

TEST REPORT

OF

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

FCC ID: CQOED00670 IC Certification: 1551E-ED00670

Equipment Under Test	: Smart Key ECU
Model Name	: ED00670
Applicant	: DENSO KOREA ELECTRONICS CORPORATION
Manufacturer	: DENSO KOREA ELECTRONICS CORPORATION
Date of Receipt	: 2016.10.25
Date of Test(s)	: 2016.11.10 ~ 2016.11.17
Date of Issue	: 2016.11.21

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

Tested By: 2016.11.21 Date: Inho Park **Technical** Date: 2016.11.21 Manager: Alvin Kim

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RTT5041-20(2015.10.01)(3)

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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 All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at <u>http://www.sgs.com/en/Terms-and-Conditions.aspx</u>. Phone No. : +82 31 688 0901

Find the No. : +82 31 688 0901 Fax No. : +82 31 688 0921

1.2. Details of Applicant

Applicant:DENSO KOREA ELECTRONICS CORPORATIONAddress:3, Cheomdan Industry, Masanhappo-gu, Chang-won-si, Gyungsangnam-do, KoreaContact Person:Kang, Sung-WonPhone No.:+82 55 600 9346

1.3. Description of EUT

Kind of Product		Smart Key ECU
Model Name		ED00670
Power Supply		DC 12.0 V (Used by Vehicle battery)
Frequency Range)	Tx: 134.20 kHz, Rx: 433.92 MHz
Antenna Type Rx		External Type (Coil Antenna)
		Internal Type
Operating Tempe	rature	-30 °C ~ 80 °C
H/W Version		A002
S/W Version		a00

1.4. 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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1.5. Test Equipment List

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Interval	Cal. Due
Spectrum Analyzer	R&S	FSV30	103100	Jun. 24, 2016	Annual	Jun. 24, 2017
Signal Generator	R&S	SMBV100A	255834	Jun. 20, 2016	Annual	Jun. 20, 2017
DC Power Supply	R&S	HMP2020	020089489	May 31, 2016	Annual	May 31, 2017
Test Receiver	R&S	ESU26	100109	Mar. 07, 2016	Annual	Mar. 07, 2017
Loop Antenna	Schwarzbeck Mess-Elektronik	FMZB 1519	1519-039	Aug. 19, 2015	Biennial	Aug. 19, 2017
Turn Table	INNCO systems	CONTROLLER CO3000	N/A	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.

1.6. Sample calculation

Where relevant, the following sample calculation is provided:

Field strength level ($dB\mu N/m$) = Measured level ($dB\mu N$) + Antenna factor (dB) + Cable loss (dB)

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1.7. 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

1.8. Test Report Revision

Revision	Report number	Date of Issue	Description
0	F690501/RF-RTL010558	2016.11.21	Initial

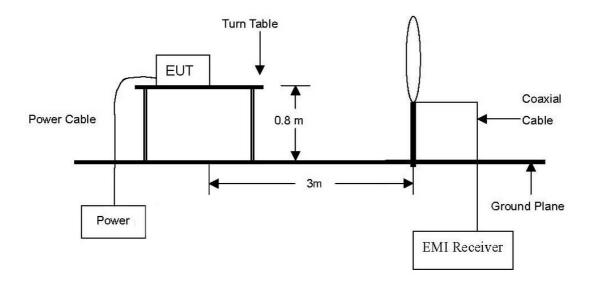
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2. Field Strength of Fundamental and Spurious Emission

2.1. Test Setup

The diagram below shows the test setup that is utilized to make the measurements for emission from 9 $\,\rm klz$ to 30 $\,\rm Mz\,$ Emissions.



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 (Mb)	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 Mz, 76-88 Mz, 174-216 Mz or 470-806 Mz. 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.

Frequency (Mb)	Field Strength (μ /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 \mathbb{G} , 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 \mathbb{M} . 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.

Frequency	Electric Field Strength (μ V/m)	Magnetic Field Strength (H-Field) (µA/m)	Measurement Distance (metres)
9-490 kHz	2,400/F (F in kHz)	2,400/377F (F in klz)	300
490-1,705 kHz	24,000/F (F in ㎞)	24,000/377F (F in klz)	30
1,705 - 30 MHz	30	N/A	30

Note: The emission limits for the bands 9-90 kt and 110-490 kt 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 $\,{\rm k}{\rm t}$ to 30 $\,{\rm M}{\rm t}$

- a. 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.
- b. 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.
- c. 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.
- d. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

e. 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.

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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 (쌘)	Reading (dBµV)	Detect Mode	Pol.	Ant. (dB/m)	Cable (dB)	Actual (dBµV/m) at 3 m	Actual (dBµV/m) at 300 m	Limit (dBµV/m) at 300 m	Margin (dB)	
AST Antenna										
0.134	51.10	Average	Н	19.42	0.07	70.59	-9.41	25.06	34.47	
BUM Antenna	BUM Antenna									
0.134	53.30	Average	Н	19.42	0.07	72.79	-7.21	25.06	32.27	
DRV Antenna	DRV Antenna									
0.134	51.10	Average	Н	19.42	0.07	70.59	-9.41	25.06	34.47	
INT Antenna										
0.134	54.20	Average	Н	19.42	0.07	73.69	-6.31	25.06	31.37	
INT3 Antenna	INT3 Antenna									
0.134	53.20	Average	Н	19.42	0.07	72.69	-7.31	25.06	32.37	
SSB Antenna				•				•		
0.134	41.40	Average	Н	19.42	0.07	60.89	-19.11	25.06	44.17	
TNK Antenna										
0.134	58.30	Average	Н	19.42	0.07	77.79	-2.21	25.06	27.27	

Note;

1. According to §15.31 (f)(2) 300 m Result(dBµN/m) = 3 m Result(dBµN/m) - 40log(300/3) (dBµN/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).

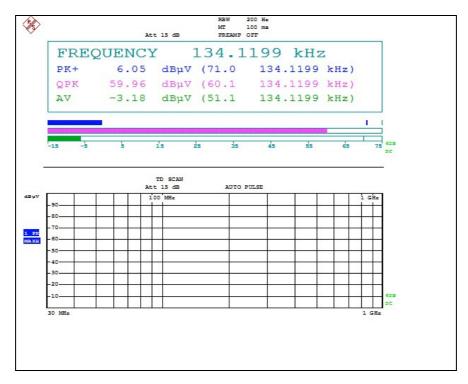
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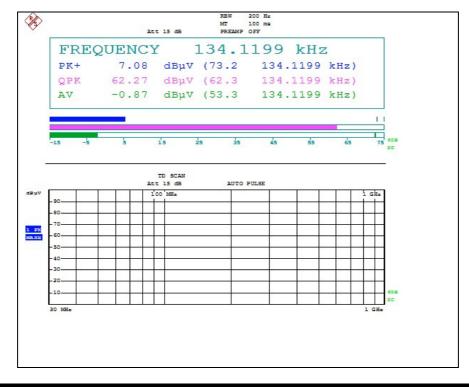


