FCC Test Report

(Co-located)

Report No.:	RFBBGM-WTW-P22050652-8
FCC ID:	WIYAMS1001
Test Model:	AMS1
Received Date:	May 20, 2022
Test Date:	Jun. 17 ~ Jul. 29, 2022
Issued Date:	Aug. 25, 2022
Applicant:	CASTLES TECHNOLOGY CO., LTD.
Address:	6F, NO. 207-5, SEC. 3, BEIXIN RD., XINDIAN DISTRICT, NEW TAIPEI CITY 23143, TAIWAN (R. O. C.)
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location (1):	No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, Taiwan
Test Location (2):	B2F., No.215, Sec. 3, Beixin Rd., Xindian Dist., New Taipei City 231, Taiwan
FCC Registration / Designation Number:	788550 / TW0003 427177 / TW0011

Testing Laboratory
2021

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RFBBGM-WTW-P22050652-8	Original Release	Aug. 25, 2022

1 Certificate of Conformity

Product:	POS Terminal
Brand:	adyen
Test Model:	AMS1
Sample Status:	Identical Prototype
Applicant:	CASTLES TECHNOLOGY CO., LTD.
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.247) 47 CFR FCC Part 15, Subpart E (Section 15.407) 47 CFR FCC Part 15, Subpart C (Section 15.225) 47 CFR FCC Part 15, Subpart C (Section 15.215) ANSI C63.10:2013 FCC Part 22, Subpart H FCC Part 24, Subpart E FCC Part 27, Subpart C, H, F, L, M FCC Part 90, Subpart I, S FCC Part 2

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : Lena Wang , **Date:** Aug. 25, 2022

Lena Wang / Specialist

Approved by : Jeremy Lin , **Date:** Aug. 25, 2022

Jeremy Lin / Project Engineer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247) 47 CFR FCC Part 15, Subpart E (Section 15.407) 47 CFR FCC Part 15, Subpart C (Section 15.225, 15.215) FCC Part 22, Subpart H FCC Part 24, Subpart E FCC Part 27, Subpart C, H, F, L, M FCC Part 90, Subpart I, S FCC Part 2			
FCC Clause	**Test Item**	**Result**	**Remarks**
15.205 / 15.209 / 15.247(d) / 15.225 (d) / 15.407(b) (1/2/3/4(i/ii)/9)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -7.7 dB at 86.27 MHz.
2.1053 22.917	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -30.00 dB at 79.47 MHz.
15.225 (a)	The field strength of any emissions within the band 13.553-13.567 MHz	Pass	Meet the requirement of limit. Minimum passing margin is -74.0 dB at 13.56 MHz.

Note:

1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. After pre-test, Part 22 GSM 850MHz was the worst for the final tests.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.0400 dB
	30 MHz ~ 200 MHz	2.0153 dB
	200 MHz ~ 1000 MHz	2.0224 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	1.0121 dB
	18 GHz ~ 40 GHz	1.1508 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	POS Terminal	
Brand	adyen	
Test Model	AMS1	
Status of EUT	Identical Prototype	
Power Supply Rating	5.0 Vdc (adapter) 3.85 Vdc (Li-ion battery)	
Modulation Type	WLAN	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
	BT	GFSK, π/4-DQPSK, 8DPSK
	GSM/GPRS	GMSK
	EDGE	8PSK
	WCDMA	BPSK, QPSK
	HSDPA	BPSK
	HSUPA	QPSK
	LTE	QPSK, 16QAM
	NFC	ASK
Data Rate	WLAN	802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0 Mbps 802.11b: 11.0 / 5.5 / 2.0 / 1.0 Mbps 802.11g: 54.0 / 48.0 / 36.0 / 24.0 / 18.0 / 12.0 / 9.0 / 6.0 Mbps 802.11n: up to 72.2Mbps
	BT	1/2/3 Mbps
	NFC	Type A: 106 kbit/s Type B: 106 kbit/s Type F: 212 kbit/s, 424 kbit/s
Operating Frequency	WLAN	2412 ~ 2462 MHz 5180 ~ 5240 MHz, 5745 ~ 5825 MHz
	BT	2402 ~ 2480 MHz
	GSM/GPRS/EDGE 850	850: 824.2 ~ 848.8 MHz
	GSM/GPRS/EDGE 1900	1850.2 ~ 1909.8 MHz
	WCDMA Band 2	1852.4 ~ 1907.6 MHz
	WCDMA Band 4	1712.4 ~ 1752.6 MHz
	WCDMA Band 5	826.4 ~ 846.6 MHz
	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	1850.7 ~ 1909.3 MHz
	LTE Band 2 (Channel Bandwidth: 3 MHz)	1851.5 ~ 1908.5 MHz
	LTE Band 2 (Channel Bandwidth: 5 MHz)	1852.5 ~ 1907.5 MHz

	LTE Band 2 (Channel Bandwidth: 10 MHz)	1855.0 ~ 1905.0 MHz
	LTE Band 2 (Channel Bandwidth: 15 MHz)	1857.5 ~ 1902.5 MHz
	LTE Band 2 (Channel Bandwidth: 20 MHz)	1860.0 ~ 1900.0 MHz
	LTE Band 4 (Channel Bandwidth: 1.4 MHz)	1710.7 ~ 1754.3 MHz
	LTE Band 4 (Channel Bandwidth: 3 MHz)	1711.5 ~ 1753.5 MHz
	LTE Band 4 (Channel Bandwidth: 5 MHz)	1712.5 ~ 1752.5 MHz
	LTE Band 4 (Channel Bandwidth: 10 MHz)	1715.0 ~ 1750.0 MHz
	LTE Band 4 (Channel Bandwidth: 15 MHz)	1717.5 ~ 1747.5 MHz
	LTE Band 4 (Channel Bandwidth: 20 MHz)	1720.0 ~ 1745.0 MHz
	LTE Band 5 (Channel Bandwidth: 1.4 MHz)	824.7 ~ 848.3 MHz
	LTE Band 5 (Channel Bandwidth: 3 MHz)	825.5 ~ 847.5 MHz
	LTE Band 5 (Channel Bandwidth: 5 MHz)	826.5 ~ 846.5 MHz
	LTE Band 5 (Channel Bandwidth: 10 MHz)	829 ~ 844 MHz
	LTE Band 7 (Channel Bandwidth: 5 MHz)	2502.5 ~ 2567.5 MHz
	LTE Band 7 (Channel Bandwidth: 10 MHz)	2505 ~ 2565 MHz
	LTE Band 7 (Channel Bandwidth: 15 MHz)	2507.5 ~ 2562.5 MHz
	LTE Band 7 (Channel Bandwidth: 20 MHz)	2510 ~ 2560 MHz
	LTE Band 12 (Channel Bandwidth: 1.4 MHz)	699.7 ~ 715.3 MHz
	LTE Band 12 (Channel Bandwidth: 3 MHz)	700.5 ~ 714.5 MHz
	LTE Band 12 (Channel Bandwidth: 5 MHz)	701.5 ~ 713.5 MHz
	LTE Band 12 (Channel Bandwidth: 10 MHz)	704.0 ~ 711.0 MHz
	LTE Band 13 (Channel Bandwidth: 5 MHz)	779.5 ~ 784.5 MHz
	LTE Band 13 (Channel Bandwidth: 10 MHz)	782.0 MHz
	LTE Band 17 (Channel Bandwidth: 5 MHz)	706.5 ~ 713.5 MHz
	LTE Band 17 (Channel Bandwidth: 10 MHz)	709.0 ~ 711.0 MHz
	LTE Band 25 (Channel Bandwidth: 1.4 MHz)	1850.7 ~ 1914.3 MHz
	LTE Band 25 (Channel Bandwidth: 3 MHz)	1851.5 ~ 1913.5 MHz
	LTE Band 25 (Channel Bandwidth: 5 MHz)	1852.5 ~ 1912.5 MHz
	LTE Band 25 (Channel Bandwidth: 10 MHz)	1855.0 ~ 1910.0 MHz
	LTE Band 25 (Channel Bandwidth: 15 MHz)	1857.5 ~ 1907.5 MHz
	LTE Band 25 (Channel Bandwidth: 20 MHz)-Part 27	1860.0 ~ 1905.0 MHz

