



EMC Test Report

Product Name: eMTC Module

Product Model: ME309-562

Report Number: SYBH(Z-EMC)014012018

**FCC ID: QISME309-562
IC : 6369A-ME309562**

Reliability Laboratory of Huawei Technologies Co., Ltd.

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2. **The laboratory has passed the accreditation by The American Association for Laboratory Accreditation (A2LA). The accreditation number is 2174.01**
3. **The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 6369A-1.**
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Applicant: Huawei Technologies Co., Ltd.
Address: Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C
Date of Receipt Test Item: Jan. 25,2018
Start Date of Test: Jan. 28,2018
End Date of Test: Jan. 30,2018
Test Result: Pass

Approved By (Lab Manager)	<u>2018-1-31</u>	<u>Roger Zhang</u>	<u>Roger Zhang</u>
	Date	Name	Signature
Prepared by (Test Engineer)	<u>2018-1-31</u>	<u>Fu Liang Liang</u>	<u>Fu Liang Liang</u>
	Date	Name	Signature



Modification Record

No.	Last Report No.	Modification Description
1	NA	First report



TABLE OF CONTENT

1	General Information	6
1.1	EUT Description	6
1.2	Test Site Information.....	6
1.3	Applied Standards.....	6
2	Summary of Results.....	7
3	System Configuration during EMC Test.....	8
3.1	Test Mode.....	8
3.2	Test System Configuration	8
3.3	Cables Used during Test	8
3.4	Associated Equipment Used during Test	8
4	Electromagnetic Interference (EMI)	9
4.1	Radiated Disturbance 30MHz to 18GHz.....	9
4.2	Conducted Disturbance 0.15 MHz to 30MHz	11
5	Main Test Instruments.....	12
6	System Measurement Uncertainty.....	12
7	Test Data and Graph	13
7.1	Radiated Disturbance.....	14
7.2	Conducted Disturbance.....	15



1 General Information

1.1 EUT Description

EUT Description	
Product Name	eMTC Module
Model Number	ME309-562
Serials Number	856790030007322
Input Rated Voltage	DC 3.3 V to 4.2V (typical: 3.8V)
TX Frequency	LTE Band 2: 1850MHz to 1910MHz LTE Band 4: 1710MHz to 1755MHz LTE Band 12: 699MHz to 716MHz LTE Band 13:777MHz to 787MHz
RX Frequency	LTE Band 2: 1850MHz to 1910MHz LTE Band 4: 1710MHz to 1755MHz LTE Band 12: 699MHz to 716MHz LTE Band 13:777MHz to 787MHz
HW Version	ML2ME309M Ver.A
SW Version	11.511.00.00.00

Remark: The above EUT's information is declared by manufacturer. Please refer to the specifications or user's manual for more detailed information.

1.2 Test Site Information

Test Site:	RELIABILITY LABORATORY OF HUAWEI TECHNOLOGIES CO., LTD.
Test Site Location:	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

1.3 Applied Standards

APPLIED STANDARD

47 CFR FCC Part 15:2016, Subpart B

ICES-003 Issue 6



2 Summary of Results

Summary of Results				
Test Items	Test Mode	Performance Class & Required Performance Criteria	Result	Site
<u>Radiated Emissions</u> <input checked="" type="checkbox"/> Enclosure Port	Mode 1	CLASS B	Pass	Site1
<u>Conducted Emissions</u> <input type="checkbox"/> DC Power Port <input checked="" type="checkbox"/> AC Power Port <input type="checkbox"/> Telecommunication Ports	Mode 1~Mode 2	CLASS B	Pass	Site1
Note: 1, Measurement taken is within the measurement uncertainty of measurement system. 2, <input checked="" type="checkbox"/> The item has been tested; <input type="checkbox"/> The item has not been tested.				

During the measurement, the environmental conditions complied with the range listed as below.

