

TEST REPORT

of

FCC Part 15 Subpart C §15.209 / IC RSS-210 Issue 9, RSS-Gen Issue 4

FCC ID: CQOEG07170
IC Certification: 1551E-EG07170

Equipment Under Test : IBU_SMK
Model Name : EG07170
Applicant : DENSO KOREA ELECTRONICS CORPORATION
Manufacturer : DENSO KOREA ELECTRONICS CORPORATION
Date of Receipt : 2017.08.25
Date of Test(s) : 2017.12.02 ~ 2018.01.09
Date of Issue : 2018.01.11

In the configuration tested, the EUT complied with the standards specified above.

Tested By:



Jinhyoung Cho

Date:

2018.01.11

Technical
Manager:



Hyunchae You

Date:

2018.01.11

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RTT5041-19(2017.07.10)(0)

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A4(210 mm x 297 mm)

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1. General information

1.1. Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)

- Wireless Div. 2FL, 10-2, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- Designation number: KR0150

All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>.

Phone No. : +82 31 688 0901

Fax No. : +82 31 688 0921

1.2. Details of Applicant

Applicant : DENSO KOREA ELECTRONICS CORPORATION

Address : 3, Cheomdansaneop-ro, Masanhappo-gu, Changwon-si, Gyeongsangnam-do, Korea
51776

Contact Person : Cho, Dong-Ki

Phone No. : +82 31 349 9864

1.3. Details of manufacturer

Company : Same as applicant

Address : Same as applicant

1.4. Description of EUT

Kind of Product		IBU_SMK
Model Name		EG07170
Power Supply		DC 12.0 V
Frequency Range		Tx: 134.20 kHz, Rx: 433.92 MHz
Antenna Type	Tx	External Type (Coil Antenna)
	Rx	Internal Type

1.5. Declaration of manufacturer

- The EUT has 7 transmit antennas and one receive antenna.
- The transmit antennas can not operate at the same time.

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1.6. Test Equipment List

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Interval	Cal. Due
Spectrum Analyzer	R&S	FSV30	103102	Jun. 10, 2017	Annual	Jun. 10, 2018
Signal Generator	R&S	SMBV100A	255834	Jun. 15, 2017	Annual	Jun. 15, 2018
DC Power Supply	R&S	HMP2020	020089489	May 28, 2017	Annual	May 28, 2018
Test Receiver	R&S	ESU26	100109	Feb. 17, 2017	Annual	Feb. 17, 2018
Loop Antenna	Schwarzbeck Mess-Elektronik	FMZB 1519	1519-039	Aug. 23, 2017	Biennial	Aug. 23, 2019
Preamplifier	H.P.	8447F	2944A03909	Aug. 11, 2017	Annual	Aug. 11, 2018
Log-Periodic Antenna	R&S	HL223	837942/015	Dec. 01, 2017	Biennial	Dec. 01, 2019
Biconical Antenna	R&S	HK116	8374141/007	Dec. 01, 2017	Biennial	Dec. 01, 2019
Turn Table	Innco systems GmbH	DS 1200 S	N/A	N. C. R.	N/A	N. C. R.
Antenna Mast	Innco systems GmbH	MA4640-XP-ET	MA4640/536/3 8330516/L	N.C.R.	N/A	N.C.R.
Controller	Innco systems GmbH	CONTROLLER CO3000-4P	CO3000/963/3 8330516/L	N. C. R.	N/A	N. C. R.
Anechoic Chamber	SY Corporation	L × W × H (9.6 m × 6.4 m × 6.6 m)	N/A	N. C. R.	N/A	N. C. R.
Coaxial Cable	SUCOFLEX	104 (3 m)	MY3258414	Jul. 15, 2017	Semi-annual	Jan. 15, 2018
Coaxial Cable	SUCOFLEX	104 (10 m)	MY3145814	Jul. 15, 2017	Semi-annual	Jan. 15, 2018

1.7. Sample calculation

Where relevant, the following sample calculation is provided:

Field strength level ($\text{dB}\mu\text{V}/\text{m}$) = Measured level ($\text{dB}\mu\text{V}$) + Antenna factor (dB) + Cable loss (dB)

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1.8. Summary of Test Results

The EUT has been tested according to the following specifications:

APPLIED STANDARD			
Section in FCC Part 15	Section in RSS-210, RSS-Gen	Test Item	Result
15.209	RSS-210 Issue 9, 4.4, RSS-Gen Issue 4, 8.9	Radiated emission, Spurious Emission and Field Strength of Fundamental	Complied
2.1049	-	20 dB Bandwidth	Complied
-	RSS-Gen Issue 4, 6.6	Occupied Bandwidth	Complied

1.9. Test Report Revision

Revision	Report number	Date of Issue	Description
0	F690501/RF-RTL012165	2017.12.18	Initial
1	F690501/RF-RTL012165-1	2018.01.11	Added below 1 GHz radiated emission test result.

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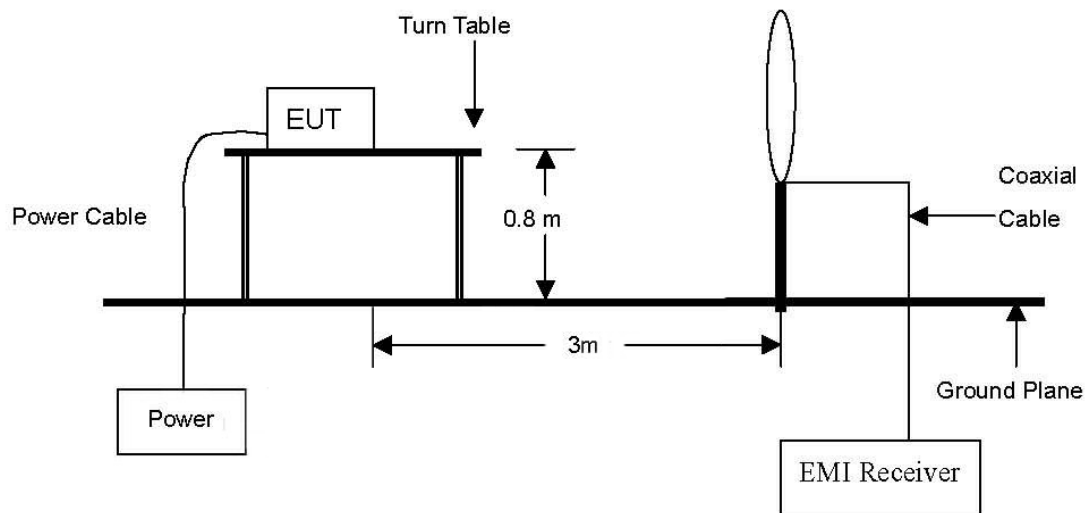
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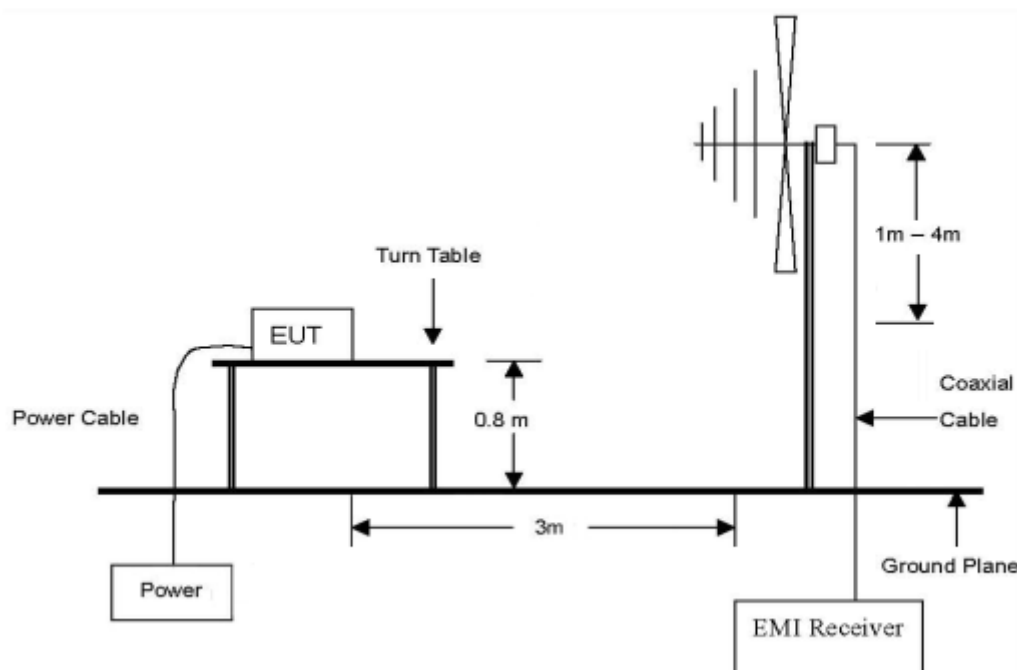
2. Field Strength of Fundamental and Spurious Emission

2.1. Test Setup

The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz Emissions.



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2.2. Limits

2.2.1. FCC Limits

2.2.1.1. Radiated emission limits, general requirements

According to §15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 - 0.490	2 400/F(kHz)	300
0.490 - 1.705	24 000/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., Sections §15.231 and §15.241.

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2.2.2. IC Limits

2.2.2.1. Transmitter Emission Limits for Licence-Exempt Radio Apparatus

According to RSS-Gen Issue 4, Section 8.9, except when the requirements applicable to a given device state otherwise, the emissions from licence-exempt transmitters shall comply with the field strength limits shown in Table 4 or Table 5 below. Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission.

Table 4- General Field Strength Limits for Licence-Exempt Transmitters at Frequencies Above 30 MHz

Frequency (MHz)	Field Strength ($\mu\text{V}/\text{m}$ at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960*	500

* Unless otherwise specified, for all frequencies greater than 1 GHz, the radiated emission limits for licence-exempt radio apparatus stated in applicable RSSs (including RSS-Gen) are based on measurements using a linear average detector function having a minimum resolution bandwidth of 1 MHz. If an average limit is specified for the EUT, then the peak emission shall also be measured with instrumentation properly adjusted for such factors as pulse desensitization to ensure the peak emission is less than 20 dB above the average limit.

Note: Transmitting devices are not permitted in restricted frequency bands unless stated otherwise in the specific RSS.

Table 5- General Field Strength Limits for Licence-Exempt Transmitters at Frequencies Below 30 MHz

Frequency	Electric Field Strength ($\mu\text{V}/\text{m}$)	Magnetic Field Strength (H-Field) ($\mu\text{A}/\text{m}$)	Measurement Distance (metres)
9-490 kHz	2,400/F (F in kHz)	2,400/377F (F in kHz)	300
490-1,705 kHz	24,000/F (F in kHz)	24,000/377F (F in kHz)	30
1,705-30 MHz	30	N/A	30

Note: The emission limits for the bands 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector. Transmitting devices are not permitted in restricted frequency bands unless stated otherwise in the relevant RSS.

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2.3. Test Procedures

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.10-2013.

2.3.1. Test Procedures for emission from 9 kHz to 30 MHz

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- Then antenna is a loop antenna is fixed at one meter above the ground to determine the maximum value of the field strength. Both parallel and perpendicular of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- To get a maximum emission level from the EUT, the EUT is manipulated through three orthogonal planes (X, Y, Z). Worst orthogonal plan of EUT is X – axis during radiation test.

Note;

Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 meter open field test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 937606.

2.3.2. Test Procedures for emission from above 30 MHz

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site below 1 GHz. The table was rotated 360 degrees to determine the position of the highest radiation.
- During performing radiated emission below 1 GHz, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower..
- The antenna is a bi-log antenna and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

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2.4. Field Strength of Fundamental Test Result

Ambient temperature : (23 ± 1) °C
Relative humidity : 47 % R.H.

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical. The field strength of spurious emission was measured in one orthogonal EUT position (X-axis). Definition of DUT for a orthogonal plane was described in the test setup photo.

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	Ant. (dB/m)	Cable (dB)	Actual (dB μ V/m) at 3 m	Actual (dB μ V/m) at 300 m	Limit (dB μ V/m) at 300 m	Margin (dB)
AST Antenna									
0.134	54.20	Average	H	19.68	0.05	73.93	-6.07	25.06	31.13
BUM Antenna									
0.134	54.40	Average	H	19.68	0.05	74.13	-5.87	25.06	30.93
DRV Antenna									
0.134	53.70	Average	H	19.68	0.05	73.43	-6.57	25.06	31.63
INT1 Antenna									
0.134	53.80	Average	H	19.68	0.05	73.53	-6.47	25.06	31.53
INT2 Antenna									
0.134	54.10	Average	H	19.68	0.05	73.83	-6.17	25.06	31.23
SSB Antenna									
0.135	39.20	Average	H	19.68	0.05	58.93	-21.07	25.00	46.07
TRK Antenna									
0.134	52.00	Average	H	19.68	0.05	71.73	-8.27	25.06	33.33

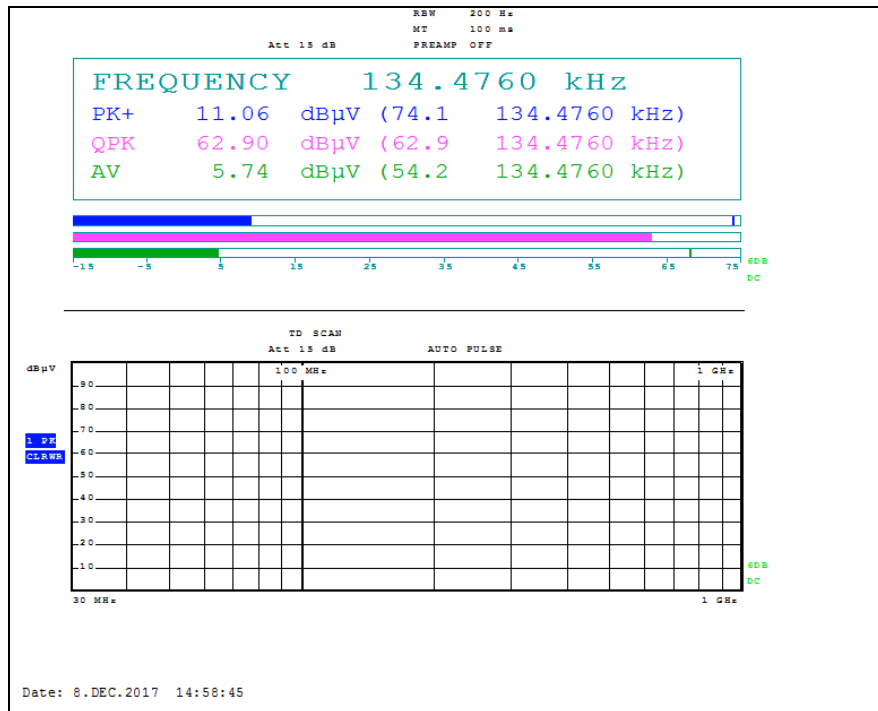
Note;

1. According to §15.31 (f)(2) 300 m Result (dB μ V/m) = 3 m Result (dB μ V/m) - 40log(300/3) (dB μ V/m).
2. According to §15.209 (d), the measurements were tested by using Quasi peak detector except for the frequency bands 9 – 90 kHz, 110 – 490 kHz and above 1 GHz in these three bands on measurements employing an average detector.
3. The limit above was calculated based on table of §15.209 (a).

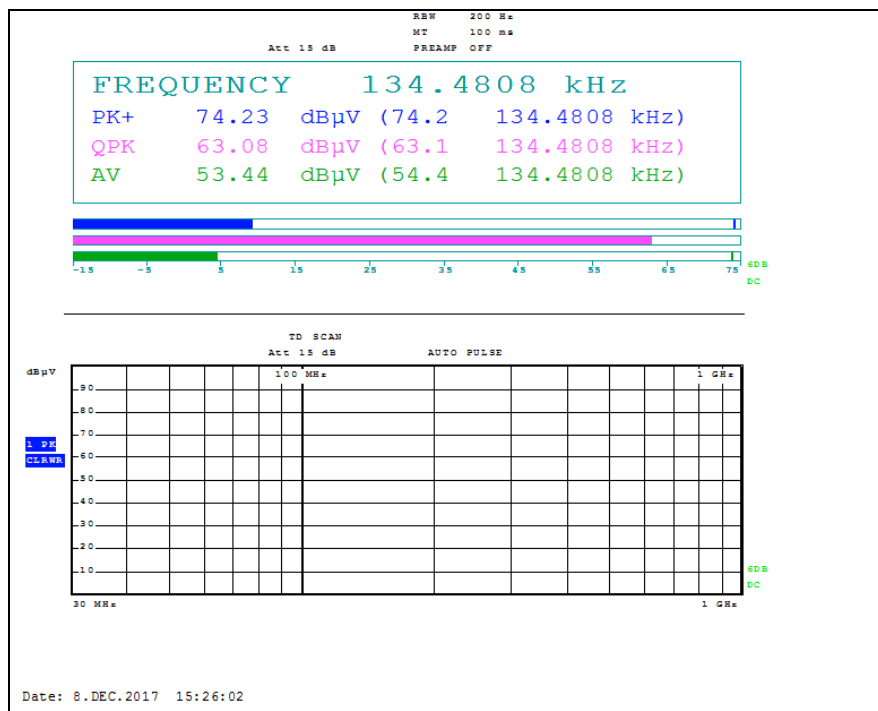
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Test plot

