



TEST REPORT NUMBER: (8519)077-1053

TEST REPORT

TO:	GOODLY TOYS LTD	FAX:	--
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ADDRESS	ROOM 502A, HARBOUR CRYSTAL CENTRE, 100 GRANVILLE ROAD, TST EAST, KOLWOON, HONGKONG		
TEST DATE	20 MARCH, 2019---08 APRIL, 2019		

MANUFACTURER OR SUPPLIER NAME	MEKBAO PLASTIC ELECTRONIC INDUSTRIAL CO LTD.
MANUFACTURER OR SUPPLIER ADDRESS:	Mekbao Plastic Electronic Industrial Co., Ltd. Jiaoxi Industry Areas, Lianxia Chenghai, Shantou City, Guangdong China
SAMPLE DESCRIPTION:	27MHZ CRAWLING GHOST
MODEL OR STYLE NUMBER:	5588-709
RATED VOLTAGE:	3V d.c. ("AA" Size *2)
ADDITIONAL MODELS:	--
FCC ID :	2APSK-5588001
The submitted sample of the above equipment has been tested according to following standard(s)	
FCC Rules and Regulations Part 15 Subpart C section 15.227 RSS-310 Issue 4, July 2015 RSS-Gen Issue 5, April 2018 ANSI C63.10:2013, ANSI C63.4:2014	
CONCLUSION: The submitted sample was found to COMPLY with the test requirement	

Assistant Manager

Name: Nick Lung
Date: 08 APRIL, 2019



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1. Summary of test results

Description of Test Item	Standard	Results
Field Strength of the Fundamental Signal	FCC Part 15: 15.227(a) ANSI C63.10:2013 ANSI C63.4:2014 RSS-310 Issue 4	PASS
20dB Bandwidth and 99% Bandwidth	FCC Part 15: 15.35 ANSI C63.10:2013 ANSI C63.4:2014 RSS-310 Issue 4	PASS
Radiated Emission	FCC Part 15: 15.209 FCC Part 15: 15.227(b) ANSI C63.10:2013 ANSI C63.4:2014 RSS-310 Issue 4 RSS-Gen Issue 5	PASS
Power Line Conducted Emissions	FCC Part 15: 15.207 ANSI C63.10:2013 ANSI C63.4:2014 RSS-Gen Issue 5	N/A
Antenna requirement	FCC Part 15: 15.203 RSS-Gen Issue 5	PASS
Note: N/A is an abbreviation for Not Applicable, and means this item is not applicable for this device.		



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2. General test information

2.1. Description of EUT

Power supply	: DC 3V (2*1.5V "AA" battery)
Operation frequency	: 27.145MHz
Antenna Type	: Dedicated antenna

2.2. Accessories of EUT

Description of Accessories	Manufacturer	Model number	Serial No.	Other
N/A	N/A	N/A	N/A	N/A

2.3. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	Serial No.	Other
N/A	N/A	N/A	N/A	N/A

2.4. Block diagram of EUT configuration for test



2.5. Deviations of test standard

No Deviation.

2.6. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature range:	21-25°C
Humidity range:	40-75%
Pressure range:	86-106kPa



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2.7. Test laboratory

Dongguan Dongdian Testing Service Co., Ltd

Add: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City, Guangdong Province, China, 523808

Tel: +86-0769-38826678, <http://www.dgddt.com>, Email: ddt@dgddt.com

CNAS Accreditation No. L6451; A2LA Accreditation No. 3870.01

Designation Number: CN1182; Test Firm Registration Number: 540522

Industry Canada site registration number: 10288A-1

Result reviewed by Centre of Testing Service (Ningbo) Co, Ltd Guangzhou Branch - a Bureau Veritas Company

Address: Building A, No.65 Zhuji Highway, Jishancun, Tianhe District, Guangzhou, China