Item	Required
Ambient temperature	15°C ~ 35°C
Relative humidity	25% ~ 75%
Atmospheric pressure	86kPa ~ 106kPa

3 System Configuration during EMC Test

3.1 Test Mode

Huawei has verified the construction and function in typical operation. All the test modes are carried out with the EUT under normal operation, which are shown in this test report and defined as below:

Test Mode	
Mode 1:	EUT with PC+ USB Cable+ Idle Mode
Mode 2:	EUT with PC+ USB Cable + Traffic Mode

Traffic Mode:

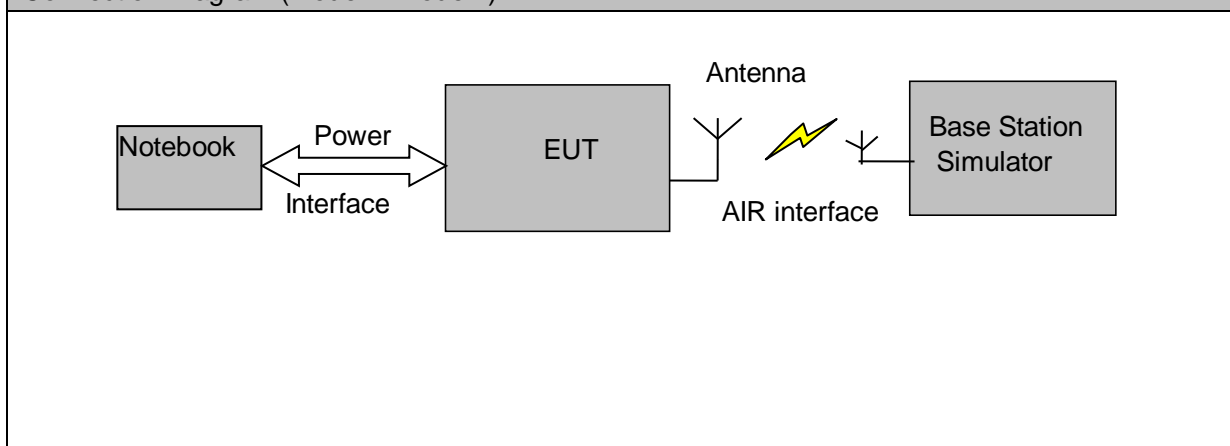
When the EUT state is switched on and with Radio Resource Control (RRC) connection established.

Idle Mode:

When the EUT state is switched on but without Radio Resource Control (RRC) connection.

3.2 Test System Configuration

Connection Diagram (Mode 1~Mode 2)



3.3 Cables Used during Test

Cable	Quantity	Length	Type of Cable
USB cable	1	1m	shielded

3.4 Associated Equipment Used during Test

Name	Model	Manufacturer	S/N	Calibrated Deadline	Cal interval (month)
Radio Communication Tester	CMU500	R&S	A111278719	2018-12-7	12
Notebook	X230	ThinkPad	31090403579	/	/

4 Electromagnetic Interference (EMI)

4.1 Radiated Disturbance 30MHz to 18GHz

4.1.1 Test Procedure

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4-2014. The test distance is 3m. The set-up and test methods are according to ANSI C63.4-2014.

A preliminary scan and a final scan of the emissions are made from 30 MHz to 18 GHz by using test script of software; The emissions are measured using Quasi-Peak Detector (30MHz~1GHz) and AV/PK detector (above 1GHz). The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth in accordance with the software setup. Normally, the height range of antenna is 1m to 4m. The azimuth range of turntable is 0° to 360°. The receiving antenna has two polarizations V and H.

Measurement bandwidth (RBW) for 30MHz to 1000 MHz: 120 kHz;

Measurement bandwidth (RBW) for 1000MHz to 18000 MHz: 1MHz;

EUT is configured in idle mode and the test performed at worst emission state.