- AST Antenna

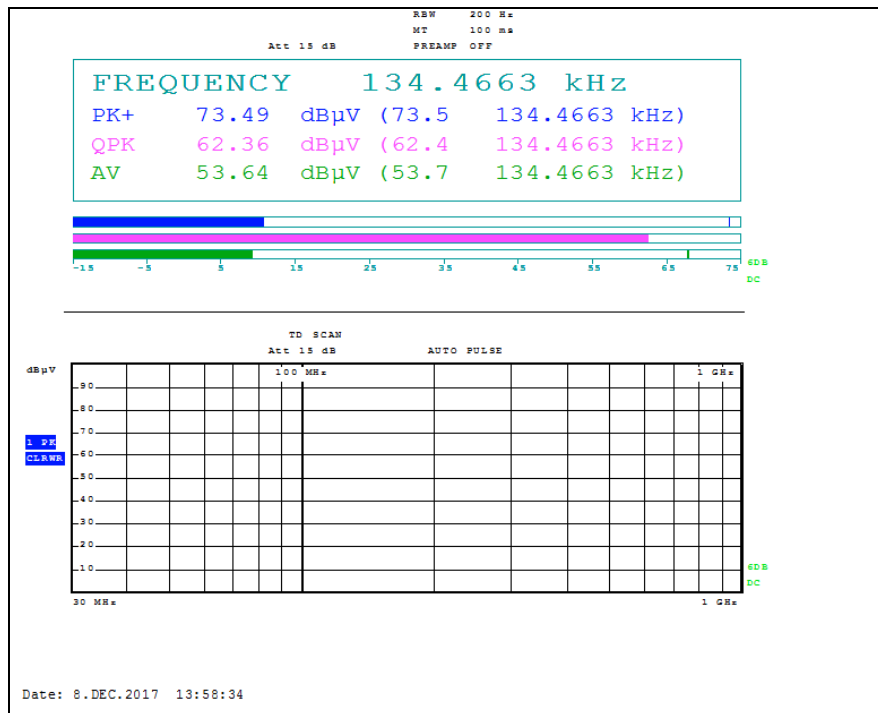


- BUM Antenna

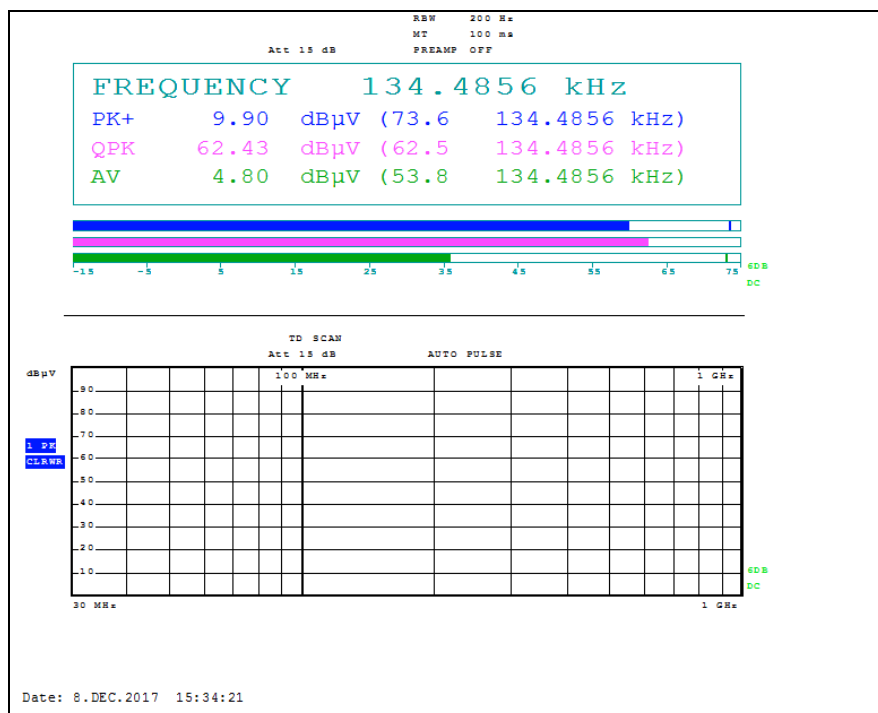


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- DRV Antenna

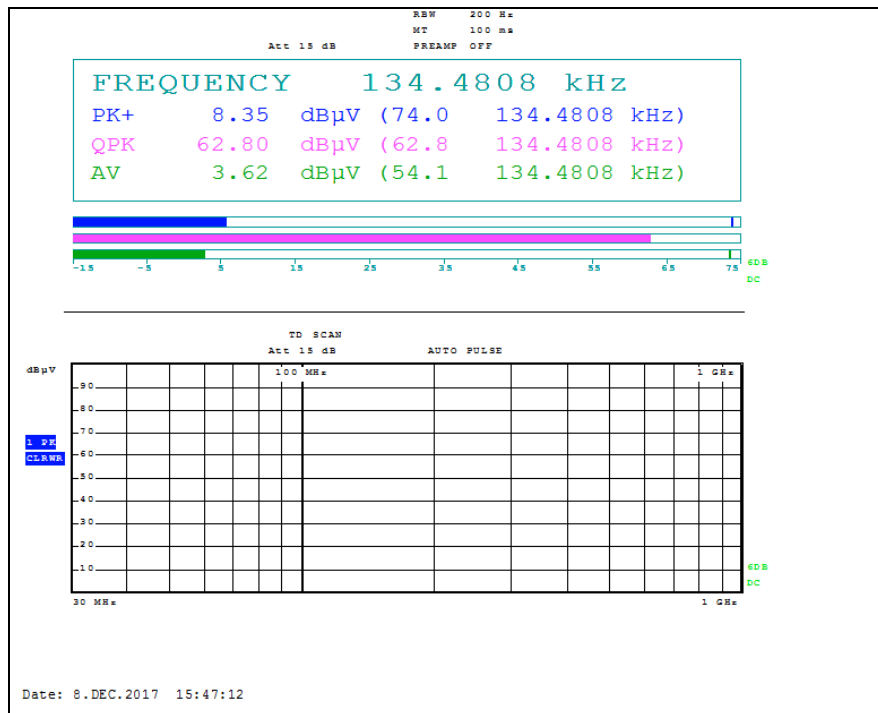


- INT1 Antenna

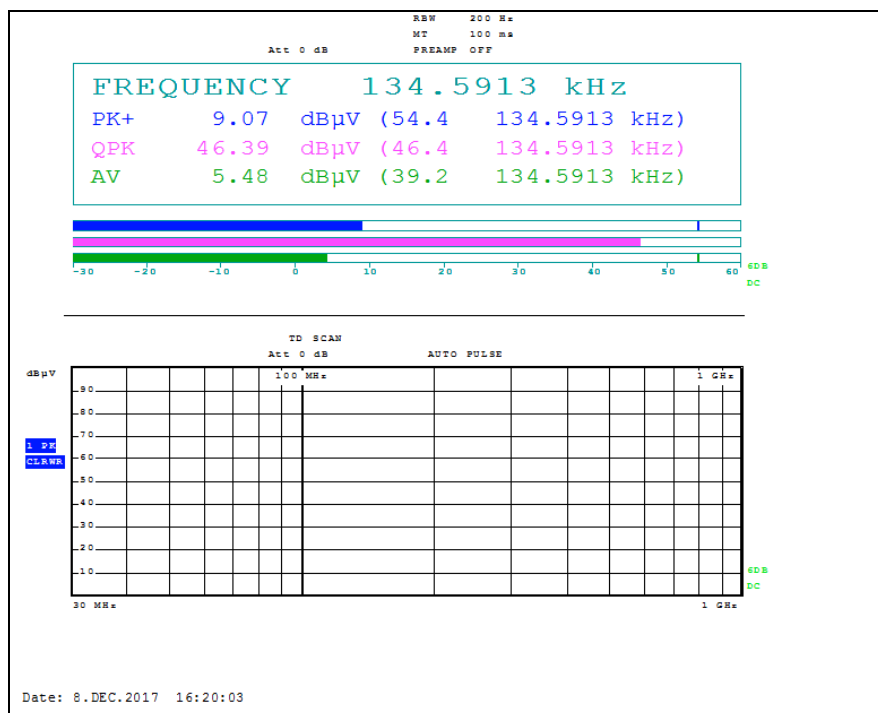


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- INT2 Antenna

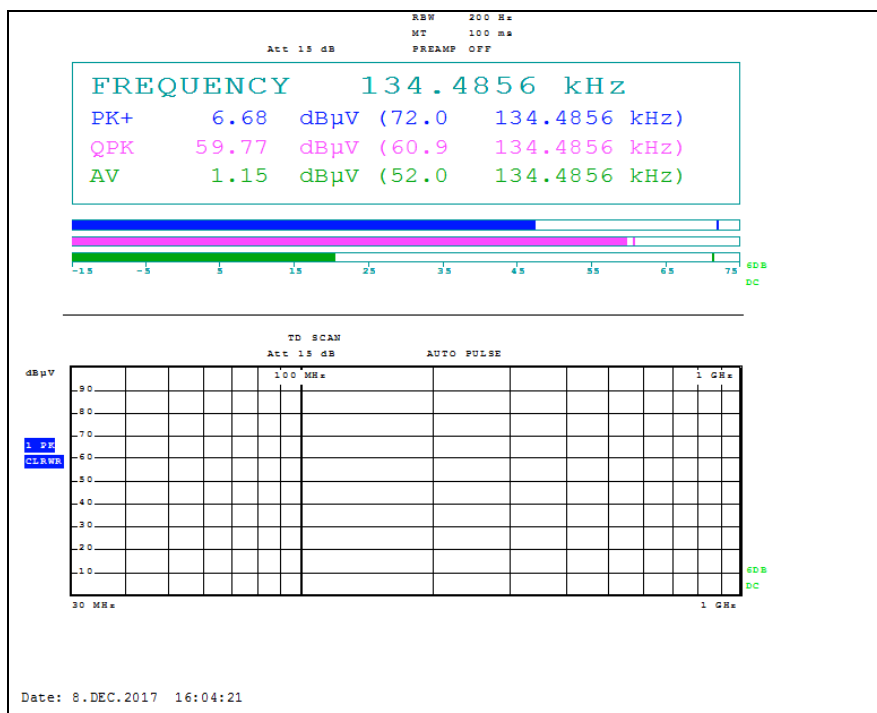


- SSB Antenna



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- TRK Antenna



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2.5. Spurious Emission Test Result

Ambient temperature : (23 ± 1) °C
Relative humidity : 47 % R.H.

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

- AST Antenna

-Below 30 MHz

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (MHz)	Reading (dBμV)	Detect Mode	Pol.	Ant. (dB/m)	Cable (dB)	Actual (dBμV/m) at 3 m	Actual (dBμV/m) at 30 m or 300 m	Limit (dBμV/m) at 30 m or 300 m	Margin (dB)
0.035	24.10	Average	H	19.79	0.02	43.91	-36.09	36.72	72.81
0.067	16.80	Average	H	19.75	0.02	36.57	-43.43	31.08	74.51
0.403	6.00	Average	H	19.60	0.10	25.70	-54.30	15.50	69.80
2.454	8.20	Quasi-Peak	H	19.77	0.13	28.10	-11.90	29.54	41.44
Above 3.000	Not detected	-	-	-	-	-	-	-	-

-Above 30 MHz

Radiated Emissions			Ant.	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP + CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
289.28	37.40	Peak	V	18.53	-25.14	30.79	46.00	15.21
339.26	41.90	Peak	V	14.59	-25.08	31.41	46.00	14.59
377.90	45.10	Peak	H	15.12	-25.37	34.85	46.00	11.15
377.96	50.90	Peak	V	15.12	-25.37	40.65	46.00	5.35
394.97	40.10	Peak	V	15.90	-25.36	30.64	46.00	15.36
887.97	39.80	Peak	H	22.34	-23.99	38.15	46.00	7.85
Above 900.00	Not detected	-	-	-	-	-	-	-

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- BUM Antenna

-Below 30 MHz

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	Ant. (dB/m)	Cable (dB)	Actual (dB μ V/m) at 3 m	Actual (dB μ V/m) at 30 m or 300 m	Limit (dB μ V/m) at 30 m or 300 m	Margin (dB)
0.035	25.70	Average	H	19.79	0.02	45.51	-34.49	36.72	71.21
0.067	16.50	Average	H	19.75	0.02	36.27	-43.73	31.08	74.81
0.609	8.40	Quasi-Peak	H	19.62	0.10	28.12	-11.88	31.91	43.79
2.488	8.90	Quasi-Peak	H	19.77	0.13	28.80	-11.20	29.54	40.74
Above 3.000	Not detected	-	-	-	-	-	-	-	-

-Above 30 MHz

Radiated Emissions			Ant.	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (dB/m)	AMP + CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
289.49	38.20	Peak	V	18.55	-25.10	31.65	46.00	14.35
299.91	37.20	Peak	V	20.48	-24.90	32.78	46.00	13.22
399.75	42.20	Peak	V	15.81	-25.40	32.61	46.00	13.39
377.99	47.00	Peak	V	15.12	-25.40	36.72	46.00	9.28
377.99	42.70	Peak	H	15.12	-25.40	32.42	46.00	13.58
887.97	38.10	Peak	H	22.34	-23.90	36.54	46.00	9.46
Above 900.00	Not detected	-	-	-	-	-	-	-

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- DRV Antenna

-Below 30 MHz

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	Ant. (dB/m)	Cable (dB)	Actual (dB μ V/m) at 3 m	Actual (dB μ V/m) at 30 m or 300 m	Limit (dB μ V/m) at 30 m or 300 m	Margin (dB)
0.035	31.30	Average	H	19.79	0.02	51.11	-28.89	36.72	65.61
0.048	10.60	Average	H	19.77	0.02	30.39	-49.61	33.98	83.59
0.881	16.90	Quasi-Peak	H	19.68	0.10	36.68	-3.32	28.70	32.02
2.470	18.10	Quasi-Peak	H	19.77	0.13	38.00	-2.00	29.54	31.54
Above 3.000	Not detected	-	-	-	-	-	-	-	-

-Above 30 MHz

Radiated Emissions			Ant.	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (dB/m)	AMP + CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
289.43	37.50	Peak	V	18.54	-25.10	30.94	46.00	15.06
339.64	42.90	Peak	H	14.59	-25.00	32.49	46.00	13.51
378.05	46.20	Peak	V	15.12	-25.40	35.92	46.00	10.08
440.58	40.00	Peak	V	16.92	-25.40	31.52	46.00	14.48
724.23	36.00	Peak	V	20.40	-24.80	31.60	46.00	14.40
888.06	39.60	Peak	H	22.34	-23.90	38.04	46.00	7.96
Above 900.00	Not detected	-	-	-	-	-	-	-

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- INT1 Antenna

-Below 30 MHz

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	Ant. (dB/m)	Cable (dB)	Actual (dB μ V/m) at 3 m	Actual (dB μ V/m) at 30 m or 300 m	Limit (dB μ V/m) at 30 m or 300 m	Margin (dB)
0.035	25.20	Average	H	19.79	0.02	45.01	-34.99	36.72	71.71
0.067	16.10	Average	H	19.75	0.02	35.87	-44.13	31.08	75.21
0.712	10.80	Quasi-Peak	H	19.64	0.10	30.54	-9.46	30.55	40.01
2.465	8.80	Quasi-Peak	H	19.77	0.13	28.70	-11.30	29.54	40.84
Above 3.000	Not detected	-	-	-	-	-	-	-	-

-Above 30 MHz

Radiated Emissions			Ant.	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (dB/m)	AMP + CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
289.58	38.60	Peak	V	18.56	-25.10	32.06	46.00	13.94
339.64	43.50	Peak	V	14.59	-25.00	33.09	46.00	12.91
377.90	51.30	Peak	V	15.12	-25.40	41.02	46.00	4.98
377.96	45.70	Peak	H	15.12	-25.40	35.42	46.00	10.58
592.48	38.00	Peak	V	19.15	-25.50	31.65	46.00	14.35
888.06	37.10	Peak	H	22.34	-23.90	35.54	46.00	10.46
Above 900.00	Not detected	-	-	-	-	-	-	-

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RTT5041-19(2017.07.10)(0)

Tel. +82 31 428 5700 / Fax. +82 31 427 2370

A4(210 mm x 297 mm)

- INT2 Antenna

-Below 30 MHz

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	Ant. (dB/m)	Cable (dB)	Actual (dB μ V/m) at 3 m	Actual (dB μ V/m) at 30 m or 300 m	Limit (dB μ V/m) at 30 m or 300 m	Margin (dB)
0.035	25.50	Average	H	19.79	0.02	45.31	-34.69	36.72	71.41
0.067	13.00	Average	H	19.75	0.02	32.77	-47.23	31.08	78.31
0.892	10.00	Quasi-Peak	H	19.68	0.10	29.78	-10.22	28.60	38.82
2.465	8.90	Quasi-Peak	H	19.77	0.13	28.80	-11.20	29.54	40.74
Above 3.000	Not detected	-	-	-	-	-	-	-	-

-Above 30 MHz

Radiated Emissions			Ant.	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (dB/m)	AMP + CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
339.46	43.80	Peak	H	14.59	-25.00	33.39	46.00	12.61
340.08	43.20	Peak	V	14.60	-25.10	32.70	46.00	13.30
378.02	46.90	Peak	H	15.12	-25.40	36.62	46.00	9.38
378.31	46.90	Peak	V	15.13	-25.40	36.63	46.00	9.37
592.51	37.70	Peak	V	19.15	-25.50	31.35	46.00	14.65
887.97	38.10	Peak	H	22.34	-23.90	36.54	46.00	9.46
Above 900.00	Not detected	-	-	-	-	-	-	-

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A4(210 mm x 297 mm)

- SSB Antenna

-Below 30 MHz

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	Ant. (dB/m)	Cable (dB)	Actual (dB μ V/m) at 3 m	Actual (dB μ V/m) at 30 m or 300 m	Limit (dB μ V/m) at 30 m or 300 m	Margin (dB)
0.035	26.70	Average	H	19.79	0.02	46.51	-33.49	36.72	70.21
0.067	16.20	Average	H	19.75	0.02	35.97	-44.03	31.08	75.11
0.684	9.40	Quasi-Peak	H	19.64	0.10	29.14	-10.86	30.90	41.76
2.394	9.60	Quasi-Peak	H	19.77	0.12	29.49	-10.51	29.54	40.05
Above 3.000	Not detected	-	-	-	-	-	-	-	-

-Above 30 MHz

Radiated Emissions			Ant.	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (dB/m)	AMP + CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
289.39	36.90	Peak	V	18.54	-25.10	30.34	46.00	15.66
339.58	40.80	Peak	V	14.59	-25.00	30.39	46.00	15.61
377.76	51.00	Peak	V	15.11	-25.40	40.71	46.00	5.29
377.96	48.70	Peak	H	15.12	-25.40	38.42	46.00	7.58
592.48	38.00	Peak	V	19.15	-25.50	31.65	46.00	14.35
888.00	39.30	Peak	H	22.34	-23.90	37.74	46.00	8.26
Above 900.00	Not detected	-	-	-	-	-	-	-

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- TRK Antenna

-Below 30 MHz

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	Ant. (dB/m)	Cable (dB)	Actual (dB μ V/m) at 3 m	Actual (dB μ V/m) at 30 m or 300 m	Limit (dB μ V/m) at 30 m or 300 m	Margin (dB)
0.035	26.40	Average	H	19.79	0.02	46.21	-33.79	36.72	70.51
0.067	14.80	Average	H	19.75	0.02	34.57	-45.43	31.08	76.51
0.715	12.30	Quasi-Peak	H	19.64	0.10	32.04	-7.96	30.52	38.48
2.401	11.10	Quasi-Peak	H	19.77	0.12	30.99	-9.01	29.54	38.55
Above 3.000	Not detected	-	-	-	-	-	-	-	-

-Above 30 MHz

Radiated Emissions			Ant.	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (dB/m)	AMP + CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
339.46	43.40	Peak	H	14.59	-25.00	32.99	46.00	13.01
339.81	43.80	Peak	V	14.60	-25.00	33.40	46.00	12.60
378.05	50.50	Peak	V	15.12	-25.40	40.22	46.00	5.78
378.23	43.20	Peak	H	15.13	-25.40	32.93	46.00	13.07
888.03	37.60	Peak	V	22.34	-23.90	36.04	46.00	9.96
890.98	36.30	Peak	H	22.28	-23.80	34.78	46.00	11.22
Above 900.00	Not detected	-	-	-	-	-	-	-

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A4(210 mm x 297 mm)

Note;

For emission from 9 kHz to 30 MHz

1. According to §15.31 (f)(2)
 - 300 m Result (dBμV/m) = 3 m Result (dBμV/m) - 40log(300/3) (dBμV/m)
 - 30 m Result (dBμV/m) = 3 m Result (dBμV/m) - 40log(30/3) (dBμV/m)
2. According to field strength table of general requirement in §15.209 (a), field strength limits below 1.705 MHz were calculated as below.
 - 9 kHz to 490 kHz : 20log(2 400 / F (kHz)) at 300 m (dBμV/m)
 - 490 kHz to 1 705 kHz : 20log(24 000 / F (kHz)) at 30 m (dBμV/m)
3. According to §15.209 (d), the measurements were tested by using Quasi peak detector except for the frequency bands 9 – 90 kHz, 110 – 490 kHz and above 1 GHz in these three bands on measurements employing an average detector.

For emission from above 30 MHz

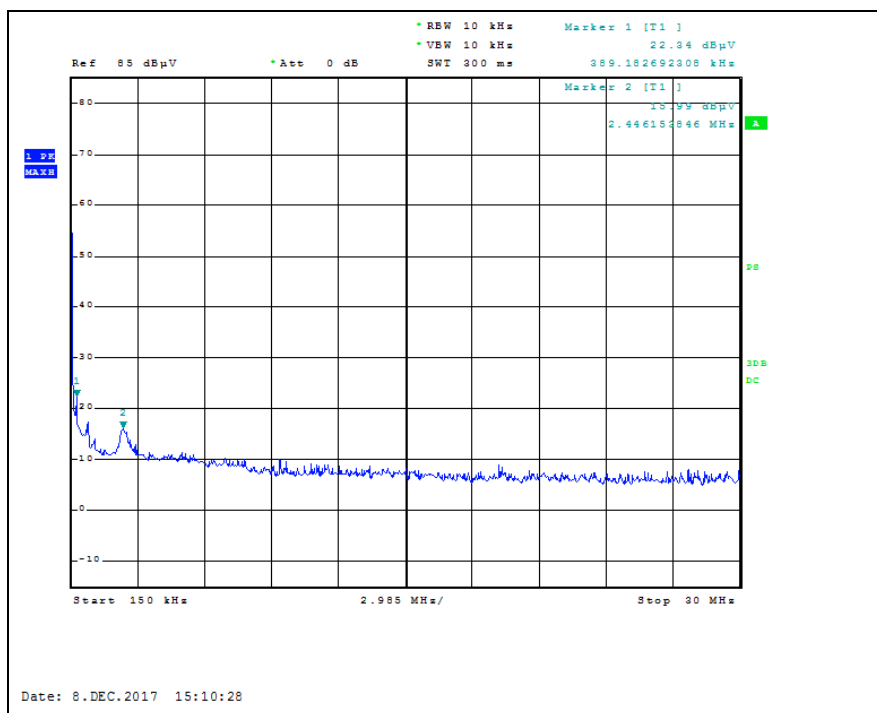
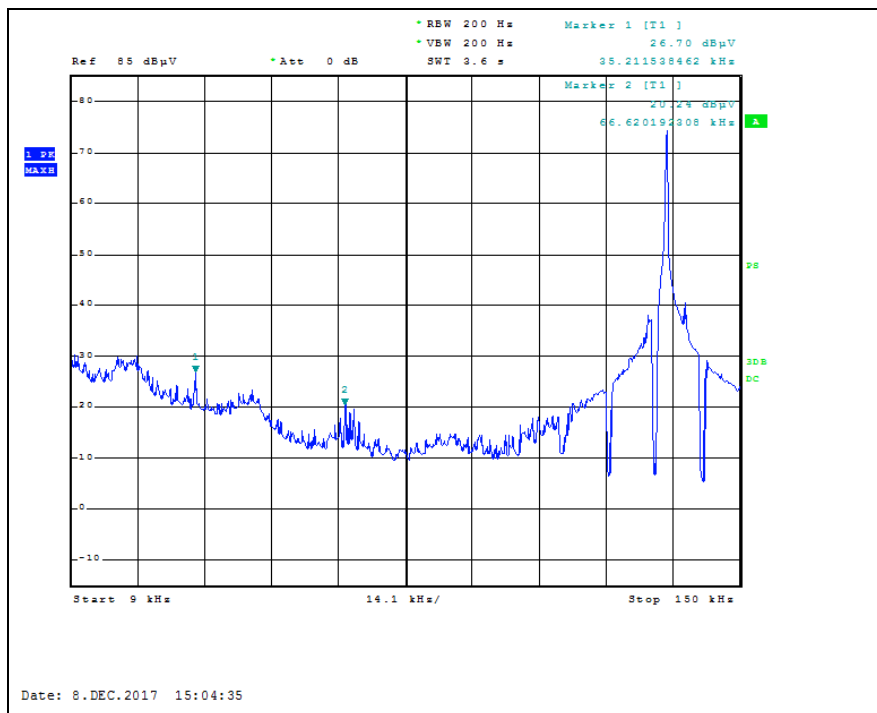
1. Radiated spurious emission measurement as below.
(Actual = Reading + AF + AMP + CL)
2. According to §15.31(o), emission levels are not report much lower than the limits by over 20 dB.

