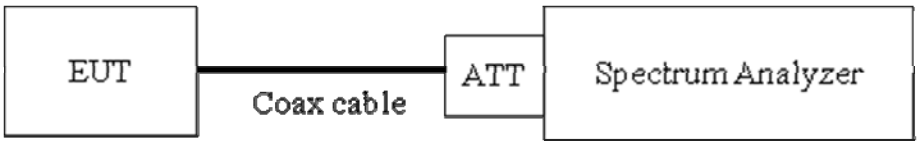
9.5 OUT OF BAND EMISSIONS AT THE BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS

Test Requirements and limit, §15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

Limit : 20 dBc

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. (Procedure 11.0 in KDB 558074, issued 01/07/2016)

RBW = 100 kHz

VBW ≥ 3 x RBW

Set span to encompass the spectrum to be examined

Detector = Peak

Trace Mode = max hold

Sweep time = auto couple

Ensure that the number of measurement points ≥ 2*Span/RBW

Allow trace to fully stabilize.

Use peak marker function to determine the maximum amplitude level.

Measurements are made over the 30 MHz to 10th harmonic range with the transmitter set to the lowest, middle, and highest channels.

Note :

1. The maximum peak conducted output power procedure was used to demonstrate compliance as described in 9.1(KDB558074 v03r05), so the peak output power measured in any 100 kHz bandwidth outside

of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 20 dBc).

2. The band edge results in plot is already including the actual values of loss for the attenuator and cable combination.
3. Spectrum offset = Attenuator loss + Cable loss
4. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB. So, 10.7 dB is offset for 2.4 GHz Band.
5. In case of conducted spurious emissions test, please check factors blow table.
6. In order to simplify the report, attached plots were only the worst case channel and data rate.

▣ FACTORS FOR FREQUENCY

Freq(MHz)	Factor(dB)
30	11.30
100	9.83
200	10.19
300	10.13
400	10.23
500	10.25
600	10.32
700	10.35
800	10.35
900	10.34
1000	10.39
2000	10.64
2400*	10.65
2500*	10.67
3000	10.68
4000	10.89
5000	11.07
6000	11.06
7000	11.35
8000	11.32
9000	11.48
10000	11.56
11000	11.56
12000	11.68

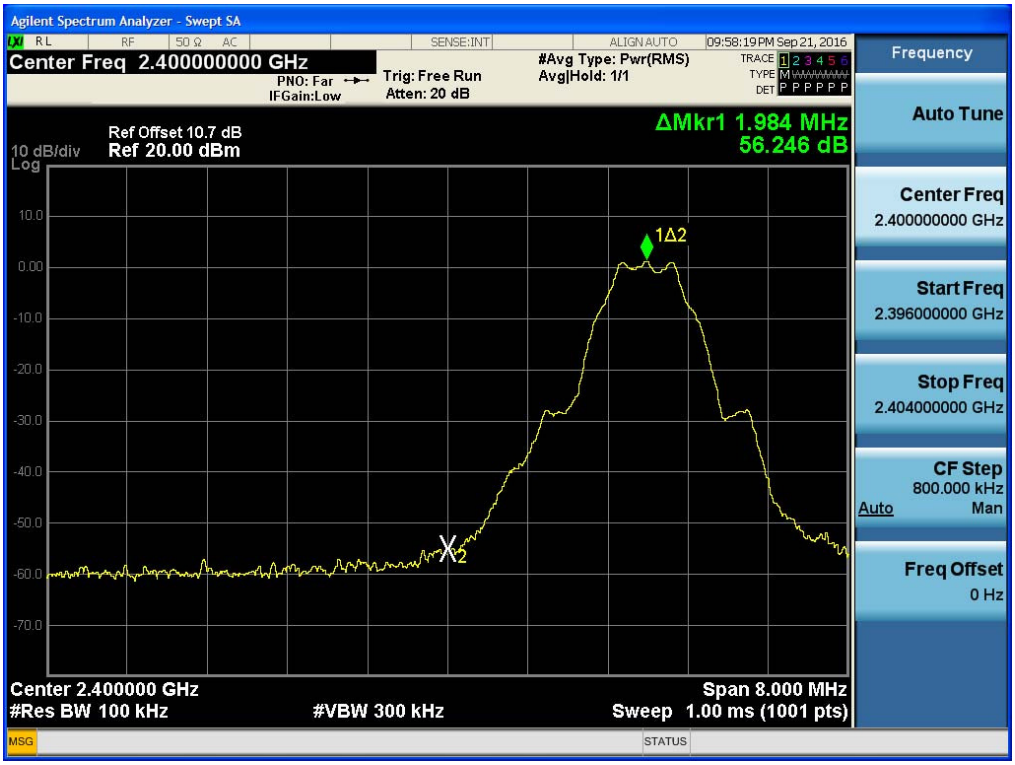
13000	11.83
14000	11.90
15000	11.98
16000	12.04
17000	12.02
18000	12.08
19000	12.07
20000	12.14
21000	12.17
22000	12.31
23000	12.60
24000	12.34
25000	12.53

Note : 1. '*' is fundamental frequency range.

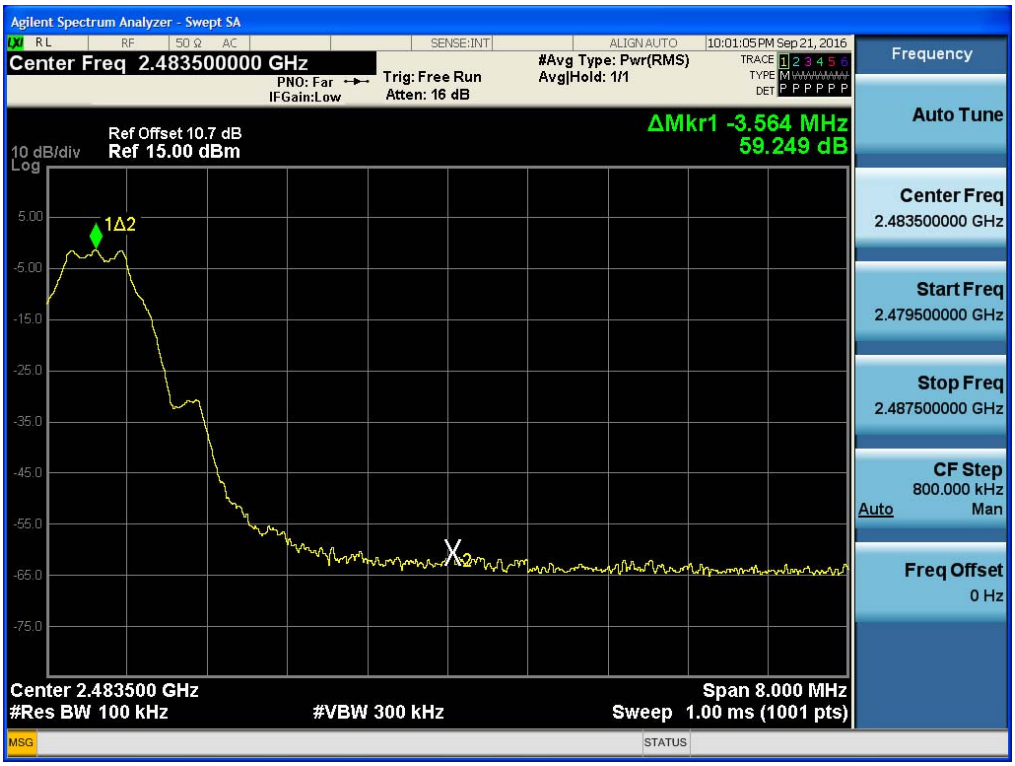
2. Factor = Cable loss + Attenuator loss

▣ RESULT PLOTS_ Data packet length (Min)

BandEdge (Low-CH 0)

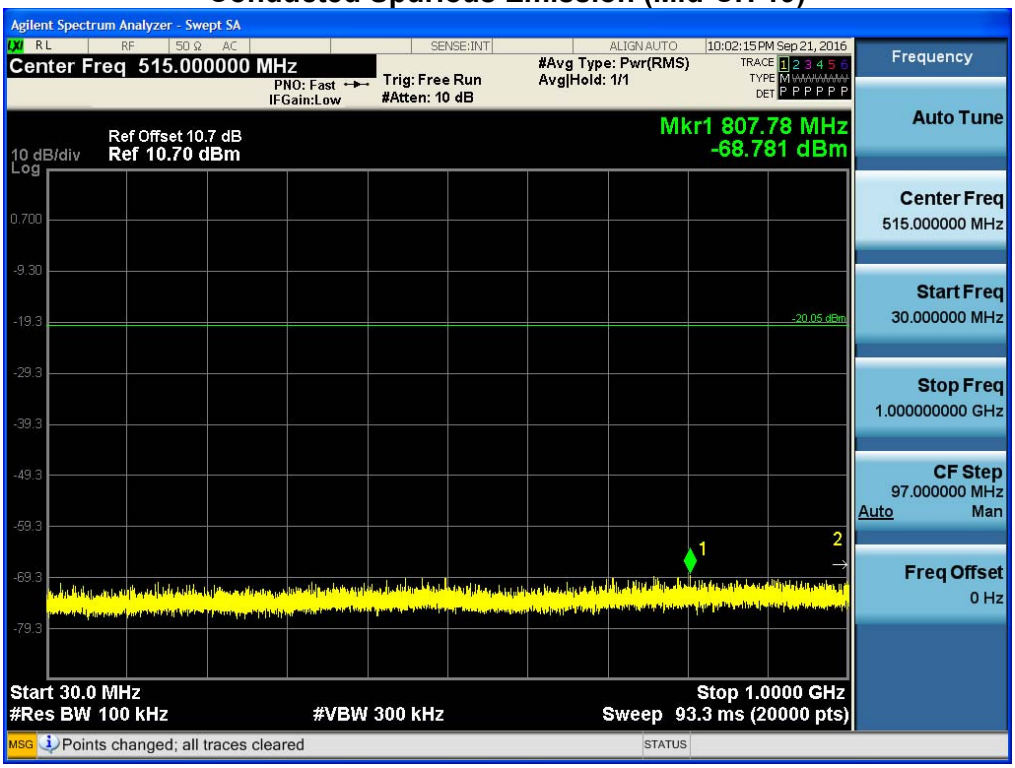


BandEdge (High-CH 39)



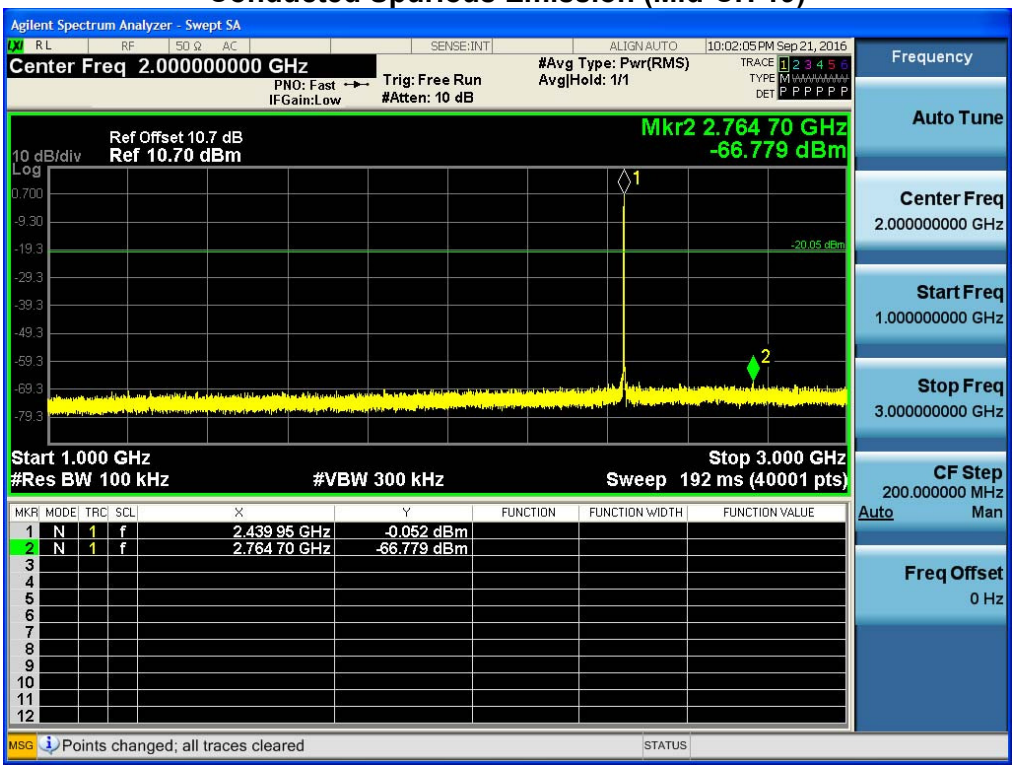
30 MHz ~ 1 GHz

Conducted Spurious Emission (Mid-CH 19)



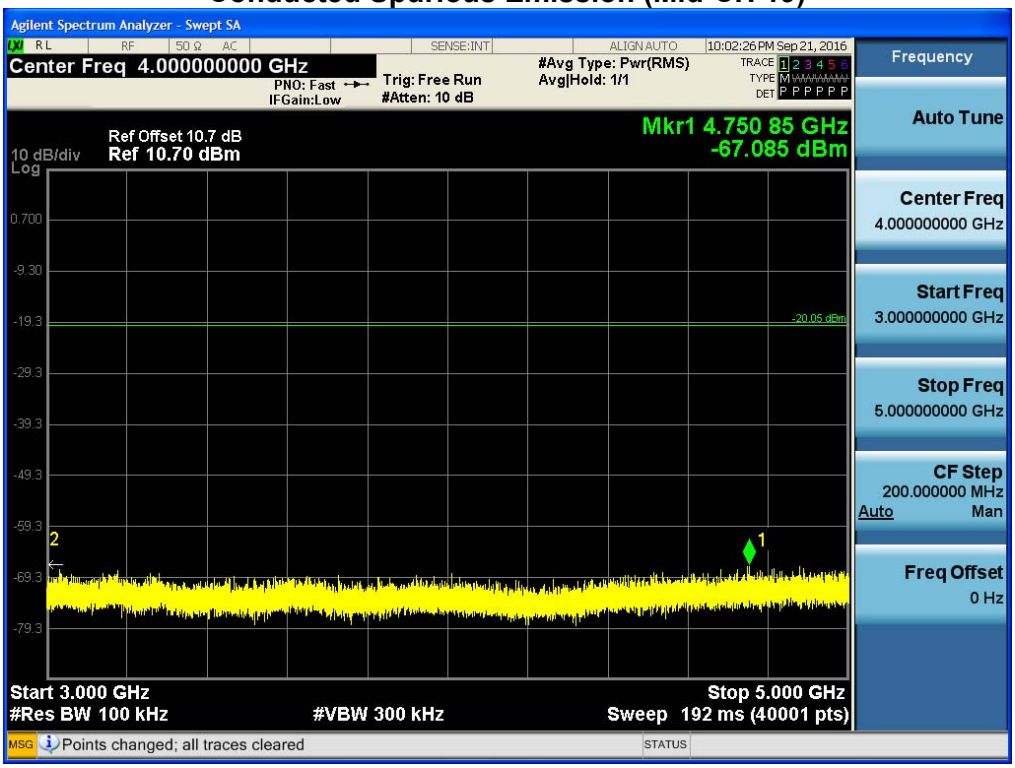
1 GHz ~ 3 GHz

Conducted Spurious Emission (Mid-CH 19)