Test plot

- AST Antenna



- BUM Antenna

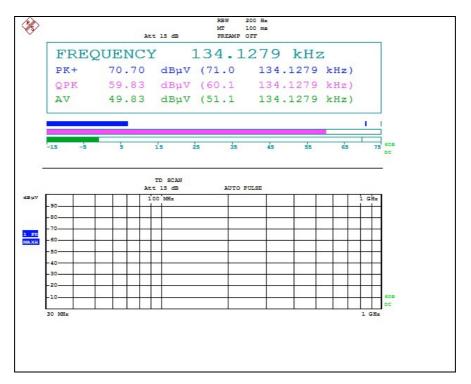


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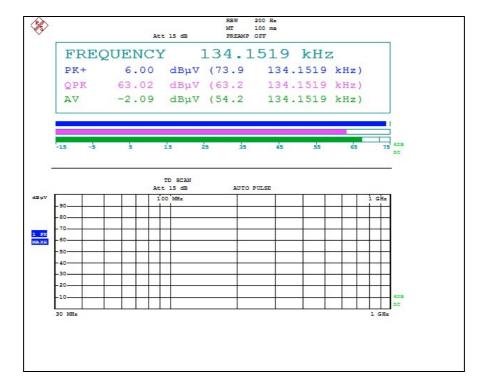
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- DRV Antenna



- INT Antenna



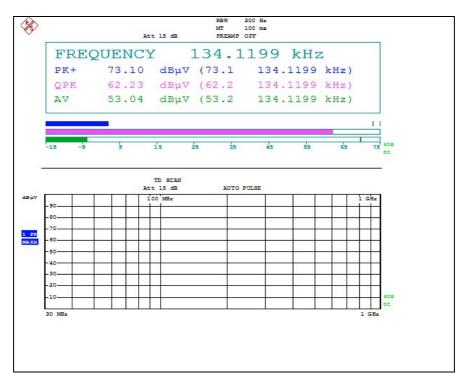
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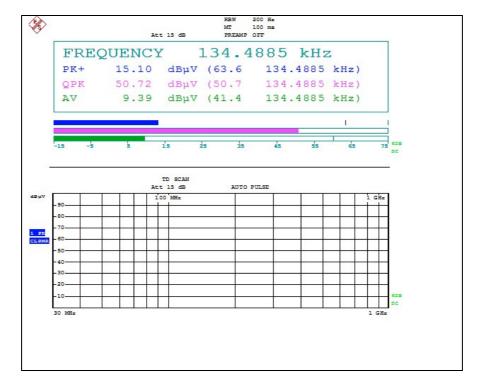
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- INT3 Antenna



- SSB Antenna



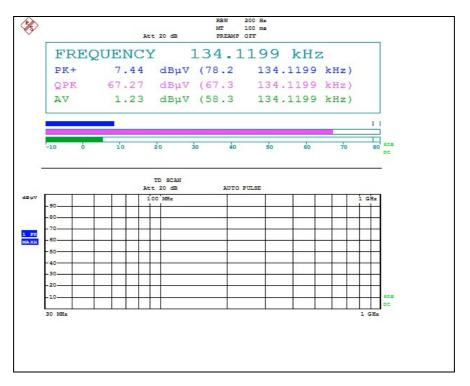
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- TNK Antenna



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2.5. Spurious Emission Test Result

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

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

Radiated Emissions			Ant.	Corre Fact		Total		Limit	
Frequency (胚)	Reading (dB _µ V)	Detect Mode	Pol.	Ant. (dB/m)	Cable (dB)	Actual (dBµN/m) at 3 m	Actual (dBµV/m) at 300 m	Limit (dBµV/m) at 300 m	Margin (dB)
AST Antenna									
0.019	36.80	Average	Н	19.52	0.02	56.34	-23.66	42.03	65.69
0.046	25.40	Average	Н	19.30	0.03	44.73	-35.27	34.35	69.62
0.069	27.80	Average	Н	19.38	0.03	47.21	-32.79	30.83	63.62
Above 1.000	Not detected	-	-	-	-	-	-	-	-
BUM Antenna	l								
0.019	34.20	Average	Н	19.52	0.02	53.74	-26.26	42.03	68.29
0.046	25.30	Average	Н	19.30	0.03	44.63	-35.37	34.35	69.72
0.069	27.51	Average	Н	19.38	0.03	46.92	-33.08	30.83	63.91
Above 1.000	Not detected	-	-	-	-	-	-	-	-
DRV Antenna									
0.019	36.70	Average	Н	19.52	0.02	56.24	-23.76	42.03	65.79
0.046	25.90	Average	Н	19.30	0.03	45.23	-34.77	34.35	69.12
0.069	27.80	Average	Н	19.38	0.03	47.21	-32.79	30.83	63.62
Above 1.000	Not detected	-	-	-	-	-	-	-	-
INT Antenna									
0.022	33.40	Average	Н	19.46	0.02	52.88	-27.12	40.76	67.88
0.046	25.00	Average	Н	19.30	0.03	44.33	-35.67	34.35	70.02
0.069	27.70	Average	Н	19.38	0.03	47.11	-32.89	30.83	63.72
Above 1.000	Not detected	-	-	-	-	-	-	-	-

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Radiated Emissions			Ant.	Corre Fact		Total		Limit	
Frequency (账)	Reading (dB _# V)	Detect Mode	Pol.	Ant. (dB/m)	Cable (dB)	Actual (dBµN/m) at 3 m	Actual (dBµV/m) at 300 m	Limit (dBµV/m) at 300 m	Margin (dB)
INT3 Antenna	l							•	
0.019	33.10	Average	Н	19.52	0.02	52.64	-27.36	42.03	69.39
0.046	25.00	Average	Н	19.30	0.03	44.33	-35.67	34.35	70.02
0.069	27.50	Average	Н	19.38	0.03	46.91	-33.09	30.83	63.92
Above 1.000	Not detected	-	-	-	-	-	-	-	-
SSB Antenna									
0.022	32.40	Average	Н	19.46	0.02	51.88	-28.12	40.76	68.88
0.045	24.40	Average	Н	19.30	0.03	43.73	-36.27	34.54	70.81
0.069	27.60	Average	Н	19.38	0.03	47.01	-32.99	30.83	63.82
Above 1.000	Not detected	-	-	-	-	-	-	-	-
TNK Antenna									
0.023	32.90	Average	Н	19.44	0.02	52.36	-27.64	40.37	68.01
0.045	24.80	Average	Н	19.30	0.03	44.13	-35.87	34.54	70.41
0.069	27.30	Average	Н	19.38	0.03	46.71	-33.29	30.83	64.12
Above 1.000	Not detected	-	-	-	-	-	-	-	-

Note;

1. According to §15.31 (f)(2)

- 300 m Result($dB\mu N/m$) = 3 m Result($dB\mu N/m$) - 40log(300/3) ($dB\mu N/m$)

2. According to field strength table of general requirement in §15.209 (a), field strength limits below 1.705 Mz were calculated as below.

