EMC TEST REPORT

For

PHOTOELECTRIC BEAM DETECTOR

Model Number: PBX, PBY, PBZ

Prepared for	:	IVTEX COMPANY LIMITED Building 1, Zhongtai Industrial Park, Yousong Community, Longhua Town, Bao'an District, Shenzhen, Guangdong Province, P.R.CHINA
Prepared By	:	Shenzhen Meihua Electronic Technology Co., Ltd. Room 05, Floor 3A, Bldg 1, Zhifu Plaza, Gushu 1 Road, Xixiang Street, Baoan District, Shenzhen, China.

Date of Test	:	Dec. 25-Dec. 30, 2013
Date of Report	:	Dec. 31, 2013

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TEST REPORT DECLARATION

Applicant	:	IVTEX COMPANY LIMITED
Address	:	Building 1, Zhongtai Industrial Park, Yousong Community, Longhua Town, Bao'an District, Shenzhen, Guangdong Province, P.R.CHINA
Manufacturer	:	IVTEX COMPANY LIMITED
Address	:	Building 1, Zhongtai Industrial Park, Yousong Community, Longhua Town, Bao'an District, Shenzhen, Guangdong Province, P.R.CHINA
EUT Description	:	PHOTOELECTRIC BEAM DETECTOR
Models No.	:	PBX, PBY, PBZ

Test Standards:

ETSI EN 301 489-1V1.9.2:2011.

The EUT described above is tested by Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory to determine the maximum emissions from the EUT and ensure the EUT to be compliance with the immunity requirements of the EUT. Shenzhen Meihua Electronic Technology Co., Ltd. is assumed full responsibility for the accuracy of the test results. Also, this report shows that the EUT technically complies with the 2004/108/EC directive and its amendment requirements.

The test report is valid for above tested sample only and shall not be reproduced in part without written approval of Shenzhen Meihua Electronic Technology Co., Ltd.

Tested by:	(Julie Liu)	Date:	Dec. 30, 2013
Checked by:	(Benny Xu)	Date:	Dec. 31, 2013
Approved by:	(Thomas Zhu)	Date:	Dec. 31, 2013

SHENZHEN MEIHUA TECHNOLOGY CO., LTD. APPROVED

1. TEST RESULTS SUMMARY

Table 1 Test Results Summary

Test Items	Test Results
Conducted Disturbance	Pass
Radiated Disturbance	Pass
Harmonic Current	Pass
Voltage Fluctuations and Flicker	Pass
Electrostatic Discharge	Pass
Radio Frequency Electromagnetic Field	Pass
Fast Transients, Common Mode	Pass
Surges	Pass
Radio Frequency, Common Mode	Pass
Voltage Dips and Interruptions	Pass

2. GENERAL INFORMATION

2.1. Report information

2.1.1.This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that SMQ approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that SMQ in any way guarantees the later performance of the product/equipment.

2.1.2.The sample/s mentioned in this report is/are supplied by Applicant, SMQ therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture or any information supplied.

2.1.3.Additional copies of the report are available to the Applicant at an additional fee. No third part can obtain a copy of this report through SMQ, unless the applicant has authorized SMQ in writing to do so.

2.2. Laboratory Accreditation and Relationship to Customer

The testing report were performed by the **Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory** (guangdong EMC compliance testing center), in their facilities located at **Bldg. of Metrology & Quality Inspection, Longzhu Road, Nanshan District, Shenzhen, Guangdong, China**. At the time of testing, the following bodies accredited the Laboratory:

The Laboratory is listed in the United States of American Federal Communications Commission (FCC), and the registration number is 274801.

The Laboratory is registered to perform emission tests with Industry Canada (IC), and the registration number is IC4174.

Jun. 19, 2013 certificated by TUV Rheinland, Shenzhen (Audit Report: 02024086 004).
The certificate is valid until the next scheduled inspection or up to 24 months, at the discretion of TUV Rhineland.

2.3. Measurement Uncertainty

Radiated disturbance measurement uncertainty: The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2, in the range 30MHz to 1GHz at 3 meter is **±3.70**dB.

Conducted disturbance measurement uncertainty: The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2, in the range 150kHz to 30MHz is **±2.38** dB.

3. PRODUCT DESCRIPTION

3.1. EUT Description

Description : PHOTOELECTRIC BEAM DETECTOR

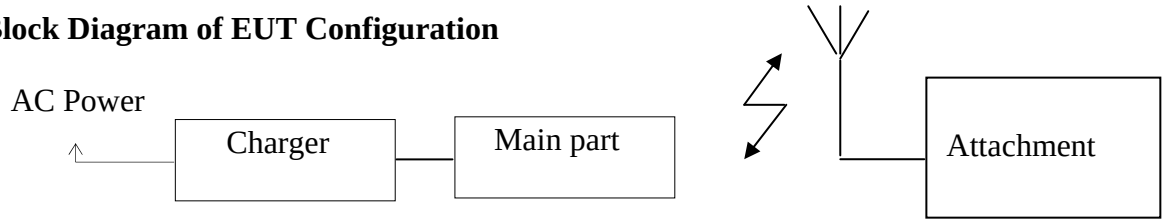
Model Number : PBX, PBY, PBZ

Applicant : IVTEX COMPANY LIMITED

Manufacturer : IVTEX COMPANY LIMITED

Remark: Models PBX, PBY, PBZare identical in schematic, structure, except for different model number, dimension and shape, EMI and EMS testing were performed with PBX only.

3.2. Block Diagram of EUT Configuration



3.3. Operating Condition of EUT

Test mode 1: 315MHz Traffic mode

Test mode 2: 315MHz Idle mode

Test mode 3: 433MHz Traffic mode

Test mode 4: 433MHz Idle mode

Traffic Mode: The nominal frequency of wanted RF input signal (for the receivers) shall be selected by setting the Absolute Radio Frequency Channel Number (ARFCN) to 65 for 315MHz, and a communications link shall be set up with the Base Station Simulator to operate at maximum transmit power.

Idle Mode: The test system shall simulate a Base Station (BS) with Broadcast Control Cannel/Common Control Channel (BCCH/CCCH) on one carrier. The EUT shall be synchronized to the BCCH, listening to the CCCH and able to respond to paging messages. Periodic Location Updating shall be disabled.

3.4. Support Equipment List

3.5. Test Conditions

Temperature: 19-21℃
Relative Humidity: 55~58 %

Date of Testing: 2010-11-22 to 2010-11-25

3.6. Modifications

No modification was made.

3.7. Performance Criterion

Criterion CT (for Continuous phenomena applied to Transmitters) :
During the test, the uplink speech output level shall be at least 35dB less than the previously recorded reference levels, when measured through an audio band pass filter of width 200Hz, centered on 1kHz (audio breakthrough check)
At the conclusion of the test, the EUT shall operate as intended with no loss of user control user control functions or stored data, and the communication link shall have been maintained.
In addition to confirming the above performance during a call, the test shall also be performed in idle mode, and the transmitter shall not unintentionally operate.

Criterion TT (for Transient phenomena applied to Transmitter):

At the conclusion of each exposure the EUT shall operate with no user noticeable loss of the communication link.
At the conclusion of the total test comprising the series of individual exposures, the EUT shall operate as intended with no loss of user control functions or stored data, as declared by the manufacturer, and the communication link shall have been maintained.
In addition to confirming the above performance during a call, the test shall also be performed in idle mode, and the transmitter shall not unintentionally operate.

Criterion CR (for Continuous phenomena applied to Receivers):

During the test, the RXQUAL of the downlink shall not exceed the value of three, measured during each individual exposure in the test sequence.
During the test, the downlink speech output level shall be at least 35dB less than the previously recorded reference levels, when measured through an audio band pass filter of width 200Hz, centered on 1kHz (audio breakthrough check).
At the conclusion of the test, the EUT shall operate as intended with no loss of user control user control functions or stored data, and the communication link shall have been maintained.

Criterion TR (for Transient phenomena applied to Transmitters):

At the conclusion of each exposure the EUT shall operate with no user noticeable loss of the communication link.
At the conclusion of the total test comprising the series of individual exposures, the EUT shall operate as intended with no loss of user control functions or stored data, as declared by the manufacturer, and the communication link shall have been maintained.

4. TEST EQUIPMENT USED

4.1. Test Equipment Used to Measure Conducted Disturbance

Table 2 Conducted Disturbance Test Equipment

No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
SB2603	EMI Test Receiver	Rohde & Schwarz	ESCS30	Jan.31, 2013	1 Year
SB2604	AMN	Rohde & Schwarz	ESH3-Z5	Jan.31, 2013	1 Year
SB3441	Radio communications tester	Rohde & Schwarz	CMU200	Jan.31, 2013	1 Year

4.2. Test Equipment Used to Measure Radiated Disturbance

Table 3 Radiated Disturbance Test Equipment

No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
SB3436	EMI Test Receiver	Rohde & Schwarz	ESI26	Jan. 28,2013	1 Year
SB3440	Bilog Antenna	Chase	CBL6112B	Feb. 01,2013	1 Year
SB3441	Radio communications tester	Rohde & Schwarz	CMU200	Jan. 31,2013	1 Year

4.3. Test Equipment Used to Measure Harmonic Current /Voltage Fluctuation and Flicker

Table 4 Harmonic Current /Voltage Fluctuation and Flicker Test Equipment

No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
SB2588	Harmonic flicker test system	CI	5001ix-CTS-400	Jan.31,2013	1 Year
SB3441	Radio communications tester	Rohde & Schwarz	CMU200	Jan.31,2013	1 Year

4.4. Test Equipment Used to Measure Electrostatic Discharge

Table 5 ESD Test Equipment

No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
SB2561	ESD tester	SCHNAFFNER	NSG435	Jan.31, 2013	1 Year
SB3441	Radio communications tester	Rohde & Schwarz	CMU200	Jan.31, 2013	1 Year