	LTE Band 26 (Channel Bandwidth: 1.4 MHz) - Part 27	824.7 ~ 848.3 MHz
	LTE Band 26 (Channel Bandwidth: 3 MHz) - Part 27	825.5 ~ 847.5 MHz
	LTE Band 26 (Channel Bandwidth: 5 MHz) - Part 27	826.5 ~ 846.5 MHz
	LTE Band 26 (Channel Bandwidth: 10 MHz) - Part 27	829 ~ 844 MHz
	LTE Band 26 (Channel Bandwidth: 1.4 MHz)) -Part 90	814.7 ~ 823.3 MHz
	LTE Band 26 (Channel Bandwidth: 3 MHz) - Part 90	815.5 ~ 822.5 MHz
	LTE Band 26 (Channel Bandwidth: 5 MHz) - Part 90	816.5 ~ 821.5 MHz
	LTE Band 26 (Channel Bandwidth: 10 MHz) - Part 90	819 MHz
	LTE Band 66 (Channel Bandwidth: 1.4 MHz)	1710.7 ~ 1779.3 MHz
	LTE Band 66 (Channel Bandwidth: 3 MHz)	1711.5 ~ 1778.5 MHz
	LTE Band 66 (Channel Bandwidth: 5 MHz)	1712.5 ~ 1777.5 MHz
	LTE Band 66 (Channel Bandwidth: 10 MHz)	1715.0 ~ 1775.0 MHz
	LTE Band 66 (Channel Bandwidth: 15 MHz)	1717.5 ~ 1772.5 MHz
	LTE Band 66 (Channel Bandwidth: 20 MHz)	1720.0 ~ 1770.0 MHz
	NFC	13.56 MHz
Number of Channel	WLAN	2412 ~ 2462 MHz 11 for 802.11b, 802.11g, 802.11n (HT20) 5180 ~ 5240 MHz: 4 for 802.11a, 802.11n (HT20) 5745 ~ 5825 MHz: 5 for 802.11a, 802.11n (HT20)
	BT	79
	NFC	1
Antenna Type	Refer to Note as below	
Antenna Connector	Refer to Note as below	
Accessory Device	Refer to Note as below	
Data Cable Supplied	N/A	

Note:

1. The EUT provides 1 completed transmitter and 1 receiver.

Modulation Mode	Tx Function
802.11b	1TX
802.11g	1TX
802.11a	1TX
802.11n (HT20)	1TX

2. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter	CASTLES TECHNOLOGY	1A52-UB52A	I/P: 100-240 Vac, 50/60 Hz, 0.3 A O/P: 5 Vdc, 2 A
Battery	CASTLES TECHNOLOGY	S1AMS1	3.85 Vdc
USB Cable	CHANG YANG ELECTRONICS CO.,LTD	CY-AS-HK0059	0.95 m shielded cable w/o core

3. The antenna information is listed as below.

WWAN Antenna														
Antenna Type	**PIFA**													
Band	**GSM**		**WCDMA**			**LTE**								
	850	**1900**	**II**	**IV**	**V**	**2**	**4**	**5**	**7**	**12**	**13**	**25**	**26**	**66**
Gain	-0.97	1.06	1.06	1.55	-0.97	1.06	1.55	-0.97	-0.17	-6.48	-1.96	1.06	-0.38	1.55

WLAN Antenna				
Brand	**Antenna Type**	**Antenna Gain (dBi)**		
		BT/WLAN 2.4 GHz	**5180 ~ 5240 MHz**	**5745 ~ 5825 MHz**
CASTLES	PIFA	0.08	-1.58	0.03

4. Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.
5. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.
6. The EUT contains certified smart module with FCC ID: WIYSLM500QA.
7. BT & WWAN & NFC technology can transmit at same time.
8. WLAN 2.4G & WWAN & NFC technology can transmit at same time.
9. WLAN 5G & WWAN & NFC technology can transmit at same time
10. After pre-test, Part 22 GSM 850MHz was the worst for the final tests.

3.2 Description of Test Modes

For 2.4G

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437		

For 5180 ~ 5240 MHz

4 channels are provided for 802.11a, 802.11n (HT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220
40	5200	48	5240

For 5745 ~ 5825 MHz:

5 channels are provided for 802.11a, 802.11n (HT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	161	5805
153	5765	165	5825
157	5785		

BT EDR:

79 channels are provided to this EUT:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		

One channel was provided to this EUT:

Channel	Frequency (MHz)
1	13.56

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable to		Description
	RE≥1G	RE<1G	
-	√	√	-

Where RE≥1G: Radiated Emission above 1GHz & Bandedge Measurement RE<1G: Radiated Emission below 1GHz

Note: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-plane for WLAN 2.4G+BT, Z-plane for WLAN 5G and X-plane for GSM 850.**

Radiated Emission Test (Above 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Freq. Range (MHz)	Available Channel	Tested Channel	Modulation Technology
-	BT EDR + GSM 850 + NFC	2402 ~ 2480	0, 39, 78	78 + 251 + 1	GFSK
		824.2 ~ 848.8	128, 189, 251		GSM
		13.56	1		ASK
-	802.11b + GSM 850 + NFC	2412 ~ 2462	1, 6, 11	11 + 251 + 1	BPSK
		824.2 ~ 848.8	128, 189, 251		GSM
		13.56	1		ASK
-	802.11a + GSM 850 + NFC	5745 ~ 5825	149, 157, 165	157 + 251 + 1	BPSK
		824.2 ~ 848.8	128, 189, 251		GSM
		13.56	1		ASK

Radiated Emission Test (Below 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Freq. Range (MHz)	Available Channel	Tested Channel	Modulation Technology
-	BT EDR + GSM 850 + NFC	2402 ~ 2480	0, 39, 78	78 + 251 + 1	GFSK
		824.2 ~ 848.8	128, 189, 251		GSM
		13.56	1		ASK
-	802.11b + GSM 850 + NFC	2412 ~ 2462	1, 6, 11	11 + 251 + 1	BPSK
		824.2 ~ 848.8	128, 189, 251		GSM
		13.56	1		ASK
-	802.11a + GSM 850 + NFC	5745 ~ 5825	149, 157, 165	157 + 251 + 1	BPSK
		824.2 ~ 848.8	128, 189, 251		GSM
		13.56	1		ASK

Test Condition:

Applicable to	Environmental Conditions	Input Power (System)	Tested by
RE≥1G	23 deg. C, 66 % RH	120 Vac, 60 Hz	Titan Hsu

RE<1G	23 deg. C, 66 % RH	120 Vac, 60 Hz	Titan Hsu

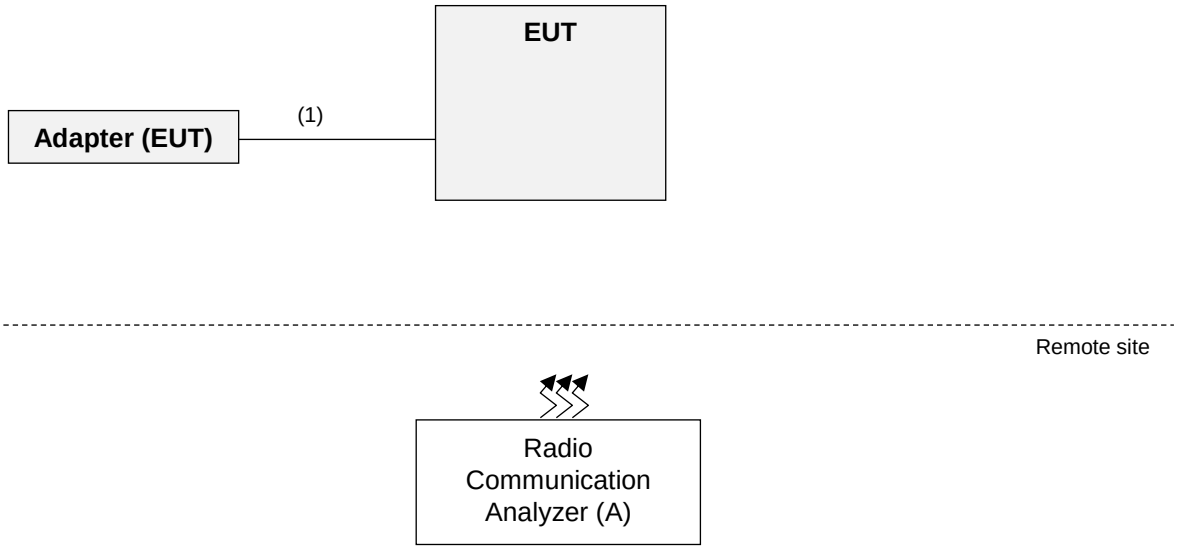
3.3 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Brand	Model No.	Serial No.	FCC ID
A	Radio Communication Analyzer	Anritsu	MT8820C	6201525832	NA

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB cable	1	0.95	Y	0	Provided by client

3.3.1 Configuration of System under Test



3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards and references:

Test Standard:

FCC Part 15, Subpart E (15.407)
FCC Part 15, Subpart C (15.247)
FCC Part 15, Subpart C (15.225)
FCC Part 15, Subpart C (15.215)
ANSI C63.10-2013
FCC 47 CFR Part 2
FCC 47 CFR Part 22
FCC 47 CFR Part 24
FCC 47 CFR Part 27
FCC 47 CFR Part 90
ANSI 63.26-2015
All test items have been performed and recorded as per the above standards.