- 9 kHz to 490 kHz : 20log(2 400 / F (kHz)) at 300 m (dB_{\ell}\!\rm V/m)

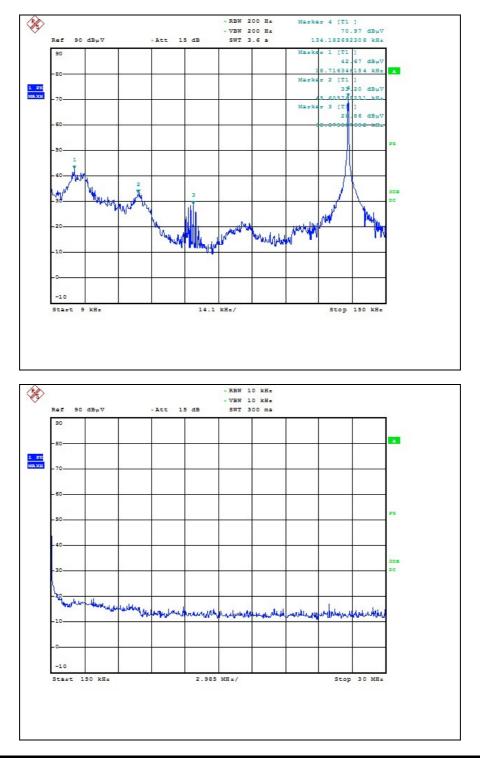
3. According to §15.209 (d), the measurements were tested by using Quasi peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1 GHz in these three bands on measurements employing an average detector.



Test plots

- AST Antenna

Scanning plots below 30 Mz



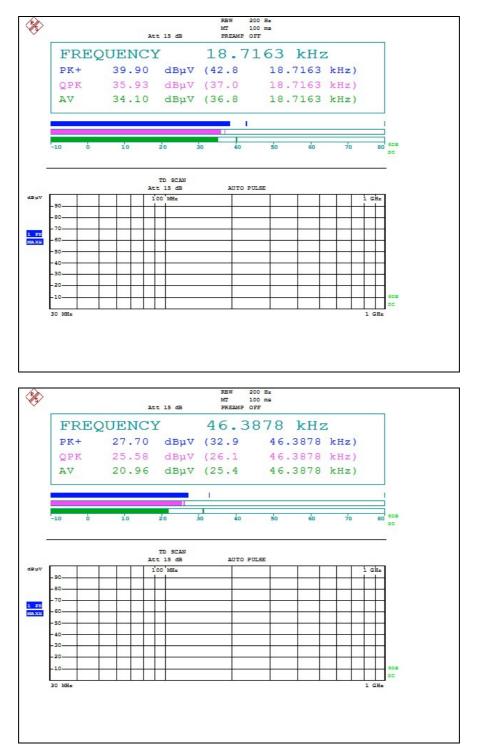
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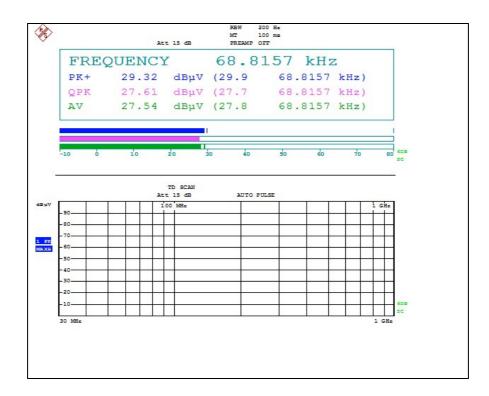


Measured plots below 30 Mb



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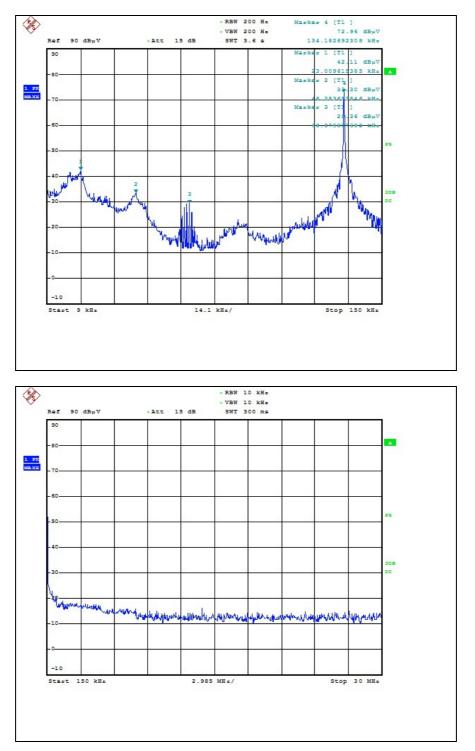
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- BUM Antenna

Scanning plots below 30 Mb



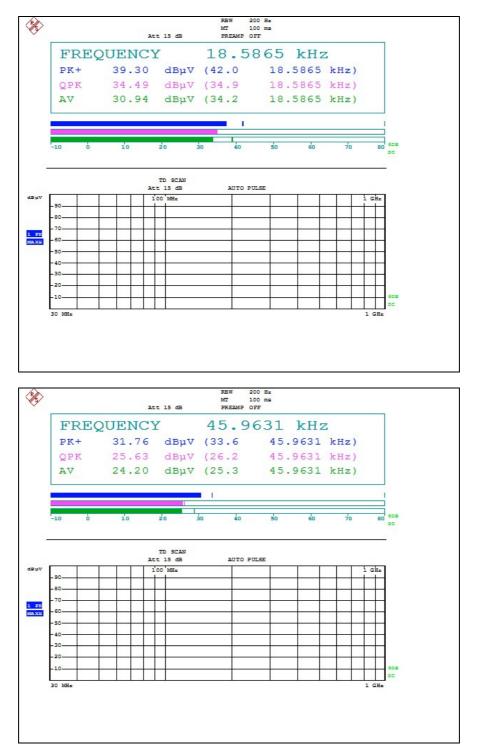
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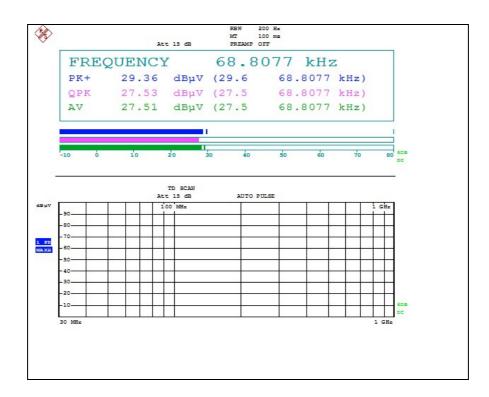


Measured plots below 30 Mb



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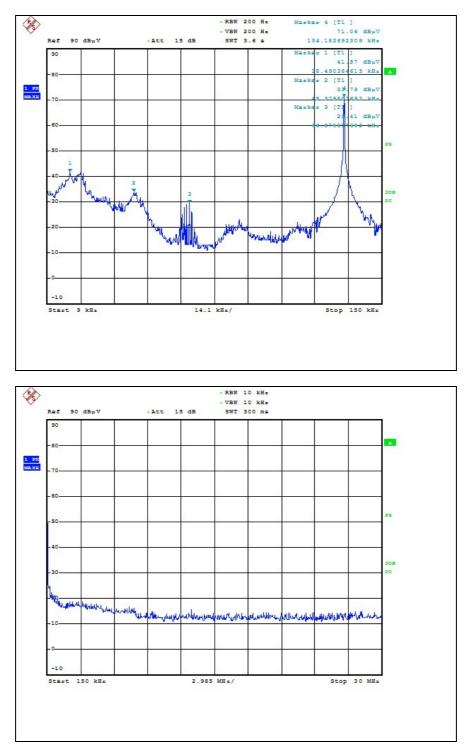
RTT5041-20(2015.10.01)(3)

