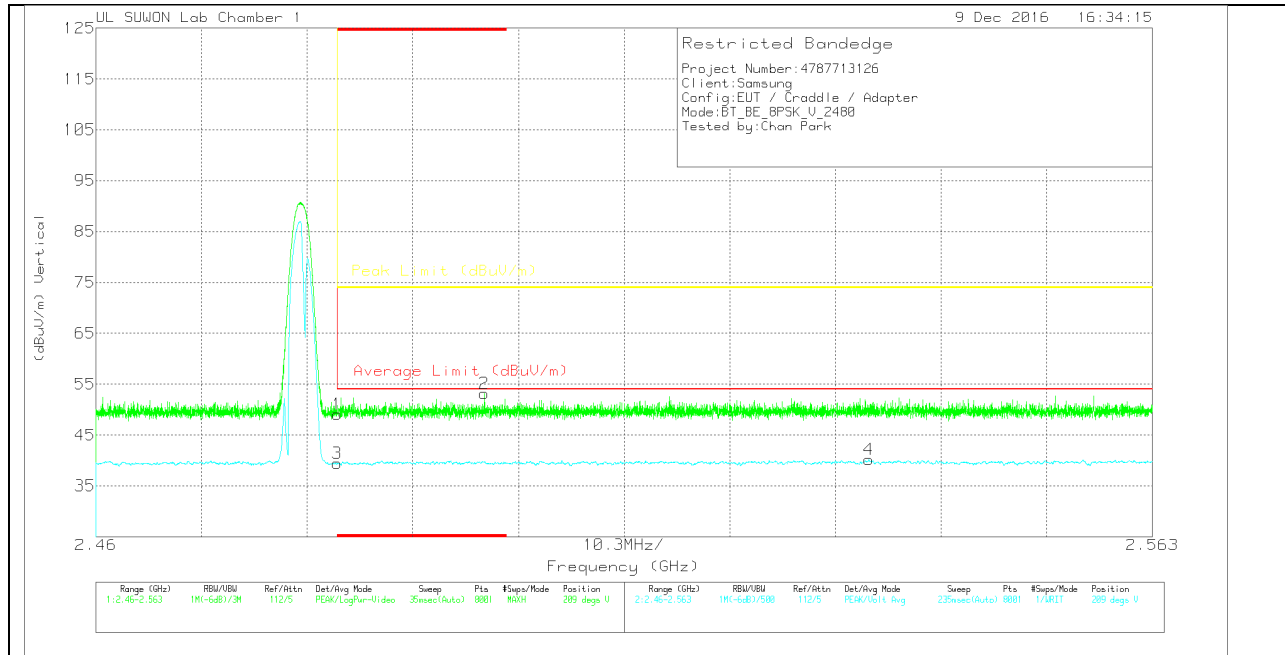
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	10dB[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	46.59	Pk	32	-28.3	50.29	-	-	74	-23.71	20	177	H
2	2.544	49.55	Pk	32	-28.3	53.25	-	-	74	-20.75	20	177	H
3	* 2.484	36.01	VA1T	32	-28.3	39.71	54	-14.29	-	-	20	177	H
4	2.56	36.45	VA1T	32	-28.3	40.15	54	-13.85	-	-	20	177	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average $V_B=1/T_{on}$ where: T_{on} is transmit duration

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	10dB[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	45.41	Pk	32	-28.3	49.11	-	-	74	-24.89	209	102	V
2	* 2.498	49.47	Pk	32	-28.3	53.17	-	-	74	-20.83	209	102	V
3	* 2.484	35.73	VA1T	32	-28.3	39.43	54	-14.57	-	-	209	102	V
4	2.535	36.47	VA1T	32	-28.3	40.17	54	-13.83	-	-	209	102	V

