EMC TEST REPORT
No. JSH007010358-002

Applicant	:	REnex Technology Limited Room 601, 6/F, 1 Science Park Avenue East, Hong Kong Science Park, N.T., Hong Kong
Manufacturer	:	REnex Technology Limited Room 601, 6/F, 1 Science Park Avenue East, Hong Kong Science Park, N.T., Hong Kong
Equipment	:	ZcoRE3(20)
Type/Model	:	PT-2418G-S

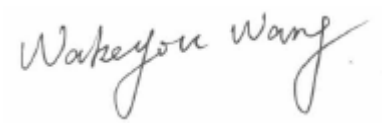
SUMMARY

The equipment complies with the requirements according to the following standard(s):

47CFR Part 15 (2006): Radio Frequency Devices
ANSIC63.4 (2003): American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

Date of issue: March 5, 2007

Tested by: Reviewed by:



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Description of Test Facility

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Content

1. General Information

1.1 Applicant Information

Applicant:	REnex Technology Limited Room 601, 6/F, 1 Science Park Avenue East, Hong Kong Science Park, N.T., Hong Kong
Name of contact:	Mr. Ma Guangyi
Tel: Fax:	+86 21 59902255-686 +86 21 59902211
Manufacturer:	REnex Technology Limited Room 601, 6/F, 1 Science Park Avenue East, Hong Kong Science Park, N.T., Hong Kong
Country of origin:	China

1.2 Identification of the EUT

Equipment:	ZcoRE3(20)
Type/model:	PT-2418G-S
FCC ID:	QNT-PT2400GS20-A

1.3 Technical specification

Operation Frequency:	2.4GHz ~ 2.4835 GHz
Modulation:	OQPSK
Antenna Designation:	Dipole antenna, User Replaceable
Gain of Antenna:	1.5dBi max.
Rating :	DC 3.3V (Supplied by main equipment, in which the EUT is Built)
Description of EUT:	The ZcoRE3(20) is a transceiver. When working as a transmitter, it has 16 channels that each occupies 5MHz. And the transmission rate of it is 250kbps.

Channel list:

Channel	Frequency (GHz)
0	2.405
1	2.410

2	2.415
3	2.420
4	2.425
5	2.430
6	2.435
7	2.440
8	2.445
9	2.450
10	2.455
11	2.460
12	2.465
13	2.470
14	2.475
15	2.480

1.4 Mode of operation during the test / Test peripherals used

The EUT was set to work normal with the highest output power under TDD mode. And the channel 0, channel 8 and channel 15 were performed test except the "Emission on the band edge" test.

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2. Test Specification

2.1 Instrument list

Equipment	Type	Manu.	Internal no.	Cal. Date	Due date
Test Receiver	ESIB 26	R&S	EC 3045	2006-7-1	2007-6-30
Ultra-broadband antenna	HL 562	R&S	EC 3046-1	2006-7-1	2007-6-30
Horn antenna	HF 906	R&S	EC 3049	2006-7-1	2007-6-30
Signal generator	SMR 20	R&S	EC 3044-1	2006-8-22	2007-8-21
Power meter	PM2002	AR	EC3043-7	2007-1-23	2008-1-22
Power sensor	PH2000	AR	EC3043-8	2007-1-23	2008-1-22
Semi-anechoic chamber	-	Albatross project	EC 3048	2006-6-17	2007-6-16
Pre-amplifier	Pre-amp 18	R&S	EC 3222	2006-7-1	2007-6-30
Pre-amplifier	Pre-amp 40	Beijing Radio 2	-	2006-3-4	2007-3-3
Horn antenna	K638A	Beijing Radio 2	-	2006-3-4	2007-3-3
A.M.N.	ESH2-Z5	R&S	EC 3119	2007-1-23	2008-1-22
Test Receiver	ESCS 30	R&S	EC 2107	2007-1-23	2008-1-22

2.2 Related Grant and test Standard

FCC Part 15 Subpart C, Section §15.205, §15.207, §15.209, §15.247
ANSI C63.4: 2003.

2.3 Test Summary

This report applies to tested sample only. This report shall not be reproduced in part without written approval of Intertek Testing Service Shanghai Limited.