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- DRV Antenna

Scanning plots below 30 Mb



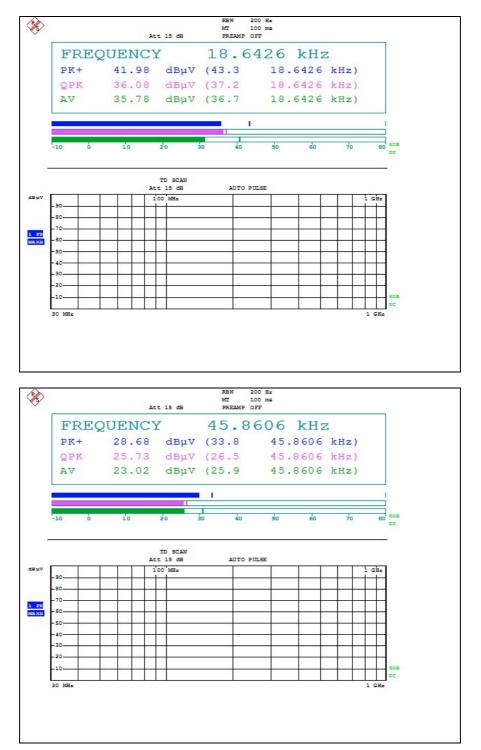
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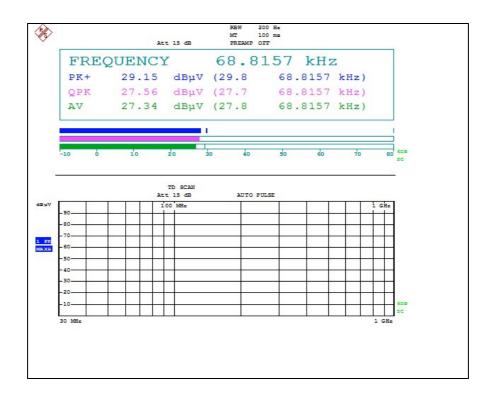


Measured plots below 30 Mb



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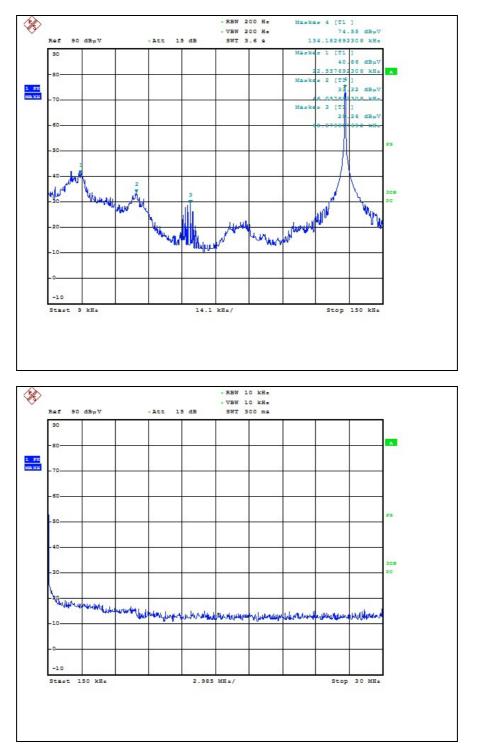
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- INT Antenna

Scanning plots below 30 Mb



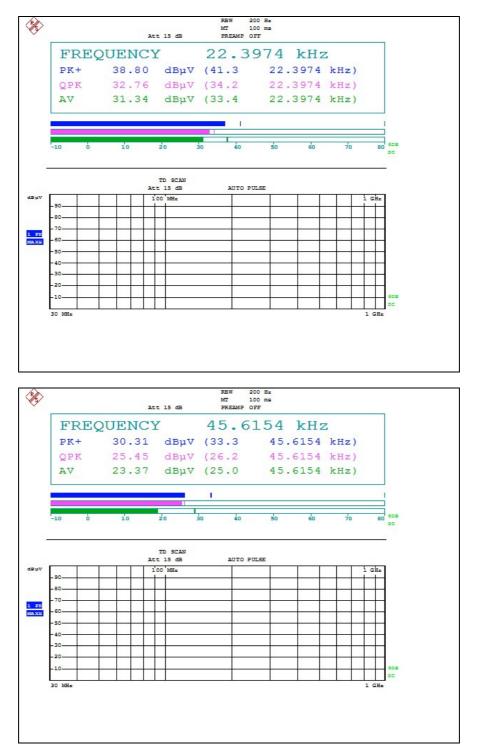
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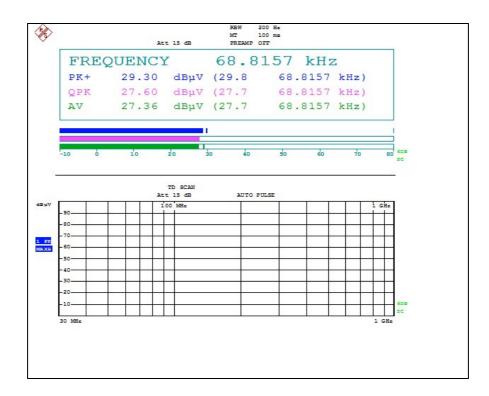


Measured plots below 30 Mb



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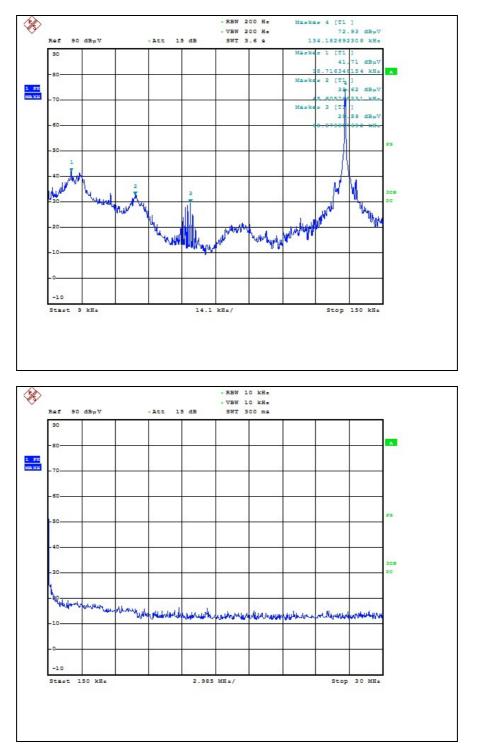
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- INT3 Antenna