4.1.2 Test setup

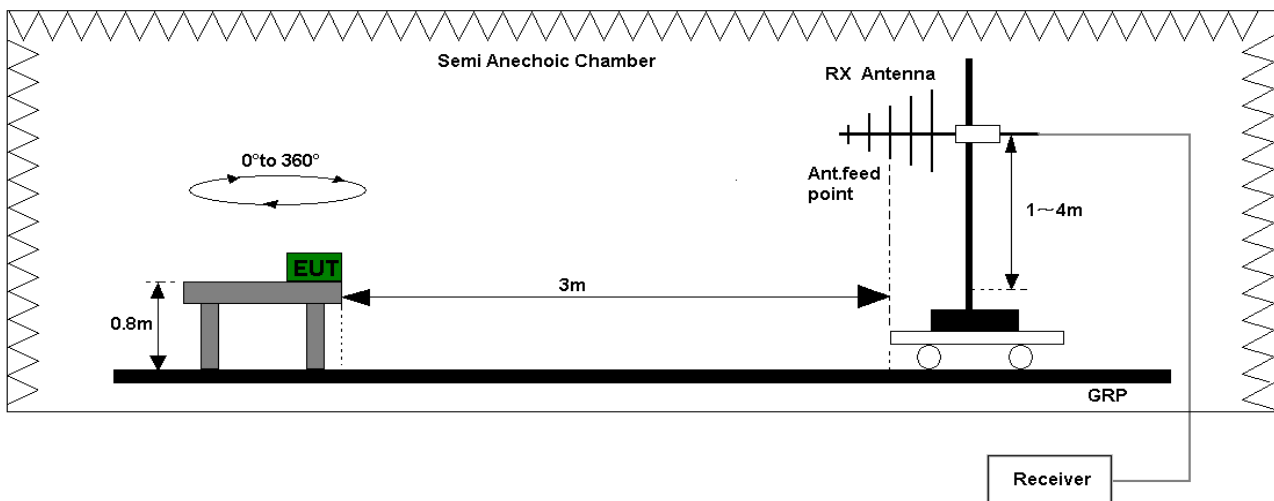


Figure 1. Test set-up of radiated disturbance(30MHz-1GHz)

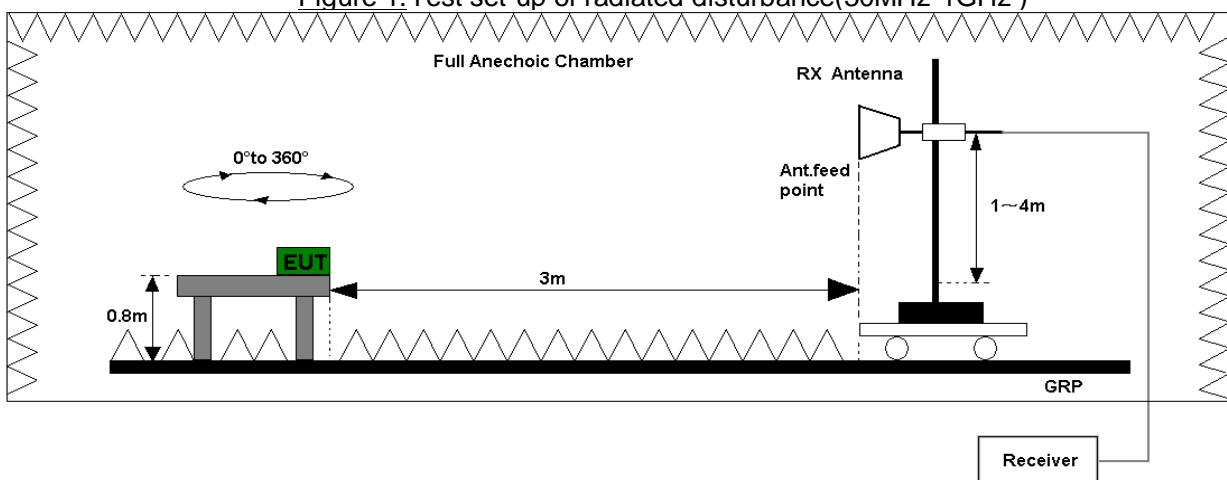


Figure 2. Test set-up of radiated disturbance(above 1GHz)



4.1.3 Test Results

The EUT has met the requirements for Radiated Emission of enclosure port.
Refer to the section 7.1 of this report for test data.