References Test Guidance:
KDB 558074 D01 15.247 Meas Guidance v05r02
KDB 414788 D01 Radiated Test Site v01r01
KDB 971168 D01 Power Meas License Digital Systems v03r01
KDB 971168 D02 Misc Rev Approv License Devices v02r01
ANSI/TIA/EIA-603-E 2016
All test items have been performed as a reference to the above KDB test guidance.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

For WLAN & BT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20 dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F (kHz)	300
0.490 ~ 1.705	24000/F (kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

Limits of Unwanted Emission Out of the Restricted Bands

<table>
<tr><th colspan="3">Applicable To</th><th colspan="2">Limit</th></tr>
<tr><td colspan="3" rowspan="2">789033 D02 General UNII Test Procedures New Rules v02r01</td><td colspan="2">Field Strength at 3 m</td></tr>
<tr><td>PK: 74 (dBµV/m)</td><td>AV: 54 (dBµV/m)</td></tr>
<tr><th>Frequency Band</th><th colspan="2">Applicable To</th><th>EIRP Limit</th><th>Equivalent Field Strength at 3 m</th></tr>
<tr><td>5150~5250 MHz</td><td colspan="2">15.407(b)(1)</td><td rowspan="3">PK: -27 (dBm/MHz)</td><td rowspan="3">PK: 68.2 (dBµV/m)</td></tr>
<tr><td>5250~5350 MHz</td><td colspan="2">15.407(b)(2)</td></tr>
<tr><td>5470~5725 MHz</td><td colspan="2">15.407(b)(3)</td></tr>
<tr><td rowspan="2">5725~5850 MHz</td><td>☒</td><td>15.407(b)(4)(i)</td><td>PK:-27 (dBm/MHz) *1
PK:10 (dBm/MHz) *2
PK:15.6 (dBm/MHz) *3
PK:27 (dBm/MHz) *4</td><td>PK: 68.2 (dBµV/m) *1
PK:105.2 (dBµV/m) *2
PK: 110.8 (dBµV/m) *3
PK:122.2 (dBµV/m) *4</td></tr>
<tr><td>☐</td><td>15.407(b)(4)(ii)</td><td colspan="2">Emission limits in section 15.247(d)</td></tr>
<tr><td colspan="5">*1 beyond 75 MHz or more above of the band edge.
*2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.
*3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.
*4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.</td></tr>
</table>

Note:

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3}$$ µV/m, where P is the eirp (Watts).

For GSM 850

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit is equal to -13 dBm.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY52260177	Sep. 01, 2021	Aug. 31, 2022
Spectrum Analyzer R&S	FSU43	101261	Apr. 11, 2022	Apr. 10, 2023
Horn Antenna ETS-Lindgren	3117	00143293	Nov. 14, 2021	Nov. 13, 2022
Bi_Log Antenna Schwarzbeck	VULB9168	9168-616	Oct. 27, 2021	Oct. 26, 2022
Horn Antenna Schwarzbeck	BBHA 9170	9170-480	Nov. 14, 2021	Nov. 13, 2022
Attenuator WOKEN	MDCS18N-10	MDCS18N-10-01	Apr. 05, 2022	Apr. 04, 2023
Loop Antenna EMCI	EM-6879	269	Sep. 16, 2021	Sep. 15, 2022
MXG Vector signal generator Agilent	N5182B	MY53050430	Nov. 25, 2021	Nov. 24, 2022
Preamplifier Agilent	310N	187226	Jun. 17, 2021	Jun. 16, 2022
			Jun. 14, 2022	Jun. 13, 2023
Preamplifier Agilent	83017A	MY39501357	Jun. 17, 2021	Jun. 16, 2022
			Jun. 14, 2022	Jun. 13, 2023
Pre-Ammlifier EMCI	EMC 184045	980116	Oct. 05, 2021	Oct. 04, 2022
Power Meter Anritsu	ML2495A	1012010	Sep. 09, 2021	Sep. 08, 2022
Power Sensor Anritsu	MA2411B	1315050	Sep. 09, 2021	Sep. 08, 2022
RF Coaxial Cable ETS-Lindgren	EMC104-SM-SM-10000	Cable-CH1-01(RFC-SMS-100-SMS-120+RFC-SMS-100-SMS-4	Jun. 17, 2021	Jun. 16, 2022
			Jun. 14, 2022	Jun. 13, 2023
RF Coaxial Cable ETS-Lindgren	RFC-SMS-100-SMS-24-IN	Cable-CH1-02(RFC-SMS-100-SMS-24)	Jun. 17, 2021	Jun. 16, 2022
			Jun. 14, 2022	Jun. 13, 2023
Fix tool for Boresight antenna tower BV	BAF-01	10	NA	NA
E3 Software AUDIX	E3	NA	NA	NA
Software BVADT	ADT_Radiated_V8.7.08	NA	NA	NA
Software BVADT	ADT_RF Test Software V6.6.5.4	NA	NA	NA
Antenna Tower MF	NA	NA	NA	NA
Turn Table MF	NA	NA	NA	NA
Controller Max-Full	MF-7802	NA	NA	NA
Radio Communication Analyzer Anritsu	MT8820C	6201525832	Jan. 25, 2022	Jan. 24, 2023

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HsinTien 966 chamber 6

4.1.3 Test Procedures

For WLAN &BT

For Radiated emission below 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

1. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

3. The height of antenna 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.

4. 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 rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

5. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

6. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.

2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.

3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.

4. All modes of operation were investigated and the worst-case emissions are reported.

For GSM 850

1. In the semi-anechoic chamber, EUT placed on the 0.8m(below or equal 1GHz) and/or 1.5m(above 1GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
2. The height of antenna 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.
3. Perform a field strength measurement and record the worse read value, is the field strength value via a spectrum reading obtained corrected for antenna factor, cable loss and pre-amplifier factor and then mathematically convert the measured field strength level to EIRP/ERP level.
4. Following C63.26 section 5.5 and 5.2.7

   EIRP (dBm) = E (dBμV/m) + 20log(D) - 104.8; where D is the measurement distance (in the far field region) in m.

   ERP (dBm) = E (dBμV/m) + 20log(D) - 104.8 - 2.15; where D is the measurement distance (in the far field region) in m.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz.
2. The emission levels were against the limit of frequency range 9 kHz ~ 30 MHz:

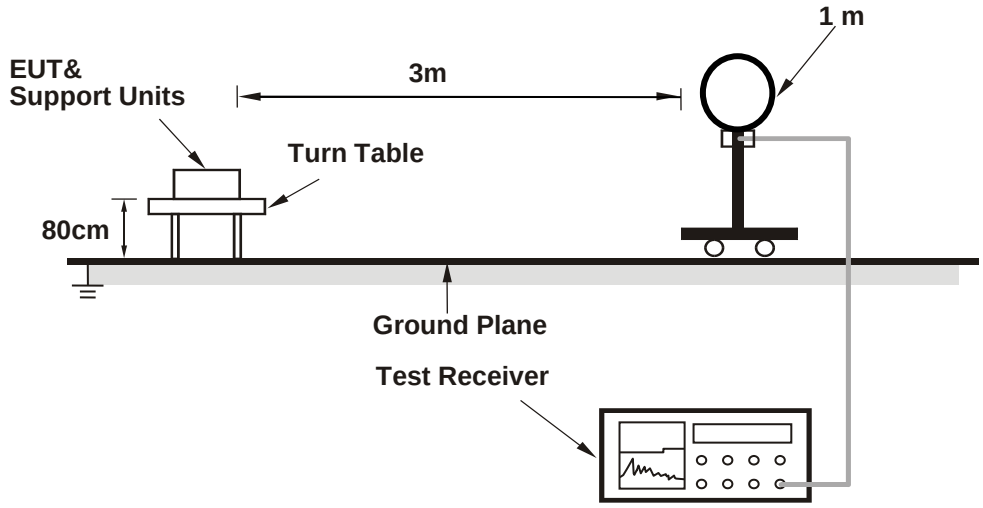
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