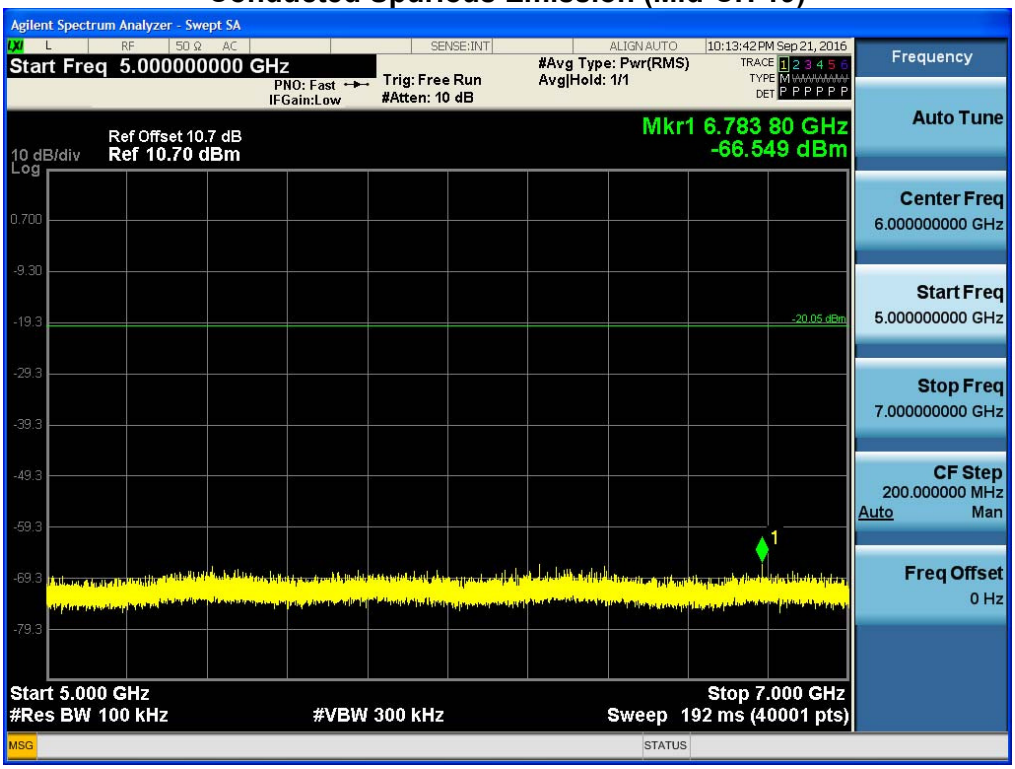
3 GHz ~ 5 GHz

Conducted Spurious Emission (Mid-CH 19)



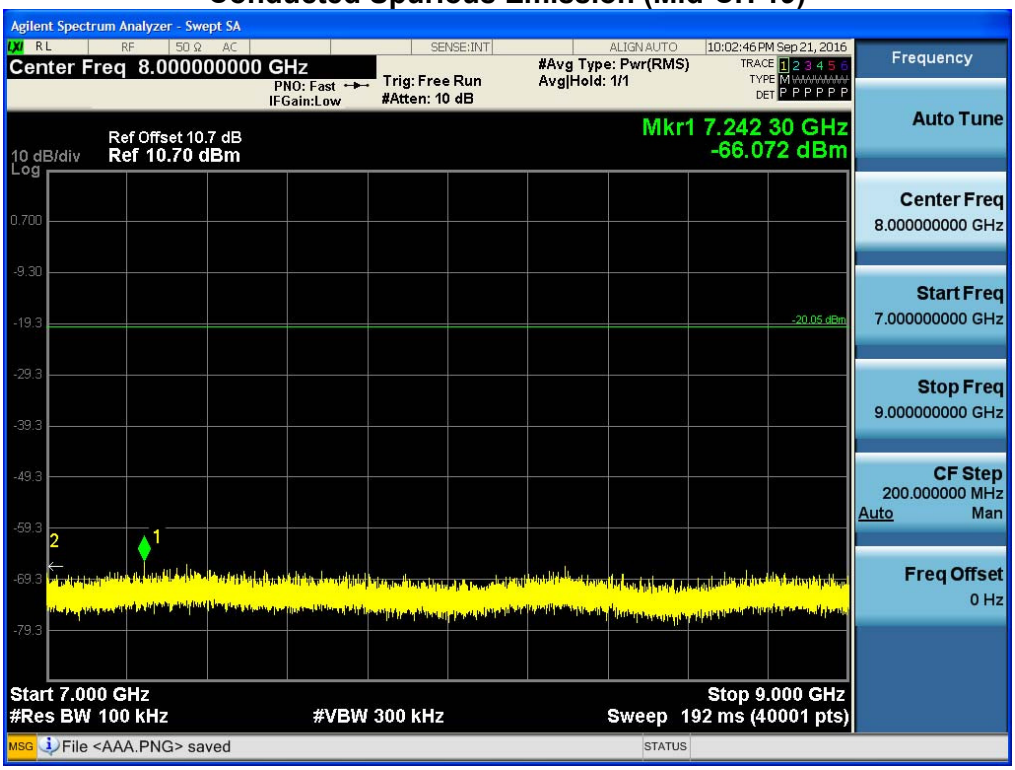
5 GHz ~ 7 GHz

Conducted Spurious Emission (Mid-CH 19)



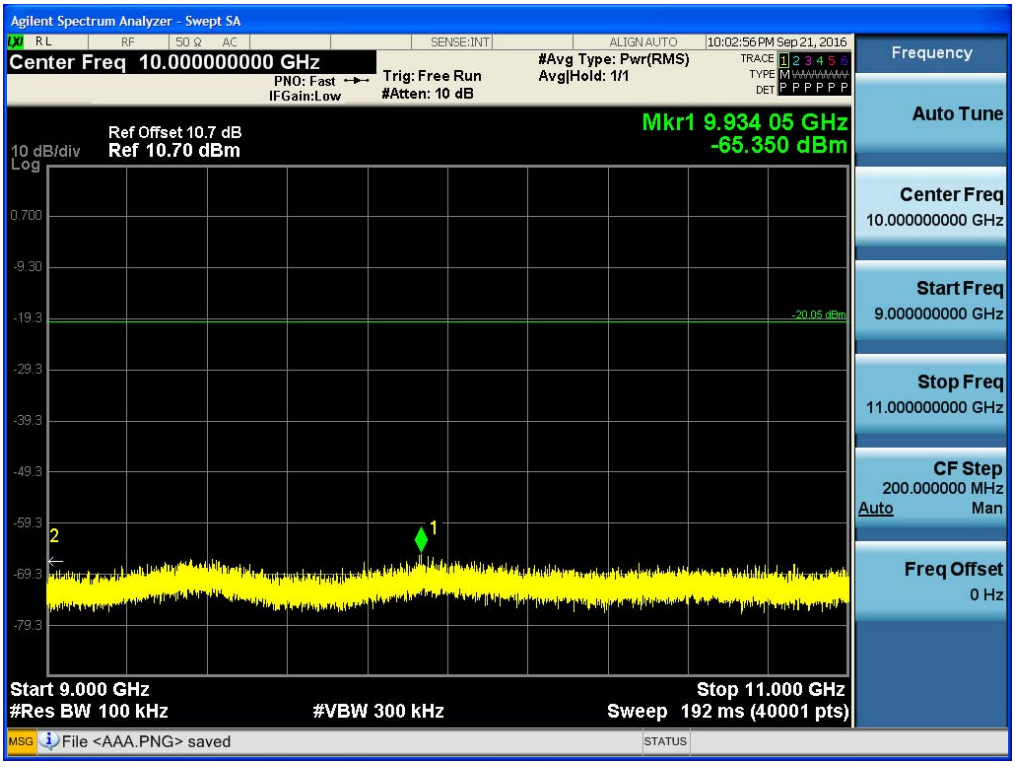
7 GHz ~ 9 GHz

Conducted Spurious Emission (Mid-CH 19)



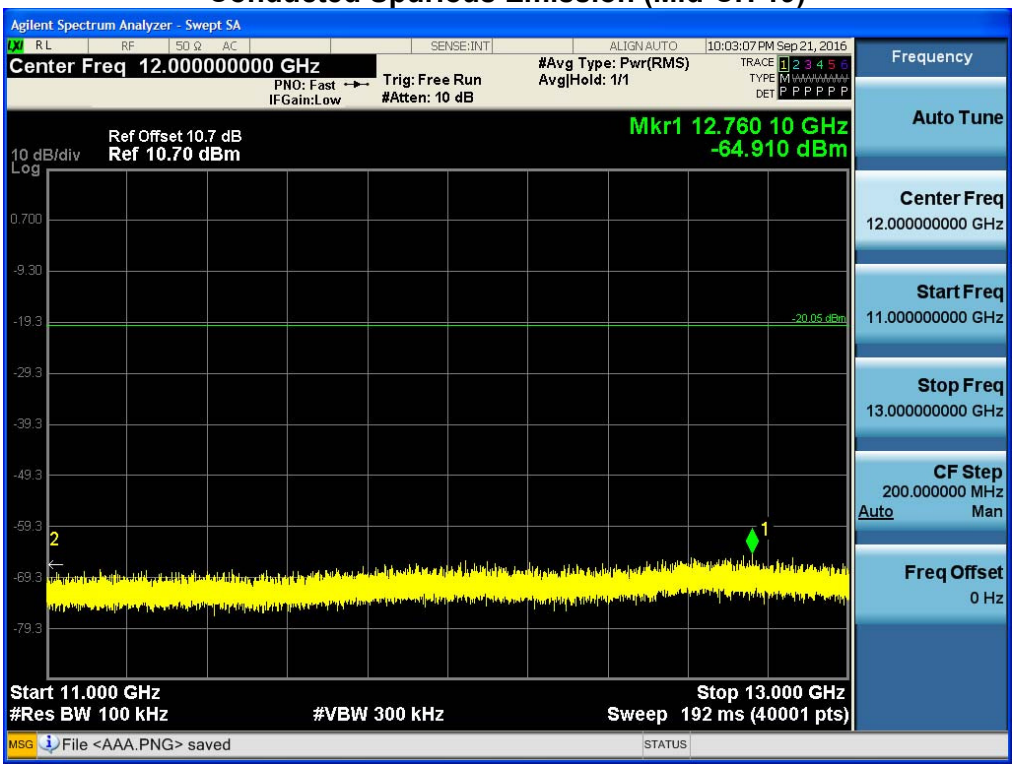
9 GHz ~ 11 GHz

Conducted Spurious Emission (Mid-CH 19)



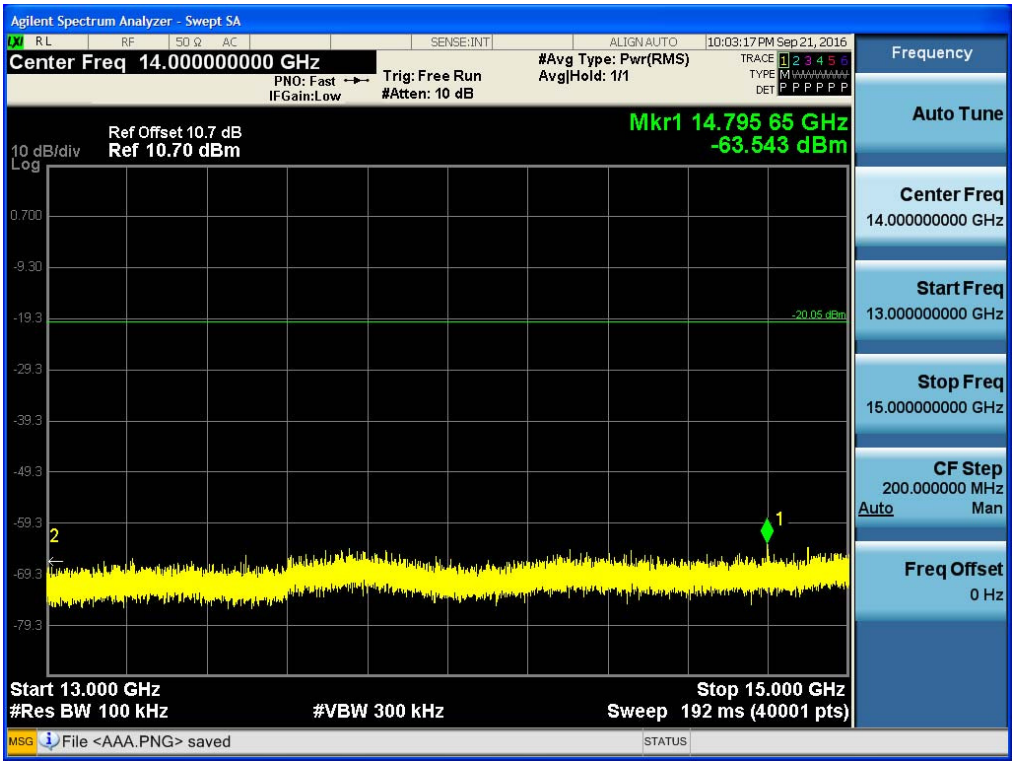
11 GHz ~ 13 GHz

Conducted Spurious Emission (Mid-CH 19)



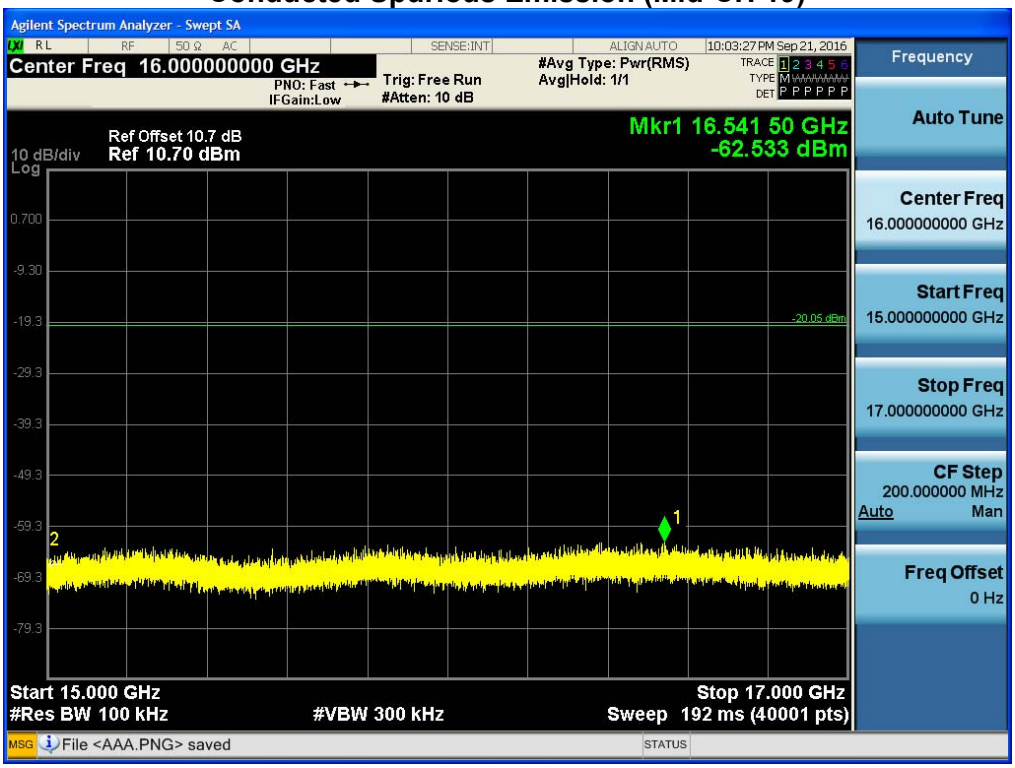
13 GHz ~ 15 GHz

Conducted Spurious Emission (Mid-CH 19)