TEST ITEM	REFERANCE	RESULT
Minimum 6dB Bandwidth	15.247(a)(2)	Pass
Maximum Peak Output Power	15.247(b)	Pass
Power Spectrum Density	15.247(e)	Pass
Radiated Spurious Emission	15.205, 15.209	Pass
Emission on the Band Edge	15.247(d)	Pass
AC Power Line Conducted Emission	15.207	Pass

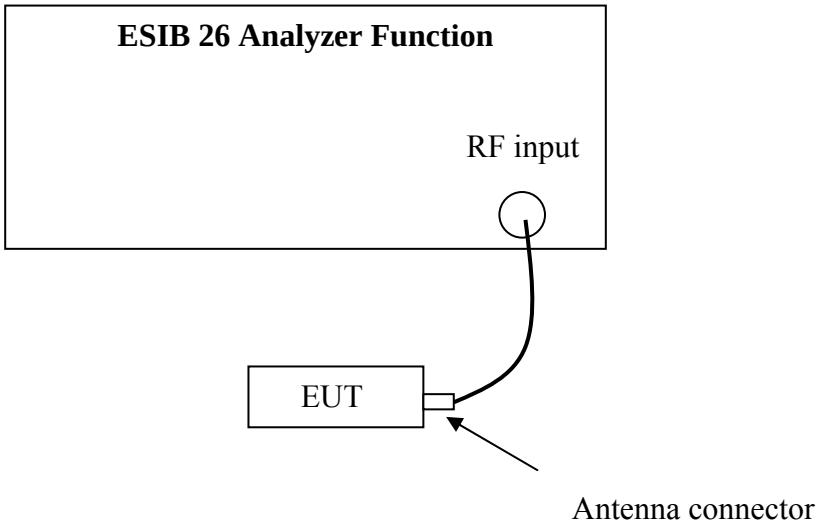
3. Minimum 6dB Bandwidth

Test result: PASS

3.1 Limit

For systems using digital modulation techniques that may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz bands, the minimum 6 dB bandwidth shall be at least 500 kHz.

3.2 Test Configuration



3.3 Test Procedure and test setup

The minimum 6dB bandwidth per FCC §15.247(a)(2) is measured using the ESIB 26 analyzer function with the resolutions bandwidth set at 100kHz, the video bandwidth set at 300kHz, and the SPAN>>RBW. The test was performed at 3 channels (lowest, middle and highest channel).

3.4 Test Protocol

Temperature : 22°C
Relative Humidity : 43%

Channel	Channel Frequency(GHz)	Bandwidth (kHz)	Limit (kHz)
0(lowest)	2.405	1900	≥500
8(middle)	2.445	1882	≥500
15(highest)	2.480	1923	≥500

3.5 Measurement uncertainty

The measurement uncertainty is ±100Hz.

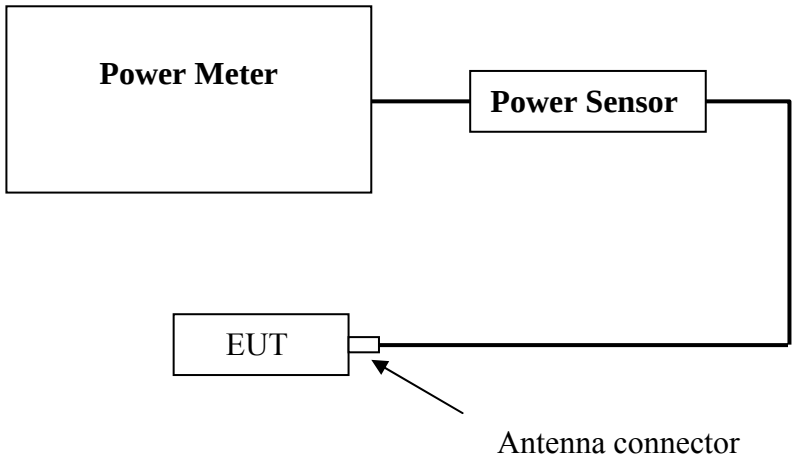
4. Maximum Peak Output Power

Test result: Pass

4.1 Test limit

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands, the maximum peak conducted output power is 1 W.