2.8. Measurement uncertainty

Test Item	Uncertainty
Bandwidth	1.1%
Peak Output Power (Conducted) (Spectrum analyzer)	0.86dB (10MHz ≤ f < 3.6GHz);
	1.38dB (3.6GHz ≤ f < 8GHz)
Peak Output Power (Conducted) (Power Sensor)	0.74dB
Dwell Time	0.6%
Conducted spurious emissions	0.86dB (10MHz ≤ f < 3.6GHz);
	1.40dB (3.6GHz ≤ f < 8GHz)
	1.66dB (8GHz ≤ f < 22GHz)
Uncertainty for radio frequency (RBW < 20kHz)	3 × 10 ⁻⁸
Temperature	0.4°C
Humidity	2%
Uncertainty for Radiation Emission test (30MHz-1GHz)	4.70dB (Antenna Polarize: V)
	4.84dB (Antenna Polarize: H)
Uncertainty for Radiation Emission test (1GHz-18GHz)	4.10dB (1-6GHz)
	4.40dB (6GHz-18GHz)
Uncertainty for Power line conduction emission test	3.32dB (150kHz-30MHz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	



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3. Equipment used during test

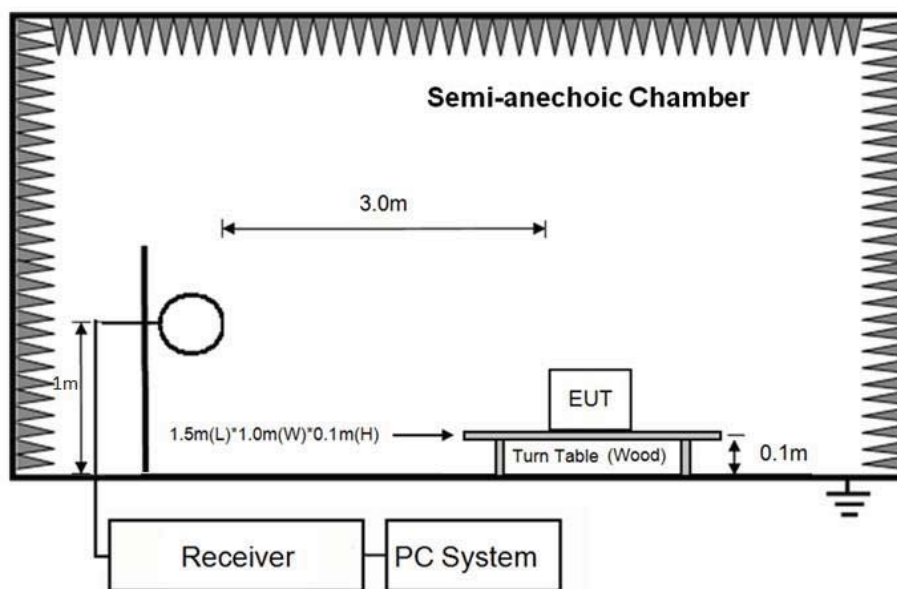
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
RF Connected Test (Tonscend RF Measurement System)					
Spectrum analyzer	R&S	FSU26	200071	Oct. 12, 2018	1 Year
Wideband Radio Communication tester	R&S	CMW500	117491	Jun. 29, 2018	1 Year
Vector Signal Generator	Agilent	E8267D	US49060192	Oct. 12, 2018	1 Year
Vector Signal Generator	Agilent	N5182A	MY48180737	Jun. 29, 2018	1 Year
Power Sensor	Agilent	U2021XA	MY55150010	Oct. 21, 2018	1 Year
Power Sensor	Agilent	U2021XA	MY55150011	Oct. 23, 2018	1 Year
DC Power Source	MATRIS	MPS-3005L-3	D813058W	Aug. 18, 2018	1 Year
Attenuator	Mini-Circuits	BW-S10W2	101109	Aug. 18, 2018	1 Year
RF Cable	Micable	C10-01-01-1	100309	Oct. 21, 2018	1 Year
Temp&Humi Programmable	ZHIXIANG	ZXGDJS-150L	ZX170110-A	Oct. 21, 2018	1 Year
Test Software	JS Tonscend	JS1120-3	Ver.2.7	N/A	N/A
Radiated Emission Test Chamber 1#					
EMI Test Receiver	R&S	ESU8	100316	Oct. 12, 2018	1 Year
Spectrum analyzer	Agilent	E4447A	MY50180031	Jun. 29, 2018	1 Year
Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	Nov. 09, 2018	1 Year
Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	Oct. 20, 2018	1 Year
Double Ridged Horn Antenna	R&S	HF907	100276	Nov. 16, 2018	1 Year
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	790	Oct. 25, 2018	1 Year
Pre-amplifier	A.H.	PAM-0118	360	Oct. 12, 2018	1 Year
Pre-amplifier	TERA-MW	TRLA-0040 G35	101303	Oct. 12, 2018	1 Year
RF Cable	HUBSER	CP-X2+ CP-X1	W11.03+ W12.02	Oct. 21, 2018	1 Year
RF Cable	N/A	SMAJ-SMA J-1M+ 11M	17070133+17070131	Nov. 08, 2018	1 Year
MI Cable	HUBSER	C10-01-01-1 M	1091629	Oct. 21, 2018	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A

