Audix Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
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FCC 15.209
Wireless Power Transfer Report

for

Hitachi-LG Data Storage Korea, Inc.

(Gasan-dong) 189, Gasandigital 1-ro, Geumcheon-gu, Seoul-Korea.

Product Name	**:**	**Super multi wireless charger**
Model Name	**:**	**(1)HLW-TNMP7 (2)HLW-TNMP7A (3)HLW-TNMP7B (4)HLW-TNMP7C (5)HLW-TNMP7***
Brand	**:**	**H・L Data Storage**
FCC ID	**:**	**2AQ9F-HLW-TNMP7**

Prepared by: **:** **AUDIX Technology Corporation, EMC Department**

Testing Laboratory
1724

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TEST REPORT CERTIFICATION

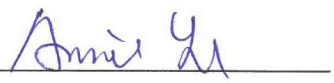
Applicant	:	Hitachi-LG Data Storage Korea, Inc.
Manufacture	:	#1 Hitachi-LG Data Storage (Huizhou), Ltd.
		#2 HITACHI ELECTRONIC PRODUCTS (M) SDN. BHD.
EUT Description		
(1) Product	:	Super multi wireless charger
(2) Model	:	(1)HLW-TNMP7 (2)HLW-TNMP7A (3)HLW-TNMP7B (4)HLW-TNMP7C (5)HLW-TNMP7*
(3) Brand	:	H·L Data Storage

Applicable Standards:

47 CFR FCC Part 15 Subpart C
ANSI C63.10:2013

Audix Technology Corp. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.
Audix Technology Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens and samples.

Date of Report: 2018. 09. 25

Reviewed by:  (Annie Yu/Administrator)

Approved by:  (Ben Cheng/Manager)

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1. REVISION RECORD OF TEST REPORT

Edition No	Issued Data	Revision Summary	Report Number
0	2018. 09. 25	Original Report	EM-F180412

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2. SUMMARY OF TEST RESULTS

Rule	Description	Results
FCC		
15.207	Conducted Emission	**PASS**
15.209	Radio Spurious Emission	**PASS**
15.215 (c)	20dB Bandwidth	**PASS**
15.203	Antenna Requirement	**Compliance**

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3. GENERAL INFORMATION

3.1. Description of Application

Applicant	Hitachi-LG Data Storage Korea, Inc. (Gasan-dong) 189, Gasandigitall-ro, Geumcheon-gu, Seoul-Korea.
Manufacture	#1 Hitachi-LG Data Storage (Huizhou), Ltd. #2 HITACHI ELECTRONIC PRODUCTS (M) SDN. BHD.
Product	Super multi wireless charger
Model	(1)HLW-TNMP7 (2)HLW-TNMP7A (3)HLW-TNMP7B (4)HLW-TNMP7C (5)HLW-TNMP7* (Where symbol "*" can be any number, character or blank)
Brand	H·L Data Storage

3.2. Description of EUT

Test Model	HLW-TNMP7
Serial Number	N/A
Power Rating	DC 5~12V
RF Features	Wireless Power Transfer
I/O Ports List	• USB Port x1
Accessories	• USB Type-C Cable
Date of Receipt	2018. 09. 07
Date of Test	2018. 09. 17 ~ 25

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3.3. EUT Specifications Assessed in Current Report

Mode	Fundamental Range	Modulation
WPC	115-130kHz	FSK

3.4. Antenna Information

No.	Antenna Part Number	Manufacture	Antenna Type	Frequency (MHz)	Max Gain (dBi)
1	---	---	Loop	---	---

3.5. Description of Key Components

None.

3.6. Test Configuration

AC Conduction	
Test Case	5W Charge with AC 5V Adapter
	10W Charge with AC 9V Adapter
	15W Charge with AC 12V Adapter

Item		Test Frequency	Mode
Radiated Test Case	Radiated Spurious Emission	127.3kHz	5W Charge with AC 5V Adapter
			10W Charge with AC 9V Adapter
			15W Charge with AC 12V Adapter
Conducted Test Case	20dB Bandwidth	127.3kHz	5W Charge with AC 5V Adapter
			10W Charge with AC 9V Adapter
			15W Charge with AC 12V Adapter

Note 1:

■ Mobile Device:.

☐ Portable Device, and 3 axis were assessed.

- ☐ Lie
- ☐ Side
- ☐ Stand

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3.7. Tested Supporting System List

3.7.1. Support Peripheral Unit

No.	Product	Brand	Model No.	Serial No.	Approval
1.	AC Adapter (5V)	SAMSUNG	EP-TA12KWK	RT4K306kV/B-E	N/A
2.	AC Adapter (9V)	SAMSUNG	EP-TA20JBS	R37G3RA0033DK3	N/A
3.	AC Adapter (12V)	SAMSUNG	EP-TA300	R37K5PN1AE3SE3	N/A
4.	Simulator#1	N/A	N/A	N/A	N/A
5.	Simulator#2	N/A	N/A	N/A	N/A
6.	R-Load#1	N/A	N/A	N/A	N/A
7.	R-Load#2	N/A	N/A	N/A	N/A
8.	R-Load#3	N/A	N/A	N/A	N/A

3.7.2. Cable Lists

No.	Cable Description Of The Above Support Units
1.	AC Power Cable: Wall-mount, 2C I/P: 100-240Vac, 50-60Hz, 0.35A, O/P: 5.0Vdc 2.0A
2.	AC Power Cable: Wall-mount, 2C I/P: 100-240Vac, 50-60Hz, 0.6A(0.5A), O/P: 9.0Vdc 1.67A or 5.0Vdc 2.0A
3.	AC Power Cable: Wall-mount, 2C I/P: 100-240Vac, 50-60Hz, 1.0A, O/P: 12V 2.1A or 9V 1.67A or 5V 2.0A
4.	Data Cable: Unshielded, Undetachable, 0.18m (5W with R-Load#1)
5.	Data Cable: Unshielded, Undetachable, 0.10m (10W with R-Load#2, 15W with R-Load#3)
6.	Data Cable: Unshielded, Undetachable, 0.11m (5W with Simulator#1)
7.	Data Cable: Unshielded, Undetachable, 0.20m (10W with Simulator#2)
8.	Data Cable: Unshielded, Undetachable, 0.26m (15W with Simulator#2)

