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Report No.: 2205TWB901-E1
Report Version: 1.0
Issue Date: 2022-08-25

MEASUREMENT REPORT

Applicant	:	Fanstel Corporation, Taipei
Address	:	10F-10, No. 79, Sec. 1, Hsin Tai Wu Rd., Hsi-Chih, New Taipei City 221 Taiwan
Product	:	BLG840F/X BLE/802.15.4 to LTE Gateways
Model No.	:	BLG840F, BLG840X, BLG40F, BLG840E, BLG840XE, BLG40E, BLE840F, BLE840X, BLE40F, BLE840E, BLE840XE, BLE40E, LN60G840F, LN60G840X, LN60G40F, LN60G840E, LN60G840XE, LN60G40E, LN60E840F, LN60E840X, LN60E40F, LN60E840E, LN60E840XE, LN60E40E
Trademark	:	Fanstel
Standards	:	EN 301 489 - 1 V2.2.3 (2019-11) EN 301 489 - 52 V1.2.1 (2021-11) EN IEC 61000-3-2: 2019+A1:2021 EN 61000-3-3: 2013+A1:2019
Result	:	Complies
Received Date	:	May 24, 2022
Test Date	:	June 22, 2022~July 27, 2022

Tested By : Fran Chen
(Fran Chen)

Reviewed By : Paddy Chen
(Paddy Chen)

Approved By : Chenz Ker
(Chenz Ker)

Testing Laboratory
3261

The test results only relate to the tested sample.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

Revision History

Report No.	Version	Description	Issue Date
2205TWB901-E1	1.0	Original Report	2022-08-25

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Description Page

1. General Information

Applicant	Fanstel Corporation, Taipei
Applicant Address	10F-10, No. 79, Sec. 1, Hsin Tai Wu Rd., Hsi-Chih, New Taipei City 221 Taiwan
Manufacturer	Fanstel Corporation, Taipei
Manufacturer Address	10F-10, No. 79, Sec. 1, Hsin Tai Wu Rd., Hsi-Chih, New Taipei City 221 Taiwan
Test Site	MRT Technology (Taiwan) Co., Ltd
Test Site Address	No. 38, Fuxing Second Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C)
Test Device Serial No.	#1-1
Radio-frequency electromagnetic field & Radio-Frequency Continuous Conducted Test Site Information	
Test Site	MRT Technology (Suzhou) Co., Ltd
Test Site Address	D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
Test Facility / Accreditations	MRT(Suzhou) Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01).

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Fuxing Rd., Taoyuan, Taiwan (R.O.C)

- **MRT facility is a FCC registered (Reg. No. 291082) test facility with the site description report on file and is designated by the FCC as an Accredited Test Firm.**
- **MRT facility is an IC registered (MRT Reg. No. 21723) test laboratory with the site description on file at Industry Canada.**
- **MRT Lab is accredited to ISO 17025 by the Taiwan Accreditation Foundation (TAF Cert. No. 3261) in EMC, Telecommunications and Radio testing for FCC (Designation Number: TW3261), Industry Taiwan, EU and TELEC Rules.**

2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name	BLG840F/X BLE/802.15.4 to LTE Gateways
Model No.	BLG840F, BLG840X, BLG40F, BLG840E, BLG840XE, BLG40E, BLE840F, BLE840X, BLE40F, BLE840E, BLE840XE, BLE40E, LN60G840F, LN60G840X, LN60G40F, LN60G840E, LN60G840XE, LN60G40E, LN60E840F, LN60E840X, LN60E40F, LN60E840E, LN60E840XE, LN60E40E
Trademark	Fanstel
Highest Operating Frequency	Cat-M1 & NB-IoT Band1: 1980MHz
Power Adapter	Brand: GAT Model No: GA-0502000V Input: AC 100-240V~ 50/60Hz 0.6A Output: DC 5.0V, 2000mA

Note:

1. Model Difference Description:

BLE to LTE (Cat-M1 & NB-IoT) Gateways		
BLG840F	LN60G840F	BT840F, nRF9160, integrated GPS antenna
BLG840X	LN60G840X	BT840X, nRF9160, integrated GPS antenna
BLG40F	LN60G40F	BT40F, nRF9160, integrated GPS antenna
BLG840E	LN60G840E	BT840E, nRF9160, integrated GPS antenna
BLG840XE	LN60G840XE	BT840XE, nRF9160, integrated GPS antenna
BLG40E	LN60G40E	BT40E, nRF9160, integrated GPS antenna
BLE840F	LN60E840F	BT840F, nRF9160, external GPS antenna (not included)
BLE840X	LN60E840X	BT840X, nRF9160, external GPS antenna (not included)
BLE40F	LN60E40F	BT40F, nRF9160, external GPS antenna (not included)
BLE840E	LN60E840E	BT840E, nRF9160, GPS not supported
BLE840XE	LN60E840XE	BT840XE, nRF9160, GPS not supported
BLE40E	LN60E40E	BT40E, nRF9160, GPS not supported

2. The test was performed base on BLG840F.

2.2. Test Mode

Pre-Test Mode	
EMI & EMS Mode	Mode1: BLE to LTE Gateways_BLG840F, Cat-M1 Band1 Link + GPS On, Power by USB Adapter (GA-0502000) Mode2: BLE to LTE Gateways_BLG840F, Cat-M1 Band3 Link + GPS On, Power by USB Adapter (GA-0502000) Mode3: BLE to LTE Gateways_BLG840F, Cat-M1 Band8 Link + GPS On, Power by USB Adapter (GA-0502000) Mode4: BLE to LTE Gateways_BLG840F, Cat-M1 Band20 Link + GPS On, Power by USB Adapter (GA-0502000) Mode5: BLE to LTE Gateways_BLG840F, Cat-M1 Band28 Link + GPS On, Power by USB Adapter (GA-0502000) Mode6: BLE to LTE Gateways_BLG840F, NB-IoT Band1 Link + GPS On, Power by USB Adapter (GA-0502000) Mode7: BLE to LTE Gateways_BLG840F, NB-IoT Band3 Link + GPS On, Power by USB Adapter (GA-0502000) Mode8: BLE to LTE Gateways_BLG840F, NB-IoT Band8 Link + GPS On, Power by USB Adapter (GA-0502000) Mode9: BLE to LTE Gateways_BLG840F, NB-IoT Band20 Link + GPS On, Power by USB Adapter (GA-0502000) Mode10: BLE to LTE Gateways_BLG840F, NB-IoT Band28 Link + GPS On, Power by USB Adapter (GA-0502000) Mode11: BLE to LTE Gateways_BLG840X, Idle + GPS On, Power by USB Adapter (GA-0502000) Mode12: BLE to LTE Gateways_BLG40F, Idle + GPS On, Power by USB Adapter (GA-0502000) Mode13: BLE to LTE Gateways_BLG840E, Idle + GPS On, Power by USB Adapter (GA-0502000) Mode14: BLE to LTE Gateways_BLG840XE, Idle + GPS On, Power by USB Adapter (GA-0502000) Mode15: BLE to LTE Gateways_BLG40E, Idle + GPS On, Power by USB Adapter (GA-0502000) Mode16: BLE to LTE Gateways_BLE840F, Idle + GPS On, Power by USB Adapter (GA-0502000) Mode17: BLE to LTE Gateways_BLE840X, Idle + GPS On, Power by USB

	Adapter (GA-0502000) Mode18: BLE to LTE Gateways_BLE40F, Idle + GPS On, Power by USB Adapter (GA-0502000) Mode19: BLE to LTE Gateways_BLE840E, Idle + GPS On, Power by USB Adapter (GA-0502000) Mode20: BLE to LTE Gateways_BLE840XE, Idle + GPS On, Power by USB Adapter (GA-0502000) Mode21: BLE to LTE Gateways_BLE40E, Idle + GPS On, Power by USB Adapter (GA-0502000)
Final Test Mode	
EMI & EMS Mode	Mode1: BLE to LTE Gateways_BLG840F, Cat-M1 Band1 Link + GPS On, Power by USB Adapter (GA-0502000) Mode6: BLE to LTE Gateways_BLG840F, NB-IoT Band1 Link + GPS On, Power by USB Adapter (GA-0502000)

Note: After pretest mode, find the worst mode to do final test and record in this report.

2.3. General Requirements (EN 301489-1):

The performance criteria are used to take a decision on whether radio equipment passes or fails immunity tests.

For the purpose of the present document four categories of performance criteria apply:

- performance criteria for continuous phenomena applied to transmitters;
- performance criteria for transient phenomena applied to transmitters;
- performance criteria for continuous phenomena applied to receivers;
- performance criteria for transient phenomena applied to receivers.

Normally, the performance criteria depend on the type of radio equipment. Thus, the present document only contains general performance criteria commonly used for the assessment of radio equipment. More specific and product-related performance criteria for a dedicated type of radio equipment may be found in the part of EN 301 489 series dealing with the particular type of radio equipment.

Performance criteria for continuous phenomena applied to transmitters and receivers

If no further details are given in the relevant part of EN 301 489 series [i.13] dealing with the particular type of radio equipment, the following general performance criteria for continuous phenomena shall apply.

During and after the test, the equipment shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer when the equipment is used as intended. In some cases, this permissible performance level may be replaced by a permissible loss of performance.

During the test the EUT shall not unintentionally transmit or change its actual operating state and stored data.

If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

Performance criteria for transient phenomena applied to transmitters and receivers

If no further details are given in the relevant part of EN 301 489 series [i.13] dealing with the particular type of radio equipment, the following general performance criteria for transient phenomena shall apply.

For surges applied to symmetrically operated wired network ports intended to be connected directly to outdoor lines the following criteria applies:

- For products with only one symmetrical port intended for connection to outdoor lines, loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A SW reboot is not allowed. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

- For products with more than one symmetrical port intended for connection to outdoor lines, loss of function on the port under test is allowed, provided the function is self-recoverable. A SW reboot is not allowed. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

For all other ports the following applies:

- After the test, the equipment shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer, when the equipment is used as intended. In some cases, this permissible performance level may be replaced by a permissible loss of performance.

- During the EMC exposure to an electromagnetic phenomenon, a degradation of performance is, however, allowed. No change of the actual mode of operation (e.g. unintended transmission) or stored data is allowed.

- If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

Performance criteria for equipment which does not provide a continuous communication link

For radio equipment which does not provide a continuous communication link, the performance criteria described in clauses 6.1 and 6.2 are not appropriate, in these cases the manufacturer shall declare, for inclusion in the test report, his own specification for an acceptable level of performance or degradation of performance during and/or after the immunity tests. The performance specification shall be included in the product description and documentation. The related specifications set out in clause 5.3 have also to be taken into account.

The performance criteria specified by the manufacturer shall give the same degree of immunity protection as called for in clauses 6.1 and 6.2.

Performance criteria for ancillary equipment tested on a stand-alone basis

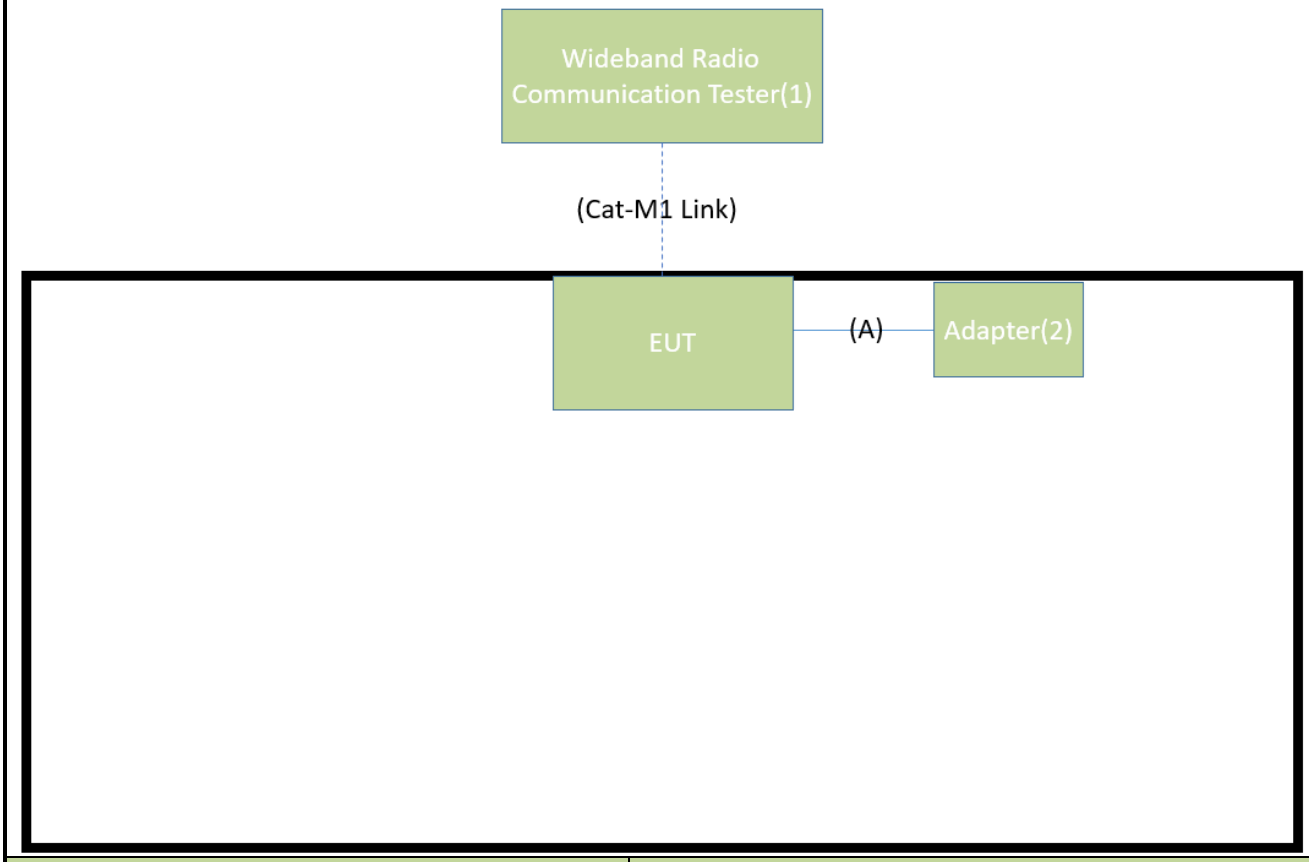
If ancillary equipment is intended to be tested on a standalone basis, the performance criteria described in clauses 6.1 and 6.2 are not appropriate, in these cases the manufacturer shall declare, for inclusion in the test report, his own specification for an acceptable level of performance or degradation of performance during and/or after the immunity tests. The performance specification shall be included in the product description and documentation. The related specifications set out in clause 5.3 have also to be taken into account.

The performance criteria specified by the manufacturer shall give the same degree of immunity protection as called for in clauses 6.1 and 6.2.

2.4. Configuration of Tested System

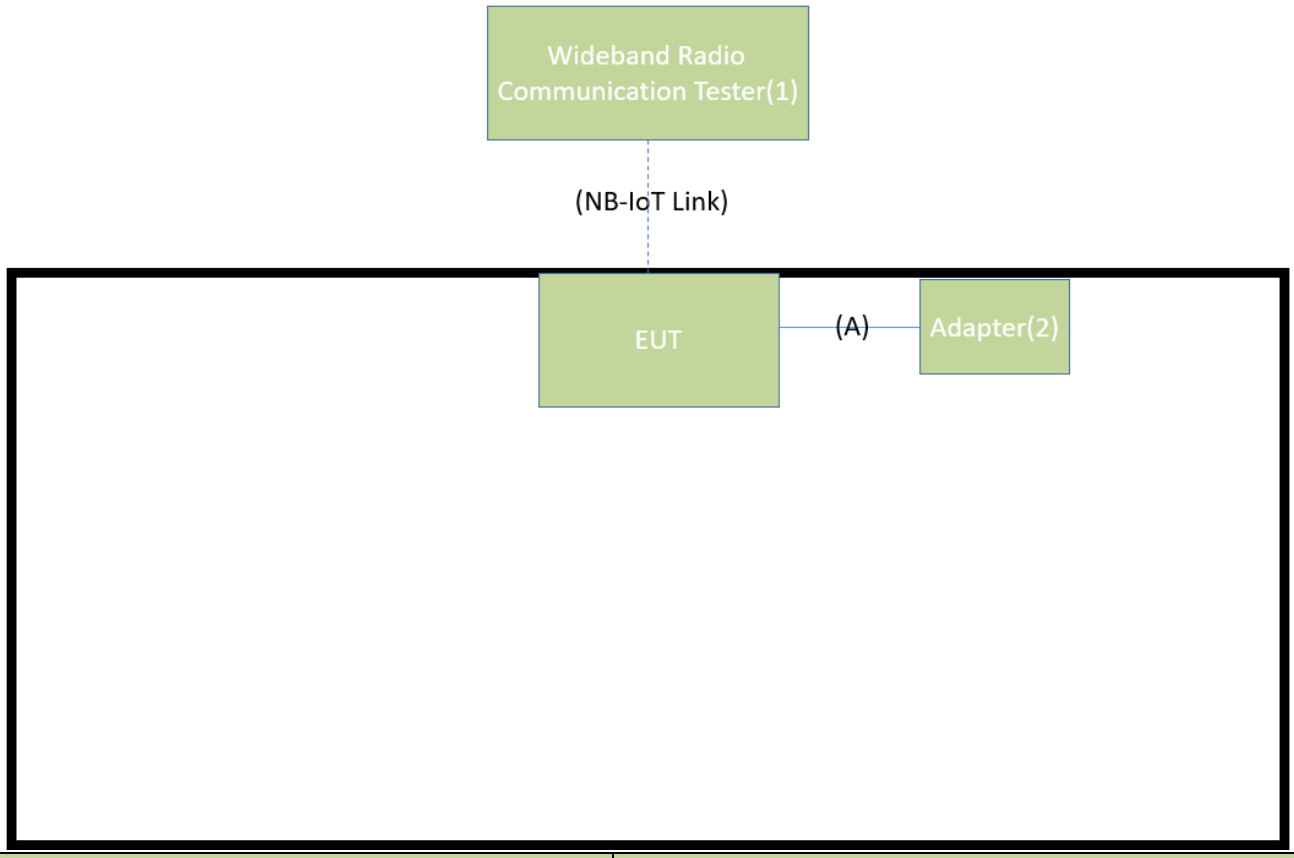
The EUT was tested per the guidance EN 301 489-1, EN 301 489-52 was used to reference the appropriate EUT setup for EMI testing and EMS conducted testing.

Connection Diagram (Mode 1)



Signal Cable Type		Signal Cable Description
A	USB Cable	Shielded, 2.0m

Connection Diagram (Mode 6)



	Signal Cable Type	Signal Cable Description
A	USB Cable	Shielded, 2.0m

2.5. Test System Details

The types for all equipment, and descriptions of all cables used in the tested system (including inserted cards) are:

Mode1/Mode6:

No.	Product	Manufacturer	Model No.	Serial No.	Power Cord
1	Wideband Radio Communication Tester	R&S	CMW500	127805	Non-shielded, 1.8m
2	Adapter	GAT	GA-0502000V	N/A	N/A

2.6. EUT Test Procedure

1.	Setup the EUT and simulators as shown on 2.4.
2.	Turn on the power of all equipment.
3.	Turn on the test software, make the EUT with full load.
4.	Start test.

2.7. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

3. DESCRIPTION OF TEST

3.1. Evaluation Procedure

The measurement procedures described in the Electromagnetic compatibility of multimedia equipment - Emission Requirements (EN 301 489-1, EN 301 489-52) was used in the measurement of the **BLG840F/X BLE/802.15.4 to LTE Gateways**

Deviation from measurement procedure…….....None

3.2. Measurement Uncertainty

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2

EMI Measurement Uncertainty

AC Conducted Emission Measurement – SR2
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.15MHz~30MHz: ± 2.53dB
Impedance Stabilization Network Measurement – SR2
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.15MHz~30MHz: ± 3.96dB
Radiated disturbance Measurement – AC1
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 9kHz~30MHz: ± 3.92dB 30MHz~1GHz: ± 4.25dB 1GHz~18GHz: ± 4.40dB 18GHz~40GHz: ± 4.45dB
Harmonic current emissions
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): The maximum measurement uncertainty is evaluated as ± 0.69%.
Voltage fluctuation and flicker
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): The maximum measurement uncertainty is evaluated as d_c and d_{max}: ± 0.04%, P_{st}: ± 0.25%, $d_{(t)}$: ± 1.5%.

EMS Measurement Uncertainty

Electrostatic discharge – SR4
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): Voltage: ± 1.9%; Timing: ± 6.9%
Radio-frequency electromagnetic field – AC1
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 80MHz~6GHz: ± 4.34dB.
Fast transients – SR3
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): Voltage: ± 1.6 %;Timing: ± 5.2%
Surges – SR3
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): Voltage: ± 3.6%, Current: ± 2.7%, Timing: ± 4.3%.
Radio-frequency continuous conducted – SR3
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ± 2.15dB (CDN); ± 3.3dB (EM Clamp)
Power-frequency magnetic field – SR3
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ± 0.33%
DIP – SR3
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): Voltage: ± 6.1%; Time: ± 5.5%

4. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions and Impedance Stabilization Network - SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cal. Date
Two-Line V-Network	R&S	ENV216	MRTTWA00019	1 year	2023/3/7
Two-Line V-Network	R&S	ENV216	MRTTWA00020	1 year	2023/4/20
8-Wire ISN (T8)	R&S	ENY81	MRTTWA00018	1 year	2022/7/29
EMI Test Receiver	R&S	ESR3	MRTTWA00009	1 year	2023/3/9

Radiated Disturbance – AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cal. Date
Broadband TRILOG Antenna	Schwarzbeck	VULB 9162	MRTTWA00001	1 year	2022/10/4
Broadband Horn antenna	Schwarzbeck	BBHA 9120D	MRTTWA00003	1 year	2023/3/30
Broadband Preamplifier	Schwarzbeck	BBV 9718	MRTTWA00005	1 year	2023/3/30
Signal Analyzer	R&S	FSV40	MRTTWA00007	1 year	2023/3/16
EMI Test Receiver	R&S	ESR3	MRTTWA00009	1 year	2023/3/9

EMI Test Software

Software	Manufacturer	Version No.
e3	Audix	9.160520a
EMI	Quietek	V3

Power Harmonics and Voltage Fluctuation and Flicker -SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cal. Date
Precision Power Analyzer	Newtons4th	PPA5511	MRTTWA00066	1 year	2022/8/16
Impedence Network	Newtons4th	IMP161	MRTTWA00067	1 year	2022/8/16
Programmable AC Power Source	Newtons4th	N4A03A	MRTTWA00068	1 year	2022/7/18

Electrostatic Discharge-SR4

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cal. Date
ESD Simulator	TESEQ	NSG 435	MRTTWA00049	1 year	2022/11/23

Radio-Frequency Electromagnetic Field – AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EXA Analog Signal Generator	KEYSIGHT	N5173B	MRTTWA00072	1 year	2023/1/10
Power Sensor	KEYSIGHT	U2021XA	MRTTWA00014	1 year	2023/4/20
Broadband Antenna	SCHWARZBECK	STLP 9129	MRTTWA00075	N/A	N/A
Field Probe	narda	PMM EP601	MRTTWA00076	1 year	2022/12/10
Power Amplifier	rflight	NTWPA-00810300	MRTTWA00077	N/A	N/A
Power Amplifier	rflight	NTWPA-1060100P	MRTTWA00085	N/A	N/A

Fast Transients-SR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cal. Date
Compact Immunity Test System	3cTest	CCS 600	MRTTWA00056	1 year	2022/11/24
EFT Clamp	3cTest	EFTC	MRTTWA00060	1 year	2022/11/24

Surges-SR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cal. Date
Compact Immunity Test System	3cTest	CCS 600	MRTTWA00056	1 year	2022/11/24
Corrbination Wave Surge Simulator	3cTest	CWS 600T	MRTTWA00057	1 year	2022/11/22
CDN	3cTest	CDN 405T8A1	MRTTWA00081	1 year	2023/5/4

Radio-Frequency Continuous Conducted -SR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Date
Conducted Immunity Tester	Frankonia	CIT-10/75	MRTTWA00051	1 year	2022/11/13
CDN	Frankonia	CDN M2+M3	MRTTWA00052	1 year	2022/11/21
CDN	R&S	ENY81 CA6	MRTTWA00017	1 year	2022/11/21
CDN	TESE Q	CDN ST08AS	MRTTWA00083	1 year	2022/9/29
EM Clamp	Frankonia	EMCL-20	MRTTWA00055	1 year	2022/11/21

Voltage Dips and Interruptions-SR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cal. Date
Compact Immunity Test System	3cTest	CCS 600	MRTTWA00056	1 year	2022/11/24
CDN	3cTest	VMT 2612S	MRTTWA00058	1 year	2022/11/23

5. Test Summary

Clause	Test Item	Test Standard	Result (Pass/Fail)	Remark
Emission Measurements				
EN 301 489-1 Clause 8.3 / 8.4	Conducted Emission	EN 55032 (2015+A11:2020)	Pass	---
EN 301 489-1 Clause 8.7	Impedance Stabilization Network	EN 55032 (2015+A11:2020)	N/A	---
EN 301 489-1 Clause 8.2	Radiated Emission	EN 55032 (2015+A11:2020)	Pass	---
EN 301 489-1 Clause 8.5	Harmonic current emissions	EN IEC 61000-3-2 (2019+A1:2021)	Pass	---
EN 301 489-1 Clause 8.6	Voltage fluctuations and flicker	EN 61000-3-3 (2013+A1:2019)	Pass	---
Immunity Measurements				
EN 301 489-1 Clause 9.3	Electrostatic discharge	IEC 61000-4-2 (2008)	Pass	---
EN 301 489-1 Clause 9.2	Radio-frequency electromagnetic field	IEC 61000-4-3 (2006+AMD1: 2007+AMD2:2010)	Pass	LTE Data can refer to Appendix B.
EN 301 489-1 Clause 9.4	Fast transients, common mode	IEC 61000-4-4 (2012)	Pass	---
EN 301 489-1 Clause 9.8	Surges	IEC 61000-4-5 (2014/AMD1:2017)	Pass	---
EN 301 489-1 Clause 9.5	Radio-Frequency Continuous Conducted	IEC 61000-4-6 (2013/COR1:2015)	Pass	LTE Data can refer to Appendix B.
EN 301 489-1 Clause 9.7	Voltage dips and interruptions	IEC 61000-4-11 (2020)	Pass	---

Note1: Determining compliance is based on the test results met the regulation limits or requirements declared by clients, and the test results don't take into account the value of measurement uncertainty.
Note2: The EUT not LAN port, so do not need to test Impedance Stabilization Network.

6. Conducted Emission and Impedance Stabilization Network Measurement

6.1. Test Limit

Limits of conducted emission for AC mains power input/output ports		
Frequency range MHz	Limits dB(μV)	
	Class A	
	Quasi-peak	Average
0.15 to 0.50	79	66
0.50 to 30	73	60
Frequency range MHz	Class B	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

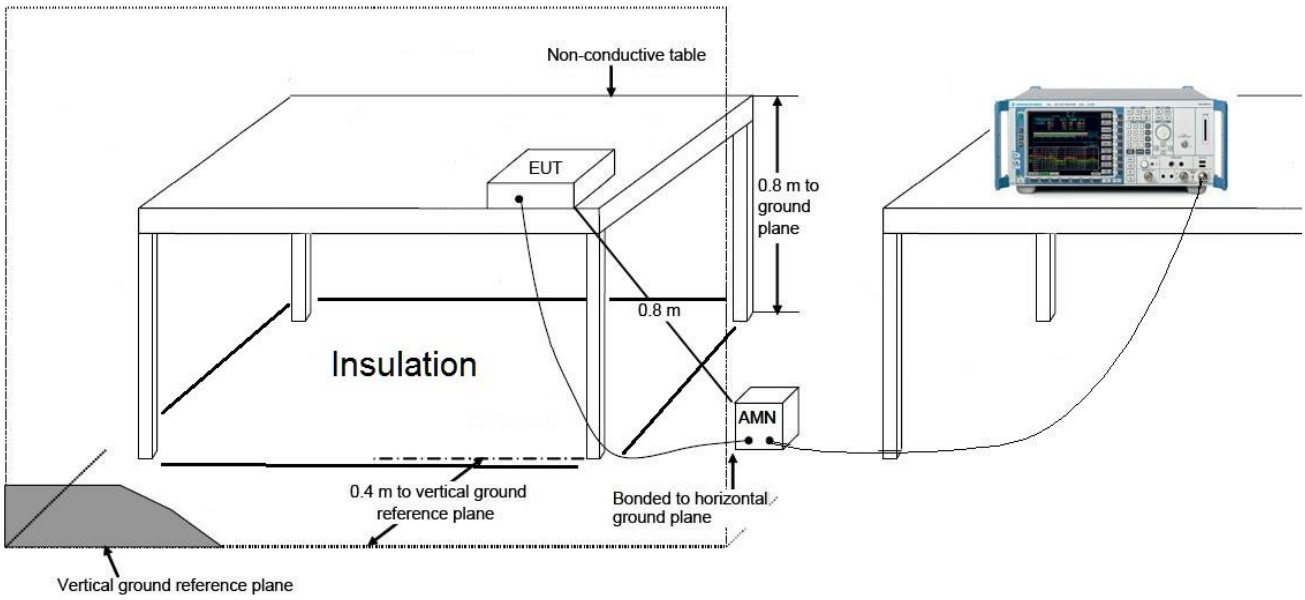
Limits of conducted emission for telecommunication ports				
Frequency range MHz	Limits dB(μV)			
	Class A		Class B	
	Quasi-peak	Average	Quasi-peak	Average
0.15 to 0.50	97 to 87	84 to 74	84 to 74	74 to 64
0.50 to 30	87	74	74	64

Note 1: The lower limit shall apply at the transition frequencies.

