



EMC TEST REPORT

Report No. : EME-020800

Model No. : AV-T2G4B

Issued Date : Aug. 9, 2002

Applicant : ELANSat Technologies Inc.
5F, No. 12, Innovation Rd. 1 Science-Based Industrial Park,
Hsinchu, 300, Taiwan, R.O.C.

Test By : Intertek Testing Services Taiwan Ltd.
No. 11, Ko-Tze-Nan Chia-Tung Li, Shiang-Shan District,
Hsinchu, Taiwan, R.O.C.

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Project Engineer

Elton Chen

Approved By

MICHAEL CHEN
GENERAL MANAGER
ETL SEMKO DIVISION



Reviewed By

Michael Chen



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Summary of Tests

Shiu -Model: AV-T2G4B

FCC ID: PNKSHIU01

Test	Reference	Results
Conducted Emission of AC Power	15.207	Complies
Radiated Emission test	15.249(c), 15.209	Complies



1. General information

1.1 Identification of the EUT

Manufacturer	: ELANsat Technologies Inc.
Product	: Shiu
Model No.	: AV-T2G4B
FCC ID.	: PNKSHIU01
Operating Frequency (Tx)	: 2414MHz to 2468MHz
Operating Frequency (Rx)	: 433.92MHz
Channel Number (Tx)	: 4 channels
Channel Number (Rx)	: 1 channels
Frequency of Each Channel (Tx)	: 2414MHz, 2432MHz, 2450MHz, 2468MHz
Frequency of Each Channel (Rx)	: 433.92MHz
Type of Modulation (Tx)	: FM
Type of Modulation (Rx)	: ASK
Power Supply	: 120Vac, 60Hz with adapter (DV-9300S)
Power Cord	: N/A
Sample Received	: July 18, 2002
Test Date(s)	: July 19, 2002 to July 29, 2002

A DoC report has been generated for the client.

1.2 Additional information about the EUT

The main function of EUT is to send the video and audio signals to receiver unit by 2.4GHz RF signal with FM modulation. The receiver unit will pick up the 2.4GHz RF signal and do the FM demodulation, then put the video and audio signals to TV, or other AV device.

For more detail features, please refer to User's Manual.



1.3 Description of Peripherals

Peripherals	Manufacturer	Product No.	Serial No.	FCC ID
DVD	Royal Tek	RDP-702	P13C193100769	FCC DoC Approved

1.4 Antenna description

The EUT uses a permanently connected antenna.

Antenna Gain : 2dBi

Antenna Type : Monopole antenna



2. Test specifications

2.1 Test standard

The EUT was performed according to the procedures in FCC Part 15 Subpart C Paragraph 15.249 for non-spread spectrum devices.

The AC power conducted emissions was investigated over the frequency range from 0.45MHz to 30MHz using a receiver bandwidth of 9kHz. (15.207 paragraph)

Radiated emissions were investigated cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 10Hz VBW record Average reading. (15.209 paragraph), the Peak reading recorded also on the report.

The test of radiated measurements according to FCC Part 15 Section 15.33(a) had been conducted and the field strength of this frequency band were all meet limit requirement, thus we evaluate the EUT pass the specified test.

Radiated testing was performed at an antenna to EUT distance of 3 meters.

The EUT setup configurations please refer to the photo of test configuration in item.

2.2 Operation mode

Get the EUT connected to a DVD player with a 1.2 meter length RCA cable. Then power on the EUT and DVD player.

The EUT transmitted continuously during all the tests.