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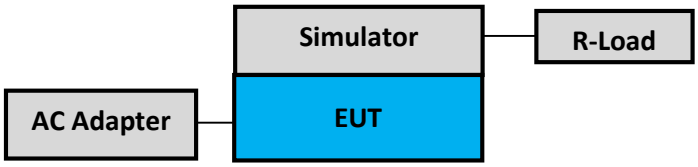
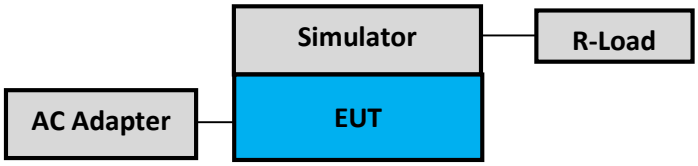
3.8. Setup Configuration

3.8.1. For AC Conduction Test



3.8.2. For Radiated Spurious Emission Test



3.9. Operating Condition of EUT

To Set EUT on RF function under continues transmitting.

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3.10.Description of Test Facility

Name of Test Firm	Audix Technology Corporation / EMC Department No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan Tel: +886-2-26092133 Fax: +886-2-26099303 Website : www.audixtech.com Contact e-mail: attemc_report@audixtech.com
Accreditations	The laboratory is accredited by following organizations under ISO/IEC 17025:2005 (1) NVLAP(USA) NVLAP Lab Code 200077-0 (2) TAF(Taiwan) No. 1724
Test Facilities	FCC OET Designation Number under APEC MRA by NCC is : TW1724 (1) No. 8 Shielding Room (2) No. 1 Semi-Anechoic Chamber (IC Test Site Registration No.: 5183B-1) (3) No. 3 Semi-Anechoic Chamber (IC Test Site Registration No.: 5183B-3) (4) RF Test Room

3.11.Measurement Uncertainty

Test Item	Frequency Range	Uncertainty
Conduction Test	150kHz~30MHz	±3.50dB
Radiation Test (Distance: 3m)	30MHz~1000MHz	± 3.68dB
	Above 1GHz	± 5.82dB

Remark：Uncertainty = $ku_c(y)$

Test Item	Uncertainty
20dB Bandwidth	± 0.2kHz

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4. MEASUREMENT EQUIPMENT LIST

4.1. Conducted Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Test Receiver	R&S	ESR3	101774	2018. 01. 24	1 Year
2.	A.M.N.	R&S	ENV4200	100169	2017. 11. 12	1 Year
3.	L.I.S.N.	Kyoritsu	KNW-407	8-855-9	2017. 12. 14	1 Year
4.	Pulse Limiter	R&S	ESH3-Z2	100354	2018. 01. 16	1 Year
5.	Signal Cable	Yeida	RG/58AU	CE-08	2018. 09. 21	1 Year
6.	Digital Thermo- Hygro Meter	iMax	HTC-1	No.8 S/R	2018. 04. 20	1 Year
7.	Test Software	Audix	e3	V.6.120424	N.C.R.	N.C.R.

4.2. Radiated Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
1	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2018. 09. 12	1 Year
2	Spectrum Analyzer	Agilent	N9010A-526	MY52220368	2017. 11. 08	1 Year
3	Test Receiver	R & S	ESCS30	100338	2018. 06. 20	1 Year
4	Test Receiver	R & S	ESCI7	100923	2018. 03. 28	1 Year
5	Amplifier	HP	8447D	2944A06669	2018. 05. 09	1 Year
6	Loop Antenna	R&S	HFH2-Z2	891847/27	2017. 12. 18	1 Year
7	Bilog Antenna	TESEQ	CBL6112D	33820	2018. 01. 21	1 Year
8	Digital Thermo-Hygro Meter	iMax	HTC-1	No.3 3m A/C	2018. 04. 20	1 Year
9	Digital Thermo-Hygro Meter	iMax	HTC-1	No.1 3m A/C	2018. 04. 20	1 Year
10	Test Software	Audix	e3	V.120619C	N.C.R.	N.C.R.
11	Test Software	Audix	e3	V.6.110601	N.C.R.	N.C.R.

4.3. RF Radiated Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
1	Spectrum Analyzer	Agilent	N9030A-544	US51350140	2018. 06. 20	1 Year
2.	Wide Band Antenna	Diamond	RH799	N/A	N.C.R	N.C.R
3.	Digital Thermo-Hygro Meter	Shenzhen Datronn Electronics	KT-905	RF	2018. 04. 20	1 Year

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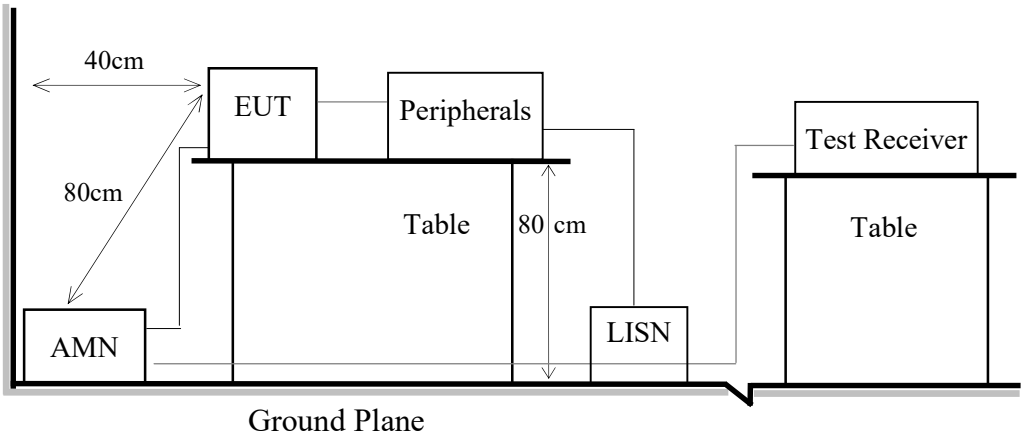
5. CONDUCTED EMISSION

5.1. Block Diagram of Test Setup

5.1.1. Block Diagram of EUT

Indicated as section 3.8

5.1.2. Shielded Room Setup Diagram



5.2. Conducted Emission Limit

Frequency	Conducted Limit	
	Quasi-Peak Level	Average Level
150kHz ~ 500kHz	66 ~ 56 dBμV	56 ~ 46 dBμV
500kHz ~ 5MHz	56 dBμV	46 dBμV
5MHz ~ 30MHz	60 dBμV	50 dBμV

Remark 1.: If the average limit is met when using a Quasi-Peak detector, the measurement using the average detector is not required.
2.: The lower limit applies to the band edges.