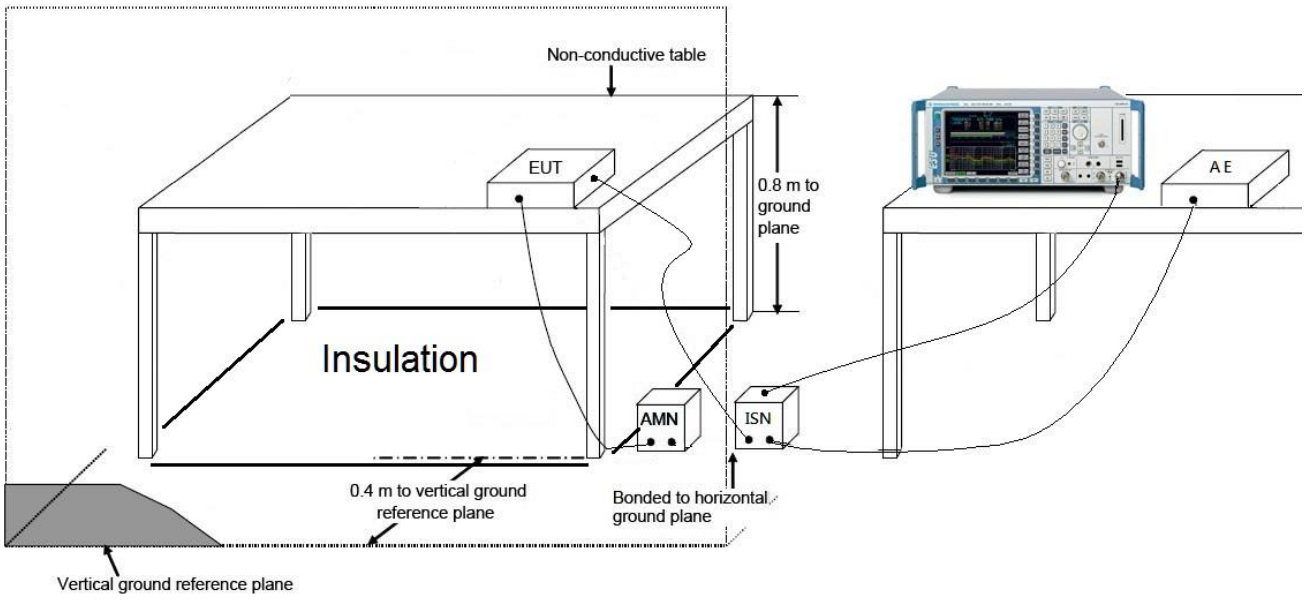
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

6.2. Test Setup

Conducted Emission Test Setup:



Impedance Stabilization Network Test Setup:



6.3. Test Procedure

The receiver or associated equipment under measurement and the artificial mains network are disposed as shown in 2.3. Measurements shall be carried out using a selective voltmeter having a quasi-peak detector for broadband measurements and an Average detector for arrow-band measurements in accordance with CISPR 16-2.

The mains lead shall be arranged to follow the shortest possible path between the receiver and artificial mains network on the ground. The mains lead in excess of 0,8 m separating the equipment under test from the artificial mains network shall be folded back and forth parallel to the lead so as to form a bundle with a length of 0,3 m to 0,4 m.

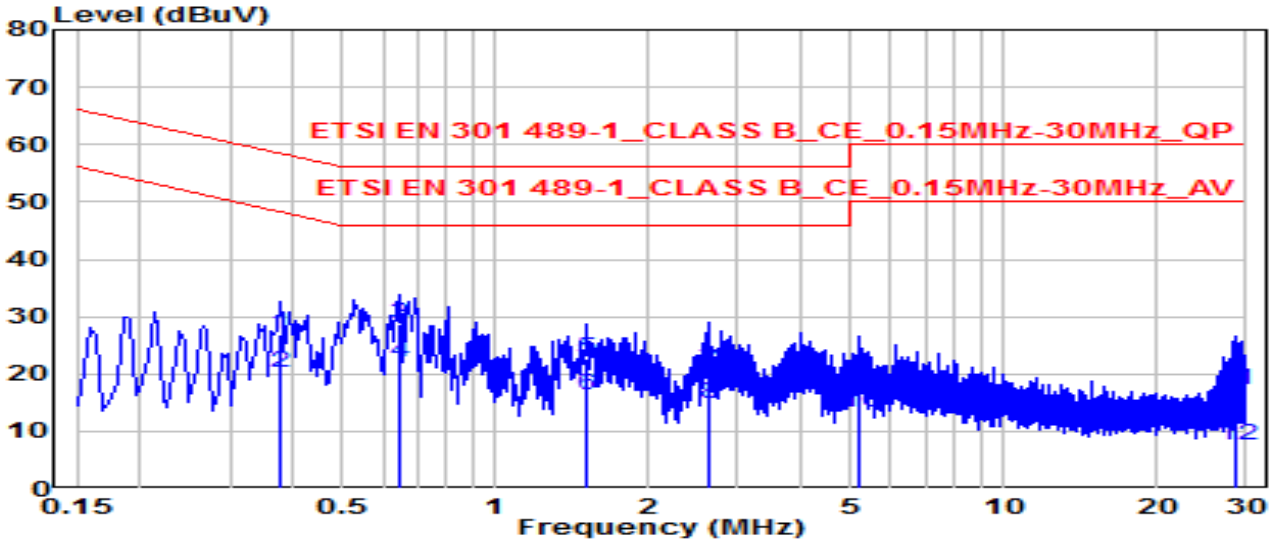
Earthing of the equipment under test if provided with a safety earth connection, shall be made to the earth terminal provided on the artificial mains network with the shortest possible lead.

If the equipment under test has a coaxial RF input connector, tests shall be performed with and without an earth connection made to the outer conductor screen of the coaxial RF input connector. When these tests are being carried out, no other earth connections shall be made to any additional earth terminal whatever.

If the equipment under test has no coaxial RF input connector and if it has an earth terminal, tests shall be performed with this terminal earthed.

6.4. Test Result

EUT	BLG840F/X BLE/802.15.4 to LTE Gateways	Date of Test	2022-06-23
Factor	CE_ENV216-L1 (Filter ON)	Temp. / Humidity	25.2°C /54%
Polarity	Line1	Site / Test Engineer	SR2 / Amber
Test Mode	Mode1	Test Voltage	AC 230V/50Hz



No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1		0.375	17.32	9.63	26.95	-31.44	58.39	QP
2		0.375	10.50	9.63	20.14	-28.25	48.39	Average
3	*	0.645	19.02	9.65	28.67	-27.33	56.00	QP
4	*	0.645	12.26	9.65	21.91	-24.09	46.00	Average
5		1.518	12.85	9.68	22.53	-33.47	56.00	QP
6		1.518	6.63	9.68	16.31	-29.69	46.00	Average
7		2.616	10.97	9.70	20.67	-35.33	56.00	QP
8		2.616	5.23	9.70	14.93	-31.07	46.00	Average
9		5.176	8.76	9.75	18.51	-41.49	60.00	QP
10		5.176	3.55	9.75	13.30	-36.70	50.00	Average
11		28.533	7.25	9.92	17.17	-42.83	60.00	QP
12		28.533	-2.32	9.92	7.59	-42.41	50.00	Average

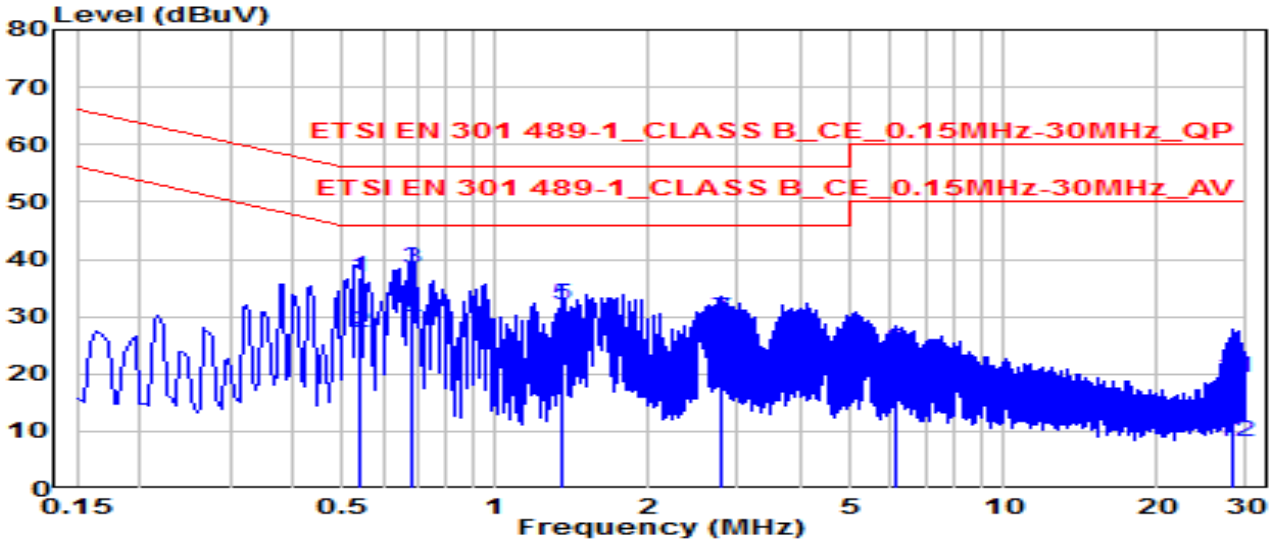
Note:

1. " *", means this data is the worst emission level.

2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).

3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).

EUT	BLG840F/X BLE/802.15.4 to LTE Gateways	Date of Test	2022-06-23
Factor	CE_ENV216-N (Filter ON)	Temp. / Humidity	25.2°C /54%
Polarity	Neutral	Site / Test Engineer	SR2 / Amber
Test Mode	Mode1	Test Voltage	AC 230V/50Hz



No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1		0.541	27.22	9.64	36.87	-19.13	56.00	QP
2		0.541	17.44	9.64	27.09	-18.91	46.00	Average
3	*	0.685	28.83	9.65	38.49	-17.51	56.00	QP
4	*	0.685	19.62	9.65	29.28	-16.72	46.00	Average
5		1.347	22.19	9.68	31.86	-24.14	56.00	QP
6		1.347	11.56	9.68	21.24	-24.76	46.00	Average
7		2.778	19.77	9.71	29.48	-26.52	56.00	QP
8		2.778	10.38	9.71	20.08	-25.92	46.00	Average
9		6.166	14.26	9.78	24.04	-35.96	60.00	QP
10		6.166	5.12	9.78	14.90	-35.10	50.00	Average
11		28.340	9.23	10.05	19.27	-40.73	60.00	QP
12		28.340	-1.97	10.05	8.07	-41.93	50.00	Average

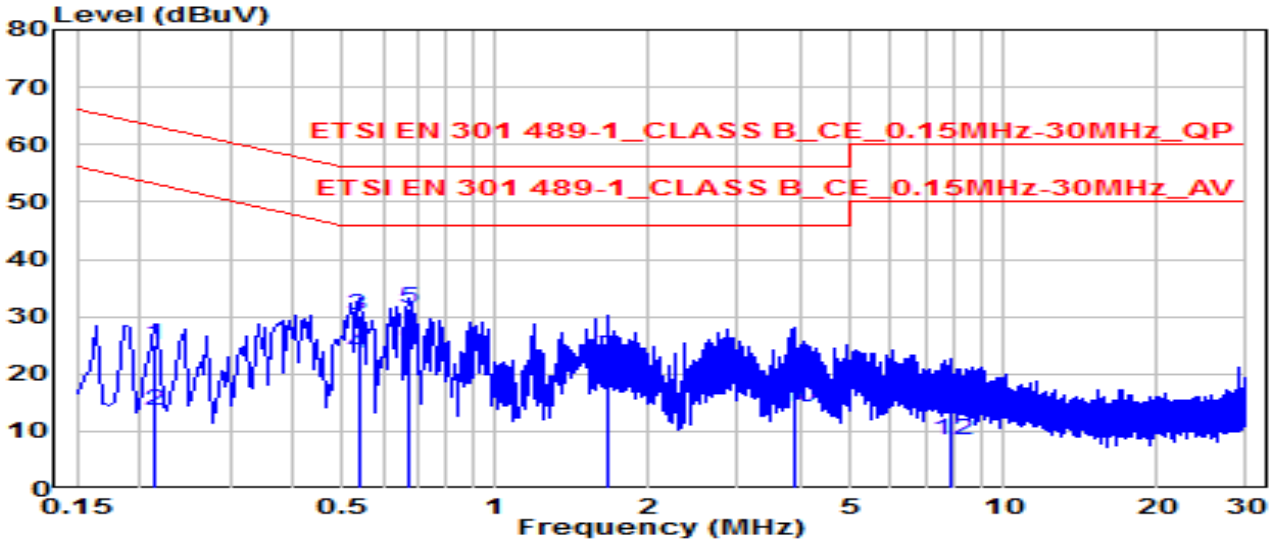
Note:

1. " *", means this data is the worst emission level.

2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).

3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).

EUT	BLG840F/X BLE/802.15.4 to LTE Gateways	Date of Test	2022-06-23
Factor	CE_ENV216-L1 (Filter ON)	Temp. / Humidity	25.2°C /54%
Polarity	Line1	Site / Test Engineer	SR2 / Amber
Test Mode	Mode6	Test Voltage	AC 230V/50Hz



No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1		0.213	15.58	9.62	25.20	-37.88	63.09	QP
2		0.213	3.89	9.62	13.52	-39.57	53.09	Average
3		0.537	20.49	9.64	30.14	-25.86	56.00	QP
4		0.537	13.83	9.64	23.48	-22.52	46.00	Average
5	*	0.676	21.67	9.65	31.33	-24.67	56.00	QP
6	*	0.676	15.05	9.65	24.70	-21.30	46.00	Average
7		1.675	13.33	9.68	23.01	-32.99	56.00	QP
8		1.675	7.02	9.68	16.70	-29.30	46.00	Average
9		3.871	10.69	9.73	20.41	-35.59	56.00	QP
10		3.871	4.36	9.73	14.09	-31.91	46.00	Average
11		7.853	3.23	9.81	13.04	-46.96	60.00	QP
12		7.853	-1.46	9.81	8.35	-41.65	50.00	Average

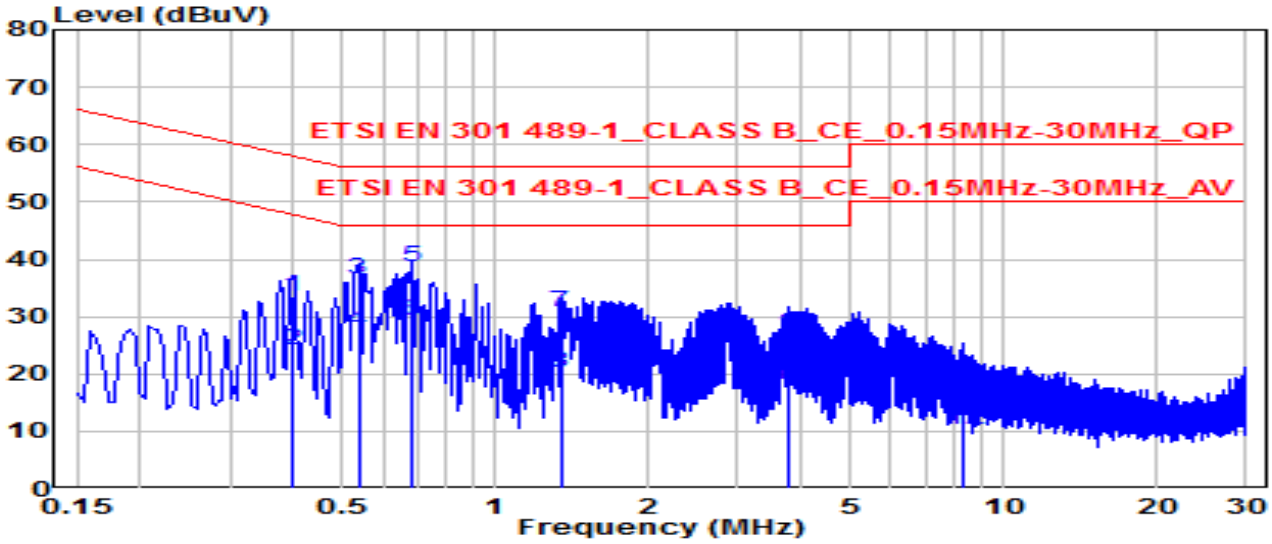
Note:

1. " *", means this data is the worst emission level.

2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).

3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).

EUT	BLG840F/X BLE/802.15.4 to LTE Gateways	Date of Test	2022-06-23
Factor	CE_ENV216-N (Filter ON)	Temp. / Humidity	25.2°C /54%
Polarity	Neutral	Site / Test Engineer	SR2 / Amber
Test Mode	Mode6	Test Voltage	AC 230V/50Hz



No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1		0.397	23.95	9.63	33.59	-24.32	57.91	QP
2		0.397	14.47	9.63	24.11	-23.80	47.91	Average
3		0.537	26.96	9.64	36.60	-19.40	56.00	QP
4		0.537	17.81	9.64	27.45	-18.55	46.00	Average
5	*	0.681	28.93	9.65	38.58	-17.42	56.00	QP
6	*	0.681	19.77	9.65	29.42	-16.58	46.00	Average
7		1.342	21.05	9.68	30.72	-25.28	56.00	QP
8		1.342	10.68	9.68	20.36	-25.64	46.00	Average
9		3.763	17.26	9.73	26.98	-29.02	56.00	QP
10		3.763	8.41	9.73	18.14	-27.86	46.00	Average
11		8.299	7.85	9.83	17.68	-42.32	60.00	QP
12		8.299	0.43	9.83	10.25	-39.75	50.00	Average

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).

6.5. Test Photo

Test Mode: Mode 1/Mode 6

Description: Front View of Conducted Emission Test Setup

Test Mode: Mode 1/Mode 6

Description: Back View of Conducted Emission Test Setup

7. Radiated Emission Measurement

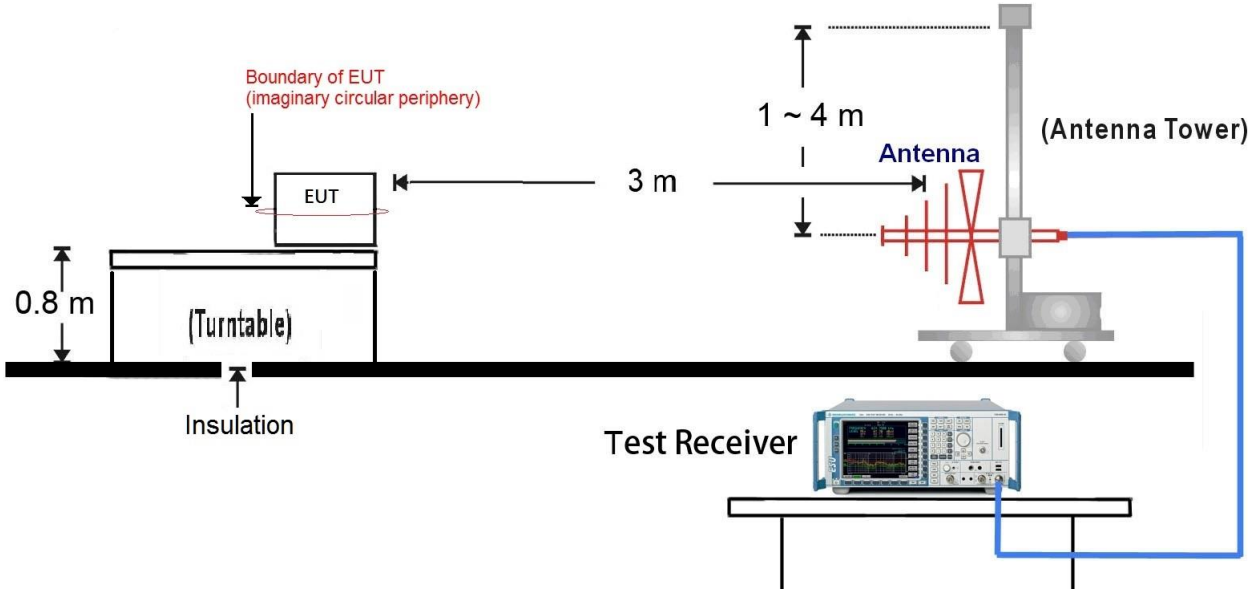
7.1. Test Limit

Frequency range (MHz)	Quasi-peak limits dB(μV/m)	
	Class A	Class B
30 to 230	50	40
230 to 1000	57	47
Note 1: The lower limit shall apply at the transition frequency. Note 2: Additional provisions may be required for cases where interference occurs.		

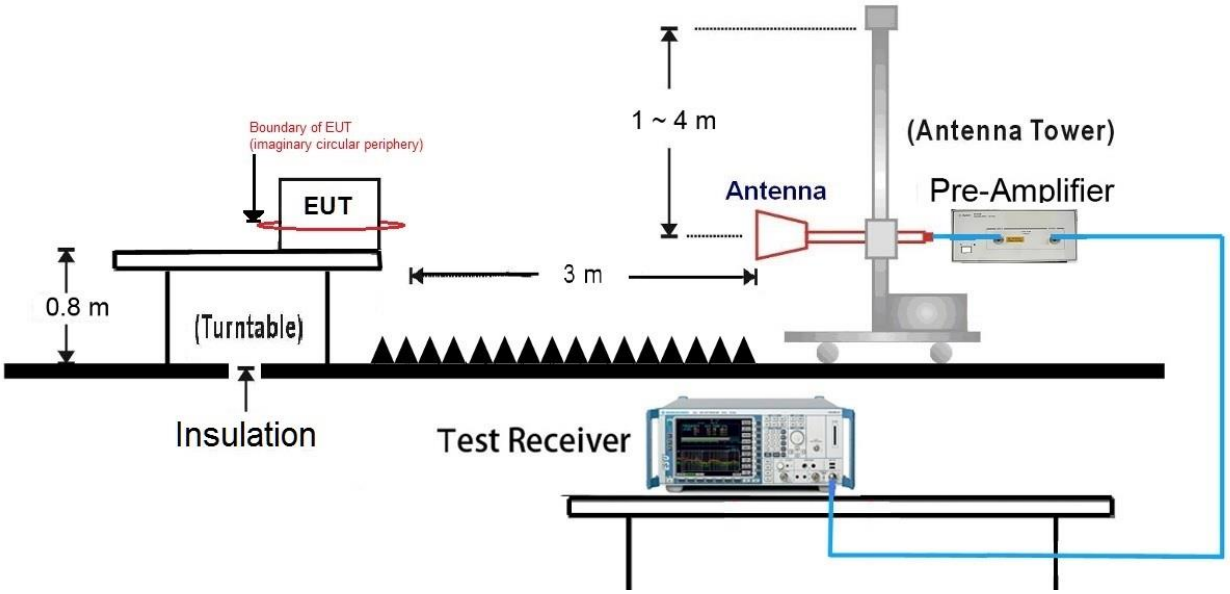
Frequency range GHz	Average limit dB(μV/m)		Peak limit dB(μV/m)	
	Class A	Class B	Class A	Class B
1 to 3	56	50	76	70
3 to 6	60	54	80	74
Note: The lower limit applies at the transition frequency.				

7.2. Test Setup

30MHz ~ 1GHz Test Setup:



1GHz ~ 6GHz Test Setup:



Note: About the radiated test setup, the EUT and local AE shall be arranged in the most compact practical arrangement within the test volume, while respecting typical spacing and the requirements defined in EN55032 Annex D. The central point of the arrangement shall be positioned at the centre of the turntable. The measurement distance is the shortest horizontal distance between an imaginary circular periphery just encompassing this arrangement and the calibration point of the antenna. See below Figure 1 and Figure 2.

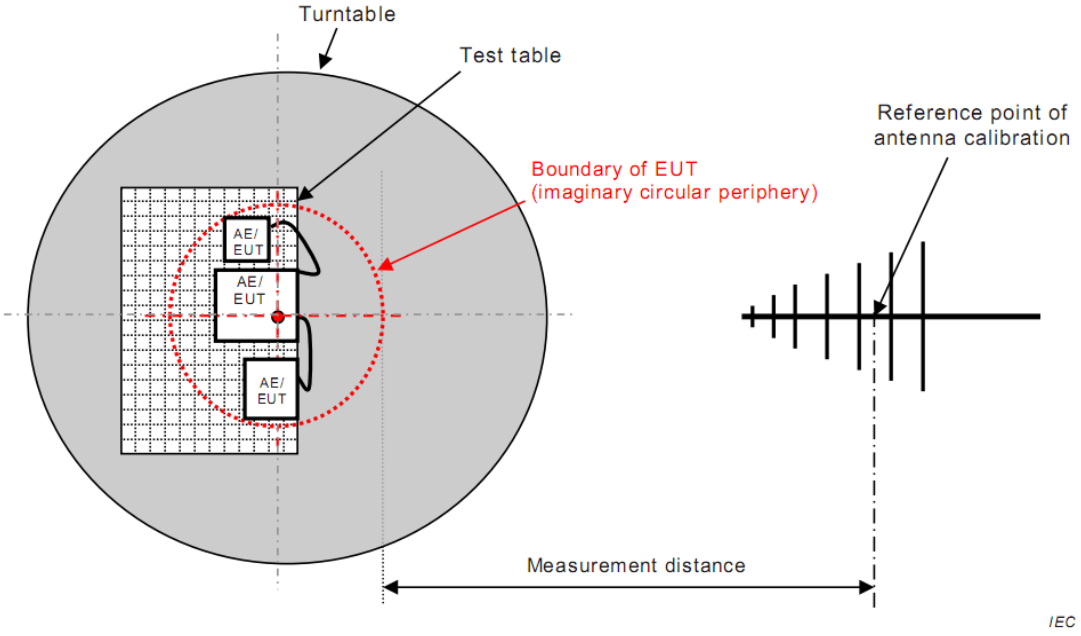


Figure 1

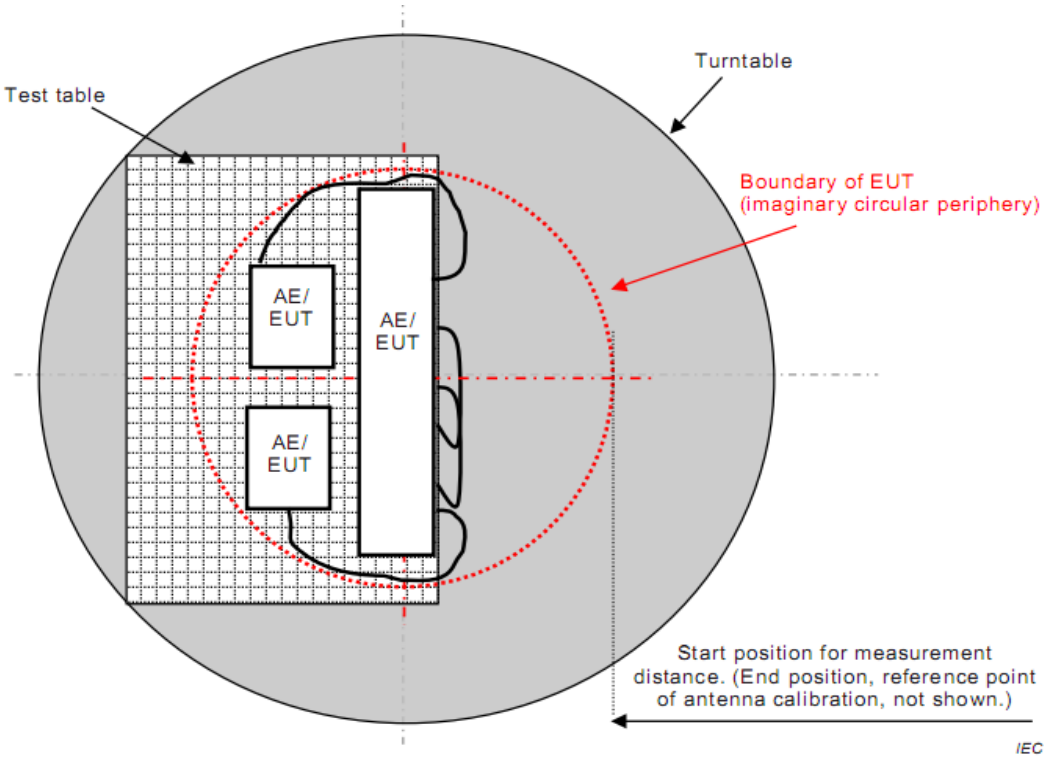


Figure 2

7.3. Test Procedure

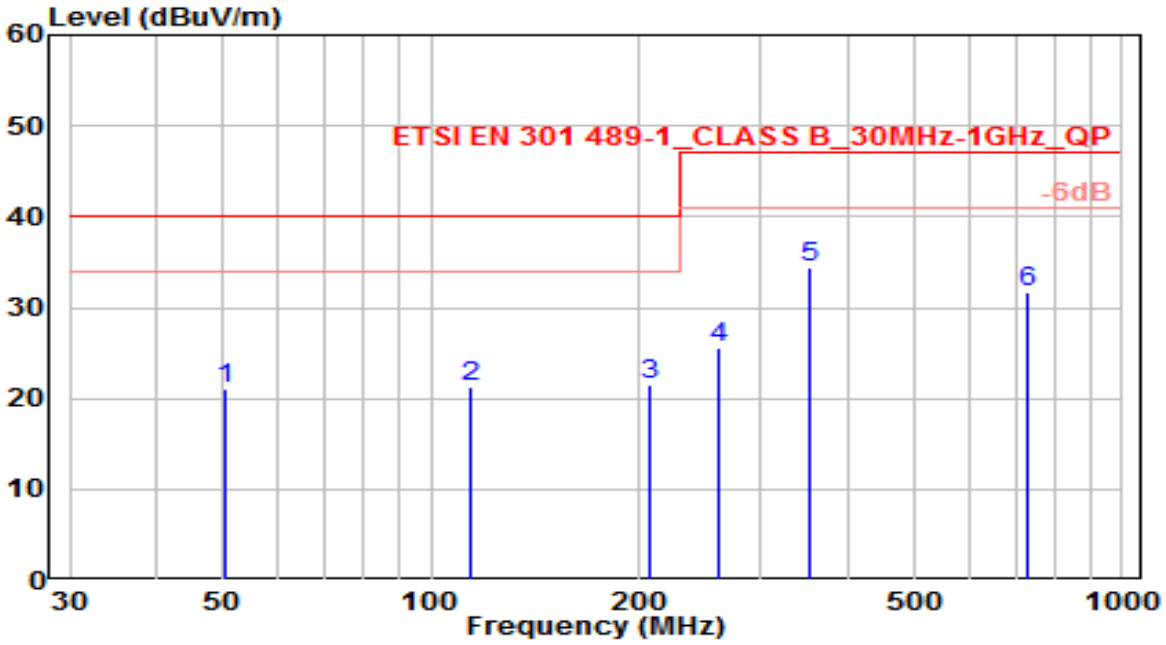
Starting with the front of the receiver under test facing the measuring antenna, the measuring antenna is adjusted for horizontal polarization measurement and its height varied between 1 m and 4 m until the maximum reading is obtained.