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2.3 Test equipment

Equipment	Brand	Frequency range	Model No.	Series No.	Cal.Date
EMI Test Receiver	Rohde & Schwarz	9kHz~2.75GHz	ESCS 30	825788/014	May 24, 2002
EMI Test Receiver	Rohde & Schwarz	20Hz~26.5GHz	ESMI	825428/005	June 10, 2002
Spectrum Analyzer	Rohde & Schwarz	9kHz~30GHz	FSP 30	100137	July 9, 2001
Horn Antenna	EMCO	1GHz~18GHz	3115	9906-5822	Sep. 10, 2001
Horn Antenna	SCHWARZBECK	14GHz~40GHz	BBHA 9170	159	June 20, 2002
Bilog Antenna	SCHWARZBECK	25MHz~1.7GHz	VULB 9160	3111	June 20, 2002
Turn Table	HDGmbH	N/A	DS 420S	420/669/01	N/A
Antenna Tower	HDGmbH	N/A	MA 240	240/573	N/A
Microwave Amplifier	Agilent	2GHz~26.5GHz	8348A	3111A00567	Dec. 20, 2001

Note:

1. The calibration interval of the above instruments is 12 months.

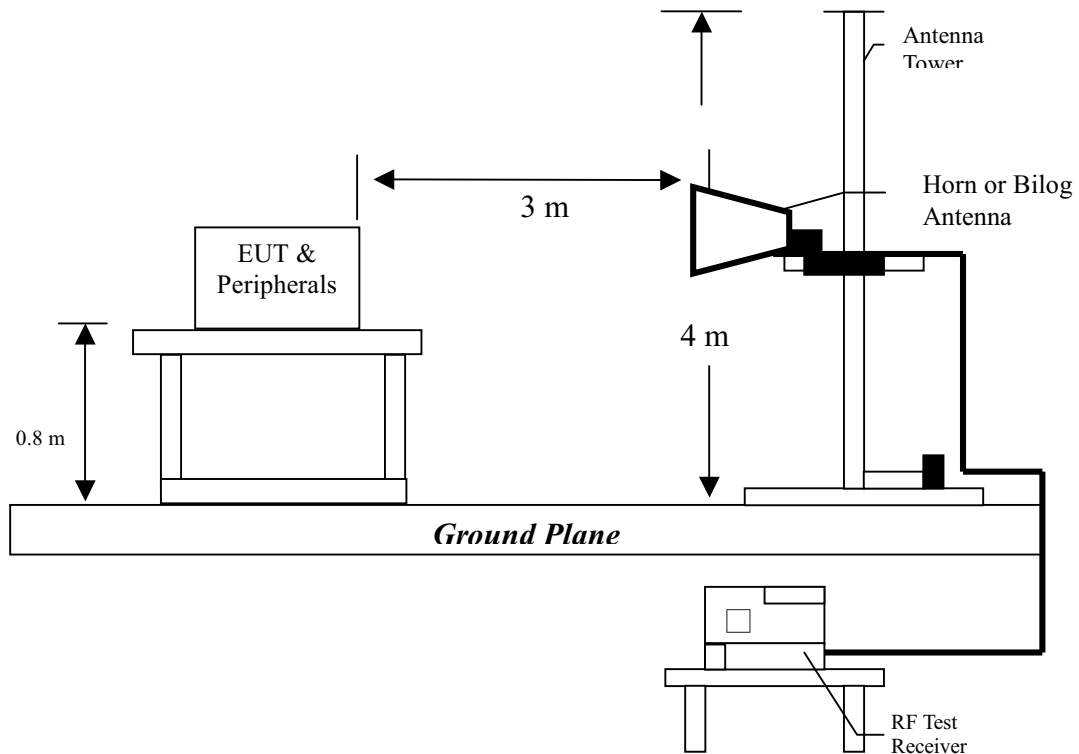
3. Radiated emission test FCC 15.249 (C)

3.1 Operating environment

Temperature: 26 °C
Relative Humidity: 58 %

3.2 Test setup & procedure

The Diagram below shows the test setup, which is utilized to make these measurements.



Radiated emission measurements were performed from 30MHz to 25GHz. Spectrum Analyzer Resolution Bandwidth is 100kHz or greater for frequencies 30MHz to 1GHz, 1MHz – for frequencies above 1GHz.

The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.