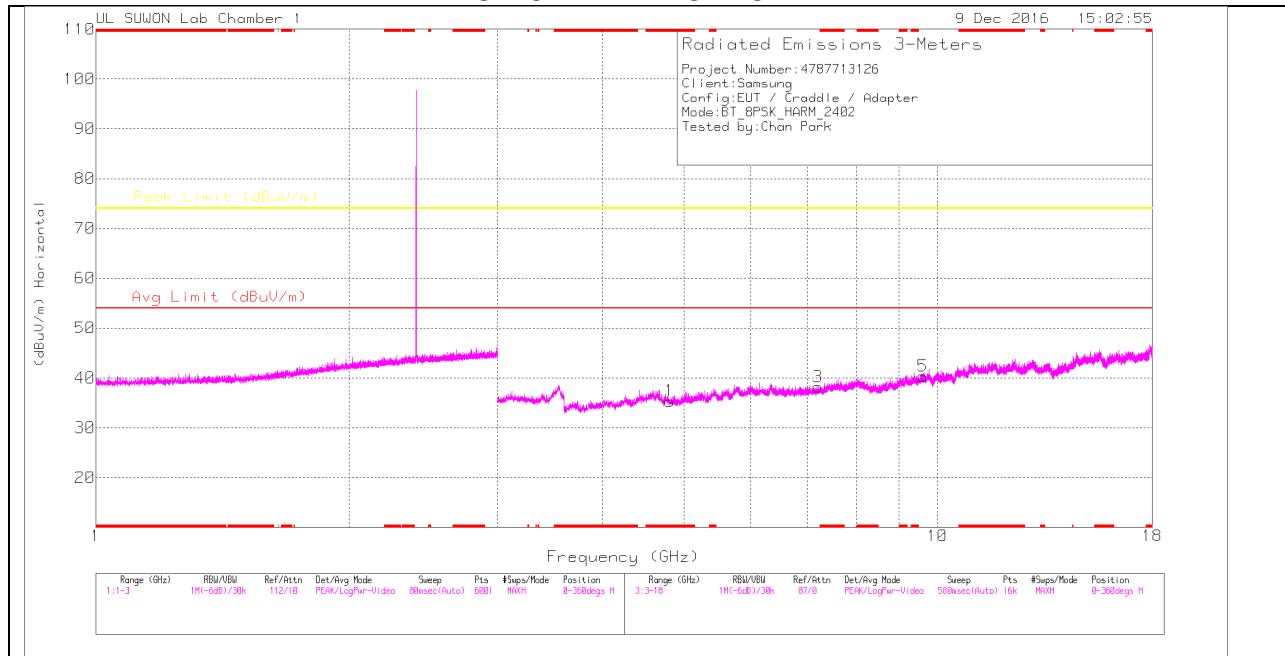
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

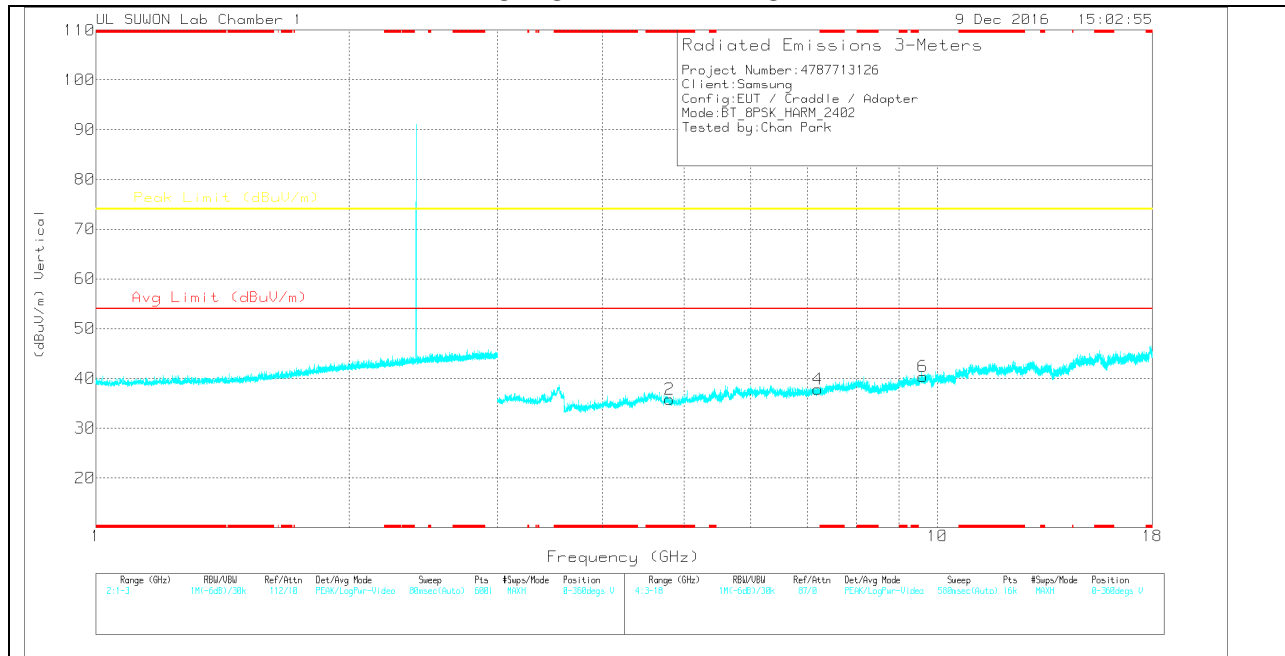
VA1T - FHSS: Linear Voltage Average $V_B=1/T_{on}$ where: T_{on} is transmit duration