The central point of the arrangement shall be positioned at the centre of the turntable and rotate the turntable until the maximum meter reading is obtained, after which the measuring antenna height is again varied between 1 m and 4 m and the maximum reading noted.

The procedure is repeated for vertical polarization of the measuring antenna.
The highest value found, following this procedure, is defined as the radiation figure of the receiver.
If at certain frequencies the ambient signal field strength is high at the position of the receiving antenna, one of the following methods may be used to show compliance of the equipment under test.
a) For small frequency bands with high ambient signals, the disturbance value may be interpolated from the adjacent values. The interpolated value shall lie on the curve describing a continuous function of the disturbance values adjacent to the ambient noise.
b) Another possibility is to use the method described in annex A of CISPR 16-2-3.

7.4. Test Result

EUT	BLG840F/X BLE/802.15.4 to LTE Gateways	Date of Test	2022-06-22
Factor	VULB 9162	Temp. / Humidity	22°C /57%
Polarity	Horizontal	Site / Test Engineer	AC1 / Kaunaz
Test Mode	Mode1	Test Voltage	AC 230V/50Hz

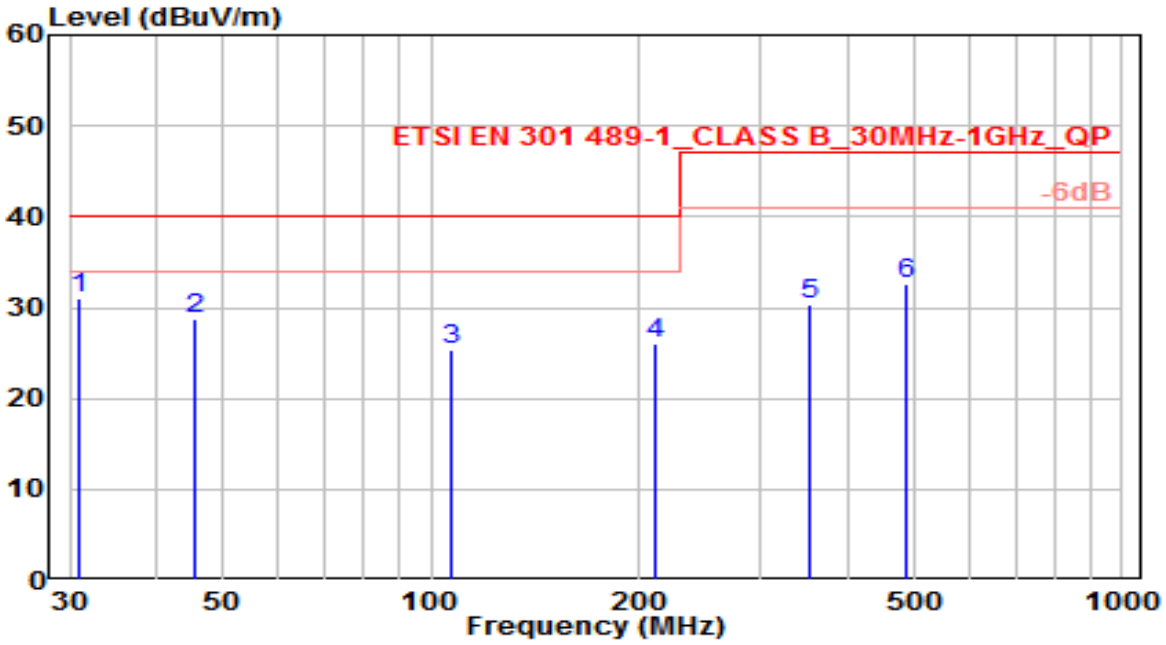


No		Frequency (MHz)	Reading (dBuV)	C.F (dB/m)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		50.370	-0.44	21.39	20.95	-19.05	40.00	100	310	QP
2		114.390	2.96	18.25	21.21	-18.79	40.00	100	240	QP
3		206.540	2.75	18.71	21.46	-18.54	40.00	100	65	QP
4		260.860	4.81	20.87	25.68	-21.32	47.00	100	240	QP
5	*	353.010	11.18	23.20	34.38	-12.62	47.00	100	245	QP
6		732.280	1.88	29.77	31.64	-15.36	47.00	100	115	QP

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	BLG840F/X BLE/802.15.4 to LTE Gateways	Date of Test	2022-06-22
Factor	VULB 9162	Temp. / Humidity	22°C /57%
Polarity	Vertical	Site / Test Engineer	AC1 / Kaunaz
Test Mode	Mode1	Test Voltage	AC 230V/50Hz

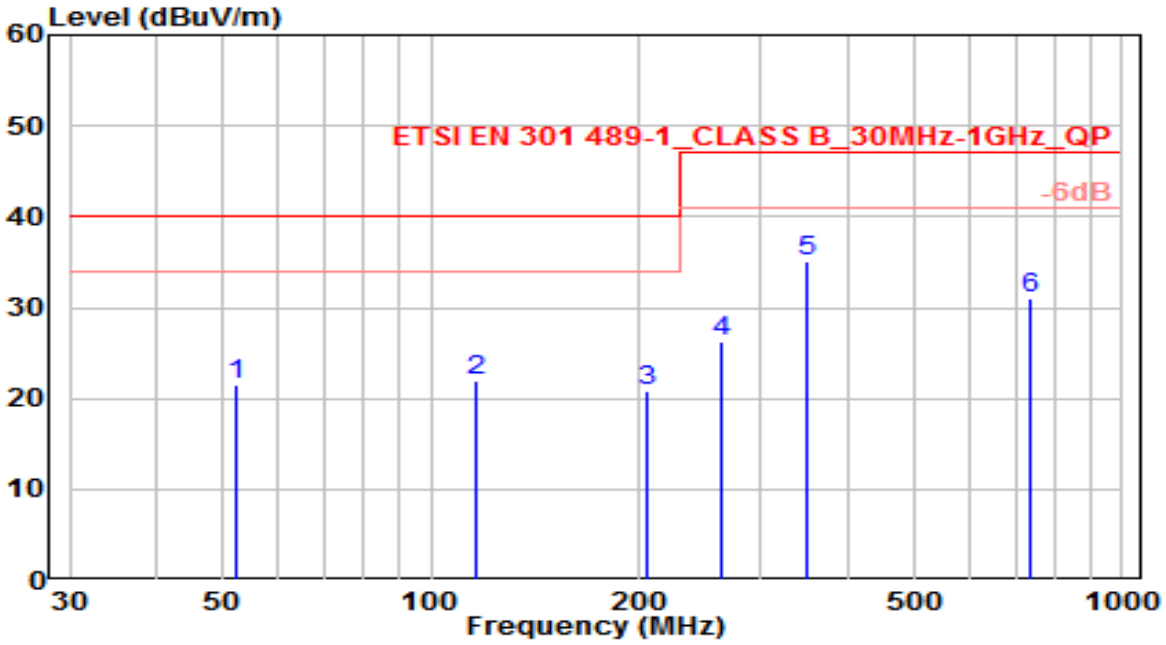


No		Frequency (MHz)	Reading (dBuV)	C.F (dB/m)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	30.970	13.84	17.26	31.10	-8.90	40.00	100	135	QP
2		45.520	7.38	21.32	28.70	-11.30	40.00	100	220	QP
3		106.630	6.41	18.97	25.38	-14.62	40.00	100	55	QP
4		210.420	7.36	18.71	26.07	-13.93	40.00	100	300	QP
5		353.010	7.06	23.20	30.26	-16.74	47.00	100	160	QP
6		487.840	6.95	25.70	32.65	-14.35	47.00	100	295	QP

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	BLG840F/X BLE/802.15.4 to LTE Gateways	Date of Test	2022-06-22
Factor	VULB 9162	Temp. / Humidity	22°C /57%
Polarity	Horizontal	Site / Test Engineer	AC1 / Kaunaz
Test Mode	Mode6	Test Voltage	AC 230V/50Hz

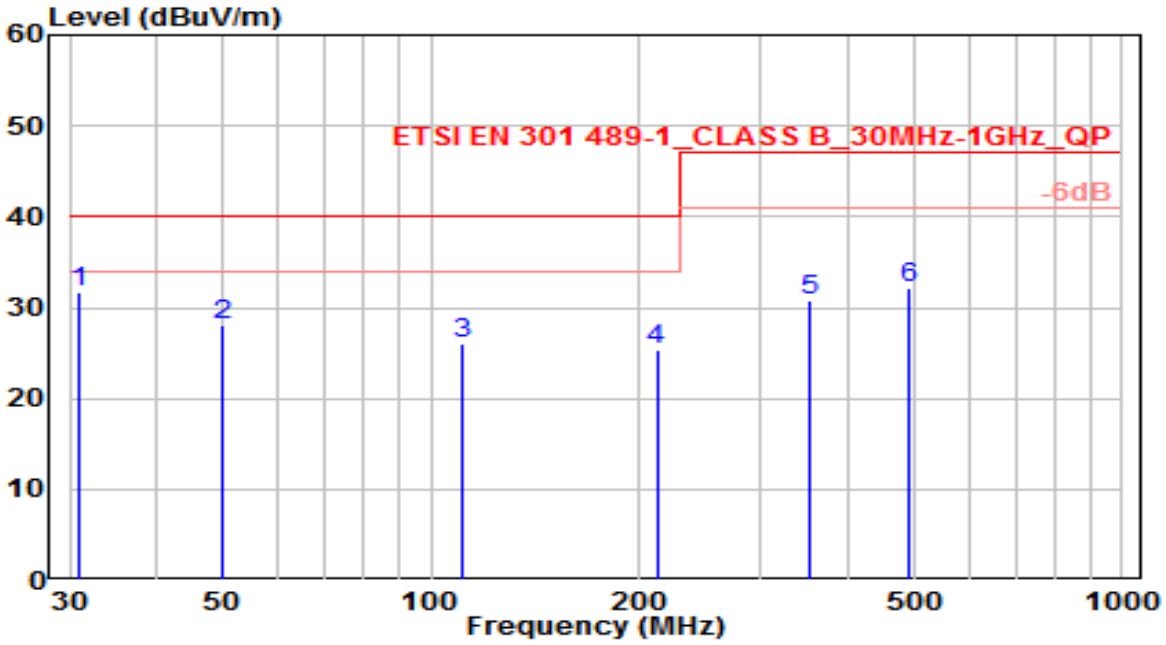


No		Frequency (MHz)	Reading (dBuV)	C.F (dB/m)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		52.130	0.48	21.12	21.60	-18.40	40.00	100	310	QP
2		116.240	3.85	18.02	21.87	-18.13	40.00	100	240	QP
3		204.880	2.09	18.72	20.81	-19.19	40.00	100	65	QP
4		262.510	5.46	20.88	26.34	-20.66	47.00	100	240	QP
5	*	351.330	11.86	23.16	35.02	-11.98	47.00	100	245	QP
6		734.100	1.31	29.79	31.10	-15.90	47.00	100	115	QP

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	BLG840F/X BLE/802.15.4 to LTE Gateways	Date of Test	2022-06-22
Factor	VULB 9162	Temp. / Humidity	22°C /57%
Polarity	Vertical	Site / Test Engineer	AC1 / Kaunaz
Test Mode	Mode6	Test Voltage	AC 230V/50Hz

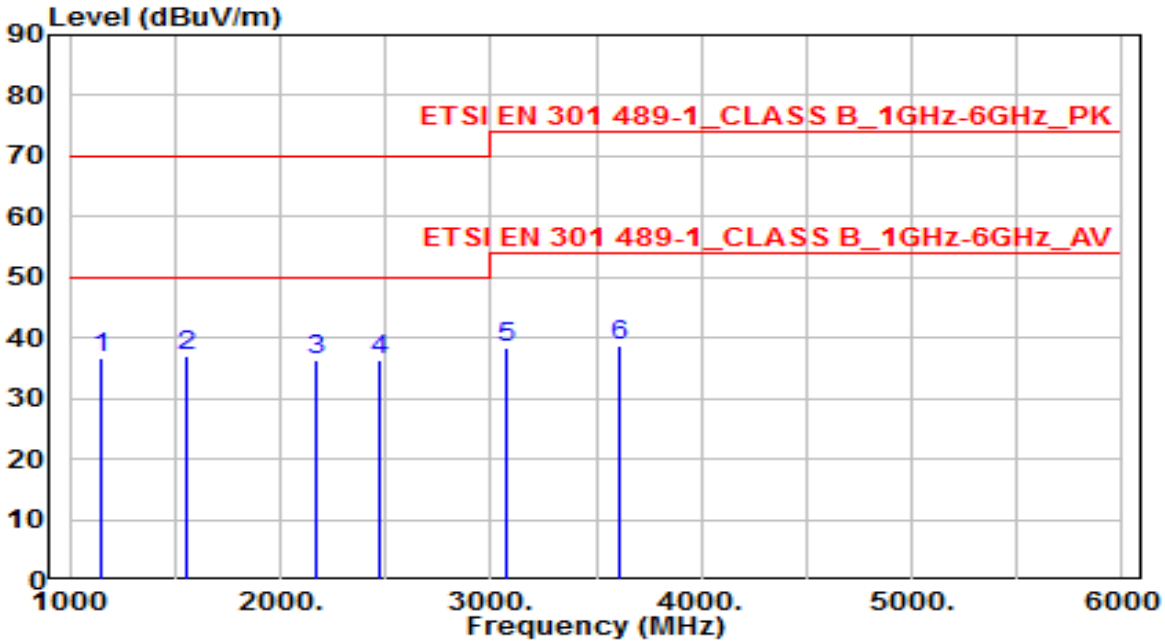


No		Frequency (MHz)	Reading (dBuV)	C.F (dB/m)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	30.910	14.51	17.24	31.75	-8.25	40.00	100	135	QP
2		50.090	6.60	21.44	28.04	-11.96	40.00	100	220	QP
3		111.130	7.36	18.67	26.03	-13.97	40.00	100	55	QP
4		212.060	6.64	18.78	25.42	-14.58	40.00	100	300	QP
5		352.180	7.72	23.18	30.90	-16.10	47.00	100	160	QP
6		489.390	6.35	25.74	32.09	-14.91	47.00	100	295	QP

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	BLG840F/X BLE/802.15.4 to LTE Gateways	Date of Test	2022-06-23
Factor	BBHA 9120D	Temp. / Humidity	22°C /57%
Polarity	Horizontal	Site / Test Engineer	AC1 / Kaunaz
Test Mode	Mode1	Test Voltage	AC 230V/50Hz

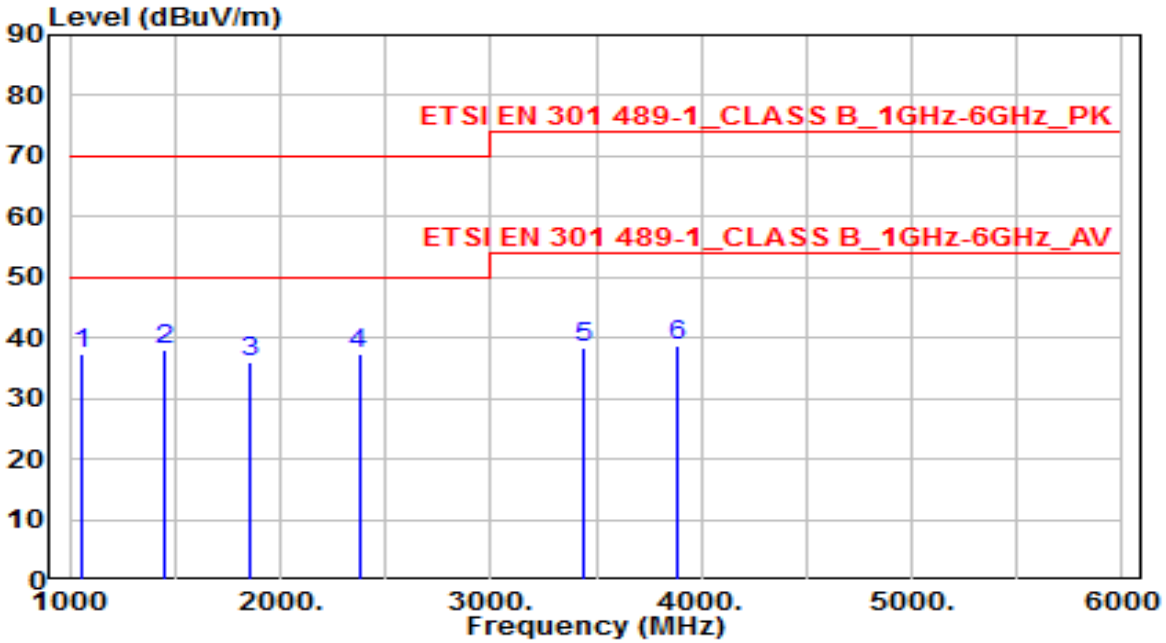


No		Frequency (MHz)	Reading (dBuV)	C.F (dB/m)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		1148.125	42.23	-5.66	36.57	-33.43	70.00	150	360	Peak
2	*	1552.031	41.05	-4.10	36.95	-33.05	70.00	150	360	Peak
3		2174.844	39.18	-2.72	36.46	-33.54	70.00	150	360	Peak
4		2469.844	38.09	-1.79	36.30	-33.70	70.00	150	360	Peak
5		3070.781	40.06	-1.70	38.36	-35.64	74.00	150	360	Peak
6		3617.188	38.68	0.04	38.72	-35.28	74.00	150	360	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB) – Preamplifier(dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	BLG840F/X BLE/802.15.4 to LTE Gateways	Date of Test	2022-06-23
Factor	BBHA 9120D	Temp. / Humidity	22°C /57%
Polarity	Vertical	Site / Test Engineer	AC1 / Kaunaz
Test Mode	Mode1	Test Voltage	AC 230V/50Hz

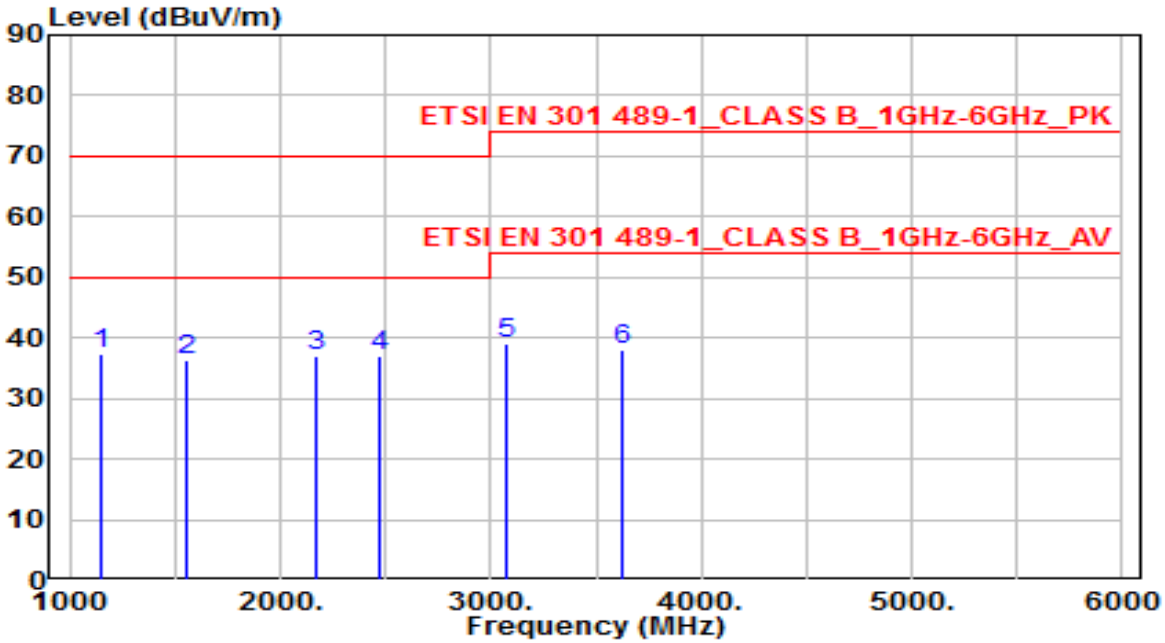


No		Frequency (MHz)	Reading (dBuV)	C.F (dB/m)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		1051.875	43.31	-6.06	37.25	-32.75	70.00	150	360	Peak
2	*	1445.781	42.40	-4.42	37.98	-32.02	70.00	150	360	Peak
3		1856.563	39.67	-3.54	36.13	-33.87	70.00	150	360	Peak
4		2374.063	39.48	-2.09	37.39	-32.61	70.00	150	360	Peak
5		3446.250	38.93	-0.45	38.48	-35.52	74.00	150	360	Peak
6		3880.469	37.98	0.73	38.70	-35.30	74.00	150	360	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB) – Preamplifier(dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	BLG840F/X BLE/802.15.4 to LTE Gateways	Date of Test	2022-06-23
Factor	BBHA 9120D	Temp. / Humidity	22°C /57%
Polarity	Horizontal	Site / Test Engineer	AC1 / Kaunaz
Test Mode	Mode6	Test Voltage	AC 230V/50Hz

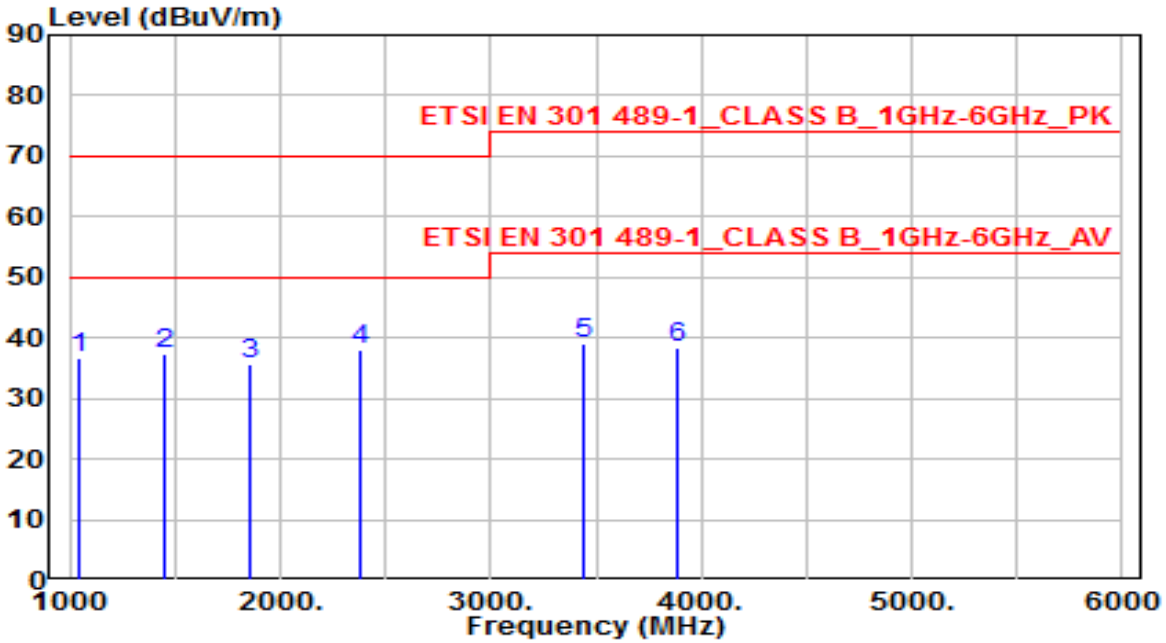


No		Frequency (MHz)	Reading (dBuV)	C.F (dB/m)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	1149.885	42.87	-5.65	37.22	-32.78	70.00	150	360	Peak
2		1553.881	40.48	-4.10	36.38	-33.62	70.00	150	360	Peak
3		2173.184	39.84	-2.72	37.11	-32.89	70.00	150	360	Peak
4		2471.494	38.74	-1.78	36.96	-33.04	70.00	150	360	Peak
5		3069.101	40.71	-1.71	39.00	-35.00	74.00	150	360	Peak
6		3619.008	38.13	0.04	38.17	-35.83	74.00	150	360	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB) – Preamplifier(dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	BLG840F/X BLE/802.15.4 to LTE Gateways	Date of Test	2022-06-23
Factor	BBHA 9120D	Temp. / Humidity	22°C /57%
Polarity	Vertical	Site / Test Engineer	AC1 / Kaunaz
Test Mode	Mode6	Test Voltage	AC 230V/50Hz



No		Frequency (MHz)	Reading (dBuV)	C.F (dB/m)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		1050.485	42.66	-6.06	36.60	-33.40	70.00	150	360	Peak
2		1447.351	41.75	-4.42	37.33	-32.67	70.00	150	360	Peak
3		1857.983	39.10	-3.53	35.57	-34.43	70.00	150	360	Peak
4	*	2375.753	40.13	-2.08	38.05	-31.95	70.00	150	360	Peak
5		3444.910	39.59	-0.45	39.13	-34.87	74.00	150	360	Peak
6		3882.079	37.51	0.73	38.24	-35.76	74.00	150	360	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB) – Preamplifier(dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

7.5. Test Photo

Test Mode: Mode1/ Mode6

Description: Radiated Disturbance Test Setup (30MHz ~ 1GHz)

Test Mode: Mode1/ Mode6

Description: Radiated Disturbance Test Setup (1GHz ~ 6GHz)

8. Harmonic Current Emissions

8.1. Limit of Harmonic Current Emissions

Limits of Class A Harmonics Currents

Harmonics Order n	Maximum Permissible harmonic current A	Harmonics Order n	Maximum Permissible harmonic current A
Odd harmonics		Even harmonics	
3	2.30	2	1.08
5	1.14	4	0.43
7	0.77	6	0.30
9	0.40	8 ≤ n ≤ 40	0.23 * 8/n
11	0.33	--	--
13	0.21	--	--
15 ≤ n ≤ 39	0.15 * 15/n	--	--

Limits of Class B Harmonics Currents

For Class B equipment, the harmonic of the input current shall not exceed the maximum permissible values given in table that is the limit of Class A multiplied by a factor of 1.5.