3.3 Emission limit

3.3.1 Fundamental and harmonics emission limits

Frequency (MHz)	Field Strength of Fundamental		Field Strength of Harmonics	
	(mV/m@3m)	(dBuV/m@3m)	(uV/m@3m)	(dBuV/m@3m)
2400-2483.5	50	94	500	54

3.3.2 General radiated emission limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

Frequency MHz	15.209 Limits (dB μ V/m@3m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

Remark:

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

Uncertainty was calculated in accordance with NAMAS NIS 81.

Expanded uncertainty (k=2) of radiated emission measurement is ± 3.078 dB.



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3.4 Radiated emission test data FCC 15.249

3.4.1 Fundamental & harmonics radiated emission data

EUT : AV-T2G4B

Test Condition : Tx at low channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Reading (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)
2414	PK	V	0	31.1	50.58	81.68	114	-32.32
2414	AV	V	0	31.1	48.77	79.87	94	-14.13
4828	PK	V	28.02	37.9	41.79	51.67	74	-22.33
4828	AV	V	28.02	37.9	32.14	42.02	54	-11.98
7242	PK	V	28.02	43.26	41.48	56.72	74	-17.28
7242	AV	V	28.02	43.26	34.05	49.29	54	-4.71
9656	PK	V	28.02	46.8	-	-	74	-
9656	AV	V	28.02	46.8	-	-	54	-
12070	PK	V	28.02	48.57	-	-	74	-
12070	AV	V	28.02	48.57	-	-	54	-
2414	PK	H	0	31.1	45.29	76.39	114	-37.61
2414	AV	H	0	31.1	44.58	75.68	94	-18.32
4828	PK	H	28.02	37.9	41.26	51.14	74	-22.86
4828	AV	H	28.02	37.9	29.82	39.7	54	-14.3
7242	PK	H	28.02	43.26	40.86	56.1	74	-17.9
7242	AV	H	28.02	43.26	32.82	48.06	54	-5.94
9656	PK	H	28.02	46.8	-	-	74	-
9656	AV	H	28.02	46.8	-	-	54	-
12070	PK	H	28.02	48.57	-	-	74	-
12070	AV	H	28.02	48.57	-	-	54	-

Remark:

1. Corrected Level = Reading Level + Correction Factor – Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. “-” means the emission is below the noise floor.



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EUT : AV-T2G4B

Test Condition : Tx at middle channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamplifier (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Reading (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)
2432	PK	V	0	31.1	47.53	78.63	114	-35.37
2432	AV	V	0	31.1	46.03	77.13	94	-16.87
4864	PK	V	28.02	37.9	37.27	47.15	74	-26.85
4864	AV	V	28.02	37.9	27.4	37.28	54	-16.72
7296	PK	V	28.02	43.26	39.55	54.79	74	-19.21
7296	AV	V	28.02	43.26	30.29	45.53	54	-8.47
9728	PK	V	28.02	46.8	-	-	74	-
9728	AV	V	28.02	46.8	-	-	54	-
12160	PK	V	28.02	48.57	-	-	74	-
12160	AV	V	28.02	48.57	-	-	54	-
2432	PK	H	0	31.1	49.84	80.94	114	-33.06
2432	AV	H	0	31.1	48.39	79.49	94	-14.51
4864	PK	H	28.02	37.9	37.13	47.01	74	-26.99
4864	AV	H	28.02	37.9	28.35	38.23	54	-15.77
7296	PK	H	28.02	43.26	40.86	56.1	74	-17.9
7296	AV	H	28.02	43.26	32.68	47.92	54	-6.08
9728	PK	H	28.02	46.8	-	-	74	-
9728	AV	H	28.02	46.8	-	-	54	-
12160	PK	H	28.02	48.57	-	-	74	-
12160	AV	H	28.02	48.57	-	-	54	-

Remark:

1. Corrected Level = Reading Level + Correction Factor – Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. “-” means the emission is below the noise floor.