Scanning plots below 30 Mb



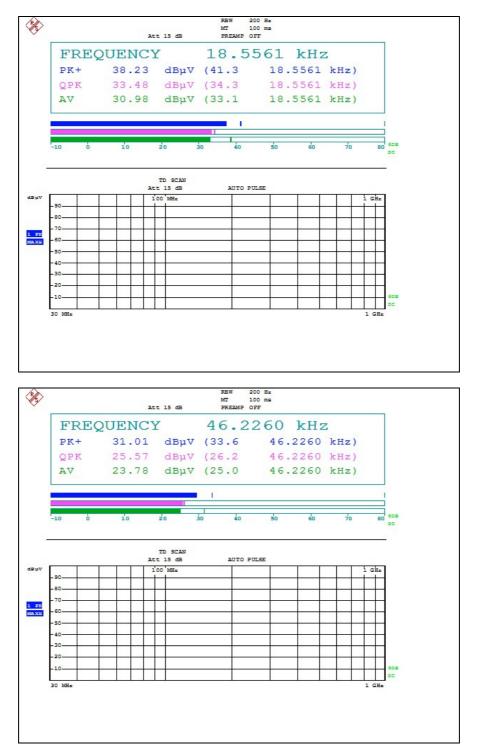
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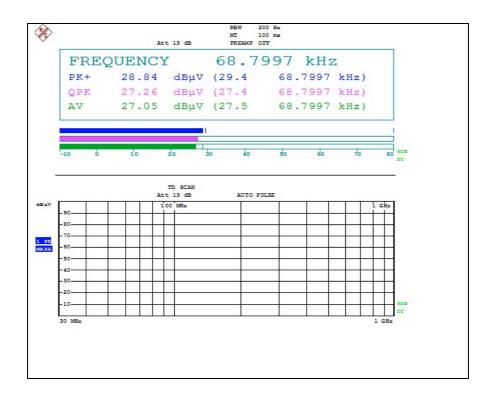
Measured plots below 30 Mb



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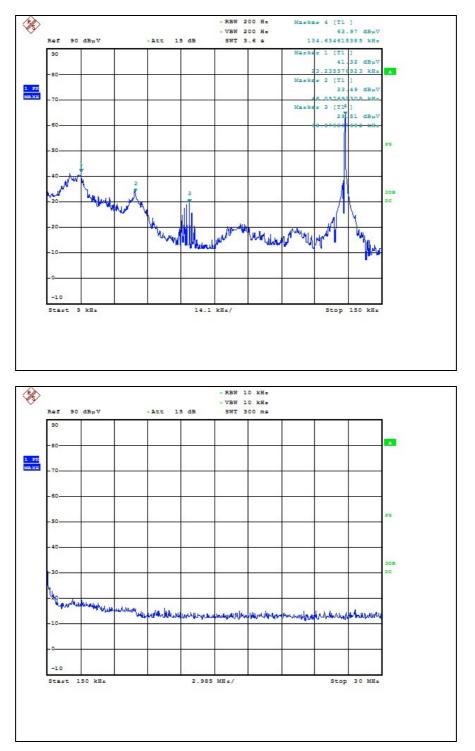
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- SSB Antenna

Scanning plots below 30 Mb

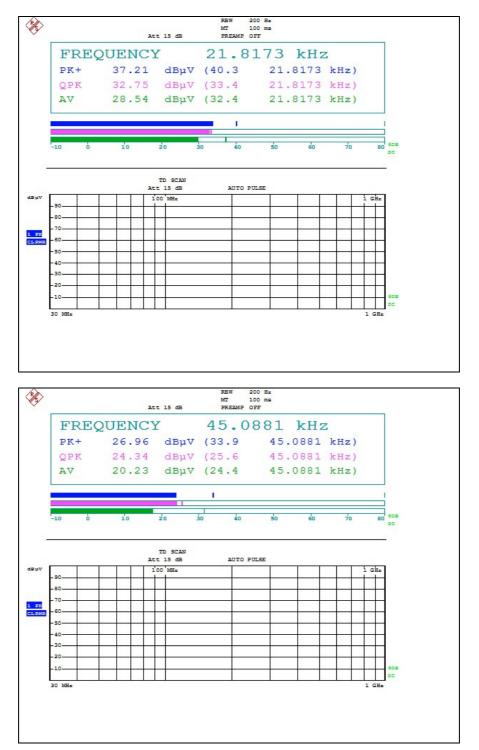


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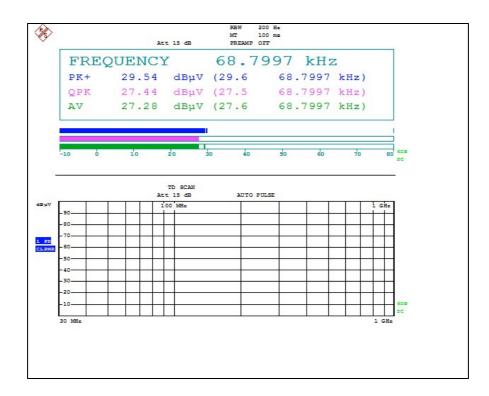


Measured plots below 30 Mb



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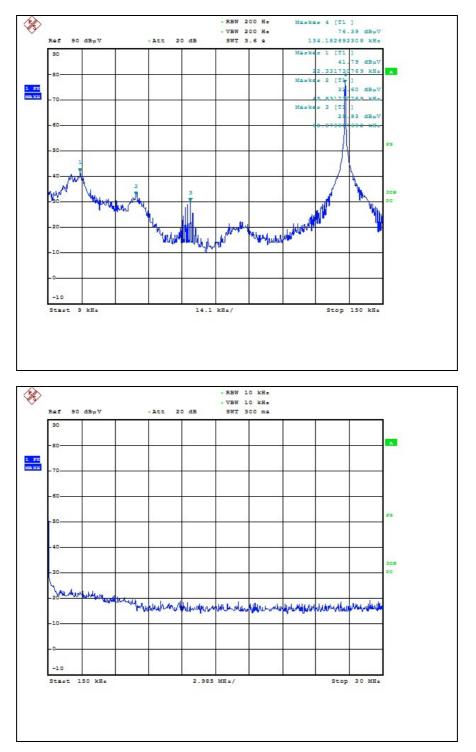
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- TNK Antenna

Scanning plots below 30 Mb



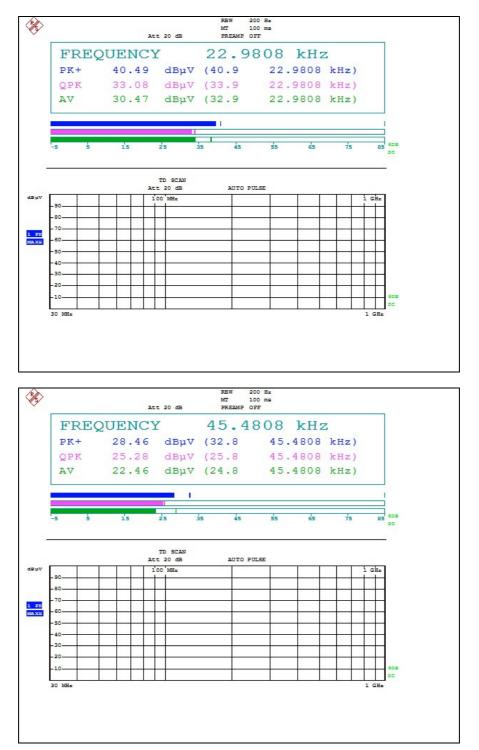
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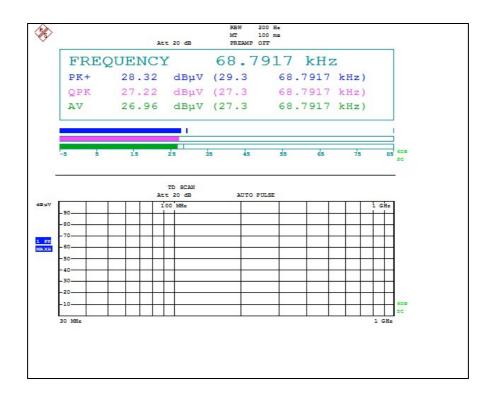