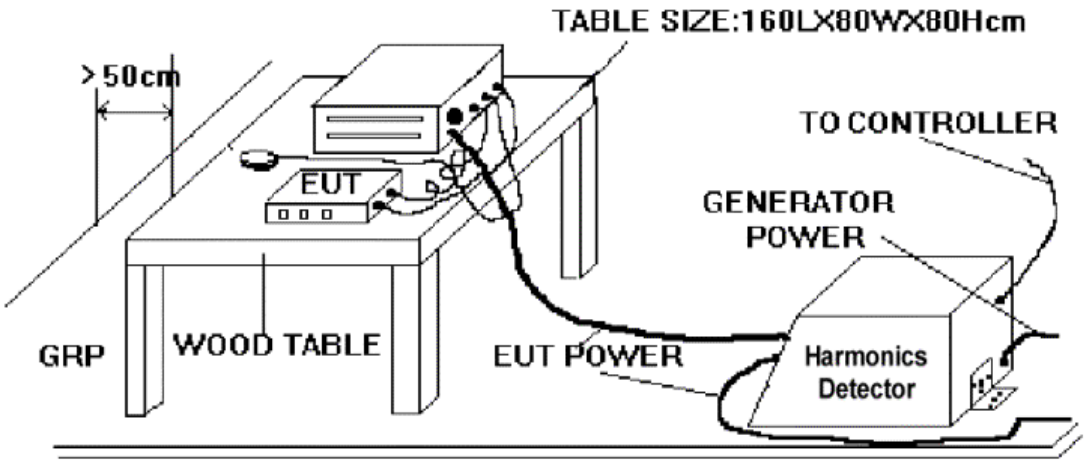
Limits of Class C Harmonics Currents

Harmonics Order n	Maximum Permissible harmonic current Expressed as a percentage of the input current at the fundamental frequency %
2	2
3	30 · λ*
5	10
7	7
9	5
11 ≤ n ≤ 39 (odd harmonics only)	3
∗λ is the circuit power factor	

Limits of Class D Harmonics Currents

Harmonics Order n	Maximum Permissible harmonic current per watt mA/W	Maximum Permissible harmonic current A
3	3.4	2.30
5	1.9	1.14
7	1.0	0.77
9	0.5	0.40
11	0.35	0.33
$11 \leq n \leq 39$ (odd harmonics only)	3.85/n	See limit of Class A

8.2. Test Setup



8.3. Test Procedure

The EUT is supplied in series with power analyzer from a power source having the same normal voltage and frequency as the rated supply voltage and the equipment under test. And the rated voltage at the supply voltage of EUT of 0.98 times and 1.02 times shall be performed.

With the exception of lighting equipment section 7 of the IEC 61000-3-2 standard declares that no Harmonic current limits are specified for equipment with a rated power of 75W or less.

8.4. Test Result

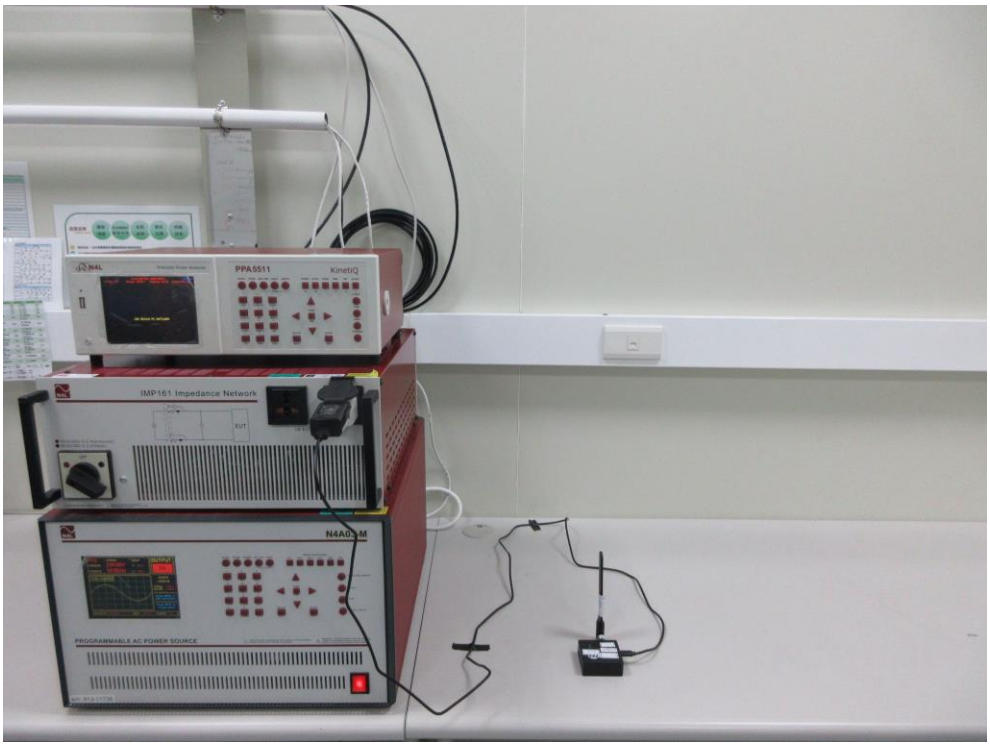
Instrument Details (Mode1)		
Instrument Model	PPA5511	
Serial Number	162-04880	
Firmware Version	2.185	
Instrument Version	Standard	
Test Settings		
Class	Class A	
Mode	Measured	
Equipment Under Test		
Brand	Fanstel	
Model	BLG840F	
Serial	N/A	
Impedance Network ID	IMP161	
Test Conditions		
	User Entered	**Measured**
Rated Voltage	230.000V	230.196V
Rated Current	2.000A	4.591mA
Rated Frequency	50.000Hz	50.000Hz
Rated Power	10.000W	161.289mW
Additional Test Information		
Measured Power Factor	0.1908	
Max Current THD	0.00%	
Max THC	30.047mA	
Max Power	212.919mW	
Max F.Current	2.239mA	
Average F.Current	1.524mA	
Minimum Current	100A	
Test Duration	3.0 minutes	
Additional Test Details		
Operator	Amber	
Lab Name	MRT-Taiwan	
Location	SR2	
Results	**Test - N/A.** **Rated Power < 75W**	

Instrument Details (Mode6)		
Instrument Model	PPA5511	
Serial Number	162-04880	
Firmware Version	2.185	
Instrument Version	Standard	
Test Settings		
Class	Class A	
Mode	Measured	
Equipment Under Test		
Brand	Fanstel	
Model	BLG840F	
Serial	N/A	
Impedance Network ID	IMP161	
Test Conditions		
	User Entered	**Measured**
Rated Voltage	230.000V	230.105V
Rated Current	2.000A	2.172mA
Rated Frequency	50.000Hz	50.000Hz
Rated Power	10.000W	141.306mW
Additional Test Information		
Measured Power Factor	0.4714	
Max Current THD	0.00%	
Max THC	30.103mA	
Max Power	201.632mW	
Max F.Current	2.162mA	
Average F.Current	1.478mA	
Minimum Current	100A	
Test Duration	3.0 minutes	
Additional Test Details		
Operator	Amber	
Lab Name	MRT-Taiwan	
Location	SR2	
Results	**Test - N/A.** **Rated Power < 75W**	

8.5. Test Photograph

Test Mode: Mode1/ Mode6

Description: Harmonic Current Emissions Test Setup



9. Voltage Fluctuations and Flicker

9.1. Limit of Voltage Fluctuations and Flicker

The following limits apply:

- the value of P_{st} shall not be greater than 1.0;
- the $_{value}$ of P_{lt} shall not be greater than 0.65;
- the $_{value}$ of d(t) during a voltage change shall not exceed 3.3% for more than 500ms;
- the $_{relative}$ steady-state voltage change, d_c, shall not exceed 3.3%;
- the $_{maximum}$ relative voltage change, d_{max}, shall not exceed;

a) 4% without additional conditions;

b) 6% for equipment which is:

- switched manually, or
- switched automatically more frequently than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds), or manual restart, after a power supply interruption.

NOTE: The cycling frequency will be further limited by the P_{st} and P_{lt} limit.

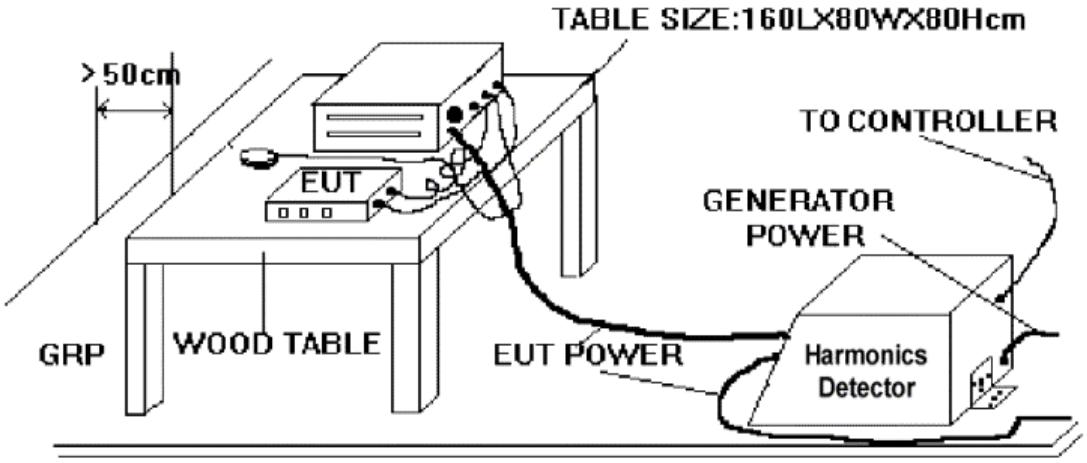
For example: a d_{max} of 6% producing a rectangular voltage change characteristic twice per hour will give a P_{lt} of about 0.65.

c) 7% for equipment which is:

- attended whilst in use (for example: hair dryers, vacuum cleaners, kitchen equipment such as mixers, garden equipment such as lawn mowers, portable tools such as electric drills), or
- switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds) or manual restart, after a power supply interruption.

P_{st} and P_{1t} requirements shall not be applied to voltage changes caused by manual switching.

9.2. Test Setup



9.3. Test Procedure

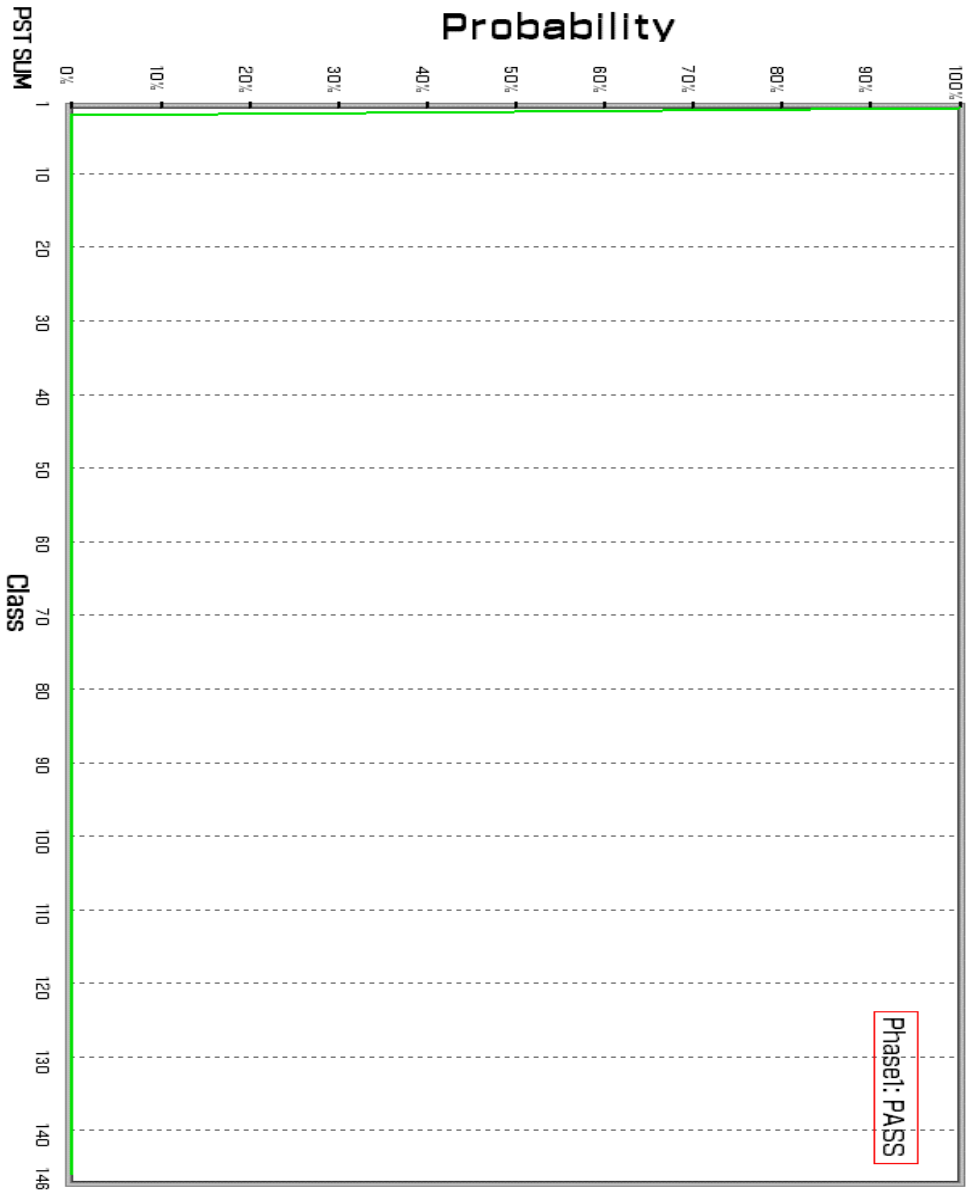
The EUT is supplied in series with power analyzer from a power source having the same normal voltage and frequency as the rated supply voltage and the equipment under test. And the rated voltage at the supply voltage of EUT of 0.98 times and 1.02 times shall be performed.

9.4. Test Result

Instrument Details (Mode1)		
Instrument Model	PPA5511	
Serial Number	162-04880	
Firmware Version	2.185	
Instrument Version	Standard	
Source Details		
Source Model	N4A03	
Source Serial	91J-11738	
Source Frequency	50Hz	
Source Voltage RMS	230V	
Test Settings		
Class	Voltage	
Mode	Normal (4%)	
Minimum Current	10A	
PST	10.00 minutes	
PLT	1 PSTs	
Equipment Under Test		
Brand	Fanstel	
Model	BLG840F	
Serial	N/A	
Impedance Network ID	IMP161	
Test Conditions		
	User Entered	**Measured**
Rated Voltage	230.000V	230.159V
Rated Current	2.000A	N/A
Rated Frequency	50.000Hz	50.000Hz
Rated Power	10.000W	N/A
D max	0.0485% (Limit: 4.0%)	
T max	0.0000 s (Limit: 0.5 s)	
DC max	0.0033% (Limit: 3.3%)	
Additional Test Details		
Operator	Amber	
Lab Name	MRT-Taiwan	
Location	SR2	

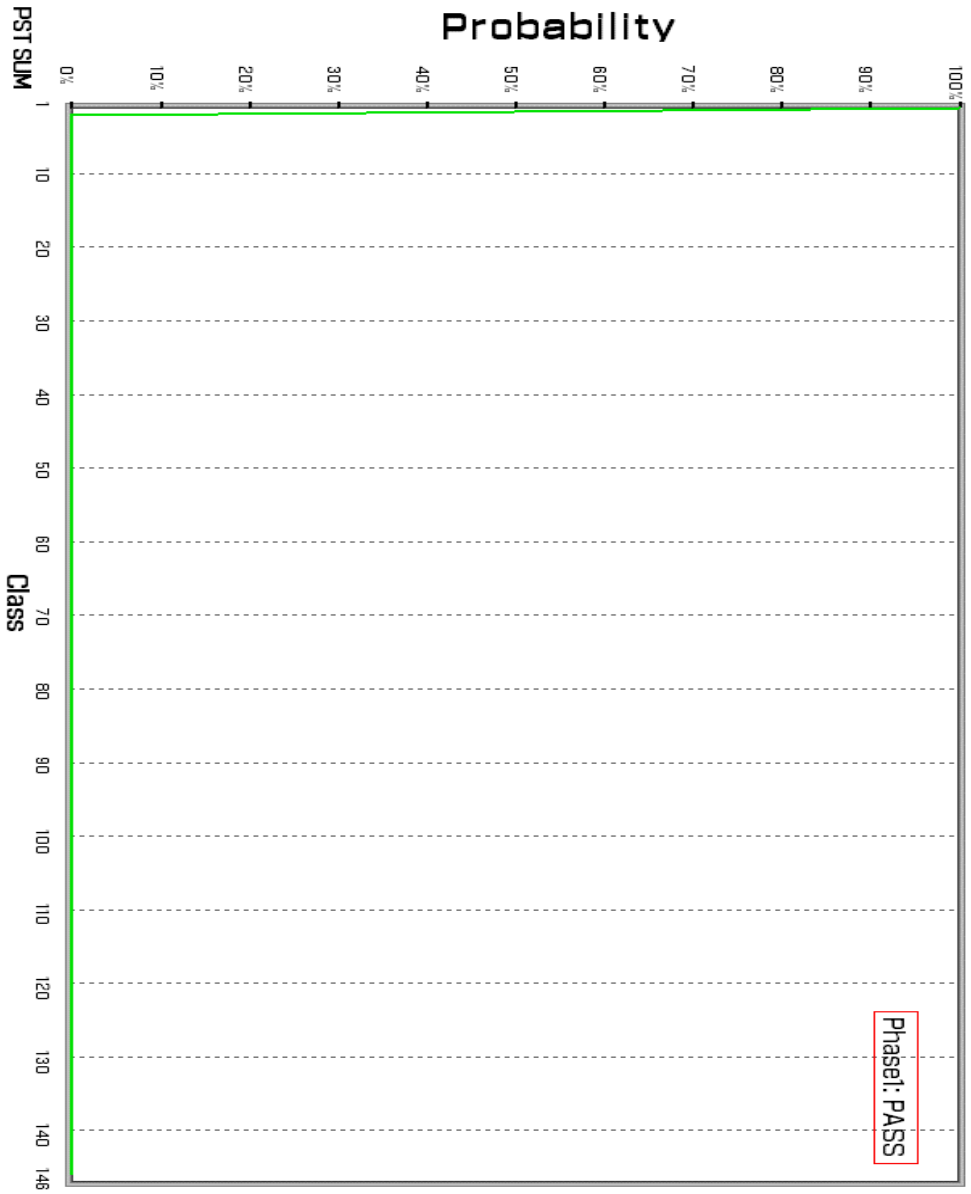
Results	Phase1: PASS

Flicker Test Results								
PST no.	Status	DC (%)	Dmax (%)	Tmax (s)	PST	PST Lim	PLT	PLT Lim
1	Phase1: PASS	0.00334	0.04851	0.00000	0.08226	1.00000	0.08226	0.65000



Instrument Details (Mode6)		
Instrument Model	PPA5511	
Serial Number	162-04880	
Firmware Version	2.185	
Instrument Version	Standard	
Source Details		
Source Model	N4A03	
Source Serial	91J-11738	
Source Frequency	50Hz	
Source Voltage RMS	230V	
Test Settings		
Class	Voltage	
Mode	Normal (4%)	
Minimum Current	10A	
PST	10.00 minutes	
PLT	1 PSTs	
Equipment Under Test		
Brand	Fanstel	
Model	BLG840F	
Serial	N/A	
Impedance Network ID	IMP161	
Test Conditions		
	User Entered	**Measured**
Rated Voltage	230.000V	230.121V
Rated Current	2.000A	N/A
Rated Frequency	50.000Hz	50.000Hz
Rated Power	10.000W	N/A
D max	0.0415% (Limit: 4.0%)	
T max	0.0000 s (Limit: 0.5 s)	
DC max	0.0069% (Limit: 3.3%)	
Additional Test Details		
Operator	Amber	
Lab Name	MRT-Taiwan	
Location	SR2	
Results	**Phase1: PASS**	

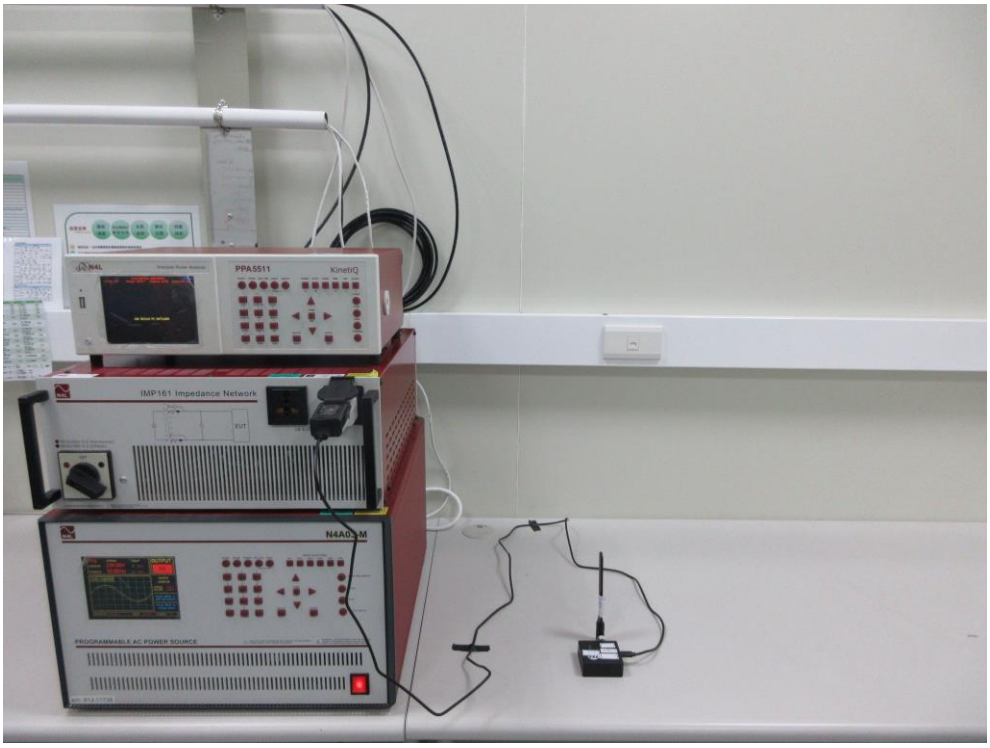
Flicker Test Results								
PST no.	Status	DC (%)	Dmax (%)	Tmax (s)	PST	PST Lim	PLT	PLT Lim
1	Phase1: PASS	0.00687	0.04151	0.00000	0.08226	1.00000	0.08226	0.65000



9.5. Test Photograph

Test Mode: Mode1/ Mode6

Description: Voltage Fluctuations and Flicker Test Setup

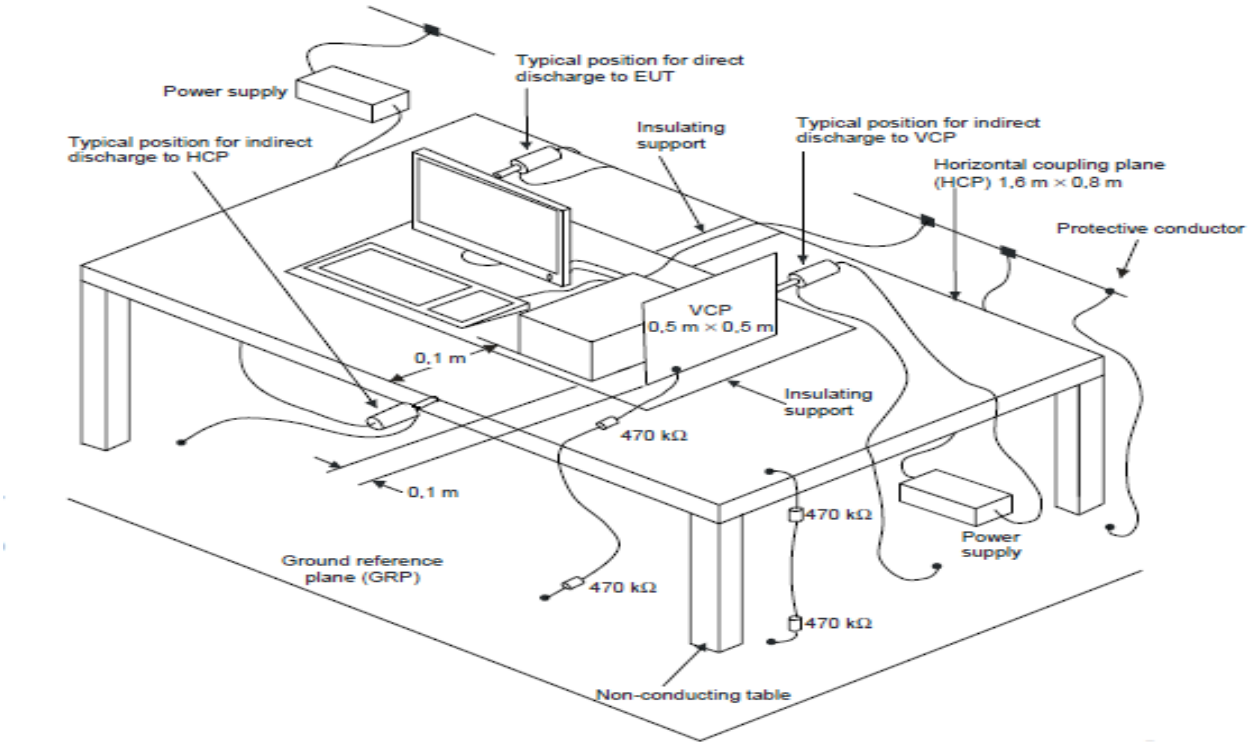


10. Electrostatic Discharge

10.1. Limit of Electrostatic Discharge

Environmental phenomenon	Test specification	Units	Performance criterion
Enclosure port			
Electrostatic discharge	± 4 (Contact discharge) ± 8 (Air discharge)	kV (Charge voltage) kV (Charge voltage)	TT/TR (B)

10.2. Test Setup



10.3. Test Procedure

Direct application of discharges to the EUT:

Contact discharge was applied only to conductive surfaces of the EUT.

Air discharges were applied only to non-conductive surfaces of the EUT.

During the test, it was performed with single discharges. For the single discharge time between successive single discharges will be keep longer 1 second. It was at least twenty-five single discharges with positive and negative at the same selected point.

The selected point, which was performed with electrostatic discharge, was marked on the red label of the EUT.

Indirect application of discharges to the EUT:

Vertical Coupling Plane (VCP):

The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from the EUT, with the Discharge Electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge. It was at least twenty-five single discharges with positive and negative at the same selected point.

Horizontal Coupling Plane (HCP):

The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge. It was at least twenty-five single discharges with positive and negative at the same selected point.

10.4. Test Result

EUT	BLG840F/X BLE/802.15.4 to LTE Gateways	Date of Test	2022/7/27
Site	SR4	Temp.	24°C
Test Engineer	Tim	Humidity	47%
Test Mode	Mode1	Test Voltage	AC 230V/50Hz

Air Discharge (10 Discharges @ Per Test Point)					
Test Location	Test Level (kV) & Test Result criterion		Performance criterion	Result	Observation
	+8	-8			
1~18	TT/TR (A)	TT/TR (A)	TT/TR (B)	Pass	Note1

Note1: There is no any degradation of performance and function, and the test result criterion was A.

Contact Discharge (10 Discharges @ Per Test Point)					
Test Location	Test Level (kV) & Test Result criterion		Performance criterion	Result	Observation
	+4	-4			
1	TT/TR (A)	TT/TR (A)	TT/TR (B)	Pass	Note1

Note1: There is no any degradation of performance and function, and the test result criterion was A.

Horizontal Coupling (10 Discharges @ Per Test Point)					
Test Location	Test Level (kV) & Test Result criterion		Performance criterion	Result	Observation
	+4	-4			
Horizontal	TT/TR (A)	TT/TR (A)	TT/TR (B)	Pass	Note1

Note1: There is no any degradation of performance and function, and the test result criterion was A.

Vertical Coupling (10 Discharges @ Per Test Point)					
Test Location	Test Level (kV) & Test Result criterion		Performance criterion	Result	Observation
	+4	-4			
Front	TT/TR (A)	TT/TR (A)	TT/TR (B)	Pass	Note1
Rear	TT/TR (A)	TT/TR (A)	TT/TR (B)	Pass	Note1
Left	TT/TR (A)	TT/TR (A)	TT/TR (B)	Pass	Note1
Right	TT/TR (A)	TT/TR (A)	TT/TR (B)	Pass	Note1

Note1: There is no any degradation of performance and function, and the test result criterion was A.

EUT	BLG840F/X BLE/802.15.4 to LTE Gateways	Date of Test	2022/7/27
Site	SR4	Temp.	24°C
Test Engineer	Tim	Humidity	47%
Test Mode	Mode6	Test Voltage	AC 230V/50Hz

Air Discharge (10 Discharges @ Per Test Point)					
Test Location	Test Level (kV) & Test Result criterion		Performance criterion	Result	Observation
	+8	-8			
1~18	TT/TR (A)	TT/TR (A)	TT/TR (B)	Pass	Note1

Note1: There is no any degradation of performance and function, and the test result criterion was A.

Contact Discharge (10 Discharges @ Per Test Point)					
Test Location	Test Level (kV) & Test Result criterion		Performance criterion	Result	Observation
	+4	-4			
1	TT/TR (A)	TT/TR (A)	TT/TR (B)	Pass	Note1

Note1: There is no any degradation of performance and function, and the test result criterion was A.