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

LOW CHANNEL DATA

Trace Markers

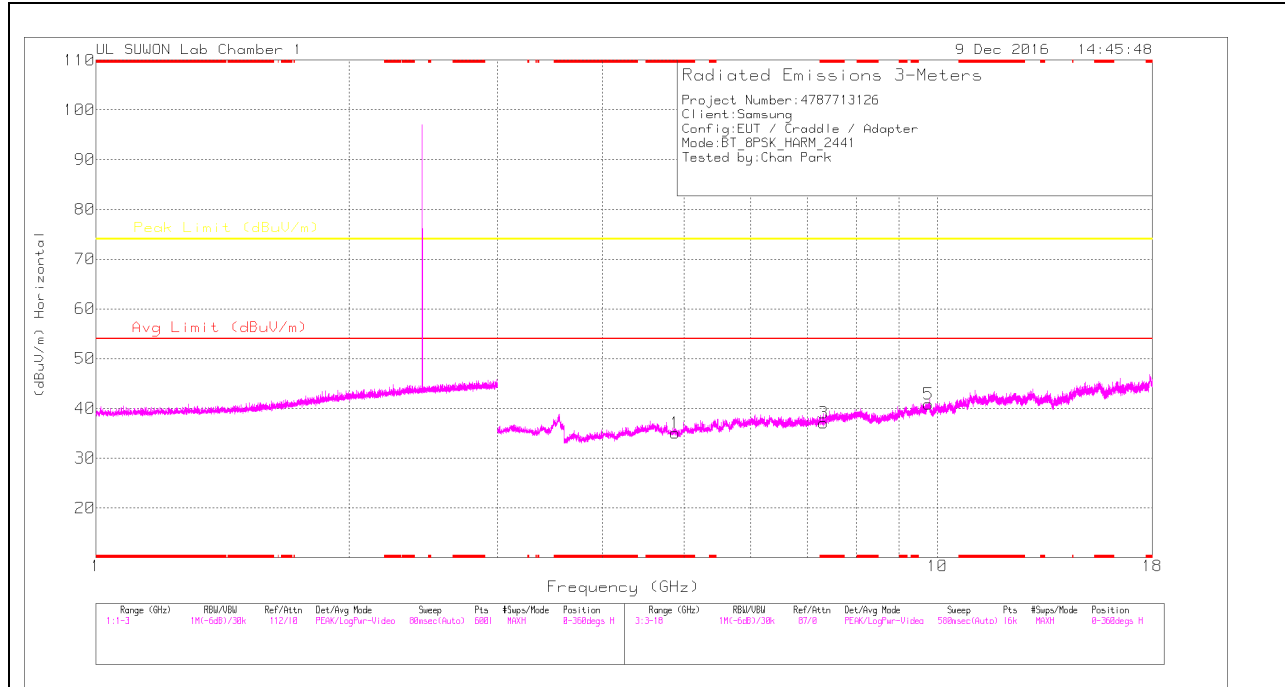
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	3GHz_HP[d B]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.804	34.87	PK	34	-33.5	35.37	-	-	74	-38.63	0-360	250	H
3	7.205	33.09	PK	35.7	-30.6	38.19	-	-	74	-35.81	0-360	250	H
5	9.607	30.77	PK	37	-27.4	40.37	-	-	74	-33.63	0-360	250	H
2	* 4.804	35.28	PK	34	-33.5	35.78	-	-	74	-38.22	0-360	150	V
4	7.205	32.73	PK	35.7	-30.6	37.83	-	-	74	-36.17	0-360	250	V
6	9.61	30.74	PK	37	-27.4	40.34	-	-	74	-33.66	0-360	250	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