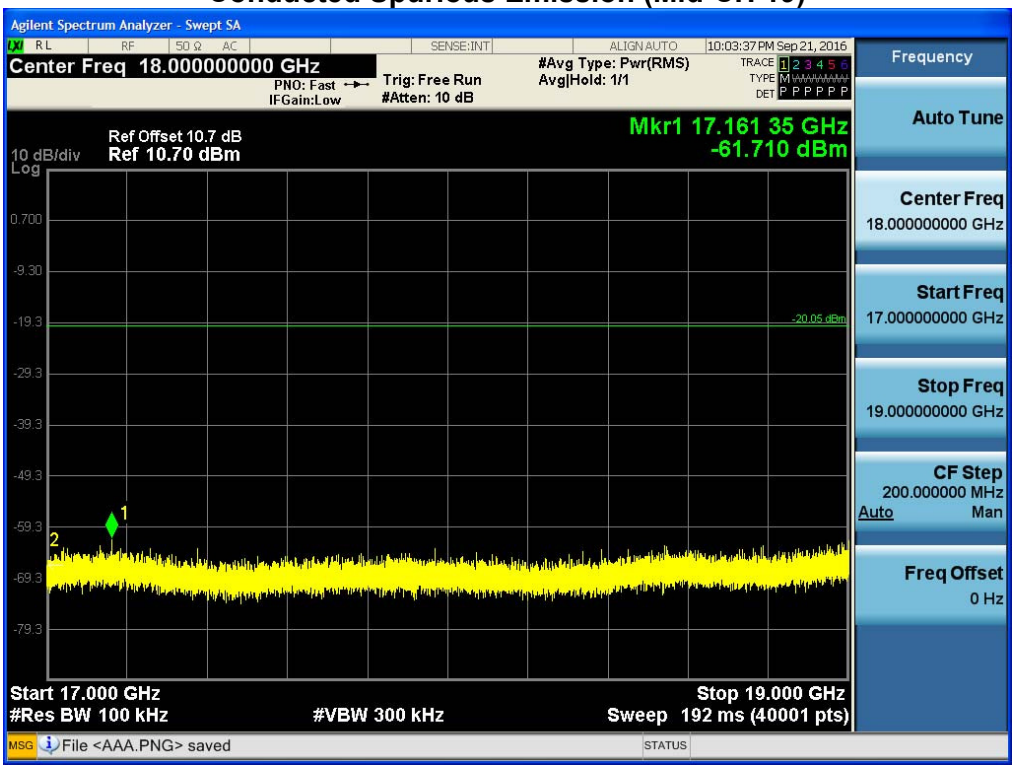
15 GHz ~ 17 GHz

Conducted Spurious Emission (Mid-CH 19)



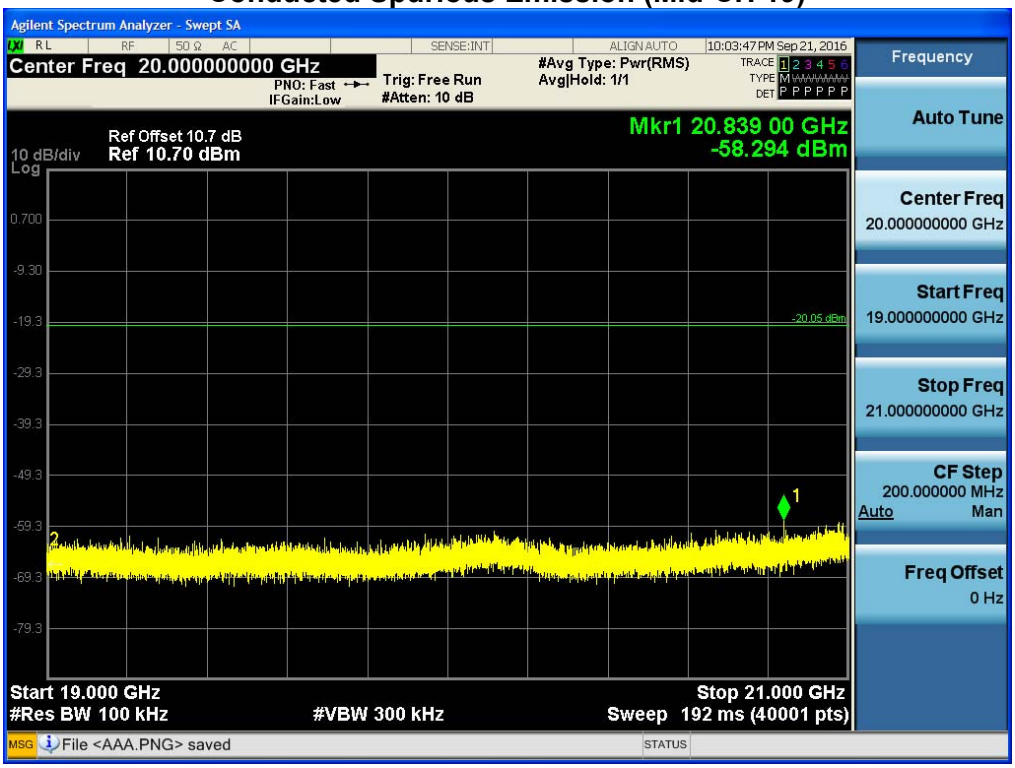
17 GHz ~ 19 GHz

Conducted Spurious Emission (Mid-CH 19)



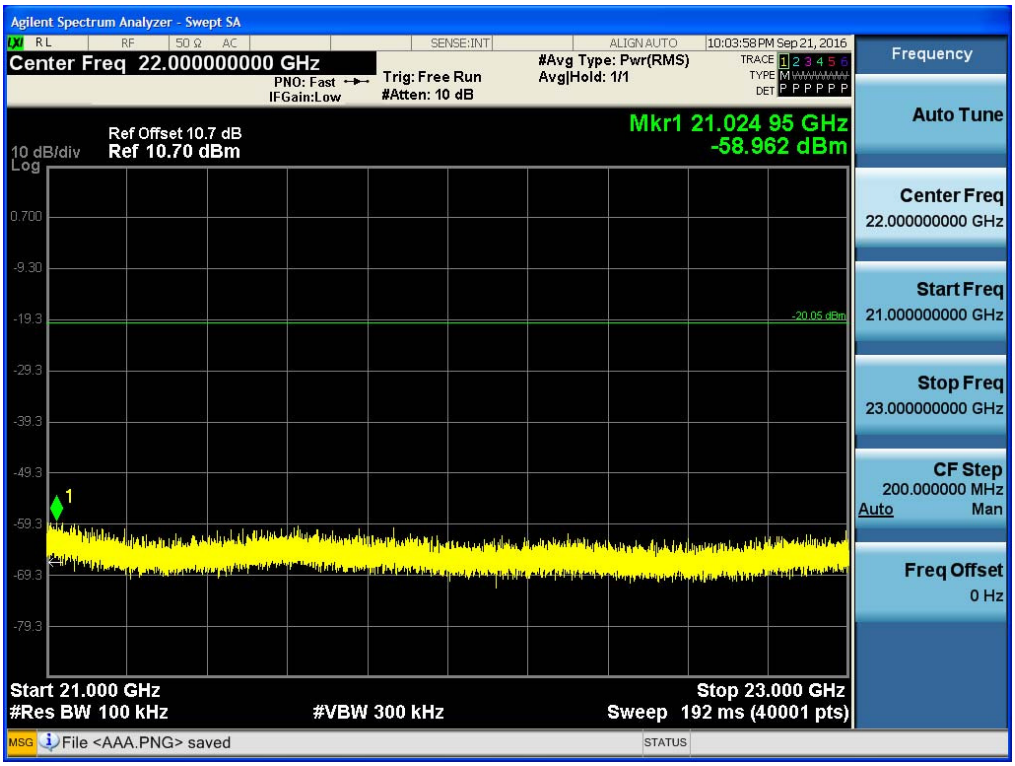
19 GHz ~ 21 GHz

Conducted Spurious Emission (Mid-CH 19)



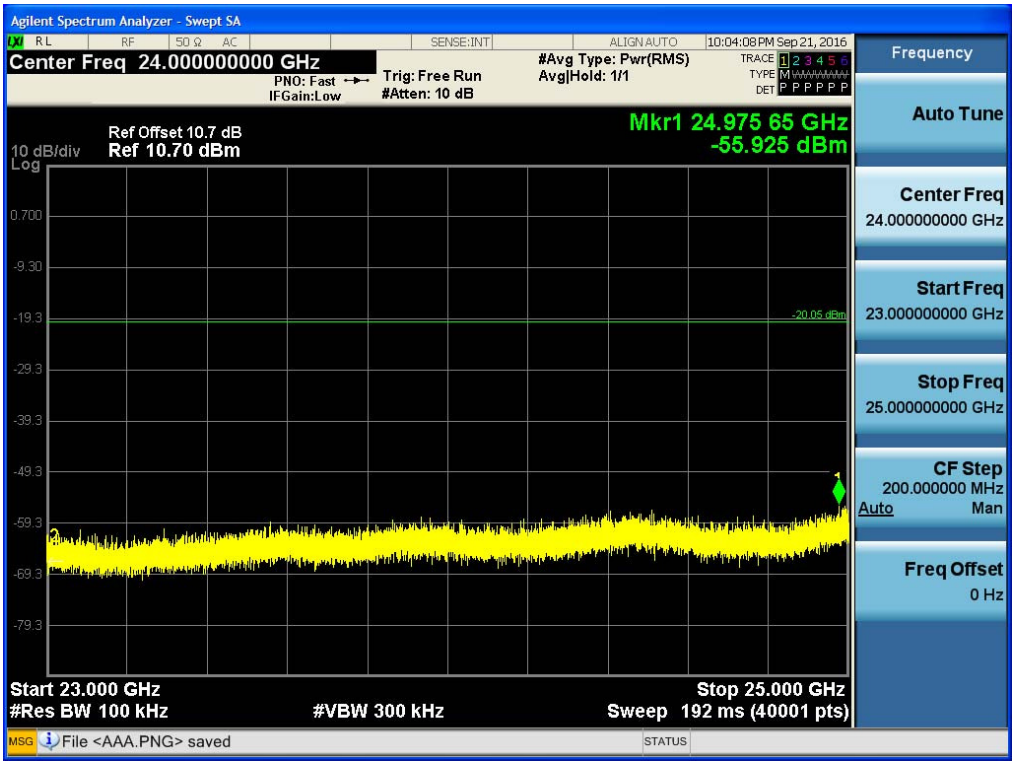
21 GHz ~ 23 GHz

Conducted Spurious Emission (Mid-CH 19)



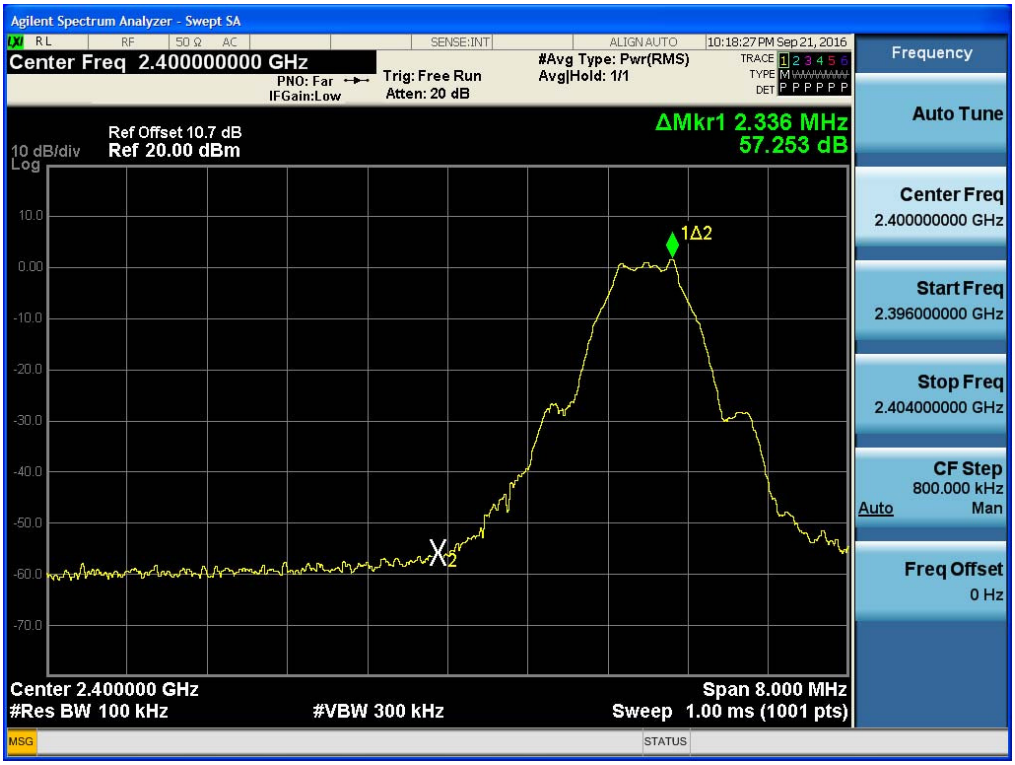
23 GHz ~ 25 GHz

Conducted Spurious Emission (Mid-CH 19)

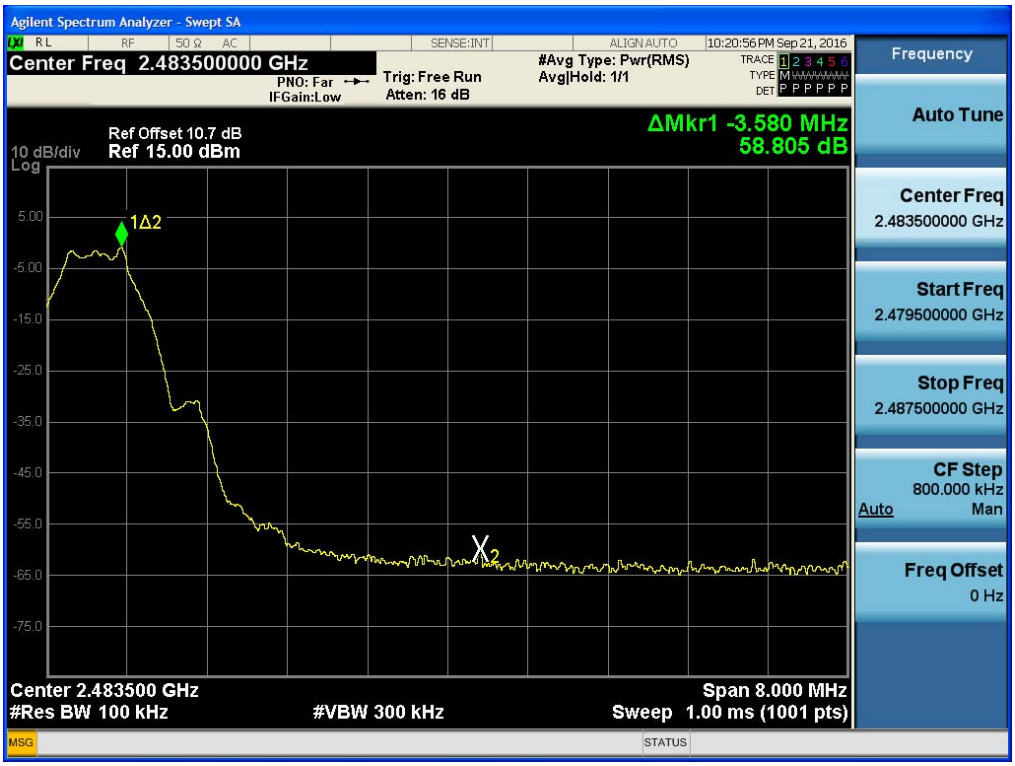


▣ RESULT PLOTS_ Data packet length (Max)