4.1.4 Deviation from Test Standard

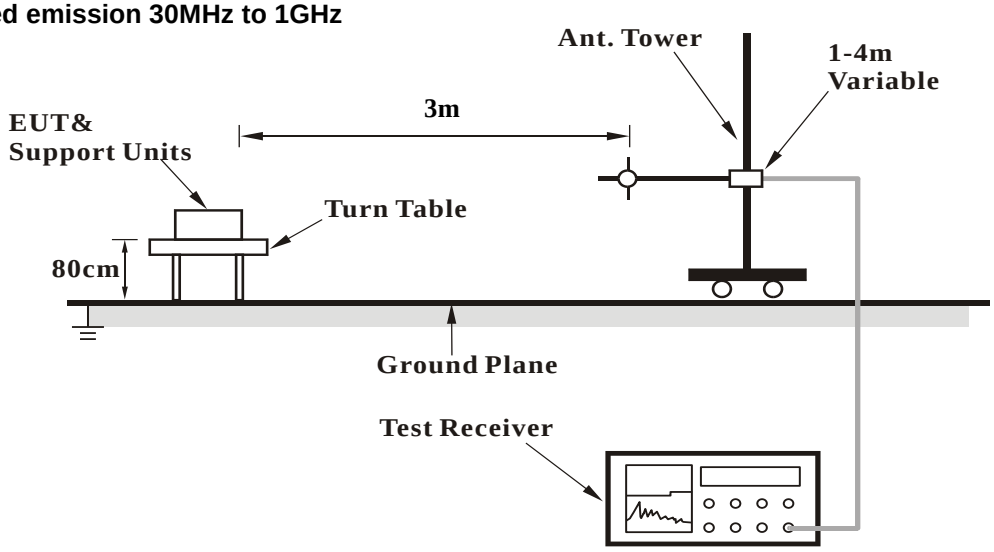
No deviation.

4.1.5 Test Setup

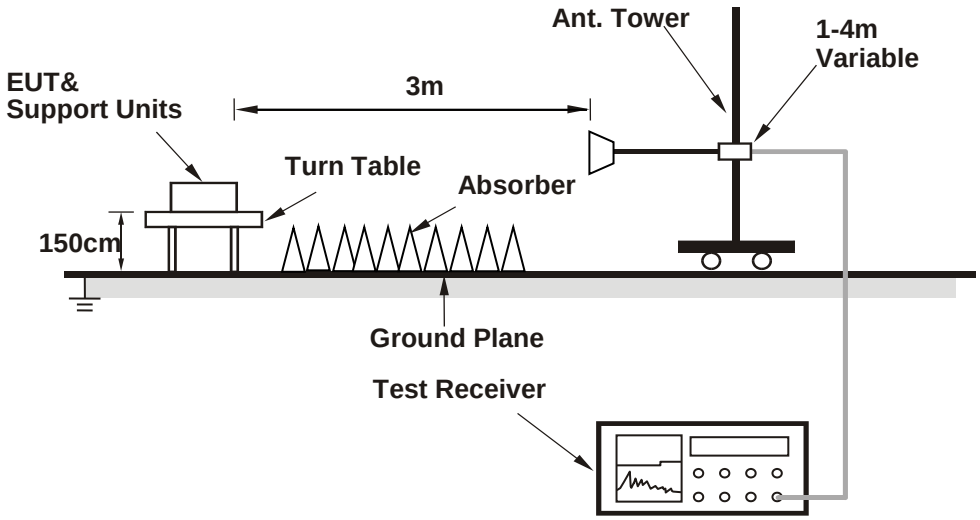
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT Operating Conditions

1. Placed the EUT on the testing table.
2. Set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1 GHz Data：

BT EDR + GSM 850 + NFC

Channel	Ch78 + Ch 251 + Ch1	Detector Function	Peak (PK) Average (AV)
Frequency Range	1GHz ~ 25GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2480.00	98.2 PK			1.05 H	69	66.2	32.0
2	*2480.00	67.4 AV			1.05 H	69	35.4	32.0
3	2483.50	50.6 PK	74.0	-23.4	1.05 H	69	54.8	-4.2
4	2483.50	19.8 AV	54.0	-34.2	1.05 H	69	24.0	-4.2
5	4960.00	48.8 PK	74.0	-25.2	1.09 H	138	45.9	2.9
6	4960.00	18.0 AV	54.0	-36.0	1.09 H	138	15.1	2.9
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2480.00	99.7 PK			2.48 V	79	67.7	32.0
2	*2480.00	68.9 AV			2.48 V	79	36.9	32.0
3	2483.50	50.9 PK	74.0	-23.1	2.48 V	79	55.1	-4.2
4	2483.50	20.1 AV	54.0	-33.9	2.48 V	79	24.3	-4.2
5	4960.00	49.1 PK	74.0	-24.9	1.22 V	248	46.2	2.9
6	4960.00	18.3 AV	54.0	-35.7	1.22 V	248	15.4	2.9

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

Channel	Ch78 + Ch 251 + Ch1	Frequency Range	1GMHz ~ 18GHz

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1697.60	-56.87	-13.00	-43.87	1.38 H	322	47.24	-104.11
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1697.60	-56.53	-13.00	-43.53	1.05 V	318	47.58	-104.11

Remarks:

1. ERP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8 – 2.15
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

802.11b + GSM 850 + NFC

Channel	Ch11 + Ch 251 + Ch1	Detector Function	Peak (PK) Average (AV)
Frequency Range	1GHz ~ 25GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	95.7 PK			1.08 H	66	63.7	32.0
2	*2462.00	93.1 AV			1.08 H	66	61.1	32.0
3	2483.50	51.3 PK	74.0	-22.7	1.08 H	66	19.3	32.0
4	2483.50	41.1 AV	54.0	-12.9	1.08 H	66	9.1	32.0
5	4924.00	40.1 PK	74.0	-33.9	1.69 H	175	37.3	2.8
6	4924.00	32.1 AV	54.0	-21.9	1.69 H	175	29.3	2.8
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	98.0 PK			1.95 V	78	66.0	32.0
2	*2462.00	95.2 AV			1.95 V	78	63.2	32.0
3	2483.50	51.0 PK	74.0	-23.0	1.95 V	78	19.0	32.0
4	2483.50	41.0 AV	54.0	-13.0	1.95 V	78	9.0	32.0
5	4924.00	49.2 PK	74.0	-24.8	2.78 V	149	46.4	2.8
6	4924.00	41.5 AV	54.0	-12.5	2.78 V	149	38.7	2.8

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

Channel	Ch11 + Ch 251 + Ch1	Frequency Range	1GMHz ~ 18GHz

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1697.60	-56.88	-13.00	-43.88	1.55 H	321	47.23	-104.11
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1697.60	-56.56	-13.00	-43.56	1.19 V	325	47.55	-104.11

Remarks:

1. ERP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8 – 2.15
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

802.11a + GSM 850 + NFC

Channel	Ch157 + Ch 251 + Ch1	Detector Function	Peak (PK) Average (AV)
Frequency Range	1GHz ~ 40GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5622.75	59.2 PK	68.2	-9.0	1.22 H	169	55.9	3.3
2	*5785.00	98.2 PK			1.22 H	169	56.4	41.8
3	*5785.00	91.1 AV			1.22 H	169	49.3	41.8
4	#5964.76	58.0 PK	68.2	-10.2	1.22 H	169	54.1	3.9
5	11570.00	54.1 PK	74.0	-19.9	1.82 H	118	44.5	9.6
6	11570.00	44.5 AV	54.0	-9.5	1.82 H	118	34.9	9.6
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5632.83	57.5 PK	68.2	-10.7	1.69 V	179	54.2	3.3
2	*5785.00	95.1 PK			1.69 V	179	53.3	41.8
3	*5785.00	87.4 AV			1.69 V	179	45.6	41.8
4	#5973.97	59.2 PK	68.2	-9.0	1.69 V	179	55.2	4.0
5	11570.00	54.0 PK	74.0	-20.0	2.11 V	279	44.4	9.6
6	11570.00	44.1 AV	54.0	-9.9	2.11 V	279	34.5	9.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