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EUT : AV-T2G4B

Test Condition : Tx at high channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamplifier (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Reading (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)
2468	PK	V	0	31.1	47.02	78.12	114	-35.88
2468	AV	V	0	31.1	46.28	77.38	94	-16.62
4936	PK	V	28.02	37.9	38.5	48.38	74	-25.62
4936	AV	V	28.02	37.9	28.82	38.7	54	-15.3
7404	PK	V	28.02	43.29	39.03	54.3	74	-19.7
7404	AV	V	28.02	43.29	29.89	45.16	54	-8.84
9872	PK	V	28.02	46.78	-	-	74	-
9872	AV	V	28.02	46.78	-	-	54	-
12340	PK	V	28.02	48.72	-	-	74	-
12340	AV	V	28.02	48.72	-	-	54	-
2468	PK	H	0	31.1	44.96	76.06	114	-37.94
2468	AV	H	0	31.1	43.72	74.82	94	-19.18
4936	PK	H	28.02	37.9	39.99	49.87	74	-24.13
4936	AV	H	28.02	37.9	29.01	38.89	54	-15.11
7404	PK	H	28.02	43.29	39.79	55.06	74	-18.94
7404	AV	H	28.02	43.29	30.04	45.31	54	-8.69
9872	PK	H	28.02	46.78	-	-	74	-
9872	AV	H	28.02	46.78	-	-	54	-
12340	PK	H	28.02	48.72	-	-	74	-
12340	AV	H	28.02	48.72	-	-	54	-

Remark:

1. Corrected Level = Reading Level + Correction Factor – Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. “-” means the emission is below the noise floor.



3.5 General radiated emission data FCC 15.209

The radiated emissions at

Frequency(MHz)	Margin
55.20000	-1.30

are less than uncertainty. This is within the stated measurement uncertainty, this may affect compliance determined in other test arrangements.

3.5.1 General Radiated Emission Data

EUT : AV-T2G4B

Test Condition : Tx at low channel

Polar (circle)	Freq. (MHz)	Antenna Factor (dB)	Cable Loss (dB)	Reading (dB μ V)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
VER.	55.20000	11.39	1.70	25.61	38.70	40.00	-1.30
VER.	72.70000	8.69	1.83	21.48	32.00	40.00	-8.00
VER.	198.80000	10.19	2.40	21.61	34.20	43.50	-9.30
VER.	220.10000	10.99	2.83	19.18	33.00	46.00	-13.00
VER.	293.80000	12.76	3.06	15.78	31.60	46.00	-14.40
VER.	363.70000	15.78	3.75	9.57	29.10	46.00	-16.90
HOR.	55.20000	11.39	1.70	17.61	30.70	40.00	-9.30
HOR.	198.80000	10.19	2.40	20.51	33.10	43.50	-10.40
HOR.	293.80000	12.76	3.06	15.78	31.60	46.00	-14.40
HOR.	319.10000	13.81	3.21	13.98	31.00	46.00	-15.00
HOR.	338.50000	14.78	3.75	13.47	32.00	46.00	-14.00
HOR.	350.10000	14.78	3.75	10.37	28.90	46.00	-17.10

Remark:

1. Emission Level = Reading Level + Antenna Factor + Cable Loss
2. Uncertainty was calculated in accordance with NAMAS NIS 81.

Expanded uncertainty (k=2) of radiated emission measurement is ± 3.078 dB.



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The radiated emissions at

Frequency(MHz)	Margin
55.20000	-2.20

are less than uncertainty. This is within the stated measurement uncertainty, this may affect compliance determined in other test arrangements.

EUT : AV-T2G4B

Test Condition : Tx at middle channel

Polar (circle)	Freq. (MHz)	Antenna Factor (dB)	Cable Loss (dB)	Reading (dB μ V)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
VER.	55.20000	11.39	1.70	24.71	37.80	40.00	-2.20
VER.	72.70000	8.69	1.83	22.18	32.70	40.00	-7.30
VER.	198.80000	10.19	2.40	23.11	35.70	43.50	-7.80
VER.	220.10000	10.99	2.83	19.58	33.40	46.00	-12.60
VER.	338.50000	14.78	3.75	16.47	35.00	46.00	-11.00
VER.	359.80000	14.78	3.75	15.97	34.50	46.00	-11.50
HOR.	55.20000	11.39	1.70	15.21	28.30	40.00	-11.70
HOR.	198.80000	10.19	2.40	18.41	31.00	43.50	-12.50
HOR.	220.10000	10.99	2.83	16.88	30.70	46.00	-15.30
HOR.	239.50000	11.42	2.83	15.55	29.80	46.00	-16.20
HOR.	293.80000	12.76	3.06	12.28	28.10	46.00	-17.90
HOR.	338.50000	14.78	3.75	14.67	33.20	46.00	-12.80

Remark:

1. Emission Level = Reading Level + Antenna Factor + Cable Loss
2. Uncertainty was calculated in accordance with NAMAS NIS 81.