4.2Test Configuration



4.3 Test procedure and test setup

The power output per FCC §15.247(b) was measured on the EUT using a power meter via power sensor. The test was performed at 3 channels (lowest, middle and highest channel).

4.4 Test protocol

Temperature : 22°C
Relative Humidity : 43%

Channel	Channel Frequency(GHz)	Maximum peak output power (dBm)	Limit (dBm)
0(lowest)	2.405	15.17	30
8(middle)	2.445	15.06	30
15(highest)	2.480	14.22	30

4.5 Measurement uncertainty

The measurement uncertainty is ±1dB.

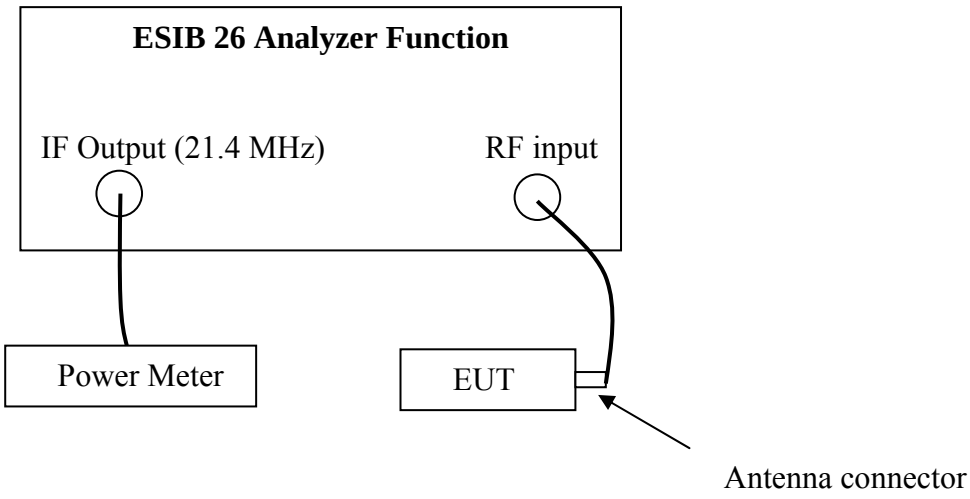
5. Power Spectrum Density

Test result: **PASS**

5.1 Test limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

5.2 Test Configuration



5.3 Test procedure and test setup

The power output per FCC §15.247(e) is measured using the ESIB 26 analyzer function with a power meter connected to IF output (21.4MHz) port. Under spectral measurement mode, catch the frequency point with maximum power spectrum. Then set the span to be 0 and the resolutions bandwidth to be 3 kHz. After calibration, it is found that the power spectral density equals the reference level of analyzer plus the reading of power meter.
The test was performed at 3 channels (lowest, middle and highest channel).

5.4 Test Protocol

Temperature : 22°C
Relative Humidity : 43%

Channel	Channel Frequency(GHz)	Maximum power spectral density (dBm/3kHz)	Limit (dBm/3kHz)
0(lowest)	2.405	-12.64	8
8(middle)	2.445	-11.80	8
15(highest)	2.480	-12.93	8

5.5 Measurement uncertainty

The measurement uncertainty is ±1dB/3kHz.