Measured plots below 30 Mb



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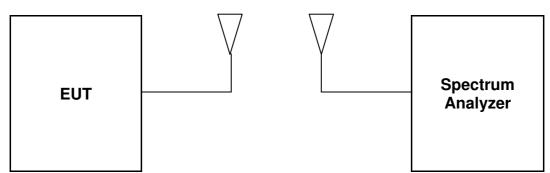
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3.20 dB Bandwidth

3.1. Test Setup



3.2. Limits

None; for reporting purposed only

3.3. Test Procedure

20 dB Bandwidth

- a. Span = approximately 2 to 3 times the 20 dB bandwidth, RBW = greater than 1 % of the 20 dB bandwidth, VBW = RBW, Sweep = auto, Detector = peak, Trace = max hold.
- b. 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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 A4(210 mm × 297 mm)



3.4. Test Result

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

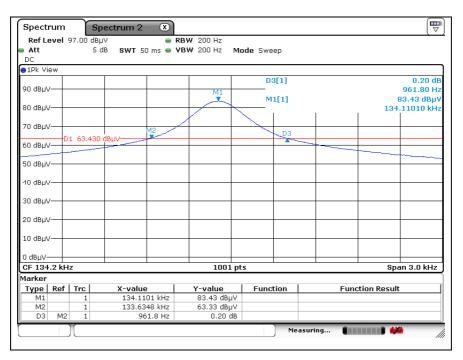
Test Antenna	Carrier Frequency (朏)	20 dB Bandwidth (朏)	Limit
AST Antenna	134.110	0.962	
BUM Antenna	134.110	0.986	
DRV Antenna	134.107	0.986	
INT Antenna	134.104	1.001	Reporting proposed only
INT3 Antenna	134.110	0.983	
SSB Antenna	134.479	0.989	
TNK Antenna	134.110	1.010	

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Test plots

- AST Antenna



- BUM Antenna

Odd D3[1] 0.00 90 dBµV M1 M1[1] 985.80 80 dBµV M1 M1[1] 79.52 d 60 dBµV D3 D3 134.11010 70 dBµV D3 D3 134.11010 60 dBµV D1 59.520 dBµV D3 0 0 60 dBµV D1 59.520 dBµV D3 0 0 50 dBµV D3 D3 0 0 10 dBµV D3 D3 0 0 20 dBµV D3 D3 D3 0 0 10 dBµV D3 D1 pts Span 3.0 k Span 3.0 k Marker Type Ref Trc X-value Y-value Function Result M1 1 134.1101 kHz 79.52 dBµV Function Result D3 D3 M2 1 985.8 Hz 0.08 dB D3 D3	Spectrum	Spectru	m 2 🛛 🗶					
DC 1 Pk View 90 dBµV 90 dBµV 10 dBµV 60 dBµV 10 dBµ	Ref Level 97.0							
IPk View D3[1] 0.00 90 dBµV 01 96.81 985.81 80 dBµV 134.11010 134.11010 134.11010 70 dBµV 01 59.520 dBµV 03 0.00 60 dBµV 01 59.520 dBµV 03 03 04 60 dBµV 01 59.520 dBµV 03 04 04 04 50 dBµV 01 59.520 dBµV 04		5 dB S '	WT 50 ms 👄 V	BW 200 Hz M	ode Sweep			
90 dBµV D3[1] 0.00 90 dBµV M1 M1[1] 985.80 80 dBµV M1 M1[1] 79.52 d 80 dBµV D3 D3 134.11010 70 dBµV D3 D3 0 60 dBµV D1 59.520 dBµV D3 0 50 dBµV D3 D3 0 50 dBµV D3 D3 0 10 dBµV D3 D3 0 20 dBµV D3 D3 0 10 dBµV D3 D3 D3 0 dBµV D3 D3 D3 0 dBµV D3 D3 D3 0 dBµV D3 D1 D5 0 dBµV D3 D3 D3 D3 Yolue Function M2 1 133.6168 H2 59.41 dBµV D3 D3 M2 1 985.8 H2 0.08 dB D3								
90 dBµV 985.81 80 dBµV 985.81 80 dBµV 01 59.520 dBµV 50.550 dDµV 50.550 d	●1Pk View							
80 dBµV M1 M1[1] 79.52 d 70 dBµV 134.11010 134.11010 60 dBµV D1 59.520 dBµV D3 60 dBµV D1 59.520 dBµV D3 50 dBµV 0 D3 D3 10 dBµV 0 0 0 30 dBµV 0 0 0 10 dBµV 0 0 0 11 134.1101 kHz 79.52 dBµV Function Result M1 1 134.1101 kHz 79.52 dBµV 0.08 dB					D3[1]			0.08 d
80 dBµV 134.11010 70 dBµV 01 59.520 dBµV 60 dBµV 01 59.520 dBµV 50 dBµV 03 10 dBµV 0 11 134.1101 kHz 79.52 dBµV M2 1 11 133.6166 kHz 59.41 dBµV 10 3 M2 11 995.8 Hz 0.08 dB	90 dBµV							985.80 H
70 dBµV N2 D3 60 dBµV D1 59.520 dBµV D3 50 dBµV D3 D3 10 dBµV D3 D3 30 dBµV D3 D3 30 dBµV D3 D3 10 dBµV D3 D3 20 dBµV D3 D3 10 dBµV D3 D3 0 dBµV D3 D3 10 dBµV D3 D3 0 dBµV D3 D3				M1	M1[1]			79.52 dBµ
60 dBµV D3 50 dBµV D3 50 dBµV D3 10 dBµV D3 30 dBµV D3 20 dBµV D3 10 dBµV D3 20 dBµV D3 10 dBµV D3 20 dBµV D3 10 dBµV D3 10 dBµV D3 10 dBµV D3 10 dBµV D3 11 133.6168 Hz 59.41 dBµV D3 M2 11 985.8 Hz 0.08 dB	80 dBµV						13	4.11010 kH
60 dBµV D3 50 dBµV D3 50 dBµV D3 10 dBµV D3 30 dBµV D3 20 dBµV D3 20 dBµV D3 10 dBµV D3 20 dBµV D3 21 133.6168 Hz 20.8BµV D3 21 985.8 Hz 0.08 dB								
60-88µV 01 59.520 80.000 50-88µV 10 10 10 10 30-88µV 10 10 10 10 10 20-88µV 10 <t< td=""><td>/U авру</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	/U авру							
50 dBpV 10 dBµV 10 dBµV 10 dBµV 30 dBµV 10 dBµV 20 dBµV 10 dBµV 10 dBµV 10 dBµV 11 dBµV 1001 pts 12 dBµV 11 133.6168 kHz 13 dB µV 11 33.6168 kHz 10 dBµV 11 33.6168 kHz	co do al	l I	N12		D3			
10 dBµV	ou asuv-D1 5	9.520 dBµV	~~~		*			
10 dBµV	EQ. (D.)							~
30 dBµV Image: constraint of the second o	30 ubpv							
30 dBµV	40 dBuV							
20 dBμV Image: Constraint of the second secon								
20 dBμV Image: Constraint of the second secon	30 dBuV							
10 dBμV Image: Constraint of the second secon								
O dBµV Image: CF 134.2 kHz 1001 pts Span 3.0 k CF 134.2 kHz 1001 pts Span 3.0 k Marker Yorker Function Result M1 1 134.1101 kHz 79.52 dBµV Function Function Result M2 1 133.6168 kHz 59.41 dBµV Function Function Result D3 M2 1 985.8 Hz 0.08 dB Function Result	20 dBµV							
O dBµV Image: CF 134.2 kHz 1001 pts Span 3.0 k CF 134.2 kHz 1001 pts Span 3.0 k Marker Yorker Function Result M1 1 134.1101 kHz 79.52 dBµV Function Function Result M2 1 133.6168 kHz 59.41 dBµV Function Function Result D3 M2 1 985.8 Hz 0.08 dB Function Result								
CF 134.2 kHz 1001 pts Span 3.0 k Marker Type Ref Trc X-value Y-value Function Function Result M1 1 134.1101 kHz 79.52 dBµV M2 1 133.6168 kHz 59.41 dBµV D3 M2 1 985.8 Hz 0.08 dB	10 dBµV							
CF 134.2 kHz 1001 pts Span 3.0 k Marker Type Ref Trc X-value Y-value Function Function Result M1 1 134.1101 kHz 79.52 dBµV M2 1 133.6168 kHz 59.41 dBµV D3 M2 1 985.8 Hz 0.08 dB								
Marker Your Year Year Function Function Result M1 1 134.1101 kHz 79.52 dBµV Function Function Result M2 1 133.6168 kHz 59.41 dBµV Function Function Result D3 M2 1 985.8 Hz 0.08 dB Function Function Result								
Type Ref Trc X-value Y-value Function Function Result M1 1 134.1101 kHz 79.52 dBµV	CF 134.2 kHz			1001 p	ts		Sp	oan 3.0 kHz
M1 1 134.1101 kHz 79.52 dBµV M2 1 133.6168 kHz 59.41 dBµV D3 M2 1 985.8 Hz 0.08 dB	Marker							
M2 1 133.6168 kHz 59.41 dBμV D3 M2 1 985.8 Hz 0.08 dB	Type Ref Tr	c X-	value	Y-value	Function	F	unction Resu	lt
D3 M2 1 985.8 Hz 0.08 dB			34.1101 kHz					
	D3 M2	1	985.8 Hz	0.08 dB				
Measuring 📲 🖊 🖊 🍎					Me	asuring		X