BandEdge (Low-CH 0)

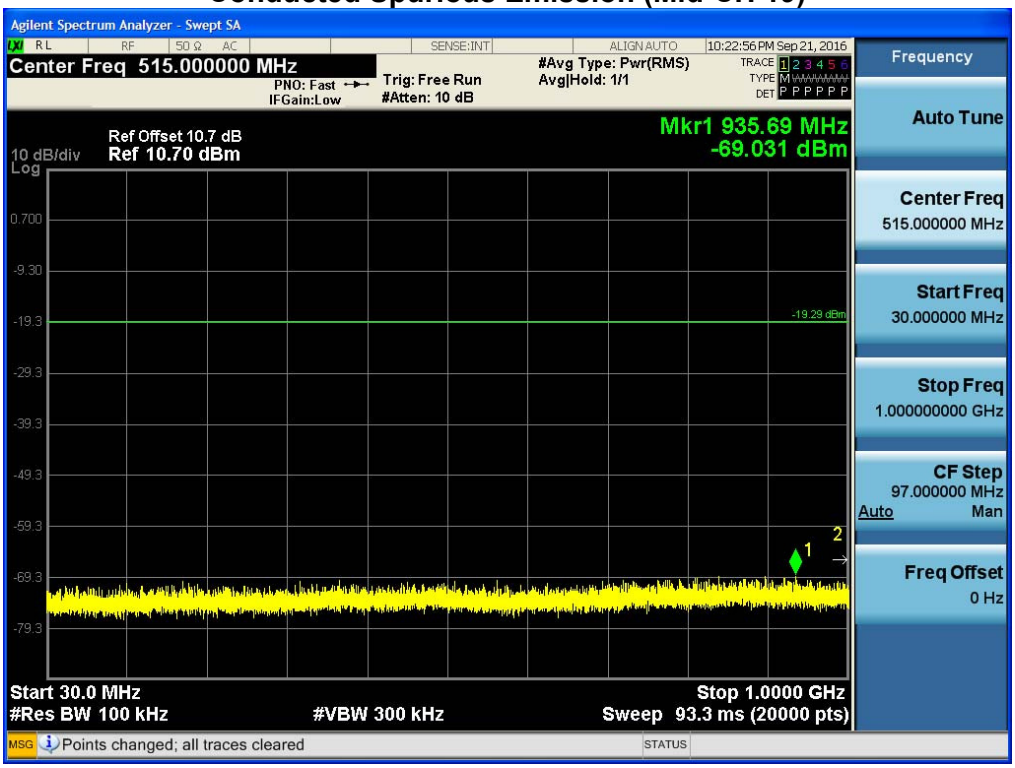


BandEdge (High-CH 39)



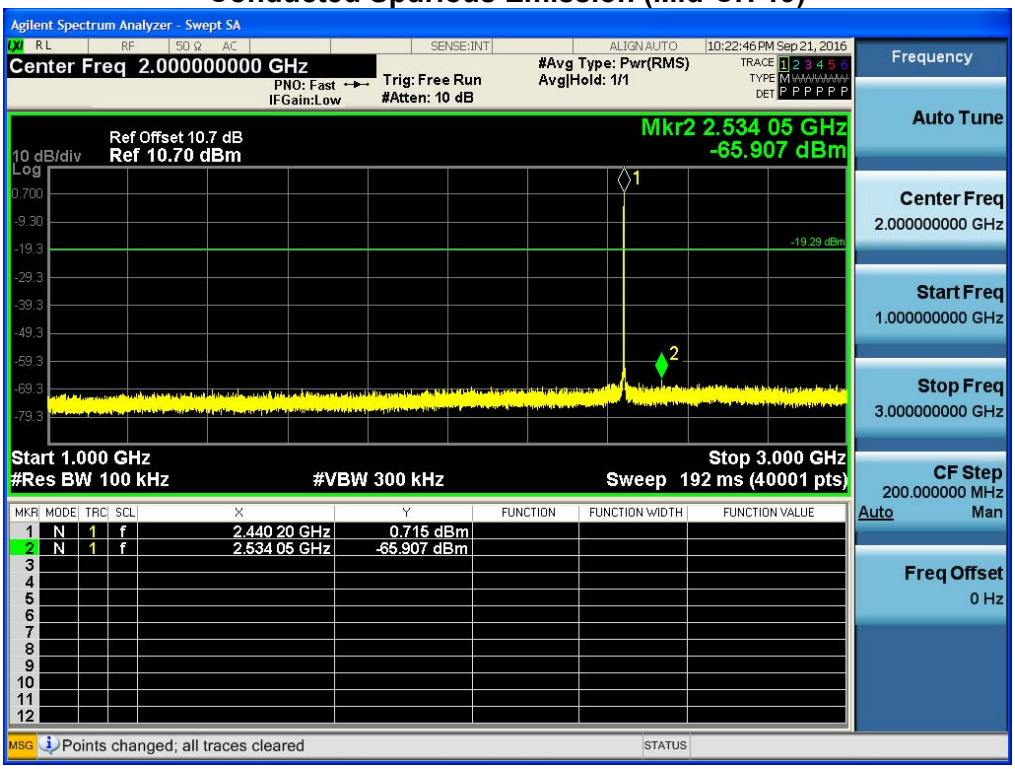
30 MHz ~ 1 GHz

Conducted Spurious Emission (Mid-CH 19)



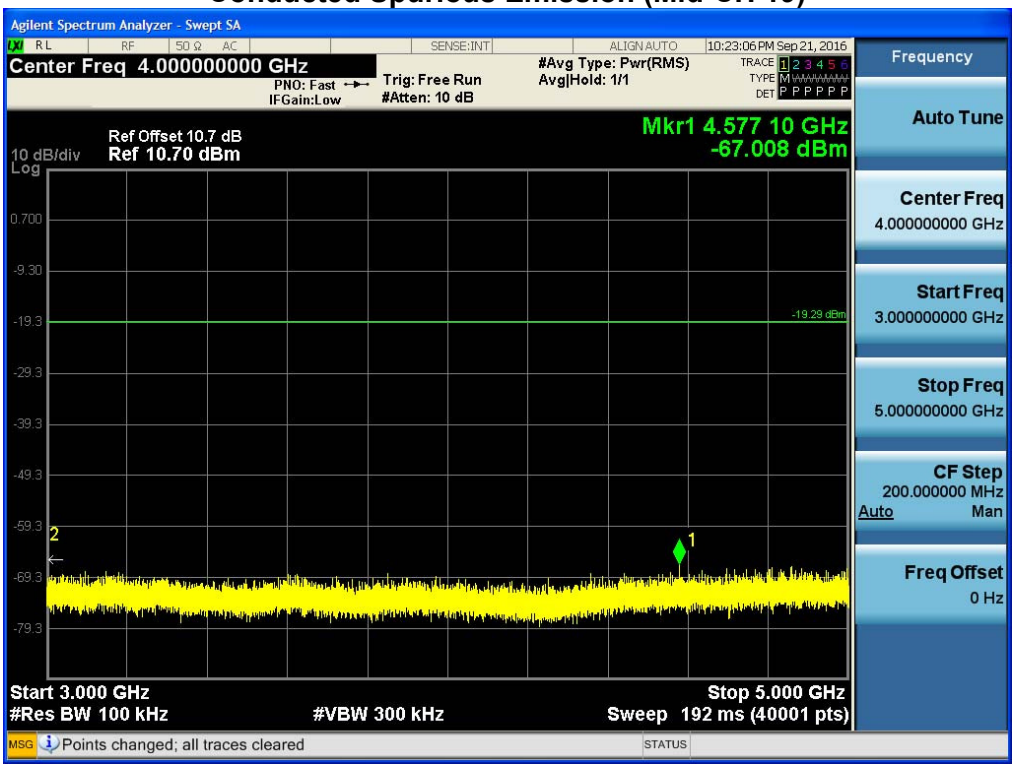
1 GHz ~ 3 GHz

Conducted Spurious Emission (Mid-CH 19)



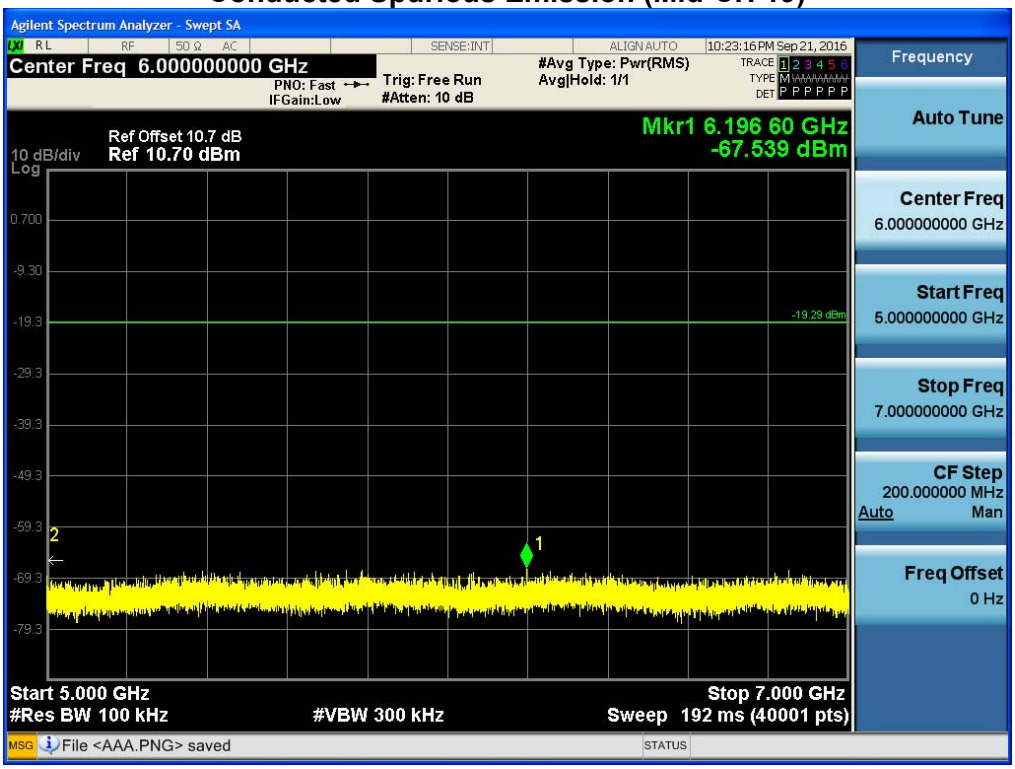
3 GHz ~ 5 GHz

Conducted Spurious Emission (Mid-CH 19)



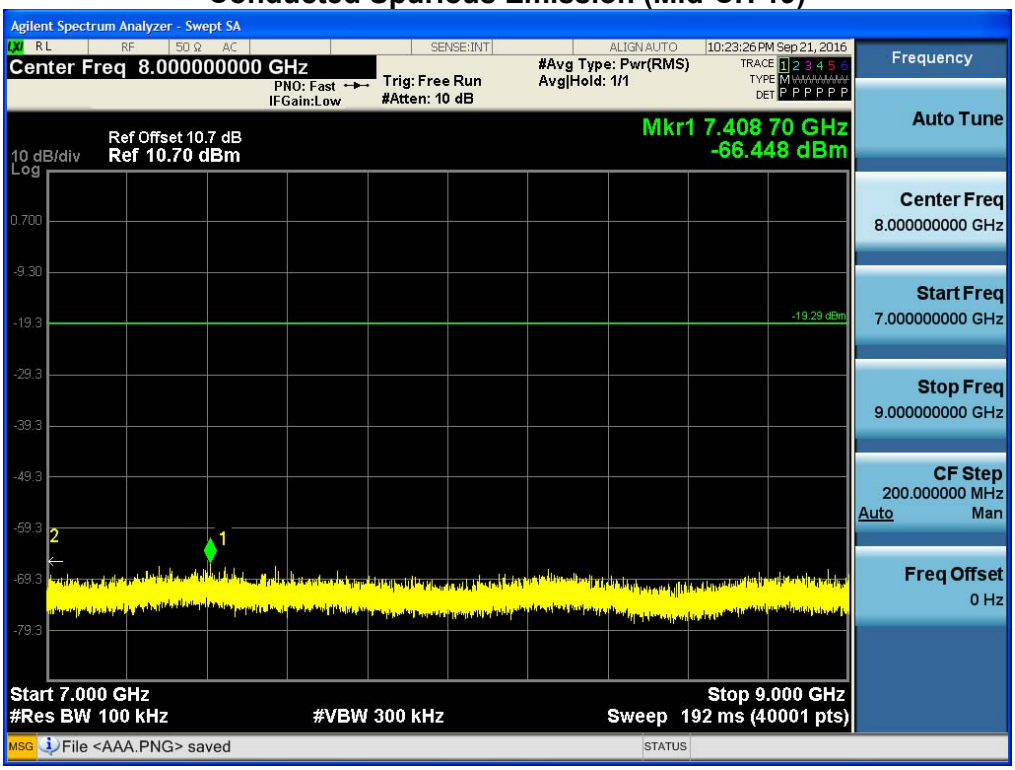
5 GHz ~ 7 GHz

Conducted Spurious Emission (Mid-CH 19)



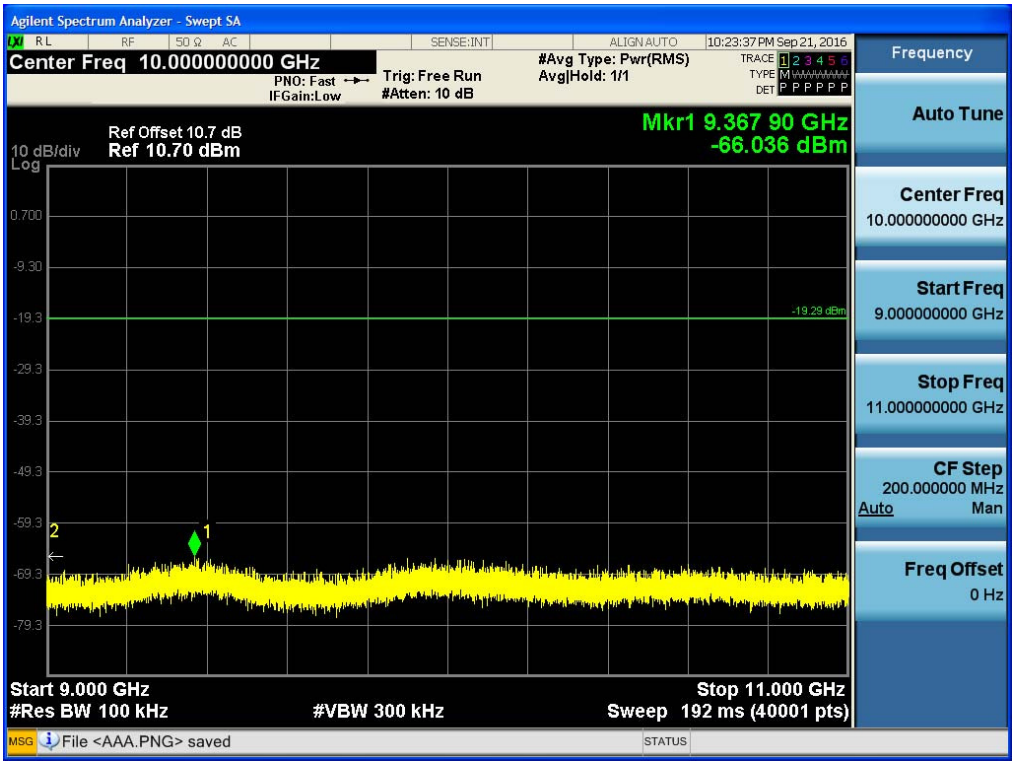
7 GHz ~ 9 GHz

Conducted Spurious Emission (Mid-CH 19)