6. Spurious Emission

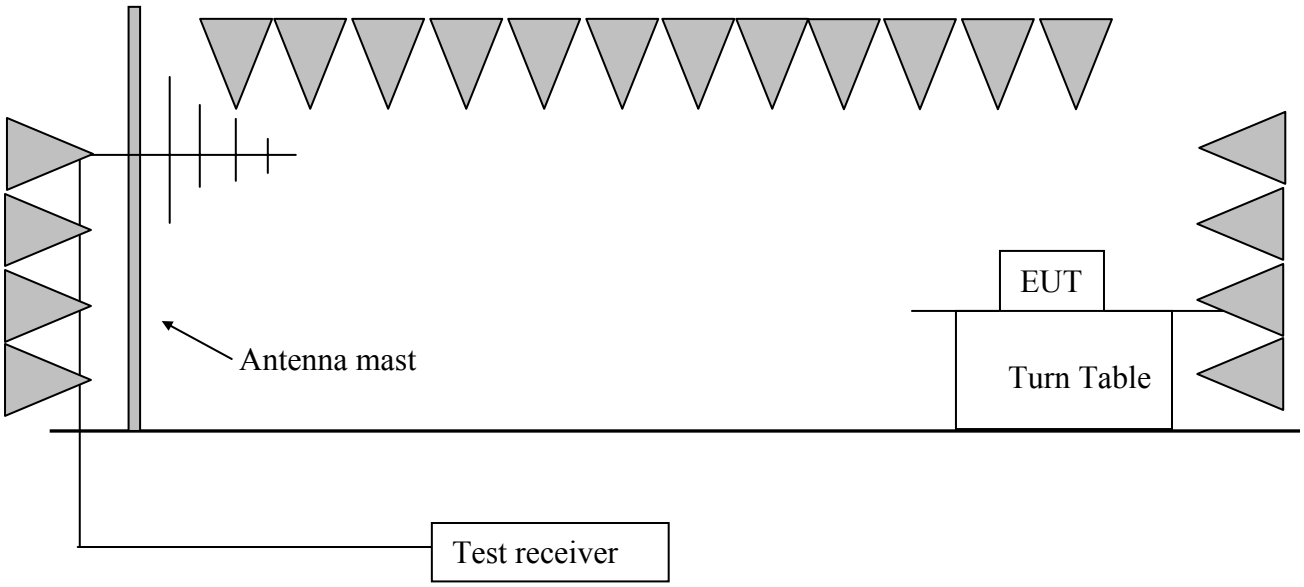
Test result: PASS

6.1 Test limit

The spurious emission shall test through the 10th harmonic. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) showed as below:

Frequency (MHz)	Field Strength (dBuV/m)	Measurement Distance (m)
30 - 88	40.0	3
88 - 216	43.5	3
216 - 960	46.0	3
Above 960	54.0	3

6.2 Test Configuration



6.3 Test procedure and test setup

The measurement was applied in a semi-anechoic chamber. While testing for spurious emission higher than 1GHz, the pre-amplifier is equipped just at the output terminal of the antenna.
The EUT and simulators were placed on a 0.8m high wooden turntable above the horizontal metal ground plane. The turn table rotated 360 degrees to determine the

position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mast. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.

6.4 Test protocol

Channel 0

Antenna	Frequency (MHz)	Correct Factor (dB/m)	Gain of Preamplifier (dB)	Receiver Reading (dBuV)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)
H	30	10.14	None	11.52	21.66	40.00	18.34
H	240.27	10.22	None	19.38	29.6	46.00	16.40
H	898.05	15.07	None	16.09	31.16	46.00	14.84
H	4825.44	37.44	33.21	29.24	33.47	54.00	20.53
H	7149.21	37.88	33.17	23.36	28.07	54.00	25.93
H	13710.08	38.05	32.59	26.52	31.98	54.00	22.02
V	30	10.14	None	10.86	21.00	40.00	19.00
V	240.27	10.22	None	19.04	29.26	46.00	16.74
V	898.05	15.07	None	15.57	30.64	46.00	15.36
V	4825.44	37.44	33.21	29.33	33.56	54.00	20.44
V	7149.21	37.88	33.17	23.18	27.89	54.00	26.11
V	13710.08	38.05	32.59	26.45	31.91	54.00	22.09

Remark: 1.Correct Factor = Antenna Factor + Cable Loss
2. Corrected Reading = Receiver Reading + Correct Factor - Gain of Preamplifier (if preamplifier applied)
3. Margin = limit - Corrected Reading

Channel 8

Antenna	Frequency (MHz)	Correct Factor (dB/m)	Gain of Preamplifier (dB)	Receiver Reading (dBuV)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)
H	30	10.14	None	11.51	21.65	40.00	18.35
H	240.27	10.22	None	19.36	29.58	46.00	16.42
H	898.05	15.07	None	16.44	31.51	46.00	14.49
H	4825.44	37.44	33.21	29.05	33.28	54.00	20.72
H	7149.21	37.88	33.17	23.28	27.99	54.00	26.01
H	13710.08	38.05	32.59	26.17	31.63	54.00	22.37
V	30	10.14	None	10.03	20.17	40.00	19.83
V	240.27	10.22	None	19.01	29.23	46.00	16.77
V	898.05	15.07	None	15.58	30.65	46.00	15.35
V	4825.44	37.44	33.21	29.46	33.69	54.00	20.31
V	7149.21	37.88	33.17	23.19	27.90	54.00	26.10
V	13710.08	38.05	32.59	26.41	31.87	54.00	22.13