5.3. Test Procedure

5.3.1. To set up the EUT as indicated in ANSI C 63.10. The EUT was placed on the table which has 80 cm height to the ground and 40 cm distance to the conducting wall.

5.3.2. Power supplier of the EUT was connected to the AC mains through an Artificial Mains Network (A.M.N.).

5.3.3. The AC power supplies to all peripheral devices must be provided through line impedance stabilization network (L.I.S.N.)

5.3.4. Checking frequency range from 150 kHz to 30 MHz and record the emission which does not have 20 dB below limit.

5.4. Test Results

Please refer to Appendix A.

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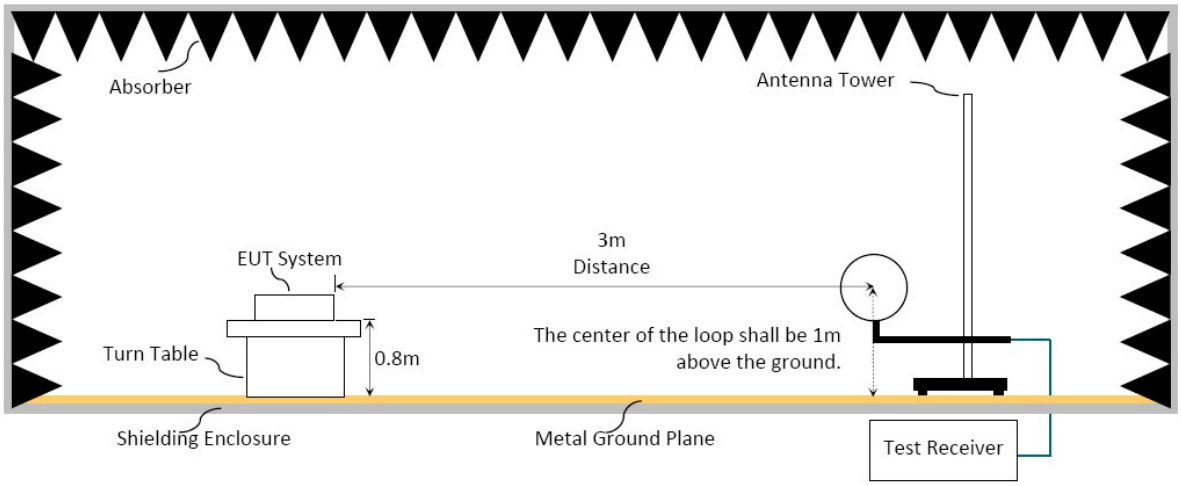
6. RADIATED SPURIOUS EMISSION

6.1. Block Diagram of Test Setup

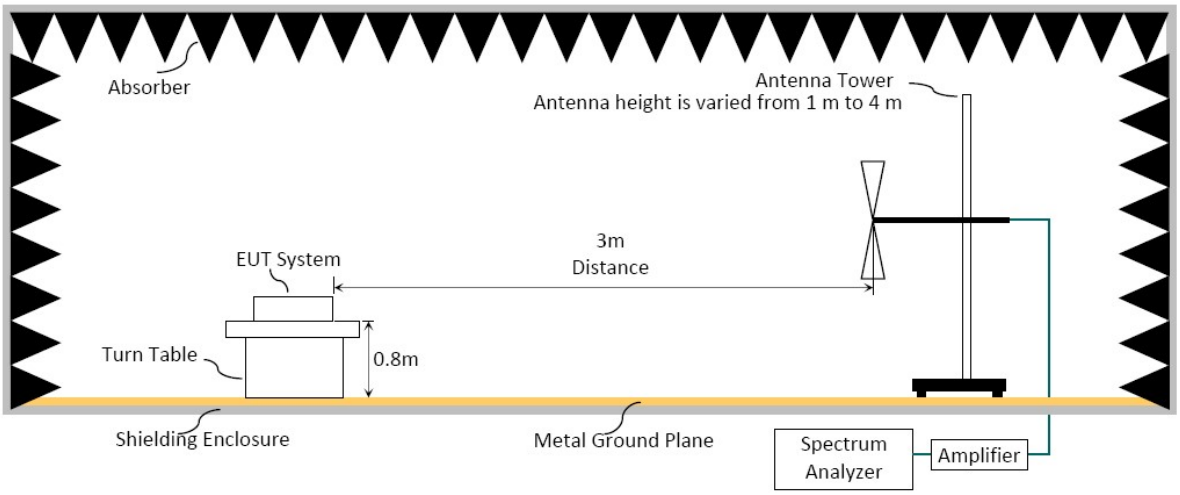
6.1.1. Block Diagram of EUT

Indicated as section 3.8

6.1.2. Setup Diagram for 9kHz-30MHz



6.1.3. Setup Diagram for 30-1000 MHz



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6.2. Radiated Emission Limits

In any 100kHz bandwidth outside the frequency band, the radio frequency power produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205 must also comply with the radiated emission limits specified as below.