Channel	Ch157 + Ch 251 + Ch1	Frequency Range	1GMHz ~ 18GHz

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1697.60	-56.85	-13.00	-43.85	1.35 H	311	47.26	-104.11
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1697.60	-56.56	-13.00	-43.56	1.17 V	327	47.55	-104.11

Remarks:

1. ERP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8 – 2.15
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

Below 30MHz data

BT EDR + GSM 850 + NFC

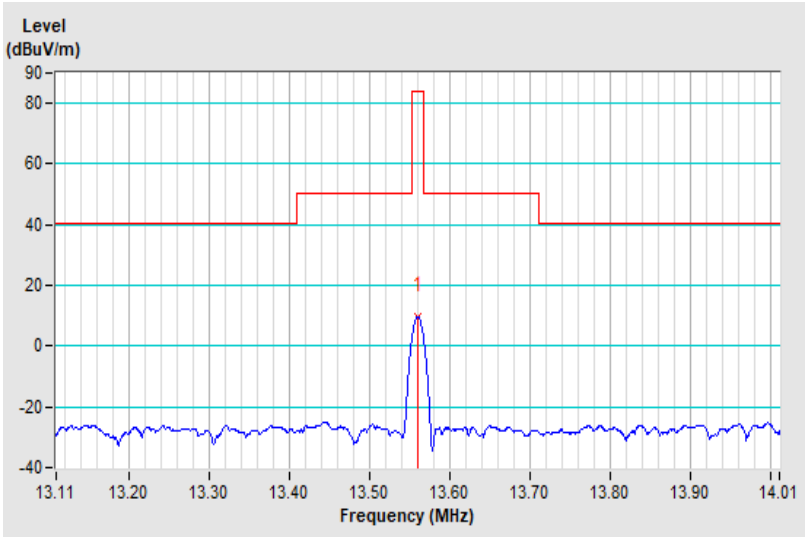
Channel	Ch78 + Ch 251 + Ch1	Detector Function & Bandwidth	Quasi-Peak (QP), 9kHz
Frequency Range	13.11MHz ~ 14.01MHz		

Antenna Polarity : Parallel								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*13.56	9.8 QP	84.0	-74.2	1.00	231	27.8	-18.0

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. Above limits have been translated by the formula

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

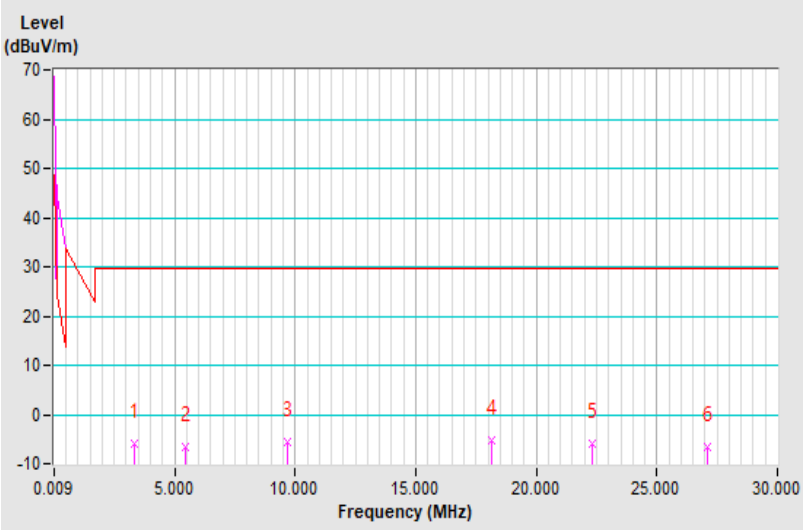


Channel	Ch78 + Ch 251 + Ch1	Detector Function & Bandwidth	Peak (PK), 9kHz
Frequency Range	9kHz ~ 30MHz		

Antenna Polarity : Parallel								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3.31	-5.8 PK	29.5	-35.3	1.00	112	14.2	-20.0
2	5.44	-6.6 PK	29.5	-36.1	1.00	228	13.1	-19.7
3	9.67	-5.6 PK	29.5	-35.1	1.00	65	12.6	-18.2
4	18.12	-5.2 PK	29.5	-34.7	1.00	86	12.7	-17.9
5	22.32	-5.8 PK	29.5	-35.3	1.00	159	12.0	-17.8
6	27.12	-6.5 PK	29.5	-36.0	1.00	285	11.4	-17.9

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. The test distance for 0.49 ~ 30MHz is 3m, extrapolate the measured field strength to a distance of 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)



802.11b + GSM 850 + NFC

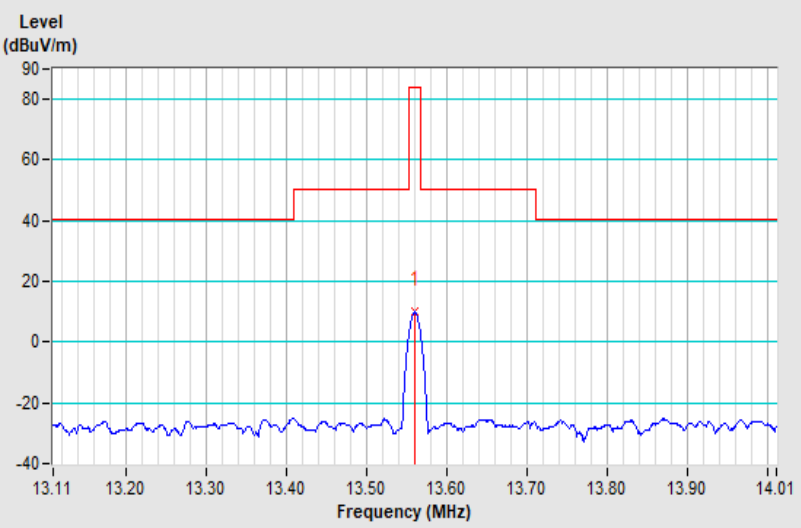
Channel	Ch11 + Ch 251 + Ch1	Detector Function & Bandwidth	Quasi-Peak (QP), 9kHz
Frequency Range	13.11MHz ~ 14.01MHz		

Antenna Polarity : Parallel								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*13.56	9.9 QP	84.0	-74.1	1.00	228	27.9	-18.0

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. Above limits have been translated by the formula

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

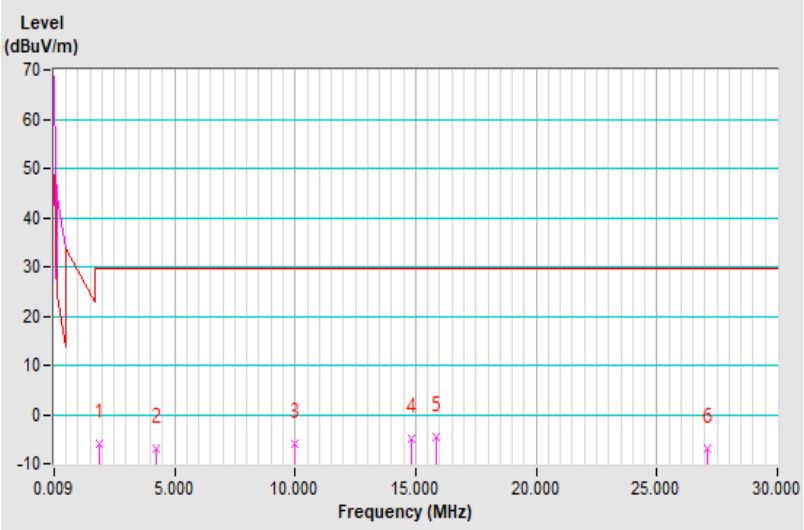


Channel	Ch11 + Ch 251 + Ch1	Detector Function & Bandwidth	Peak (PK), 9kHz
Frequency Range	9kHz ~ 30MHz		