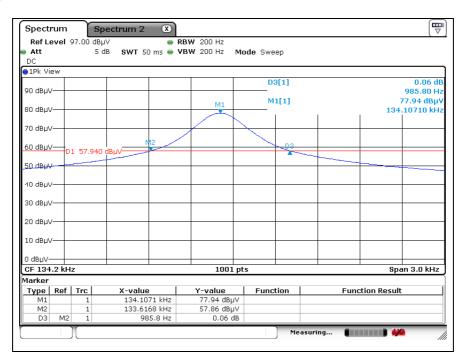
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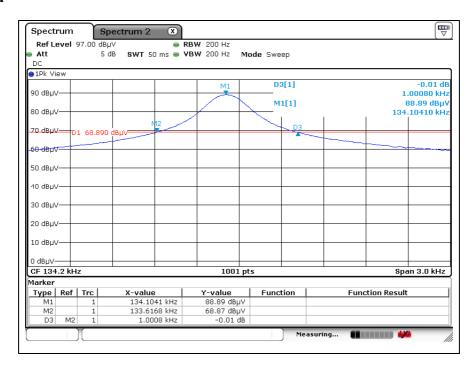
4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807 Tel. +82 31 428 5700 / Fax. +82 31 427 2370 <u>http://www.sgsgroup.kr</u> A4(210 mm × 297 mm)



- DRV Antenna



- INT Antenna



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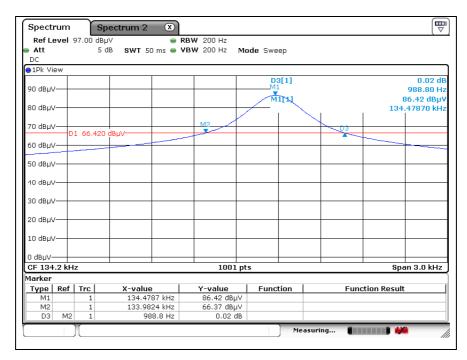
4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807 Tel. +82 31 428 5700 / Fax. +82 31 427 2370



- INT3 Antenna

Ref Le	vel	97.00 d	BuV	= R	BW 200 Hz			
Att				r 50 ms 🖷 V	BW 200 Hz Mc	de Sweep		
DC						•		
1Pk Vie	ew							
					M1	D3[1]		-0.03 di
0 dBµV								982.80 H
						M1[1]		86.68 dBµ\
0 dBµV							1 1	134.11010 kH
'O dBµV				M2	-			
o app.	D	1 66.68	10 dBµV					
0 dBµ⊻	_							
0 dBµV	-		-					
0 dBµV								
0 dBuV								
0 dBµV	_							
0 dBµV	-							
I dBµV−								
F 134	.2 kH	z			1001 pt	s		Span 3.0 kHz
arker	n-6 1	T		1				· BIt
Type M1	Ref	Trc 1	X-va	1ue 1101 kHz	Y-value 86.68 dBµV	Function	Funct	ion Result
M1 M2		1		.6198 kHz	66.62 dBµV			
D3	M2	1	100	982.8 Hz	-0.03 dB			
_	_	-		1			asuring	

- SSB Antenna



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- TNK Antenna

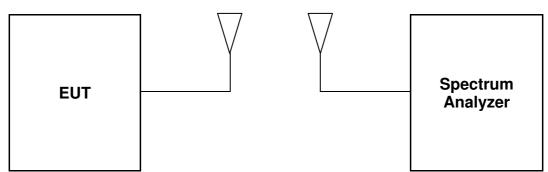
Spect			Spectrum 2					
Att DC	evers	97.00 d S			RBW 200 Hz V BW 200 Hz M	ode Sweep		
1Pk Vie	зw							
90 dBµV					M1	D3[1]		0.02 dE 1.00980 kHz
30 dBµV						M1[1]	1	85.72 dBµ\ 134.11010 kHa
70 dBµV		1 65 70	:0 dBµV	M2				
50 dBµV		1 03.72		1		^		
50 dBµV			_					
10 dBµV				-				
30 dBµV								
20 dBµV				-				
10 dBµV								
) dBµV−								
CF 134	.2 kH	z			1001 p	ts		Span 3.0 kHz
1arker Type	Ref	Trol	X-valı		Y-value	Function	l r	ction Result
M1	Rei	1		101 kHz	85.72 dBµV	Function	Fun	LUUII RESUIL
M2		1		168 kHz	65.68 dBµV			
D3	M2	1		098 kHz	0.02 dB			
		1				Me	asuring	·····