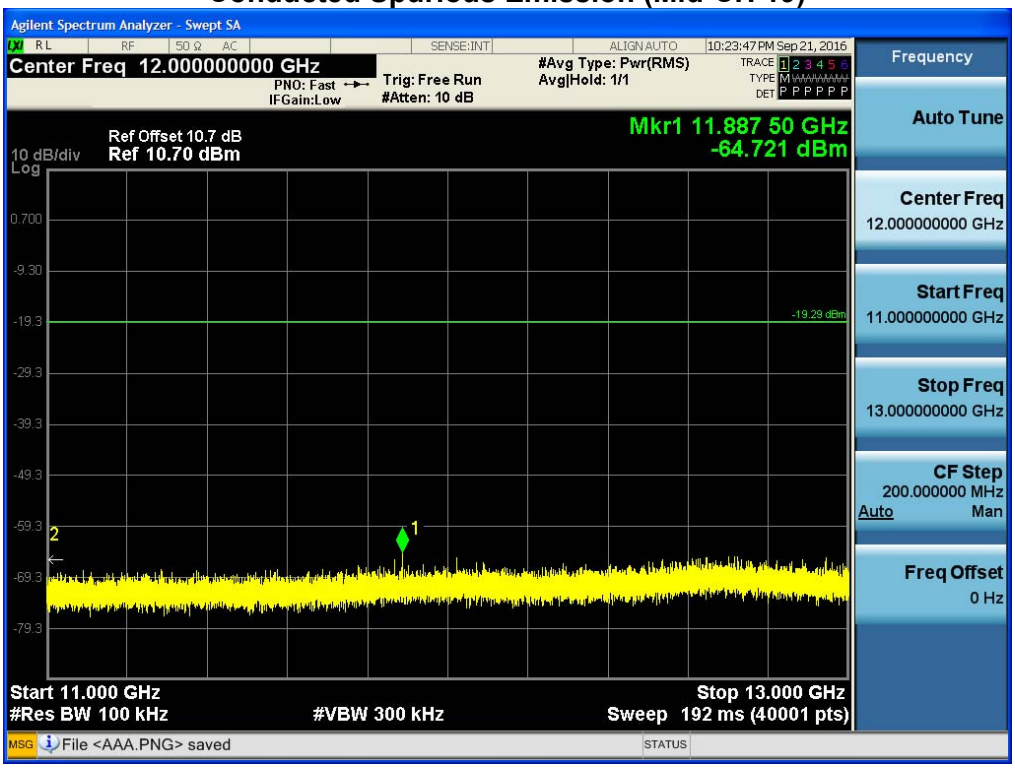
9 GHz ~ 11 GHz

Conducted Spurious Emission (Mid-CH 19)



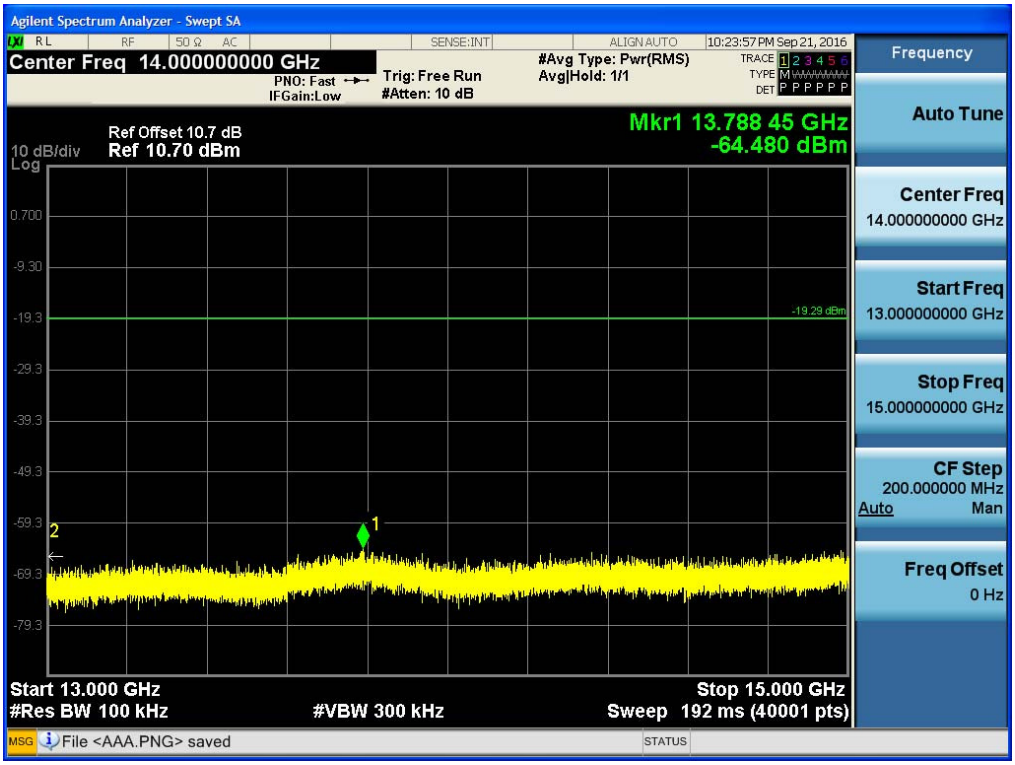
11 GHz ~ 13 GHz

Conducted Spurious Emission (Mid-CH 19)



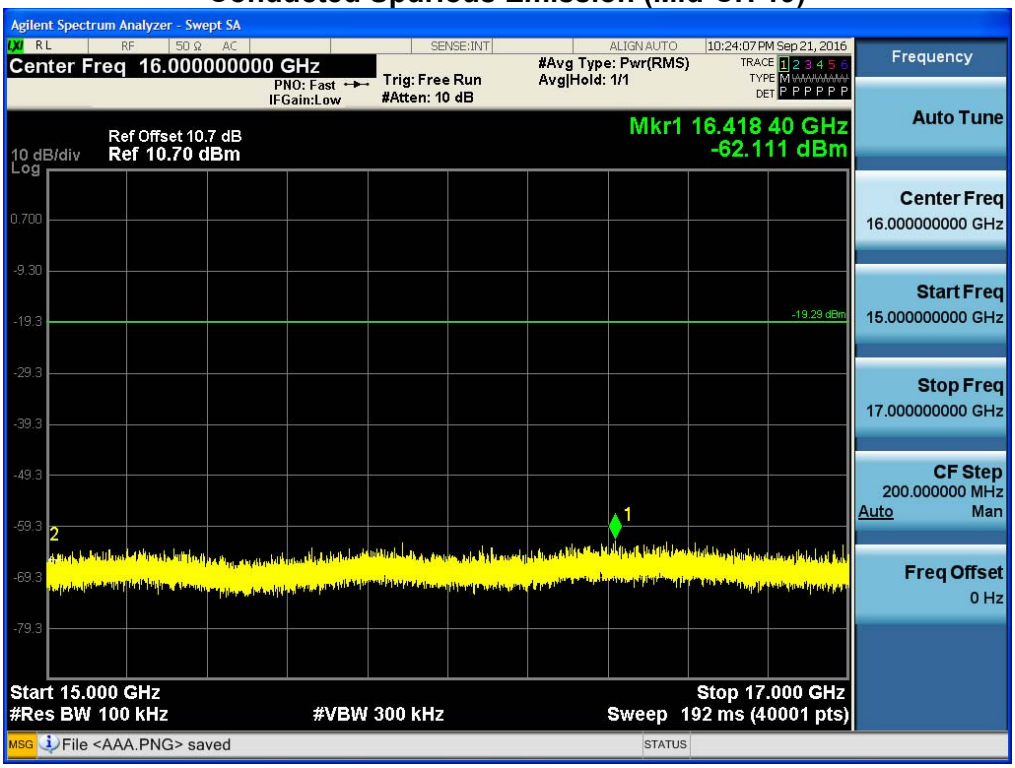
13 GHz ~ 15 GHz

Conducted Spurious Emission (Mid-CH 19)



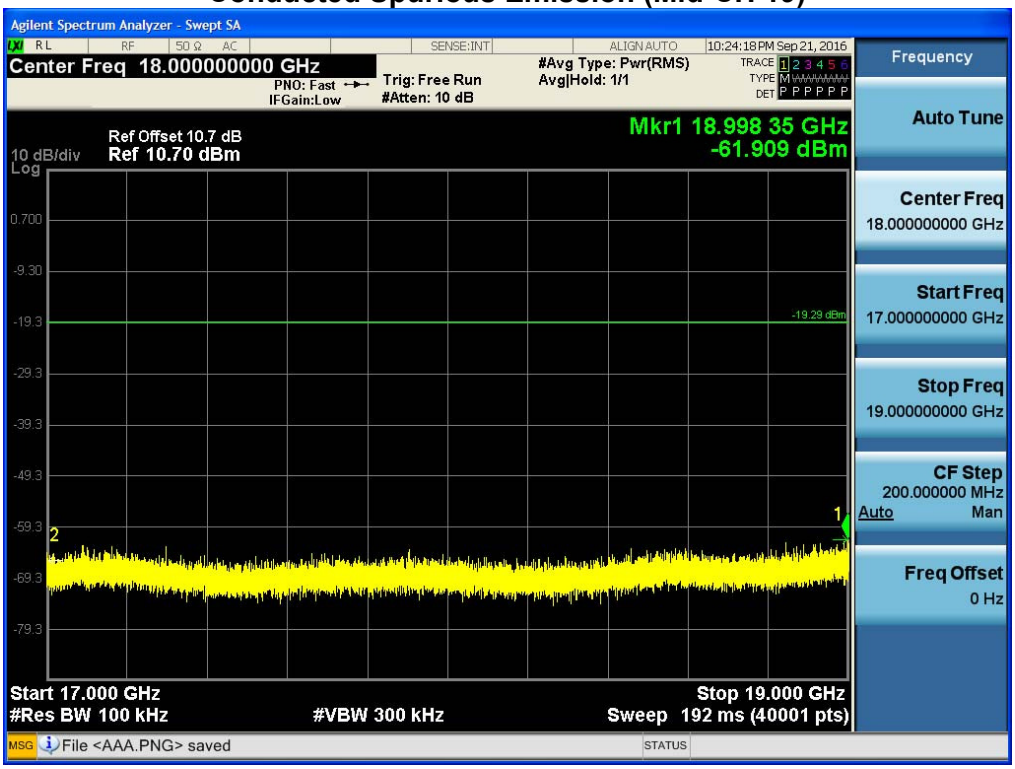
15 GHz ~ 17 GHz

Conducted Spurious Emission (Mid-CH 19)



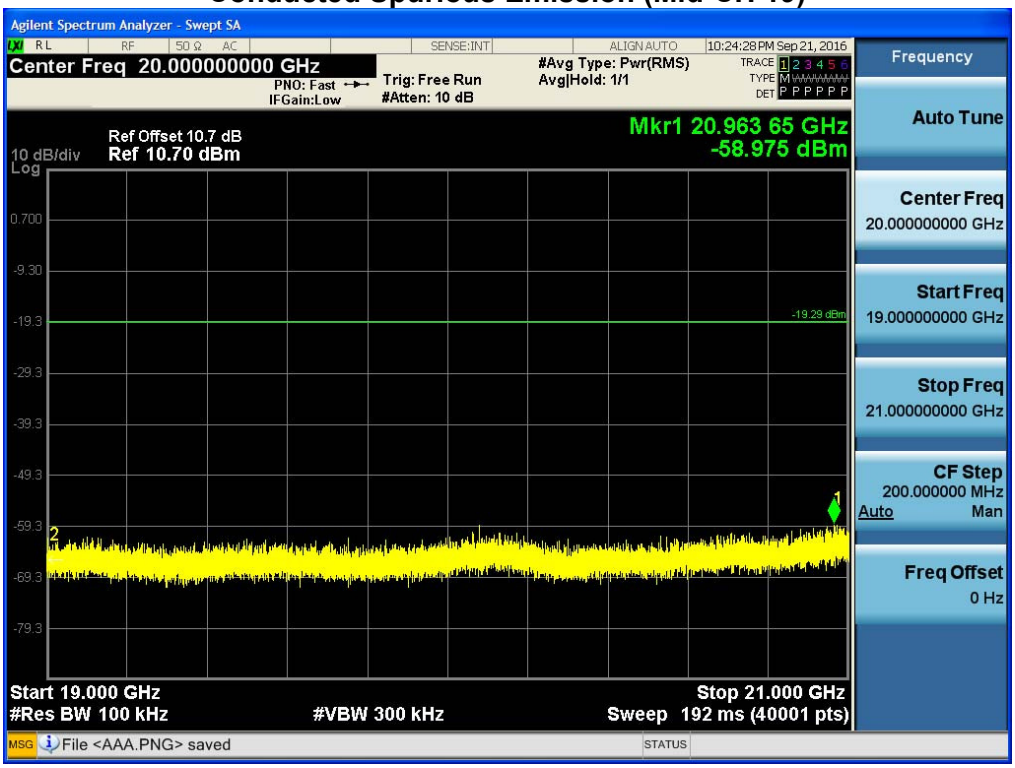
17 GHz ~ 19 GHz

Conducted Spurious Emission (Mid-CH 19)



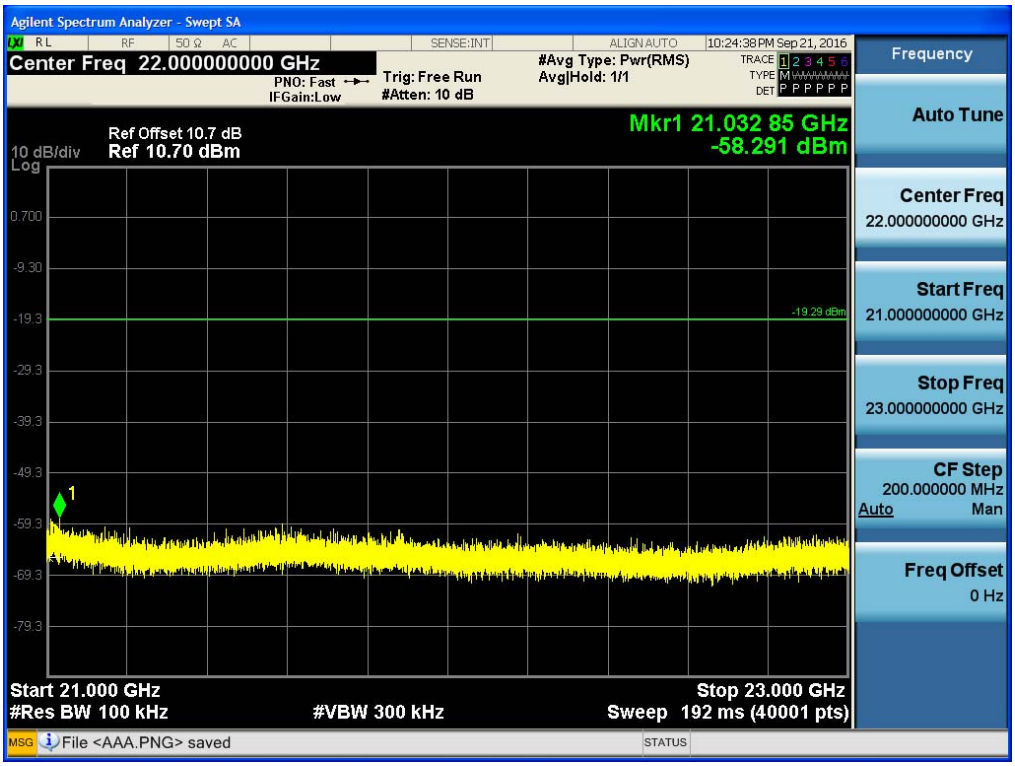
19 GHz ~ 21 GHz

Conducted Spurious Emission (Mid-CH 19)