Antenna Polarity : Parallel								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1.87	-5.8 PK	29.5	-35.3	1.00	109	14.0	-19.8
2	4.24	-7.0 PK	29.5	-36.5	1.00	225	12.9	-19.9
3	10.00	-5.9 PK	29.5	-35.4	1.00	69	12.2	-18.1
4	14.85	-4.9 PK	29.5	-34.4	1.00	99	13.1	-18.0
5	15.84	-4.7 PK	29.5	-34.2	1.00	152	13.2	-17.9
6	27.12	-7.0 PK	29.5	-36.5	1.00	301	10.9	-17.9

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. The test distance for 0.49 ~ 30MHz is 3m, extrapolate the measured field strength to a distance of 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)



802.11a + GSM 850 + NFC

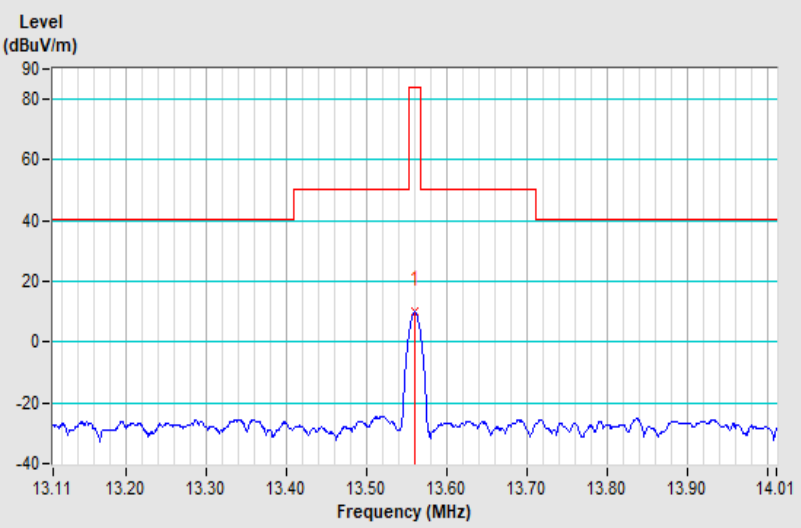
Channel	Ch157 + Ch 251 + Ch1	Detector Function & Bandwidth	Quasi-Peak (QP), 9kHz
Frequency Range	13.11MHz ~ 14.01MHz		

Antenna Polarity : Parallel								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*13.56	10.0 QP	84.0	-74.0	1.00	219	28.0	-18.0

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. Above limits have been translated by the formula

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

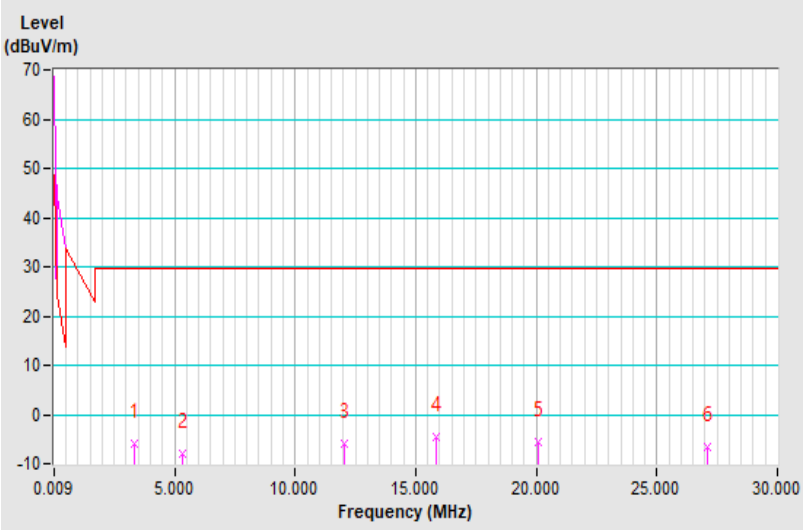


Channel	Ch157 + Ch 251 + Ch1	Detector Function & Bandwidth	Peak (PK), 9kHz
Frequency Range	9kHz ~ 30MHz		

Antenna Polarity : Parallel								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3.31	-5.8 PK	29.5	-35.3	1.00	11	14.2	-20.0
2	5.35	-7.8 PK	29.5	-37.3	1.00	228	11.9	-19.7
3	12.04	-6.0 PK	29.5	-35.5	1.00	85	12.0	-18.0
4	15.84	-4.7 PK	29.5	-34.2	1.00	105	13.2	-17.9
5	20.07	-5.5 PK	29.5	-35.0	1.00	166	12.3	-17.8
6	27.12	-6.5 PK	29.5	-36.0	1.00	305	11.4	-17.9

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. The test distance for 0.49 ~ 30MHz is 3m, extrapolate the measured field strength to a distance of 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)



Below 1GHz data

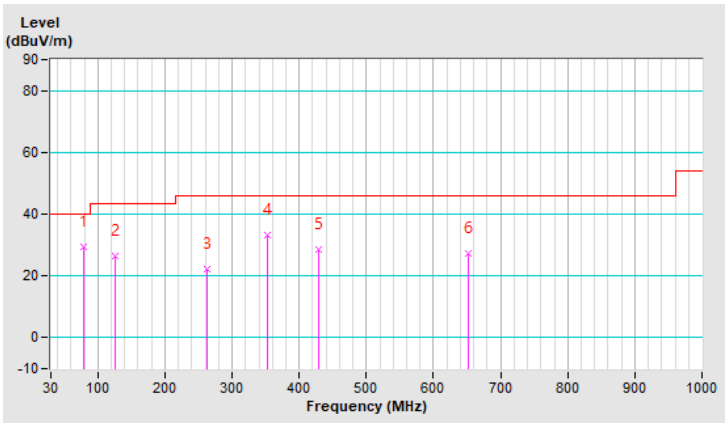
BT EDR + GSM 850 + NFC

Channel	Ch78 + Ch 251 + Ch1	**Detector Function**	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	79.48	29.6 QP	40.0	-10.4	1.51 H	18	47.5	-17.9
2	126.04	26.5 QP	43.5	-17.0	2.00 H	131	41.3	-14.8
3	261.85	22.1 QP	46.0	-23.9	1.51 H	6	36.1	-14.0
4	353.04	33.2 QP	46.0	-12.8	2.00 H	6	44.7	-11.5
5	428.71	28.5 QP	46.0	-17.5	1.51 H	18	37.9	-9.4
6	651.83	27.1 QP	46.0	-18.9	1.51 H	313	31.7	-4.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

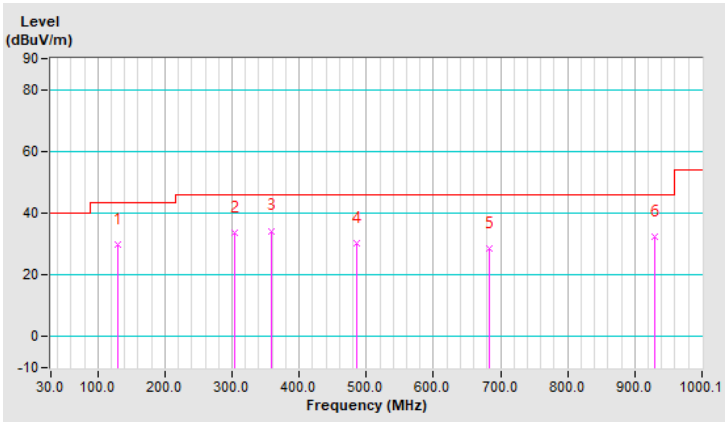


Channel	Ch78 + Ch 251 + Ch1	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	128.95	29.8 QP	43.5	-13.7	1.00 V	326	44.3	-14.5
2	304.54	33.6 QP	46.0	-12.4	1.50 V	2	46.1	-12.5
3	358.86	34.3 QP	46.0	-11.7	1.50 V	29	45.7	-11.4
4	485.95	30.1 QP	46.0	-15.9	1.50 V	182	38.1	-8.0
5	682.88	28.5 QP	46.0	-17.5	1.00 V	2	32.9	-4.4
6	929.28	32.5 QP	46.0	-13.5	1.00 V	2	33.1	-0.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