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Test plots

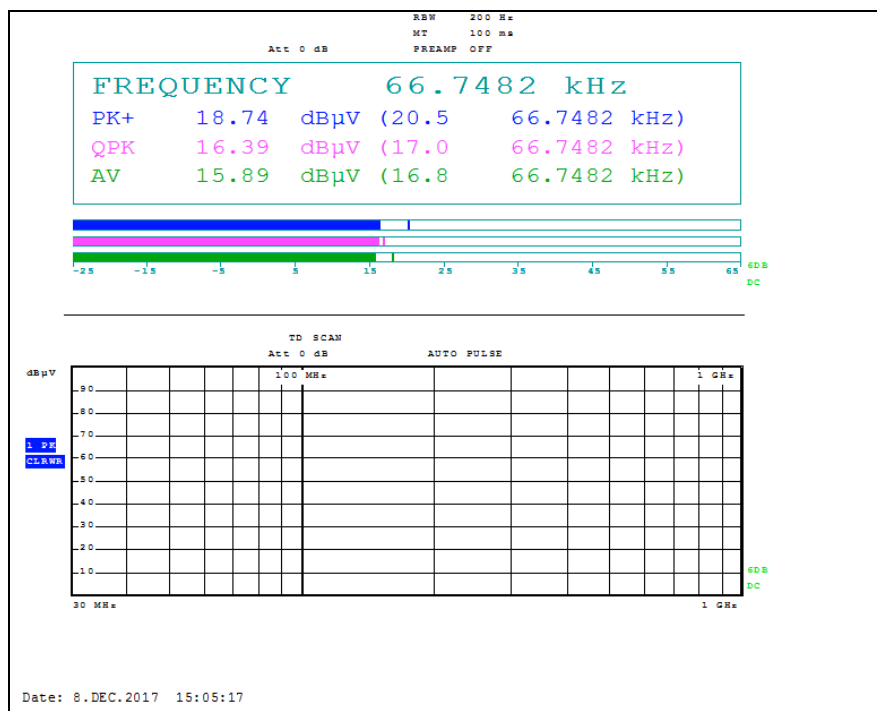
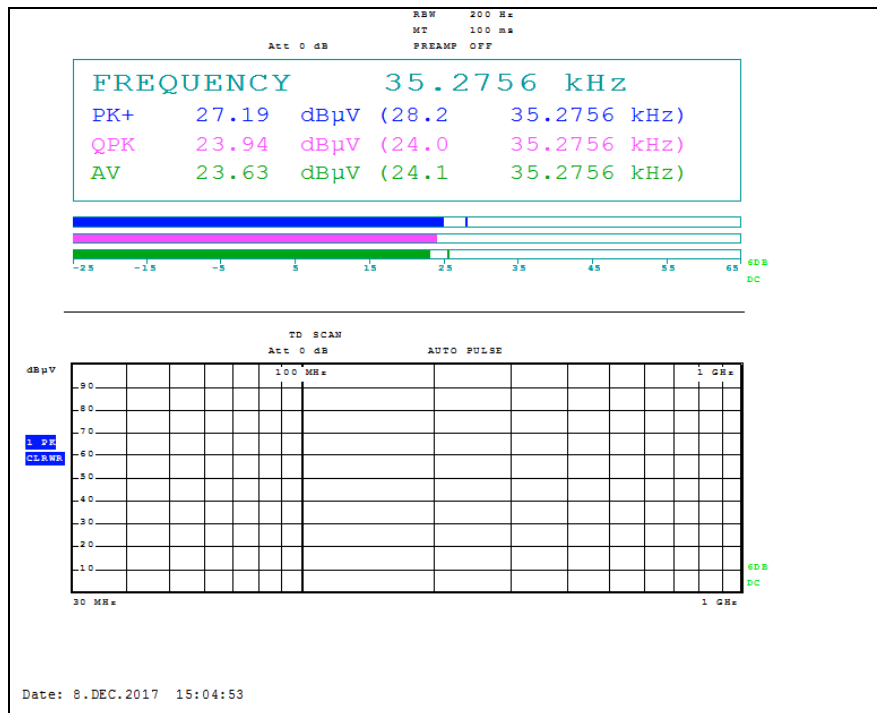
- AST Antenna

Scanning plots below 30 MHz

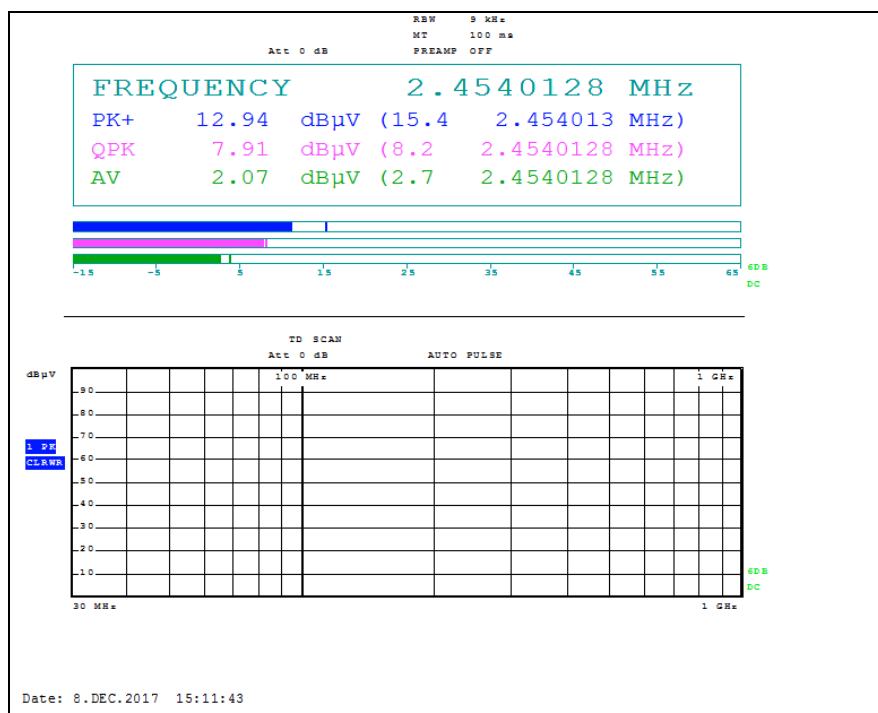
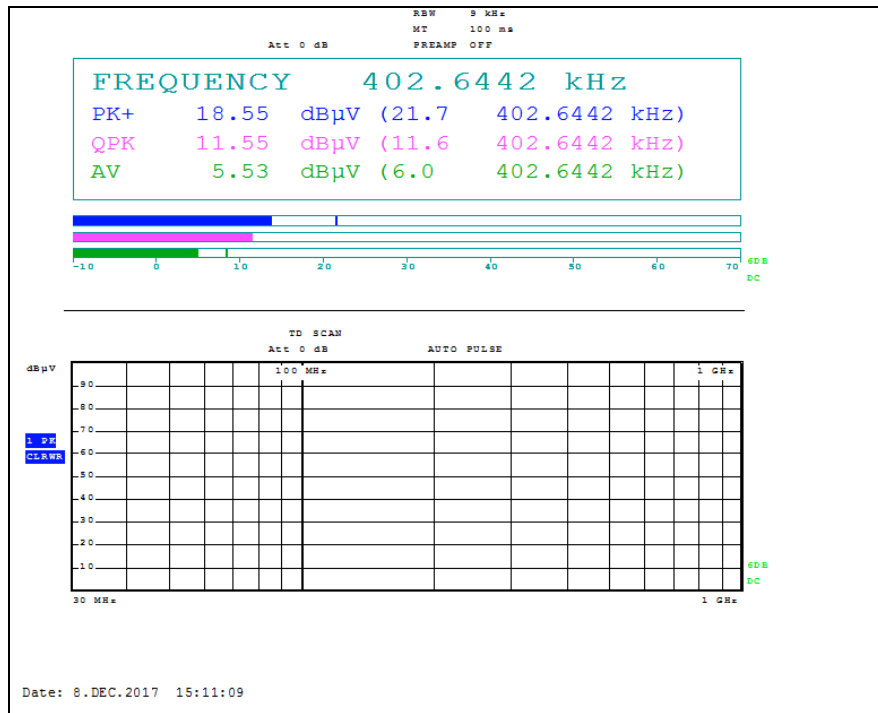


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Measured plots below 30 MHz



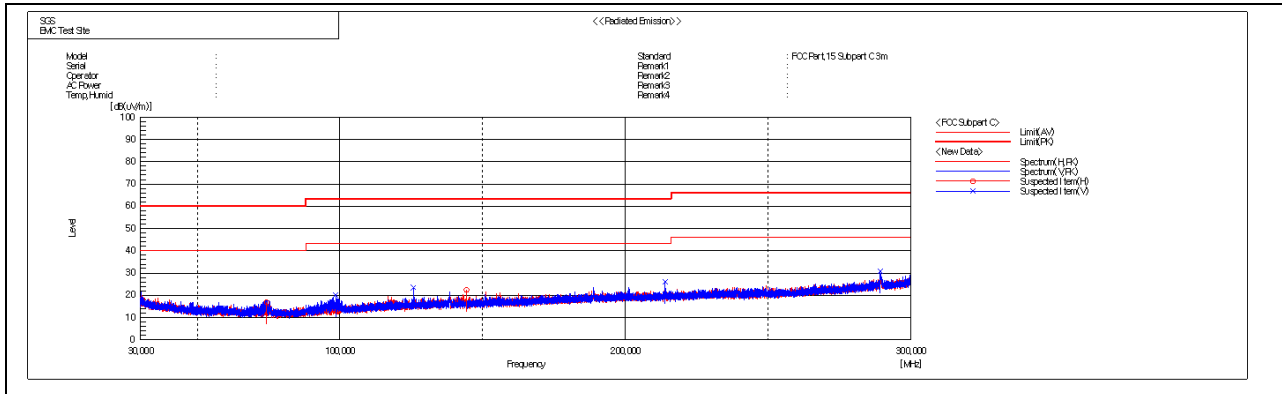
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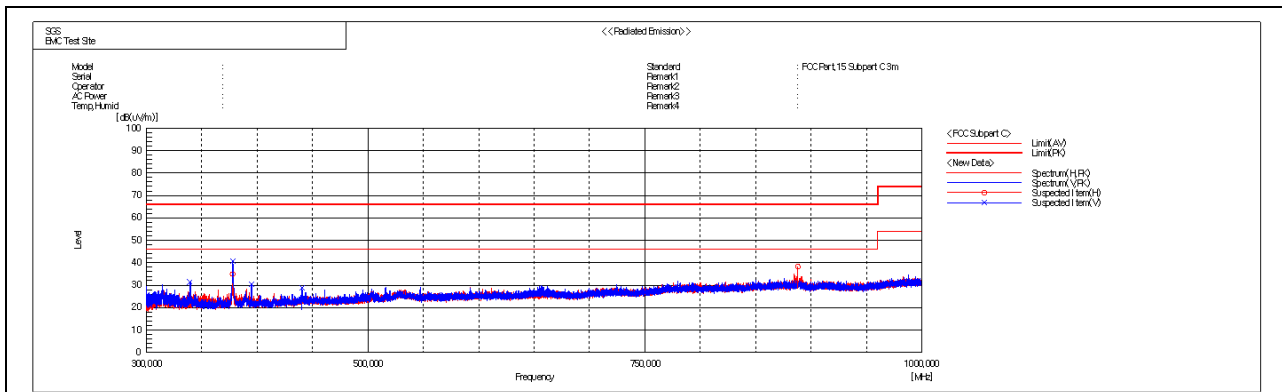
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Test plots above 30 MHz

<30 MHz ~ 300 MHz>



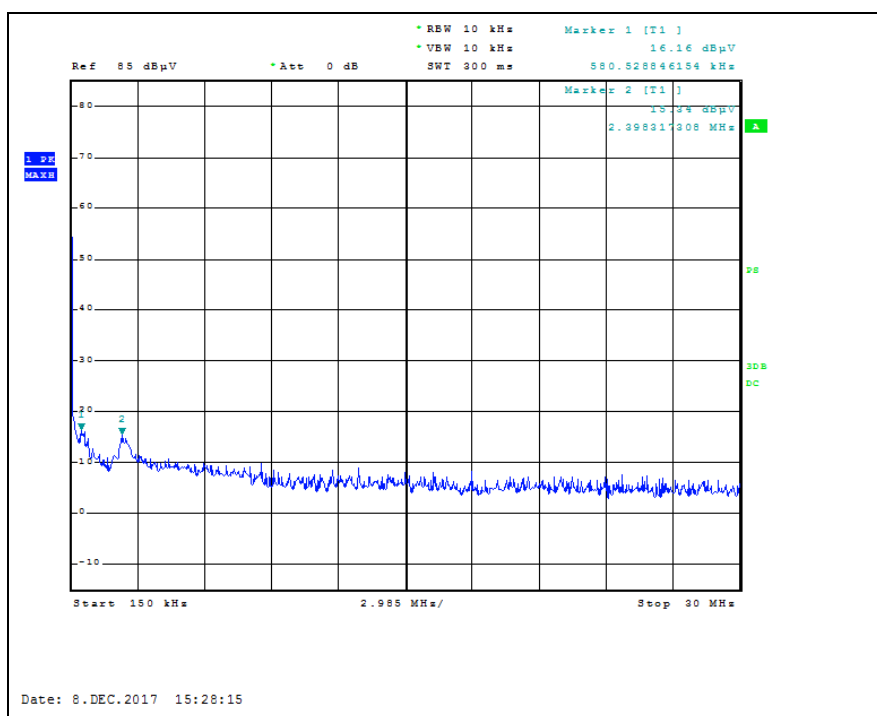
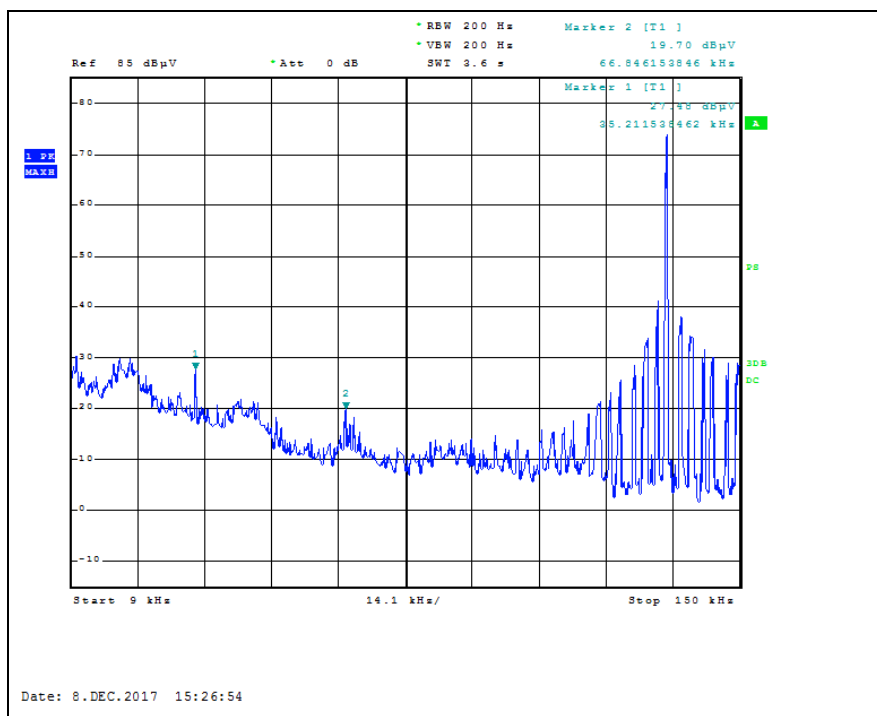
<300 MHz ~ 1 000 MHz>



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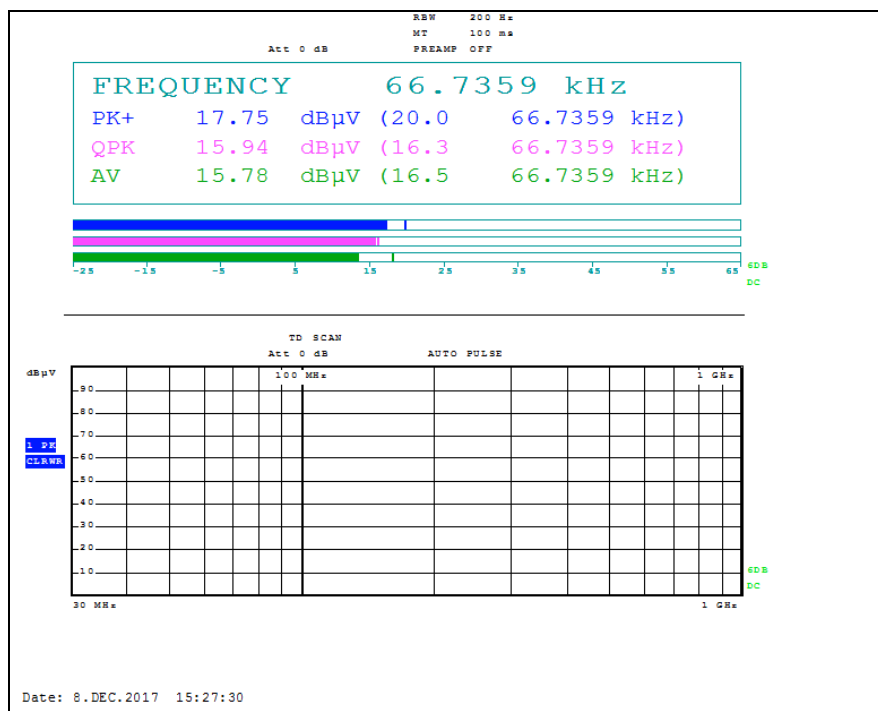
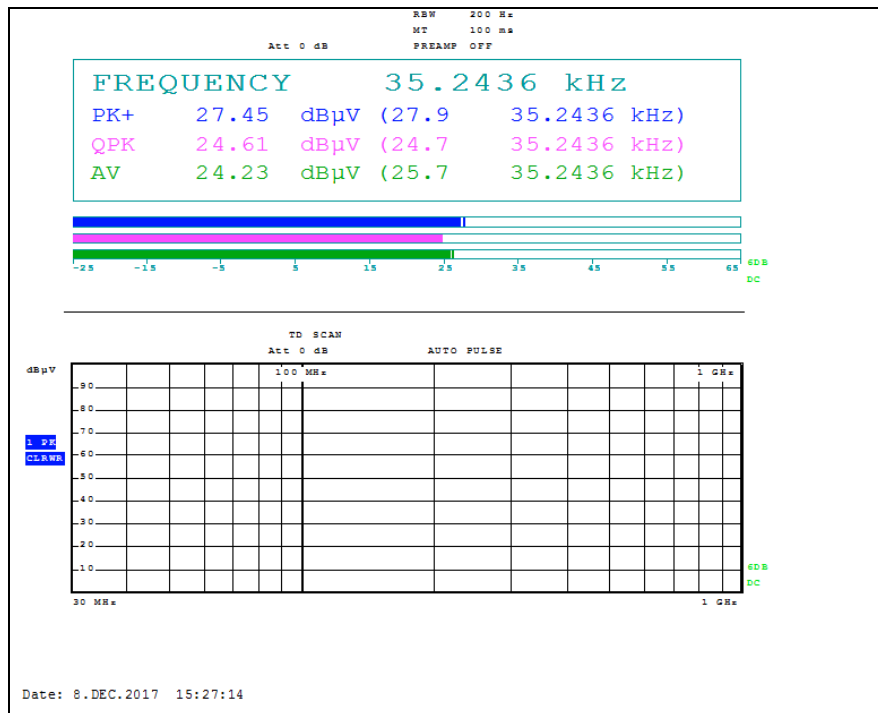
- BUM Antenna