Horizontal Coupling (10 Discharges @ Per Test Point)					
Test Location	Test Level (kV) & Test Result criterion		Performance criterion	Result	Observation
	+4	-4			
Horizontal	TT/TR (A)	TT/TR (A)	TT/TR (B)	Pass	Note1

Note1: There is no any degradation of performance and function, and the test result criterion was A.

Vertical Coupling (10 Discharges @ Per Test Point)					
Test Location	Test Level (kV) & Test Result criterion		Performance criterion	Result	Observation
	+4	-4			
Front	TT/TR (A)	TT/TR (A)	TT/TR (B)	Pass	Note1
Rear	TT/TR (A)	TT/TR (A)	TT/TR (B)	Pass	Note1
Left	TT/TR (A)	TT/TR (A)	TT/TR (B)	Pass	Note1
Right	TT/TR (A)	TT/TR (A)	TT/TR (B)	Pass	Note1

Note1: There is no any degradation of performance and function, and the test result criterion was A.

Electrostatic Discharge Test Location

Test Location Air 01	Test Location Air 02~03
	
Test Location Air 04~07	**Test Location Air 08~11 & Contact 01**
	
Test Location Air 12~14	**Test Location Air 15~18**
	

10.5. Test Photograph

Test Mode: Mode1/ Mode6

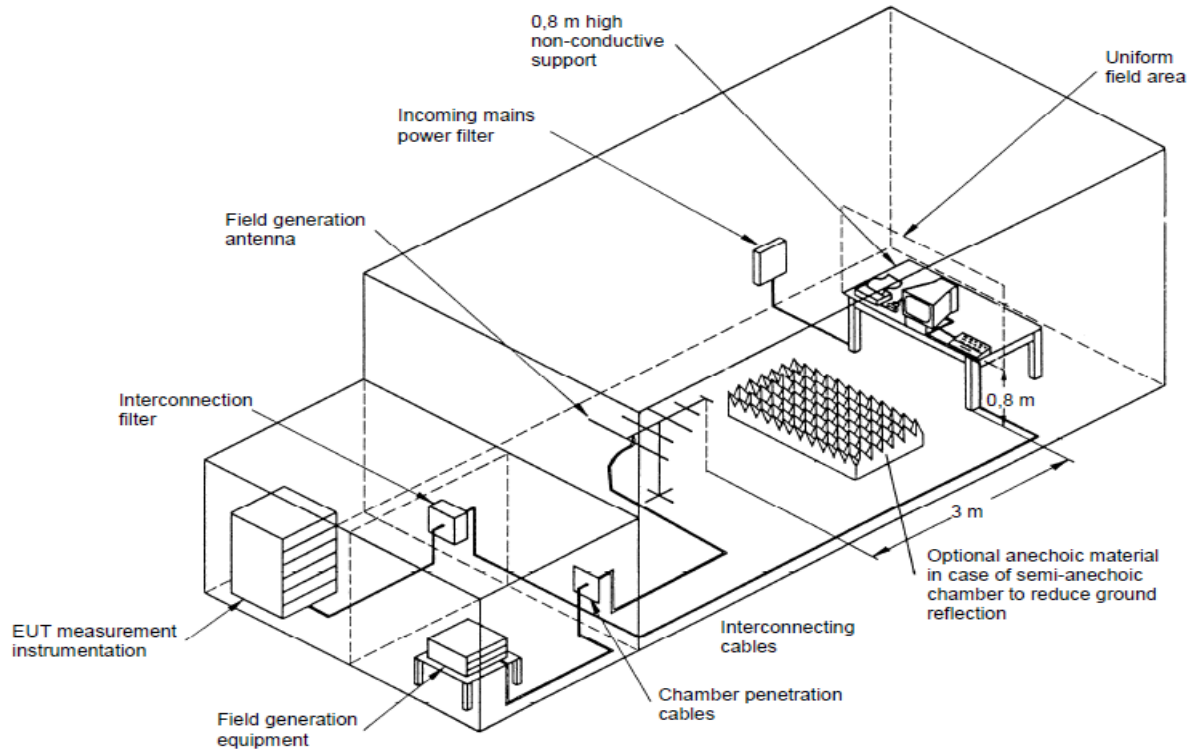
Description: Electrostatic Discharge Test Setup

11. Radio-Frequency Electromagnetic Field

11.1. Limit of Radio-Frequency Electromagnetic Field

Environmental phenomenon	Test specification	Units	Performance criterion
Enclosure port			
Radio frequency electromagnetic field	80 - 6000 3 80	MHz V/m (unmodulated, r.m.s) % AM (1kHz)	2G: RXQUAL ≦ 3 3G:BER ≦ 0.001 4G: throughput ≧ 95%
Note 1: If the wanted signal is modulated at 1000Hz, then an audio signal of 400Hz shall be used. Note 2: The test shall be performed over the frequency range 80MHz to 6000MHz with the exception of the exclusion band for transmitters, receivers and duplex transceivers of EN 301 489-1, as appropriate.			

11.2. Test Setup



11.3. Test Procedure

The EUT and load, which are placed on a table that is 0.8 meter above ground, are placed with one coincident with the calibration plane such that the distance from antenna to the EUT was 3 meters. Both horizontal and vertical polarization of the antenna and four sides of the EUT are set on measurement.

In order to judge the EUT performance, a CCD camera is used to monitor EUT screen.

All the scanning conditions are as follows:

	Condition of Test	Remarks
1.	Field Strength	3V/m
2.	Radiated Signal	AM 80% Modulated with 1kHz
3.	Scanning Frequency	80 - 6000MHz
4.	Dwell Time	3 Seconds
5.	Frequency Step Size Δf	1%

11.4. Test Result

EUT	BLG840F/X BLE/802.15.4 to LTE Gateways	Date of Test	2022/7/19
Site	AC1	Temp.	26°C
Test Engineer	Kaunaz	Humidity	56%
Test Mode	Mode1	Test Voltage	AC 230V/50Hz

Frequency (MHz)	Polarity	Test Position	Field Strength (V/m)	Test Result	Result
80-1000	Horizontal	Front	3	CT/CR (A)	Pass
		Rear		CT/CR (A)	Pass
		Left		CT/CR (A)	Pass
		Right		CT/CR (A)	Pass
80-1000	Vertical	Front	3	CT/CR (A)	Pass
		Rear		CT/CR (A)	Pass
		Left		CT/CR (A)	Pass
		Right		CT/CR (A)	Pass
1000-6000	Horizontal	Front	3	CT/CR (A)	Pass
		Rear		CT/CR (A)	Pass
		Left		CT/CR (A)	Pass
		Right		CT/CR (A)	Pass
1000-6000	Vertical	Front	3	CT/CR (A)	Pass
		Rear		CT/CR (A)	Pass
		Left		CT/CR (A)	Pass
		Right		CT/CR (A)	Pass

Note: There is no any degradation of performance and function, and the test result criterion was A

EUT	BLG840F/X BLE/802.15.4 to LTE Gateways	Date of Test	2022/7/19
Site	AC1	Temp.	26°C
Test Engineer	Kaunaz	Humidity	56%
Test Mode	Mode6	Test Voltage	AC 230V/50Hz

Frequency (MHz)	Polarity	Test Position	Field Strength (V/m)	Test Result	Result
80-1000	Horizontal	Front	3	CT/CR (A)	Pass
		Rear		CT/CR (A)	Pass
		Left		CT/CR (A)	Pass
		Right		CT/CR (A)	Pass
80-1000	Vertical	Front	3	CT/CR (A)	Pass
		Rear		CT/CR (A)	Pass
		Left		CT/CR (A)	Pass
		Right		CT/CR (A)	Pass
1000-6000	Horizontal	Front	3	CT/CR (A)	Pass
		Rear		CT/CR (A)	Pass
		Left		CT/CR (A)	Pass
		Right		CT/CR (A)	Pass
1000-6000	Vertical	Front	3	CT/CR (A)	Pass
		Rear		CT/CR (A)	Pass
		Left		CT/CR (A)	Pass
		Right		CT/CR (A)	Pass

Note: There is no any degradation of performance and function, and the test result criterion was A

11.5. Test Photograph

Test Mode: Mode1/ Mode6

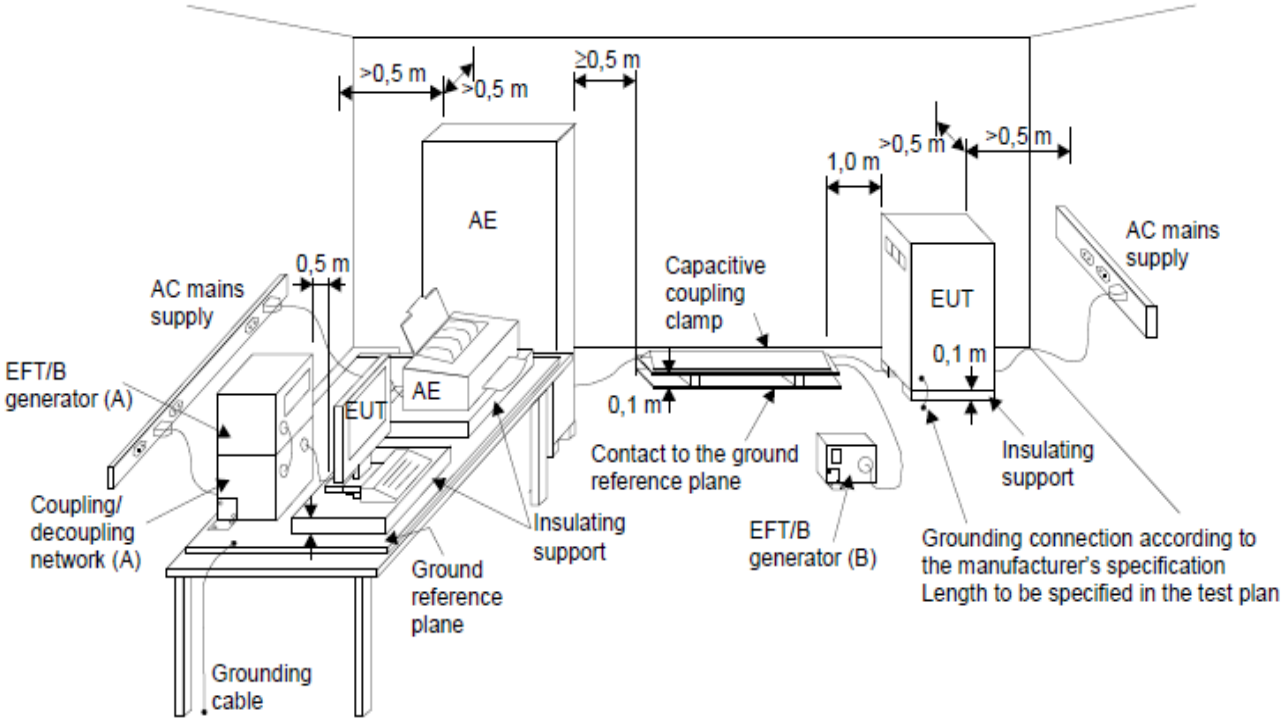
Description: Radio-Frequency Electromagnetic Field Test Setup

12. Electrical Fast Transients

12.1. Limit of Electrical Fast Transients

Environmental phenomenon	Test specification	Units	Performance criterion
Input AC Power Ports			
Electrical fast transients	± 1 5 / 50 5	kV (open circuit test voltage) Tr/Th (ns) Repetition frequency (kHz)	TT/TR (B)
Input DC Power Port			
Electrical fast transients	± 0.5 5 / 50 5	kV (open circuit test voltage) Tr/Th (ns) Repetition frequency (kHz)	TT/TR (B)
I/O and Communication Port			
Electrical fast transients	± 0.5 5 / 50 5	kV (open circuit test voltage) Tr/Th (ns) Repetition frequency (kHz)	TT/TR (B)
Note 1: This test shall be additionally performed on signal ports, telecommunication ports, control ports, and DC power ports, of radio equipment and associated ancillary equipment, if the cables may be longer than 3m. Note 2: The test level for signal ports, wired network ports (excluding xDSL), and control ports shall be 0.5 kV open circuit voltage at a repetition rate of 5 kHz. Note 3: The test level for xDSL wired network ports shall be 0,5 kV open circuit voltage at a repetition rate of 100 kHz			

12.2. Test Setup



12.3. Test Procedure

The EUT is placed on a table that is 0.8 meter height. A ground reference plane is placed on the table, and uses a 0.1m insulation between the EUT and ground reference plane.
The minimum area of the ground reference plane is 1m*1m, and 0.65mm thick min, and projected beyond the EUT by at least 0.1m on all sides.

Test on I/O and communication ports:
The EFT interference signal is through a coupling clamp device couples to the signal and control lines of the EUT with burst noise for 1minute.

Test on power supply ports:
The EUT is connected to the power mains through a coupling device that directly couples the EFT/B interference signal.
Each of the Line and Neutral conductors is impressed with burst noise for 1 minute.

The length of the signal and power lines between the coupling device and the EUT is 0.5m.

12.4. Test Result

EUT	BLG840F/X BLE/802.15.4 to LTE Gateways	Date of Test	2022/7/21
Site	SR3	Temp.	25°C
Test Engineer	Tim	Humidity	56%
Test Mode	Mode1	Test Voltage	AC 230V/50Hz

Inject Line	Polarity	Test Level (kV)	Test Duration (second)	Inject Method	Test Result	Result
L	±	1	60	Direct	TT/TR (A)	Pass
N	±	1	60	Direct	TT/TR (A)	Pass
L-N-	±	1	60	Direct	TT/TR (A)	Pass

Note: There is no any degradation of performance and function, and the test result criterion was A.

EUT	BLG840F/X BLE/802.15.4 to LTE Gateways	Date of Test	2022/7/21
Site	SR3	Temp.	25°C
Test Engineer	Tim	Humidity	56%
Test Mode	Mode6	Test Voltage	AC 230V/50Hz

Inject Line	Polarity	Test Level (kV)	Test Duration (second)	Inject Method	Test Result	Result
L	±	1	60	Direct	TT/TR (A)	Pass
N	±	1	60	Direct	TT/TR (A)	Pass
L-N-	±	1	60	Direct	TT/TR (A)	Pass

Note: There is no any degradation of performance and function, and the test result criterion was A.

12.5. Test Photograph

Test Mode: Mode1/ Mode6

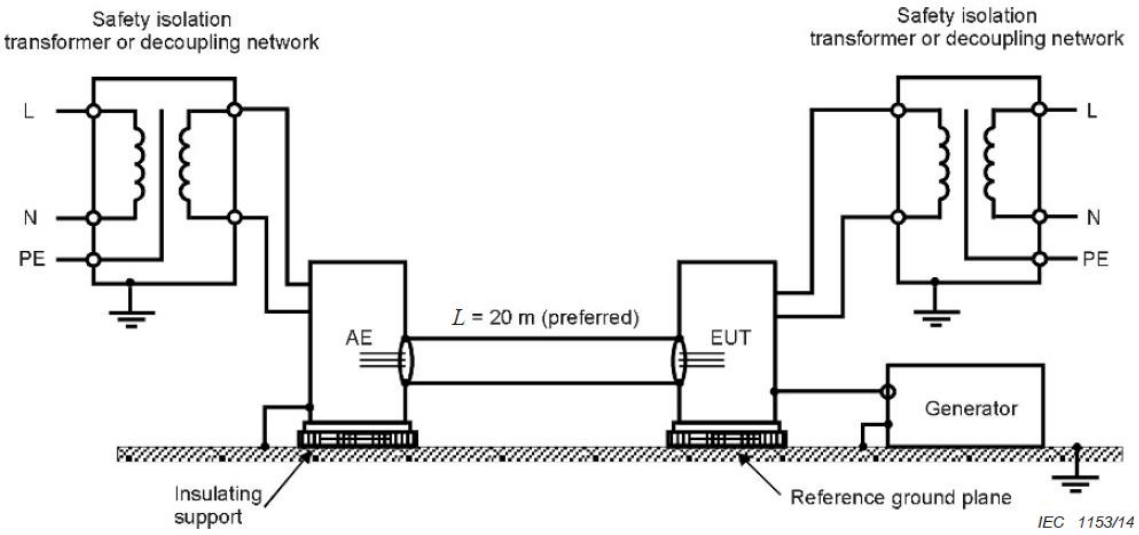
Description: Electrical Fast Transients Test Setup

13. Surge

13.1. Limit of Surges

Environmental phenomenon	Test specification	Units	Performance criterion
Input AC power ports (See Note 1)			
Surges	1.2/50 (8/20) ±1 line to line ±2 line to earth	Tr/Th (us) kV (open circuit test voltage) kV (open circuit test voltage)	TT/TR (B)
Telecommunication ports directly connected to indoor cables (See Note 1 and 2)			
Surges	1.2/50 (8/20) ±0.5 line to ground	Tr/Th us kV (peak)	TT/TR (B)
Note 1: Where normal functioning cannot be achieved because of the impact of the CDN on the EUT, no test shall be required. Note 2: The test level for wired network ports, intended to be connected to indoor cables (longer than 30 m) shall be 0,5 kV (applied line to ground, or shield to ground)			

13.2. Test Setup



13.3. Test Procedure

The EUT is placed on a table that is 0.8 meter above a metal ground plane measured 1m*1m minimum and 0.65mm thick minimum and projected beyond the EUT by at least 0.1m on all sides. The length of power cord between the coupling device and the EUT shall be 2m or less.

For input AC / DC power ports
The EUT is connected to the power mains through a coupling device that directly couples the surge interference signal.
The surge noise shall be applied synchronized to the voltage phase at 0^0, 90^0, 180^0, 270^0 and the peak value of the AC voltage wave. (Positive and negative)
Each of Line to Earth and Line to Line is impressed with a sequence of five surge voltages with interval of 1 minute.

13.4. Test Result

EUT	BLG840F/X BLE/802.15.4 to LTE Gateways	Date of Test	2022/7/21
Site	SR3	Temp.	25°C
Test Engineer	Tim	Humidity	56%
Test Mode	Mode1	Test Voltage	AC 230V/50Hz

Inject Line	Polarity	Angle (degree)	Test Level (kV)	Test Interval (second)	Test Result	Result
L-N	±	0	1	60	TT/TR (A)	Pass
L-N	±	90	1	60	TT/TR (A)	Pass
L-N	±	180	1	60	TT/TR (A)	Pass
L-N	±	270	1	60	TT/TR (A)	Pass

Note: There is no any degradation of performance and function, and the test result criterion was A.

EUT	BLG840F/X BLE/802.15.4 to LTE Gateways	Date of Test	2022/7/21
Site	SR3	Temp.	25°C
Test Engineer	Tim	Humidity	56%
Test Mode	Mode6	Test Voltage	AC 230V/50Hz

Inject Line	Polarity	Angle (degree)	Test Level (kV)	Test Interval (second)	Test Result	Result
L-N	±	0	1	60	TT/TR (A)	Pass
L-N	±	90	1	60	TT/TR (A)	Pass
L-N	±	180	1	60	TT/TR (A)	Pass
L-N	±	270	1	60	TT/TR (A)	Pass

Note: There is no any degradation of performance and function, and the test result criterion was A.

13.5. Test Photograph

Test Mode: Mode1/Mode 6

Description: Surge Test Setup

14. Radio-Frequency Continuous Conducted

14.1. Limit of Radio-Frequency Continuous Conducted

Environmental phenomenon	Test specification	Units	Performance criterion
Input AC Power Ports			
Radio-frequency continuous conducted	0.15 - 80 3 80 1	MHz V (unmodulated, r.m.s) % AM (1kHz) Frequency Step Size Δf %	CT/CR (A) 2G: RXQUAL ≦ 3 3G:BER ≦ 0.001 4G: throughput ≧ 95%
Signal Ports and Telecommunication Ports			
Radio-frequency continuous conducted	0.15 - 80 3 80 1	MHz V (unmodulated, r.m.s) % AM (1kHz) Frequency Step Size Δf %	CT/CR (A) 2G: RXQUAL ≦ 3 3G:BER ≦ 0.001 4G: throughput ≧ 95%

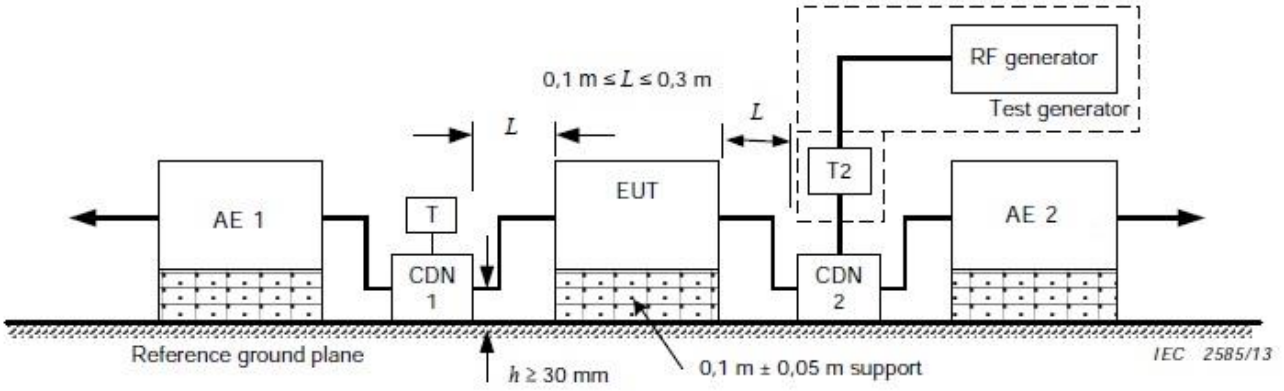
NOTE 1: If the wanted signal is modulated at 1000Hz, then an audio signal of 400Hz shall be used.

NOTE 2: The test shall be performed over the frequency range 150kHz to 80MHz with the exception of the exclusion band for transmitters, and for receivers and duplex transceivers [see clause 4 of EN 301 489-1.

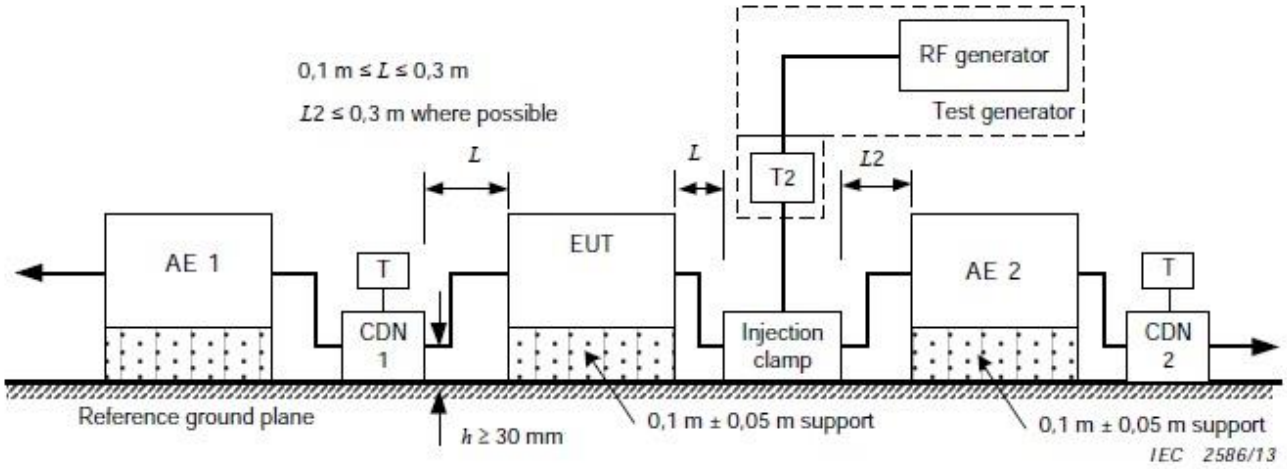
NOTE 3: This test shall be additionally performed on signal ports, telecommunication ports, control ports, and DC power ports, of radio equipment and associated ancillary equipment, if the cables may be longer than 3m.

14.2. Test Setup

CDN Test Setup



EM-Clamp Test Setup



14.3. Test Procedure

The EUT is placed on a table that is 0.8 meter height, and a ground reference plane on the table, EUT is placed upon table and use 0.1m insulation between the EUT and ground reference plane.

For Signal Ports and Telecommunication Ports
The disturbance signal is through a coupling and decoupling networks (CDN) or EM-clamp device couples to the signal and Telecommunication lines of the EUT.

For Input DC and AC Power Ports
The EUT is connected to the power mains through a coupling and decoupling networks for power supply lines. And directly couples the disturbances signal into EUT.
Used CDN-M2 for two wires or CDN-M3 for three wires.

All the scanning conditions are as follows:

	Condition of Test	Remarks
1.	Field Strength	130dBuV(3V) Level 2
2.	Radiated Signal	AM 80% Modulated with 1kHz
3.	Scanning Frequency	0.15MHz – 80MHz
4.	Dwell Time	3 Seconds
5.	Frequency step size Δf :	1%
6.	The rate of Swept of Frequency	1.5 x 10^{-3} decades/s

14.4. Test Result

EUT	BLG840F/X BLE/802.15.4 to LTE Gateways	Date of Test	2022/7/21
Site	SR3	Temp.	25°C
Test Engineer	Tim	Humidity	56%
Test Mode	Mode1	Test Voltage	AC 230V/50Hz

Frequency (MHz)	Inject Voltage (V)	Inject Ports	Inject Method	Test Result	Result
0.15-80	3	AC IN	CDN-M2	CT/CR (A)	Pass

Note: There is no any degradation of performance and function, and the test result criterion was A.

EUT	BLG840F/X BLE/802.15.4 to LTE Gateways	Date of Test	2022/7/21
Site	SR3	Temp.	25°C
Test Engineer	Tim	Humidity	56%
Test Mode	Mode6	Test Voltage	AC 230V/50Hz

Frequency (MHz)	Inject Voltage (V)	Inject Ports	Inject Method	Test Result	Result
0.15-80	3	AC IN	CDN-M2	CT/CR (A)	Pass

Note: There is no any degradation of performance and function, and the test result criterion was A.

14.5. Test Photograph

Test Mode: Mode1/ Mode6

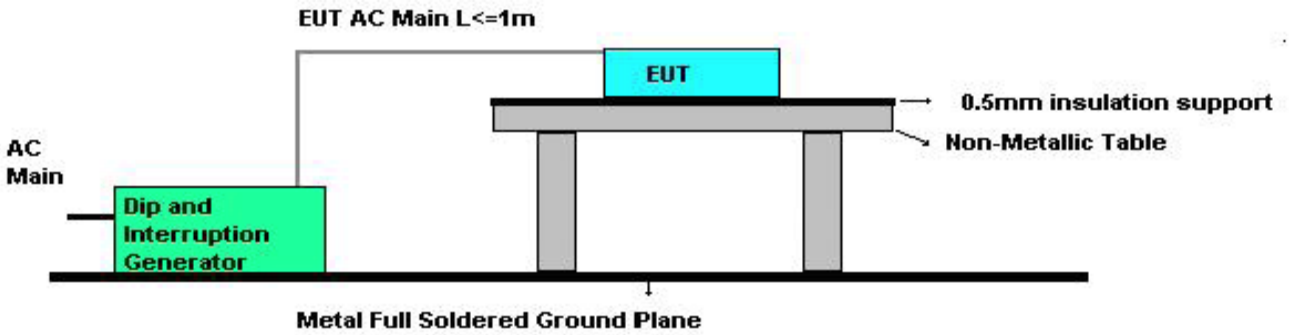
Description: Radio-Frequency Common Mode Test Setup

15. Voltage Dips and Interruptions

15.1. Limit of Voltage Dips and Interruptions

Environmental phenomenon	Test specification	Units	Performance criterion
Input AC power ports			
Voltage dips	70 25	% residual cycle	TT/TR (C)
	0 0.5	% residual cycle	TT/TR (B)
	0 1	% residual cycle	TT/TR (B)
Voltage interruptions	0 250	% residual cycle	TT/TR (C)

15.2. Test Setup



15.3. Test Procedure

The EUT is placed on a table which is 0.8 meter above a metal ground plane measured 1m*1m minimum, and 0.65mm thick minimum, and projected beyond the EUT by at least 0.1m on all sides. The power cord shall be used the shortest power cord as specified by the manufacturer.

For Voltage Dips/ Interruptions test:
The selection of test voltage is based on the rated power range. If the operation range is large than 20% of lower power range, both end of specified voltage shall be tested. Otherwise, the typical voltage specification is selected as test voltage.

The EUT is connected to the power mains through a coupling device that directly couples to the Voltage Dips and Interruption Generator.

The EUT shall be tested for 30% voltage dip of supplied voltage and duration 25 Periods, for 95% voltage dip of supplied voltage and duration 0.5 Periods with a sequence of three voltage dips with intervals of 10 seconds, and for 95% voltage interruption of supplied voltage and duration 250 Periods with a sequence of three voltage interruptions with intervals of 10 seconds.
Voltage phase shifting are shall occur at 0^0, 45^0, 90^0 ,135^0 ,180^0 ,225^0, 270^0 ,315^0 of the voltage.