Frequency (MHz)	Distance (m)	Limits	
		dBμV/m	μV/m
0.009 - 0.490	300	67.6	2400/kHz
0.490 - 1.705	30	87.6	24000/kHz
1.705 - 30	30	29.5	30
30 - 88	3	40.0	100
88- 216	3	43.5	150
216- 960	3	46.0	200
Above 960	3	54.0	500
Above 1000	3	74.0 dBμV/m (Peak) 54.0 dBμV/m (Average)	

Remark：(1) dBμV/m = 20 log (μV/m)
(2) The tighter limit applies to the edge between two frequency bands.
(3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
(4) Fundamental and emission fall within operation band are exempted from this section.
(5) Pursuant to ANSI C63.10: 6.6.4.3, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

6.3. Test Procedure

Frequency Range 9kHz~30MHz:

The EUT setup on the turn table which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level.
In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

(1) RBW = 9kHz with peak and average detector.
(2) Detector: average and peak (10kHz-490kHz)
Q.P. (490kHz-30MHz)

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Frequency Range 30MHz ~ 1000MHz:
The EUT setup on the turn table which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna varied from 1 m to 4 m to find the maximum emission level. Both horizontal and vertical polarization are required. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 regulation.

Spectrum Analyzer is used for pre-testing with following setting:
(1) RBW = 120KHz
(2) VBW ≥ 3 x RBW.
(3) Detector = Peak.
(4) Sweep time = auto.
(5) Trace mode = max hold.
(6) Allow sweeps to continue until the trace stabilizes.
(7) When peak-detected value is lower than limit that the measurement using the Q.P. detector is not required. Otherwise using Q.P. for finally measurement.

6.4. Measurement Limit Formula

Frequency (MHz)	Formula
0.009 - 0.490MHz	3 Limit (dBμV/m) = 20log(2400/F^{Note})+ 40log(300m/3m)
0.490 - 1.705MHz	3 Limit (dBμV/m) = 20log(24000/F^{Note})+ 40log(300m/3m)
1.750- 30MHz	3 Limit (dBμV/m) = 20log(30)+ 40log(300m/3m)
Note: F is test frequency	

6.5. Test Results

Please refer to Appendix A.

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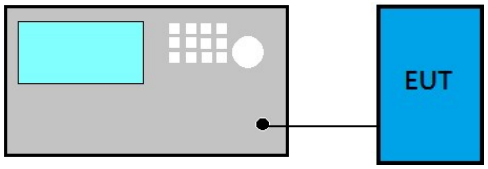
7. 20dB BANDWIDTH

7.1. Block Diagram of Test Setup



7.2. Specification Limits

The 20dB bandwidth shall be specified in operating frequency band.

7.3. Test Procedure

Following measurement procedure:

(1) Set RBW close to1% of OBW.
(2) Set the video bandwidth (VBW) ≥ 3 × RBW.
(3) Detector = Peak.
(4) Trace mode = max hold.
(5) Sweep = auto couple.
(6) Allow the trace to stabilize.
(7) Setting channel bandwidth function x dB to -20 dB to record the final bandwidth.

7.4. Test Results

Please refer to Appendix A

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8. DEVIATION TO TEST SPECIFICATIONS

【NONE】

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APPDNDIX A

TEST DATA AND PLOTS

(Model: (1)HLW-TNMP7 (2)HLW-TNMP7A
(3)HLW-TNMP7B (4)HLW-TNMP7C
(5)HLW-TNMP7*)

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A.1 CONDUCTED EMISSION

Test Date	2018/09/19	Temp./Hum.	26℃/64%
Test Voltage	AC 120V/60Hz (Via 5V Adapter)		
Test Mode	5W		

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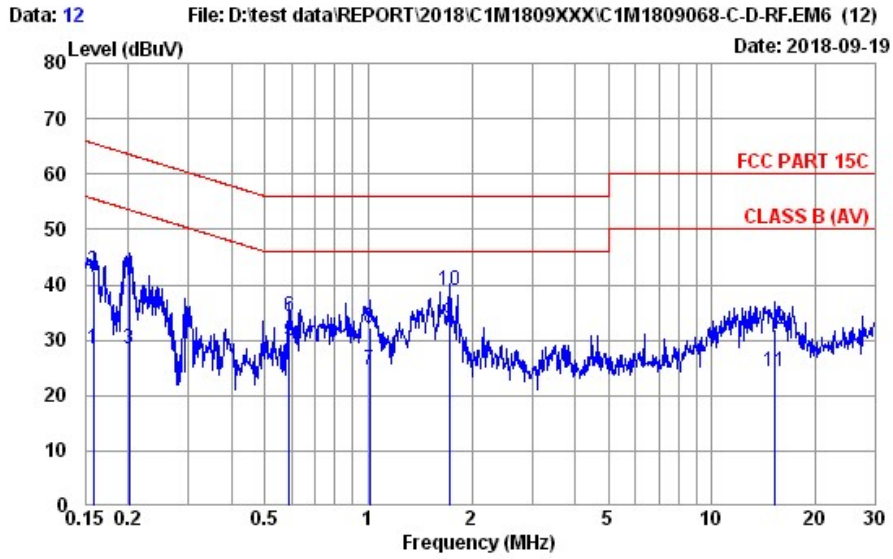

Site no. : No.8 Shielded Room
Condition : ENV4200 100169
Limit : FCC PART 15C
Env. / Ins. : 26°C /64% ESR3(1774)
EUT : HLW-TNMP7
Power Rating : 120Vac/60Hz
Test Mode : OPERATING
5W

Data no. : 12
LISN Phase : NEUTRAL

Engineer : Nick Du

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBµV)	Emission Level (dBµV)	Limits (dBµV)	Margin (dB)	Remark
1	0.158	10.56	0.03	9.98	7.87	28.44	55.56	27.12	Average
2	0.158	10.56	0.03	9.98	21.80	42.37	65.56	23.19	QP
3	0.202	10.52	0.03	9.98	7.86	28.39	53.54	25.15	Average
4	0.202	10.52	0.03	9.98	21.06	41.59	63.54	21.95	QP
5	0.589	10.43	0.05	9.98	9.48	29.94	46.00	16.06	Average
6	0.589	10.43	0.05	9.98	13.90	34.36	56.00	21.64	QP
7	1.010	10.42	0.06	9.99	4.24	24.71	46.00	21.29	Average
8	1.010	10.42	0.06	9.99	11.89	32.36	56.00	23.64	QP
9	1.716	10.45	0.07	9.99	12.71	33.22	46.00	12.78	Average
10	1.716	10.45	0.07	9.99	18.40	38.91	56.00	17.09	QP
11	15.226	12.64	0.23	10.05	1.49	24.41	50.00	25.59	Average
12	15.226	12.64	0.23	10.05	8.96	31.88	60.00	28.12	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
2. If the average limit is met when useing a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