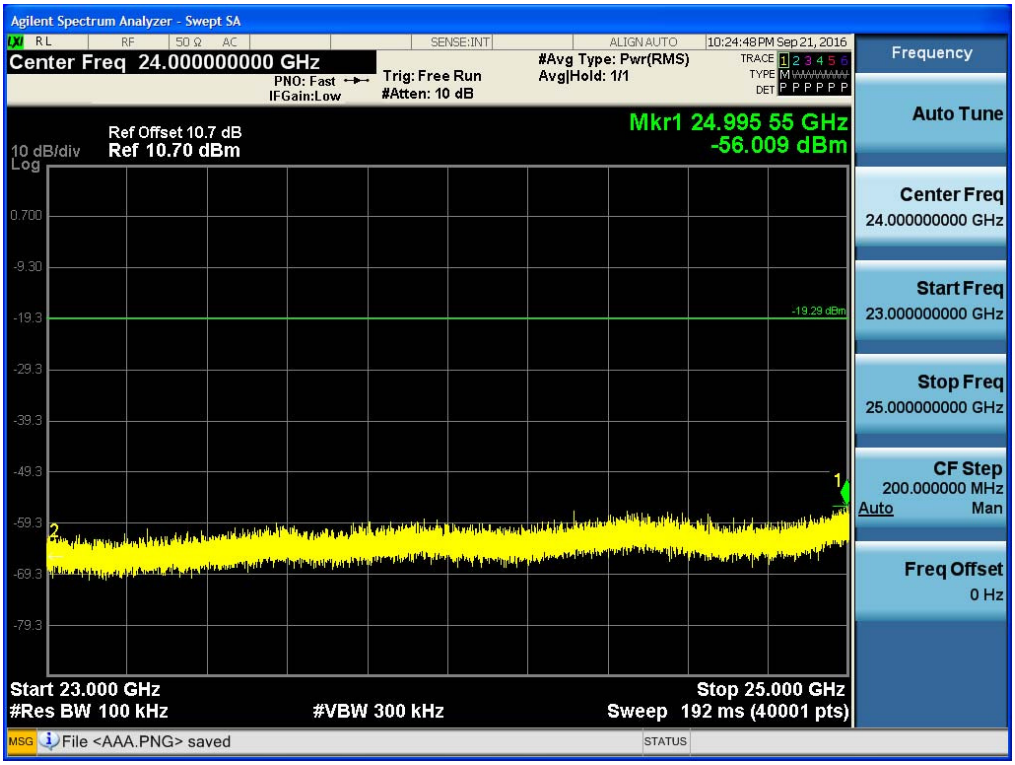
21 GHz ~ 23 GHz

Conducted Spurious Emission (Mid-CH 19)



23 GHz ~ 25 GHz

Conducted Spurious Emission (Mid-CH 19)



9.6 RADIATED MEASUREMENT.

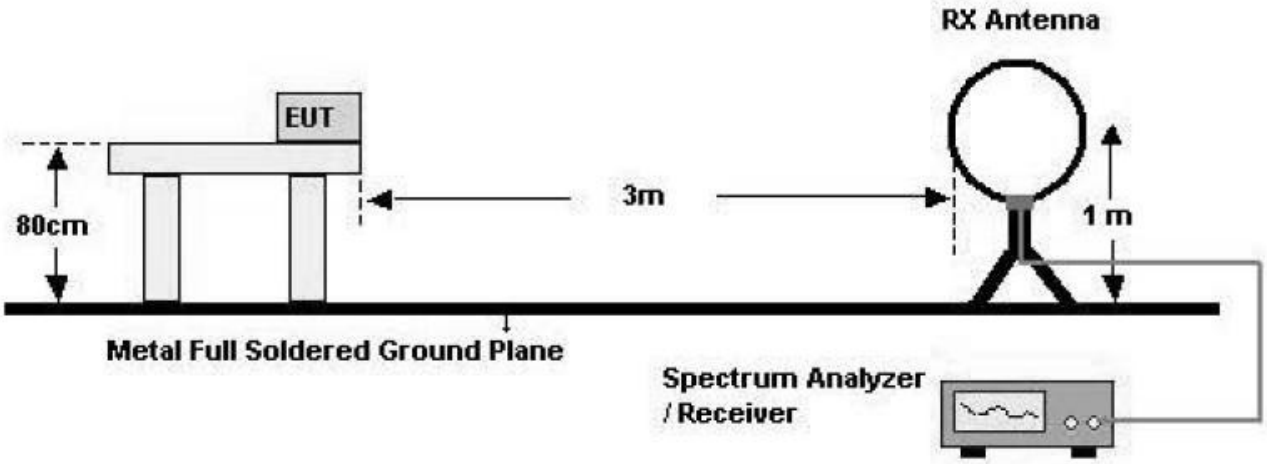
9.6.1 RADIATED SPURIOUS EMISSIONS.

Test Requirements and limit, §15.205, §15.209

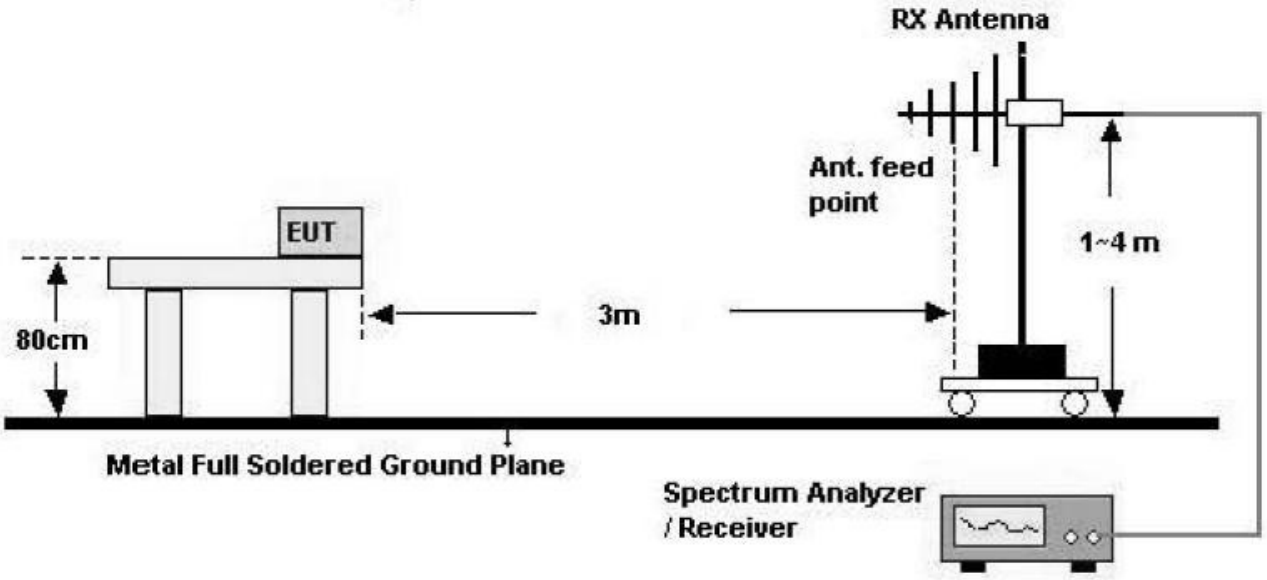
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

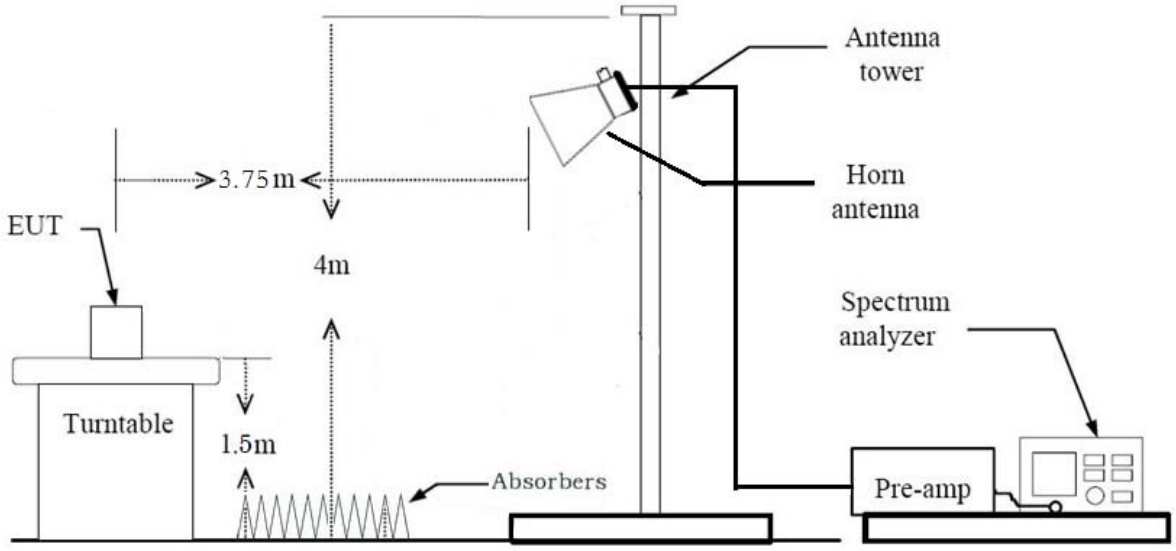
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



TEST PROCEDURE USED

Method 12.1 in KDB 558074 v03r05

Spectrum Setting

- Peak

Peak emission levels are measured by setting the instrument as follows:

RBW = cf. Table 1.

VBW ≥ 3 x RBW.

Detector = Peak.

Sweep time = auto.

Trace mode = max hold.

Allow sweeps to continue until the trace stabilizes.

(Note that the required measurement time may be longer for low duty cycle applications).

Table 1 —RBW as a function of frequency

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

- Average (duty cycle < 98%, duty cycle variations are less than ±2%)

Set RBW = 1 MHz

Set VBW ≥ 3 x RBW

Detector = RMS.

Averaging type = power (*i.e.*, RMS).

Sweep time = auto.

Trace mode = average (at least 100 traces).

A correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle.

Note :

1. We are performed the RSE and radiated band edge using standard radiated method(RMS).
2. According to SVSWR requirement in ANSI 63.4-2014, We performed the radiated test at 3.75 m distance from center of turn table. So, we applied the distance factor(reference distance : 3 m).
3. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Data packet length (Min)

LE Mode	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
	0.3901	0.6245	0.6247	2.04

Data packet length (Max)

LE Mode	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
	2.1350	2.5000	0.8540	0.69

TEST RESULTS

9 kHz – 30MHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dBuV/m	dBm/m	dBm	(H/V)	dBuV/m	dBuV/m	dB
No Critical peaks found							

Notes:

1. Measuring frequencies from 9 kHz to the 30MHz.
2. The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
3. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
4. Limit line = specific Limits (dBuV) + Distance extrapolation factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

TEST RESULTS

Below 1 GHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dBuV/m	dBm/m	dBm	(H/V)	dBuV/m	dBuV/m	dB
No Critical peaks found							

Notes:

1. Measuring frequencies from 30 MHz to the 1 GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Above 1 GHz

Operation Mode: CH.0_ Data packet length (Min)

Frequency [MHz]	Reading [dBuV/m]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G.+D.F. [dBm]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4804	48.49	0.00	-0.61	V	47.88	73.98	26.10	PK
4804	36.27	2.04	-0.61	V	37.7	53.98	16.28	AV
7206	45.52	0.00	8.78	V	54.3	73.98	19.68	PK
7206	33.81	2.04	8.78	V	44.63	53.98	9.35	AV
4804	48.68	0.00	-0.61	H	48.07	73.98	25.91	PK
4804	36.32	2.04	-0.61	H	37.75	53.98	16.23	AV
7206	45.83	0.00	8.78	H	54.61	73.98	19.37	PK
7206	33.88	2.04	8.78	H	44.7	53.98	9.28	AV

*A.F. : Antenna Factor / C.L. : Cable Loss / A.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor + Duty Cycle Factor
5. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Operation Mode: CH.19_ Data packet length (Min)

Frequency [MHz]	Reading [dBuV/m]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G.+D.F. [dBm]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4880	49.16	0.00	0.19	V	49.35	73.98	24.63	PK
4880	37.33	2.04	0.19	V	39.56	53.98	14.42	AV
7320	46.18	0.00	8.85	V	55.03	73.98	18.95	PK
7320	34.06	2.04	8.85	V	44.95	53.98	9.03	AV
4880	49.24	0.00	0.19	H	49.43	73.98	24.55	PK
4880	37.45	2.04	0.19	H	39.68	53.98	14.30	AV
7320	46.32	0.00	8.85	H	55.17	73.98	18.81	PK
7320	34.17	2.04	8.85	H	45.06	53.98	8.92	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor + Duty Cycle Factor
5. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Operation Mode: CH.39_ Data packet length (Min)

Frequency [MHz]	Reading [dBuV/m]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G.+D.F. [dBm]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4960	49.12	0.00	0.92	V	50.04	73.98	23.94	PK
4960	37.79	2.04	0.92	V	40.75	53.98	13.23	AV
7440	45.86	0.00	9.03	V	54.89	73.98	19.09	PK
7440	33.73	2.04	9.03	V	44.8	53.98	9.18	AV
4960	49.44	0.00	0.92	H	50.36	73.98	23.62	PK
4960	37.81	2.04	0.92	H	40.77	53.98	13.21	AV
7440	45.93	0.00	9.03	H	54.96	73.98	19.02	PK
7440	33.82	2.04	9.03	H	44.89	53.98	9.09	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor + Duty Cycle Factor
5. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Operation Mode: CH.0_ Data packet length (Max)

Frequency [MHz]	Reading [dBuV/m]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G.+D.F. [dBm]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4804	48.66	0.00	-0.61	V	48.05	73.98	25.93	PK
4804	36.25	0.69	-0.61	V	36.33	53.98	17.65	AV
7206	45.73	0.00	8.78	V	54.51	73.98	19.47	PK
7206	33.84	0.69	8.78	V	43.31	53.98	10.67	AV
4804	48.71	0.00	-0.61	H	48.1	73.98	25.88	PK
4804	36.28	0.69	-0.61	H	36.36	53.98	17.62	AV
7206	45.91	0.00	8.78	H	54.69	73.98	19.29	PK
7206	33.91	0.69	8.78	H	43.38	53.98	10.60	AV

*A.F. : Antenna Factor / C.L. : Cable Loss / A.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor + Duty Cycle Factor
5. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Operation Mode: CH.19_ Data packet length (Max)