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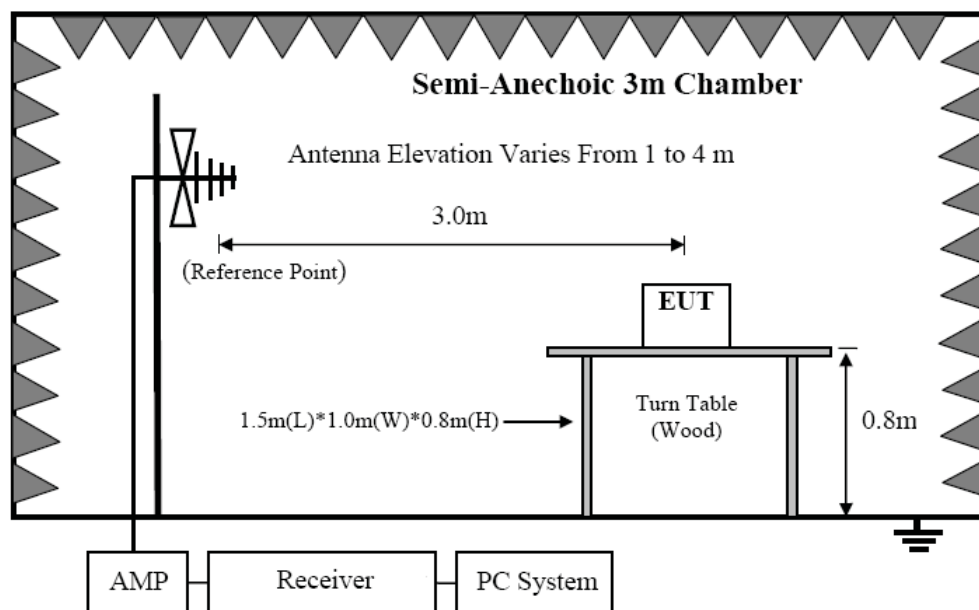
4. Radiated emission