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Test Date	2018/09/19	Temp./Hum.	26℃/64%
Test Voltage	AC 120V/60Hz (Via 5V Adapter)		
Test Mode	5W		

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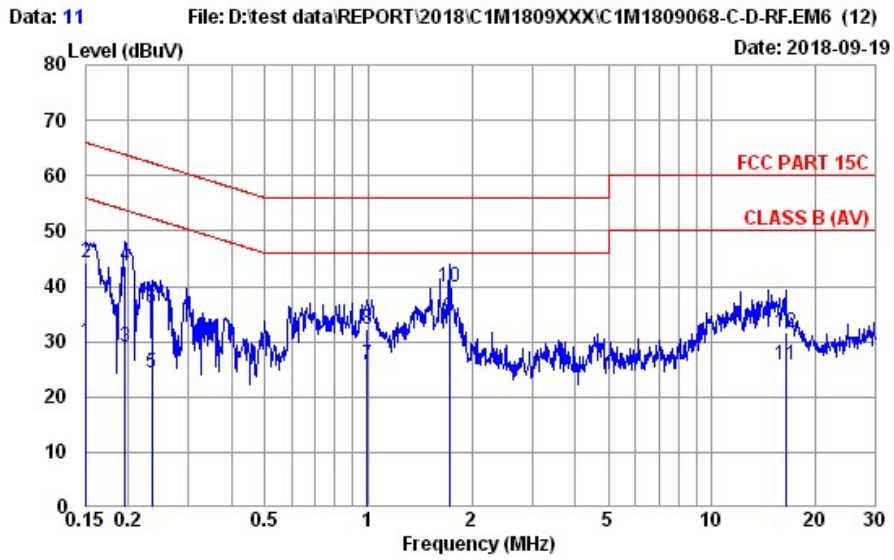

Site no. : No.8 Shielded Room Data no. : 11
Condition : ENV4200 100169 LISN Phase : LINE
Limit : FCC PART 15C
Env. / Ins. : 26°C / 64% ESR3(1774) Engineer : Nick Du
EUT : HLW-TNMP7
Power Rating : 120Vac/60Hz
Test Mode : OPERATING
5W

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBµV)	Emission Level (dBµV)	Limits (dBµV)	Margin (dB)	Remark
1	0.151	10.63	0.03	9.98	9.11	29.75	55.96	26.21	Average
2	0.151	10.63	0.03	9.98	23.54	44.18	65.96	21.78	QP
3	0.195	10.57	0.03	9.98	8.44	29.02	53.80	24.78	Average
4	0.195	10.57	0.03	9.98	22.99	43.57	63.80	20.23	QP
5	0.234	10.53	0.03	9.98	3.75	24.29	52.30	28.01	Average
6	0.234	10.53	0.03	9.98	15.36	35.90	62.30	26.40	QP
7	0.994	10.44	0.06	9.99	5.32	25.81	46.00	20.19	Average
8	0.994	10.44	0.06	9.99	11.76	32.25	56.00	23.75	QP
9	1.716	10.46	0.07	9.99	13.70	34.22	46.00	11.78	Average
10	1.716	10.46	0.07	9.99	19.45	39.97	56.00	16.03	QP
11	16.398	12.91	0.24	10.06	2.71	25.92	50.00	24.08	Average
12	16.398	12.91	0.24	10.06	8.47	31.68	60.00	28.32	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
2. If the average limit is met when useing a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

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Test Date	2018/09/19	Temp./Hum.	26℃/64%
Test Voltage	AC 120V/60Hz (Via 9V Adapter)		
Test Mode	10W		

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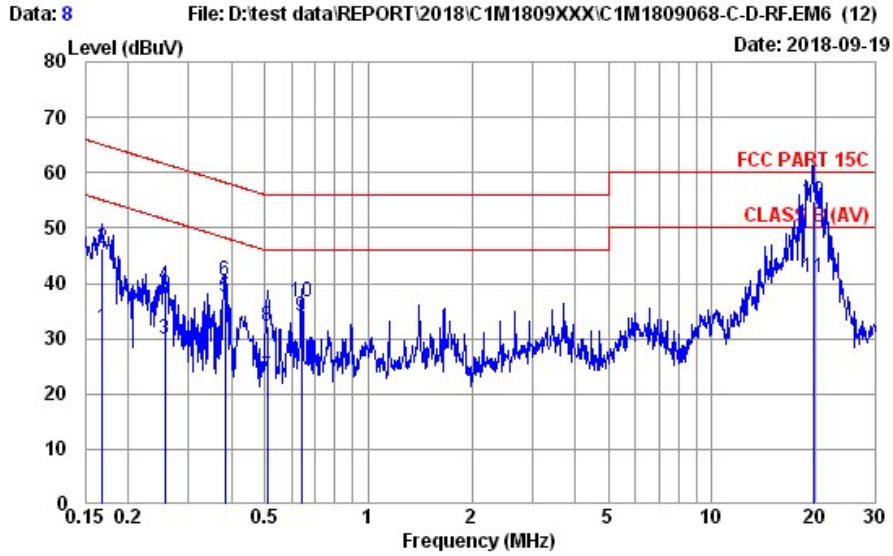

Site no. : No.8 Shielded Room
Condition : ENV4200 100169
Limit : FCC PART 15C
Env. / Ins. : 26°C /64% ESR3(1774)
EUT : HLW-TNMP7
Power Rating : 120Vac/60Hz
Test Mode : OPERATING
10W