Scanning plots below 30 MHz

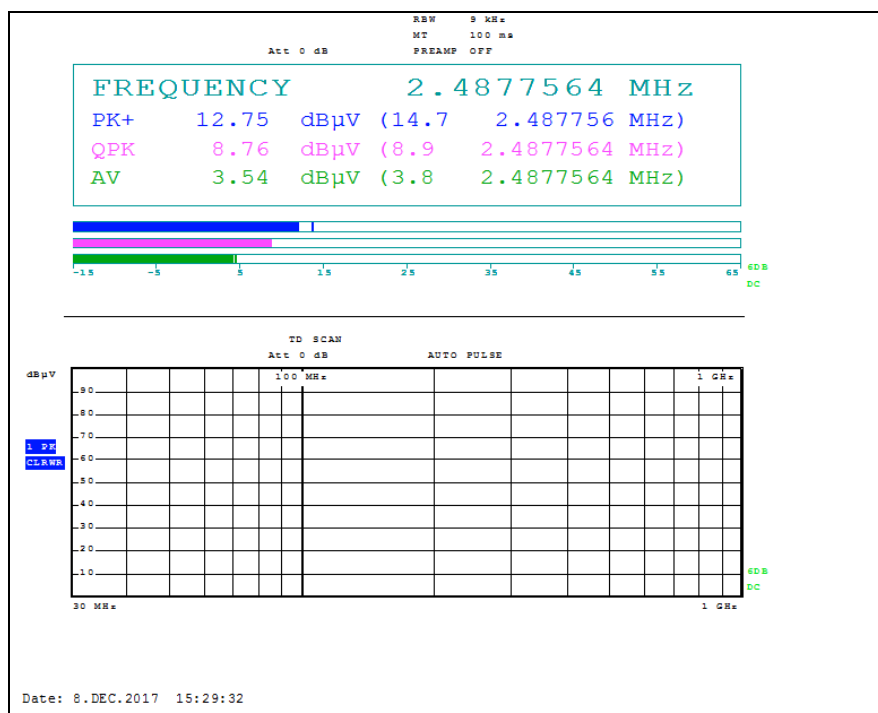
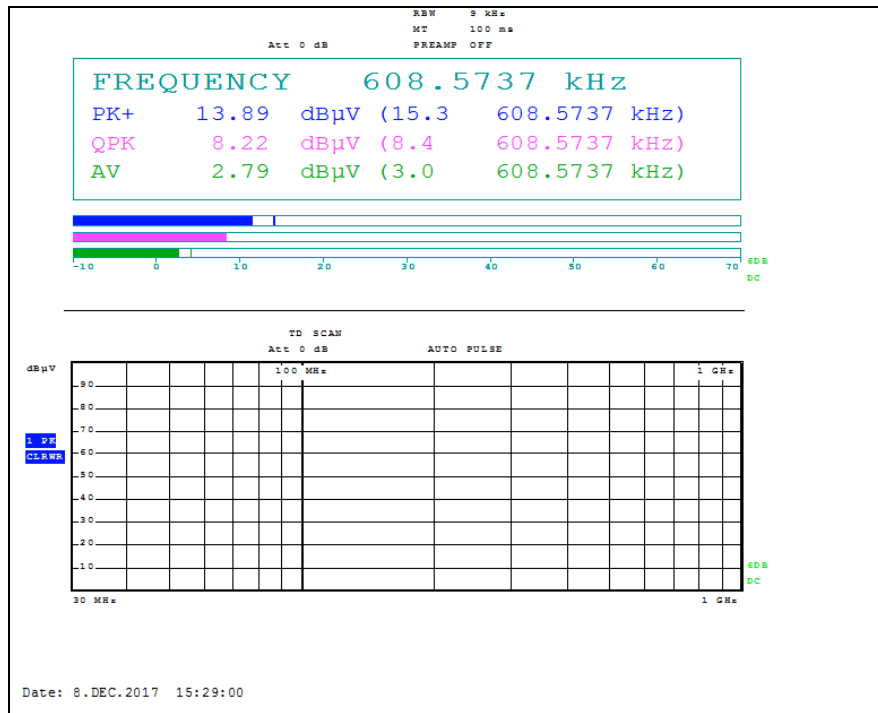


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Measured plots below 30 MHz



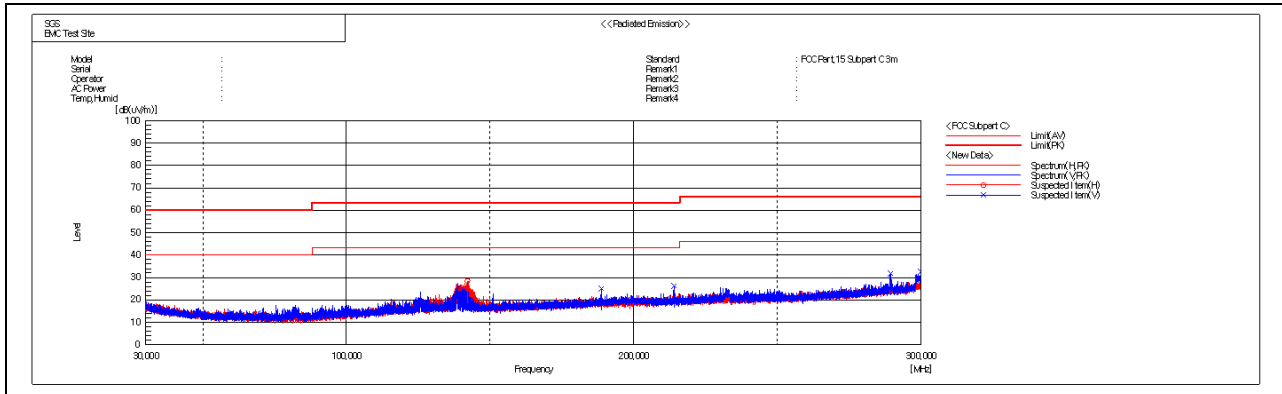
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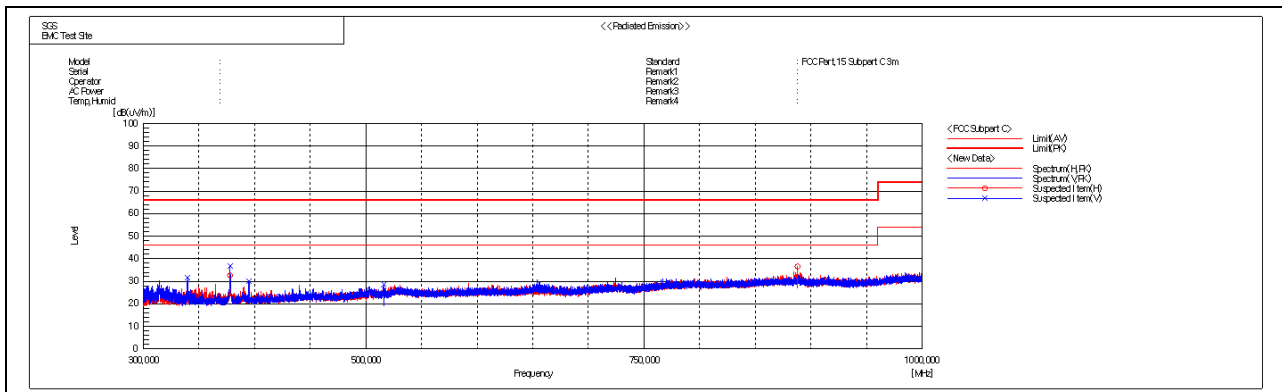
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Test plots above 30 MHz

<30 MHz ~ 300 MHz>



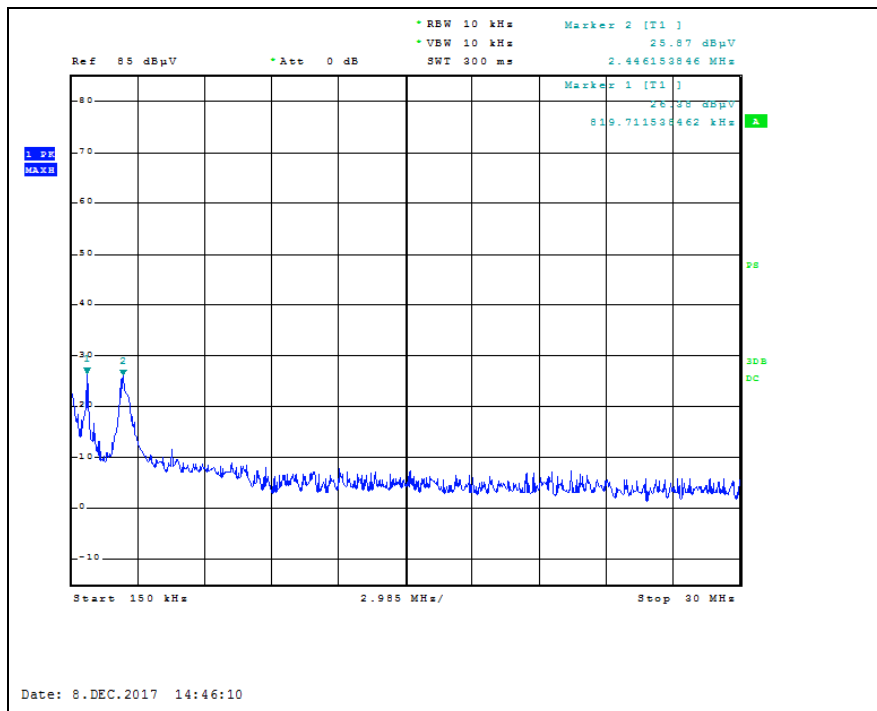
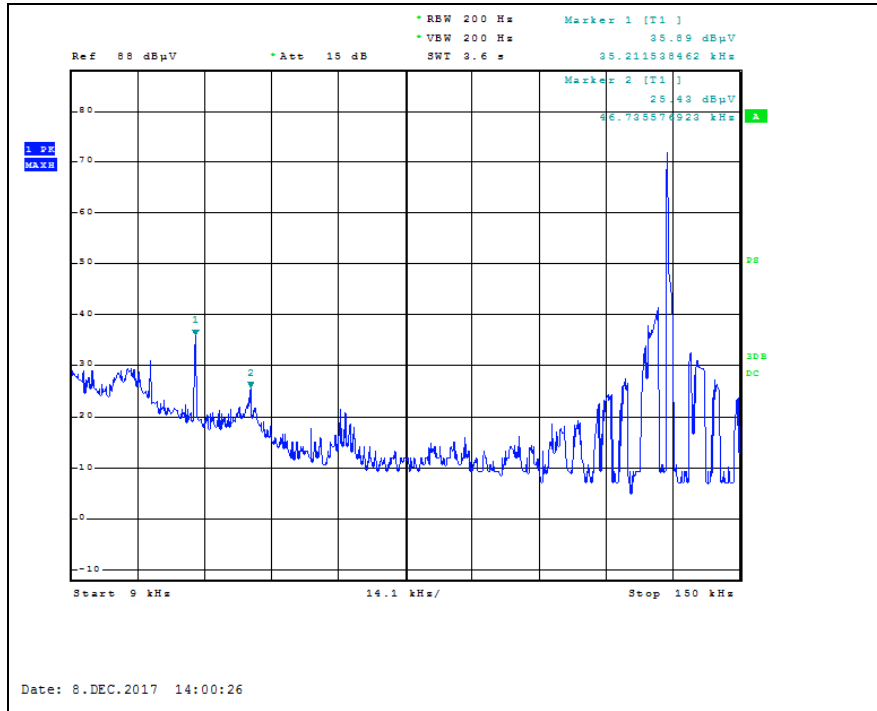
<300 MHz ~ 1 000 MHz>



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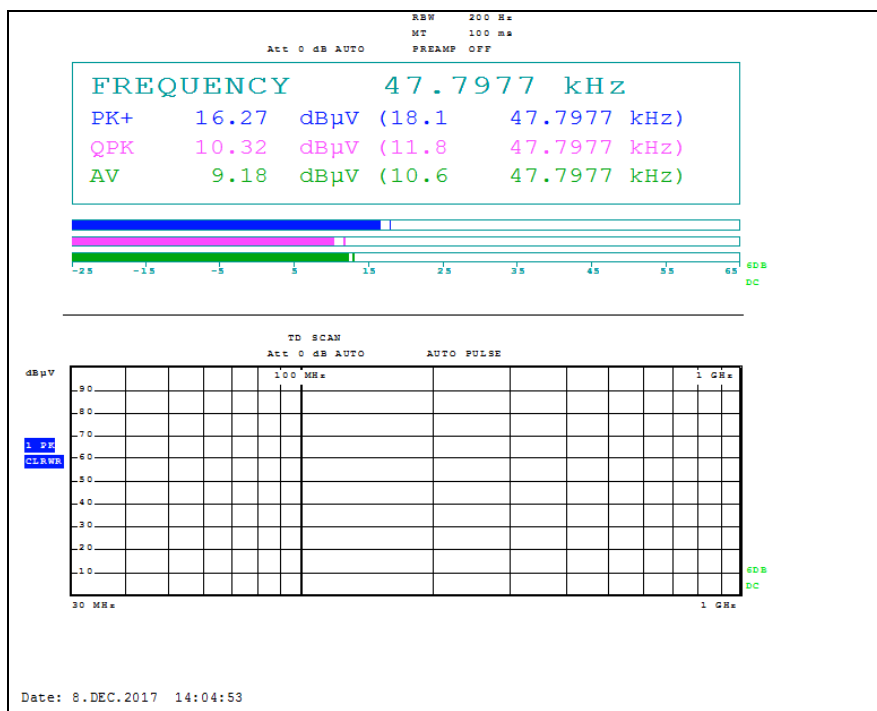
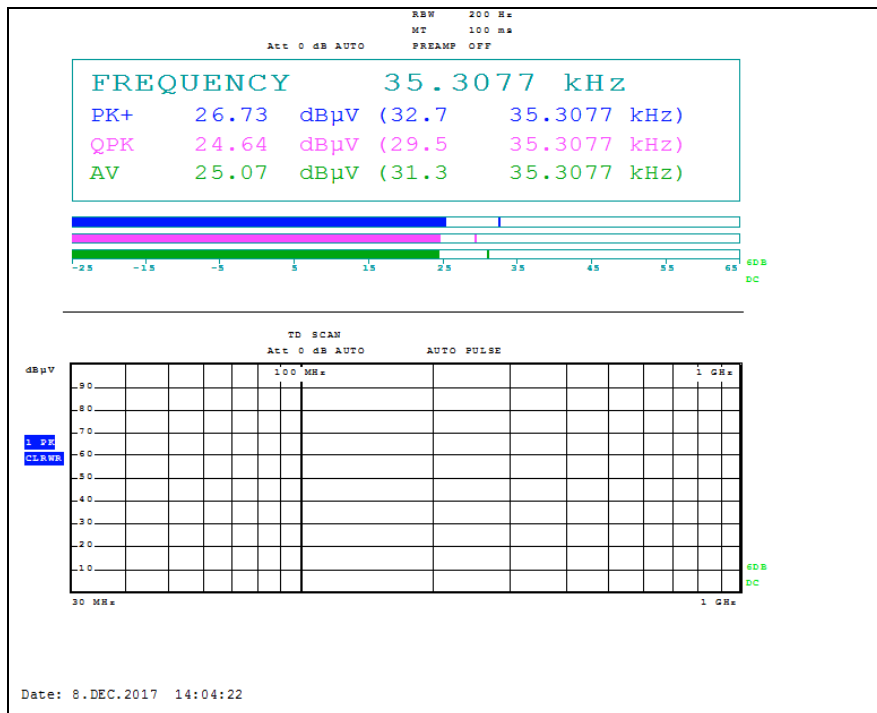
- DRV Antenna

Scanning plots below 30 MHz

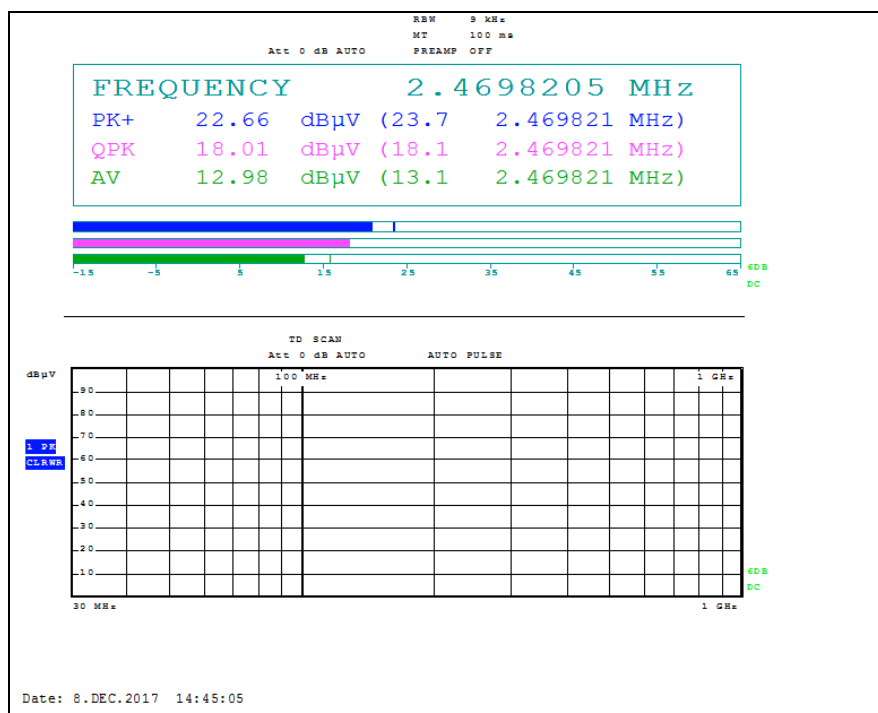
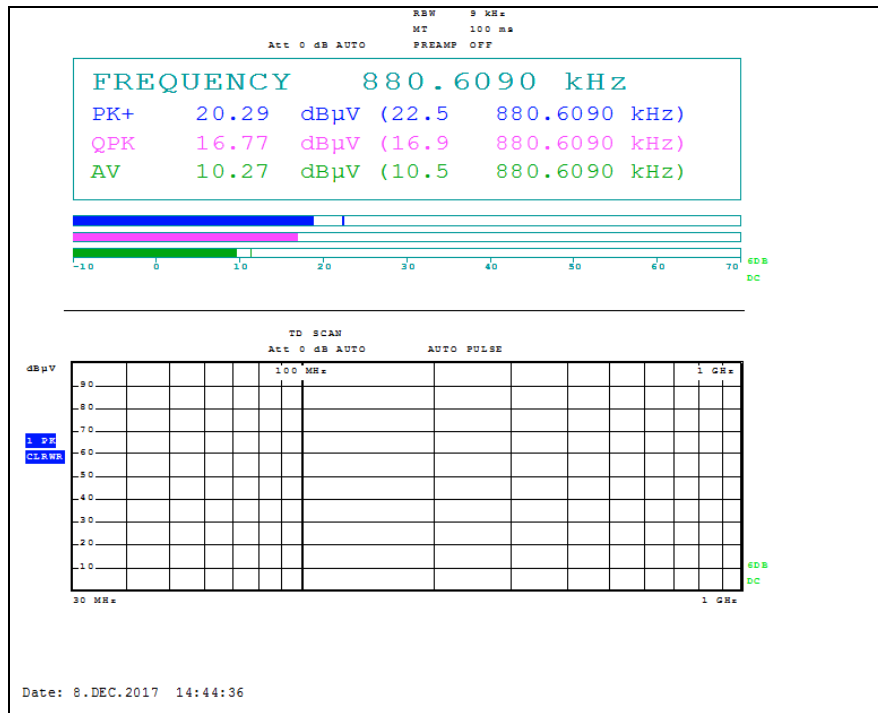


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Measured plots below 30 MHz



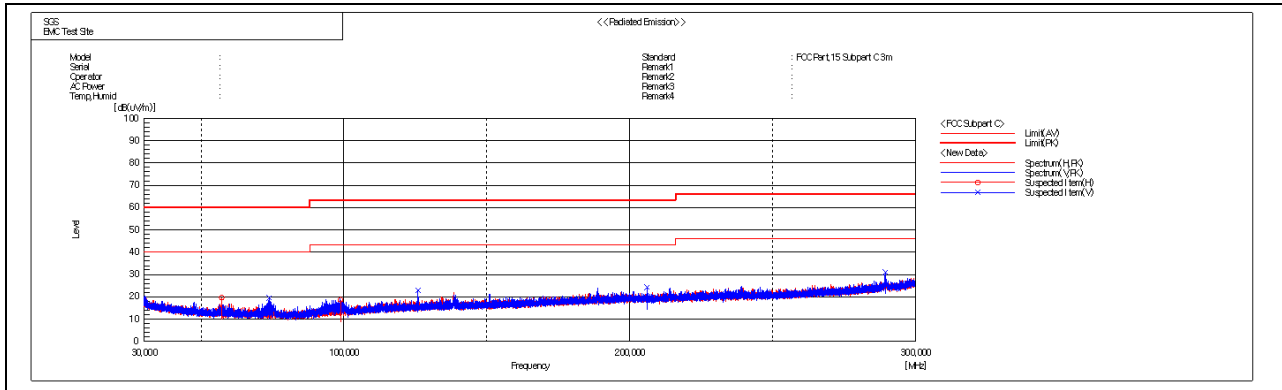
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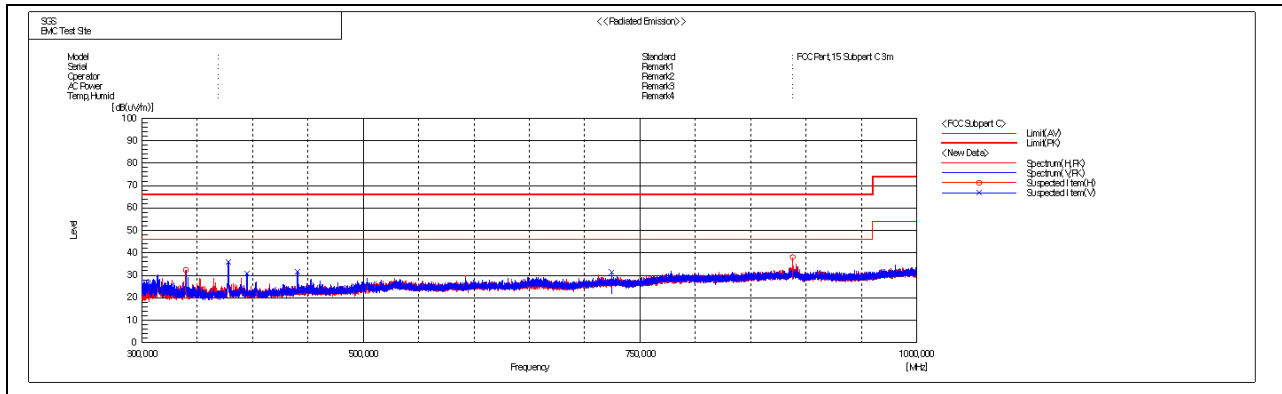
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Test plots above 30 MHz