4.1. Block diagram of test setup

In 3m Anechoic Chamber Test Setup Diagram for 9kHz-30MHz

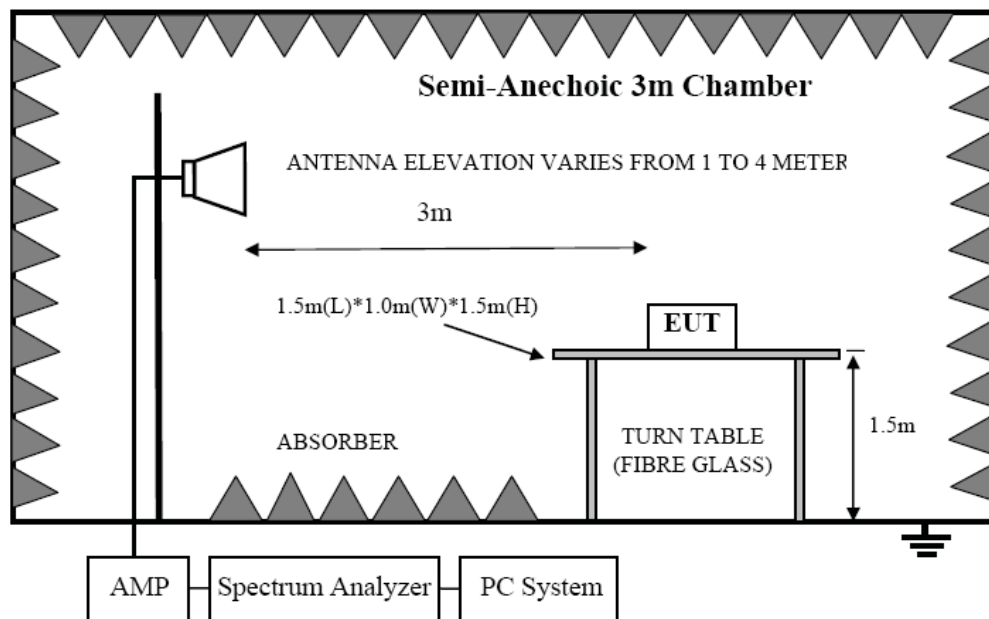


In 3m Anechoic Chamber Test Setup Diagram for below 1GHz



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In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz



Note: For harmonic emissions test an appropriate high pass filter was inserted in the input port of AMP.

4.2. Limit

4.2.1 FCC 15.205 Restricted frequency band

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)



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4.2.2 FCC 15.209 Limit.

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V/m}$	$\text{dB}(\mu\text{V})/\text{m}$
0.009 ~ 0.490	300	$2400/F(\text{kHz})$	$67.6-20\log(F)$
0.490 ~ 1.705	30	$24000/F(\text{kHz})$	$87.6-20\log(F)$
1.705 ~ 30.0	30	30	29.54
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

4.2.3 FCC 15.227(a) Limit.

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V/m}$	$\text{dB}(\mu\text{V})/\text{m}$
26.96 ~ 27.28	3	10000	80(Average)
			100(Peak)

Note: (1) The emission limits shown in the above table are based on measurements employing a CISPR QP detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

(2) At frequencies below 30MHz, measurement may be performed at a distance closer than that specified, and the limit at closer measurement distance can be extrapolated by below formula:

$$\text{Limit}_{3\text{m}}(\text{dB}\mu\text{V}/\text{m}) = \text{Limit}_{30\text{m}}(\text{dB}\mu\text{V}/\text{m}) + 40\log(30\text{m}/3\text{m})$$

4.2.3 Limit for this EUT

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209 and 15.227, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.



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4.3. Test Procedure

- (1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.
- (2) Test antenna was located 3m from the EUT on an adjustable mast, and the antenna used as below table.

Test frequency range	Test antenna used
9kHz-30MHz	Active Loop antenna
30MHz-1GHz	Trilog Broadband Antenna
1GHz-18GHz	Double Ridged Horn Antenna(1GHz-18GHz)
18GHz-40GHz	Horn Antenna(18GHz-40GHz)

According ANSI C63.10:2013 clause 6.4.4.2 and 6.5.3, for measurements below 30 MHz, the loop antenna was positioned with its plane vertical from the EUT and rotated about its vertical axis for maximum response at each azimuth position around the EUT. And the loop antenna also be positioned with its plane horizontal at the specified distance from the EUT. The center of the loop is 1 m above the ground. for measurement above 30MHz, the Trilog Broadband Antenna or Horn Antenna was located 3m from EUT, Measurements were made with the antenna positioned in both the horizontal and vertical planes of Polarization, and the measurement antenna was varied from 1 m to 4 m. in height above the reference ground plane to obtain the maximum signal strength.

- (3) Below pre-scan procedure was first performed in order to find prominent frequency spectrum radiated emissions from 9kHz to 1GHz:

- (a) Scanning the peak frequency spectrum with the antenna specified in step (3), and the EUT was rotated 360 degree, the antenna height was varied from 1m to 4m (Except loop antenna, it's fixed 1m above ground.)

