

FCC RF Test Report

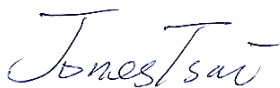
APPLICANT : Wistron Corporation
EQUIPMENT : Tablet PC
BRAND NAME : Lenovo
MODEL NAME : TP00082A
FCC ID : PU5-TP00082ASI
STANDARD : 47 CFR Part 2, 24(E), 27
CLASSIFICATION : PCS Licensed Transmitter (PCB)

Equipment: Sierra Wireless EM7455 and Intel 8265D2W tested inside of Lenovo Tablet PC.

This is a variant report which is only valid together with the original test report. The product was received on Sep. 12, 2016 and completely tested on Nov. 05, 2016. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA / EIA-603-D-2010 and the testing has shown the tested sample to be in compliance with the applicable technical standards. The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.



Reviewed by: Joseph Lin / Supervisor



Approved by: Jones Tsai / Manager



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FCC ID : PU5-TP00082ASI

Page Number : 1 of 14

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Report Version : Rev. 01

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG5N2711-08B	Rev. 01	Initial issue of report	Dec. 05, 2016

**SUMMARY OF TEST RESULT**

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1053 §24.238(a) §27.53(c)(2) §27.53(f)	Radiated Spurious Emission (Band 2) (Band 13)	$< 43 + 10 \log_{10}(P[\text{Watts}])$	PASS	Under limit 10.24 dB at 1560.000 MHz

1 General Description

1.1 Applicant

Wistron Corporation

21F, No. 88, Sec. 1, Hsin Tai Wu Rd., Hsichih Dist, New Taipei City 221, Taiwan R.O.C.

1.2 Manufacturer

Wistron Corporation

21F, No. 88, Sec. 1, Hsin Tai Wu Rd., Hsichih Dist, New Taipei City 221, Taiwan R.O.C.

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Tablet PC
Brand Name	Lenovo
Model Name	TP00082A
FCC ID	PU5-TP00082ASI
Integrated the WWAN Module	Brand Name: Sierra Wireless Model Name: EM7455
Integrated the WLAN Module	Brand Name: Intel Model Name: 8265D2W
EUT supports Radios application	WCDMA/HSPA/LTE WLAN 11a/b/g/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE
EUT Stage	Production Unit

Remark: This is a variant report by TP00082A (FCC ID: PU5-TP00082AUC) update its CPU to Intel KabyLake-Y processor and change WLAN module from Intel 8260D2W to Intel 8265D2W. WWAN RSE spot check has been performed on PU5-TP00082ASI (model: TP00082A). Other test cases were performed on original report which can be referred to Sporton Report Number FG5N2711-01B. Based on the original report, only worst case was verified.

EM7455			3G & LTE
Manufacturer	PULSE	Peak gain	3.22
Part number	025.900FA.0001	Antenna type	Monopole

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx Frequency	LTE Band 2 : 1850.7 MHz ~ 1909.3 MHz LTE Band 4 : 1710.7 MHz ~ 1754.3 MHz LTE Band 5 : 824.7 MHz ~ 848.3 MHz LTE Band 7 : 2502.5 MHz ~ 2567.5 MHz LTE Band 12 : 699.7 MHz ~ 715.3 MHz LTE Band 13 : 779.5 MHz ~ 784.5 MHz LTE Band 25 : 1850.7MHz ~ 1914.3 MHz LTE Band 26 : 824.7MHz ~ 848.3 MHz LTE Band 41 : 2498.5 MHz ~ 2687.5 MHz
Rx Frequency	LTE Band 2 : 1930.7 MHz ~ 1989.3 MHz LTE Band 4 : 2110.7 MHz ~ 2154.3 MHz LTE Band 5 : 869.7 MHz ~ 893.3 MHz LTE Band 7 : 2622.5MHz ~ 2687.5 MHz LTE Band 12 : 729.7 MHz ~ 745.3 MHz LTE Band 13 : 748.5 MHz ~ 753.5 MHz LTE Band 25 : 1930.7MHz ~ 1994.3 MHz LTE Band 26 : 869.7MHz ~ 893.3MHz LTE Band 41 : 2498.5 MHz ~ 2687.5 MHz
Bandwidth	LTE Band 2 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz LTE Band 4 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz LTE Band 5 : 1.4MHz / 3MHz / 5MHz / 10MHz LTE Band 7 : 5MHz / 10MHz / 15MHz / 20MHz LTE Band 12 : 1.4MHz / 3MHz / 5MHz / 10MHz LTE Band 13 : 5MHz / 10MHz LTE Band 25 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz LTE Band 26 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz LTE Band 41 : 5MHz / 10MHz / 15MHz / 20MHz
Type of Modulation	QPSK / 16QAM

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1022 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd. Guishan Dist, Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	Sporton Site No.
	03CH12-HY