<30 MHz ~ 300 MHz>



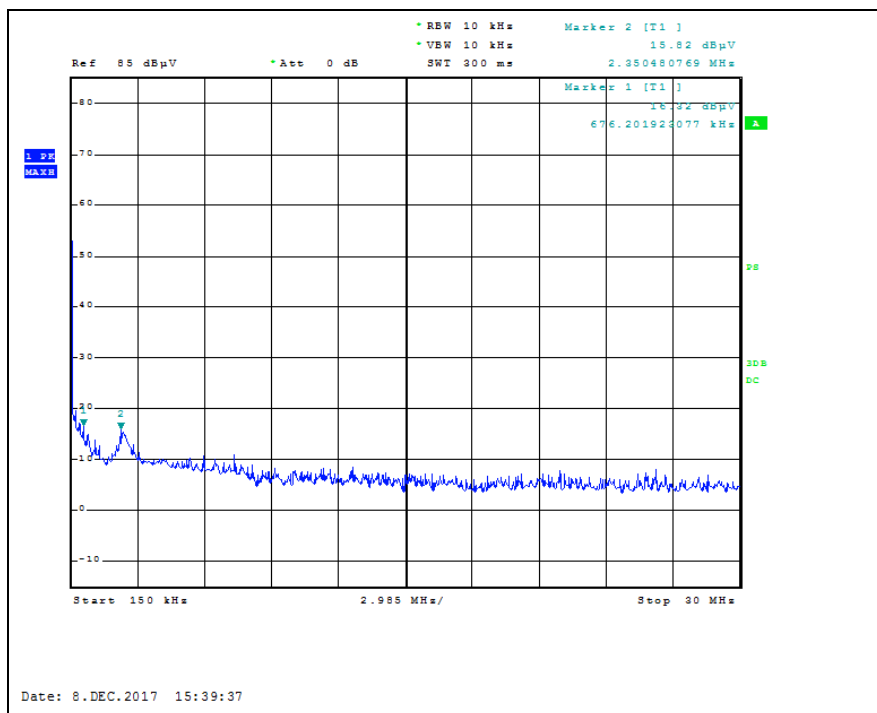
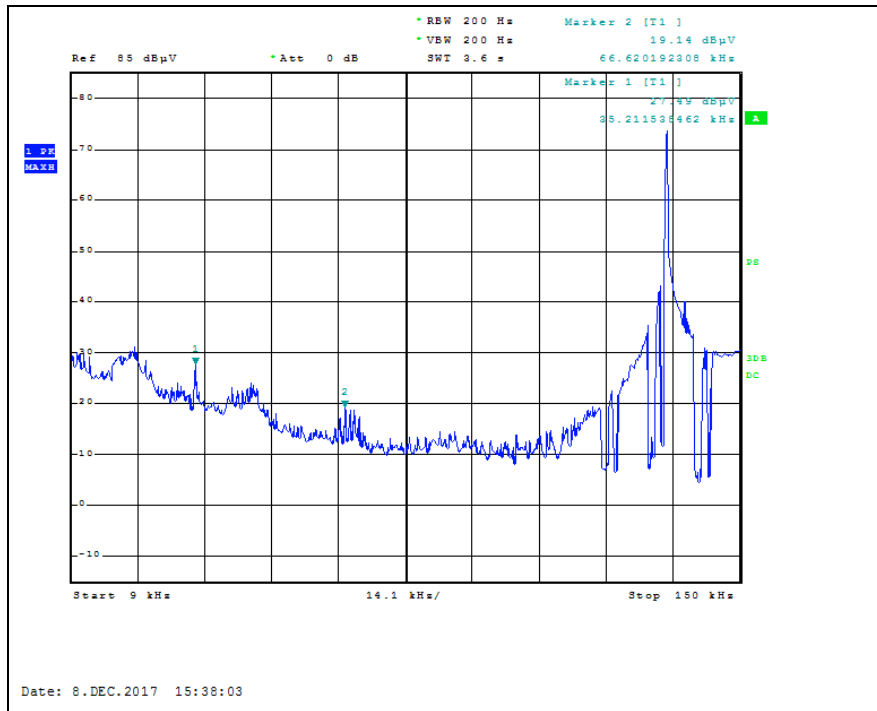
<300 MHz ~ 1 000 MHz>



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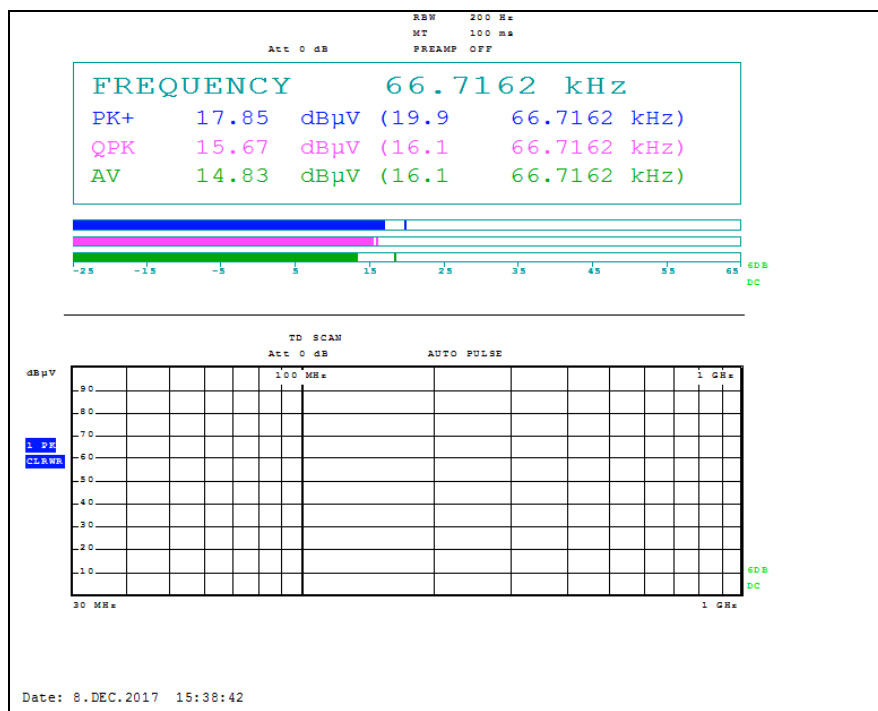
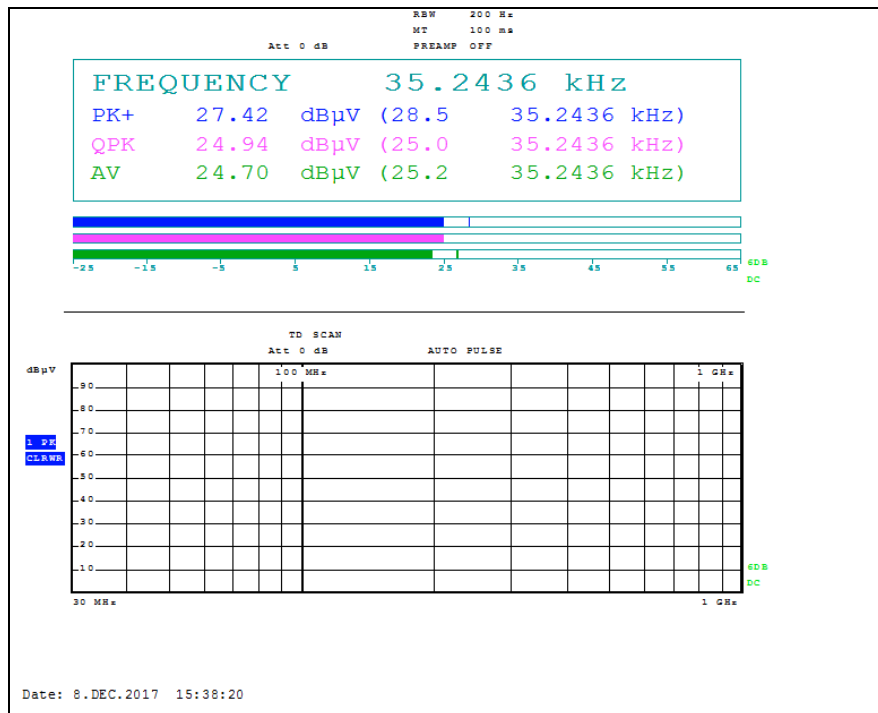
- INT1 Antenna

Scanning plots below 30 MHz

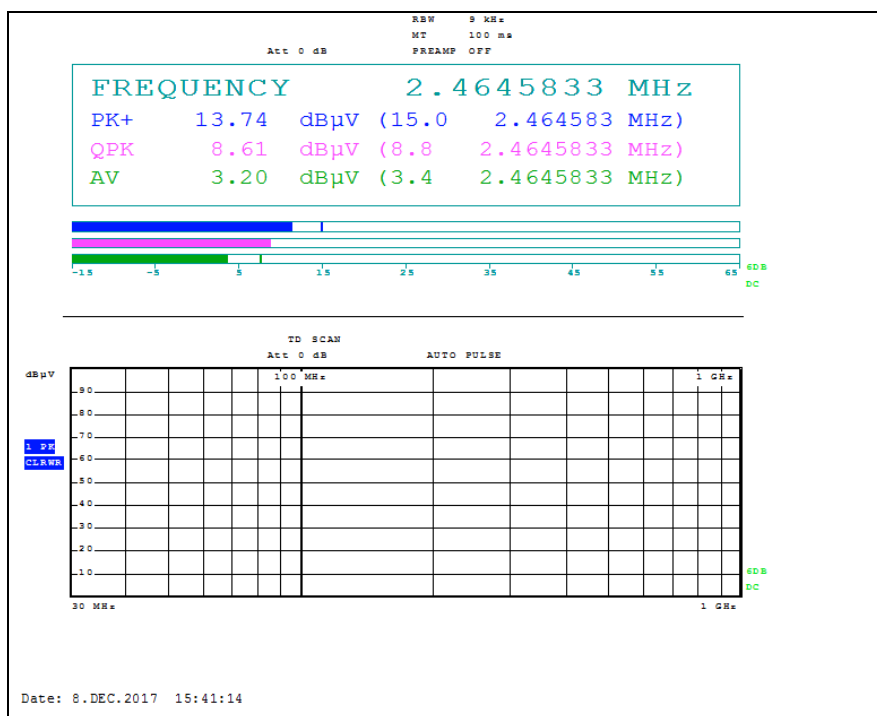
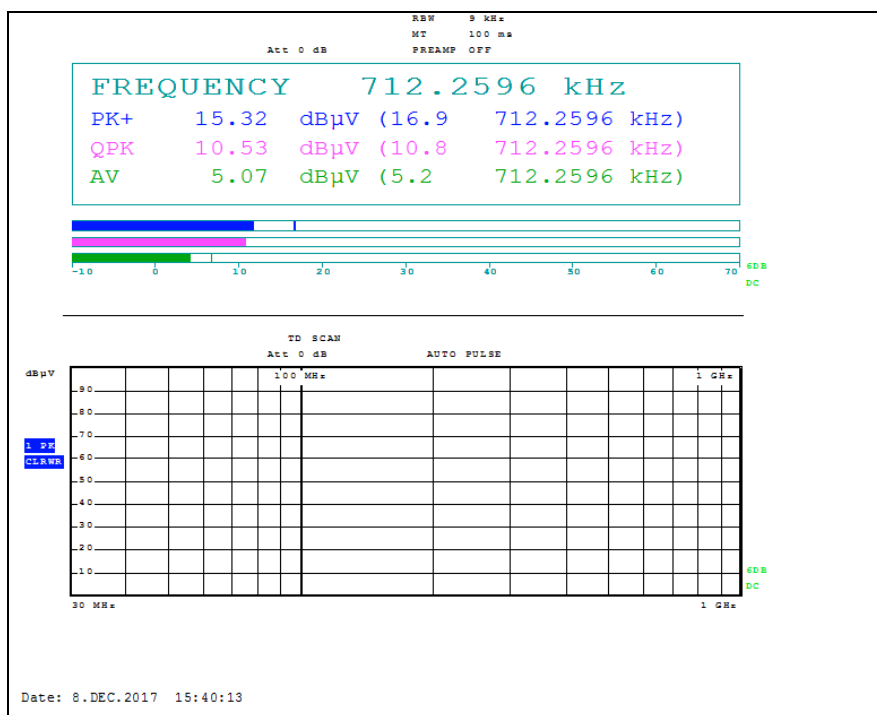


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Measured plots below 30 MHz



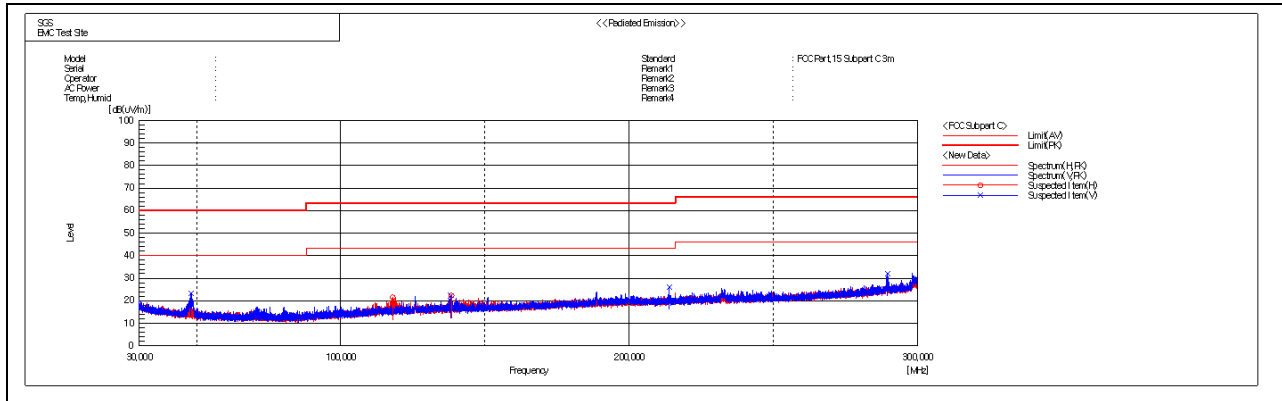
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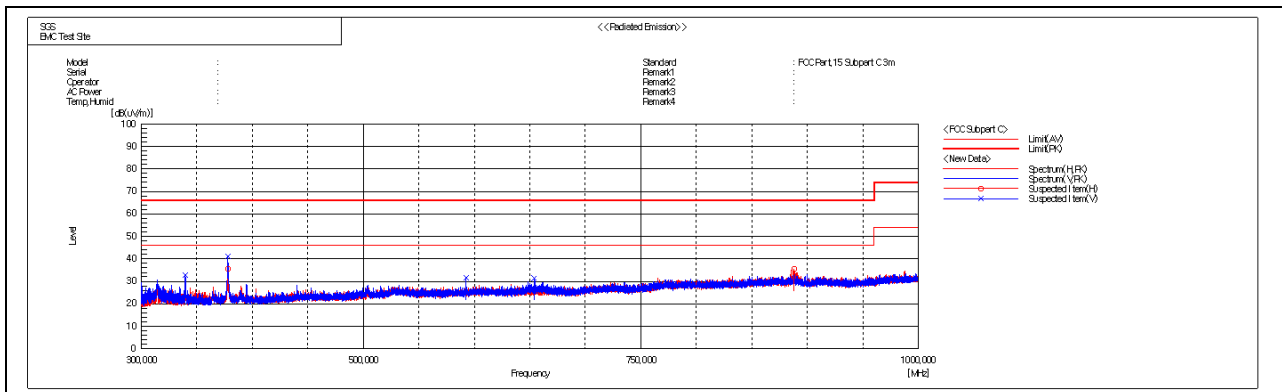
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Test plots above 30 MHz

<30 MHz ~ 300 MHz>



<300 MHz ~ 1 000 MHz>



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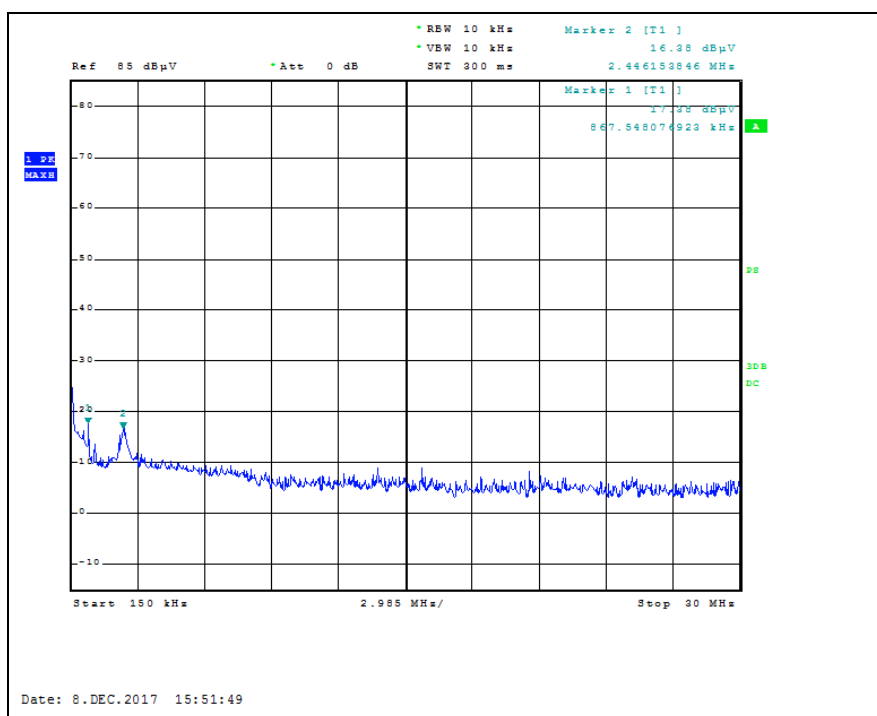
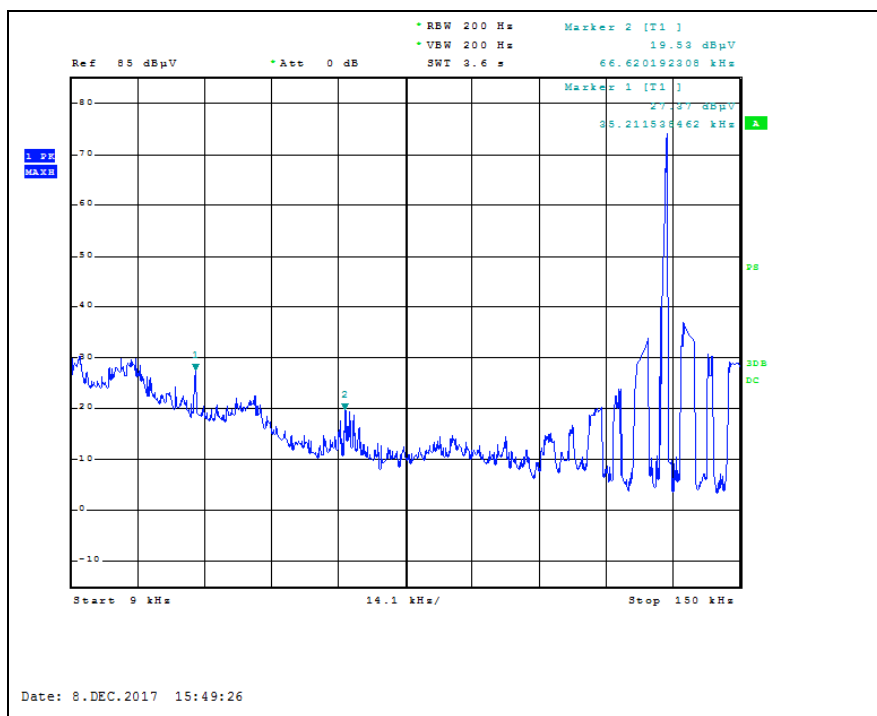
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A4(210 mm x 297 mm)