15.4. Test Result

EUT	BLG840F/X BLE/802.15.4 to LTE Gateways	Date of Test	2022/7/21
Site	SR3	Temp.	25°C
Test Engineer	Tim	Humidity	56%
Test Mode	Mode1	Test Voltage	AC 100V/50Hz AC 240V/50Hz

Voltage Dips and Interruption Residual (%)	Angle	Test Duration (Periods)	Test Result	Result
70	0	25	TT/TR (A)	PASS
70	45	25	TT/TR (A)	PASS
70	90	25	TT/TR (A)	PASS
70	135	25	TT/TR (A)	PASS
70	180	25	TT/TR (A)	PASS
70	225	25	TT/TR (A)	PASS
70	270	25	TT/TR (A)	PASS
70	315	25	TT/TR (A)	PASS
0	0	0.5	TT/TR (A)	PASS
0	45	0.5	TT/TR (A)	PASS
0	90	0.5	TT/TR (A)	PASS
0	135	0.5	TT/TR (A)	PASS
0	180	0.5	TT/TR (A)	PASS
0	225	0.5	TT/TR (A)	PASS
0	270	0.5	TT/TR (A)	PASS
0	315	0.5	TT/TR (A)	PASS

0	0	1.0	TT/TR (A)	PASS
0	45	1.0	TT/TR (A)	PASS
0	90	1.0	TT/TR (A)	PASS
0	135	1.0	TT/TR (A)	PASS
0	180	1.0	TT/TR (A)	PASS
0	225	1.0	TT/TR (A)	PASS
0	270	1.0	TT/TR (A)	PASS
0	315	1.0	TT/TR (A)	PASS
0	0	250	TT/TR (B)	PASS
0	45	250	TT/TR (B)	PASS
0	90	250	TT/TR (B)	PASS
0	135	250	TT/TR (B)	PASS
0	180	250	TT/TR (B)	PASS
0	225	250	TT/TR (B)	PASS
0	270	250	TT/TR (B)	PASS
0	315	250	TT/TR (B)	PASS

Note1: There is no any degradation of performance and function, and the test result criterion was A.
Note2: The EUT will shut down disconnected during the test, but will recover on its own after testing, thus the test result criterion was B.

EUT	BLG840F/X BLE/802.15.4 to LTE Gateways	Date of Test	2022/7/21
Site	SR3	Temp.	25°C
Test Engineer	Tim	Humidity	56%
Test Mode	Mode6	Test Voltage	AC 100V/50Hz AC 240V/50Hz

Voltage Dips and Interruption Residual (%)	Angle	Test Duration (Periods)	Test Result	Result
70	0	25	TT/TR (A)	PASS
70	45	25	TT/TR (A)	PASS
70	90	25	TT/TR (A)	PASS
70	135	25	TT/TR (A)	PASS
70	180	25	TT/TR (A)	PASS
70	225	25	TT/TR (A)	PASS
70	270	25	TT/TR (A)	PASS
70	315	25	TT/TR (A)	PASS
0	0	0.5	TT/TR (A)	PASS
0	45	0.5	TT/TR (A)	PASS
0	90	0.5	TT/TR (A)	PASS
0	135	0.5	TT/TR (A)	PASS
0	180	0.5	TT/TR (A)	PASS
0	225	0.5	TT/TR (A)	PASS
0	270	0.5	TT/TR (A)	PASS
0	315	0.5	TT/TR (A)	PASS

0	0	1.0	TT/TR (A)	PASS
0	45	1.0	TT/TR (A)	PASS
0	90	1.0	TT/TR (A)	PASS
0	135	1.0	TT/TR (A)	PASS
0	180	1.0	TT/TR (A)	PASS
0	225	1.0	TT/TR (A)	PASS
0	270	1.0	TT/TR (A)	PASS
0	315	1.0	TT/TR (A)	PASS
0	0	250	TT/TR (B)	PASS
0	45	250	TT/TR (B)	PASS
0	90	250	TT/TR (B)	PASS
0	135	250	TT/TR (B)	PASS
0	180	250	TT/TR (B)	PASS
0	225	250	TT/TR (B)	PASS
0	270	250	TT/TR (B)	PASS
0	315	250	TT/TR (B)	PASS

Note1: There is no any degradation of performance and function, and the test result criterion was A.
Note2: The EUT will shut down disconnected during the test, but will recover on its own after testing, thus the test result criterion was B.

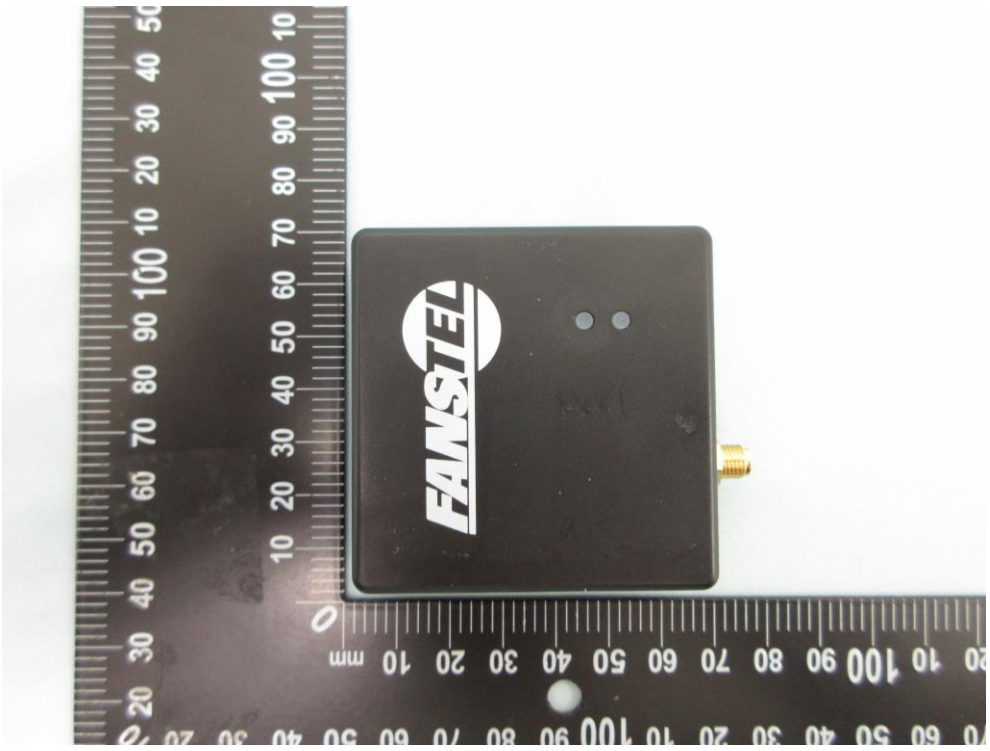
15.5. Test Photograph

Test Mode: Mode1/ Mode6

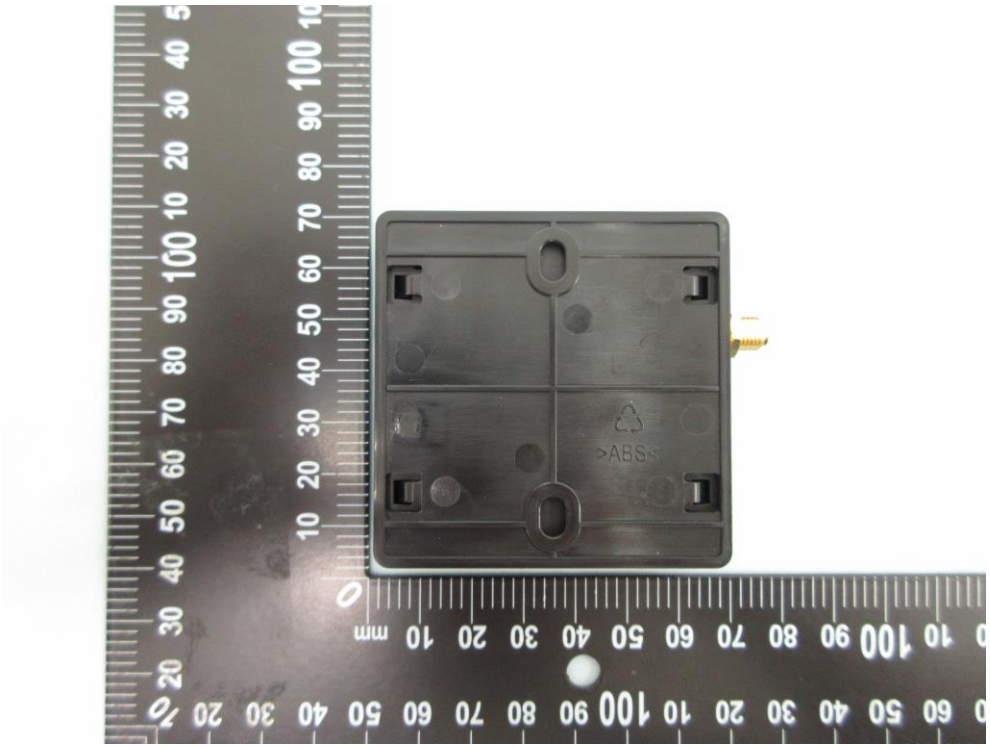
Description: Voltage Dips and Interruptions Test Setup

Appendix A : EUT Photograph

(1) EUT Photo (BLG40F with GPS Integrated Antenna)

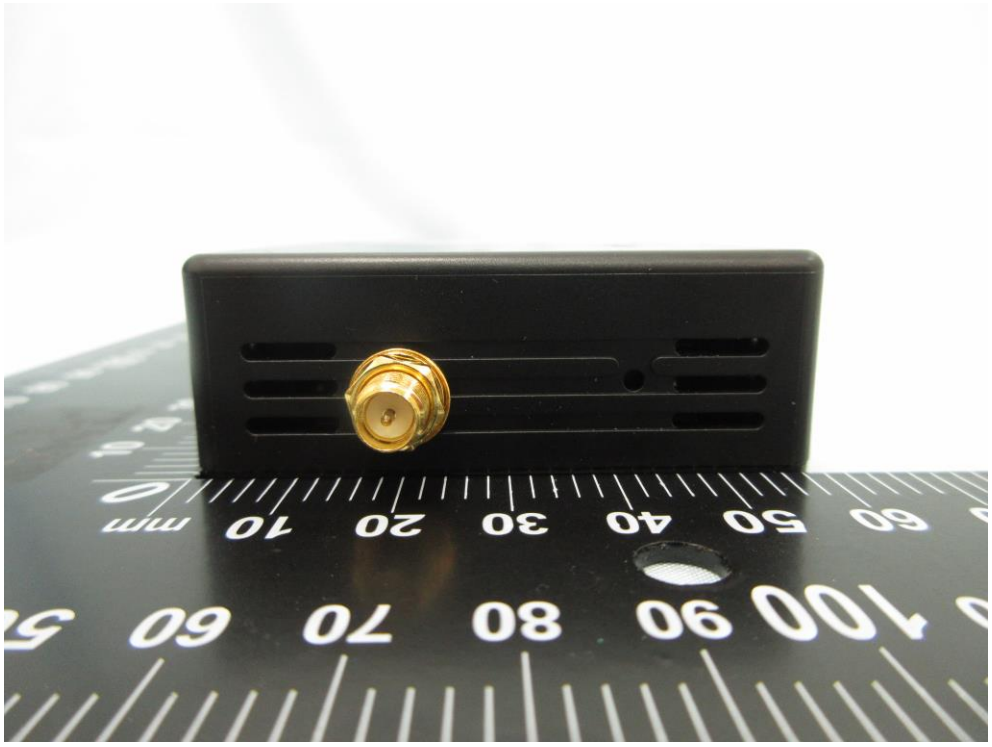


(2) EUT Photo (BLG40F with GPS Integrated Antenna)

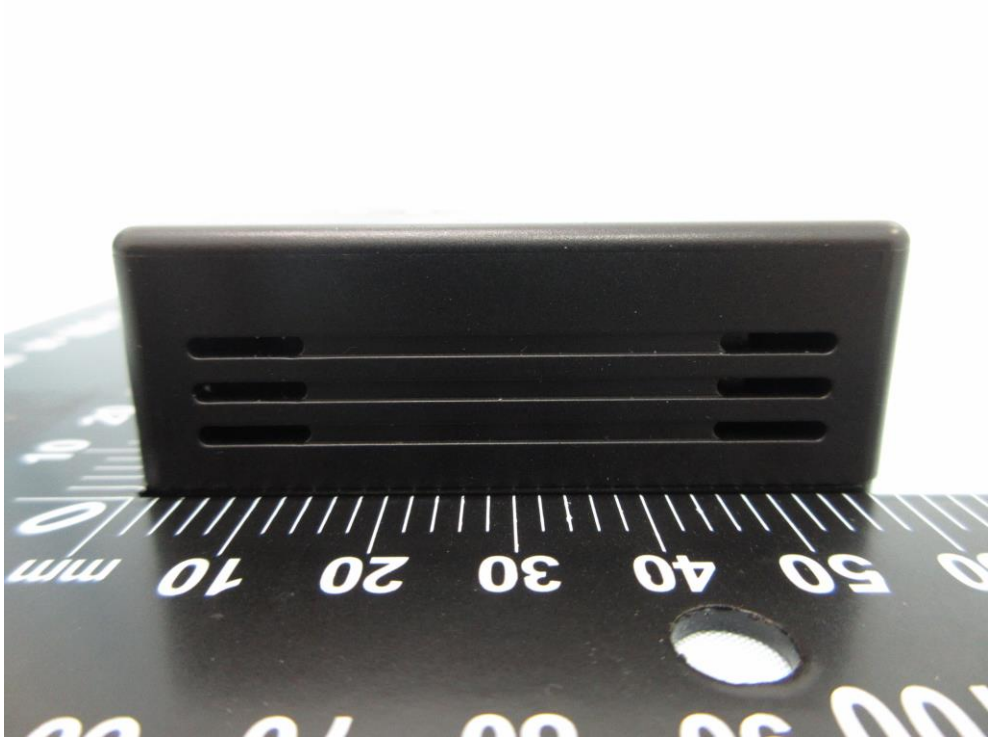


(3) EUT Photo (BLG40F with GPS Integrated Antenna)

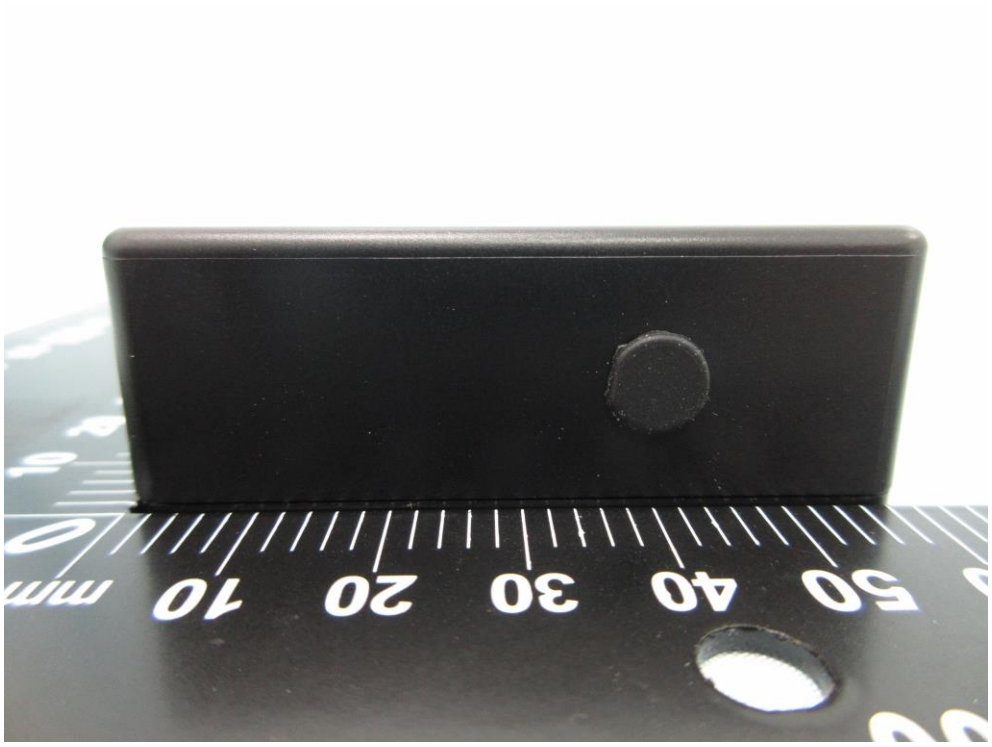
(4) EUT Photo (BLG40F with GPS Integrated Antenna)



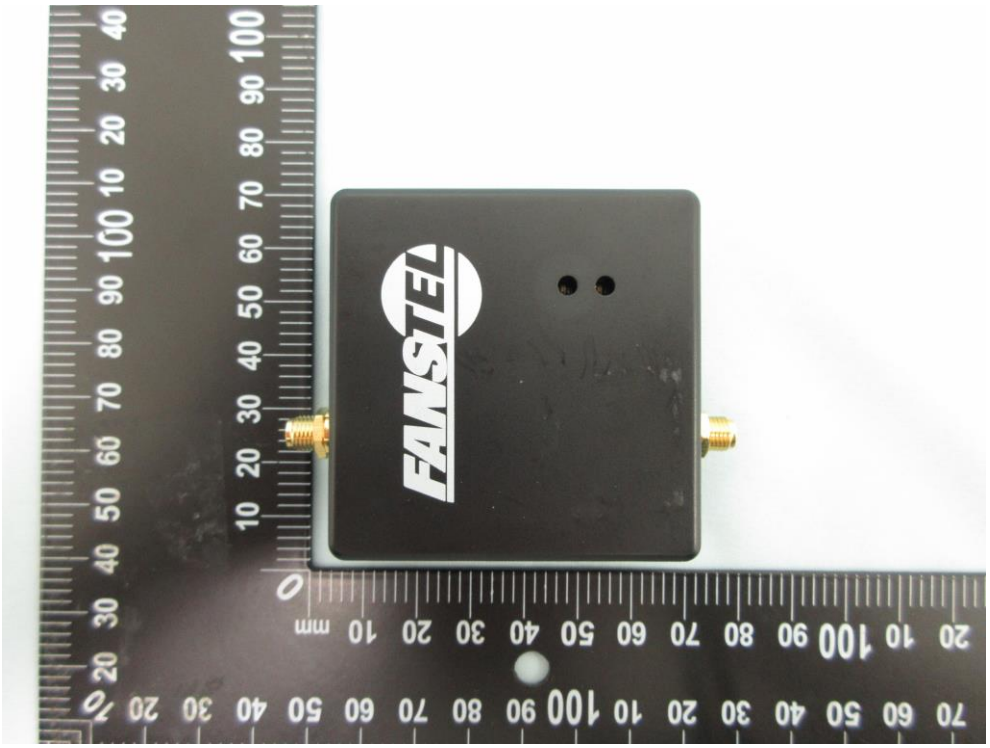
(5) EUT Photo (BLG40F with GPS Integrated Antenna)



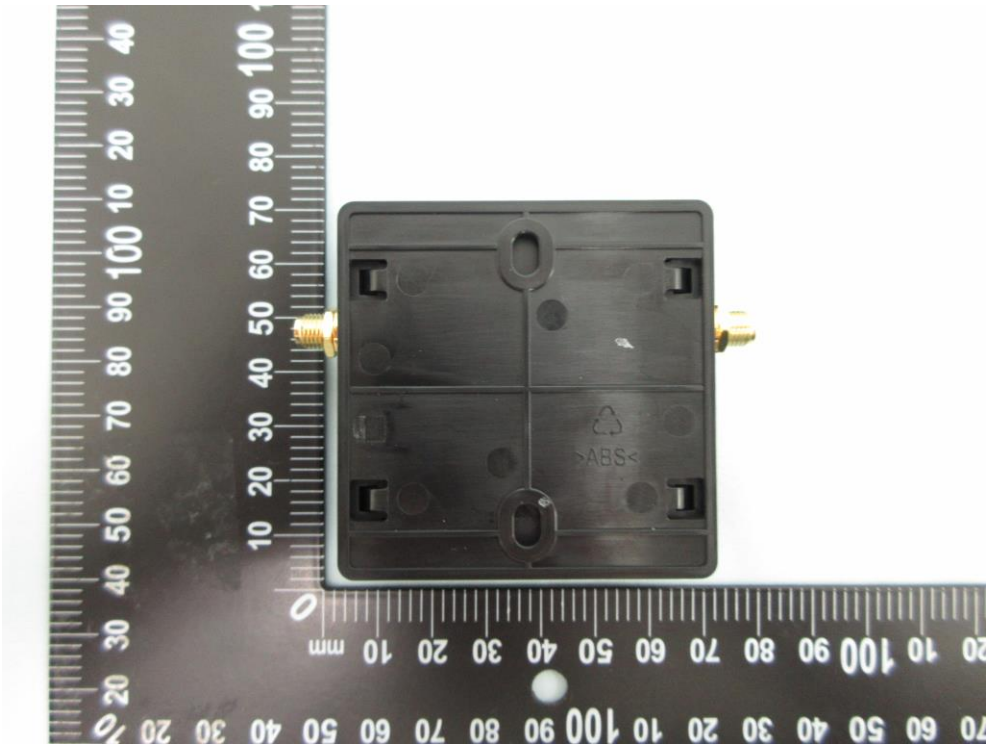
(6) EUT Photo (BLG40F with GPS Integrated Antenna)



(7) EUT Photo (BLE840X with GPS External Antenna)



(8) EUT Photo (BLE840X with GPS External Antenna)

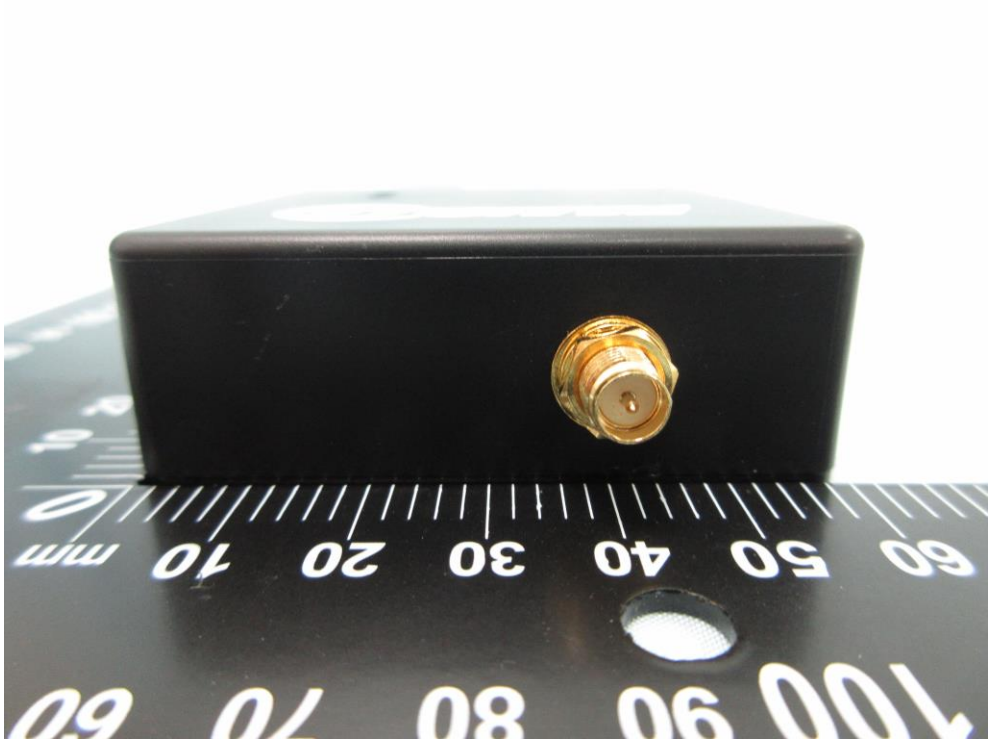


(9) EUT Photo (BLE840X with GPS External Antenna)

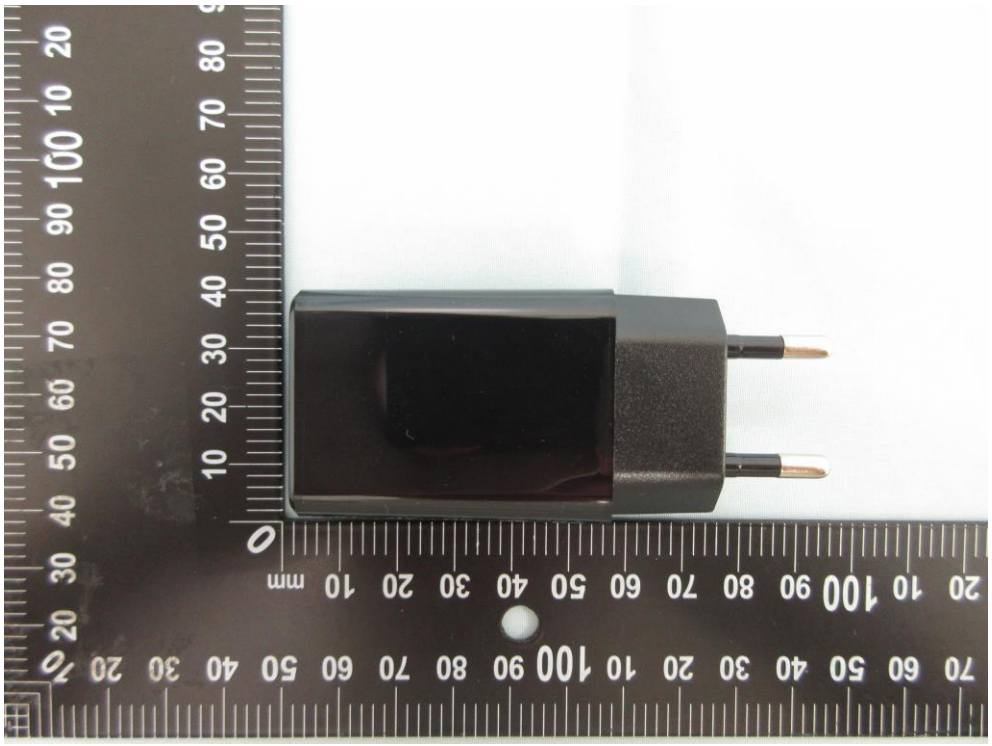
(10) EUT Photo (BLE840X with GPS External Antenna)

(11) EUT Photo (BLE840X with GPS External Antenna)

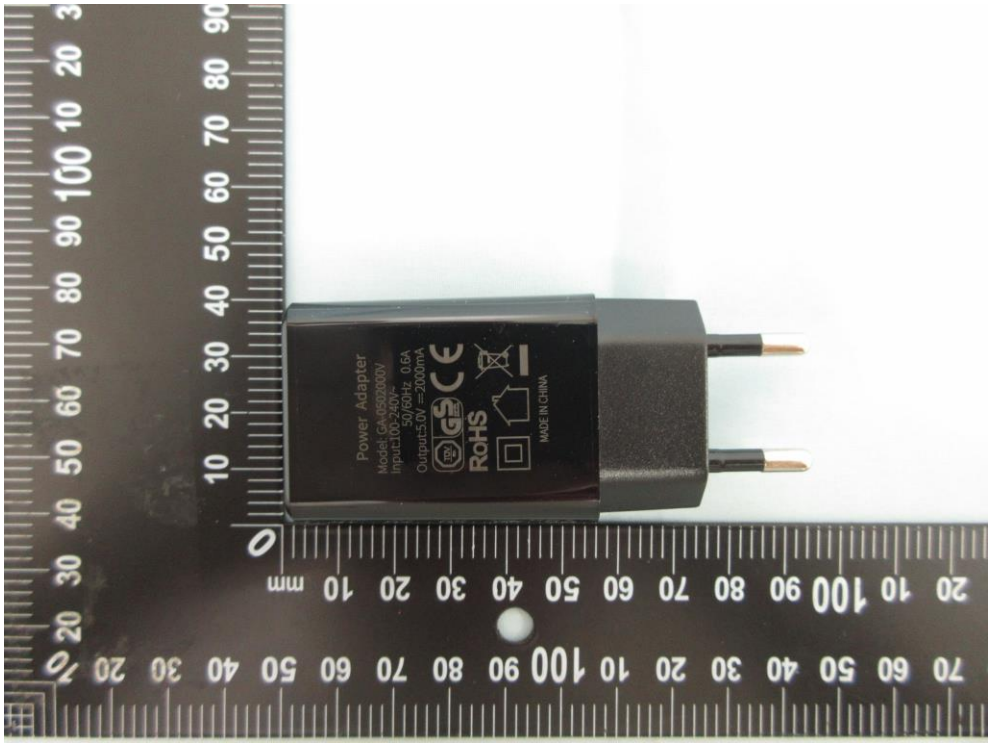
(12) EUT Photo (BLE840X with GPS External Antenna)