1.7 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ 47 CFR Part 2, 24(E), 27
- ♦ ANSI / TIA / EIA-603-D-2010
- ♦ FCC KDB 971168 D01 Power Meas. License Digital Systems v02r02

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

2 Test Configuration of Equipment Under Test

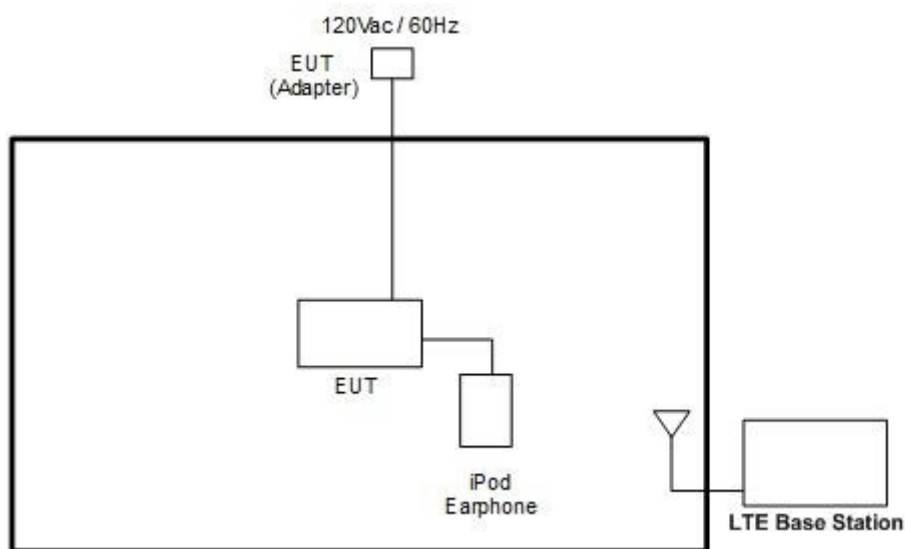
2.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v02r02 with maximum output power.

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes to find the maximum emission.

Test Items	Band	Bandwidth (MHz)						Modulation		RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full	L	M	H
Radiated Spurious Emission	2			v				v		v			v	v	v
	13	-	-	v		-	-	v		v			v	v	v
Note	1. The mark “v” means that this configuration is chosen for testing 2. The mark “-” means that this bandwidth is not supported. 3. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported.														

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	LTE Base Station	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
2.	iPod Earphone	Apple	N/A	Verification	Unshielded, 1.0 m	N/A

2.4 Frequency List of Low/Middle/High Channels

LTE Band 2 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
20	Channel	18700	18900	19100
	Frequency	1860	1880	1900
15	Channel	18675	18900	19125
	Frequency	1857.5	1880	1902.5
10	Channel	18650	18900	19150
	Frequency	1855	1880	1905
5	Channel	18625	18900	19175
	Frequency	1852.5	1880	1907.5
3	Channel	18615	18900	19185
	Frequency	1851.5	1880	1908.5
1.4	Channel	18607	18900	19193
	Frequency	1850.7	1880	1909.3

LTE Band 13 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
10	Channel	-	23230	-
	Frequency	-	782	-
5	Channel	23205	23230	23255
	Frequency	779.5	782	784.5