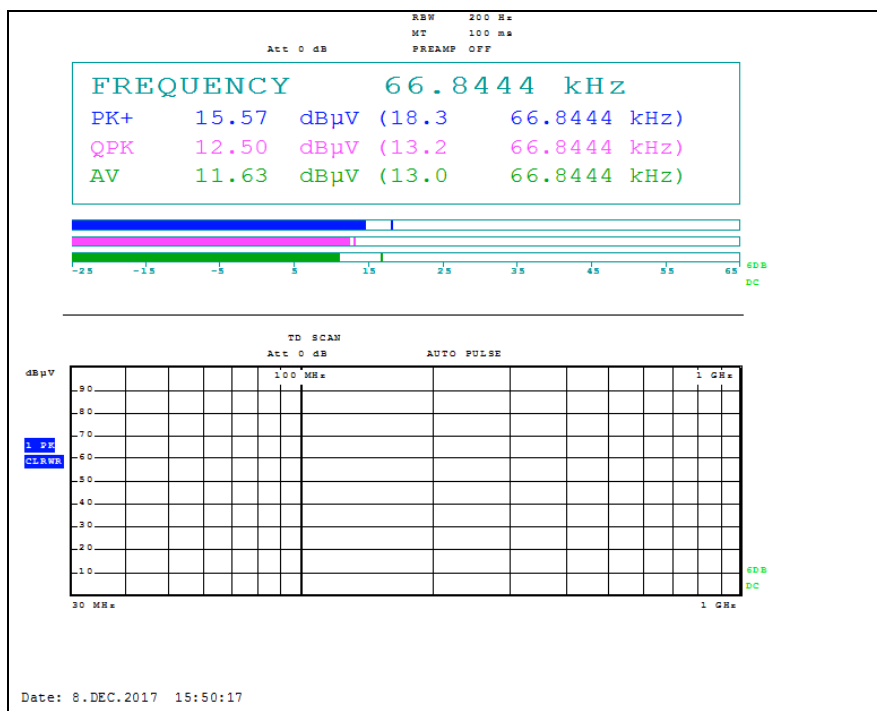
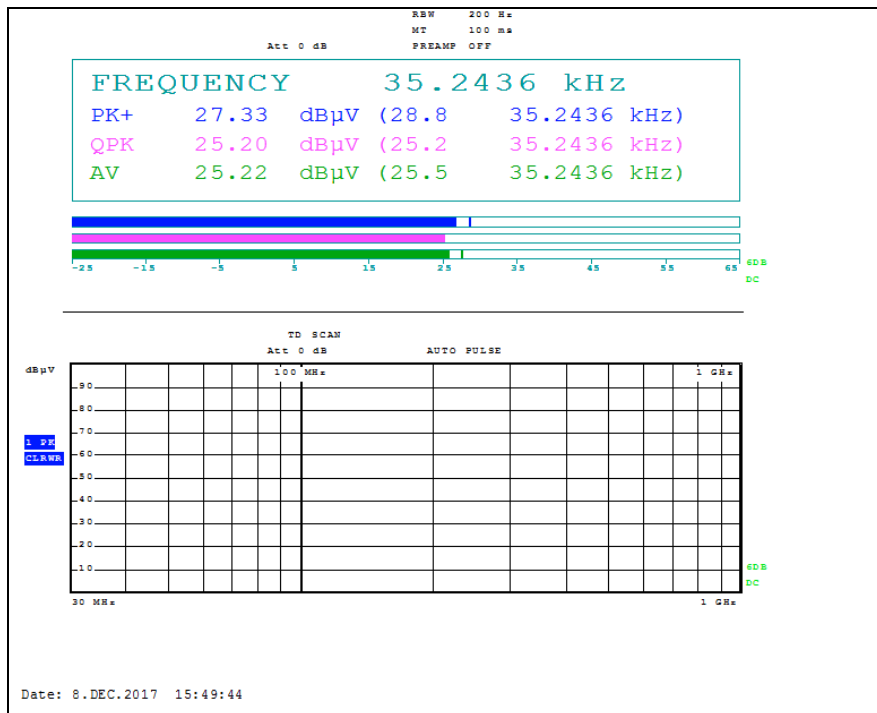
- INT2 Antenna

Scanning plots below 30 MHz

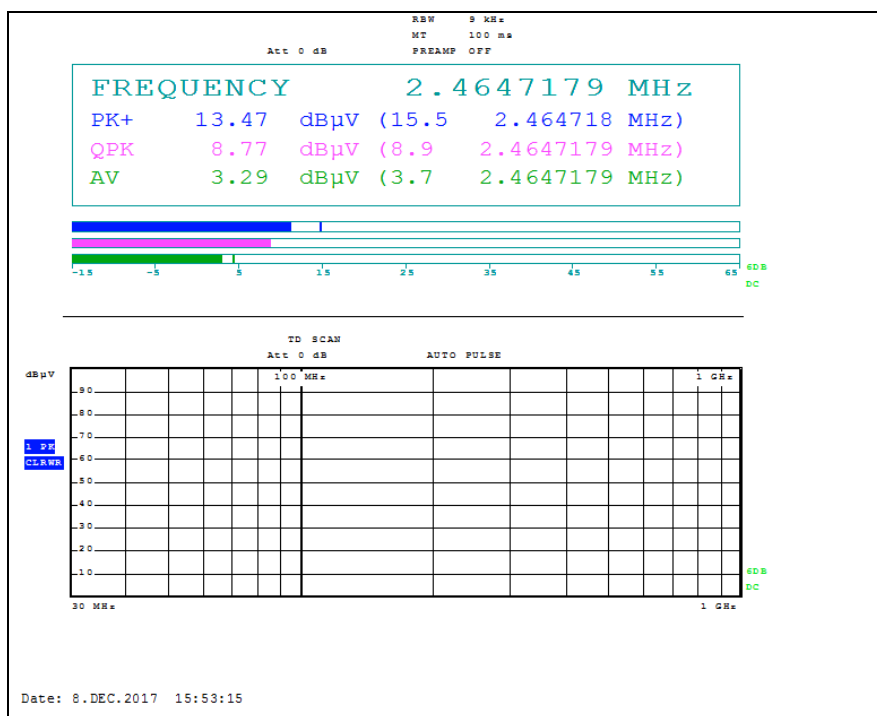
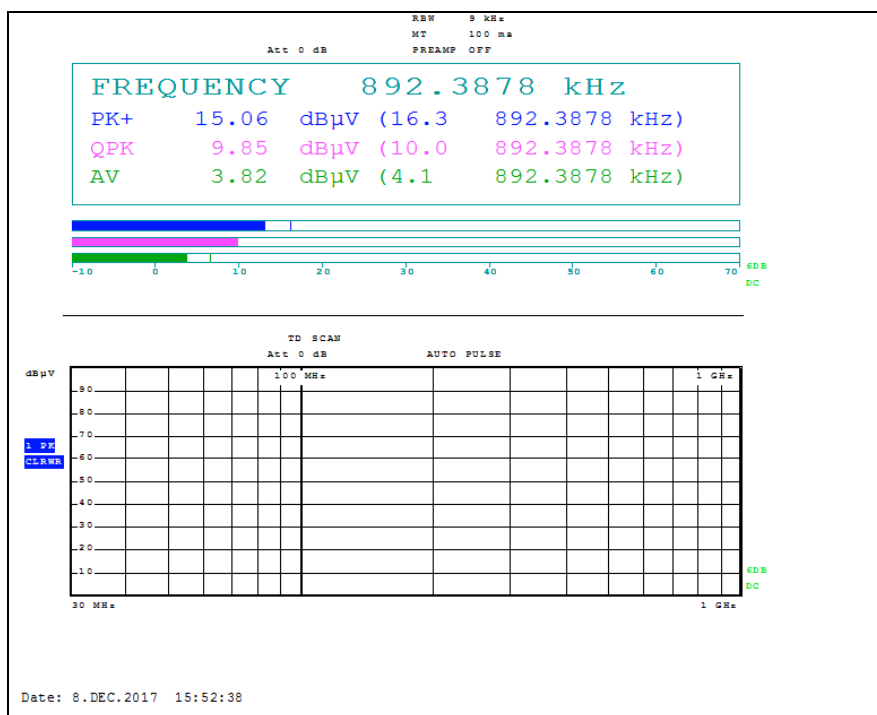


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Measured plots below 30 MHz



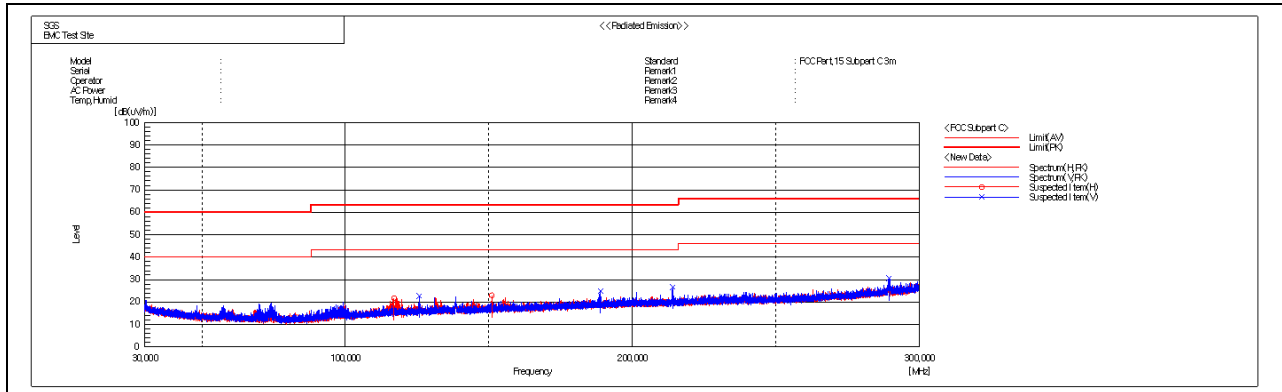
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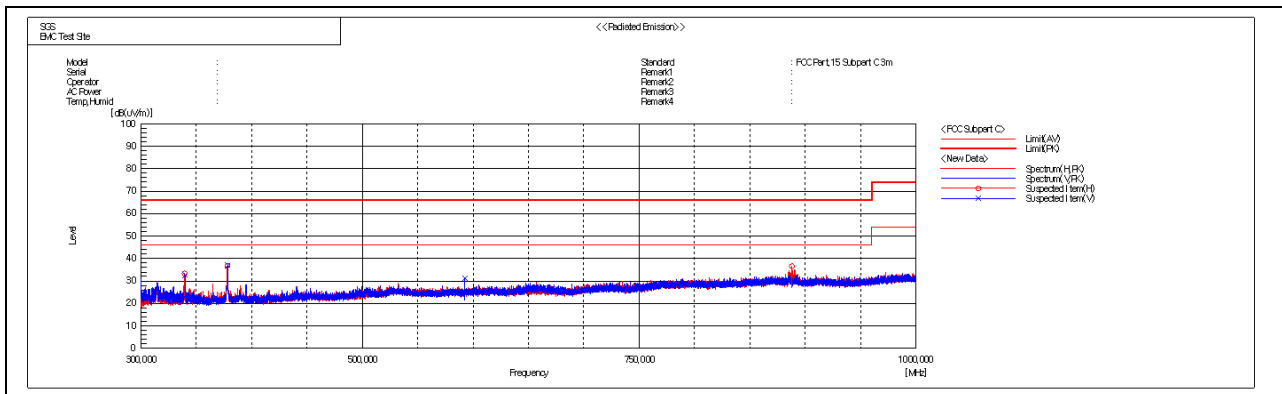
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Test plots above 30 MHz

<30 MHz ~ 300 MHz>



<300 MHz ~ 1 000 MHz>



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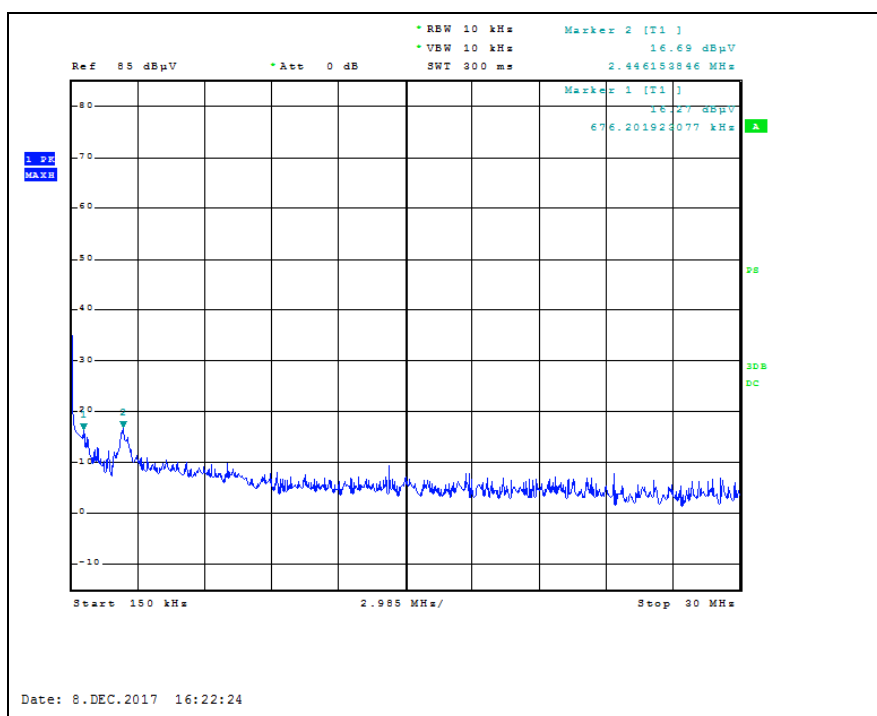
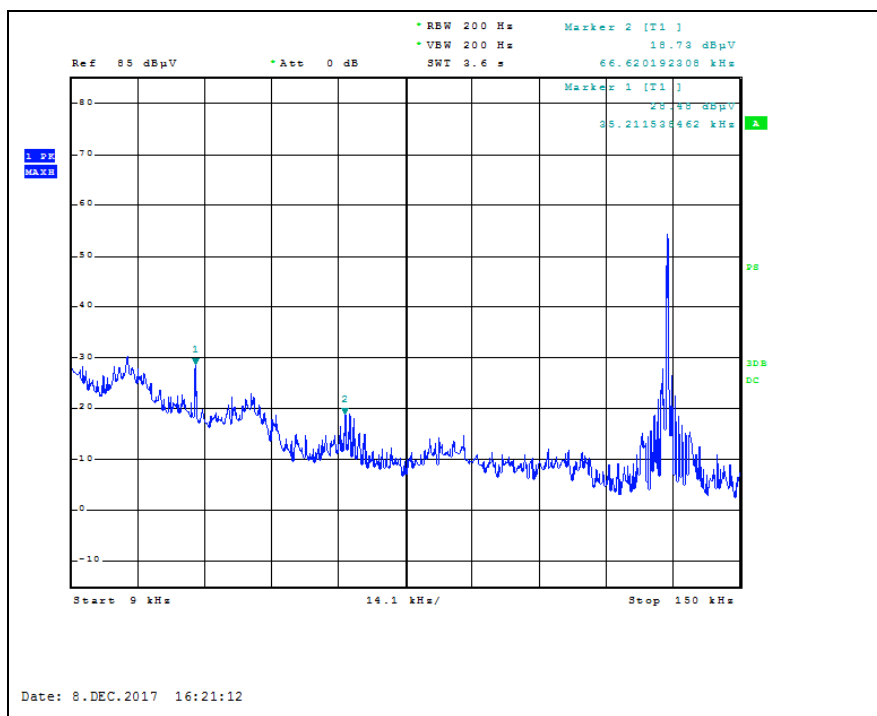
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A4(210 mm x 297 mm)

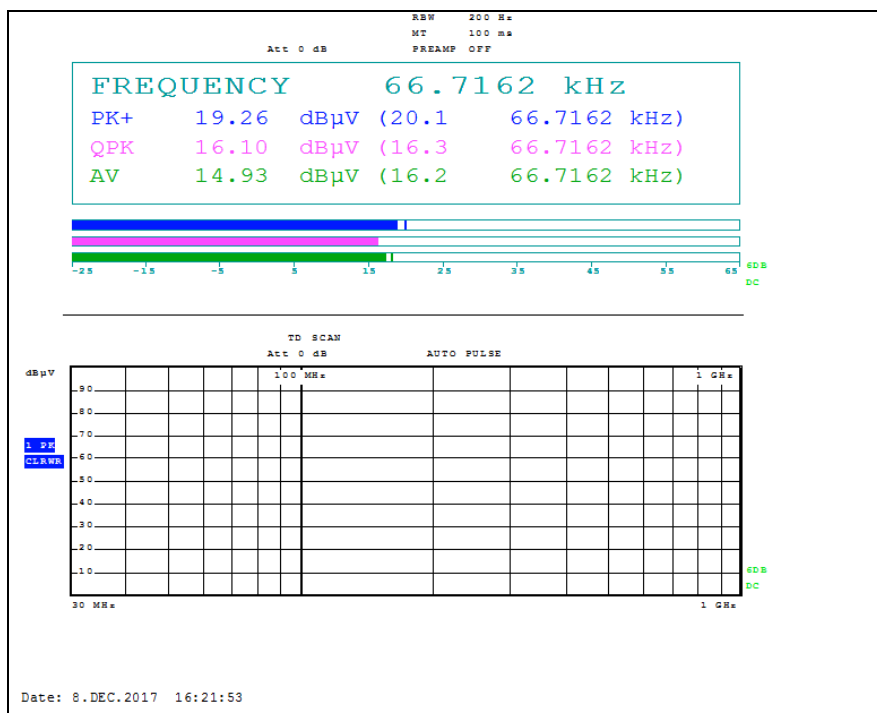
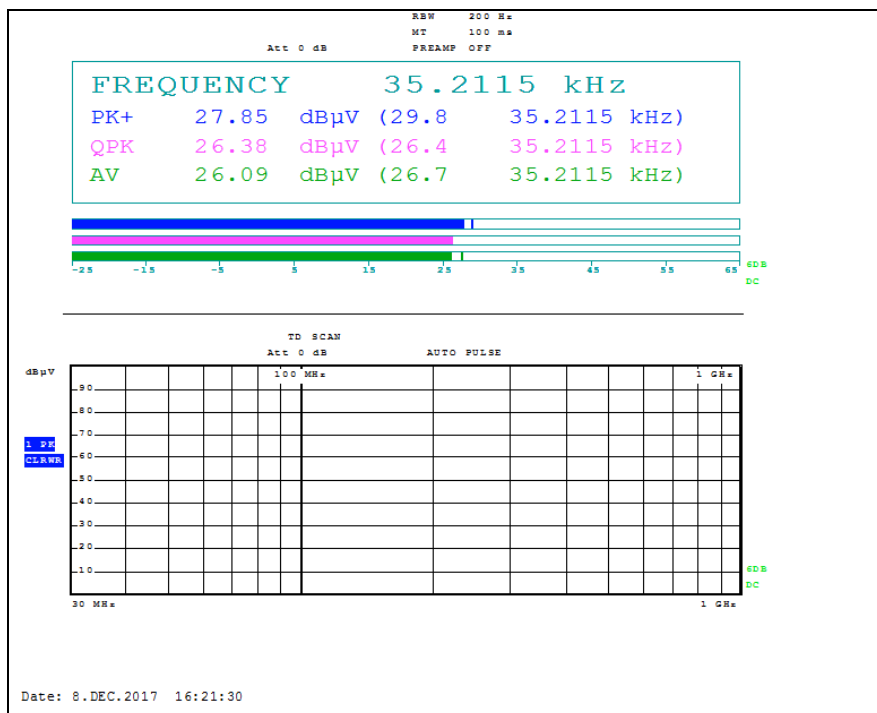
- SSB Antenna

Scanning plots below 30 MHz

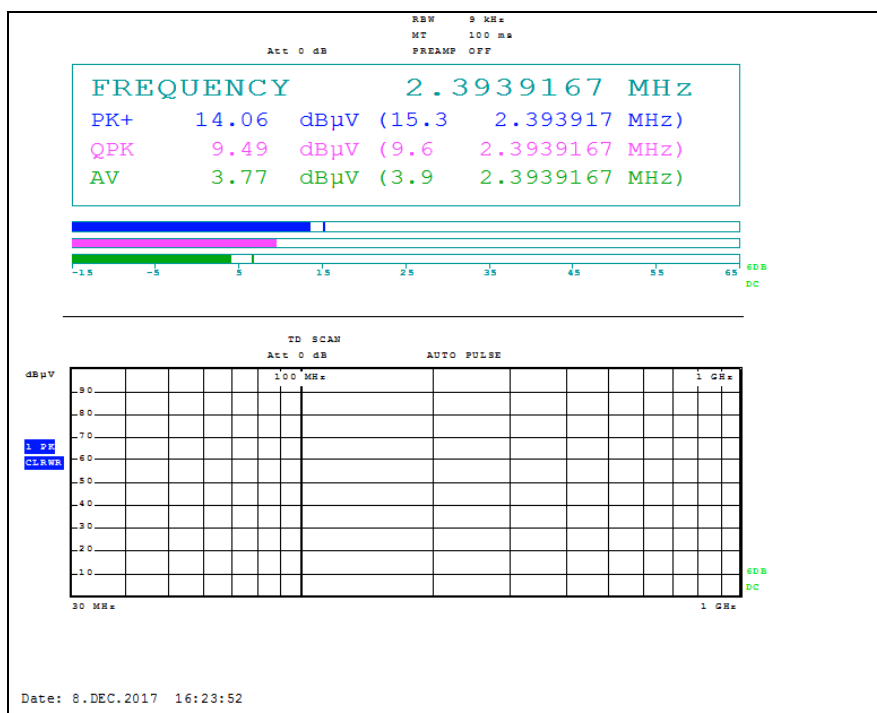
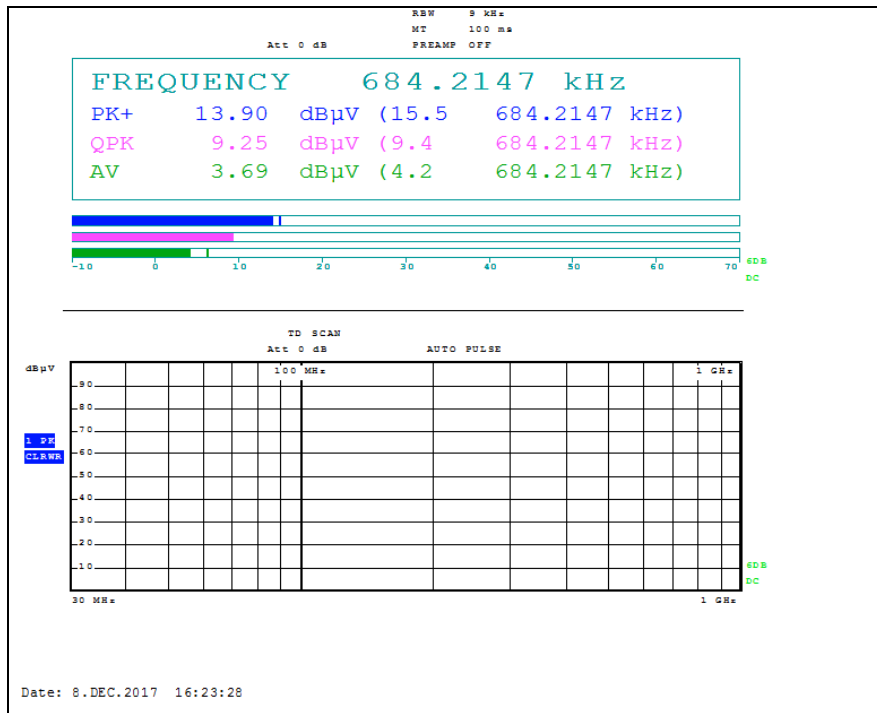