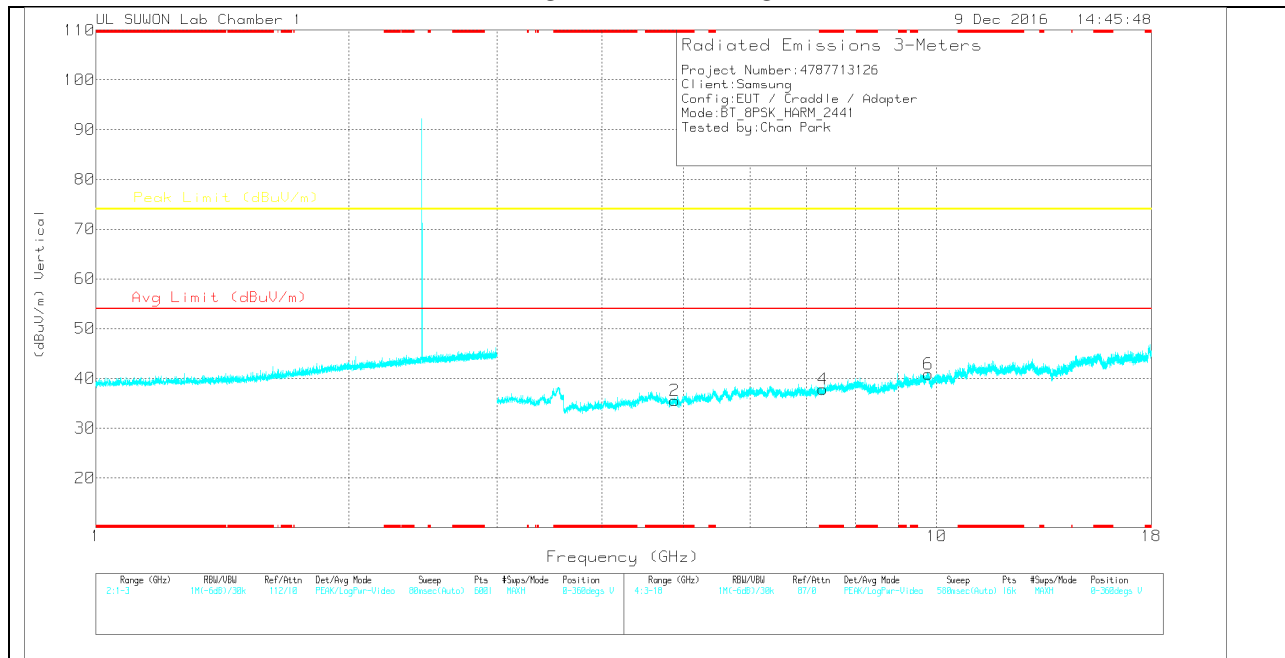
PK – Peak detector

Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limit (54dBuV/m).

MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

MID CHANNEL DATA

Trace Markers

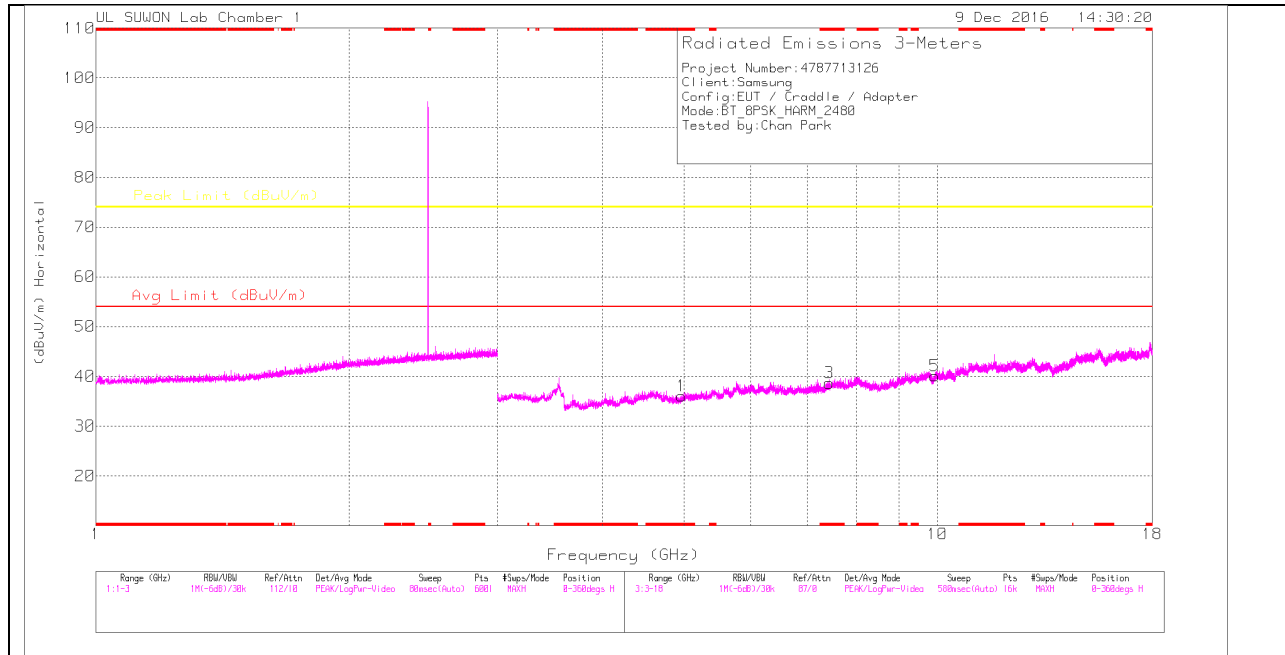
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	3GHz_HP[d B]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.881	34.5	PK	34	-33.5	35	-	-	74	-39	0-360	150	H
3	* 7.324	31.9	PK	35.8	-30.6	37.1	-	-	74	-36.9	0-360	250	H
5	9.765	30.27	PK	37.2	-26.6	40.87	-	-	74	-33.13	0-360	150	H
2	* 4.879	35.03	PK	34	-33.5	35.53	-	-	74	-38.47	0-360	150	V
4	* 7.325	32.62	PK	35.8	-30.6	37.82	-	-	74	-36.18	0-360	150	V
6	9.769	30.12	PK	37.2	-26.5	40.82	-	-	74	-33.18	0-360	250	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