Frequency [MHz]	Reading [dBuV/m]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G.+D.F. [dBm]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4880	49.31	0.00	0.19	V	49.5	73.98	24.48	PK
4880	37.48	0.69	0.19	V	38.36	53.98	15.62	AV
7320	46.02	0.00	8.85	V	54.87	73.98	19.11	PK
7320	34.06	0.69	8.85	V	43.6	53.98	10.38	AV
4880	49.13	0.00	0.19	H	49.32	73.98	24.66	PK
4880	37.51	0.69	0.19	H	38.39	53.98	15.59	AV
7320	46.15	0.00	8.85	H	55	73.98	18.98	PK
7320	34.13	0.69	8.85	H	43.67	53.98	10.31	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor + Duty Cycle Factor
5. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Operation Mode: CH.39_ Data packet length (Max)

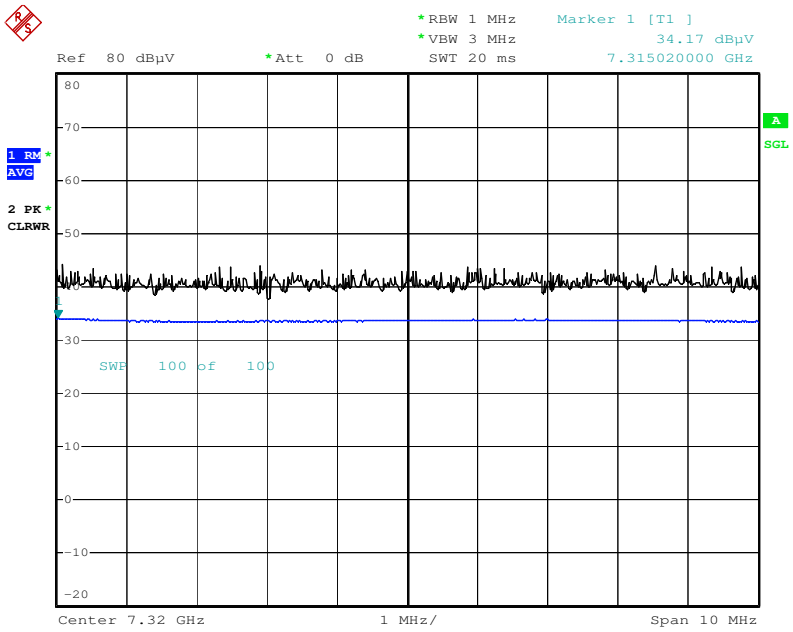
Frequency [MHz]	Reading [dBuV/m]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G.+D.F. [dBm]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4960	49.25	0.00	0.92	V	50.17	73.98	23.81	PK
4960	37.78	0.69	0.92	V	39.39	53.98	14.59	AV
7440	46.03	0.00	9.03	V	55.06	73.98	18.92	PK
7440	33.80	0.69	9.03	V	43.52	53.98	10.46	AV
4960	49.39	0.00	0.92	H	50.31	73.98	23.67	PK
4960	37.79	0.69	0.92	H	39.4	53.98	14.58	AV
7440	46.11	0.00	9.03	H	55.14	73.98	18.84	PK
7440	33.76	0.69	9.03	H	43.48	53.98	10.50	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor + Duty Cycle Factor
5. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

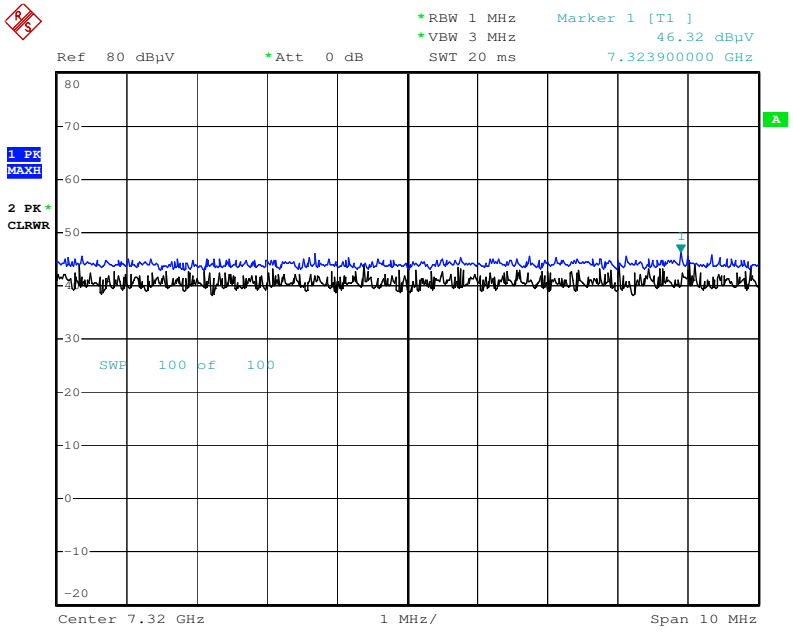
▣ RESULT PLOTS_Data packet length (Min) (Worst case : x-H)

Radiated Spurious Emissions plot – Average Reading (Ch.19 3rd Harmonic)



Date: 7.SEP.2016 17:46:13

Radiated Spurious Emissions plot – Peak Reading (Ch.19 3rd Harmonic)

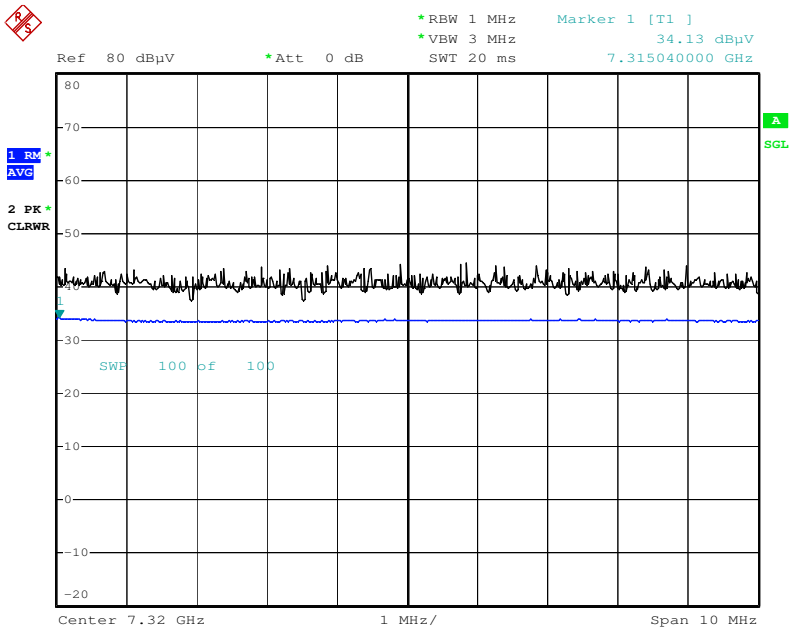


Date: 7.SEP.2016 17:46:35

Note : Only the worst case plots for Radiated Spurious Emissions.

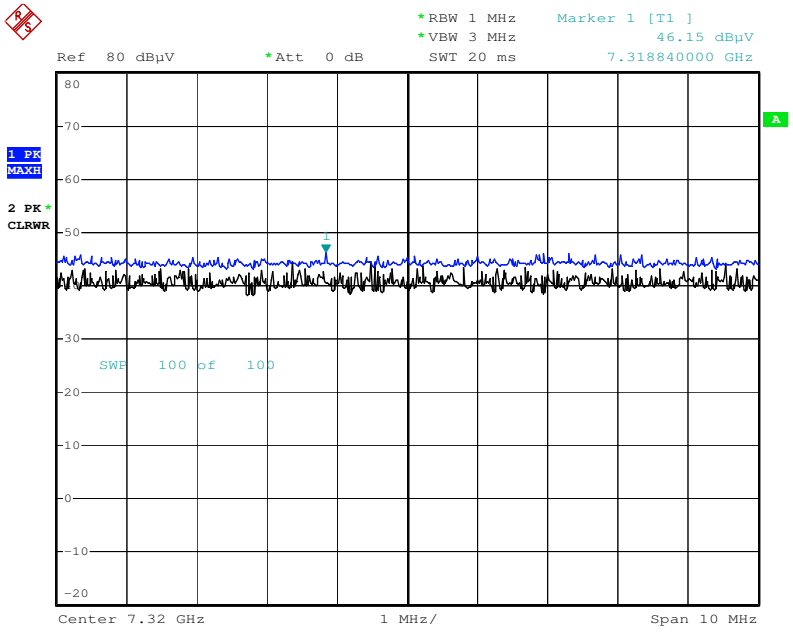
▣ RESULT PLOTS_Data packet length (Max) (Worst case : x-H)

Radiated Spurious Emissions plot – Average Reading (Ch.19 3rd Harmonic)



Date: 7.SEP.2016 17:47:30

Radiated Spurious Emissions plot – Peak Reading (Ch.19 3rd Harmonic)



Date: 7.SEP.2016 17:47:08

Note : Only the worst case plots for Radiated Spurious Emissions.

9.6.2 RADIATED RESTRICTED BAND EDGES

Test Requirements and limit, §15.247(d) §15.205, §15.209

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a) (See section 15.205(c)).

Operation Mode	BT_LE Data packet length (Min)
Operating Frequency	2402 MHz
Channel No.	0

Frequency [MHz]	Reading [dBuV/m]	Duty Cycle Factor [dB]	A.F.+C.L.+D.F. [dB]	Ant. Pol. [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	50.63	0.00	0.32	H	50.95	73.98	23.03	PK
2390.0	38.95	2.04	0.32	H	41.31	53.98	12.67	AV
2390.0	50.74	0.00	0.32	V	51.06	73.98	22.92	PK
2390.0	38.87	2.04	0.32	V	41.23	53.98	12.75	AV

Operation Mode	BT_LE Data packet length (Max)
Operating Frequency	2402 MHz
Channel No.	0

Frequency [MHz]	Reading [dBuV/m]	Duty Cycle Factor [dB]	A.F.+C.L.+D.F. [dB]	Ant. Pol. [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	50.87	0.00	0.32	H	51.19	73.98	22.79	PK
2390.0	39.18	0.69	0.32	H	40.19	53.98	13.79	AV
2390.0	50.63	0.00	0.32	V	50.95	73.98	23.03	PK
2390.0	39.06	0.69	0.32	V	40.07	53.98	13.91	AV

Notes:

1. Frequency range of measurement = 2310 MHz ~ 2390 MHz
2. Total = Reading Value + Antenna Factor + Cable Loss + Duty Cycle Factor + Distance Factor
3. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Operation Mode	BT_LE Data packet length (Min)
Operating Frequency	2480 MHz
Channel No.	39

Frequency [MHz]	Reading [dBuV/m]	Duty Cycle Factor [dB]	A.F.+C.L.+D.F. [dB]	Ant. Pol. [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2483.5	51.68	0.00	0.92	H	52.60	73.98	21.38	PK
2483.5	41.46	2.04	0.92	H	44.42	53.98	9.56	AV
2483.5	50.83	0.00	0.92	V	51.75	73.98	22.23	PK
2483.5	40.51	2.04	0.92	V	43.47	53.98	10.51	AV

Operation Mode	BT_LE Data packet length (Max)
Operating Frequency	2480 MHz
Channel No.	39

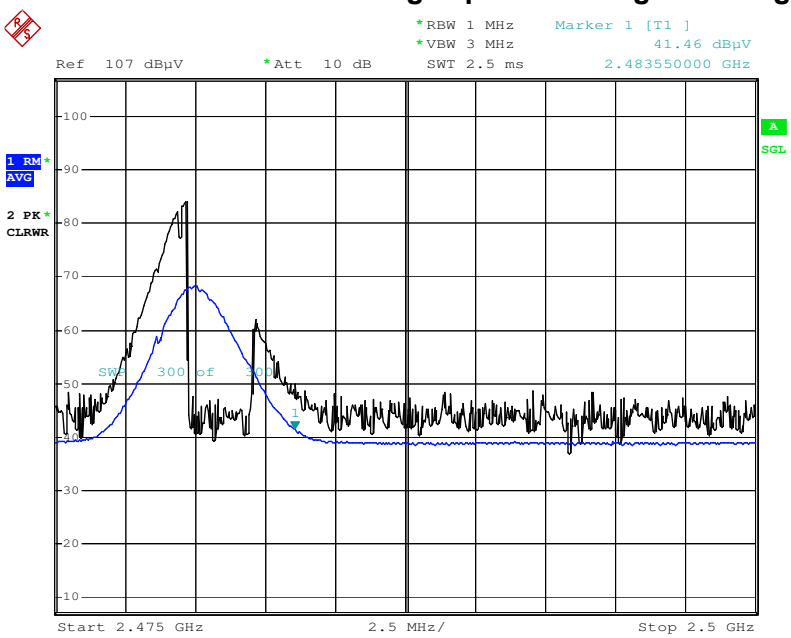
Frequency [MHz]	Reading [dBuV/m]	Duty Cycle Factor [dB]	A.F.+C.L.+D.F. [dB]	Ant. Pol. [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2483.5	52.25	0.00	0.92	H	53.17	73.98	20.81	PK
2483.5	42.98	0.69	0.92	H	44.59	53.98	9.39	AV
2483.5	51.37	0.00	0.92	V	52.29	73.98	21.69	PK
2483.5	42.05	0.69	0.92	V	43.66	53.98	10.32	AV

Notes:

1. Frequency range of measurement = 2483.5 MHz ~ 2500 MHz
2. Total = Reading Value + Antenna Factor + Cable Loss + Duty Cycle Factor + Distance Factor
3. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

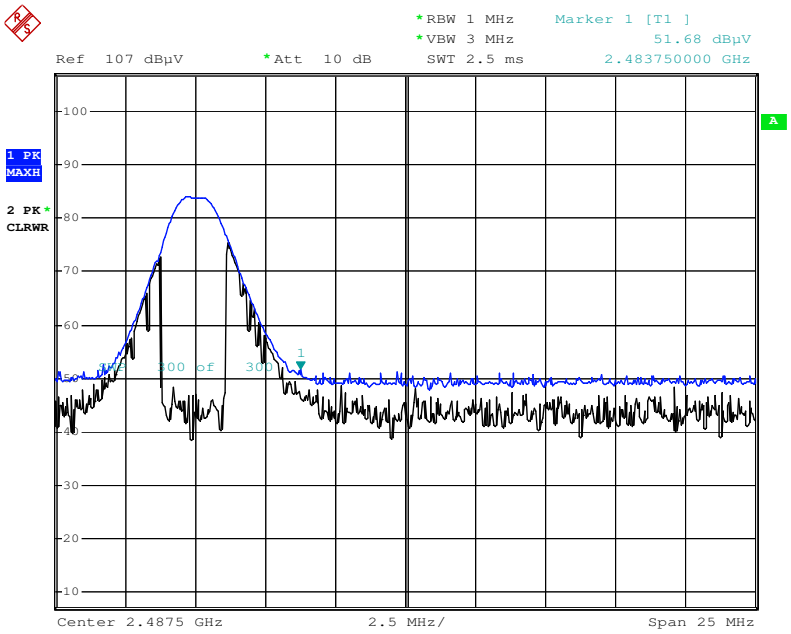
▣ RESULT PLOTS_Data packet length (Min) (Worst case : X-H)

Radiated Restricted Band Edges plot – Average Reading (Ch.39)



Date: 12.SEP.2016 17:57:58

Radiated Restricted Band Edges plot – Peak Reading (Ch.39)

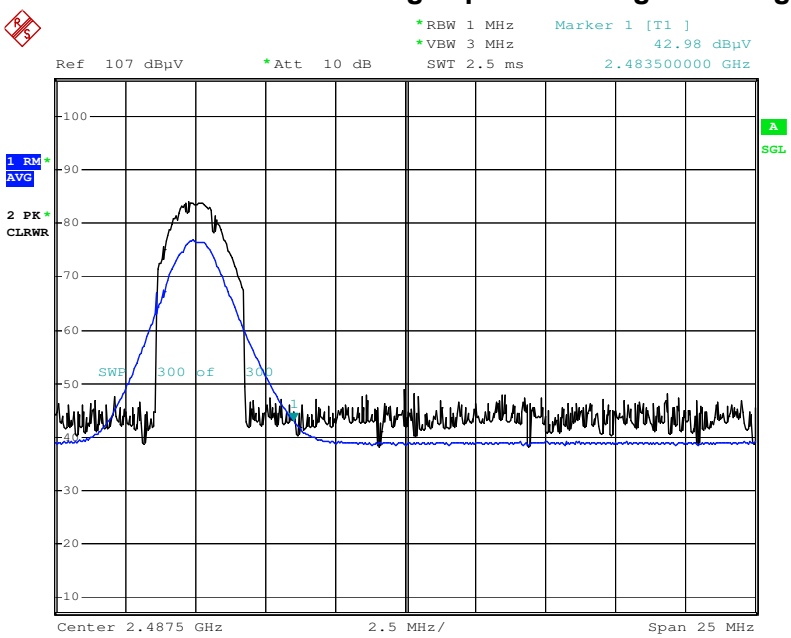


Date: 12.SEP.2016 17:58:48

Note : Only the worst case plots for Radiated Restricted Band Edges.