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Measured plots below 30 MHz



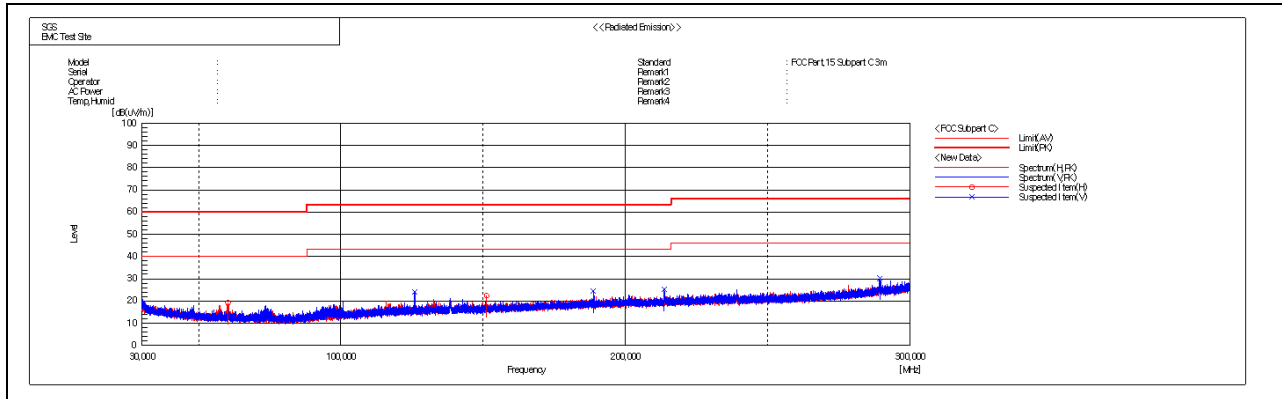
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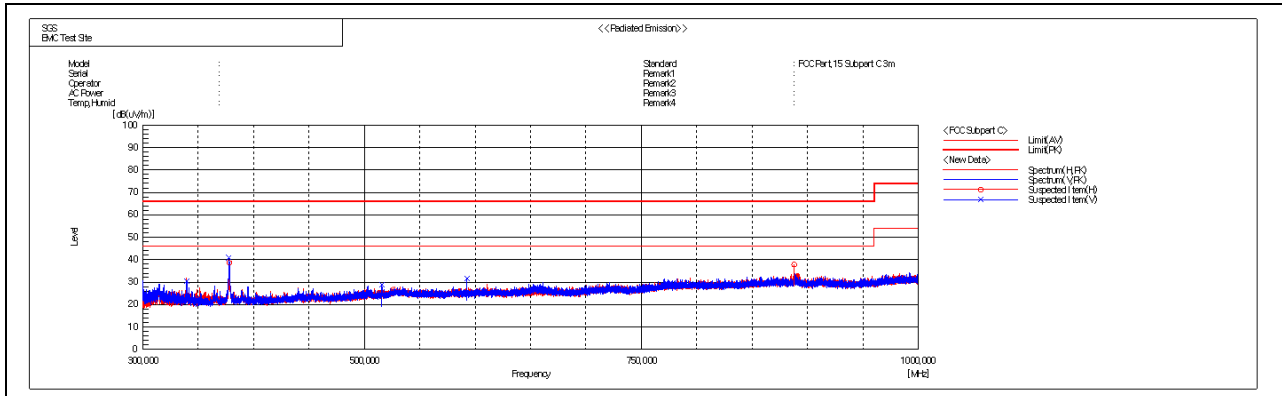
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Test plots above 30 MHz

<30 MHz ~ 300 MHz>



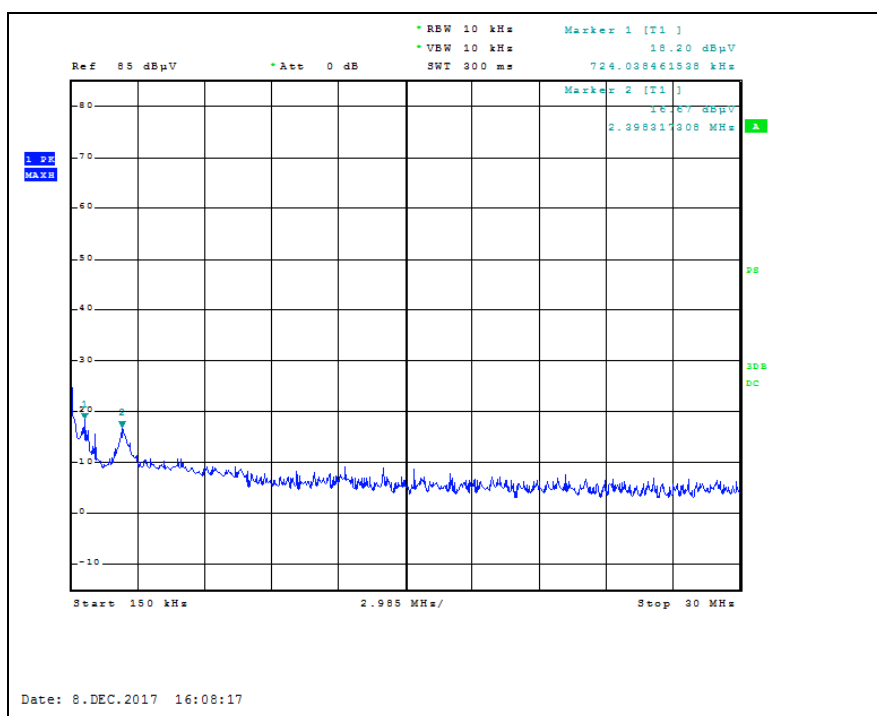
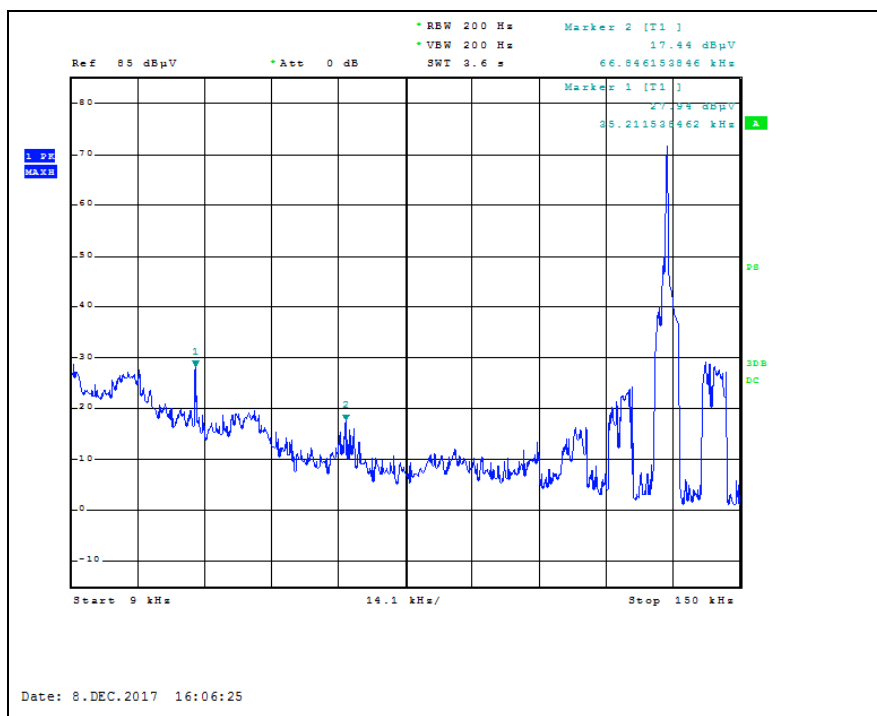
<300 MHz ~ 1 000 MHz>



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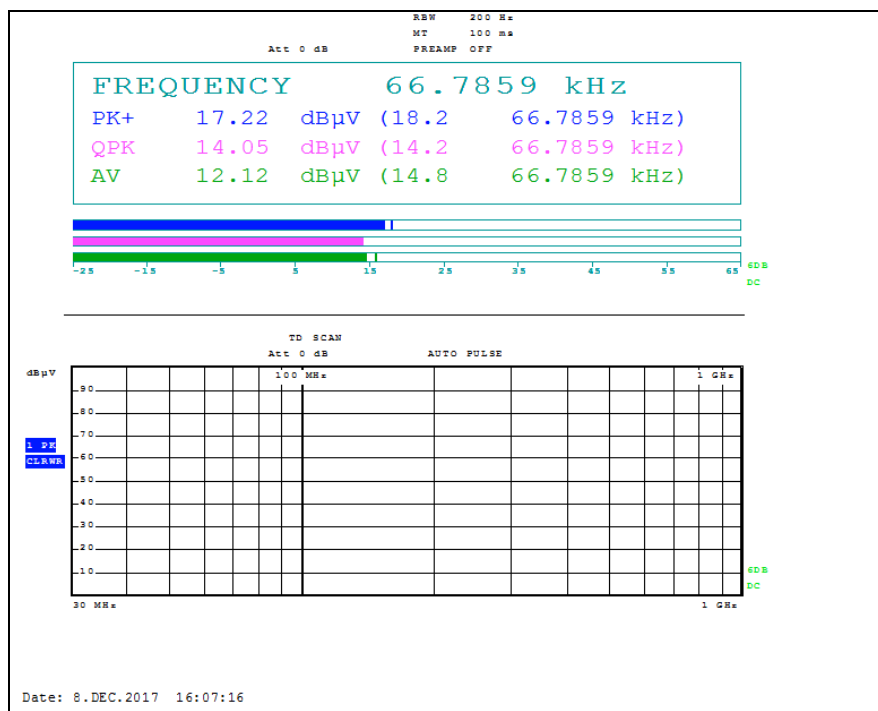
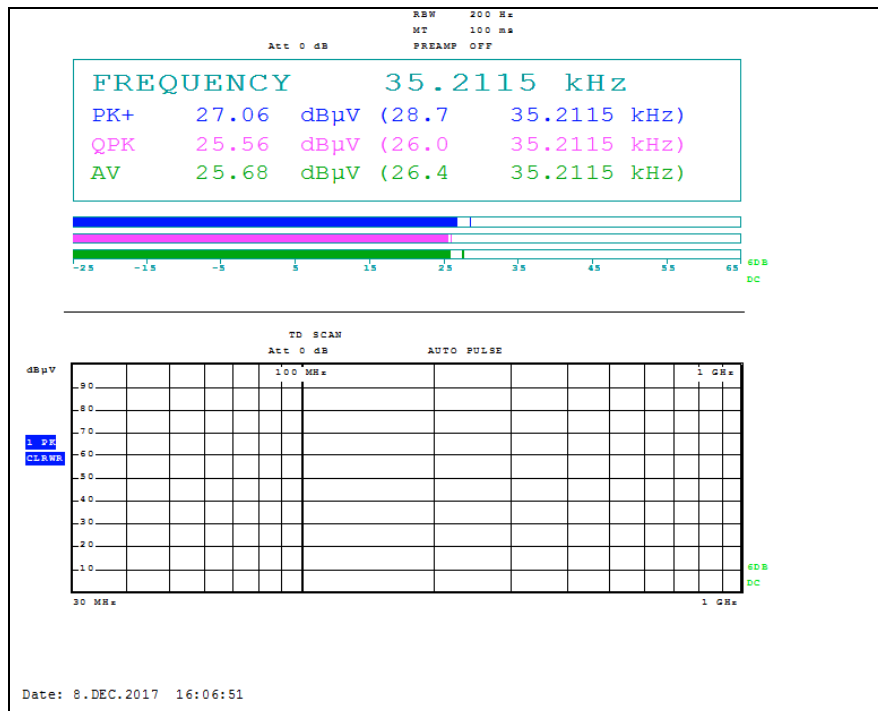
- TRK Antenna

Scanning plots below 30 MHz

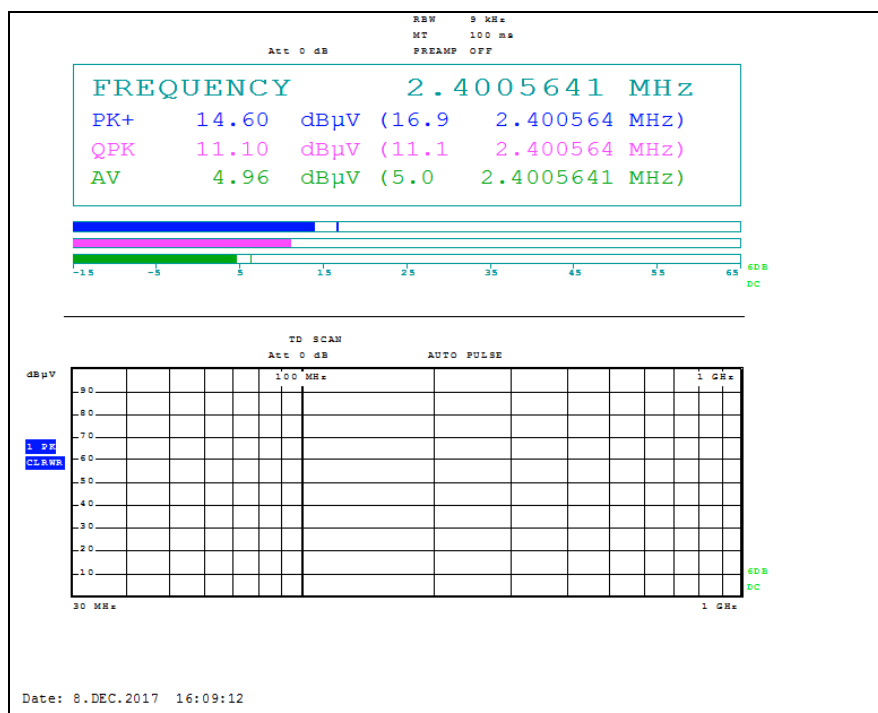
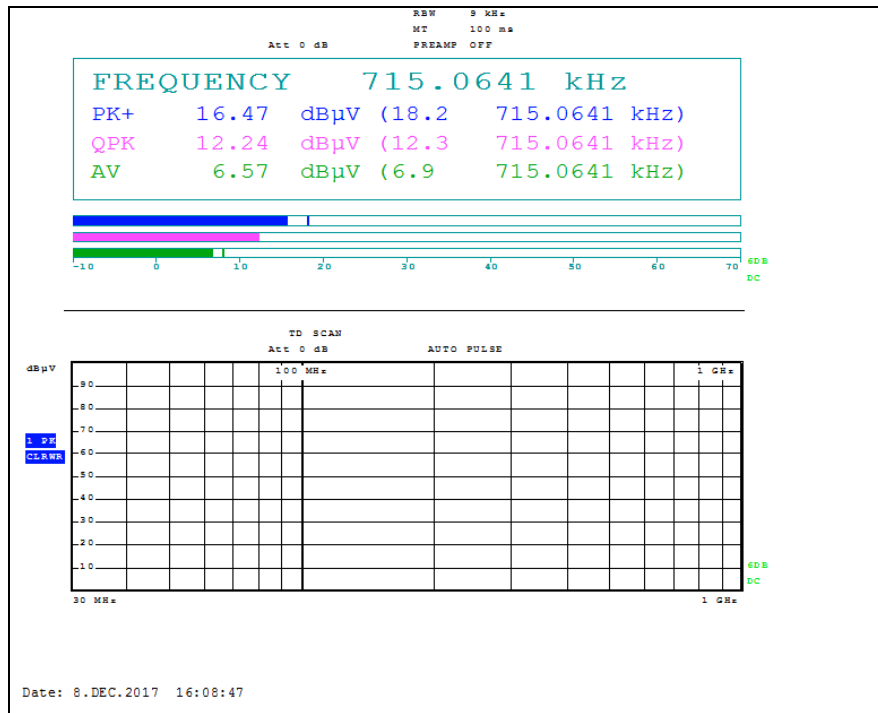


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Measured plots below 30 MHz



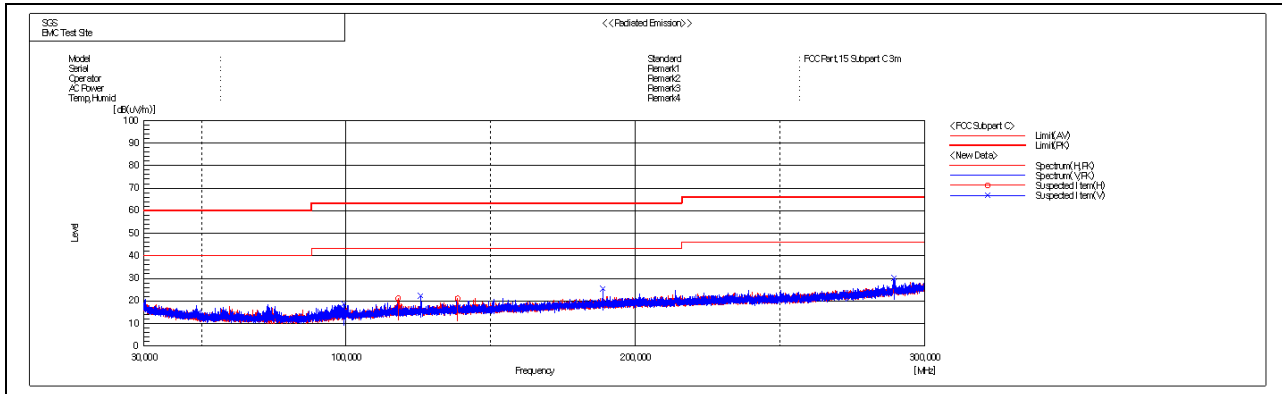
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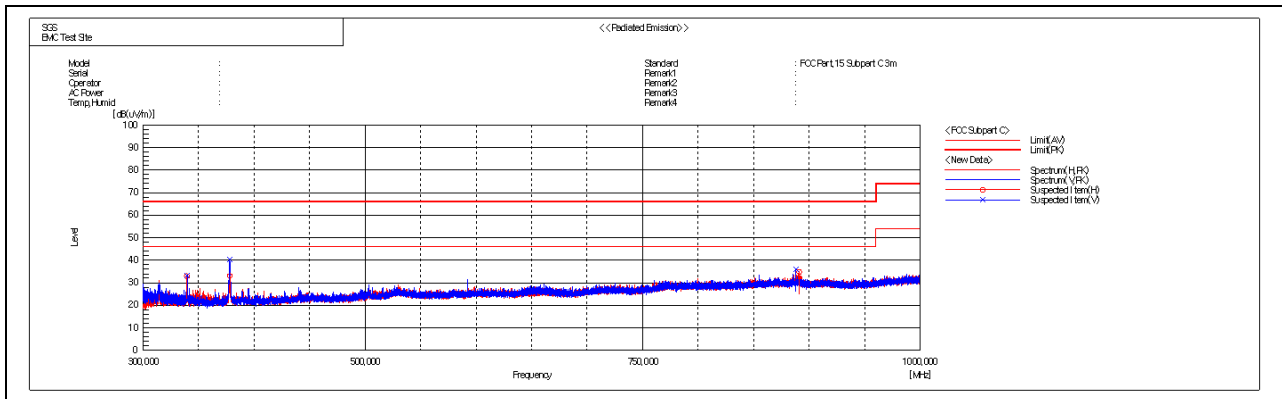
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Test plots above 30 MHz

<30 MHz ~ 300 MHz>



<300 MHz ~ 1 000 MHz>



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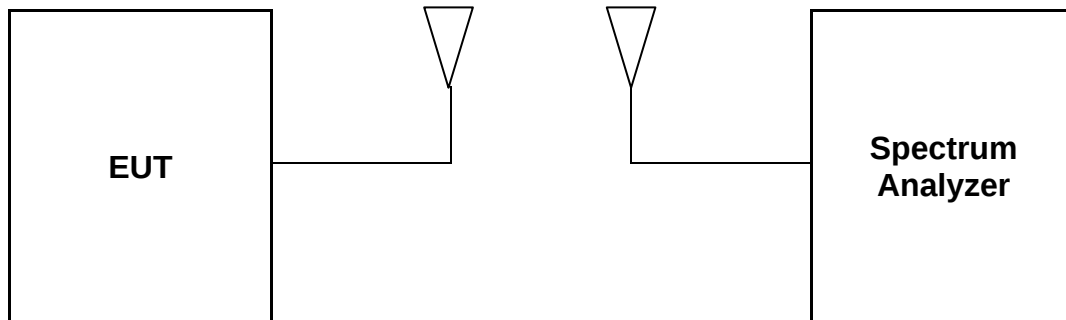
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A4(210 mm x 297 mm)

3. 20 dB Bandwidth

3.1. Test Setup



3.2. Limits

None; for reporting purposed only

3.3. Test Procedure

- Span = 20 kHz, RBW = 500 Hz, VBW = set approximately 3 x RBW, Sweep = auto, Detector = peak, Trace = max hold.
- The marker-to-peak function to set the mark to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is 20 dB bandwidth of the emission.