- (b) Change work frequency or channel of device if practicable.

- (c) Change modulation type of device if practicable.

- (d) Change power supply range from 85% to 115% of the rated supply voltage

- (e) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions.

Spectrum frequency from 9 kHz to 1GHz (tenth harmonic of fundamental frequency) was investigated, the EUT works the highest frequency in 27.145MHz, therefore the test is performed up to 1GHz, and there are no obvious emissions detected from 9 kHz to 30MHz, so below final test was performed with frequency range from 30MHz to 1GHz.

- (4) For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1m and 4m in order to maximize the emission.



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Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10:2013 on Radiated Emission test.

- (5) The emissions from 9kHz to 1GHz were measured based on CISPR QP detector except for the frequency bands 9-90kHz, 110-490kHz, for emissions from 9kHz-90kHz, 110kHz-490kHz and above 1GHz were measured based on average detector, for emissions above 1GHz, peak emissions also be measured and need comply with Peak limit.
- (6) The emissions from 9 kHz to 1GHz, QP or average values were measured with EMI receiver with below RBW.

Frequency band	RBW
9kHz-150kHz	200Hz
150kHz-30MHz	9kHz
30MHz-1GHz	120kHz

4.4. Test result

PASS. (See below detailed test result)

4.4.1 Field Strength of the Fundamental Signal

Freq. (MHz)	Read level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	PK Result Level (dBμV/m)	PK Limit (dBμV/m)	Over Limit (dB)	Detector	Polarization
27.145	64.67	12.03	3.63	80.33	100.00	-19.67	Peak	VERTICAL
27.145	57.25	12.03	3.63	72.91	80.00	-7.09	Average	VERTICAL
Result: Pass								

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 100 kHz, VBW: 300 kHz, Sweep time: auto.



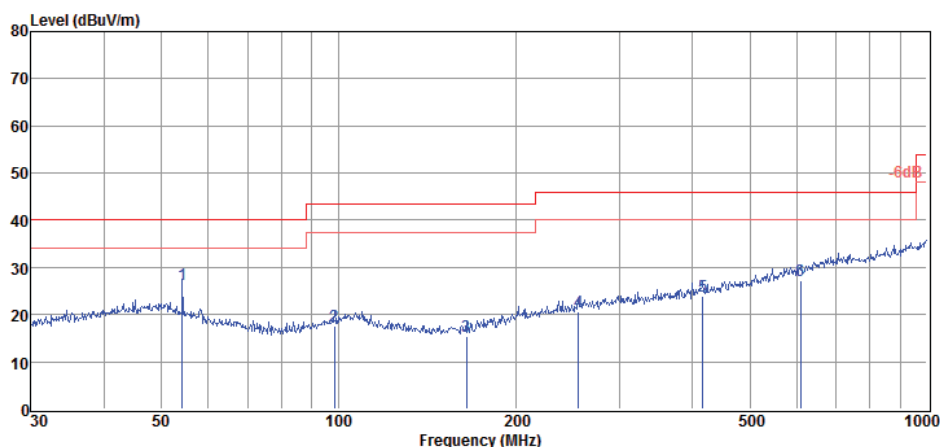
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4.4.2 Radiated Emissions

TR-4-E-009 Radiated Emission Test Result

Test Site : DDT 3m Chamber 1#
 Test Date : 2019-03-22
 EUT :
 Power Supply : DC 3V
 Condition : Temp:24.5°C, Humi:55%, Press:101.4kPa
 Memo :
 D:\2019 RE1# Report Data\BV Report\85190771052
 2.4G\RF.EM6
 Tested By : Sunny
 Model Number :
 Test Mode : Tx mode
 Antenna/Distance : 2018 VULB 9163 1#/3m/HORIZONTAL

Data: 8



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	54.26	9.39	13.16	3.91	26.46	40.00	-13.54	QP	HORIZONTAL
2	98.49	2.04	11.45	4.20	17.69	43.50	-25.81	QP	HORIZONTAL
3	164.91	1.91	8.85	4.63	15.39	43.50	-28.11	QP	HORIZONTAL
4	255.62	2.52	12.97	5.02	20.51	46.00	-25.49	QP	HORIZONTAL
5	416.18	2.45	15.87	5.57	23.89	46.00	-22.11	QP	HORIZONTAL
6	609.92	2.34	18.67	6.12	27.13	46.00	-18.87	QP	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
 2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
 3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.