Data no. : 8
LISN Phase : NEUTRAL

Engineer : Nick Du

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBµV)	Emission Level (dBµV)	Limits (dBµV)	Margin (dB)	Remark
1	0.169	10.55	0.03	9.98	11.48	32.04	55.03	22.99	Average
2	0.169	10.55	0.03	9.98	25.75	46.31	65.03	18.72	QP
3	0.256	10.49	0.03	9.98	9.53	30.03	51.56	21.53	Average
4	0.256	10.49	0.03	9.98	19.08	39.58	61.56	21.98	QP
5	0.383	10.44	0.04	9.98	17.15	37.61	48.21	10.60	Average
6	0.383	10.44	0.04	9.98	19.84	40.30	58.21	17.91	QP
7	0.507	10.43	0.05	9.98	2.76	23.22	46.00	22.78	Average
8	0.507	10.43	0.05	9.98	11.83	32.29	56.00	23.71	QP
9	0.637	10.42	0.05	9.98	13.68	34.13	46.00	11.87	Average
10	0.637	10.42	0.05	9.98	16.09	36.54	56.00	19.46	QP
11	19.740	13.47	0.27	10.07	17.29	41.10	50.00	8.90	Average
12	19.740	13.47	0.27	10.07	30.87	54.68	60.00	5.32	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
2. If the average limit is met when useing a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

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Test Date	2018/09/19	Temp./Hum.	26℃/64%
Test Voltage	AC 120V/60Hz (Via 9V Adapter)		
Test Mode	10W		

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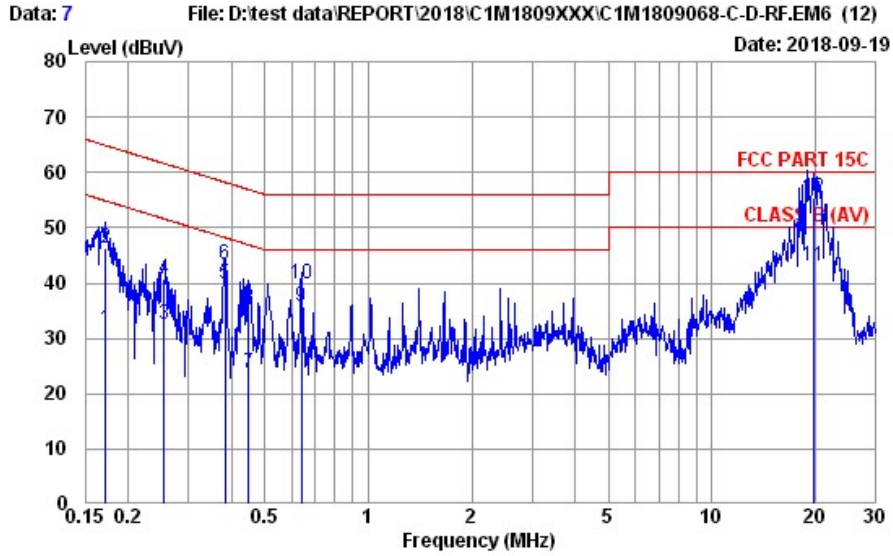


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Site no.      : No.8 Shielded Room          Data no.   : 7
Condition     : ENV4200 100169              LISN Phase : LINE
Limit         : FCC PART 15C
Env. / Ins.   : 26°C / 64% ESR3(1774)       Engineer   : Nick Du
EUT           : HLW-TNMP7
Power Rating  : 120Vac/60Hz
Test Mode     : OPERATING
                10W
```

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBµV)	Emission Level (dBµV)	Limits (dBµV)	Margin (dB)	Remark
1	0.172	10.60	0.03	9.98	11.07	31.68	54.86	23.18	Average
2	0.172	10.60	0.03	9.98	25.69	46.30	64.86	18.56	QP
3	0.255	10.52	0.03	9.98	11.90	32.43	51.60	19.17	Average
4	0.255	10.52	0.03	9.98	20.21	40.74	61.60	20.86	QP
5	0.383	10.46	0.04	9.98	19.25	39.73	48.21	8.48	Average
6	0.383	10.46	0.04	9.98	22.90	43.38	58.21	14.83	QP
7	0.449	10.45	0.04	9.98	3.20	23.67	46.89	23.22	Average
8	0.449	10.45	0.04	9.98	14.93	35.40	56.89	21.49	QP
9	0.637	10.44	0.05	9.98	15.28	35.75	46.00	10.25	Average
10	0.637	10.44	0.05	9.98	19.49	39.96	56.00	16.04	QP
11	19.845	13.53	0.27	10.07	19.14	43.01	50.00	6.99	Average
12	19.845	13.53	0.27	10.07	31.61	55.48	60.00	4.52	QP