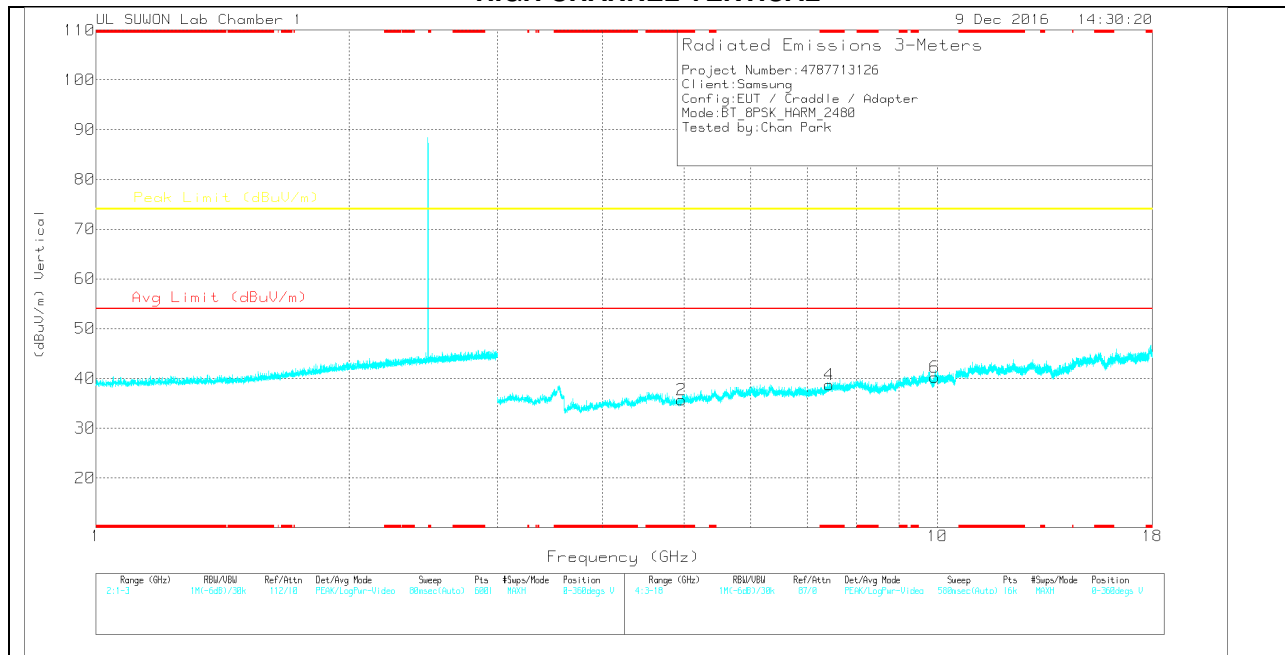
PK – Peak detector

Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limit (54dBuV/m).

HIGH CHANNEL HORIZONTAL



HIGH CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

HIGH CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	3GHz_HP[d B]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.964	35.64	PK	34	-33.6	36.04	-	-	74	-37.96	0-360	150	H
3	* 7.442	33.26	PK	35.8	-30.4	38.66	-	-	74	-35.34	0-360	150	H
5	9.921	29.76	PK	37.4	-27.1	40.06	-	-	74	-33.94	0-360	150	H
2	* 4.963	35.26	PK	34	-33.6	35.66	-	-	74	-38.34	0-360	150	V
4	* 7.438	33.33	PK	35.8	-30.4	38.73	-	-	74	-35.27	0-360	250	V
6	9.925	29.88	PK	37.4	-27	40.28	-	-	74	-33.72	0-360	150	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