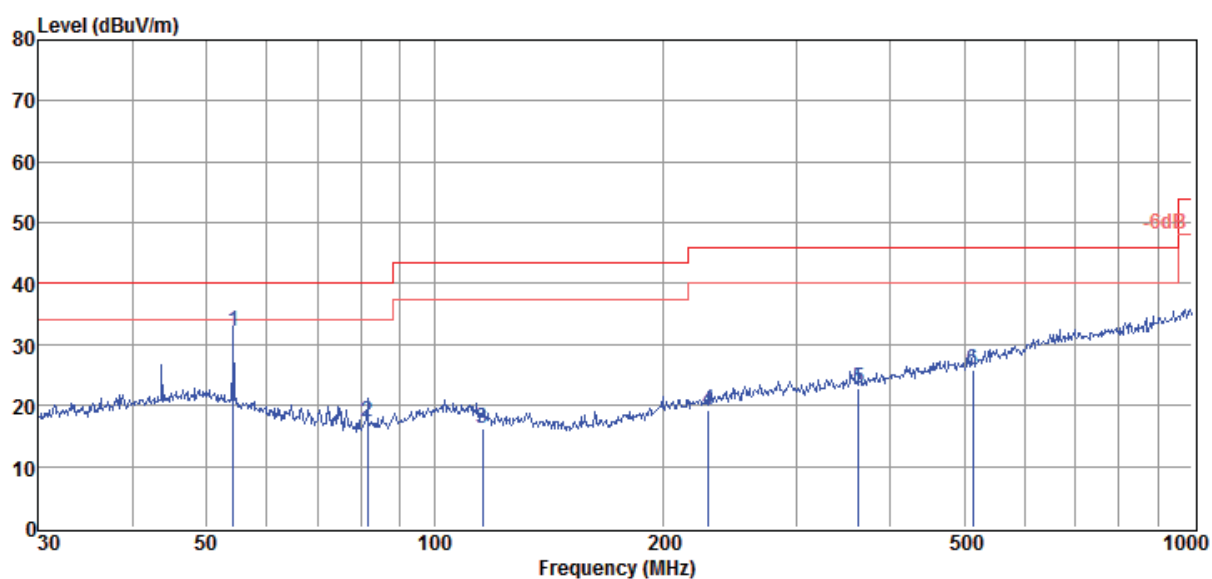
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TR-4-E-009 Radiated Emission Test Result

Test Site : DDT 3m Chamber 1#
Test Date : 2019-03-22
EUT :
Power Supply : DC 3V
Condition : Temp:24.5°C, Humi:55%, Press:101.4kPa
Memo :

D:\2019 RE1# Report Data\BV Report\85190771052
2.4G\RF.EM6
Tested By : Sunny
Model Number :
Test Mode : Tx mode
Antenna/Distance : 2018 VULB 9163 1#/3m/VERTICAL

Data: 7



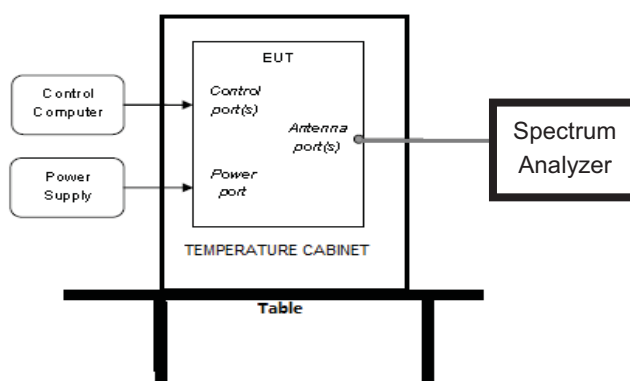
Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	54.26	14.98	13.16	3.91	32.05	40.00	-7.95	QP	VERTICAL
2	81.50	4.06	9.07	4.09	17.22	40.00	-22.78	QP	VERTICAL
3	115.73	1.29	10.58	4.29	16.16	43.50	-27.34	QP	VERTICAL
4	230.10	1.91	12.30	4.92	19.13	46.00	-26.87	QP	VERTICAL
5	362.98	2.34	15.06	5.39	22.79	46.00	-23.21	QP	VERTICAL
6	513.63	2.64	17.31	5.86	25.81	46.00	-20.19	QP	VERTICAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
 2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
 3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto