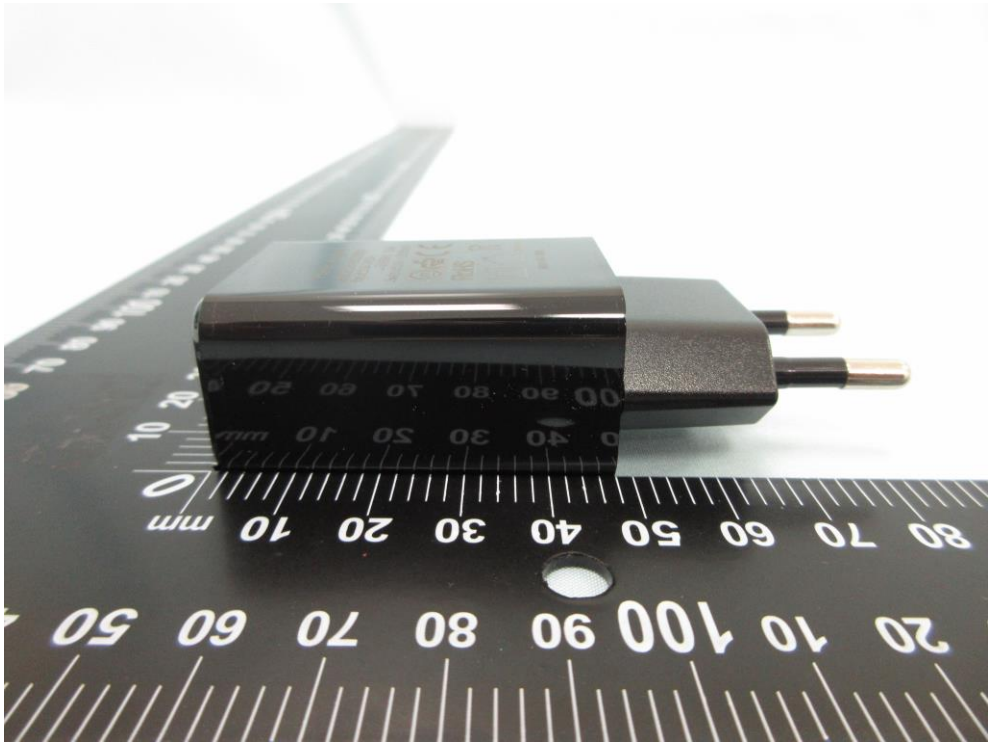
(13) EUT Photo (USB Adapter)



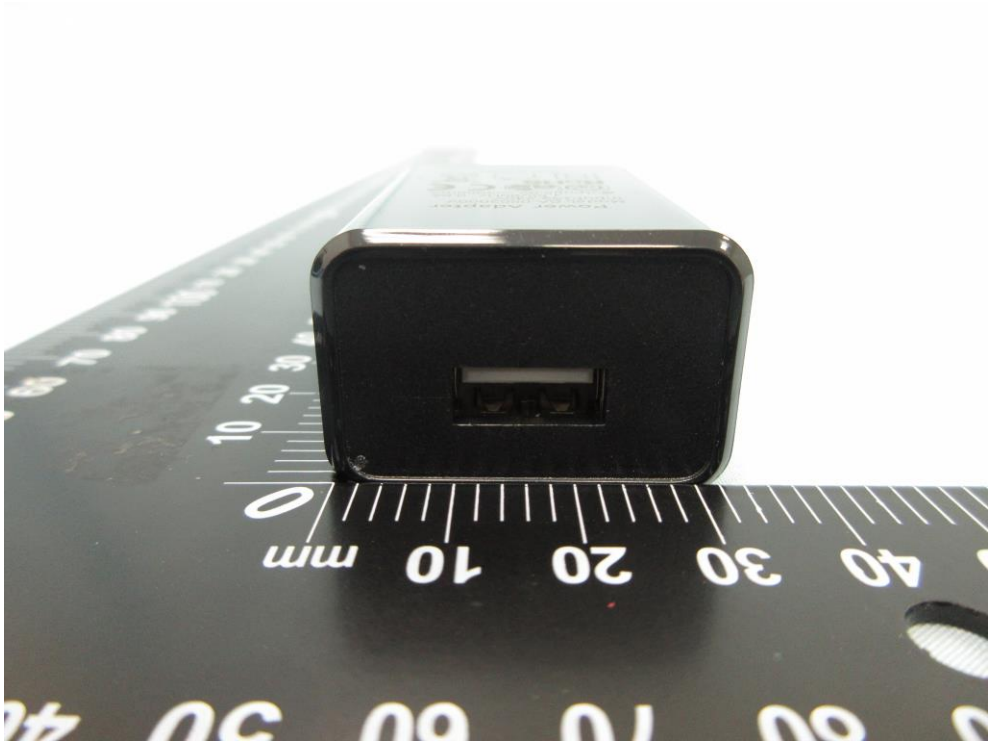
(14) EUT Photo (USB Adapter)



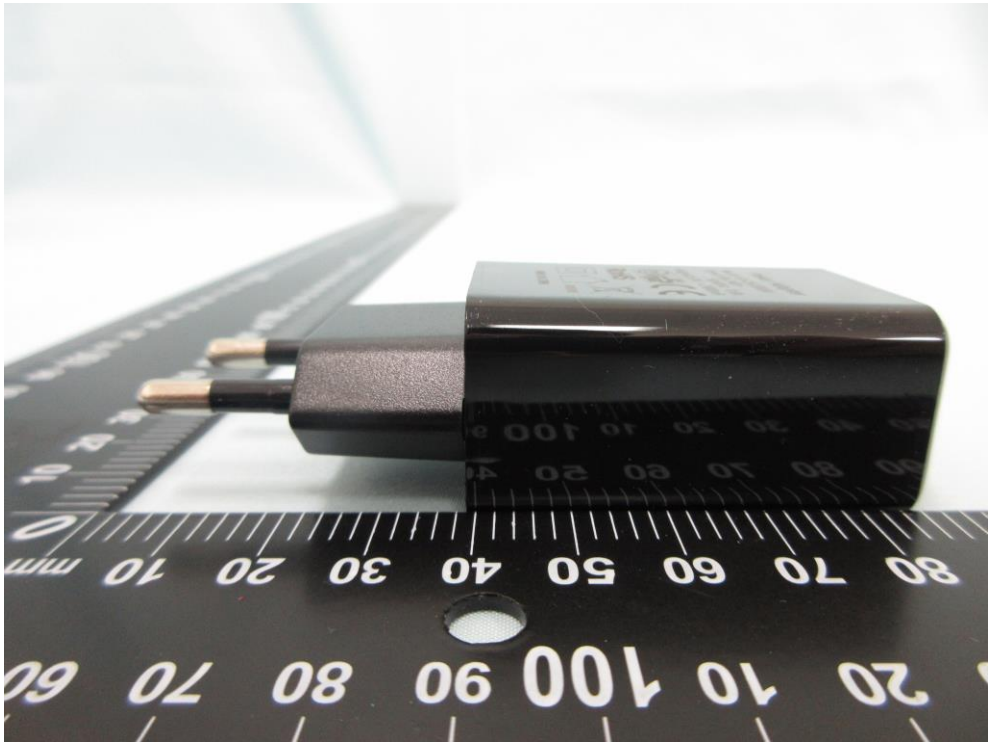
(15) EUT Photo (USB Adapter)



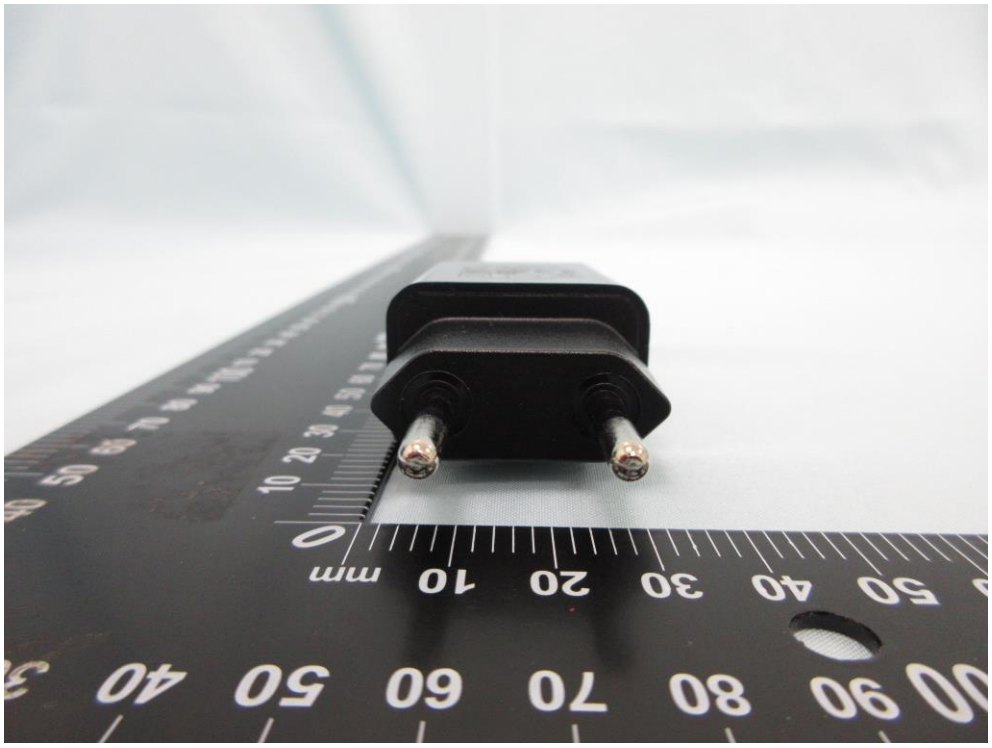
(16) EUT Photo (USB Adapter)



(17) EUT Photo (USB Adapter)



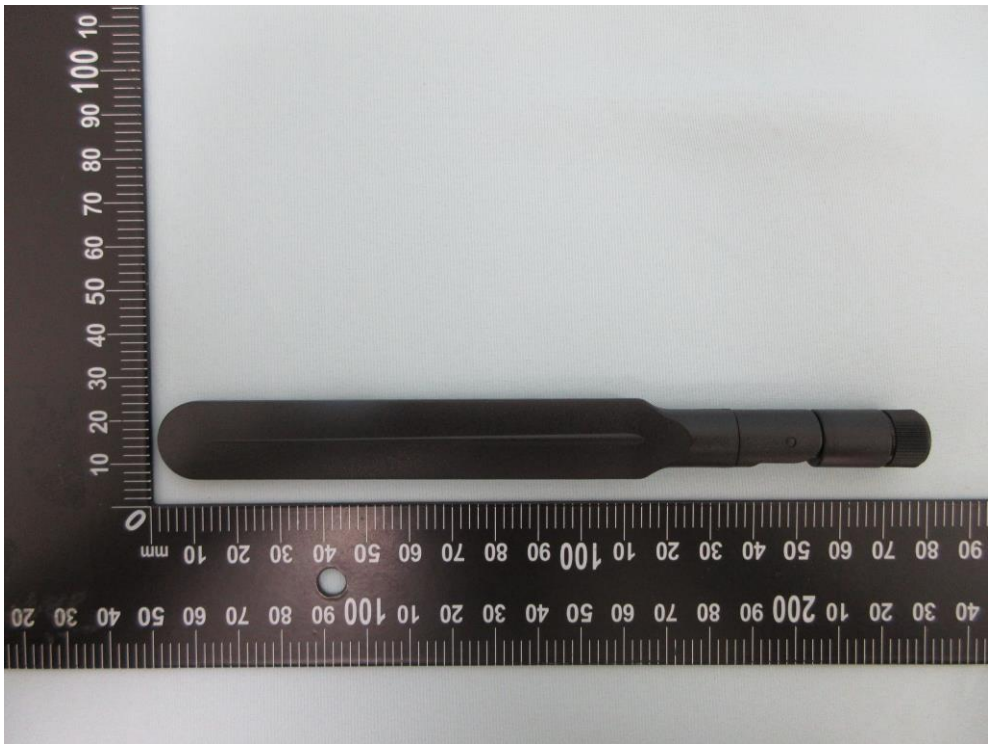
(18) EUT Photo (USB Adapter)



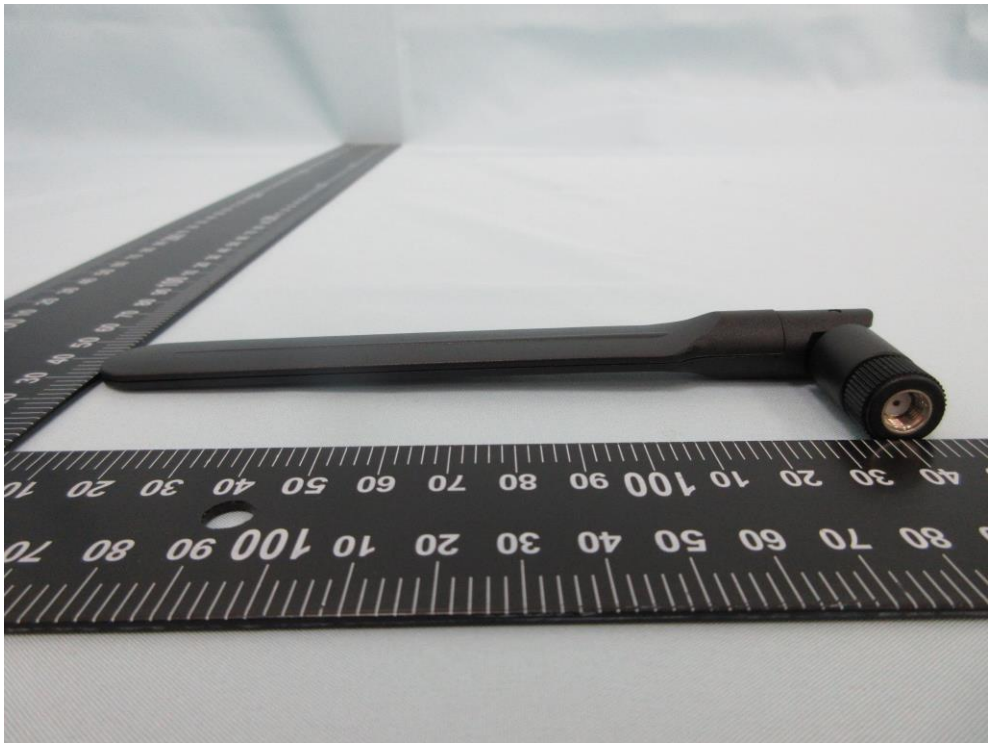
(19) EUT Photo (USB Adapter)

(20) EUT Photo (Micro USB Cable)

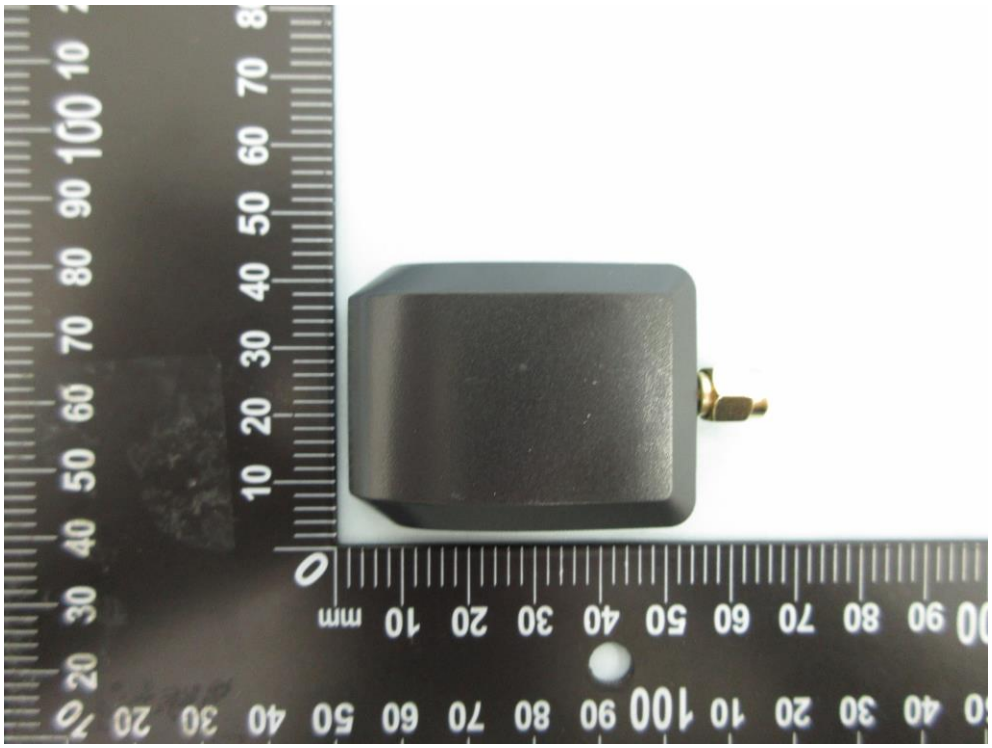
(21) EUT Photo (LTE External Antenna)



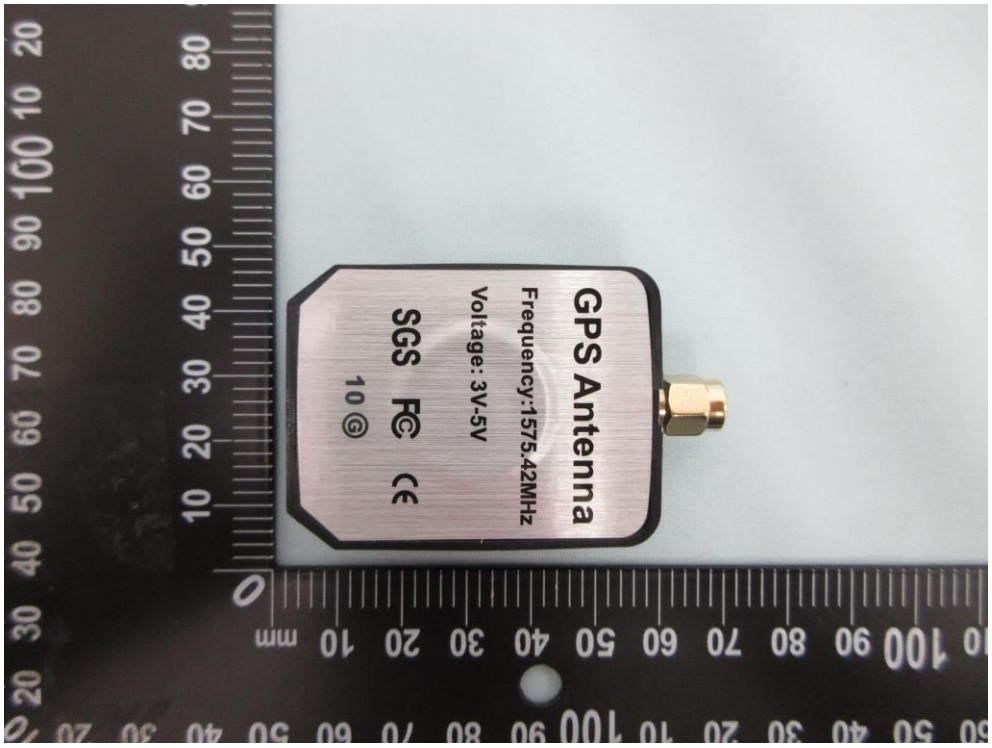
(22) EUT Photo (LTE External Antenna)



(23) EUT Photo (GPS External Antenna)



(24) EUT Photo (GPS External Antenna)



Appendix B : Radio-Frequency Electromagnetic Field Test Result

MRT Technology (Suzhou) Co., Ltd
Phone: +86-512-66308358
Fax: +86-512-66308368
Web: www.mrt-cert.com

Report No.: 2207ESU019-E1
Report Version: V01
Issue Date: 2022-08-25

MEASUREMENT REPORT

Applicant	:	Fanstel Corporation, Taipei
Address	:	10F-10, No. 79, Sec. 1, Hsin Tai Wu Rd., Hsi-Chih, New Taipei City 221 Taiwan
Product	:	BLG840F/X BLE/802.15.4 to LTE Gateways
Model No.	:	BLG840F, BLG840X, BLG40F, BLG840E, BLG840XE, BLG40E, BLE840F, BLE840X, BLE40F, BLE840E, BLE840XE, BLE40E, LN60G840F, LN60G840X, LN60G40F, LN60G840E, LN60G840XE, LN60G40E, LN60E840F, LN60E840X, LN60E40F, LN60E840E, LN60E840XE, LN60E40E
Trademark	:	Fanstel
Standards	:	EN 301 489 - 1 V2.2.3 (2019-11) EN 301 489 - 52 V1.1.2 (2020-12) EN 61000-4-3: 2006+A2:2010 EN 61000-4-6: 2014
Result	:	Complies
Received Date	:	May 24, 2022
Test Date	:	August 10 ~ 11, 2022

Reviewed By : Kevin Guo
(Kevin Guo)

Approved By : Robin Wu
(Robin Wu)

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

The test results only relate to the tested sample.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

Revision History

Report No.	Version	Description	Issue Date
2207ESU019-E1	Rev.01	Initial Report	2022-08-25

CONTENTS

Description Page

1. General Information

Applicant	Fanstel Corporation, Taipei
Applicant Address	10F-10, No. 79, Sec. 1, Hsin Tai Wu Rd., Hsi-Chih, New Taipei City 221 Taiwan
Manufacturer	Fanstel Corporation, Taipei
Manufacturer Address	10F-10, No. 79, Sec. 1, Hsin Tai Wu Rd., Hsi-Chih, New Taipei City 221 Taiwan
Test Site	MRT Technology (Suzhou) Co., Ltd
Test Site Address	D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- **MRT facility is an FCC accredited testing laboratory (MRT Designation No. CN1166) on the FCC website.**
- **MRT facility is an ISED recognized testing laboratory (MRT Reg. No. CN0001) on the ISED website.**
- **MRT facility is a VCCI registered (R-20025, G-20034, C-20020, T-20020) test laboratory with the site description on file at VCCI Council.**
- **MRT Lab is accredited to ISO 17025 by the A2LA under the A2LA Program (Cert. No. 3628.01) and CNAS under the CNAS Program (Cert. No. L10551) in EMC, Safety, Radio, Telecommunications and SAR testing.**

2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name	BLG840F/X BLE/802.15.4 to LTE Gateways
Trademark	Fanstel
Model Number	BLG840F, BLG840X, BLG40F, BLG840E, BLG840XE, BLG40E, BLE840F, BLE840X, BLE40F, BLE840E, BLE840XE, BLE40E, LN60G840F, LN60G840X, LN60G40F, LN60G840E, LN60G840XE, LN60G40E, LN60E840F, LN60E840X, LN60E40F, LN60E840E, LN60E840XE, LN60E40E
Highest Operating Frequency	Cat-M1 & NB-IoT Band1: 1980MHz
Cat-M1 & NB-IoT Specification	Band 1, 3, 8, 20, 28
Power Adapter	Brand: GAT Model No: GA-0502000V Input: AC 100-240V~ 50/60Hz 0.6A Output: DC 5.0V, 2000mA

Note:

1. Model Difference Description:

BLE to LTE Gateways		
BLG840F	LN60G840F	BT840F, nRF9160, integrated GPS antenna
BLG840X	LN60G840X	BT840X, nRF9160, integrated GPS antenna
BLG40F	LN60G40F	BT40F, nRF9160, integrated GPS antenna
BLG840E	LN60G840E	BT840E, nRF9160, integrated GPS antenna
BLG840XE	LN60G840XE	BT840XE, nRF9160, integrated GPS antenna
BLG40E	LN60G40E	BT40E, nRF9160, integrated GPS antenna
BLE840F	LN60E840F	BT840F, nRF9160, external GPS antenna (not included)
BLE840X	LN60E840X	BT840X, nRF9160, external GPS antenna (not included)
BLE40F	LN60E40F	BT40F, nRF9160, external GPS antenna (not included)
BLE840E	LN60E840E	BT840E, nRF9160, GPS not supported
BLE840XE	LN60E840XE	BT840XE, nRF9160, GPS not supported
BLE40E	LN60E40E	BT40E, nRF9160, GPS not supported

2. The test was performed base on BLG840F.

2.2. Test Mode

Pre-Test Mode	
EMS Mode	Mode1: BLE to LTE Gateways_BLG840F, Cat-M1 Band1 Link + GPS On, Power by USB Adapter (GA-0502000) Mode2: BLE to LTE Gateways_BLG840F, Cat-M1 Band3 Link + GPS On, Power by USB Adapter (GA-0502000) Mode3: BLE to LTE Gateways_BLG840F, Cat-M1 Band8 Link + GPS On, Power by USB Adapter (GA-0502000) Mode4: BLE to LTE Gateways_BLG840F, Cat-M1 Band20 Link + GPS On, Power by USB Adapter (GA-0502000) Mode5: BLE to LTE Gateways_BLG840F, Cat-M1 Band28 Link + GPS On, Power by USB Adapter (GA-0502000) Mode6: BLE to LTE Gateways_BLG840F, NB-IoT Band1 Link + GPS On, Power by USB Adapter (GA-0502000) Mode7: BLE to LTE Gateways_BLG840F, NB-IoT Band3 Link + GPS On, Power by USB Adapter (GA-0502000) Mode8: BLE to LTE Gateways_BLG840F, NB-IoT Band8 Link + GPS On, Power by USB Adapter (GA-0502000) Mode9: BLE to LTE Gateways_BLG840F, NB-IoT Band20 Link + GPS On, Power by USB Adapter (GA-0502000) Mode10: BLE to LTE Gateways_BLG840F, NB-IoT Band28 Link + GPS On, Power by USB Adapter (GA-0502000) Mode11: BLE to LTE Gateways_BLG840X, Idle + GPS On, Power by USB Adapter (GA-0502000) Mode12: BLE to LTE Gateways_BLG40F, Idle + GPS On, Power by USB Adapter (GA-0502000) Mode13: BLE to LTE Gateways_BLG840E, Idle + GPS On, Power by USB Adapter (GA-0502000) Mode14: BLE to LTE Gateways_BLG840XE, Idle + GPS On, Power by USB Adapter (GA-0502000) Mode15: BLE to LTE Gateways_BLG40E, Idle + GPS On, Power by USB Adapter (GA-0502000) Mode16: BLE to LTE Gateways_BLE840F, Idle + GPS On, Power by USB Adapter (GA-0502000) Mode17: BLE to LTE Gateways_BLE840X, Idle + GPS On, Power by USB Adapter (GA-0502000) Mode18: BLE to LTE Gateways_BLE40F, Idle + GPS On, Power by USB

	Adapter (GA-0502000) Mode19: BLE to LTE Gateways_BLE840E, Idle + GPS On, Power by USB Adapter (GA-0502000) Mode20: BLE to LTE Gateways_BLE840XE, Idle + GPS On, Power by USB Adapter (GA-0502000) Mode21: BLE to LTE Gateways_BLE40E, Idle + GPS On, Power by USB Adapter (GA-0502000)
Final Test Mode	
EMS Mode	Mode1: BLE to LTE Gateways_BLG840F, Cat-M1 Band1 Link + GPS On, Power by USB Adapter (GA-0502000) Mode6: BLE to LTE Gateways_BLG840F, NB-IoT Band1 Link + GPS On, Power by USB Adapter (GA-0502000)

Note: After pretest mode, find the worst mode to do final test and record in this report.

3. DESCRIPTION OF TEST

3.1. Evaluation Procedure

The measurement procedures described in the Electromagnetic compatibility of multimedia equipment - Emission Requirements (EN 301 489-1, EN 301 489-52) was used in the measurement of the **BLG840F/X BLE/802.15.4 to LTE Gateways**

Deviation from measurement procedure…….....None

3.2. General Requirements (EN 301489-1):

The performance criteria are used to take a decision on whether radio equipment passes or fails immunity tests.

For the purpose of the present document four categories of performance criteria apply:

- performance criteria for continuous phenomena applied to transmitters;
- performance criteria for transient phenomena applied to transmitters;
- performance criteria for continuous phenomena applied to receivers;
- performance criteria for transient phenomena applied to receivers.

Normally, the performance criteria depend on the type of radio equipment. Thus, the present document only contains general performance criteria commonly used for the assessment of radio equipment. More specific and product-related performance criteria for a dedicated type of radio equipment may be found in the part of EN 301 489 series dealing with the particular type of radio equipment.

Performance criteria for continuous phenomena applied to transmitters and receivers

If no further details are given in the relevant part of EN 301 489 series [i.13] dealing with the particular type of radio equipment, the following general performance criteria for continuous phenomena shall apply.

During and after the test, the equipment shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer when the equipment is used as intended. In some cases, this permissible performance level may be replaced by a permissible loss of performance.

During the test the EUT shall not unintentionally transmit or change its actual operating state and stored data.

If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

Performance criteria for transient phenomena applied to transmitters and receivers

If no further details are given in the relevant part of EN 301 489 series [i.13] dealing with the particular type of radio equipment, the following general performance criteria for transient phenomena shall apply.

For surges applied to symmetrically operated wired network ports intended to be connected directly to outdoor lines the following criteria applies:

- For products with only one symmetrical port intended for connection to outdoor lines, loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A SW reboot is not allowed. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

- For products with more than one symmetrical port intended for connection to outdoor lines, loss of function on the port under test is allowed, provided the function is self-recoverable. A SW reboot is not allowed. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

For all other ports the following applies:

- After the test, the equipment shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer, when the equipment is used as intended. In some cases, this permissible performance level may be replaced by a permissible loss of performance.

- During the EMC exposure to an electromagnetic phenomenon, a degradation of performance is, however, allowed. No change of the actual mode of operation (e.g. unintended transmission) or stored data is allowed.