Test Limits (Class B)				
Frequency of Emission (MHz)	Radiated Limit			
	Unit(μ V/m)		Unit(dB μ V/m)	
30-88	100		40	
88-216	150		43.5	
216-960	200		46	
Above 960	500		54	
Above 1000	AV	PK	AV	PK
	500	5000	54	74

4.2 Conducted Disturbance 0.15 MHz to 30MHz

4.2.1 Test Procedure

The Table-top EUT is placed upon a non-metallic table 0.8 m above the horizontal metal reference ground plane. EUT is connected to LISN and LISN is connected to reference Ground Plane. EUT is 80cm away from LISN. The set-up and test methods are according to ANSI C63.4-2014.

Conducted Disturbance at AC Port measurements are undertaken on the L and N Lines. The emissions are measured using a Quasi-Peak Detector and Average Detector.

EUT is communicated with the simulator through Air interface, the simulator controls the EUT to transmitter the maximum power which defined in specification of product. The EUT operated on the typical channel.

Measurement bandwidth (RBW) for 150 kHz to 30 MHz: 9 kHz;

The EUT is set in the shielded chamber and operated under nominal conditions.

4.2.2 Test Setup

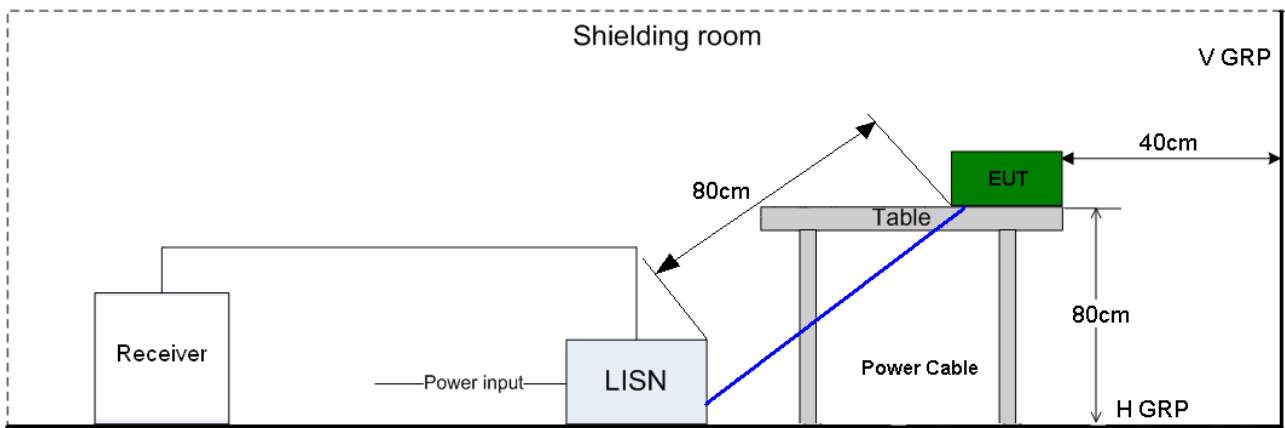


Figure 3. Test Set-up of conducted disturbance

4.2.3 Test Results

The EUT has met requirements for Conducted disturbance.

Refer to the section 7.2 of this report for test data.

Test Limit of AC Power Port		
Frequency range	150kHz ~ 30MHz	
Frequency	Voltage limits	
	QP	AV
0.15MHz~0.5MHz	66-56 dB μ V	56-46 dB μ V
0.5MHz-5MHz	56 dB μ V	46 dB μ V
5MHz~30MHz	60 dB μ V	50 dB μ V



5 Main Test Instruments

Main Test Equipments						
Test item	Test Instrument	Model	S/N	Manufacturer	Calibrated deadline	Cal interval (month)
RE	EMI Test receiver	ESU26	100150	R&S	Feb. 20, 2018	12
	Broadband Antenna	VULB 9163	9163-491	SCHWARZ BECK	Mar. 28, 2019	24
	Horn Antenna	HF906	100683	R&S	Mar. 28, 2019	24
CE	EMI Test receiver	ESU26	101163	R&S	Feb. 20, 2018	12
	Artificial Mains Network	ENV216	100382	R&S	May. 15, 2018	12
Software Information						
Test Item	Software Name		Manufacturer		Version	
RE	EMC32		R&S		V9.25.0	
CE	EMC32		R&S		V9.25.0	