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5. 20dB Bandwidth and 99% Bandwidth

5.1. Block diagram of test setup



5.2. Limits

Operation within the band 26.96-27.28 MHz

5.3. Test Procedure

- (1) Connect EUT's antenna output to spectrum analyzer by RF cable.
- (2) The bandwidth of the fundamental frequency was measured by spectrum analyzer with 300 Hz RBW and 1 kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

5.4. Test Result

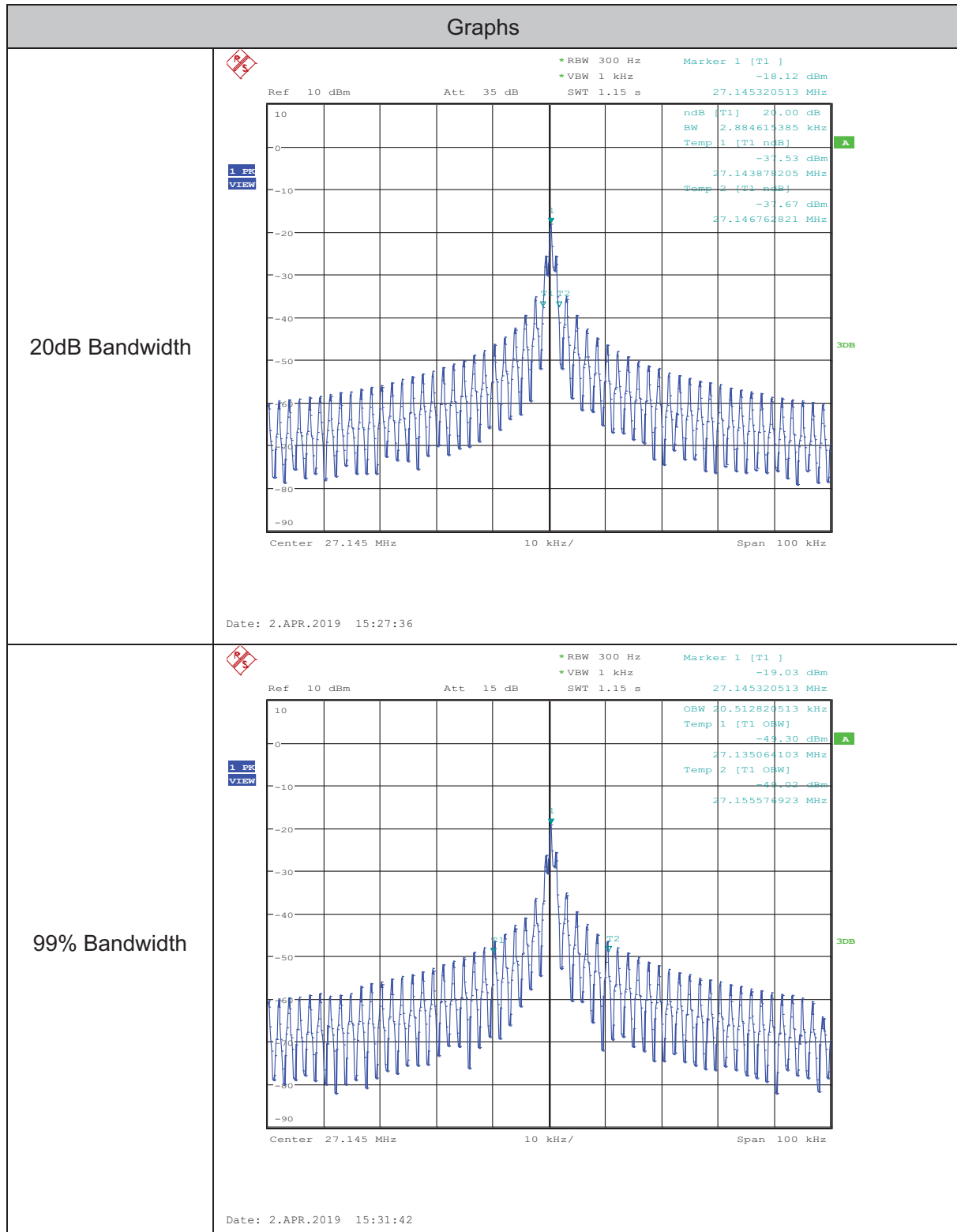
Freq. (MHz)	Limit	Conclusion
27.145	Operation within the band 26.96-27.28 MHz	PASS