4.5. Test Equipment Used to Measure Radio Frequency Electromagnetic Fields

Table 6 Radiated Electromagnetic Field Test Equipment

No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
SB3433	Signal Generator	Rohde & Schwarz	SMT03	Jan.31, 2013	1 Year
SB3437	Power Meter	Rohde & Schwarz	NRVD	Jan.31, 2013	1Year
SB3437/ 01	Voltage Probe	Rohde & Schwarz	URV5-Z2	Jan.31, 2013	1Year
SB3437/ 02	Voltage Probe	Rohde & Schwarz	URV5-Z2	Jan.31, 2013	1Year
SB3173	Power Amplifier	AR	150W1000	Jan.31, 2013	1Year
SB2622	Bilog Antenna	Chase	CBL6111C	Jan.31, 2013	1Year
SB3441	Radio communications tester	Rohde & Schwarz	CMU200	Jan.31, 2013	1 Year
SB3439	Audio Analyzer	Rohde & Schwarz	UPL	Jan.31, 2013	1 Year

4.6. Test Equipment Used to Measure Fast Transient, common mode and Surges

Table 7 Fast Transient and Surges Test Equipment

No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
SB3070	Simulator	EMTEST	UCS500M4	Jan.31, 2013	1 Year
SB3441	Radio communications tester	Rohde & Schwarz	CMU200	Jan.31, 2013	1 Year

4.7. Test Equipment Used to Measure Radio Frequency, common mode

Table 8 Radio Frequency Test Equipment

No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
SB2605	CW sine Generator	EMTEST	CWS500	Jan.31, 2013	1 Year
SB2605/01	CDN	EMTEST	CDN-M2	Jan.31, 2013	1 Year
SB3441	Radio communicatio ns tester	Rohde & Schwarz	CMU200	Jan.31, 2013	1 Year
SB3439	Audio Analyzer	Rohde & Schwarz	UPL	Jan.31, 2013	1 Year

4.8. Test Equipment Used to Measure Voltage Dips and Interruptions

Table 9 Voltage Dips and Interruption Test Equipment

No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
SB2617	EMCPRO	EMTEST	----	Jan.31, 2013	1 Year

5. CONDUCTED DISTURBANCE TEST

5.1. Test Standard and Limit

5.1.1.Test Standard

ETSI EN 301 489-1 V1.9.2 (EN55022:2010)

5.1.2.Test Limit

Table 10 Conducted Disturbance Test Limit

Frequency	Maximum RF Line Voltage (dBμV)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

* Decreasing linearly with logarithm of the frequency

5.2. Test Procedure

The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI test receiver (R&S Test Receiver ESCS30) is used to test the emissions form both sides of AC line. The bandwidth of EMI test receiver is set at 9kHz.

5.3. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

5.4. Test Data

The emissions don’t show in below are too low against the limits, the test curves are shown in the APPENDIX Ⅰ

Table 11 Conducted Disturbance Test Data

EUT: PHOTOELECTRIC BEAM DETECTOR Model No.: PBX Test Mode: 1					Date of Test: 2013.12.27 Temperature: 20 ℃ Humidity: 55-58 %				
Line					Neutral				
Frequency (MHz)	Quasi-Peak		Average		Frequency (MHz)	Quasi-Peak		Average	
	Reading (dBμV)	Limit (dBμV)	Reading (dBμV)	Limit (dBμV)		Reading (dBμV)	Limit (dBμV)	Reading (dBμV)	Limit (dBμV)
0.155	45.1	65.6	40.0	55.6	0.155	45.5	65.5	39.8	55.3
1.975	38.2	56	31.1	46	2.825	38.4	56	30.5	46
3.025	38.0	56	31.5	46	4.375	38.9	56	34.1	46

Table 12 Conducted Disturbance Test Data

EUT: PHOTOELECTRIC BEAM DETECTOR Model No.: PBX Test Mode: 2					Date of Test: 2013.12.27 Temperature: 20 ℃ Humidity: 55-58 %				
Line					Neutral				
Frequency (MHz)	Quasi-Peak		Average		Frequency (MHz)	Quasi-Peak		Average	
	Reading (dBμV)	Limit (dBμV)	Reading (dBμV)	Limit (dBμV)		Reading (dBμV)	Limit (dBμV)	Reading (dBμV)	Limit (dBμV)
0.250	42.2	61.2	34.5	51.2	0.265	42.6	61.2	35.4	51.2
0.472	38.1	56.6	31.6	46.6	0.460	40.5	56.7	32.5	46.7
2.933	38.4	56	33.2	46	2.572	39.9	56	32.6	46

Table 13 Conducted Disturbance Test Data

EUT: PHOTOELECTRIC BEAM DETECTOR Model No.: PBX Test Mode: 3					Date of Test: 2013.12.27 Temperature: 20 ℃ Humidity: 55-58 %				
Line					Neutral				
Frequency (MHz)	Quasi-Peak		Average		Frequency (MHz)	Quasi-Peak		Average	
	Reading (dBμV)	Limit (dBμV)	Reading (dBμV)	Limit (dBμV)		Reading (dBμV)	Limit (dBμV)	Reading (dBμV)	Limit (dBμV)
0.420	35.2	57.7	28.5	47.7	0.675	34.2	56	25.3	46
2.025	34.5	56	20.8	46	2.015	34.1	56	18.6	46
5.735	41.5	60	28.5	50	5.730	40.5	60	25.8	50

Table 14 Conducted Disturbance Test Data

EUT: PHOTOELECTRIC BEAM DETECTOR Model No.: PBX Test Mode: 4					Date of Test: 2013.12.27 Temperature: 20 ℃ Humidity: 55-58 %				
Line					Neutral				
Frequency (MHz)	Quasi-Peak		Average		Frequency (MHz)	Quasi-Peak		Average	
	Reading (dBμV)	Limit (dBμV)	Reading (dBμV)	Limit (dBμV)		Reading (dBμV)	Limit (dBμV)	Reading (dBμV)	Limit (dBμV)
0.415	35.6	57.7	28.5	47.7	0.680	34.5	56	25.7	46
2.650	35.2	56	20.6	46	2.650	34.8	56	22.5	46
5.730	42.0	60	26.6	50	5.745	42.2	60	30.4	50

6. RADIATED DISTURBANCE TEST

6.1. Test Standard and Limit

6.1.1.Test Standard

ETSI EN 301 489-1 V1.9.2 (EN55022:2010)

6.1.2.Test Limit

Table 15 Radiated Disturbance Test Limit

Frequency	Limit (dBμV/m)
	Quasi-peak Level
30MHz~230MHz	40
230MHz~1000MHz	47

* The lower limit shall apply at the transition frequency.
* The test distance is 3m.

6.2. Test Procedure

The EUT is placed on a turntable, which is 0.8 meter above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set **3 meters** away from the receiving antenna, which is mounted on an antenna tower. The antenna can move up and down between 1 to 4 meters to find out the maximum emission level. Broadband antenna is used as a receiving antenna. Both horizontal and vertical polarization of the antenna is set on test.

6.3. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

6.4. Test Data

Emissions don't show below are too low against the limits, the test curves are shown in the APPENDIX Ⅰ

Table 16 Radiated Disturbance Test Data

Model No.: PBX Test Mode: 1			
Frequency MHz	Readings dB(μV/m)	Polarization	Limits dB (μV/m)
91.825	37.2	Horizontal	40
84.625	35.7	Vertical	40
167.200	35.1	Vertical	40

Table 17 Radiated Disturbance Test Data

Model No.: PBX Test Mode: 2			
Frequency MHz	Readings dB(μV/m)	Polarization	Limits dB (μV/m)
70.265	37.2	Horizontal	40
177.310	36.3	Horizontal	40
131.350	32.5	Vertical	40

Table 18 Radiated Disturbance Test Data

Model No.: PBX Test Mode: 3			
Frequency MHz	Readings dB(μV/m)	Polarization	Limits dB (μV/m)
172.315	36.7	Horizontal	40
32.140	27.4	Vertical	40

Table 19 Radiated Disturbance Test Data

Model No.: PBX Test Mode: 4			
Frequency MHz	Readings dB(μV/m)	Polarization	Limits dB (μV/m)
178.685	37.4	Horizontal	40
44.005	30.0	Vertical	40

7. HARMONIC CURRENT EMISSION TEST

7.1. Test Standard and Limit

7.1.1.Test Standard

ETSI EN 301 489-1 V1.9.2 (EN61000-3-2:2010)

7.1.2.Limits

Table 20 Harmonic Current Test Limit (Class D)

Harmonic order (n)	Maximum permissible harmonic current (A)	Maximum permissible harmonic current per watt (mA/W)
3	2.30	3.4
5	1.14	1.9
7	0.77	1.0
9	0.40	0.5
11	0.33	0.35
13	0.21	3.85/n
15≤n≤39	0.15×15/n	3.85/n

7.2. Test Procedure

The power cord of the EUT is connected to the output of the test system. Turn on the Power of the EUT and use the test system to test the harmonic current level.

7.3. Test Data

The active input power of EUT is lower than 75W, therefore, no limits are necessary in accordance with standard EN61000-3-2.

8. VOLTAGE FLUCTUATIONS AND FLICKER TEST

8.1. Test Standard and Limit

8.1.1.Test Standard

ETSI EN 301 489-1 V1.9.2 (EN61000-3-3:2010)

8.1.2.Limit

Table 21 Flicker Test Limit

Test items	Limits
Pst	1.0
dc	3.3%
dmax	4.0%
dt	Not exceed 3.3% for 500ms

8.2. Test Procedure

The power cord of the EUT is connected to the output of the test system. Turn on the power of the EUT and use the test system to test the harmonic current level.