6 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 are:

System Measurement Uncertainty		
Items	Extended Uncertainty	
RE(30MHz-1GHz)	Field strength (dB μ V/m)	U=4.1dB; k=2
RE(1GHz-18GHz)	Field strength (dB μ V/m)	U=5.0dB; k=2
CE	Disturbance Voltage (dB μ V)	U=2.5dB; k=2

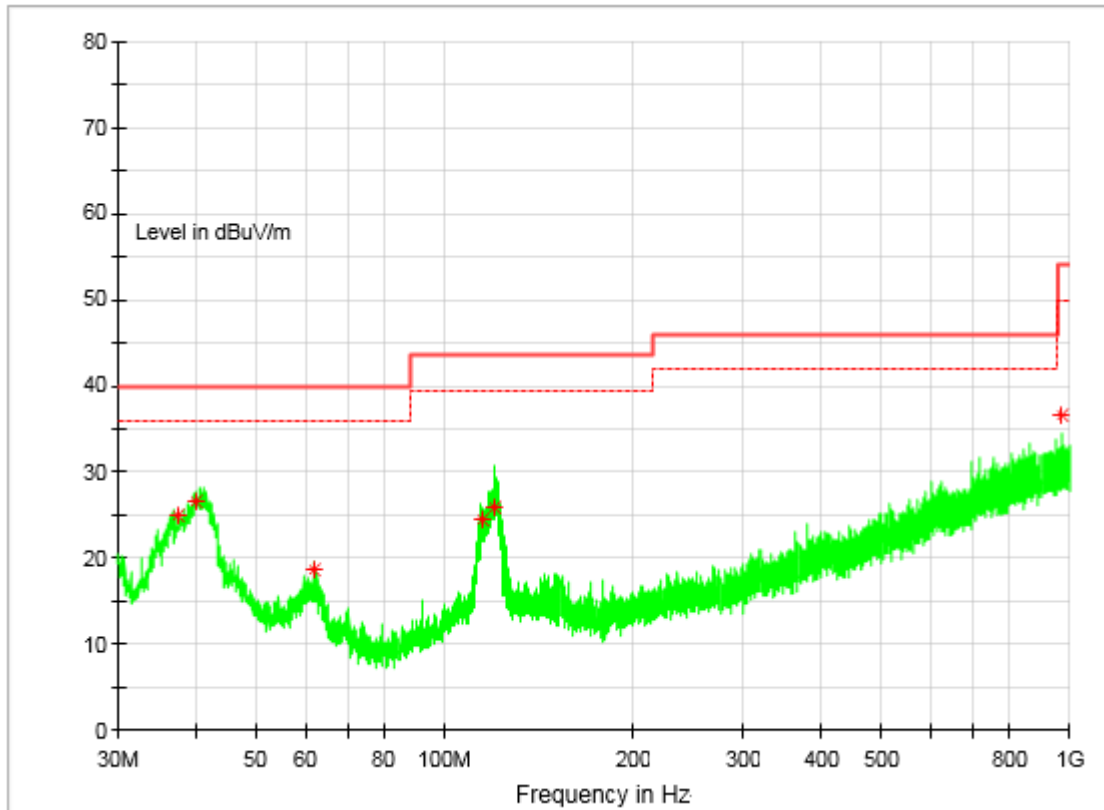
7 Test Data and Graph

Only the worst test result is shown in this report.