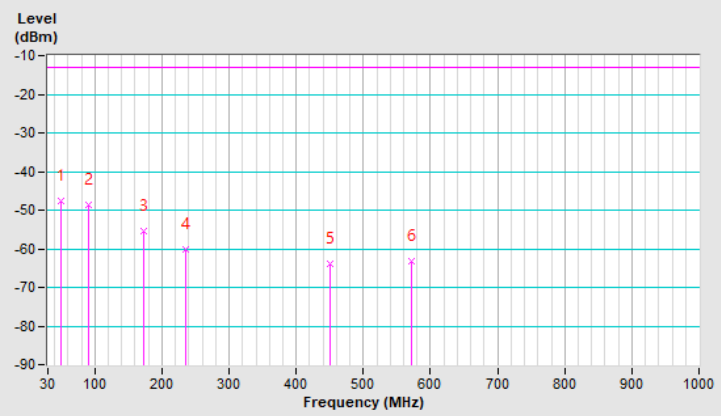


Channel	Ch78 + Ch 251 + Ch1	Frequency Range	30MHz ~ 1GHz

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	49.40	-47.48	-13.00	-34.48	1.00 H	348	63.03	-110.51
2	90.14	-48.49	-13.00	-35.49	1.00 H	104	67.95	-116.44
3	173.56	-55.49	-13.00	-42.49	1.00 H	112	55.75	-111.24
4	234.67	-60.32	-13.00	-47.32	1.00 H	104	52.19	-112.51
5	450.01	-64.06	-13.00	-51.06	1.00 H	221	41.96	-106.02
6	571.26	-63.06	-13.00	-50.06	1.00 H	98	40.71	-103.77

Remarks:

1. ERP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8 – 2.15
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

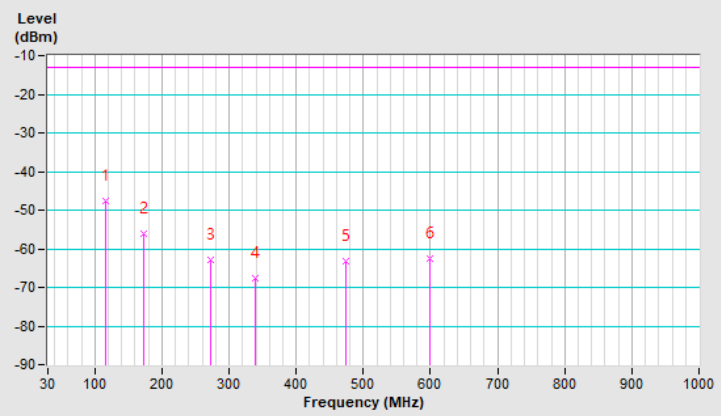


Channel	Ch78 + Ch 251 + Ch1	Frequency Range	30MHz ~ 1GHz

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	115.36	-47.47	-13.00	-34.47	1.00 V	278	65.73	-113.20
2	172.59	-56.07	-13.00	-43.07	1.00 V	149	55.10	-111.17
3	272.50	-62.92	-13.00	-49.92	1.00 V	332	47.87	-110.79
4	338.46	-67.56	-13.00	-54.56	1.00 V	212	41.37	-108.93
5	473.29	-63.12	-13.00	-50.12	1.00 V	208	42.52	-105.64
6	598.42	-62.47	-13.00	-49.47	1.00 V	234	40.25	-102.72

Remarks:

1. ERP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8 – 2.15
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.



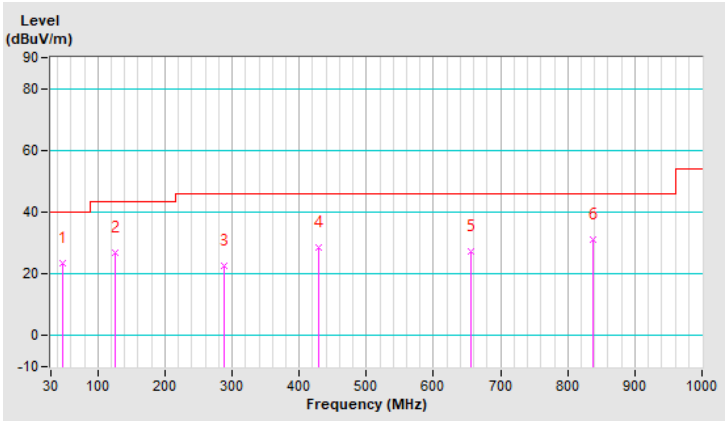
802.11b + GSM 850 + NFC

Channel	Ch11 + Ch 251 + Ch1	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	48.43	23.5 QP	40.0	-16.5	2.00 H	197	36.5	-13.0
2	126.04	27.0 QP	43.5	-16.5	1.50 H	131	41.8	-14.8
3	288.05	22.8 QP	46.0	-23.2	1.00 H	141	35.7	-12.9
4	428.71	28.5 QP	46.0	-17.5	1.50 H	18	37.9	-9.4
5	655.71	27.3 QP	46.0	-18.7	1.00 H	192	31.9	-4.6
6	838.09	31.2 QP	46.0	-14.8	2.00 H	349	33.0	-1.8

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

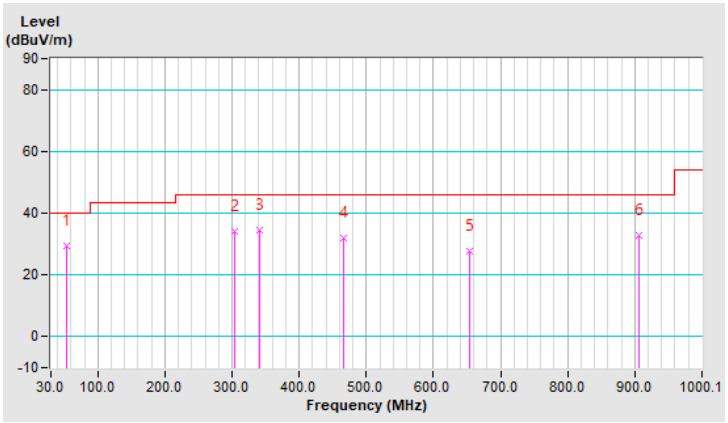


Channel	Ch11 + Ch 251 + Ch1	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	54.25	29.2 QP	40.0	-10.8	1.00 V	11	42.6	-13.4
2	304.54	34.2 QP	46.0	-11.8	1.50 V	2	46.7	-12.5
3	341.40	34.3 QP	46.0	-11.7	1.50 V	339	45.9	-11.6
4	465.57	32.1 QP	46.0	-13.9	2.00 V	229	40.4	-8.3
5	654.74	27.6 QP	46.0	-18.4	1.50 V	2	32.2	-4.6
6	906.97	32.6 QP	46.0	-13.4	1.50 V	16	33.6	-1.0

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

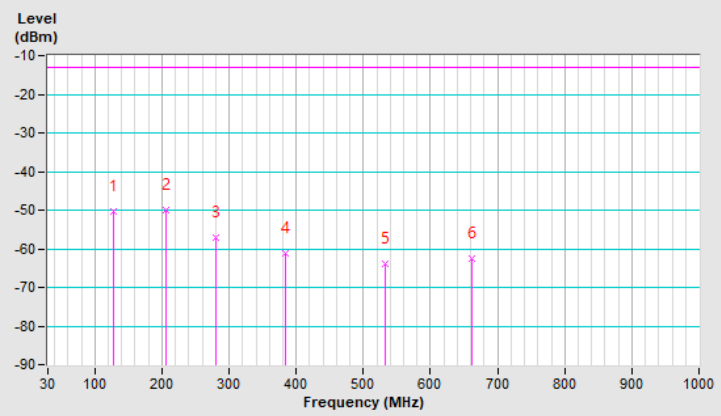


Channel	Ch11 + Ch 251 + Ch1	Frequency Range	30MHz ~ 1GHz

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	127.97	-50.30	-13.00	-37.30	1.50 H	75	61.85	-112.15
2	205.57	-49.87	-13.00	-36.87	1.00 H	97	64.31	-114.18
3	280.26	-56.99	-13.00	-43.99	1.00 H	61	53.46	-110.45
4	384.05	-61.14	-13.00	-48.14	1.00 H	201	46.78	-107.92
5	533.43	-64.00	-13.00	-51.00	2.00 H	125	40.67	-104.67
6	661.47	-62.43	-13.00	-49.43	1.00 H	18	39.61	-102.04

Remarks:

1. ERP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8 – 2.15
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