8.3. Test Data

Table 22 Flicker Test Data

Model No.: PBX Test Mode: 1		
Items	Reading	Limit
dmax	0.00	4.0%
dc	0.00	3.3%
dt	0.00	Not exceed 3.3% for 500ms
Pst	0.005	1.0

Table 23 Flicker Test Data

Model No.: PBX Test Mode: 2		
Items	Reading	Limit
dmax	0.00	4.0%
dc	0.00	3.3%
dt	0.00	Not exceed 3.3% for 500ms
Pst	0.005	1.0

Table 24 Flicker Test Data

Model No.: PBX Test Mode: 3		
Items	Reading	Limit
dmax	0.00	4.0%
dc	0.00	3.3%
dt	0.00	Not exceed 3.3% for 500ms
Pst	0.005	1.0

Table 25 Flicker Test Data

Model No.: PBX Test Mode: 4		
Items	Reading	Limit
dmax	0.00	4.0%
dc	0.00	3.3%
dt	0.00	Not exceed 3.3% for 500ms
Pst	0.005	1.0

9. ELECTROSTATIC DISCHARGE (ESD) TEST

9.1. Test Requirements

9.1.1.Test Standard

ETSI EN 301 489-1 V1.9.2 (EN61000-4-2: 2010)

9.1.2.Test Level

Table 26 Test Level for ESD

Port	Test Specification
Enclosure Port	2kV 4kV 8kV air discharge 2kV 4kV contact discharge

9.1.3.Performance criterion**: Criterion TT, Criterion TR**

9.2. Test Procedure

9.2.1.Contact Discharge**:**

The ESD generator is held perpendicular to the surface to which the discharge is applied and the tip of the discharge electrode touches the surface of EUT. Then turn the discharge switch. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed

9.2.2.Air Discharge**:**

Air discharge is used where contact discharge can't be applied.. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed

9.2.3.Indirect discharge for horizontal coupling plane

At least 10 single discharges shall be applied to the horizontal coupling plane, at points on each side of the EUT.

9.2.4.Indirect discharge for vertical coupling plane

At least 10 single discharge shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m × 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

9.3. Operating Condition of EUT

Test Mode 1, Test Mode 2, Test Mode 3 and Test Mode 4

9.4. Test Data

Table 27 ESD Test

Model No.: PBX Test Mode: 1				
Location	Voltage	Amount of test points	Discharge Method	Results
Nonconductive Enclosure	±2kV	8	A	Pass
Screw	±2kV	8	A	Pass
Nonconductive Enclosure	±4kV	8	A	Pass
VCP	±4kV	4	C	Pass
HCP	±4kV	4	C	Pass

Table 28 ESD Test

Model No.: PBX Test Mode: 2				
Location	Voltage	Amount of test points	Discharge Method	Results
Nonconductive Enclosure	±2kV	8	A	Pass
Screw	±2kV	8	A	Pass
Nonconductive Enclosure	±4kV	8	A	Pass
VCP	±4kV	4	C	Pass
HCP	±4kV	4	C	Pass

Table 29 ESD Test

Model No.: PBX Test Mode: 3				
Location	Voltage	Amount of test points	Discharge Method	Results
Nonconductive Enclosure	±2kV	8	A	Pass
Screw	±2kV	8	A	Pass
Nonconductive Enclosure	±4kV	8	A	Pass
VCP	±4kV	4	C	Pass
HCP	±4kV	4	C	Pass

Table 30 ESD Test

Model No.: PBX Test Mode: 4				
Location	Voltage	Amount of test points	Discharge Method	Results
Nonconductive Enclosure	±2kV	8	A	Pass
Screw	±2kV	8	A	Pass
Nonconductive Enclosure	±4kV	8	A	Pass
VCP	±4kV	4	C	Pass
HCP	±4kV	4	C	Pass

10. RADIATED ELECTROMAGNETIC FIELD TEST

10.1.Test Requirements

10.1.1.Test Standard

ETSI EN 301 489-1 V1.9.2 (EN61000-4-3:2010)

10.1.2.Test Level

Table 31Test Level for Radiated Electromagnetic Field Immunity Test

Port	Test Specification
Enclosure Port	80-1000MHz, and 1400-2000MHz 3 V/m 80 % AM (1kHz)

10.1.3.Performance criterion**: Criterion CT, Criterion CR**

10.2.Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter above ground. EUT is set 3 meter away from the transmitting antenna, which is mounted, on an antenna tower. Both horizontal and vertical polarization of the antenna is set on Test. Each of the four sides of EUT must be faced this transmitting antenna and measured individually. In order to judge the EUT performance, test system is used to monitor EUT.

10.3.Operating Condition of EUT

Test mode 1, Test Mode 2, Test Mode 3 and Test Mode 4

10.4.Test Data

Table 32 Radiated Electromagnetic Field Test

Model No.: PBX Test Mode: 1		
Frequency Rang (MHz)	80-1000 MHz and 1400-2000 MHz	
Field Strength (V/m)	3V/m	
Steps (%)	1%	
	Horizontal	Vertical
Front	Pass	Pass
Rear	Pass	Pass
Left	Pass	Pass
Right	Pass	Pass

Table 33 Radiated Electromagnetic Field Test

Model No.: PBX Test Mode: 2		
Frequency Rang (MHz)	80-1000 MHz and 1400-2000 MHz	
Field Strength (V/m)	3V/m	
Steps (%)	1%	
	Horizontal	Vertical
Front	Pass	Pass
Rear	Pass	Pass
Left	Pass	Pass
Right	Pass	Pass

Table 34 Radiated Electromagnetic Field Test

Model No.: PBX Test Mode: 3		
Frequency Rang (MHz)	80-1000 MHz and 1400-2000 MHz	
Field Strength (V/m)	3V/m	
Steps (%)	1%	
	Horizontal	Vertical
Front	Pass	Pass
Rear	Pass	Pass
Left	Pass	Pass
Right	Pass	Pass

Table 35 Radiated Electromagnetic Field Test

Model No.: PBX Test Mode: 4		
Frequency Rang (MHz)	80-1000 MHz and 1400-2000 MHz	
Field Strength (V/m)	3V/m	
Steps (%)	1%	
	Horizontal	Vertical
Front	Pass	Pass
Rear	Pass	Pass
Left	Pass	Pass
Right	Pass	Pass

11. FAST TRANSIENT, COMMON MODE TEST

11.1.Test Requirements

11.1.1.Test Standard

ETSI EN 301 489-1 V1.9.2 (EN61000-4-4:2010)

11.1.2.Level

Table 36 Test Level for Fast Transient

Port	Test Specification
Input AC power Port	1kV 5/50 ns 5kHz repetition frequency

11.1.3.Performance criterion**: Criterion TT, Criterion TR**

11.2.Test Procedure

11.2.1.For input and output AC power ports**:**

The EUT is connected to the power mains by using a coupling device, which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 1minute.

11.2.2.For signal lines and control lines ports**:**

A coupling clamp is use to couple the EFT interference signal to the signal and control lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 1 minute.

11.2.3.For DC input and DC output power ports**:**

The EUT is connected to the power mains by using a coupling device, which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 1 minute.

11.3.Operating Condition of EUT

Test Mode 1,Test Mode 2, Test Mode 3 and Test Mode 4

11.4.Test Data

Table 37 Fast Transient Test Data

Model No.: PBX Test Mode: 1				
Injected Line	Voltage (kV)	Test Time (s)	Injected Method	Results
L	+1	60	Direct	Pass
	-1	60	Direct	Pass
N	+1	60	Direct	Pass
	-1	60	Direct	Pass
L,N	+1	60	Direct	Pass
	-1	60	Direct	Pass

Table 38 Fast Transient Test Data

Model No.: PBX Test Mode: 2				
Injected Line	Voltage (kV)	Test Time (s)	Injected Method	Results
L	+1	60	Direct	Pass
	-1	60	Direct	Pass
N	+1	60	Direct	Pass
	-1	60	Direct	Pass
L,N	+1	60	Direct	Pass
	-1	60	Direct	Pass

Table 39 Fast Transient Test Data

Model No.: PBX Test Mode: 3				
Injected Line	Voltage (kV)	Test Time (s)	Injected Method	Results
L	+1	60	Direct	Pass
	-1	60	Direct	Pass
N	+1	60	Direct	Pass
	-1	60	Direct	Pass
L,N	+1	60	Direct	Pass
	-1	60	Direct	Pass

Table 40 Fast Transient Test Data

Model No.: PBX Test Mode: 4				
Injected Line	Voltage (kV)	Test Time (s)	Injected Method	Results
L	+1	60	Direct	Pass
	-1	60	Direct	Pass
N	+1	60	Direct	Pass
	-1	60	Direct	Pass
L,N	+1	60	Direct	Pass
	-1	60	Direct	Pass

12. SURGES TEST

12.1.Test Requirements

12.1.1.Test Standard

ETSI EN 301 489-1 V1.9.2 (EN61000-4-5:2010)

12.1.2.Level

Table 41 Test Level for Surge

Port	Test Specification
Input AC power Port	1.2/50(8/20) μs 0.5kV L-N 1kV L-PE, N-PE

12.1.3. Performance criterion **: Criterion TT, Criterion TR**

12.2.Test Procedure

Set up the EUT and test generator as shown above. A coupling device is used to couple the surge signal to the EUT. Five positive and five negative pulses is applicable and the duration of the test is 1 minute.

12.3.Operating Condition of EUT

Test mode 1, Test Mode 2, Test Mode 3 and Test Mode 4

12.4.Test Data

Table 42 Surges Test Data

Model No.: PBX Test Mode: 1						
Injected Line	Wave Form	Voltage (kV)	Phase	Number of Pulse	Interva l time	Result
L-N	1.2/50 μs	+0.5	0 ° ,90 ° ,270 °	30	60s	Pass
		-0.5	0 ° ,90 ° ,270 °	30	60s	Pass

Table 43 Surges Test Data

Model No.:PBX Test Mode: 2						
Injected Line	Wave Form	Voltage (kV)	Phase	Number of Pulse	Interva l time	Result
L-N	1.2/50 μs	+0.5	0 ° ,90 ° ,270 °	30	60s	Pass
		-0.5	0 ° ,90 ° ,270 °	30	60s	Pass

Table 44 Surges Test Data

Model No.: PBX Test Mode: 3						
Injected Line	Wave Form	Voltage (kV)	Phase	Number of Pulse	Interva l time	Result
L-N	1.2/50 μs	+0.5	0 ° ,90 ° ,270 °	30	60s	Pass
		-0.5	0 ° ,90 ° ,270 °	30	60s	Pass

Table 45 Surges Test Data

Model No.: PBX Test Mode: 4						
Injected Line	Wave Form	Voltage (kV)	Phase	Number of Pulse	Interva l time	Result
L-N	1.2/50 μs	+0.5	0 ° ,90 ° ,270 °	30	60s	Pass
		-0.5	0 ° ,90 ° ,270 °	30	60s	Pass

13. RADIO FREQUENCY, COMMON MODE TEST

13.1.Test Requirements

13.1.1.Test Standard

ETSI EN 301 489-1 V1.9.2 (EN61000-4-6:2010)

13.1.2.Level

Table 46 Test Level for Conducted Immunity

Port	Test Specification
Input AC power port	0.15MHz~80MHz 3V(r.m.s.) (unmodulated)

13.1.3.Performance criterion**: Criterion CT, Criterion CR**

13.2.Test Procedure

Set up the EUT, CDN and test generators as shown above. The test is performed with the generator contacted to each CDN in turn. The frequency range is swept form 150kHz to 80MHz, using the signal levels established during the setting process, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave.