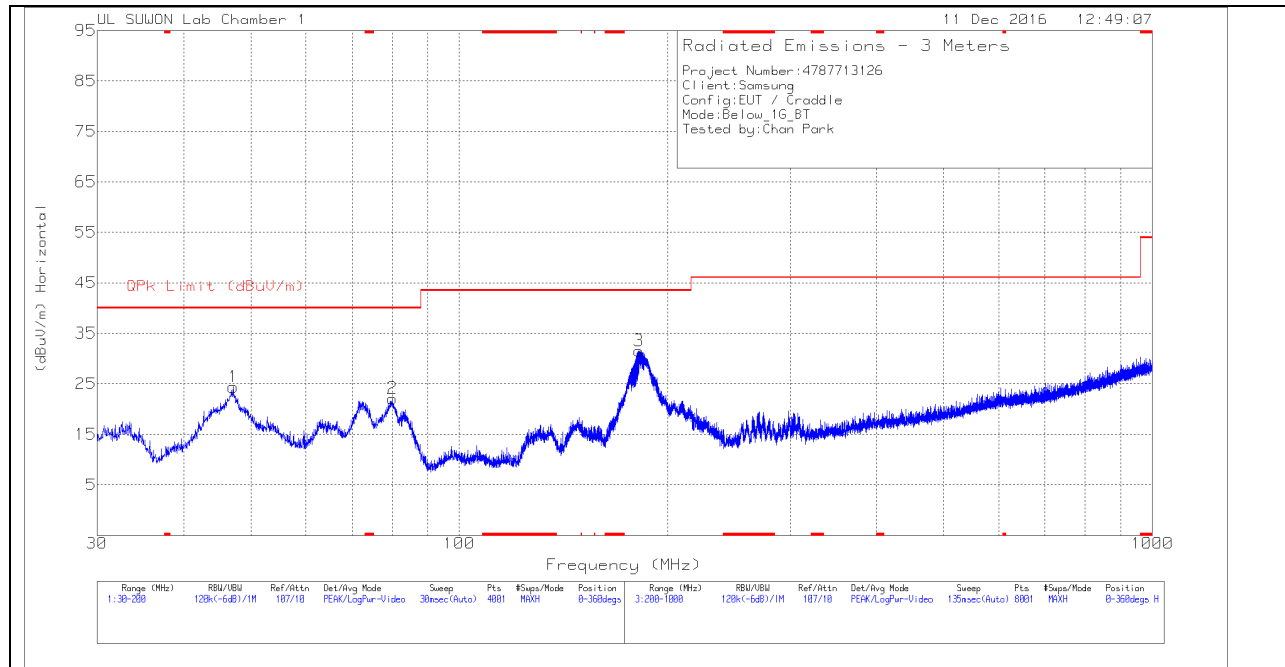
PK – Peak detector

Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limit (54dBuV/m).