- If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

Performance criteria for equipment which does not provide a continuous communication link

For radio equipment which does not provide a continuous communication link, the performance criteria described in clauses 6.1 and 6.2 are not appropriate, in these cases the manufacturer shall declare, for inclusion in the test report, his own specification for an acceptable level of performance or degradation of performance during and/or after the immunity tests. The performance specification shall be included in the product description and documentation. The related specifications set out in clause 5.3 have also to be taken into account.

The performance criteria specified by the manufacturer shall give the same degree of immunity protection as called for in clauses 6.1 and 6.2.

Performance criteria for ancillary equipment tested on a stand-alone basis

If ancillary equipment is intended to be tested on a standalone basis, the performance criteria described in clauses 6.1 and 6.2 are not appropriate, in these cases the manufacturer shall declare, for inclusion in the test report, his own specification for an acceptable level of performance or degradation of performance during and/or after the immunity tests. The performance specification shall be included in the product description and documentation. The related specifications set out in clause 5.3 have also to be taken into account.

The performance criteria specified by the manufacturer shall give the same degree of immunity protection as called for in clauses 6.1 and 6.2.

EN 55035 Performance Criteria

Performance criterion A:

The equipment shall continue to operate as intended without operator intervention. No degradation of performance, loss of function or change of operating state is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion B:

During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test.

After the test, the equipment shall continue to operate as intended without operator intervention; no degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.

If the minimum performance level (or the permissible performance loss), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion C:

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer’s instructions. A reboot or re-start operation is allowed.

Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

3.3. Measurement Uncertainty

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2

EMS Measurement Uncertainty

Radio-frequency electromagnetic field
The maximum measurement uncertainty is evaluated as ±2.72dB.
Radio-frequency continuous conducted
The maximum measurement uncertainty is evaluated as ±3.72dB.

4. TEST EQUIPMENT CALIBRATION DATE

Radio-frequency electromagnetic field

	Instrument	Manufacturer	Model No.	Asset No.	Cali. Interval	Cali. Due Date
☒	MXG Analog Signal Generator	Keysight	N5181A	MRTSUE06370	1 year	2023/06/01
☒	EPM Series Power Meter	Agilent	E4418B	MRTSUE06204	1 year	2023/06/01
☒	Power Sensor	Agilent	E9301H	MRTSUE06205	1 year	2023/06/01
☒	Amplifier	AR	150W1000M1	MRTSUE06146	N/A	N/A
☒	Amplifier	rflight	NTWPAS-1025100	MRTSUE06363	N/A	N/A
☒	Amplifier	rflight	NTWPAS-2560100	MRTSUE06364	N/A	N/A
☒	Dual Directional Coupler	AR	DC6080A	MRTSUE06148	N/A	N/A
☒	Log-Periodic Antenna	AR	ATR80M6G	MRTSUE06145	N/A	N/A
☒	Laser Powered Field Probe	AR	FL7006	MRTSUE06149	1 year	2022/12/25
☒	Temperature Humidity Meter	Testo	608-H1	MRTSUE06618	1 year	2022/11/25
☒	Temperature Humidity Meter	Testo	608-H1	MRTSUE06625	1 year	2022/11/25

Radio-frequency continuous conducted

	Instrument Name	Manufacturer	Model No.	Asset No.	Cali. Interval	Cal. Due Date
☒	Compact Immunity Test System	TESEQ	NSG 4070-35	MRTSUE06237	1 year	2022/10/21
☒	6dB Attenuator	3cTest	DTC75-6	MRTSUE06043	1 year	2023/06/01
☒	CDN	TESEQ	CDN M016	MRTSUE06238	1 year	2023/06/01
☒	CDN	TESEQ	CDN T800	MRTSUE06239	1 year	2022/11/24
☒	CDN	CYBERTEK	EM5070-M1	MRTSUE06407	1 year	2022/12/18
☒	Oscilloscope	Agilent	DSO-X 6002A	MRTSUE06107	1 year	2023/04/06
☒	Temperature Humidity Meter	Testo	608-H1	MRTSUE11021	1 year	2022/12/30

Software	Version	Function
JS32-RS	v 1.0.0.1	RS Test Software
NSG 4070 CTRL	v 1.3.0.1	CS Test Software

5. TEST RESULT

Clause	Test Item	Test Standard	Result (Pass/Fail)	Remark
Immunity Measurements				
EN 301 489-1 Clause 9.2	Radio-frequency electromagnetic field	IEC 61000-4-3 (2006+AMD1: 2007+AMD2:2010)	Pass	---
EN 301 489-1 Clause 9.5	Radio-Frequency Continuous Conducted	EN 61000-4-6 (2014/AC:2015)	Pass	---

Note1: Determining compliance is based on the test results met the regulation limits or requirements declared by clients, and the test results don't take into account the value of measurement uncertainty.

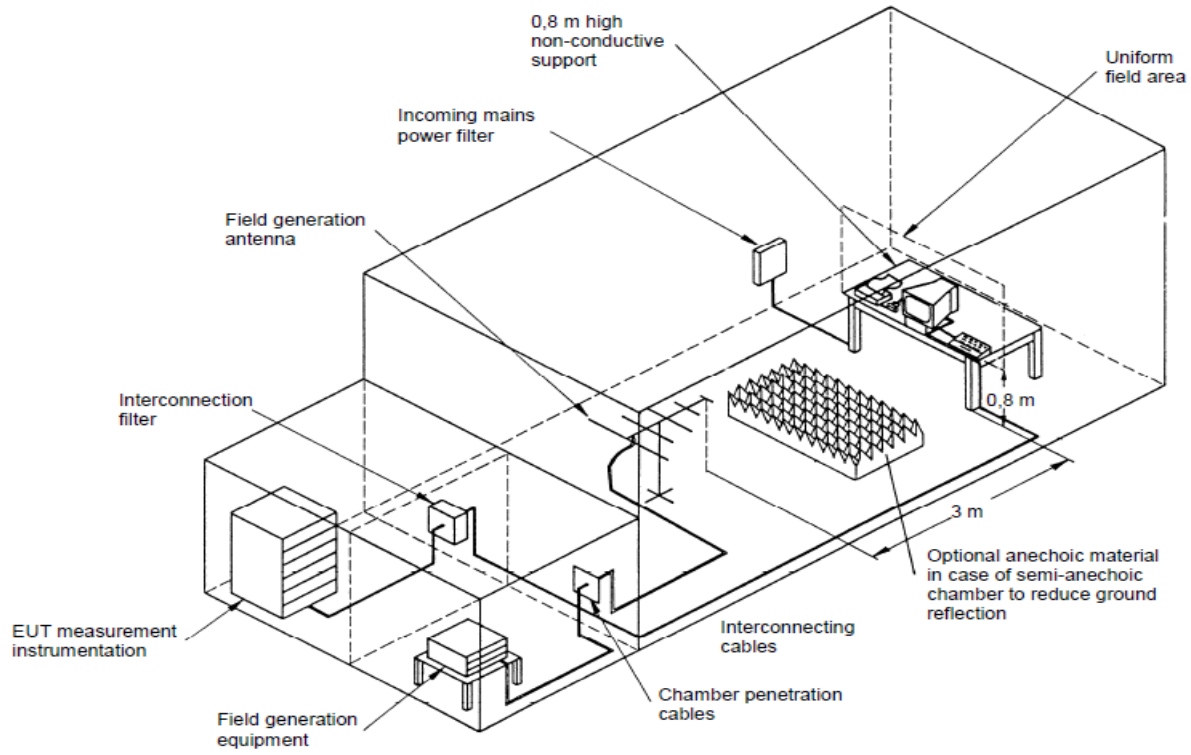
6. Radio-Frequency Electromagnetic Field

6.1. Limit of Radio-Frequency Electromagnetic Field

EN 301 489-1

Environmental phenomenon	Test specification	Units	Performance criterion
Enclosure port			
Radio frequency electromagnetic field	80 - 6000 3 80	MHz V/m (unmodulated, r.m.s) % AM (1kHz)	CT/CR 2G: RXQUAL ≦ 3 3G:BER ≦ 0.001 4G: throughput ≧ 95%
Note 1: If the wanted signal is modulated at 1000Hz, then an audio signal of 400Hz shall be used. Note 2: The test shall be performed over the frequency range 80MHz to 6000MHz with the exception of the exclusion band for transmitters, receivers and duplex transceivers of EN 301 489-1, as appropriate.			

6.2. Test Setup



6.3. Test Procedure

The EUT and load, which are placed on a table that is 0.8 meter above ground, are placed with one coincident with the calibration plane such that the distance from antenna to the EUT was 3 meters. Both horizontal and vertical polarization of the antenna and four sides of the EUT are set on measurement.

In order to judge the EUT performance, a CCD camera is used to monitor EUT screen.

All the scanning conditions are as follows:

	Condition of Test	Remarks
1.	Field Strength	3V/m
2.	Radiated Signal	AM 80% Modulated with 1kHz
3.	Scanning Frequency	80 - 6000MHz 80 - 1000MHz 1800, 2600, 3500, 5000MHz
4.	Dwell Time	3 Seconds
5.	Frequency Step Size Δf	1%

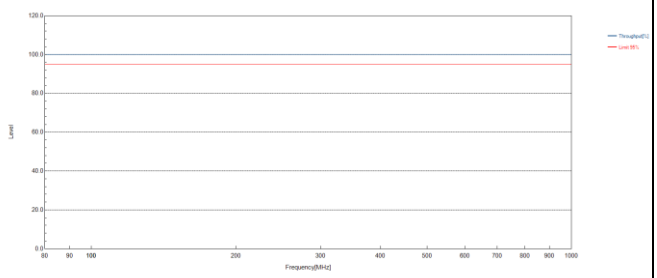
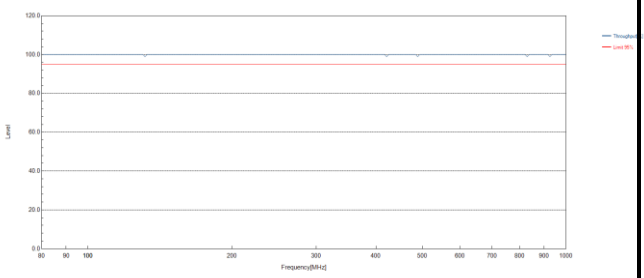
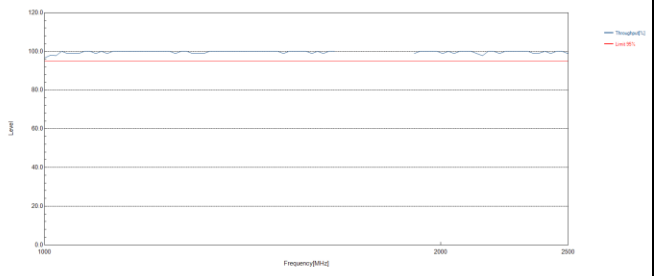
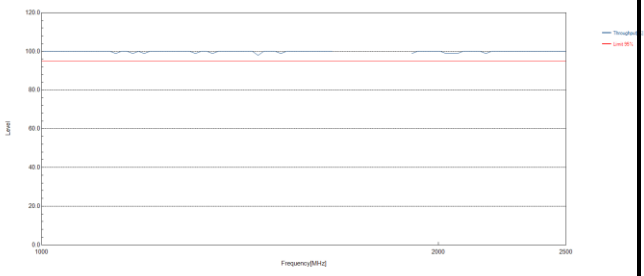
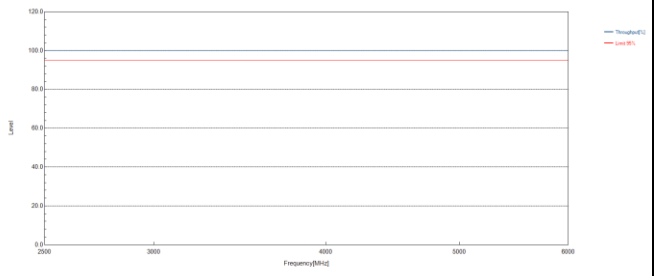
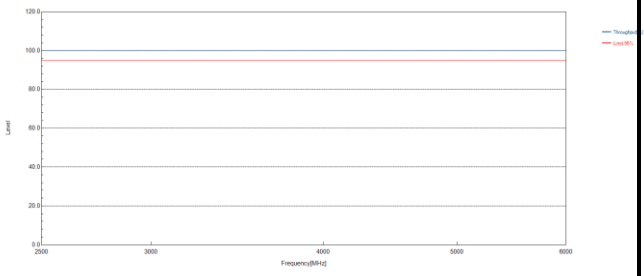
6.4. Test Result

EUT	BLG840F/X BLE/802.15.4 to LTE Gateways	Date of Test	2022/8/11
Site	SIP-AC4	Temp.	24°C
Test Engineer	Violet Tao	Humidity	35.5%
Test Mode	Mode1	Test Voltage	AC 230V/50Hz

EN 301 489-1 / EN 301 489-52

Frequency (MHz)	Polarity	Test Position	Field Strength (V/m)	Test Result	Result
80-1000	Horizontal & Vertical	Front	3	≧ 95%	Pass
		Rear		≧ 95%	Pass
		Left		≧ 95%	Pass
		Right		≧ 95%	Pass
1000-2500	Horizontal & Vertical	Front	3	≧ 95%	Pass
		Rear		≧ 95%	Pass
		Left		≧ 95%	Pass
		Right		≧ 95%	Pass
2500-6000	Horizontal & Vertical	Front	3	≧ 95%	Pass
		Rear		≧ 95%	Pass
		Left		≧ 95%	Pass
		Right		≧ 95%	Pass

Note: During and after the test, the EUT continues to operate as intended without operator Intervention and no degradation of performance or loss of function.

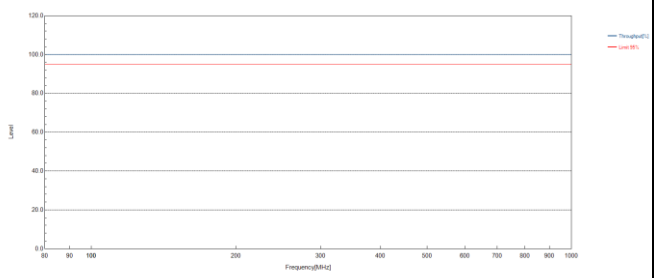
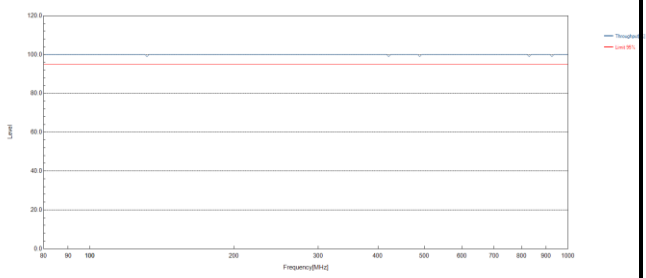
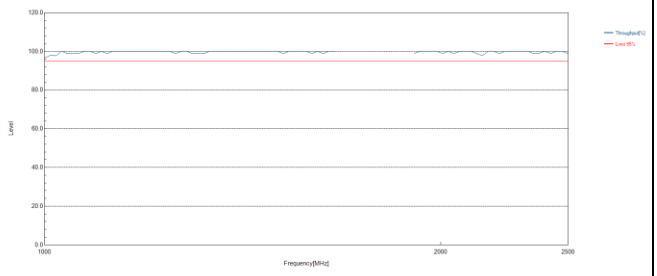
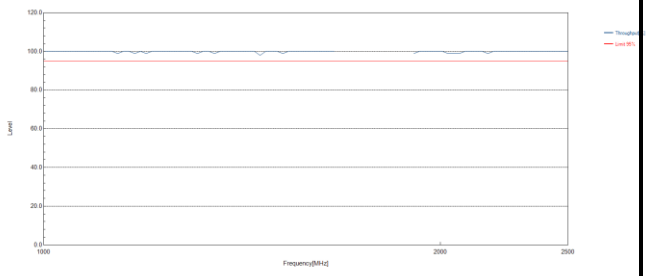
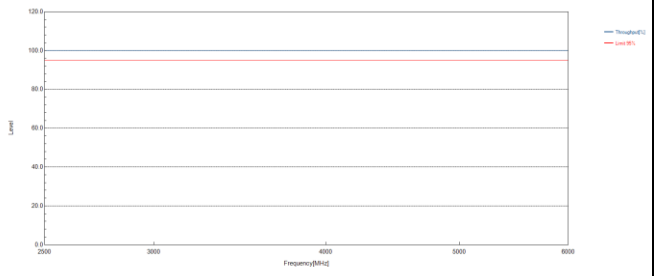
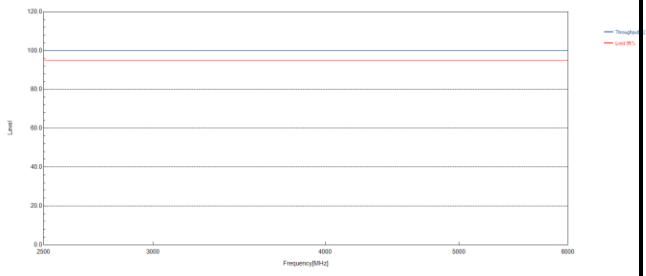
Frequency Range: 80 ~ 1000 MHz	
Throughput - Horizontal	**Throughput - Vertical**
	
Frequency Range: 1000 ~ 2500 MHz	
Throughput - Horizontal	**Throughput - Vertical**
	
Frequency Range: 2500 ~ 6000 MHz	
Throughput - Horizontal	**Throughput - Vertical**
	

EUT	BLG840F/X BLE/802.15.4 to LTE Gateways	Date of Test	2022/8/11
Site	SIP-AC4	Temp.	24°C
Test Engineer	Violet Tao	Humidity	35.5%
Test Mode	Mode6	Test Voltage	AC 230V/50Hz

EN 301 489-1 / EN 301 489-52

Frequency (MHz)	Polarity	Test Position	Field Strength (V/m)	Test Result	Result
80-1000	Horizontal & Vertical	Front	3	≧ 95%	Pass
		Rear		≧ 95%	Pass
		Left		≧ 95%	Pass
		Right		≧ 95%	Pass
1000-2500	Horizontal & Vertical	Front	3	≧ 95%	Pass
		Rear		≧ 95%	Pass
		Left		≧ 95%	Pass
		Right		≧ 95%	Pass
2500-6000	Horizontal & Vertical	Front	3	≧ 95%	Pass
		Rear		≧ 95%	Pass
		Left		≧ 95%	Pass
		Right		≧ 95%	Pass

Note: During and after the test, the EUT continues to operate as intended without operator Intervention and no degradation of performance or loss of function.

Frequency Range: 80 ~ 1000 MHz	
Throughput - Horizontal	**Throughput - Vertical**
	
Frequency Range: 1000 ~ 2500 MHz	
Throughput - Horizontal	**Throughput - Vertical**
	
Frequency Range: 2500 ~ 6000 MHz	
Throughput - Horizontal	**Throughput - Vertical**
	

7. Radio-Frequency Continuous Conducted

7.1. Limit of Radio-Frequency Continuous Conducted

EN 301 489-1

Environmental phenomenon	Test specification	Units	Performance criterion
Input AC Power Ports			
Radio-frequency continuous conducted	0.15 - 80 3 80 1	MHz V (unmodulated, r.m.s) % AM (1kHz) Frequency Step Size Δf %	CT/CR (A) 2G: RXQUAL ≦ 3 3G:BER ≦ 0.001 4G: throughput ≧ 95%
Signal Ports and Telecommunication Ports			
Radio-frequency continuous conducted	0.15 - 80 3 80 1	MHz V (unmodulated, r.m.s) % AM (1kHz) Frequency Step Size Δf %	CT/CR (A) 2G: RXQUAL ≦ 3 3G:BER ≦ 0.001 4G: throughput ≧ 95%

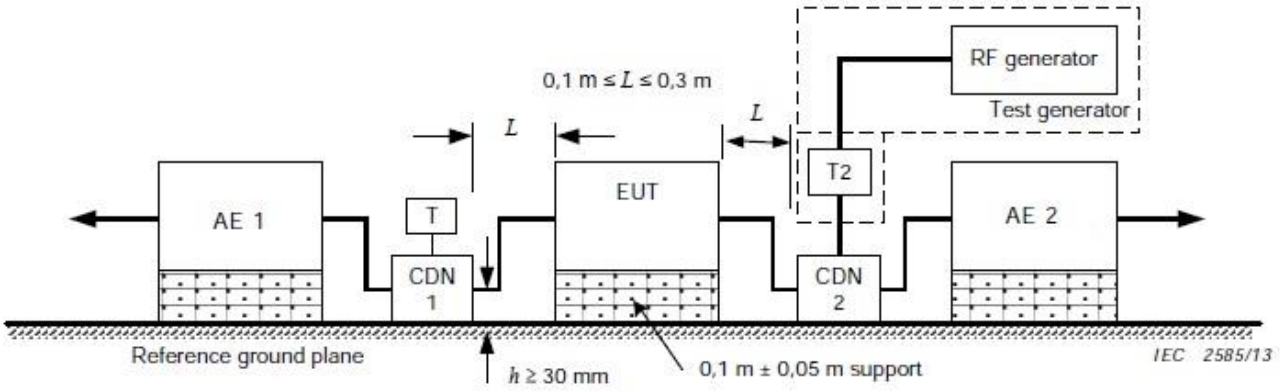
Note 1: If the wanted signal is modulated at 1000Hz, then an audio signal of 400Hz shall be used.

Note 2: The test shall be performed over the frequency range 150kHz to 80MHz with the exception of the exclusion band for transmitters, and for receivers and duplex transceivers [see clause 4 of EN 301 489-1.

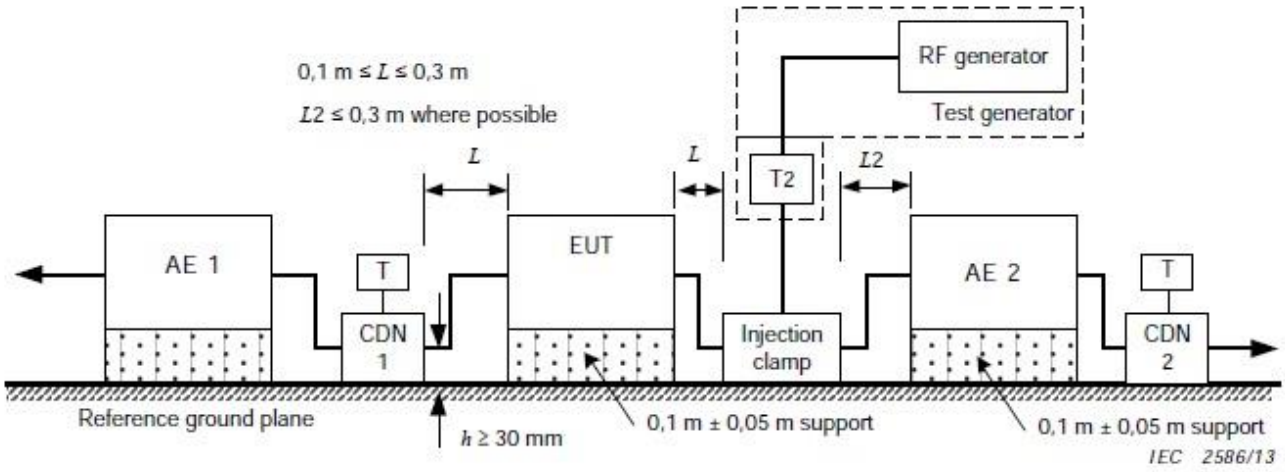
Note 3: This test shall be additionally performed on signal ports, telecommunication ports, control ports, and DC power ports, of radio equipment and associated ancillary equipment, if the cables may be longer than 3m.

7.2. Test Setup

CDN Test Setup



EM-Clamp Test Setup



7.3. Test Procedure

The EUT is placed on a table that is 0.8 meter height, and a ground reference plane on the table, EUT is placed upon table and use 0.1m insulation between the EUT and ground reference plane.

For Signal Ports and Telecommunication Ports
The disturbance signal is through a coupling and decoupling networks (CDN) or EM-clamp device couples to the signal and Telecommunication lines of the EUT.

For Input DC and AC Power Ports
The EUT is connected to the power mains through a coupling and decoupling networks for power supply lines. And directly couples the disturbances signal into EUT.
Used CDN-M2 for two wires or CDN-M3 for three wires.

All the scanning conditions are as follows:

	Condition of Test	Remarks
1.	Field Strength	130dBuV(3V) Level 2
2.	Radiated Signal	AM 80% Modulated with 1kHz
3.	Scanning Frequency	0.15MHz – 80MHz
4	Dwell Time	3 Seconds
5.	Frequency step size Δf :	1%
6.	The rate of Swept of Frequency	1.5×10^{-3} decades/s

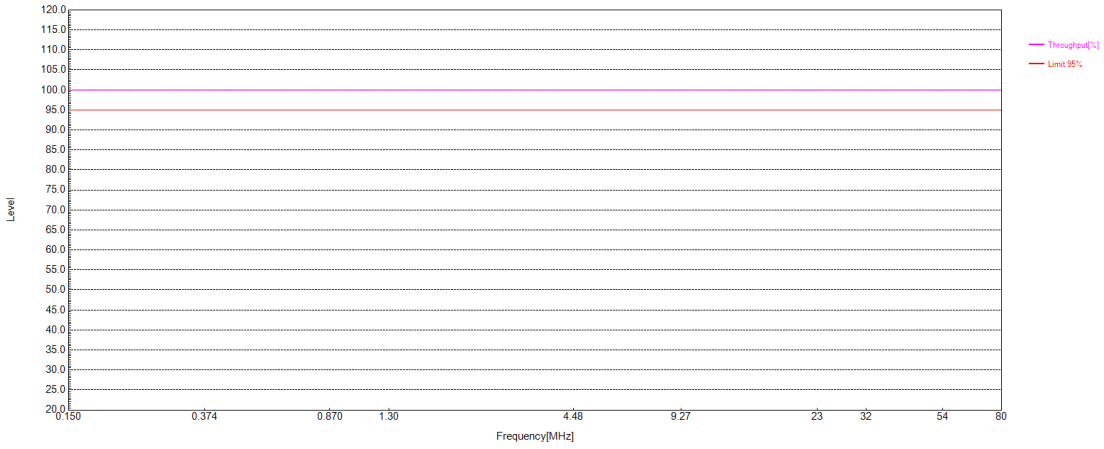
7.4. Test Result

EUT	BLG840F/X BLE/802.15.4 to LTE Gateways	Date of Test	2022/8/10
Site	SIP-SR4	Temp.	29.8°C
Test Engineer	Rupert Wang	Humidity	55.3%
Test Mode	Mode1	Test Voltage	AC 230V/50Hz

Frequency (MHz)	Inject Voltage (V)	Inject Ports	Inject Method	Test Result	Result
0.15-80	3	AC Mains	CDN	≧ 95%	Pass

Note: The EUT performance complied with performance criteria for CT&CR to MS Function and there is not any degradation of performance and function.

Frequency Range: 0.15 ~ 80 MHz Throughput (AC Mains)

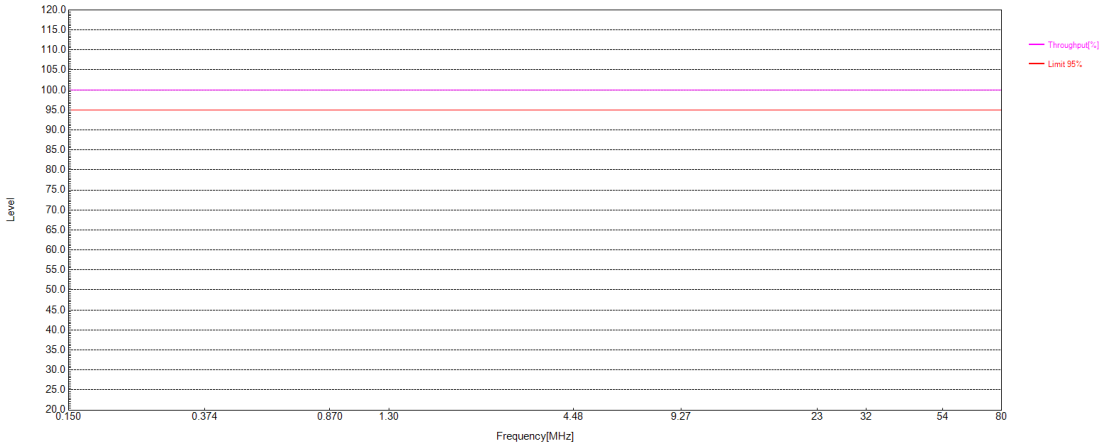


EUT	BLG840F/X BLE/802.15.4 to LTE Gateways	Date of Test	2022/8/10
Site	SIP-SR4	Temp.	29.8°C
Test Engineer	Rupert Wang	Humidity	55.3%
Test Mode	Mode6	Test Voltage	AC 230V/50Hz

Frequency (MHz)	Inject Voltage (V)	Inject Ports	Inject Method	Test Result	Result
0.15-80	3	AC Mains	CDN	≧ 95%	Pass

Note: The EUT performance complied with performance criteria for CT&CR to MS Function and there is not any degradation of performance and function.

Frequency Range: 0.15 ~ 80 MHz Throughput (AC Mains)



The End