13.3.Operating Condition of EUT

Test mode 1, Test Mode 2, Test Mode 3 and Test Mode 4

13.4.Test Data

Table 47 Radio Frequency Test Data

Model No.: PBX Test Mode: 1			
Frequency Range (MHz)	Injecteded Position	Strength	Result
0.15MHz ~ 80MHz	AC Lines	3V(rms), Unmodulated	Pass
Dwell time: 0.3s; Steps: 1%			

Table 48 Radio Frequency Test Data

Model No.: PBX Test Mode: 2			
Frequency Range (MHz)	Injecteded Position	Strength	Result
0.15MHz ~ 80MHz	AC Lines	3V(rms), Unmodulated	Pass
Dwell time: 0.3s; Steps: 1%			

Table 49 Radio Frequency Test Data

Model No.: PBX Test Mode: 3			
Frequency Range (MHz)	Injecteded Position	Strength	Result
0.15MHz ~ 80MHz	AC Lines	3V(rms), Unmodulated	Pass
Dwell time: 0.3s; Steps: 1%			

Table 50 Radio Frequency Test Data

Model No.: PBX Test Mode: 4			
Frequency Range (MHz)	Injecteded Position	Strength	Result
0.15MHz ~ 80MHz	AC Lines	3V(rms), Unmodulated	Pass
Dwell time: 0.3s; Steps: 1%			

14. VOLTAGE DIPS AND INTERRUPTIONS TEST

14.1.Test Requirements

14.1.1.Test Standard

ETSI EN 301 489-1 V1.9.2 (EN61000-4-11:2010)

14.1.2. Level

Table 51 Test Level for Voltage Dips and Interruptions

Port	Environmental phenomenon	Voltage dip and short interruptions %U_T	Duration
Input AC power port	Voltage dips	60	100ms
		30	10ms
	Voltage interruptions	>95	5000ms

Performance criterion **: Criterion TT, Criterion TR**

14.2.Test Procedure

Set up the EUT and test generator as shown above. The EUT is tested for each selected combination of test level and duration with a sequence of three dips/interruptions with intervals of 10s minimum.

14.3.Operating Condition of EUT

Test mode 1, Test Mode 2, Test Mode 3 and Test Mode 4

14.4.Test Data

Table 52 Voltage Dips and Interruptions Test Data

Model No.: PBX Test Mode: 1				
Environmental phenomenon	Voltage Dips & Short Interruptions % U_T	Duration (ms)	Phase Angle	Result
Voltage dips	60	100	0°	Pass
	30	100	0°	Pass
Voltage interruptions	>95	5000	0°	Pass

Table 53 Voltage Dips and Interruptions Test Data

Model No.: PBX Test Mode: 2				
Environmental phenomenon	Voltage Dips & Short Interruptions % U_T	Duration (ms)	Phase Angle	Result
Voltage dips	60	100	0°	Pass
	30	100	0°	Pass
Voltage interruptions	>95	5000	0°	Pass

Table 54 Voltage Dips and Interruptions Test Data

Model No.: PBX Test Mode: 3				
Environmental phenomenon	Voltage Dips & Short Interruptions % U_T	Duration (ms)	Phase Angle	Result
Voltage dips	60	100	0°	Pass
	30	100	0°	Pass
Voltage interruptions	>95	5000	0°	Pass

Table 55 Voltage Dips and Interruptions Test Data

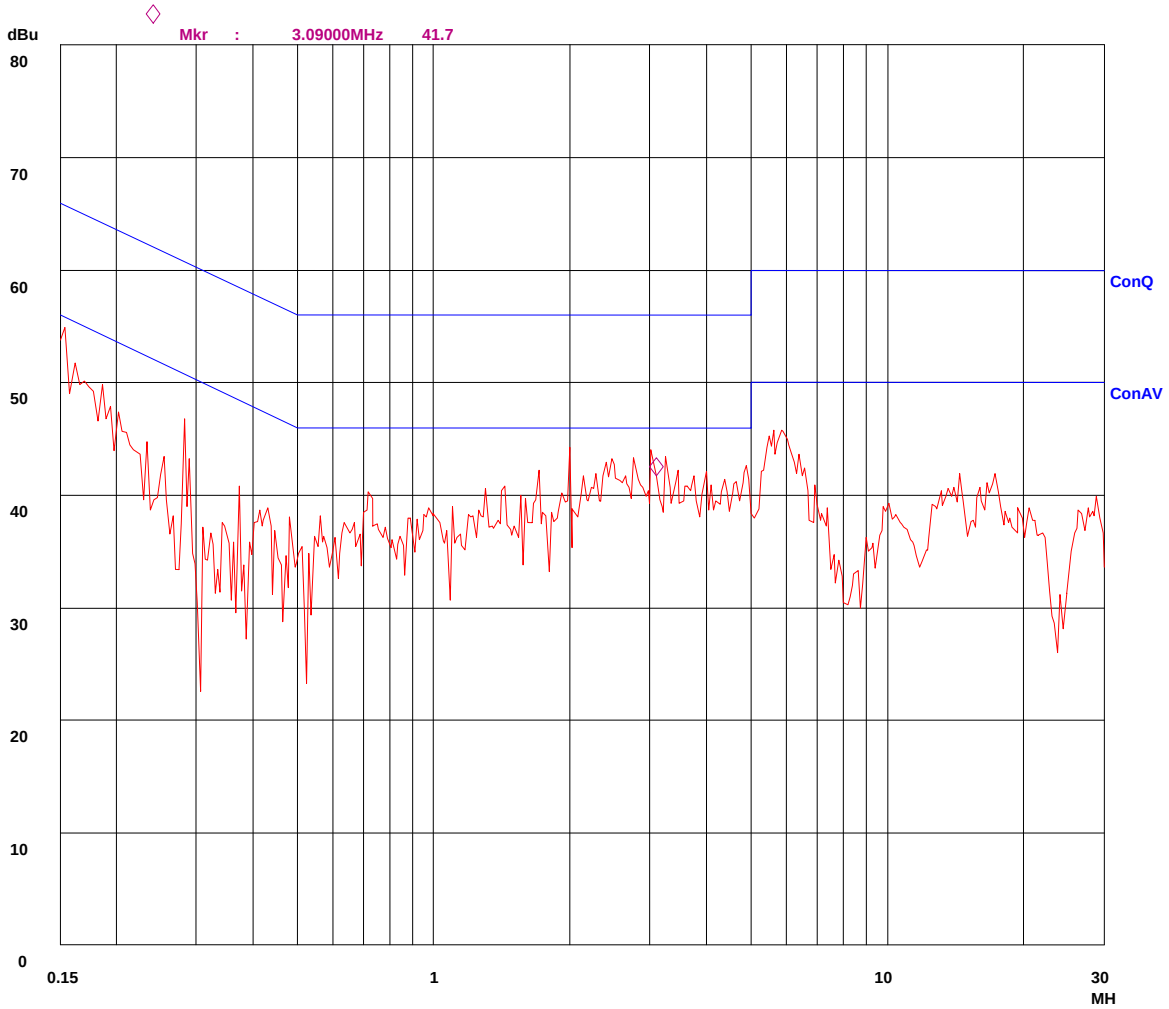
Model No.: PBX Test Mode: 4				
Environmental phenomenon	Voltage Dips & Short Interruptions % U_T	Duration (ms)	Phase Angle	Result
Voltage dips	60	100	0°	Pass
	30	100	0°	Pass
Voltage interruptions	>95	5000	0°	Pass