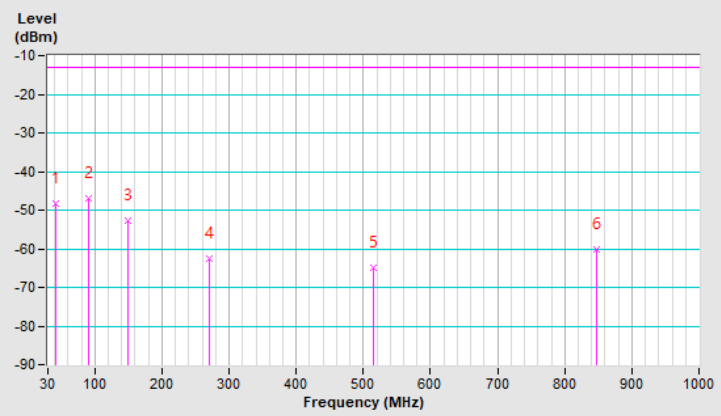


Channel	Ch11 + Ch 251 + Ch1	Frequency Range	30MHz ~ 1GHz

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	42.61	-48.20	-13.00	-35.20	2.00 V	292	62.54	-110.74
2	90.14	-47.07	-13.00	-34.07	1.00 V	101	69.37	-116.44
3	148.34	-52.66	-13.00	-39.66	1.00 V	205	57.89	-110.55
4	269.59	-62.40	-13.00	-49.40	1.50 V	309	48.55	-110.95
5	515.00	-64.90	-13.00	-51.90	1.00 V	284	40.06	-104.96
6	847.71	-60.00	-13.00	-47.00	1.50 V	140	39.17	-99.17

Remarks:

1. ERP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8 – 2.15
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.



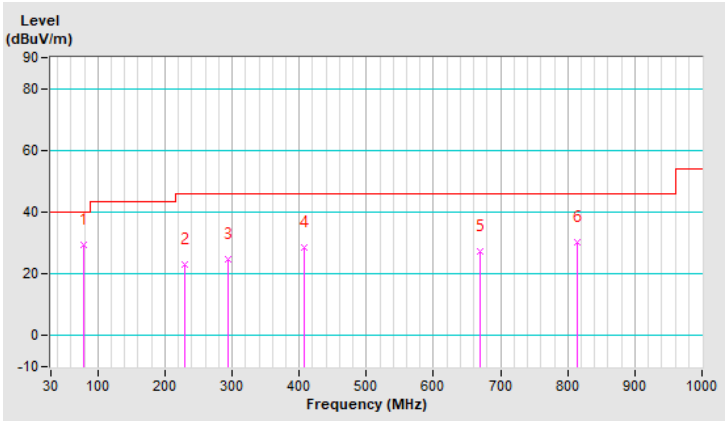
802.11a + GSM 850 + NFC

Channel	Ch157 + Ch 251 + Ch1	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	79.48	29.6 QP	40.0	-10.4	1.51 H	18	47.5	-17.9
2	228.87	22.9 QP	46.0	-23.1	1.51 H	165	38.8	-15.9
3	294.84	24.6 QP	46.0	-21.4	2.00 H	290	37.4	-12.8
4	407.37	28.4 QP	46.0	-17.6	1.51 H	18	38.4	-10.0
5	669.30	27.4 QP	46.0	-18.6	1.51 H	27	32.0	-4.6
6	814.81	30.4 QP	46.0	-15.6	2.00 H	47	32.6	-2.2

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

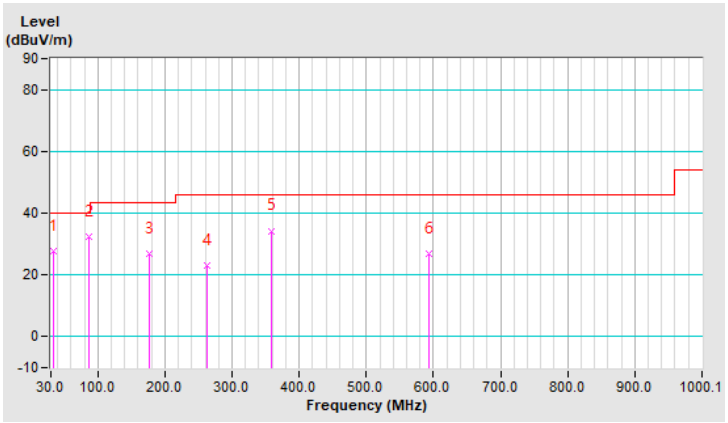


Channel	Ch157 + Ch 251 + Ch1	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	33.88	27.7 QP	40.0	-12.3	1.50 V	8	42.0	-14.3
2	**86.27**	**32.3 QP**	**40.0**	**-7.7**	**2.00 V**	**7**	**51.3**	**-19.0**
3	176.49	26.8 QP	43.5	-16.7	1.50 V	287	41.0	-14.2
4	262.82	23.2 QP	46.0	-22.8	1.00 V	208	37.1	-13.9
5	358.86	34.3 QP	46.0	-11.7	1.50 V	29	45.7	-11.4
6	593.63	27.0 QP	46.0	-19.0	1.50 V	24	32.5	-5.5

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

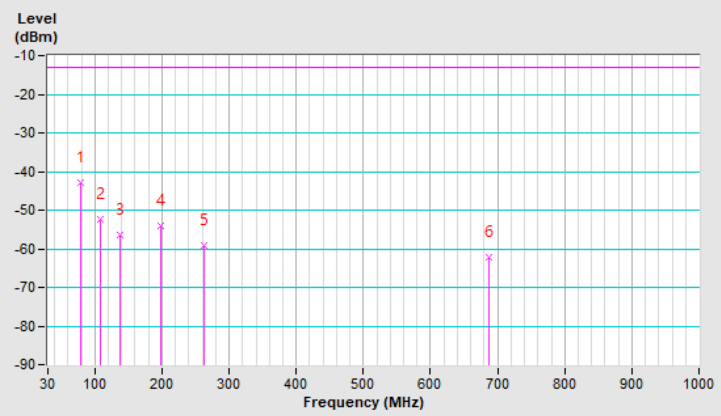


Channel	Ch157 + Ch 251 + Ch1	Frequency Range	30MHz ~ 1GHz

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	**79.47**	**-43.00**	**-13.00**	**-30.00**	**1.50 H**	**338**	**72.38**	**-115.38**
2	108.57	-52.53	-13.00	-39.53	1.00 H	244	61.30	-113.83
3	137.67	-56.41	-13.00	-43.41	1.00 H	159	54.79	-111.20
4	198.78	-54.07	-13.00	-41.07	1.00 H	104	60.03	-114.10
5	261.83	-59.10	-13.00	-46.10	2.00 H	201	52.32	-111.42
6	686.69	-62.28	-13.00	-49.28	1.00 H	125	39.50	-101.78

Remarks:

1. ERP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8 – 2.15
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

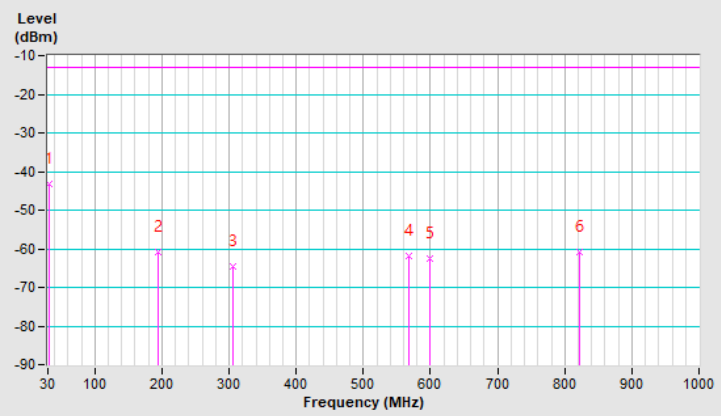


Channel	Ch157 + Ch 251 + Ch1	Frequency Range	30MHz ~ 1GHz

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	32.91	-43.20	-13.00	-30.20	1.50 V	185	68.67	-111.87
2	193.93	-60.87	-13.00	-47.87	1.00 V	134	52.94	-113.81
3	305.48	-64.74	-13.00	-51.74	1.00 V	140	45.15	-109.89
4	568.35	-61.90	-13.00	-48.90	1.00 V	140	41.97	-103.87
5	598.42	-62.50	-13.00	-49.50	1.50 V	234	40.22	-102.72
6	822.49	-60.98	-13.00	-47.98	1.00 V	320	38.50	-99.48

Remarks:

1. ERP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8 – 2.15
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.



5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Lin Kou EMC/RF Lab
Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-6668565
Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab
Tel: 886-3-3183232
Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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