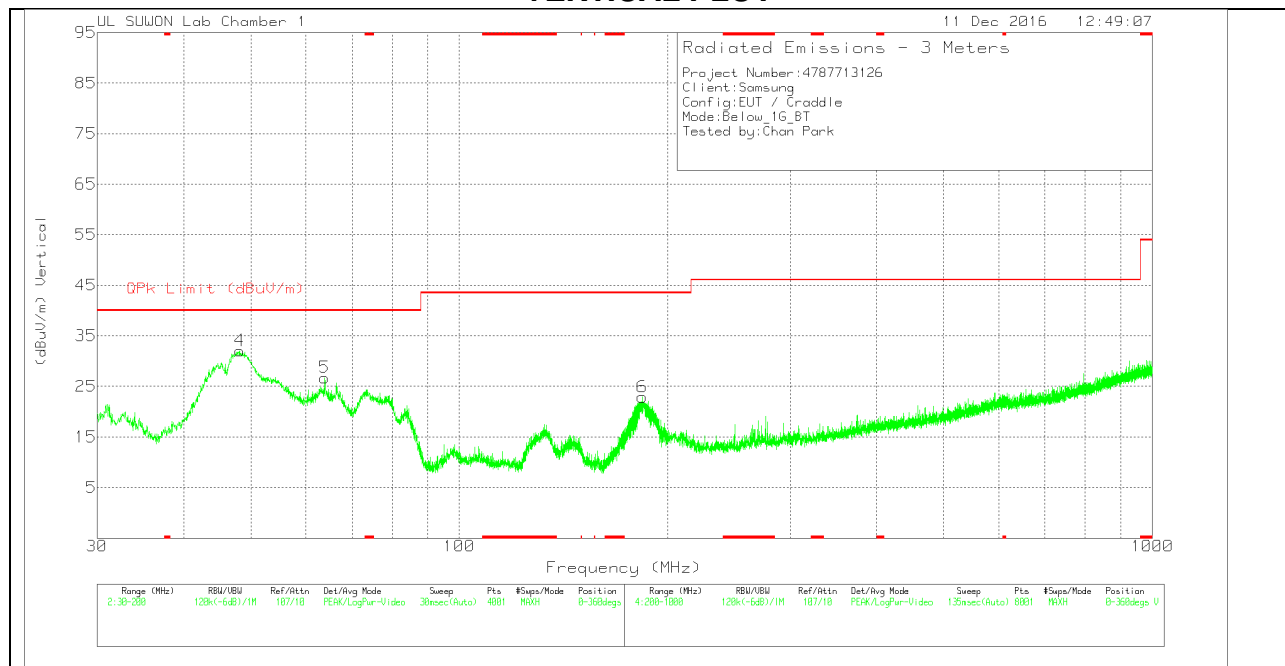
9.3. WORST-CASE BELOW 1 GHz

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

HORIZONTAL PLOT



VERTICAL PLOT



BELOW 1 GHz TABLE

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163-750	Bi-Log	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	47.17	40.88	Pk	13.7	-30.2	24.38	40	-15.62	0-360	300	H
2	80.1075	44.81	Pk	6.9	-29.6	22.11	40	-17.89	0-360	200	H
3	181.5125	50.23	Pk	9.6	-28.3	31.53	43.52	-11.99	0-360	200	H
4	48.19	48.46	Pk	13.8	-30.2	32.06	40	-7.94	0-360	100	V
5	63.9575	45.12	Pk	11.5	-29.9	26.72	40	-13.28	0-360	100	V
6	183.68	41.39	Pk	9.8	-28.3	22.89	43.52	-20.63	0-360	200	V

Pk - Peak detector

Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163-750	Bi-Log	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
181.4978	49.74	Qp	9.6	-28.3	31.04	43.52	-12.48	62	133	H
47.4561	44.96	Qp	13.7	-30.2	28.46	40	-11.54	119	109	V

Qp - Quasi-Peak detector

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

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.

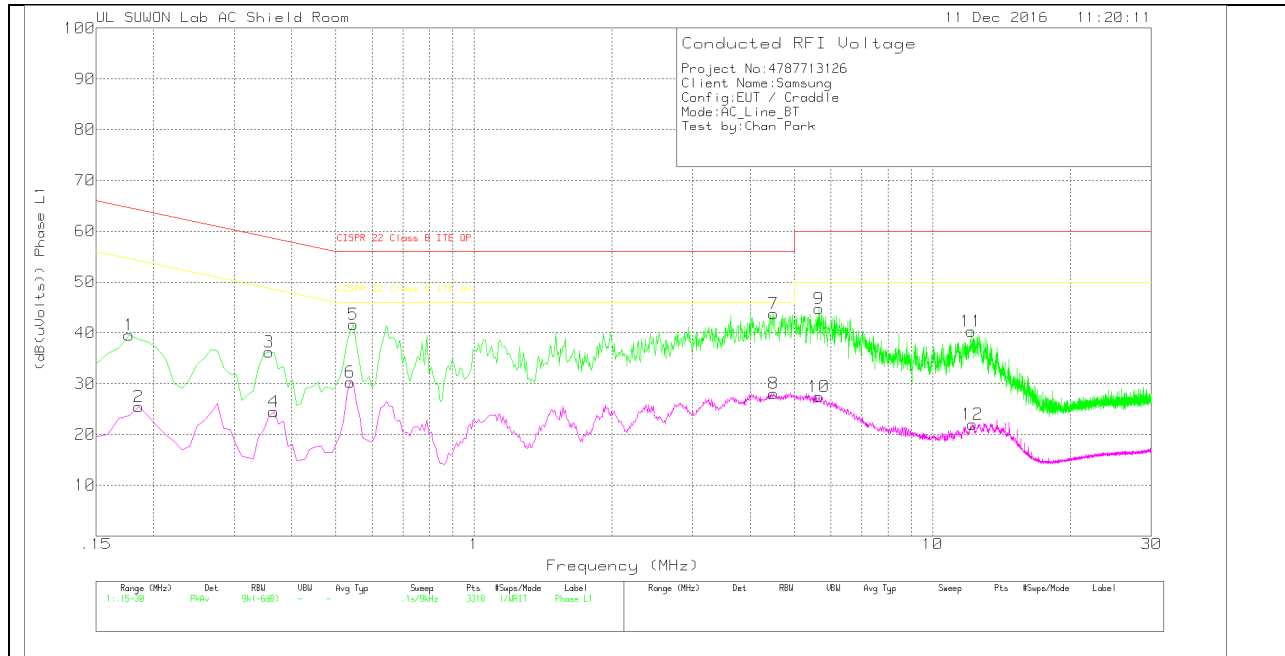
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