15. TABLE LIST

APPENDIX I TEST CURVES

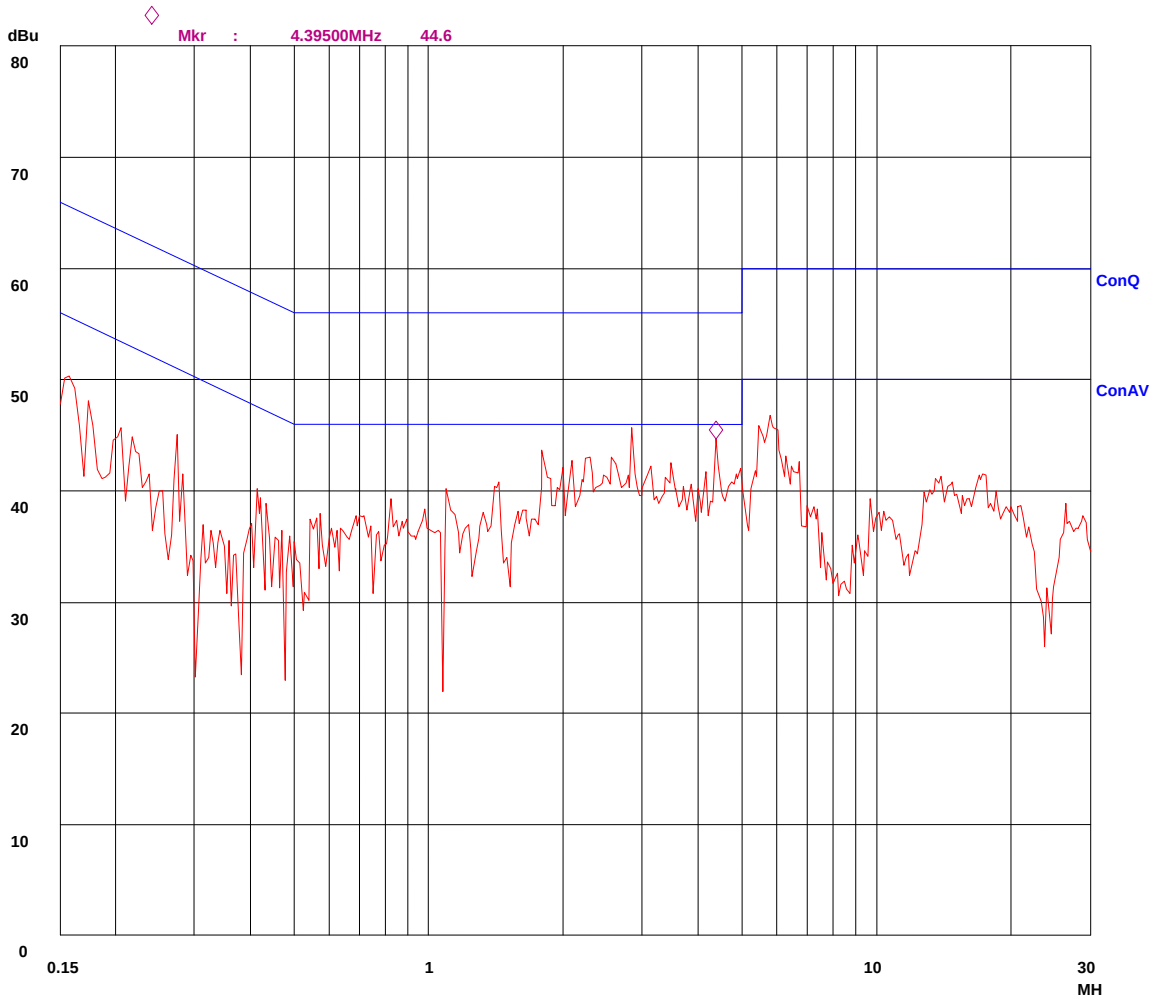
Conducted disturbance

EUT:	**M/N:**
Op Cond:	**Traffic (315MHz)**
Test Spec:	**L**
Comment	



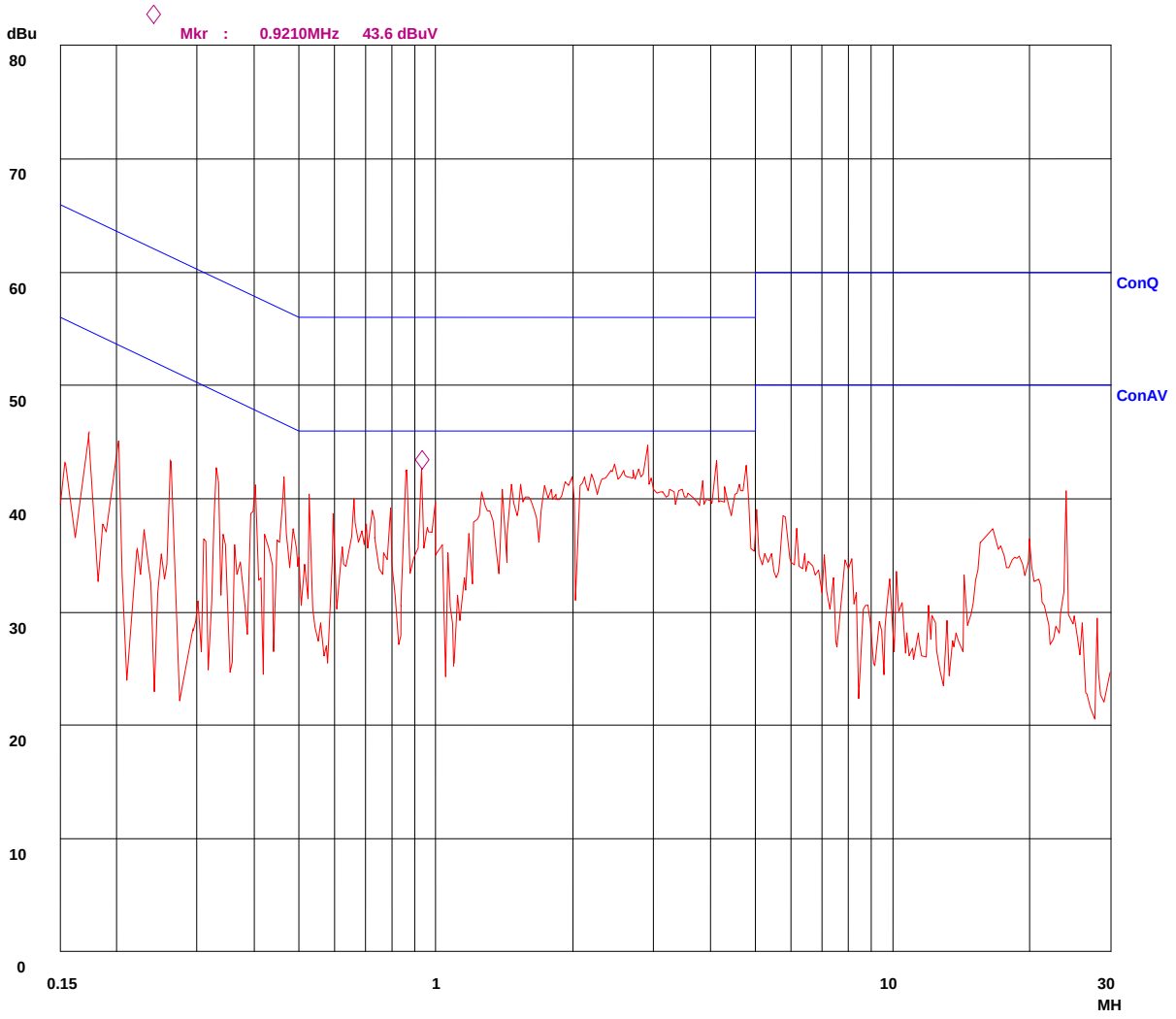
Conducted disturbance

EUT:	M/N:
Op Cond:	Traffic (315MHz)
Test Spec:	N
Comment	



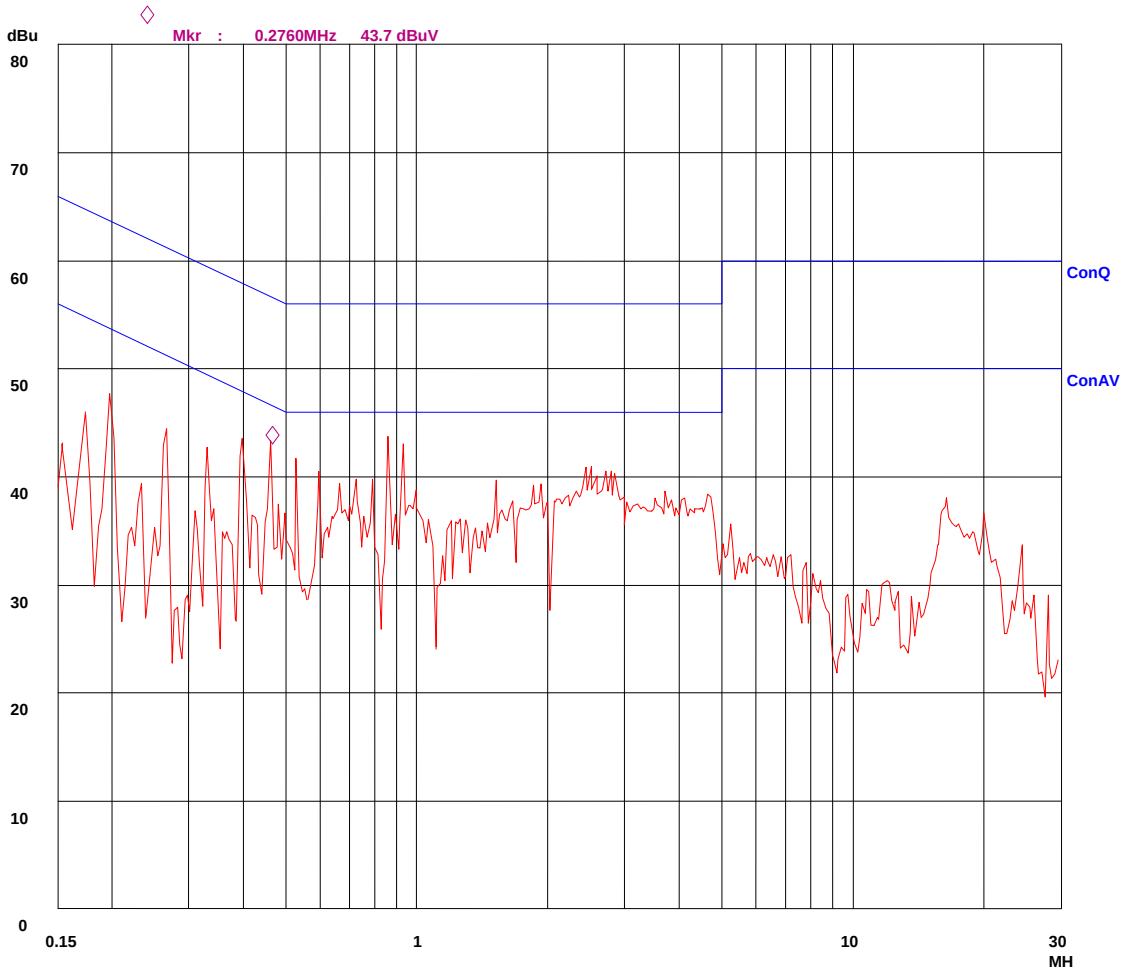
Conducted Disturbance

EUT:	M/N:
Op Cond:	Idle (315MHz)
Test Spec:	L
Comment	



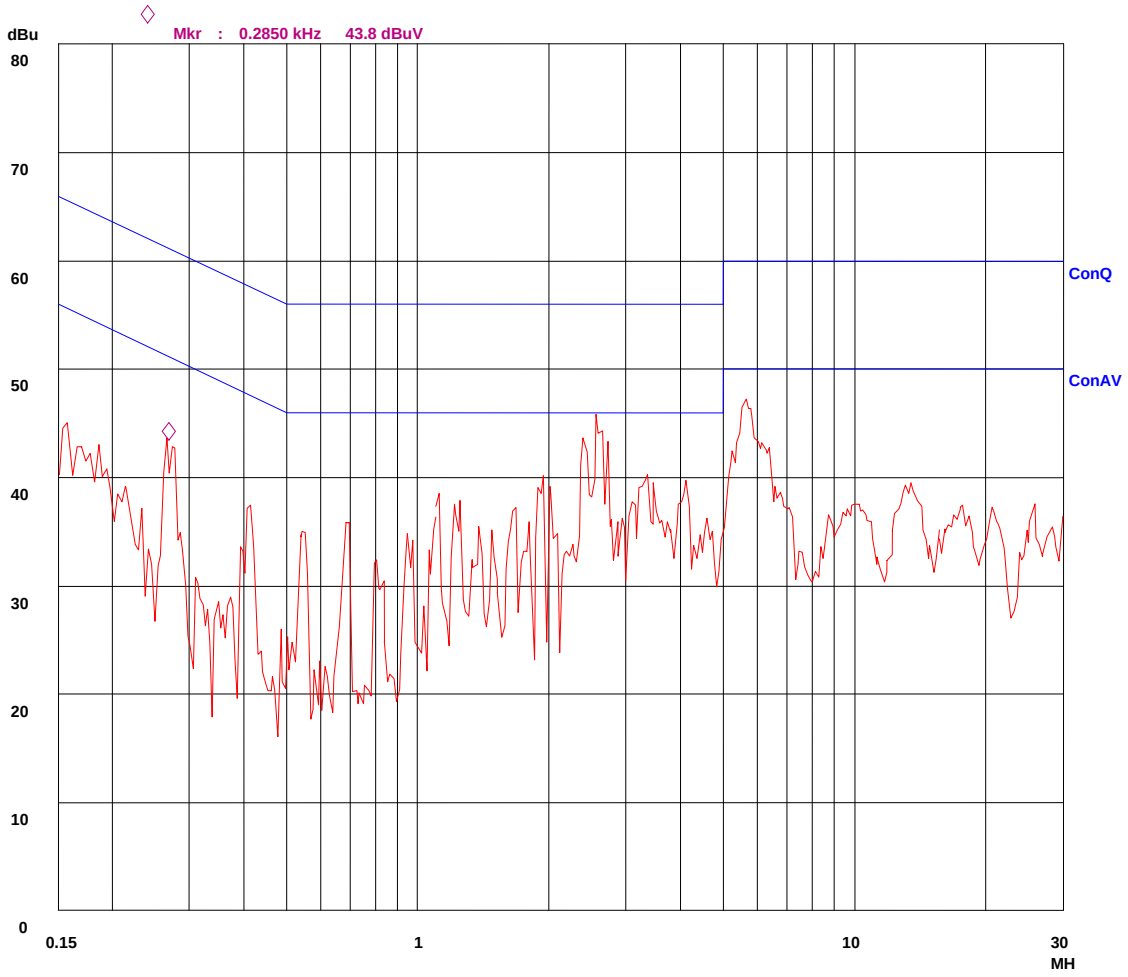
Conducted Disturbance

EUT:	M/N:
Op Cond:	Idle (315MHz)
Test Spec:	N
Comment	



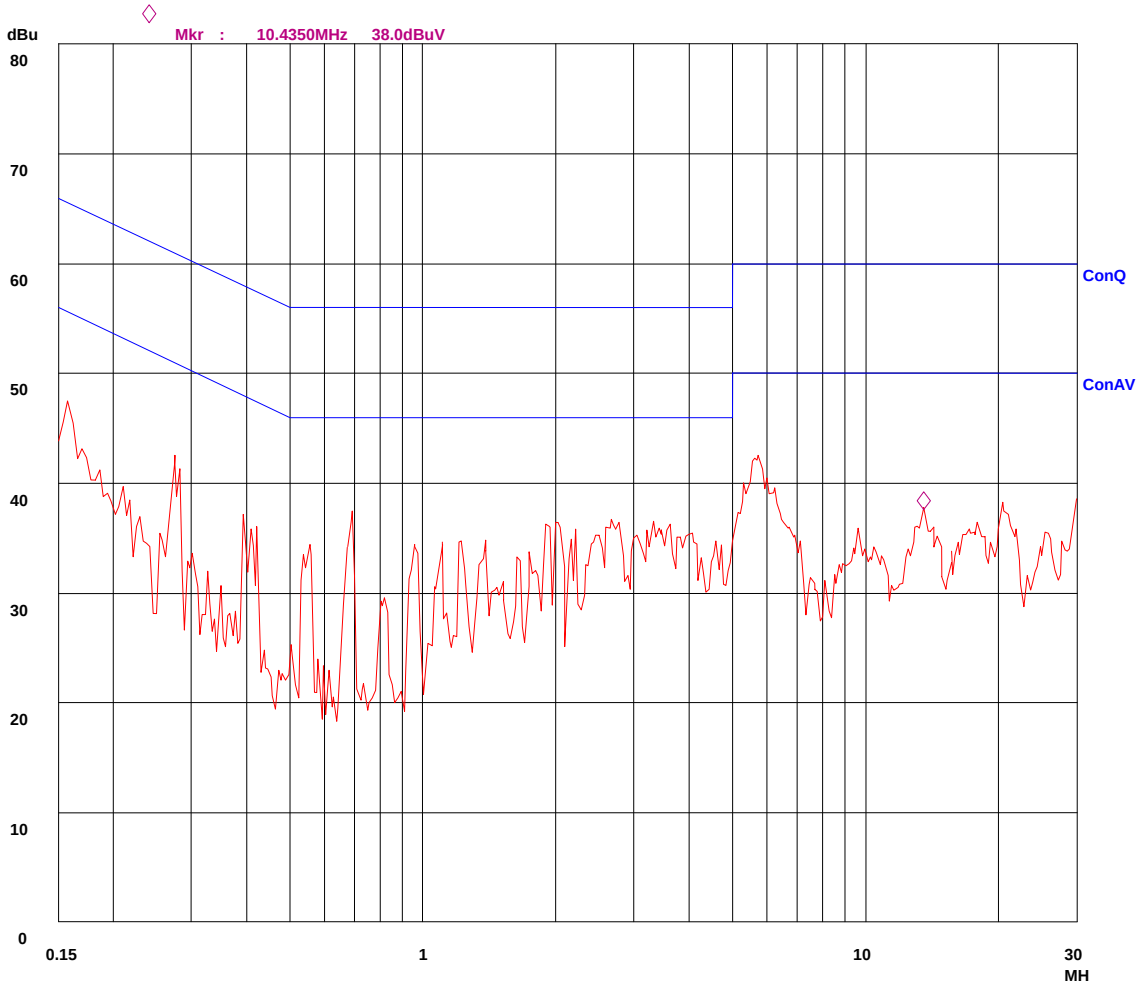
Conducted Disturbance

EUT:	**M/N:**
Op Cond:	**Traffic (433MHz)**
Test Spec:	**L**
Comment	



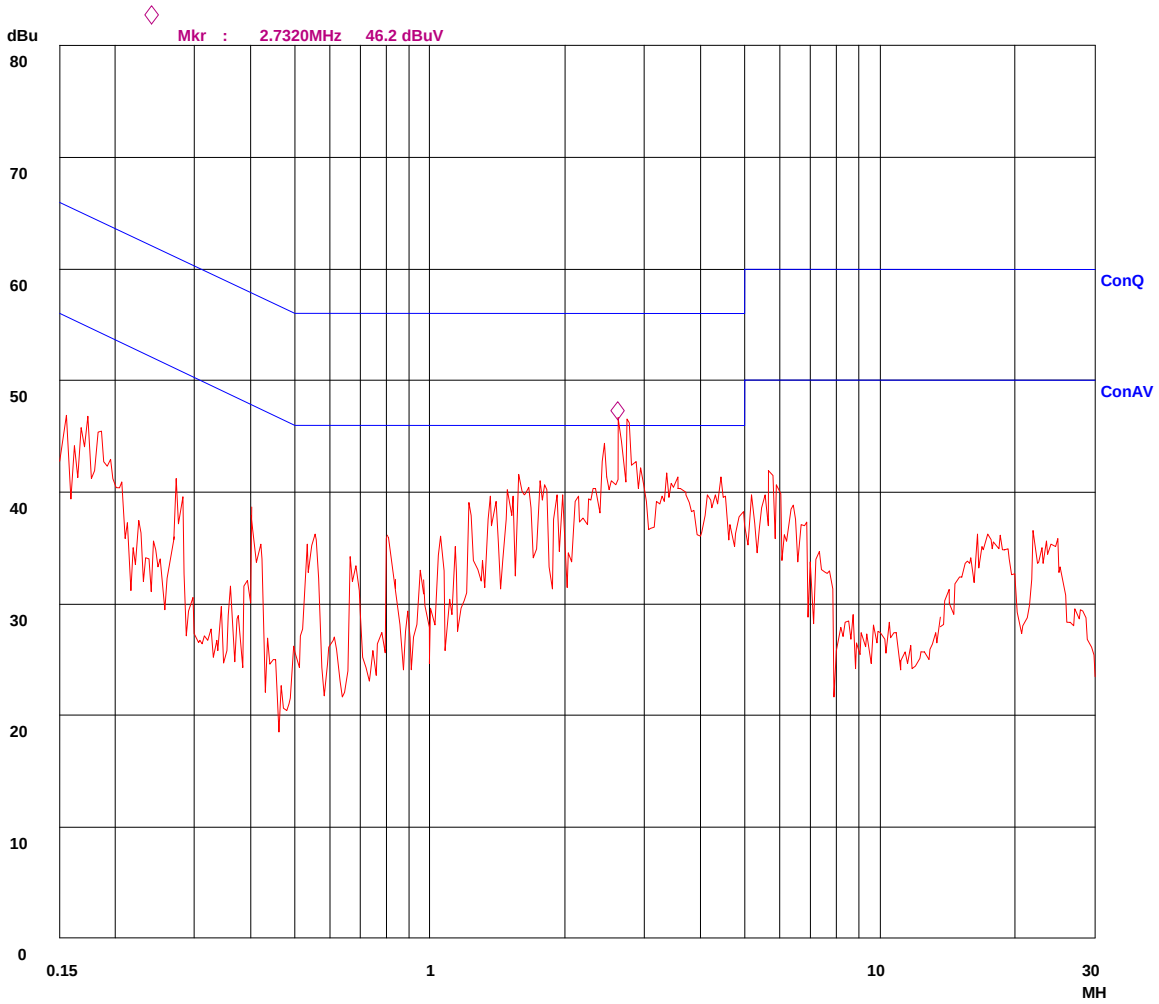
Conducted Disturbance