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4. Occupied Bandwidth

4.1. Test Setup



4.2. Limit

None; for reporting purposed only

4.3. Test Procedure

Occupied Bandwidth

- a. Set the spectrum analyzer as SPAN = set to capture all products of the modulation process, including the emission skirts, RBW = set in the range of 1 % to 5 % of the occupied bandwidth (OBW), VBW = set approximately 3 x RBW, Detector = sampling, Trace mode = max hold.
- b. Measure lowest and highest frequencies are placed in a running sum until 0.5 % and 99.5 % of the total is reached.
- c. 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) ℃
Relative humidity	:	47	% R.H.

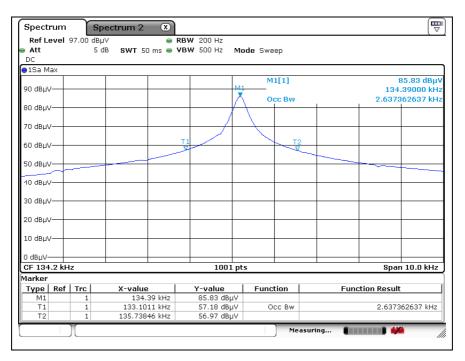
Test Antenna	Carrier Frequency (Mz)	Occupied Bandwidth (朏)	Limit
AST Antenna	134.390	2.637	
BUM Antenna	134.390	2.817	
DRV Antenna	134.380	2.697	
INT Antenna	134.390	2.607	Reporting proposed only
INT3 Antenna	134.390	2.557	
SSB Antenna	134.550	2.577	
TNK Antenna	134.400	2.557	

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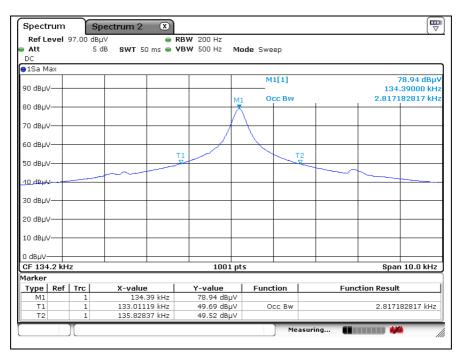


Test plots

- AST Antenna



- BUM Antenna



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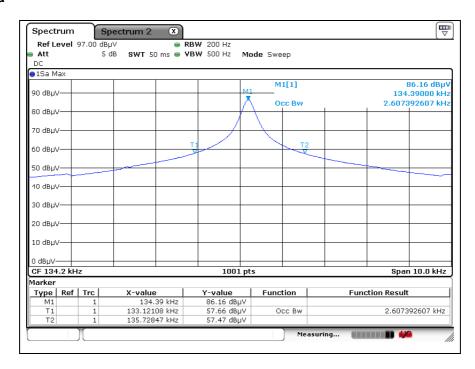
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- DRV Antenna

	Spectrum 2 🛛 🗶			
Ref Level 97.00 d	BµV	RBW 200 Hz	de course	
DC S	oub Swillsums 🖷		de Sweep	
1Sa Max				
			M1[1]	90.79 dBµ\
90 dBµV	_	X	M1	134.38000 kH
		Y `	Occ Bw	2.697302697 kH
30 dBµV			\mathbf{X}	+ + +
'0 dBµV		T1	Т2	
50 dBuV		F	- E	
O GRHA				
IO dBµV				
30 dBuV				
20 dBµV				
LO dBµV				
) dBµV				
CF 134.2 kHz		1001 pt:	-	Span 10.0 kHz
larker		1001 pt.	,	5pail 10.0 KHz
Type Ref Trc	X-value	Y-value	Function	Function Result
M1 1	134.38 kHz	90.79 dBµV		
T1 1	133.04116 kHz	61.88 dBµV	Occ Bw	2.697302697 kHz
T2 1	135.73846 kHz	61.95 dBµV		
			Measu	ring 🚺 🚺 🚧

- INT Antenna



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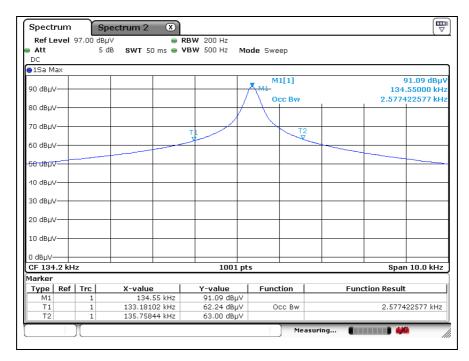
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- INT3 Antenna

Spectrum	Spectrum 2 🙁	RBW 200 Hz			
	5 dB SWT 50 ms 👄		de Sweep		
DC			•		
1Sa Max					
		M1	M1[1]		86.66 dBµ\
90 dBµV		X			134.39000 kH
30 dBµV			Occ Bw		2.557442557 kH
		l l			
'0 dвuV					
		T			
50 dBµV					
50 dBµV	-				
10 dвµV					
30 dBµV					
20 dBµV					
.0 dBuV					
.0 0000					
) dBµV					
CF 134.2 kHz		1001 pt	s		Span 10.0 kHz
larker					
Type Ref Trc	X-value	Y-value	Function	Funct	ion Result
M1 1	134.39 kHz	86.66 dBµV			
T1 1 T2 1	133.16104 kHz 135.71848 kHz	58.22 dBμV 57.30 dBμV	Occ Bw		2.557442557 kHz
12 1	100.71046 KHZ	57.30 uBµV			

- SSB Antenna



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- TNK Antenna

Spectrum		oectrum 2 🛛 🗴				
Ref Level Att DC	97.00 dBj 5		RBW 200 Hz VBW 500 Hz Mo	ode Sweep		
1Sa Max						
90 dBµV				M1[1]		91.80 dBµ\ 134.40000 kH
30 dBµV—				Occ Bw		2.557442557 kH
70 dBuV						
			B	T2 V		
50 dBµV						~
io qBhA	~					
ю авил						
80 dBµV						
20 dBµV						
.0 dBµV						
) dBuV						
CF 134.2 kH	łz		1001 pt	s		Span 10.0 kHz
larker						
Type Ref		X-value	Y-value	Function	Functi	on Result
M1	1	134.4 kHz	91.80 dBµV			
T1 T2	1	133.15105 kHz 135.70849 kHz	63.54 dBµV 63.25 dBµV	Occ Bw		2.557442557 kHz
) <u>-</u>	200110010 1012) Ma	asuring	

- End of the Test Report -

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