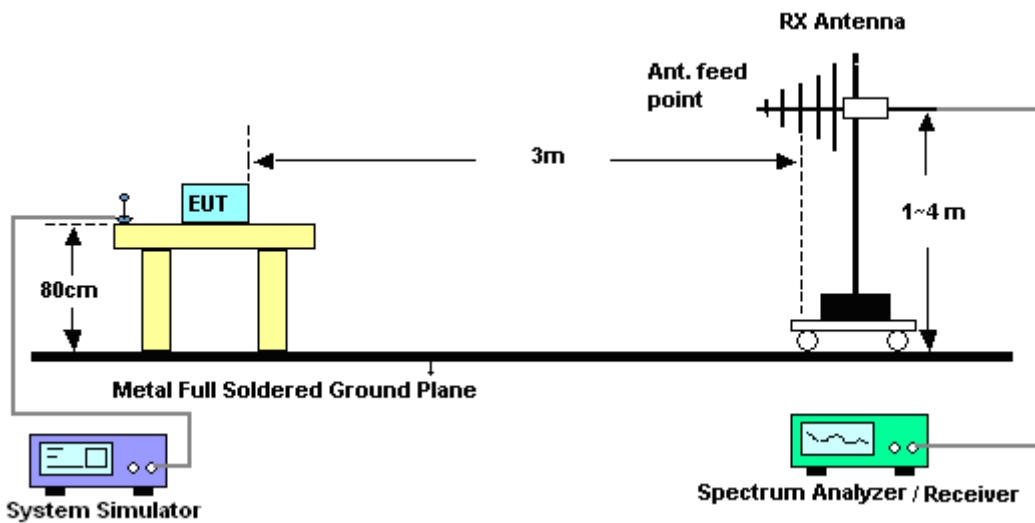
3 Radiated Test Items

3.1 Measuring Instruments

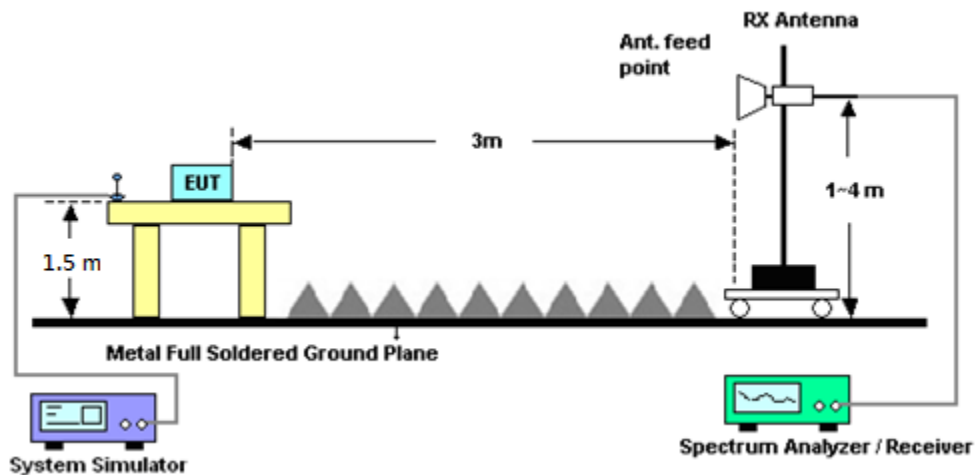
See list of measuring instruments of this test report.

3.2 Test Setup

3.2.1 For radiated test from 30MHz to 1GHz



3.2.2 For radiated test above 1GHz



3.3 Test Result of Radiated Test

Please refer to Appendix A.

3.4 Radiated Spurious Emission

3.4.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI / TIA / EIA-603-D-2010. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB.

For LTE Band 13

For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

3.4.2 Test Procedures

1. The testing follows FCC KDB 971168 v02r02 Section 5.8 and ANSI / TIA-603-D-2010 Section 2.2.12.
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
9. Taking the record of output power at antenna port.
10. Repeat step 7 to step 8 for another polarization.
11. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)

= $P(W) - [43 + 10\log(P)]$ (dB)

= $[30 + 10\log(P)]$ (dBm) - $[43 + 10\log(P)]$ (dB)

= -13dBm.



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Nov. 20, 2015	Nov. 05, 2016	Nov. 19, 2016	Radiation (03CH12-HY)
Bilog Antenna	TESEQ	CBL 6111D&00800N	37059&01	30MHz~1GHz	Oct. 15, 2016	Nov. 05, 2016	Oct. 14, 2017	Radiation (03CH12-HY)
Bilog Antenna	TESEQ	CBL 6111D&N-6-06	35414&AT-N06 02	30MHz~1GHz	Oct. 15, 2016	Nov. 05, 2016	Oct. 14, 2017	Radiation (03CH12-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1522	1G~18GHz	Mar. 31, 2016	Nov. 05, 2016	Mar. 30, 2017	Radiation (03CH12-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1326	1GHz ~ 18GHz	Oct. 07, 2016	Nov. 05, 2016	Oct. 06, 2017	Radiation (03CH12-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170576	18GHz ~ 40GHz	Apr. 15, 2016	Nov. 05, 2016	Apr. 14, 2017	Radiation (03CH12-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	18GHz- 40GHz	Oct. 07, 2016	Nov. 05, 2016	Oct. 06, 2017	Radiation (03CH12-HY)
Spectrum Analyzer	Agilent	N9030A	MY52350276	3Hz~44GHz	Mar. 21, 2016	Nov. 05, 2016	Mar. 20, 2017	Radiation (03CH12-HY)
EMI Test Receiver	Rohde & Schwarz	ESU26	100390	20Hz~26.5GHz	Dec. 21, 2015	Nov. 05, 2016	Dec. 20, 2016	Radiation (03CH12-HY)
Preamplifier	MITEQ	AMF-7D-00101 800-30-10P	1815698	1GHz~18GHz	Dec. 14, 2015	Nov. 05, 2016	Dec. 13, 2016	Radiation (03CH12-HY)
Preamplifier	MITEQ	TTA0204	1872107	2GHz~40GHz	Feb. 15, 2016	Nov. 05, 2016	Feb. 14, 2017	Radiation (03CH12-HY)
Signal Generator	Rohde & Schwarz	SMF100A	101107	100kHz~40GHz	May 19, 2016	Nov. 05, 2016	May 18, 2017	Radiation (03CH12-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	Nov. 05, 2016	N/A	Radiation (03CH12-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Nov. 05, 2016	N/A	Radiation (03CH12-HY)