EUT:	**M/N:**
Op Cond:	**Traffic (433MHz)**
Test Spec:	**N**
Comment	



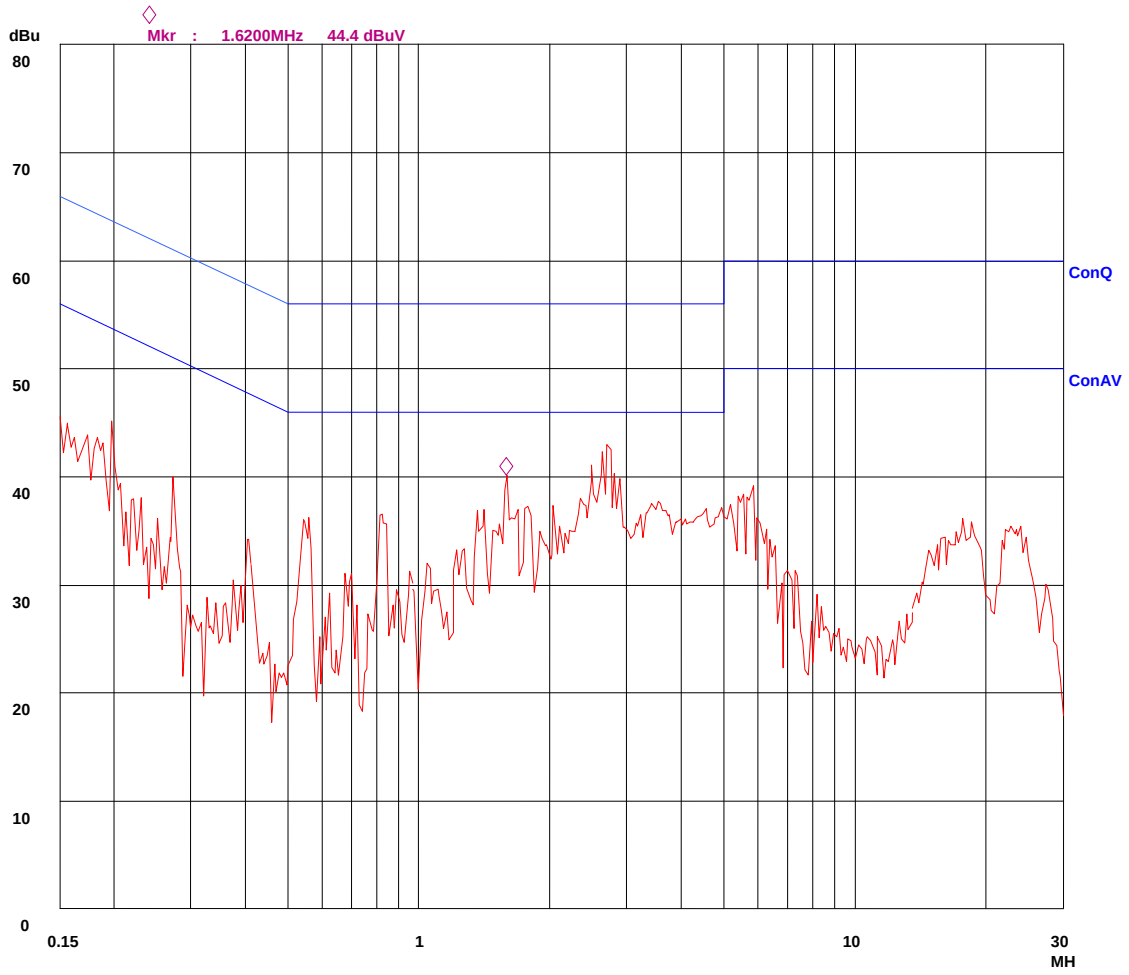
Conducted Disturbance

EUT:	M/N:
Op Cond:	Idle (433MHz)
Test Spec:	L
Comment	

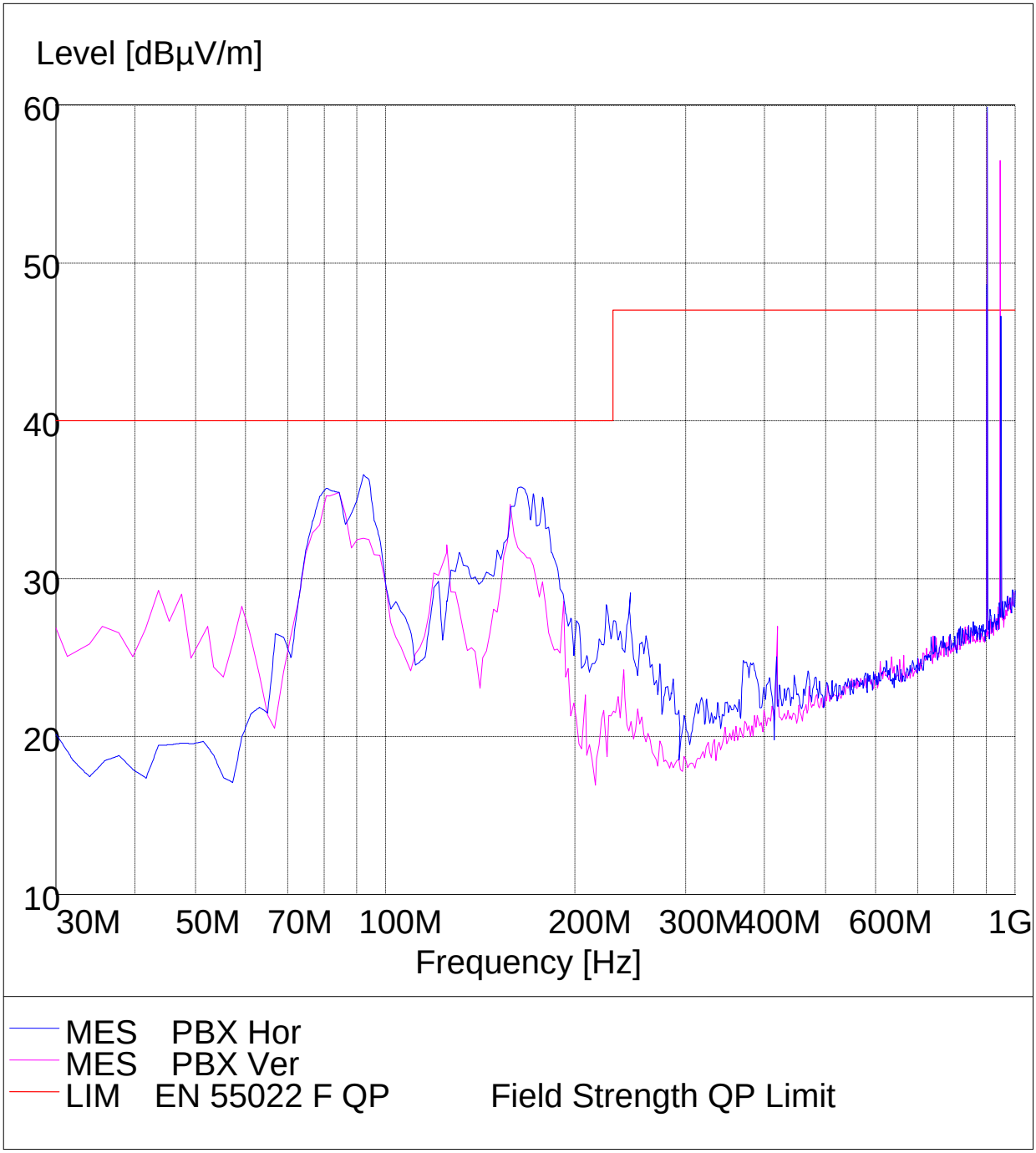


Conducted Disturbance

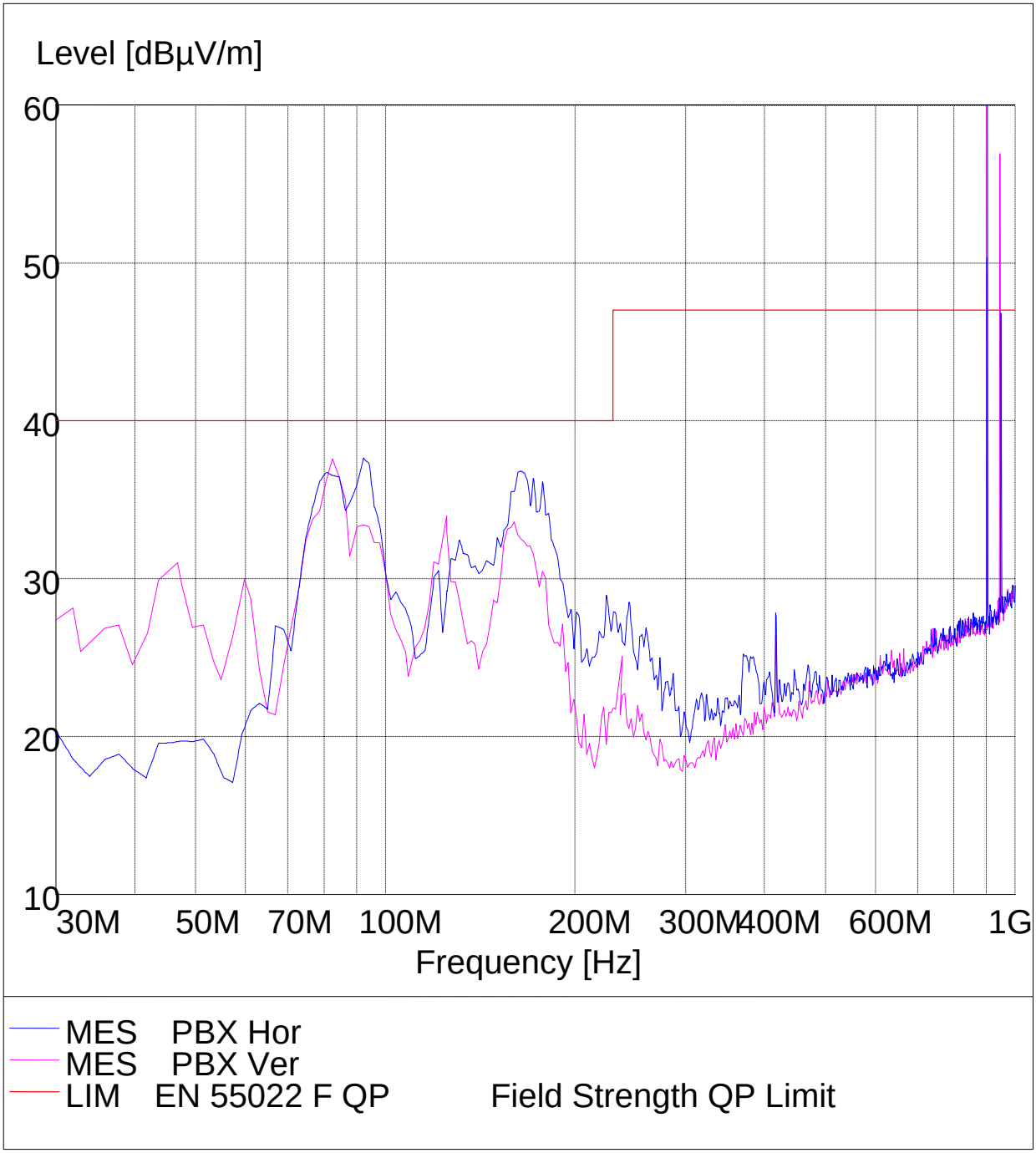
EUT:	**M/N:**
Op Cond:	**Idle (433MHz)**
Test Spec:	**N**
Comment	