BUREAU
VERITAS

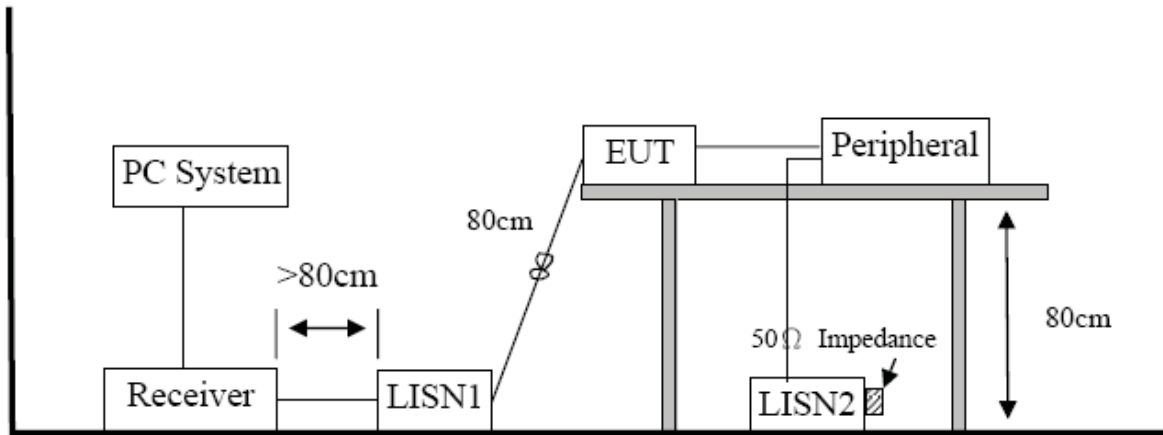
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5.5. Original test data



6. Power Line Conducted Emission

6.1. Block diagram of test setup



6.2. Power Line Conducted Emission Limits (Class B)

Frequency	Quasi-Peak Level dB(μ V)	Average Level dB(μ V)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Note 1: * Decreasing linearly with logarithm of frequency.

Note 2: The lower limit shall apply at the transition frequencies.

6.3. Test Procedure

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80cm above the ground plane.

Configuration EUT to simulate typical usage as described in clause 2.4 and test equipment as described in clause 3 of this report.

All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
All support equipment power received from a second LISN.

Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.

The Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
During the above scans, the emissions were maximized by cable manipulation.



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The test mode(s) described in clause 2.4 were scanned during the preliminary test.

After the preliminary scan, we found the test mode producing the highest emission level.

The EUT configuration and worse cable configuration of the above highest emission levels were recorded for reference of the final test.

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.

A scan was taken on both power lines, Neutral and Line, recording at least the six highest emissions.

Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.

The test data of the worst-case condition(s) was recorded.

The bandwidth of test receiver is set at 9 kHz.

6.4. Test Result

Not Applicable

Remark: Conducted limits are not required for devices which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines according to 15.207(C).

7. Antenna Requirements

For intentional device, according to FCC 47 CFR Section 15.203, An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.