7.1 Radiated Disturbance

7.1.1 30MHz~1GHz

Mode 1: EUT with PC+ USB Cable+ Idle Mode



MEASUREMENT RESULT: QP Detector

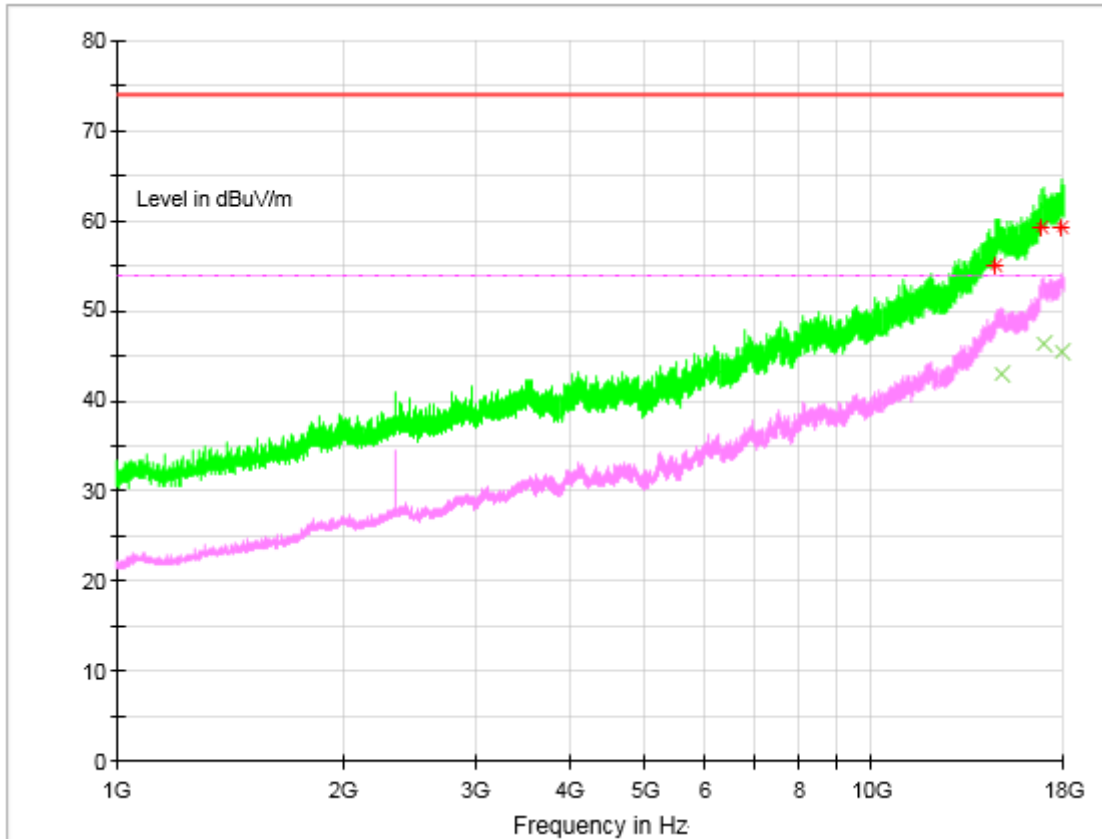
Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Height cm	Azimuth deg	Polarisation
37.54468	24.89	16.8	40	15.11	100	45	VERTICAL
39.9919	26.65	17.1	40	13.35	101	332	VERTICAL
62.02494	18.72	11.2	40	21.28	102	257	VERTICAL
115.1163	24.4	13.1	43.5	19.1	101	189	VERTICAL
120.31592	25.98	13.8	43.5	17.52	100	149	VERTICAL
971.30374	36.64	27.3	54	17.36	250	325	HORIZONTAL

Note:

Level = Reading level by receiver + Transd (Antenna factor + cable loss – preamplifier gain)
 The reading level is calculated by software which is not shown in the sheet.

7.1.2 1GHz~18GHz

Mode 1: EUT with PC+ USB Cable+ Idle Mode



MEASUREMENT RESULT: PK Detector

Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Height cm	Azimuth deg	Polarisation
14588.99467	54.97	16.9	74	19.03	117	62	HORIZONTAL
16870.37267	59.38	21	74	14.62	200	215	VERTICAL
17920.68867	59.18	21.6	74	14.82	185	334	VERTICAL

MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Height cm	Azimuth deg	Polarisation
14858.09533	43.05	17.6	54	10.95	183	353	VERTICAL
16885.926	46.31	21	54	7.69	101	17	HORIZONTAL
17897.57067	45.54	21.6	54	8.46	102	48	HORIZONTAL

Note:

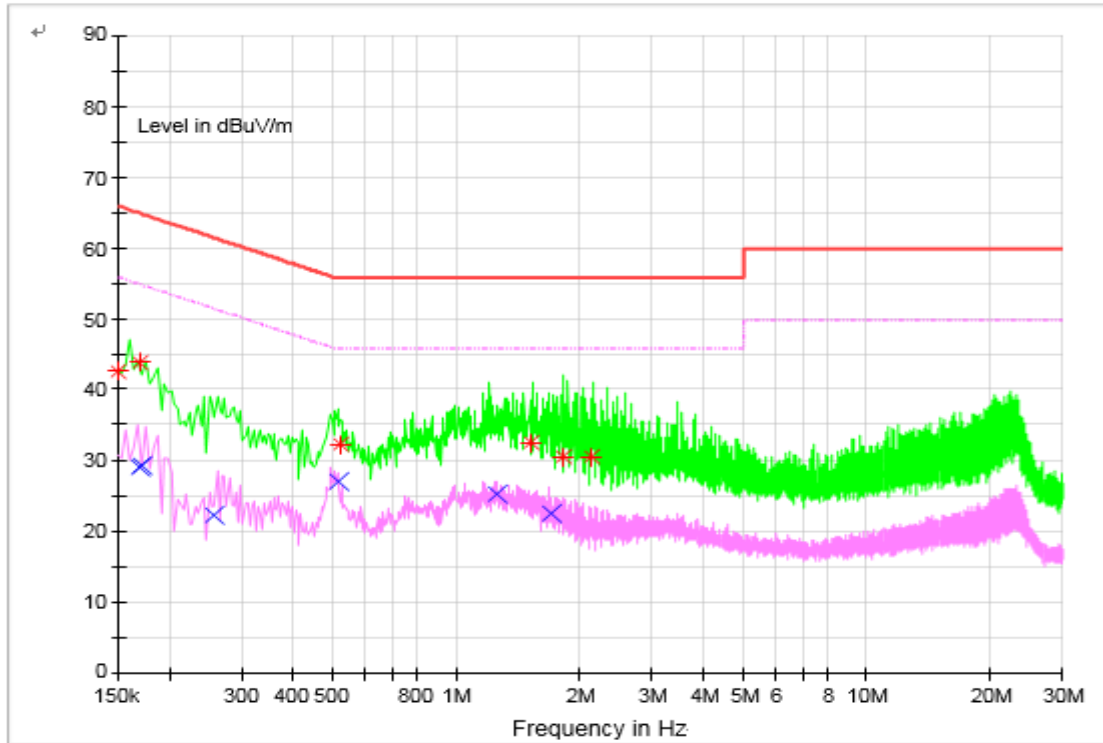
Level = Reading level by receiver + Transd (Antenna factor + cable loss – preamplifier gain)
 The reading level is calculated by software which is not shown in the sheet.



7.2 Conducted Disturbance

7.2.1 AC Port Test Data

Mode 2: EUT with PC+ USB Cable + Traffic Mode



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dB μ V	Line	Transd dB	Margin dB	Limit dB μ V	PE
0.150372	42.53	N	9.7	23.45	65.98	FLO
0.169472	43.86	N	9.7	21.13	64.99	FLO
0.521899	32.36	L1	9.7	23.64	56	FLO
1.528016	32.67	L1	9.7	23.33	56	FLO
1.825942	30.52	L1	9.7	25.48	56	FLO
2.141527	30.54	L1	9.8	25.46	56	FLO

MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dB μ V	Line	Transd dB	Margin dB	Limit dB μ V	PE
0.170572	29.05	N	9.7	25.89	54.93	FLO
0.171207	29.21	N	9.7	25.69	54.9	FLO
0.258462	22.26	N	9.7	29.22	51.48	FLO
0.518059	27.07	L1	9.7	18.93	46	FLO
1.251354	25.42	L1	9.7	20.58	46	FLO
1.707957	22.55	L1	9.7	23.45	46	FLO

Note:

Level= Reading level+ Transd (cable loss + correction factor)

The reading level is calculated by software which is not shown in the sheet.

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