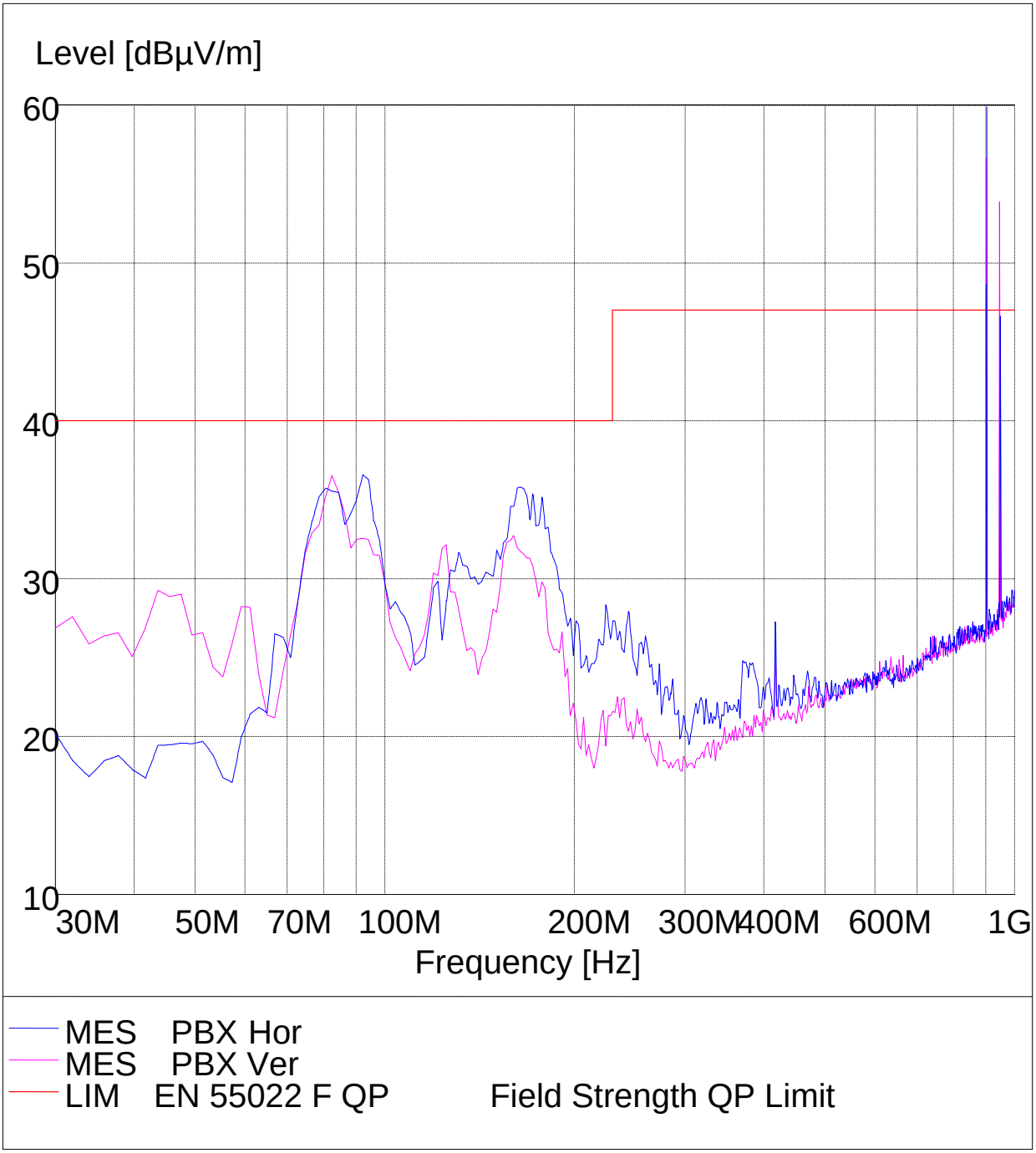
Radiated emission
EUT: Wireless Alarm system
M/N: PBX
Operating Condition: Idle (315MHz)
Test Site: EMC Lab.
Test Specification: Vertical & Horizontal
Comment:



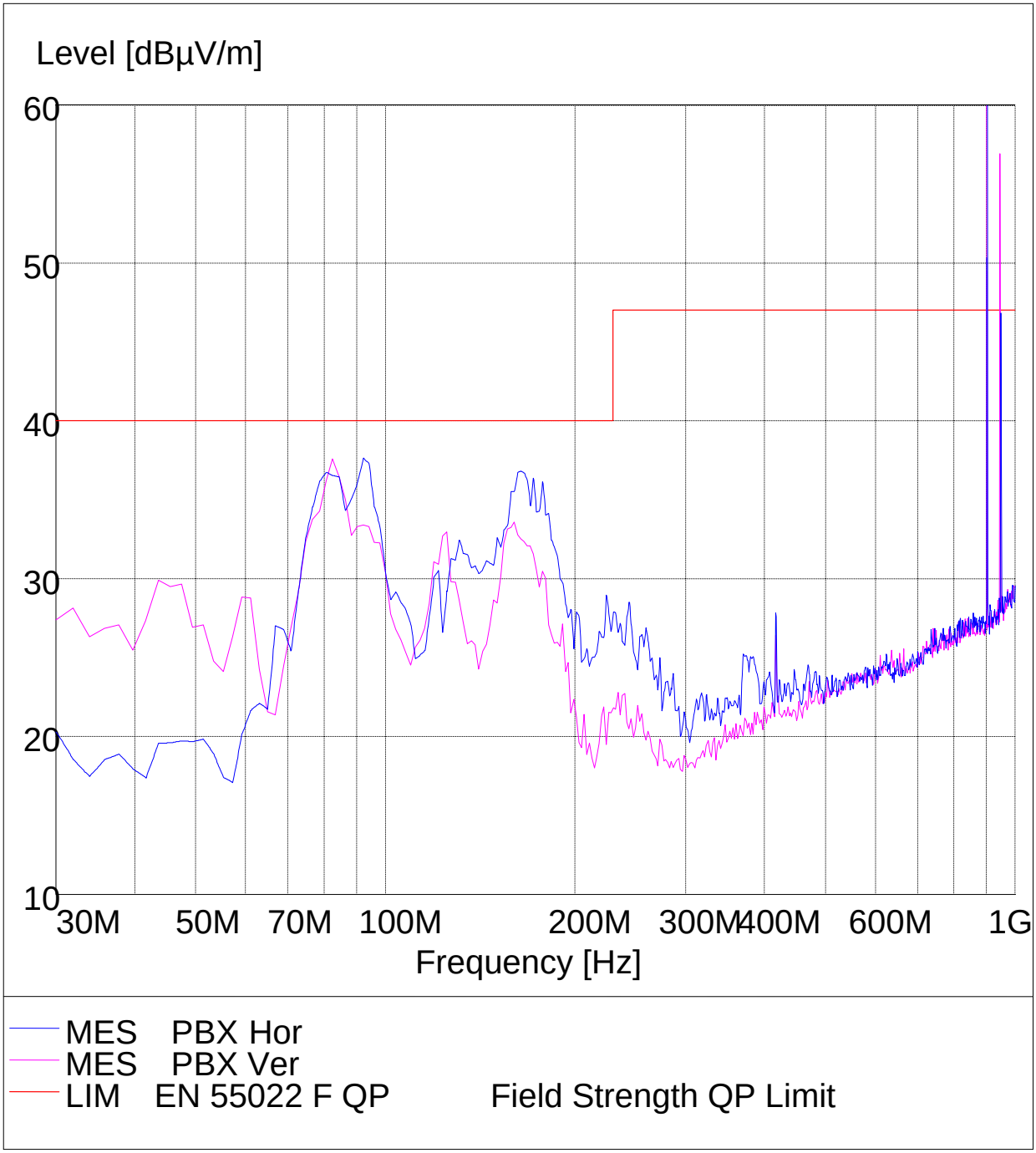
Radiated emission
EUT: Wireless Alarm system
M/N: PBX
Operating Condition: Traffic (315MHz)
Test Site: EMC Lab.
Test Specification: Vertical & Horizontal
Comment:



Radiated emission
EUT: Wireless Alarm system
M/N: PBX
Operating Condition: Idle (433MHz)
Test Site: EMC Lab.
Test Specification: Vertical & Horizontal
Comment:



Radiated emission
EUT: Wireless Alarm system
M/N: PBX
Operating Condition: Traffic (433MHz)
Test Site: EMC Lab.
Test Specification: Vertical & Horizontal
Comment:



APPENDIX II TEST SAMPLE PICTURE

Photo 1 Appearance of EUT

Photo 2 Inside of EUT

Photo 3 Inside of EUT

Photo 4 Appearance of EUT

Photo 5 Inside of EUT

Photo 6 Inside of EUT

Photo 7 Appearance of EUT

Photo 8 Inside of EUT

Photo 9 Inside of EUT

***** END OF REPORT *****