Expanded uncertainty (k=2) of radiated emission measurement is ± 3.078 dB.



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The radiated emissions at

Frequency(MHz)	Margin
55.20000	-1.70

are less than uncertainty. This is within the stated measurement uncertainty, this may affect compliance determined in other test arrangements.

EUT : AV-T2G4B

Test Condition : Tx at high channel

Polar (circle)	Freq. (MHz)	Antenna Factor (dB)	Cable Loss (dB)	Reading (dB μ V)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
VER.	55.20000	11.39	1.70	25.21	38.30	40.00	-1.70
VER.	72.70000	8.69	1.83	21.48	32.00	40.00	-8.00
VER.	165.80000	9.41	2.50	14.59	26.50	43.50	-17.00
VER.	198.80000	10.19	2.40	21.91	34.50	43.50	-9.00
VER.	293.80000	12.76	3.06	16.28	32.10	46.00	-13.90
VER.	359.80000	14.78	3.75	11.17	29.70	46.00	-16.30
HOR.	55.20000	11.39	1.70	13.51	26.60	40.00	-13.40
HOR.	198.80000	10.19	2.40	17.31	29.90	43.50	-13.60
HOR.	220.10000	10.99	2.83	15.38	29.20	46.00	-16.80
HOR.	239.50000	11.42	2.83	13.45	27.70	46.00	-18.30
HOR.	239.80000	11.42	2.83	13.05	27.30	46.00	-18.70
HOR.	330.70000	13.81	3.75	8.94	26.50	46.00	-19.50

Remark:

1. Emission Level = Reading Level + Antenna Factor + Cable Loss
2. Uncertainty was calculated in accordance with NAMAS NIS 81.

Expanded uncertainty (k=2) of radiated emission measurement is ± 3.078 dB.

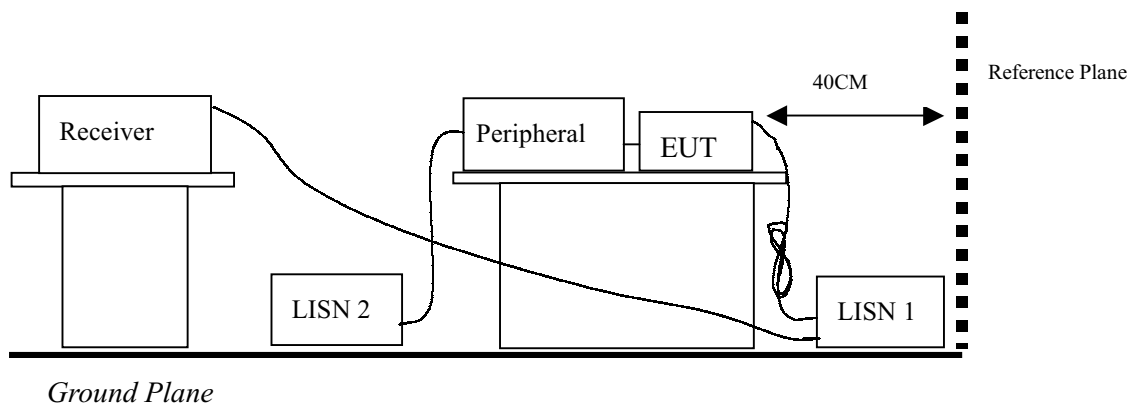
4. Conducted emission test FCC 15.207

4.1 Operating environment

Temperature: 24 °C

Relative Humidity: 57 %

4.2 Test setup & procedure



The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50 ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm 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 C63.4/1992 on conducted measurement.