RESULTS

6 WORST EMISSIONS

LINE 1 PLOT



LINE 1 RESULTS

Trace Markers

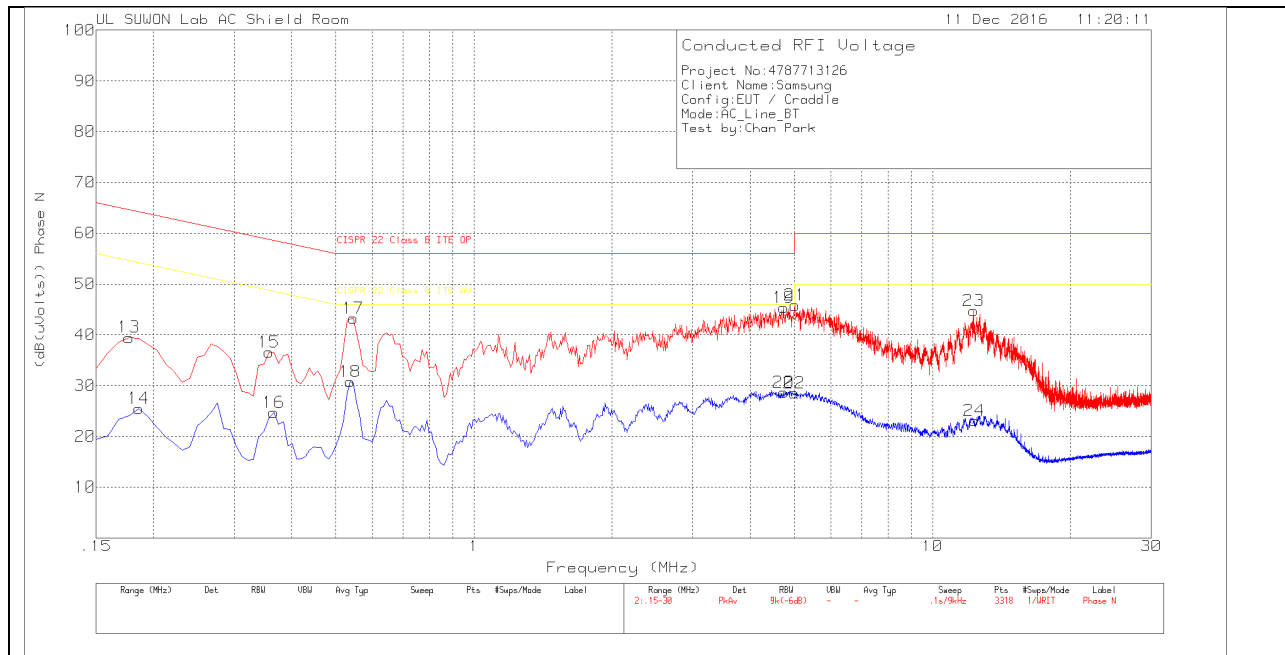
Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_w ith ex- cord_L1	CE Shield Room	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
1	.177	29.4	Pk	10.2	0	39.6	64.63	-25.03	-	-
2	.186	15.4	Av	10.1	0	25.5	-	-	54.21	-28.71
3	.357	26.13	Pk	10.1	0	36.23	58.8	-22.57	-	-
4	.366	14.41	Av	10.1	0	24.51	-	-	48.59	-24.08
5	.546	31.51	Pk	10.1	0	41.61	56	-14.39	-	-
6	.537	20.21	Av	10.1	0	30.31	-	-	46	-15.69
7	4.506	33.82	Pk	9.8	.1	43.72	56	-12.28	-	-
8	4.506	18.11	Av	9.8	.1	28.01	-	-	46	-17.99
9	5.658	34.82	Pk	9.8	.1	44.72	60	-15.28	-	-
10	5.649	17.5	Av	9.8	.1	27.4	-	-	50	-22.6
11	12.138	29.95	Pk	10.1	.2	40.25	60	-19.75	-	-
12	12.228	11.67	Av	10.1	.2	21.97	-	-	50	-28.03

Pk - Peak detector

Av - Average detection

LINE 2 PLOT



LINE 2 RESULTS

Trace Markers

Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_w ith ex-cord_N	CE Shield Room	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
13	.177	29.39	Pk	10.1	0	39.49	64.63	-25.14	-	-
14	.186	15.51	Av	10	0	25.51	-	-	54.21	-28.7
15	.357	26.57	Pk	10	0	36.57	58.8	-22.23	-	-
16	.366	14.58	Av	10.1	0	24.68	-	-	48.59	-23.91
17	.546	33.19	Pk	10.1	0	43.29	56	-12.71	-	-
18	.537	20.66	Av	10.1	0	30.76	-	-	46	-15.24
19	4.731	35.42	Pk	9.8	.1	45.32	56	-10.68	-	-
20	4.731	18.72	Av	9.8	.1	28.62	-	-	46	-17.38
21	5.01	35.9	Pk	9.8	.1	45.8	60	-14.2	-	-
22	5.001	18.65	Av	9.8	.1	28.55	-	-	50	-21.45
23	12.291	34.36	Pk	10.2	.2	44.76	60	-15.24	-	-
24	12.318	12.68	Av	10.2	.2	23.08	-	-	50	-26.92

Pk - Peak detector

Av - Average detection