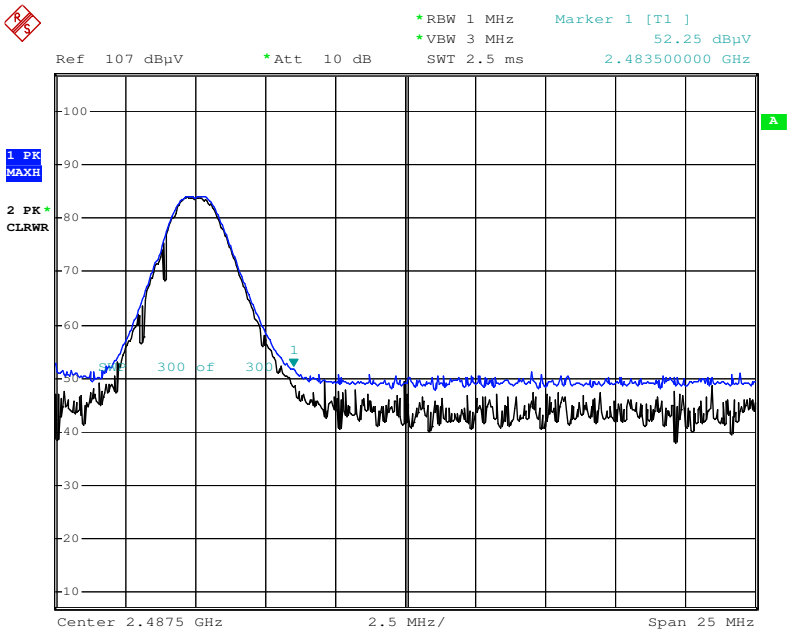
▣ RESULT PLOTS_Data packet length (Max) (Worst case : X-H)

Radiated Restricted Band Edges plot – Average Reading (Ch.39)



Date: 12.SEP.2016 18:00:15

Radiated Restricted Band Edges plot – Peak Reading (Ch.39)



Date: 12.SEP.2016 17:59:45

Note : Only the worst case plots for Radiated Restricted Band Edges.

9.7 POWERLINE CONDUCTED EMISSIONS

Test Requirements and limit, §15.207

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.

Sample Calculation

Quasi-peak(Final Result) = Reading Value + Correction Factor

▣ RESULT PLOTS

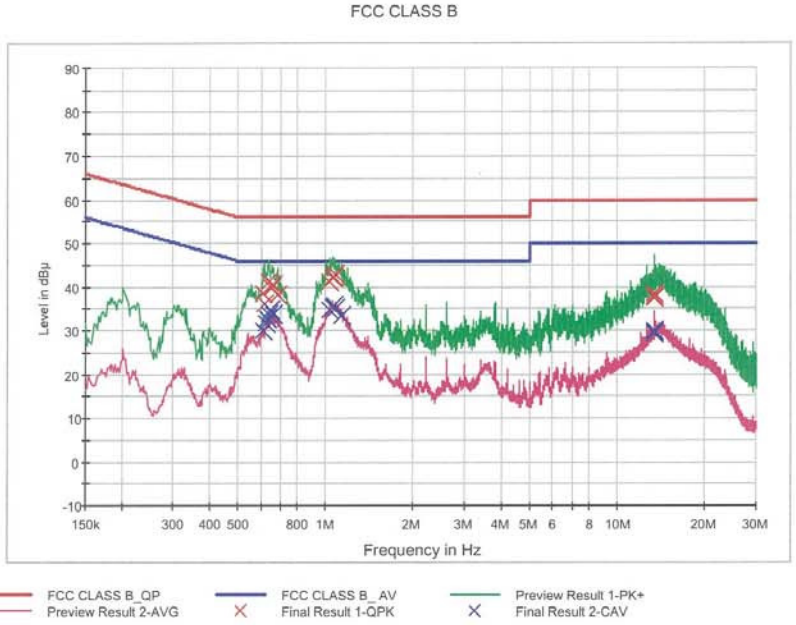
Conducted Emissions (Line 1)

BT LE MODE L1 1 / 2

HCT TEST Report

Common Information

EUT:	LGV34
Manufacturer:	LG
Test Site:	SHIELD ROOM
Operating Conditions:	BT LE MODE



Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.612000	38.6	9.000	Off	L1	9.7	17.4	56.0
0.616000	35.9	9.000	Off	L1	9.7	20.1	56.0
0.638000	41.0	9.000	Off	L1	9.7	15.0	56.0
0.656000	39.7	9.000	Off	L1	9.7	16.3	56.0
0.660000	40.4	9.000	Off	L1	9.7	15.6	56.0
0.684000	38.0	9.000	Off	L1	9.7	18.0	56.0
1.030000	41.1	9.000	Off	L1	9.8	14.9	56.0
1.034000	41.1	9.000	Off	L1	9.8	14.9	56.0
1.038000	41.2	9.000	Off	L1	9.8	14.8	56.0
1.060000	42.2	9.000	Off	L1	9.8	13.8	56.0
1.070000	42.1	9.000	Off	L1	9.8	13.9	56.0
1.078000	42.9	9.000	Off	L1	9.8	13.1	56.0
13.346000	37.6	9.000	Off	L1	10.2	22.4	60.0
13.350000	37.5	9.000	Off	L1	10.2	22.5	60.0
13.374000	37.7	9.000	Off	L1	10.2	22.3	60.0
13.382000	38.6	9.000	Off	L1	10.2	21.4	60.0
13.406000	37.8	9.000	Off	L1	10.2	22.2	60.0
13.418000	37.8	9.000	Off	L1	10.2	22.2	60.0

2016-09-22 오전 10:24:24

BT LE MODE L1 2 / 2

Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.614000	30.1	9.000	Off	L1	9.7	15.9	46.0
0.624000	31.6	9.000	Off	L1	9.7	14.4	46.0
0.634000	32.7	9.000	Off	L1	9.7	13.3	46.0
0.638000	33.6	9.000	Off	L1	9.7	12.4	46.0
0.648000	34.8	9.000	Off	L1	9.7	11.2	46.0
0.662000	33.6	9.000	Off	L1	9.7	12.4	46.0
1.038000	34.8	9.000	Off	L1	9.8	11.2	46.0
1.054000	35.4	9.000	Off	L1	9.8	10.6	46.0
1.062000	35.4	9.000	Off	L1	9.8	10.6	46.0
1.070000	35.7	9.000	Off	L1	9.8	10.3	46.0
1.078000	35.0	9.000	Off	L1	9.8	11.0	46.0
1.138000	33.5	9.000	Off	L1	9.8	12.5	46.0
13.346000	29.5	9.000	Off	L1	10.2	20.5	50.0
13.350000	29.5	9.000	Off	L1	10.2	20.5	50.0
13.374000	29.8	9.000	Off	L1	10.2	20.2	50.0
13.382000	29.8	9.000	Off	L1	10.2	20.2	50.0
13.406000	30.0	9.000	Off	L1	10.2	20.0	50.0
13.418000	30.0	9.000	Off	L1	10.2	20.0	50.0

2016-09-22 오전 10:24:24

Conducted Emissions (Line 2)

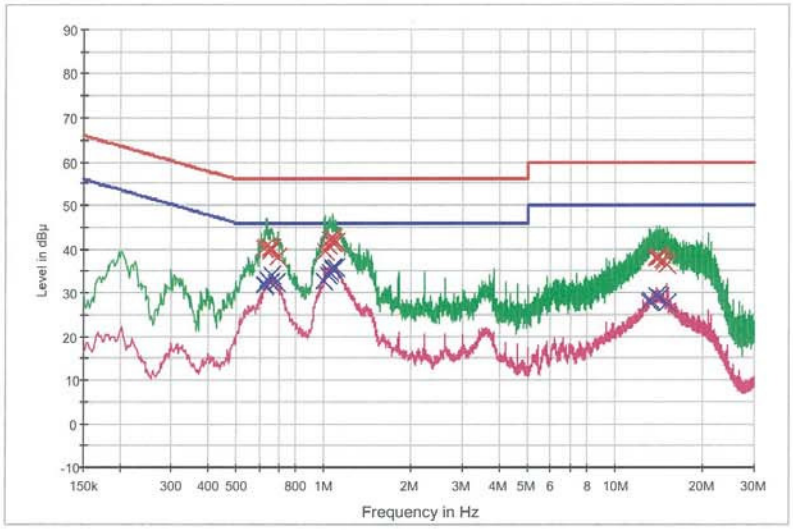
BT LE MODE N 1 / 2

HCT TEST Report

Common Information

EUT:	LGV34
Manufacturer:	LG
Test Site:	SHIELD ROOM
Operating Conditions:	BT LE MODE

FCC CLASS B



Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.626000	40.2	9.000	Off	N	9.7	15.8	56.0
0.634000	40.6	9.000	Off	N	9.7	15.4	56.0
0.652000	40.0	9.000	Off	N	9.7	16.0	56.0
0.658000	39.6	9.000	Off	N	9.7	16.4	56.0
0.662000	40.3	9.000	Off	N	9.7	15.7	56.0
0.694000	38.0	9.000	Off	N	9.7	18.0	56.0
1.006000	39.6	9.000	Off	N	9.7	16.4	56.0
1.038000	41.0	9.000	Off	N	9.7	15.0	56.0
1.050000	42.3	9.000	Off	N	9.7	13.7	56.0
1.068000	42.6	9.000	Off	N	9.7	13.4	56.0
1.076000	41.6	9.000	Off	N	9.7	14.4	56.0
1.092000	41.4	9.000	Off	N	9.7	14.6	56.0
13.824000	37.9	9.000	Off	N	10.2	22.1	60.0
13.868000	38.0	9.000	Off	N	10.2	22.0	60.0
14.238000	38.0	9.000	Off	N	10.2	22.0	60.0
14.478000	37.4	9.000	Off	N	10.2	22.6	60.0
14.726000	37.3	9.000	Off	N	10.2	22.7	60.0
15.082000	36.5	9.000	Off	N	10.2	23.5	60.0

2016-09-22 오전 10:12:52

BT LE MODE N 2 / 2

Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.622000	31.6	9.000	Off	N	9.7	14.4	46.0
0.626000	31.9	9.000	Off	N	9.7	14.1	46.0
0.636000	33.1	9.000	Off	N	9.7	12.9	46.0
0.652000	32.5	9.000	Off	N	9.7	13.5	46.0
0.660000	34.2	9.000	Off	N	9.7	11.8	46.0
0.684000	32.4	9.000	Off	N	9.7	13.6	46.0
1.002000	32.7	9.000	Off	N	9.7	13.3	46.0
1.028000	34.2	9.000	Off	N	9.7	11.8	46.0
1.044000	34.9	9.000	Off	N	9.7	11.1	46.0
1.068000	35.6	9.000	Off	N	9.7	10.4	46.0
1.076000	35.7	9.000	Off	N	9.7	10.3	46.0
1.092000	35.8	9.000	Off	N	9.7	10.2	46.0
13.152000	28.0	9.000	Off	N	10.1	22.0	50.0
13.248000	28.1	9.000	Off	N	10.1	21.9	50.0
13.824000	29.3	9.000	Off	N	10.2	20.7	50.0
13.868000	29.4	9.000	Off	N	10.2	20.6	50.0
14.154000	29.1	9.000	Off	N	10.2	20.9	50.0
15.082000	27.5	9.000	Off	N	10.2	22.5	50.0

2016-09-22 오전 10:12:52

10. LIST OF TEST EQUIPMENT

10.1 LIST OF TEST EQUIPMENT(Conducted Test)

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Rohde & Schwarz	ENV216 / LISN	12/28/2015	Annual	100073
Rohde & Schwarz	ESCI / Test Receiver	12/28/2015	Annual	100584
Agilent	N9020A / Signal Analyzer	06/24/2016	Annual	MY51110085
Agilent	N9030A / Signal Analyzer	11/24/2015	Annual	MY49431210
Agilent	N1911A / Power Meter	03/11/2016	Annual	MY45100523
Agilent	N1921A / Power Sensor	03/11/2016	Annual	MY52260025
Agilent	87300B / Directional Coupler	11/30/2015	Annual	3116A03621
Hewlett Packard	11667B / Power Splitter	06/14/2016	Annual	05001
Hewlett Packard	E3632A / DC Power Supply	03/09/2016	Annual	KR75303962
Agilent	8493C / Attenuator(10 dB)	07/15/2016	Annual	07560
Rohde & Schwarz	CBT / Bluetooth Tester	05/16/2016	Annual	100422

10.2 LIST OF TEST EQUIPMENT(Radiated Test)

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Audix	AM4000 / Antenna Position Tower	N/A	N/A	N/A
Audix	Turn Table	N/A	N/A	N/A
Audix	EM1000 / Controller	N/A	N/A	060520
Rohde & Schwarz	Loop Antenna	02/23/2016	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	04/15/2015	Biennial	255
Schwarzbeck	BBHA 9120D / Horn Antenna	05/07/2015	Biennial	937
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	09/03/2015	Biennial	BBHA9170541
Rohde & Schwarz	FSP / Spectrum Analyzer	09/10/2016	Annual	100688
Rohde & Schwarz	FSV40-N / Spectrum Analyzer	09/23/2016	Annual	101068-SZ
Wainwright Instruments	WHK3.0/18G-10EF / High Pass Filter	06/24/2016	Annual	8
Wainwright Instruments	WHFX7.0/18G-8SS / High Pass Filter	05/13/2016	Annual	29
Wainwright Instruments	WRCJV2400/2483.5-2370/2520-60/12SS / Band Reject Filter	07/06/2016	Annual	2
Wainwright Instruments	WRCJV5100/5850-40/50-8EEK / Band Reject Filter	01/26/2016	Annual	2
Agilent	8493C-10 / Attenuator(10 dB)	08/11/2016	Annual	76649
CERNEX	CBLU1183540 / Power Amplifier	07/15/2016	Annual	22964
CERNEX	CBL06185030 / Power Amplifier	07/15/2016	Annual	22965
CERNEX	CBL18265035 / Power Amplifier	07/11/2016	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	07/11/2016	Annual	25956
TESCOM	TC-3000C / Bluetooth Tester	04/01/2016	Annual	3000C000276