The bandwidth of the field strength meter (R & S Test Receiver ESCS 30) is set at 9kHz.

4.3 Emission limit

FCC Part 15 Paragraph 15.207		
Freq. (MHz)	Maximum RF Line Voltage	
	uV	dBuV
0.45 - 30	250	48.0



4.4 Conducted emission data FCC 15.207

EUT : AV-T2G4B

Test Condition : Tx at low channel

Power Line (circle)	Freq. (MHz)	Reading (dB μ V) QP	Limit (dB μ V) QP	Margin (dB) QP
LINE	0.45000	30.3	48.00	-17.70
LINE	0.74600	18.7	48.00	-29.30
LINE	4.61000	22.1	48.00	-25.90
LINE	11.93000	22.9	48.00	-25.10
LINE	13.76200	25.9	48.00	-22.10
LINE	23.98600	28.0	48.00	-20.00
NEUTRAL	0.48200	27.2	48.00	-20.80
NEUTRAL	1.20200	18.8	48.00	-29.20
NEUTRAL	3.00200	18.7	48.00	-29.30
NEUTRAL	4.61000	24.5	48.00	-23.50
NEUTRAL	11.82600	18.9	48.00	-29.10
NEUTRAL	13.61000	24.9	48.00	-23.10

Remark:

1. The reading value including cable loss and LISN factor.
2. Uncertainty was calculated in accordance with NAMAS NIS 81.

Expanded uncertainty (k=2) of conducted emission measurement is ± 2.6 dB.



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Test Condition : Tx at middle channel

Power Line (circle)	Freq. (MHz)	Reading (dB μ V) QP	Limit (dB μ V) QP	Margin (dB) QP
LINE	0.45000	30.5	48.00	-17.50
LINE	0.66600	22.1	48.00	-25.90
LINE	4.21000	22.3	48.00	-25.70
LINE	11.93000	22.0	48.00	-26.00
LINE	13.76200	22.4	48.00	-25.60
LINE	23.98600	26.3	48.00	-21.70
NEUTRAL	0.50600	27.2	48.00	-20.80
NEUTRAL	4.21000	23.3	48.00	-24.70
NEUTRAL	4.61000	24.0	48.00	-24.00
NEUTRAL	11.73000	22.4	48.00	-25.60
NEUTRAL	13.76200	25.5	48.00	-22.50
NEUTRAL	23.98600	25.5	48.00	-22.50

Remark:

1. The reading value including cable loss and LISN factor.
2. Uncertainty was calculated in accordance with NAMAS NIS 81.

Expanded uncertainty (k=2) of conducted emission measurement is ± 2.6 dB.



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Test Condition : Tx at high channel

Power Line (circle)	Freq. (MHz)	Reading (dB μ V) QP	Limit (dB μ V) QP	Margin (dB) QP
LINE	0.45000	30.6	48.00	-17.40
LINE	0.66600	23.2	48.00	-24.80
LINE	4.07400	21.1	48.00	-26.90
LINE	11.82600	23.6	48.00	-24.40
LINE	21.65800	26.6	48.00	-21.40
LINE	25.52200	22.4	48.00	-25.60
NEUTRAL	0.49000	26.8	48.00	-21.20
NEUTRAL	0.60200	21.8	48.00	-26.20
NEUTRAL	4.21000	24.2	48.00	-23.80
NEUTRAL	4.61000	24.7	48.00	-23.30
NEUTRAL	11.82600	26.4	48.00	-21.60
NEUTRAL	13.61000	22.0	48.00	-26.00

Remark:

1. The reading value including cable loss and LISN factor.
2. Uncertainty was calculated in accordance with NAMAS NIS 81.

Expanded uncertainty (k=2) of conducted emission measurement is ± 2.6 dB.



5. Radiated emission on the band edge FCC 15.249(C)

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental (2400~2483.5MHz) or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

See band-edge plot as file name “band-edge plot.pdf”.