Remark: 1.Correct Factor = Antenna Factor + Cable Loss
2. Corrected Reading = Receiver Reading + Correct Factor - Gain of Preamplifier (if preamplifier applied)
3. Margin = limit - Corrected Reading

Channel 15

Antenna	Frequency (MHz)	Correct Factor (dB/m)	Gain of Preamplifier (dB)	Receiver Reading (dBuV)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)
H	30	10.14	None	11.47	21.61	40.00	18.39
H	240.27	10.22	None	19.33	29.55	46.00	16.45
H	898.05	15.07	None	16.07	31.14	46.00	14.86
H	4825.44	37.44	33.21	29.25	33.48	54.00	20.52
H	7149.21	37.88	33.17	23.89	28.6	54.00	25.4
H	13710.08	38.05	32.59	26.05	31.51	54.00	22.49
V	30	10.14	None	10.24	20.38	40.00	19.62
V	240.27	10.22	None	19.71	29.93	46.00	16.07
V	898.05	15.07	None	15.27	30.34	46.00	15.66
V	4825.44	37.44	33.21	29.66	33.89	54.00	20.11
V	7149.21	37.88	33.17	23.12	27.83	54.00	26.17
V	13710.08	38.05	32.59	26.49	31.95	54.00	22.05

Remark: 1.Correct Factor = Antenna Factor + Cable Loss
2. Corrected Reading = Receiver Reading + Correct Factor - Gain of Preamplifier (if preamplifier applied)
3. Margin = limit - Corrected Reading

6.5 Measurement uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.
Measurement uncertainty of radiated emission is: ± 5.31dB
The measurement uncertainty is given with a confidence of 95%, k=2.
The measurement uncertainty is traceable to internal procedure TI-036.

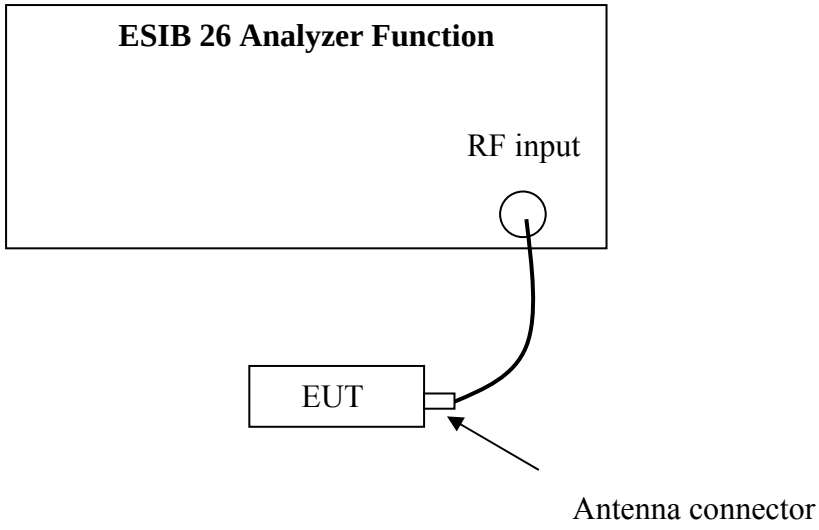
7. Emission on the band edge

Test result: **PASS**

7.1 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

7.2 Test Configuration



7.3 Test procedure and test setup

The emission on the band edge bandwidth per FCC §15.247(d) is measured using the ESIB 26 analyzer function with the resolutions bandwidth set at 100kHz, the video bandwidth set at 300kHz, and the SPAN>>RBW. The test is performed at 2 channels (lowest and highest channel).

7.4 Test protocol

Channel	Highest level outside the band edge (dBm)	Highest emission within the band edge (dBm)	Delta (dBm)	Limit
0	-27.89 (frequency lower than 2.4GHz)	13.93	41.82	≥ 20dB
15	-21.16 (frequency higher than 2.4835GHz)	12.23	33.39	≥ 20dB

7.5 Measurement uncertainty

The measurement uncertainty is ±1dB.