```
Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
         2. If the average limit is met when useing a quasi-peak detector,
            the EUT shall be deemed to meet both limits and measurement
            with average detector is unnecessary.
```

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Test Date	2018/09/19	Temp./Hum.	26℃/64%
Test Voltage	AC 120V/60Hz (Via 12V Adapter)		
Test Mode	15W		

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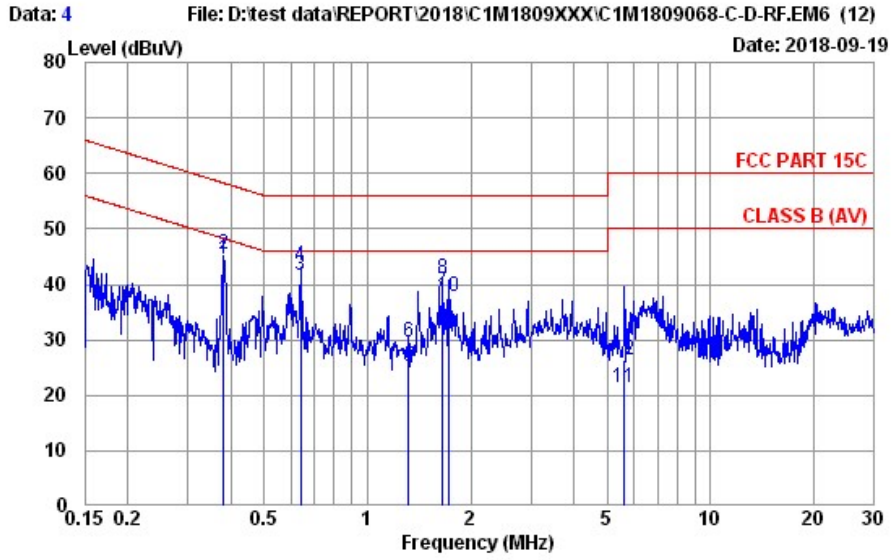

Site no. : No.8 Shielded Room Data no. : 4
Condition : ENV4200 100169 LISN Phase : NEUTRAL
Limit : FCC PART 15C
Env. / Ins. : 26°C /64% ESR3(1774) Engineer : Nick Du
EUT : HLW-TNMP7
Power Rating : 120Vac/60Hz
Test Mode : OPERATING
15W

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Emission Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.381	10.44	0.04	9.98	23.94	44.40	48.25	3.85	Average
2	0.381	10.44	0.04	9.98	24.93	45.39	58.25	12.86	QP
3	0.637	10.42	0.05	9.98	21.21	41.66	46.00	4.34	Average
4	0.637	10.42	0.05	9.98	22.87	43.32	56.00	12.68	QP
5	1.317	10.44	0.06	9.99	4.66	25.15	46.00	20.85	Average
6	1.317	10.44	0.06	9.99	9.23	29.72	56.00	26.28	QP
7	1.654	10.45	0.07	9.99	18.29	38.80	46.00	7.20	Average
8	1.654	10.45	0.07	9.99	20.41	40.92	56.00	15.08	QP
9	1.716	10.45	0.07	9.99	10.28	30.79	46.00	15.21	Average
10	1.716	10.45	0.07	9.99	17.16	37.67	56.00	18.33	QP
11	5.594	10.85	0.13	10.01	0.46	21.45	50.00	28.55	Average
12	5.594	10.85	0.13	10.01	5.37	26.36	60.00	33.64	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
2. If the average limit is met when useing a quasi-peak detector,
the EUT shall be deemed to meet both limits and measurement
with average detector is unnecessary.

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Test Date	2018/09/19	Temp./Hum.	26℃/64%
Test Voltage	AC 120V/60Hz (Via 12V Adapter)		
Test Mode	15W		

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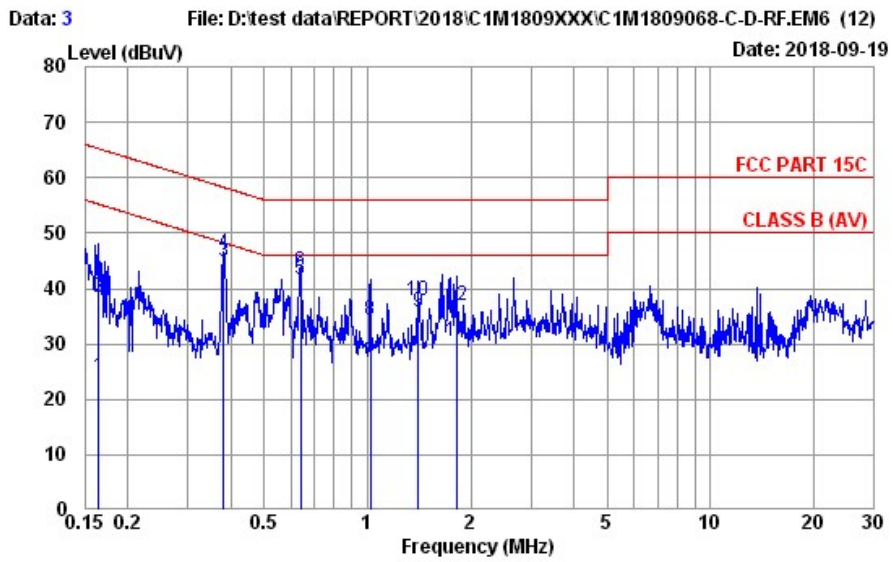

Site no. : No.8 Shielded Room Data no. : 3
Condition : ENV4200 100169 LISN Phase : LINE
Limit : FCC PART 15C
Env. / Ins. : 26°C / 64% ESR3(1774) Engineer : Nick Du
EUT : HLW-TNMP7
Power Rating : 120Vac/60Hz
Test Mode : OPERATING
15W

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBµV)	Emission Level (dBµV)	Limits (dBµV)	Margin (dB)	Remark
1	0.165	10.61	0.03	9.98	3.48	24.10	55.21	31.11	Average
2	0.165	10.61	0.03	9.98	17.79	38.41	65.21	26.80	QP
3	0.381	10.46	0.04	9.98	24.46	44.94	48.25	3.31	Average
4	0.381	10.46	0.04	9.98	25.70	46.18	58.25	12.07	QP
5	0.637	10.44	0.05	9.98	21.15	41.62	46.00	4.38	Average