5 Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	3.36
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Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	3.70
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Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	3.98
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APPENDIX A. Radiated Spurious Emission

**LTE Band 2**

LTE Band 2 / 5MHz / QPSK									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	3700	-46.93	-13	-33.93	-40.74	-53.50	1.67	8.24	H
	5548	-52.97	-13	-39.97	-53.54	-60.04	2.65	9.72	H
	11102	-55.50	-13	-42.50	-70.04	-65.27	2.69	12.46	H
	12954	-51.43	-13	-38.43	-68.44	-61.46	2.92	12.94	H
									H
									H
									H
	3700	-52.50	-13	-39.50	-46.06	-59.07	1.67	8.24	V
	5548	-53.85	-13	-40.85	-54.38	-60.92	2.65	9.72	V
	11102	-53.99	-13	-40.99	-68.16	-63.76	2.69	12.46	V
	12954	-53.92	-13	-40.92	-70.13	-63.95	2.92	12.94	V
									V
									V
									V
Middle	3756	-44.80	-13	-31.80	-38.67	-51.42	1.68	8.31	H
	5632	-54.08	-13	-41.08	-54.84	-61.13	2.70	9.75	H
	7508	-59.01	-13	-46.01	-65.24	-68.39	2.43	11.80	H
	11264	-50.75	-13	-37.75	-65.47	-60.46	2.68	12.39	H
									H
									H
									H
	3756	-49.50	-13	-36.50	-43.15	-56.12	1.68	8.31	V
	5632	-52.32	-13	-39.32	-53.03	-59.37	2.70	9.75	V
	7508	-56.57	-13	-43.57	-63.09	-65.95	2.43	11.80	V
	11264	-48.65	-13	-35.65	-63.15	-58.36	2.68	12.39	V
									V
									V
									V
									V
Highest	3812	-44.99	-13	-31.99	-38.93	-51.662338	1.70	8.37	H
	5716	-53.20	-13	-40.20	-54.19	-60.236984	2.75	9.79	H
	7620	-58.52	-13	-45.52	-64.93	-68.00145	2.39	11.87	H
	11434	-53.97	-13	-40.97	-68.86	-63.613023	2.68	12.33	H
									H
									H
									H
	3812	-49.89	-13	-36.89	-43.62	-56.562338	1.70	8.37	V
	5716	-51.78	-13	-38.78	-52.71	-58.816984	2.75	9.79	V
	7620	-56.90	-13	-43.90	-63.54	-66.38145	2.39	11.87	V
	11434	-51.96	-13	-38.96	-66.77	-61.603023	2.68	12.33	V
									V
									V
									V
									V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

**LTE Band 13**

LTE Band 13 / 5MHz / QPSK									
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	1552	-60.73	-13	-47.73	-47.04	-62.80	0.94	5.15	H
	2328	-62.26	-13	-49.26	-52.23	-63.76	1.24	4.88	H
	3104	-68.59	-13	-55.59	-61.36	-71.22	1.48	6.26	H
									H
									H
									H
									H
	1552	-60.34	-13	-47.34	-47.00	-62.41	0.94	5.15	V
	2328	-65.25	-13	-52.25	-55.08	-66.75	1.24	4.88	V
	3104	-68.55	-13	-55.55	-61.18	-71.18	1.48	6.26	V
									V
									V
									V
									V
Middle	1560	-53.57	-42.15	-11.42	-39.96	-55.61	0.94	5.13	H
	2336	-62.89	-13	-49.89	-52.95	-64.41	1.24	4.91	H
	3120	-68.44	-13	-55.44	-61.24	-71.13	1.49	6.33	H
									H
									H
									H
									H
	1560	-52.39	-42.15	-10.24	-39.10	-54.43	0.94	5.13	V
	2336	-65.46	-13	-52.46	-55.39	-66.98	1.24	4.91	V
	3120	-68.35	-13	-55.35	-61.01	-71.04	1.49	6.33	V
									V
									V
									V
									V
Highest	1568	-61.83	-42.15	-19.68	-48.22	-63.85	0.94	5.11	H
	2344	-60.82	-13	-47.82	-50.88	-62.36	1.24	4.93	H
	3136	-68.21	-13	-55.21	-61.05	-70.97	1.49	6.40	H
									H
									H
									H
									H
	1568	-62.66	-42.15	-20.51	-49.37	-64.68	0.94	5.11	V
	2344	-62.58	-13	-49.58	-52.51	-64.12	1.24	4.93	V
	3136	-68.25	-13	-55.25	-60.94	-71.01	1.49	6.40	V
									V
									V
									V
									V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.