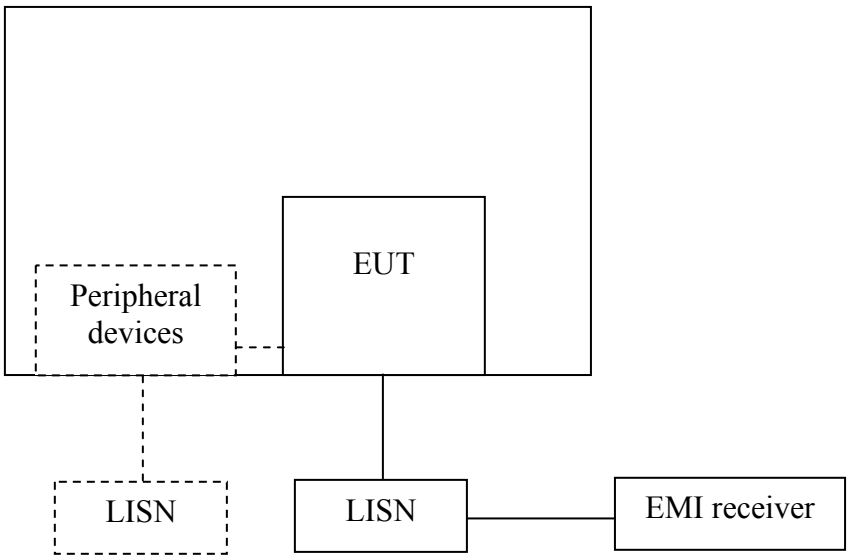
8. Power Line Conducted Emission

Test result: **Pass**

8.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	QP	AV
0.15-0.5	66 to 56*	56 to 46 *
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

8.2 Test configuration



☒ For table top equipment, wooden support is 0.8m height table

☐ For floor standing equipment, wooden support is 0.1m height rack.

8.3 Test procedure and test set up

The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50Ω/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50Ω/50uH coupling impedance with 50Ω termination.
Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4/2003 on conducted measurement.
The bandwidth of the test receiver is set at 9 kHz.

8.4 Test protocol

Power line: L

Freq	Correct Factor (dB)	Receiver Reading (dBuV)		Corrected Reading (dBuV)		Limit (dBuV)		Margin (dB)	
		QP	AV	QP	AV	QP	AV		
0.15	3	28.18	7.30	31.18	10.30	66.00	56.00	-	-
0.19	3	26.37	4.22	29.37	7.22	64.01	54.01	-	-
0.28	3	26.41	-0.04	29.41	2.96	60.90	50.90	-	-
0.72	3	20.53	-3.10	23.53	-0.10	56.00	46.00	-	-
1.04	3	18.99	-3.56	21.99	-0.56	56.00	46.00	-	-
2.21	3	1.35	-5.87	4.35	-2.87	56.00	46.00	-	-

Remark: 1. Correction Factor (dB) = LISN Factor (dB) + Cable Loss (dB).
2. Margin (dB) = Limit - Corrected Reading, If margin>20dB, it would not be listed here.

Power line: N

Freq	Correct Factor (dB)	Receiver Reading (dBuV)		Corrected Reading (dBuV)		Limit (dBuV)		Margin (dB)	
		QP	AV	QP	AV	QP	AV		
0.15	3	28.06	7.55	31.06	10.55	66.00	56.00	-	-
0.19	3	27.04	4.12	30.04	7.12	64.01	54.01	-	-
0.28	3	27.45	0.47	30.45	3.47	60.90	50.90	-	-
0.72	3	18.75	7.10	21.75	10.10	56.00	46.00	-	-
1.04	3	19.01	-3.68	22.01	-0.68	56.00	46.00	-	-
2.21	3	0.64	-5.87	3.64	-2.87	56.00	46.00	-	-

Remark: 1. Correction Factor (dB) = LISN Factor (dB) + Cable Loss (dB).
2. Margin (dB) = Limit - Corrected Reading, If margin>20dB, it would not be listed here.

8.5 Measurement Uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.
Measurement uncertainty at mains terminal: ± 1.99dB
The measurement uncertainty is given with a confidence of 95%, k=2.
The measurement uncertainty is traceable to internal procedure TI-036.