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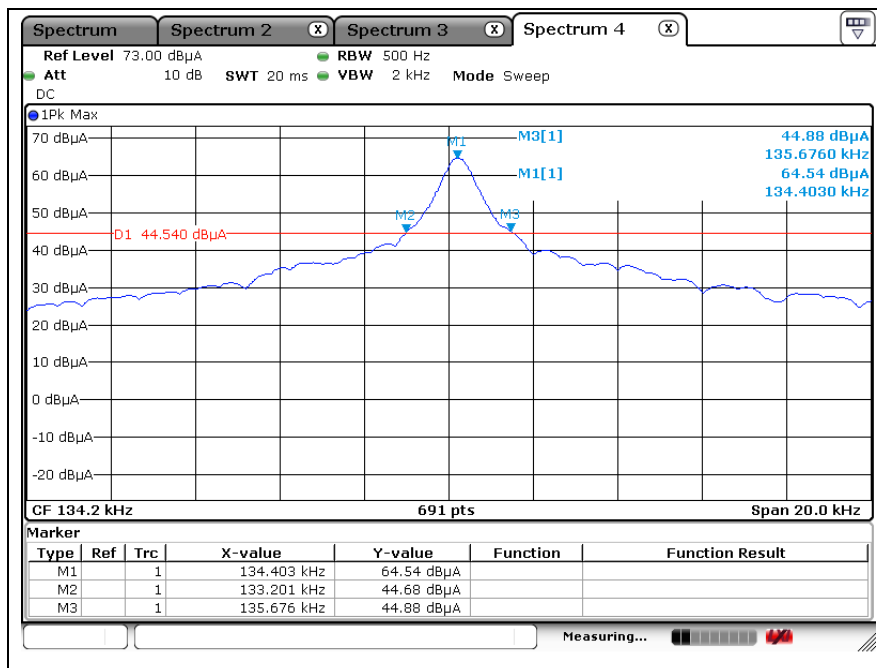
3.4. Test Result

Ambient temperature : (23 ± 1) °C
Relative humidity : 47 % R.H.

Test Antenna	Carrier Frequency (kHz)	20 dB Bandwidth (kHz)	Limit
AST Antenna	134.403	2.475	Reporting proposed only
BUM Antenna	134.403	2.562	
DRV Antenna	134.403	2.533	
INT1 Antenna	134.403	2.562	
INT2 Antenna	134.403	2.475	
SSB Antenna	134.547	2.591	
TRK Antenna	134.403	2.475	

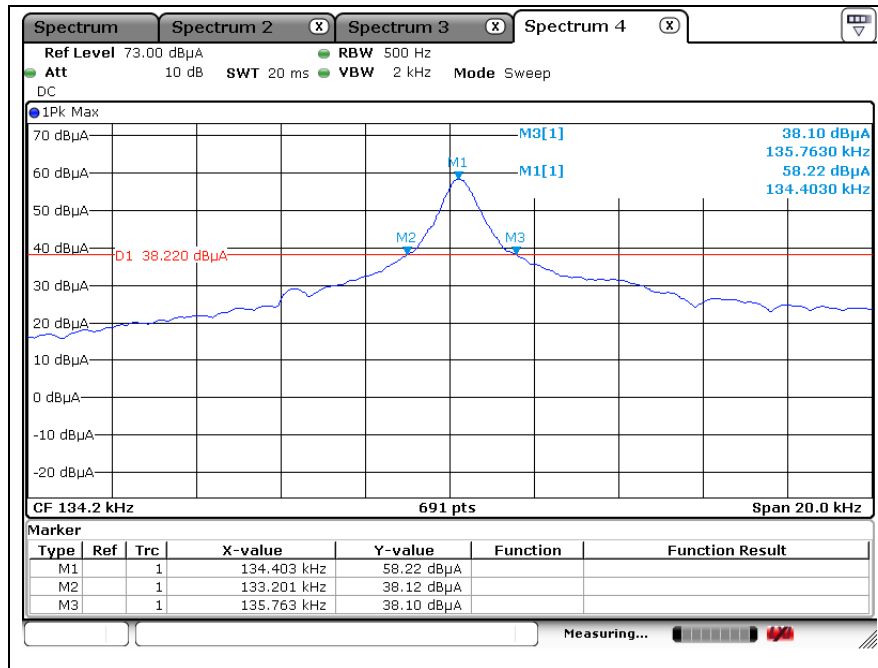
Test plots

- AST Antenna

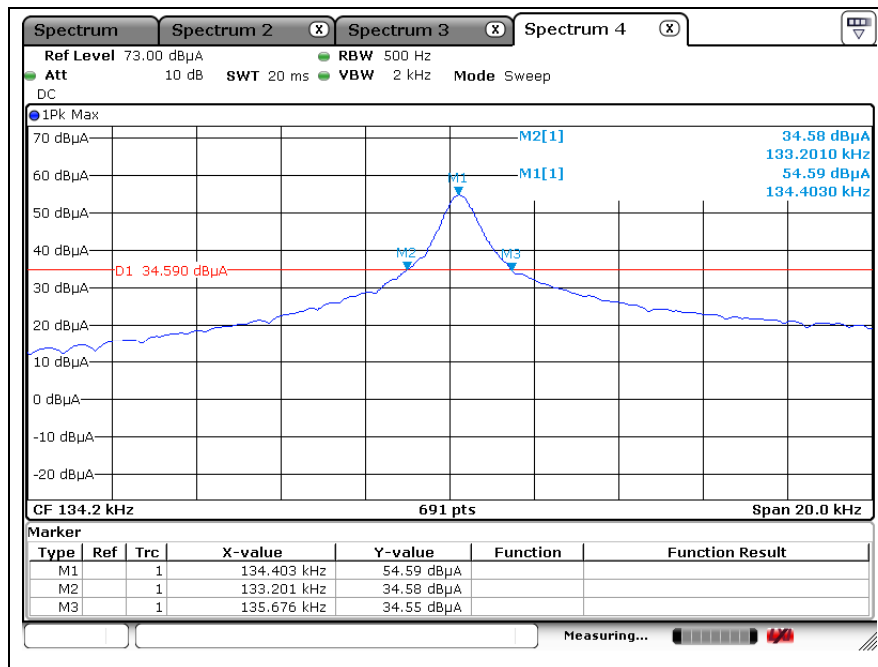


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- INT1 Antenna



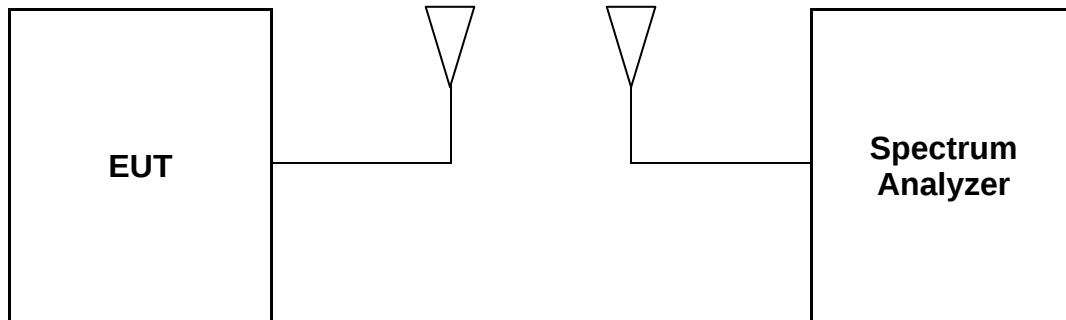
- INT2 Antenna



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4. Occupied Bandwidth

4.1. Test Setup



4.2. Limit

None; for reporting purposed only

4.3. Test Procedure

- Set the spectrum analyzer as SPAN = set to capture all products of the modulation process, including the emission skirts, RBW = 500 Hz, VBW = set approximately 3 x RBW, Detector = sampling, Trace mode = max hold.
- Measure lowest and highest frequencies are placed in a running sum until 0.5 % and 99.5 % of the total is reached.
- Record the SPAN between the lowest and the highest frequencies for the 99 % occupied bandwidth.

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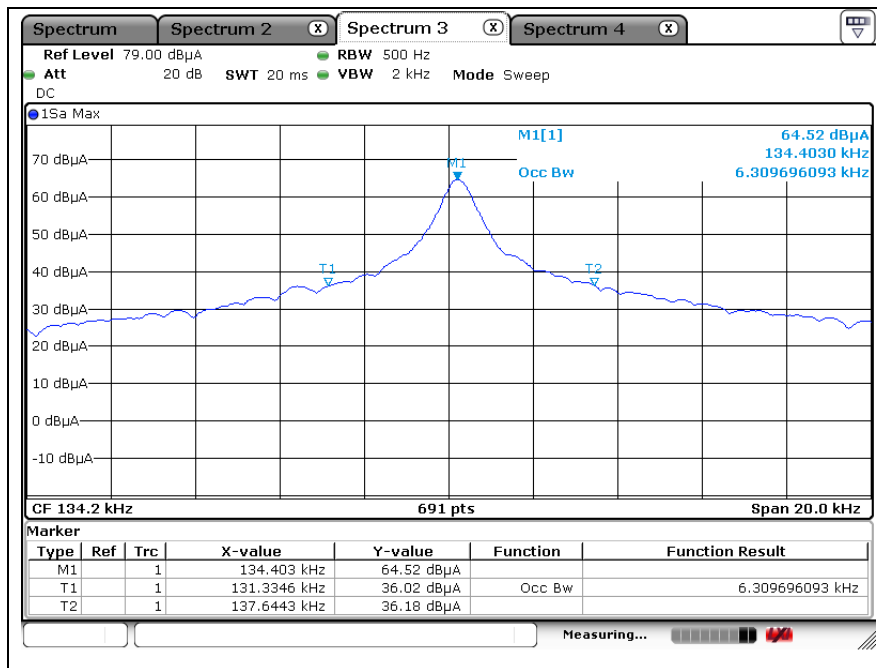
4.4. Test Result

Ambient temperature : (23 ± 1) °C
Relative humidity : 47 % R.H.

Test Antenna	Carrier Frequency (MHz)	Occupied Bandwidth (kHz)	Limit
AST Antenna	134.403	6.310	Reporting proposed only
BUM Antenna	134.345	6.628	
DRV Antenna	134.403	6.686	
INT1 Antenna	134.403	6.918	
INT2 Antenna	134.403	6.715	
SSB Antenna	134.547	6.107	
TRK Antenna	134.403	6.686	

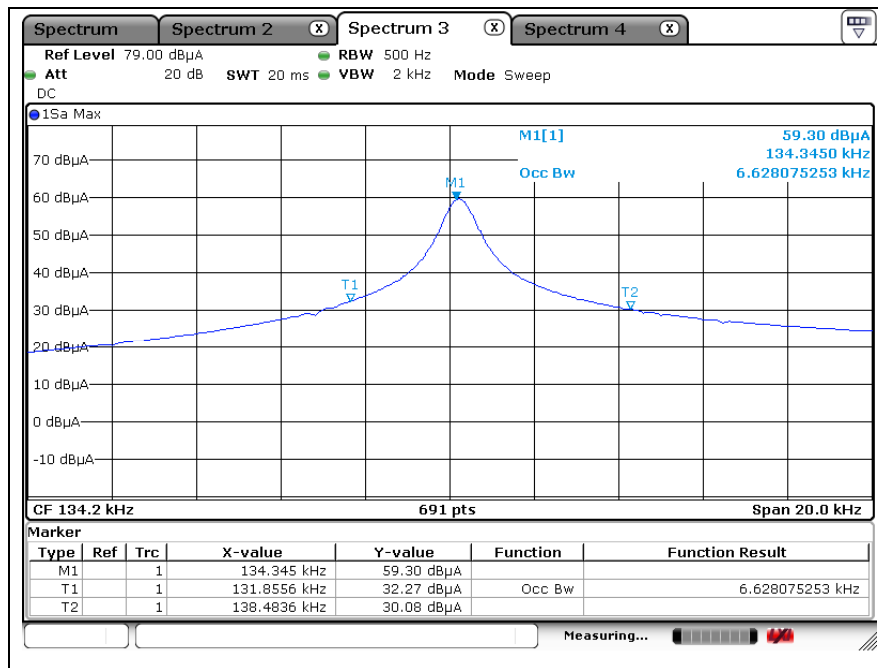
Test plots

- AST Antenna

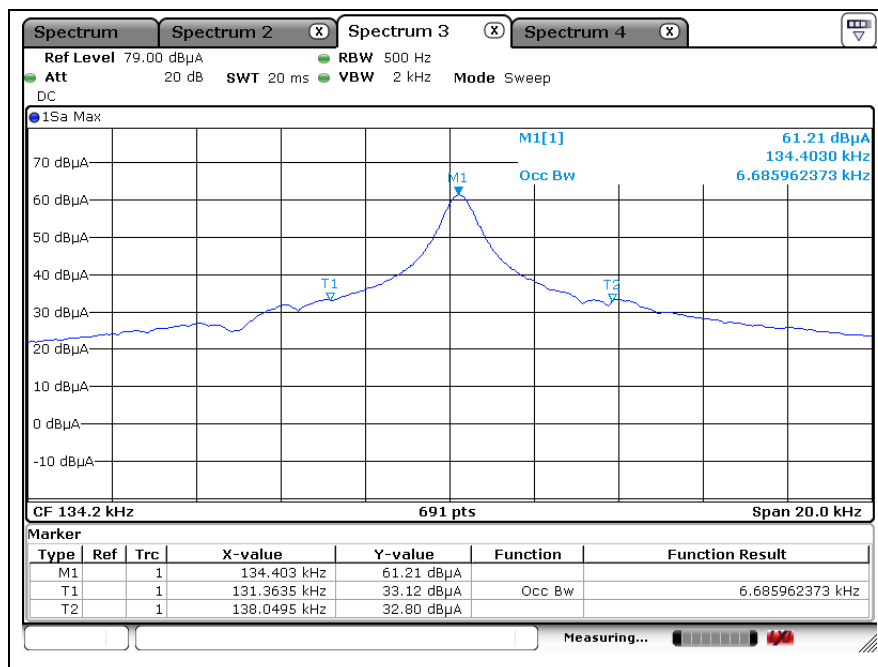


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- BUM Antenna

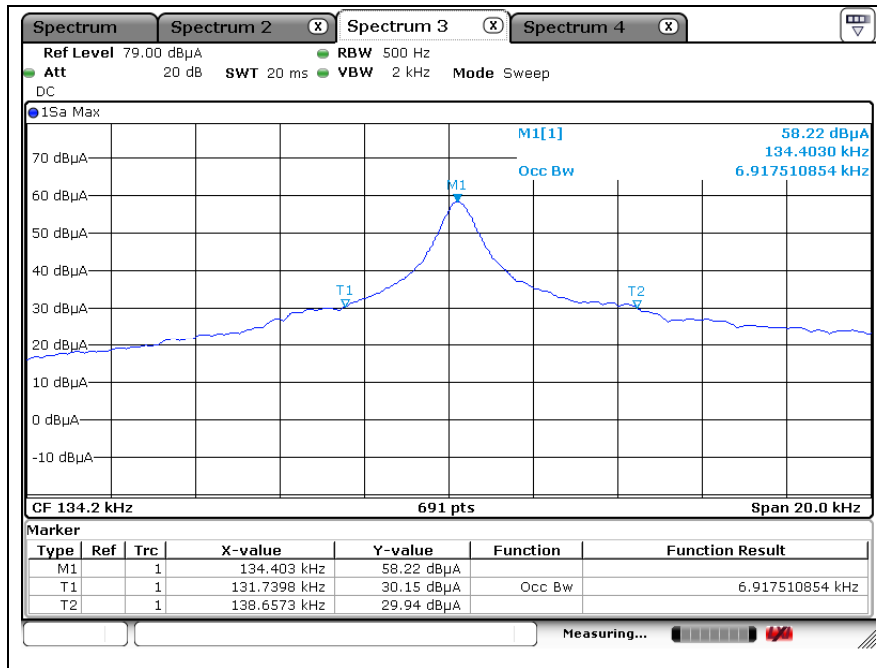


- DRV Antenna

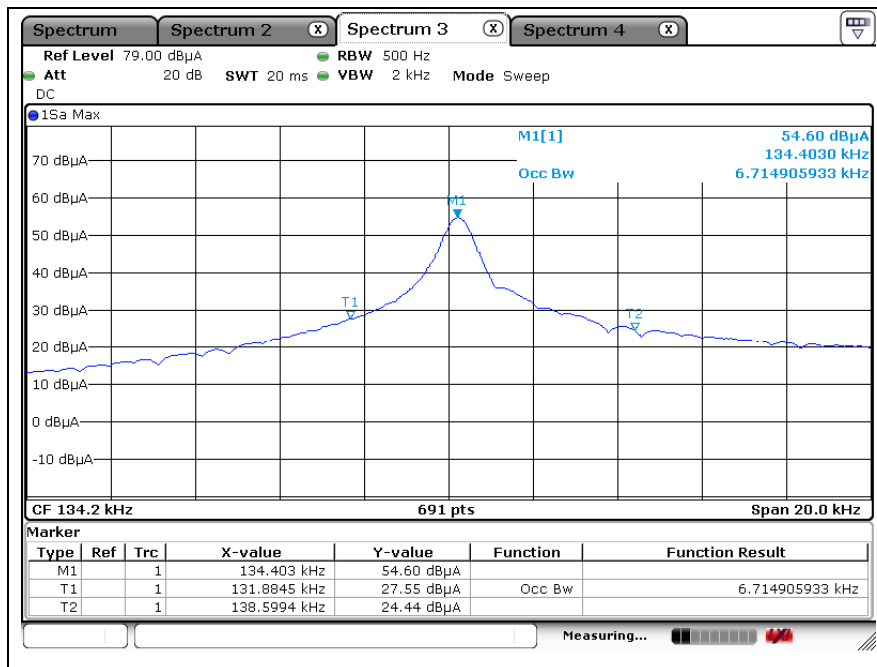


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- INT1 Antenna

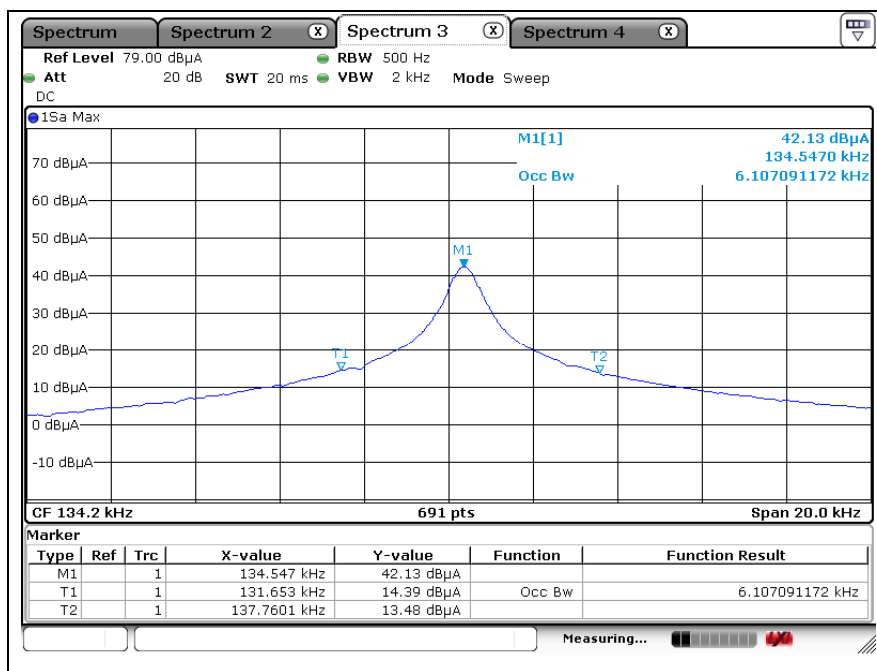


- INT2 Antenna

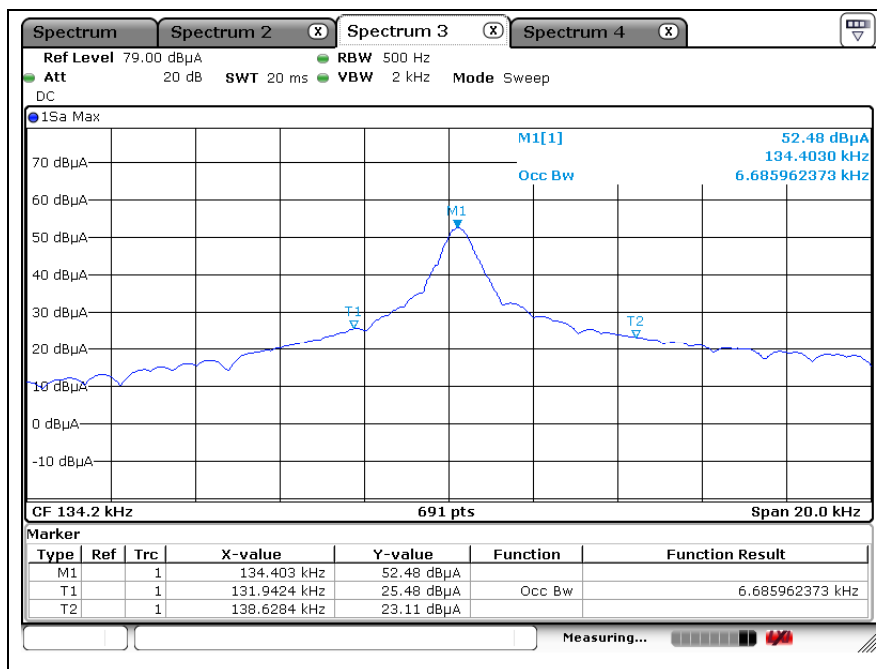


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- SSB Antenna



- TRK Antenna



- End of the Test Report -

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