6	0.637	10.44	0.05	9.98	22.68	43.15	56.00	12.85	QP
7	1.021	10.44	0.06	9.99	6.05	26.54	46.00	19.46	Average
8	1.021	10.44	0.06	9.99	13.92	34.41	56.00	21.59	QP
9	1.403	10.45	0.06	9.99	15.30	35.80	46.00	10.20	Average
10	1.403	10.45	0.06	9.99	17.16	37.66	56.00	18.34	QP
11	1.819	10.47	0.07	9.99	10.03	30.56	46.00	15.44	Average
12	1.819	10.47	0.07	9.99	16.49	37.02	56.00	18.98	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
2. If the average limit is met when useing a quasi-peak detector,
the EUT shall be deemed to meet both limits and measurement
with average detector is unnecessary.

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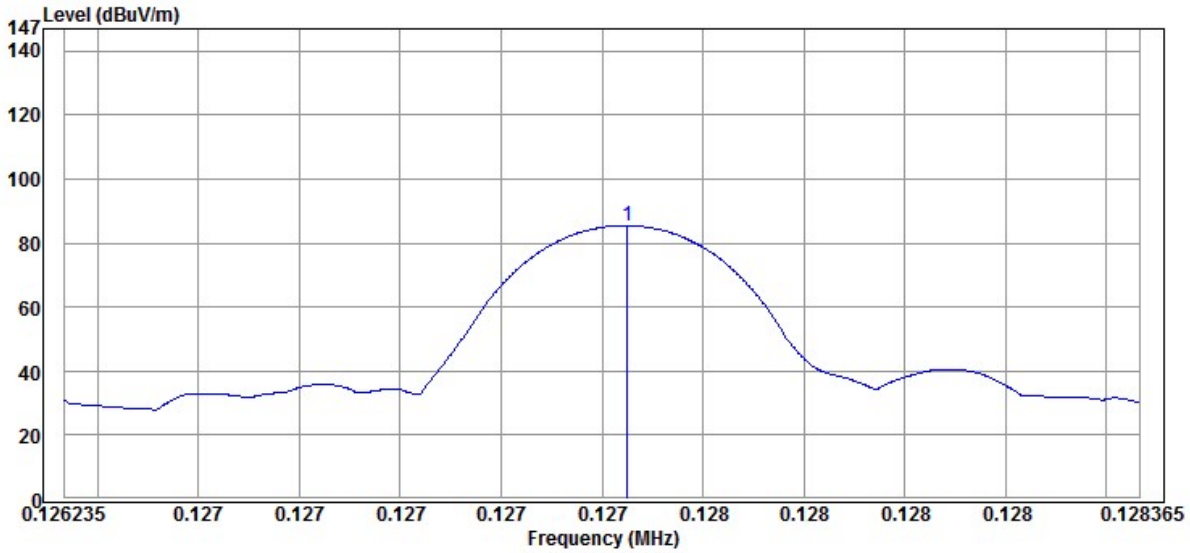
A.2 RADIATED SPURIOUS EMISSION

Test Date	2018/09/20	Temp./Hum.	25℃/48%
Test Voltage	AC 120V/60Hz (Via 5V Adapter)		
Test Mode	5W		
Test Frequency	TX 127.3kHz		

A.2.1. Frequency 9kHz~30MHz

Antenna at 0 Degree



Emission Frequency (kHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
127.300	18.88	0.10	66.96	85.94	105.51	19.57	Peak
381.900	18.76	0.10	40.43	59.19	95.97	36.78	Peak

Antenna at 90 Degree

Emission Frequency (kHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
127.300	18.88	0.10	64.27	83.25	105.51	22.26	Peak
381.900	18.75	0.10	37.15	55.90	95.97	40.07	Peak

Note: 1. All emissions are lower than the ambient level cannot be measured.
2. The Peak value has been compliance with Average limit, thus measurementwithAverage is not needed.
3. We only presented the measurement plot of the worst degree for fundamental frequency.

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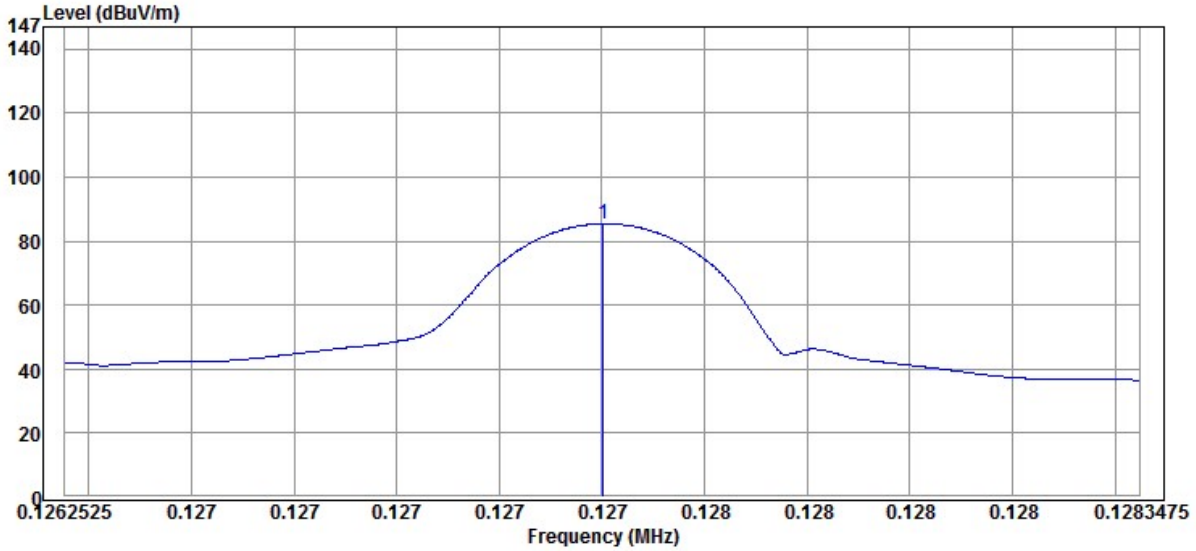
Test Date	2018/09/20	Temp./Hum.	25℃/48%
Test Voltage	AC 120V/60Hz (Via 9V Adapter)		
Test Mode	10W		
Test Frequency	TX 127.3kHz		

Antenna at 0 Degree



Emission Frequency (kHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
127.300	18.88	0.10	67.14	86.12	105.51	19.39	Peak
381.900	18.75	0.10	42.28	61.13	95.97	34.84	Peak
636.500	18.77	0.1273	33.06	51.96	71.53	19.57	Peak
891.100	18.87	0.1273	26.49	45.49	68.61	23.12	Peak

Antenna at 90 Degree

Emission Frequency (kHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
127.300	18.88	0.10	64.41	83.39	105.51	22.12	Peak
381.900	18.75	0.10	39.78	58.63	95.97	37.34	Peak

Note: 1. All emissions are lower than the ambient level cannot be measured.
2. The Peak value has been compliance with Average limit, thus measurementwithAverage is not needed.
3. We only presented the measurement plot of the worst degree for fundamental frequency.

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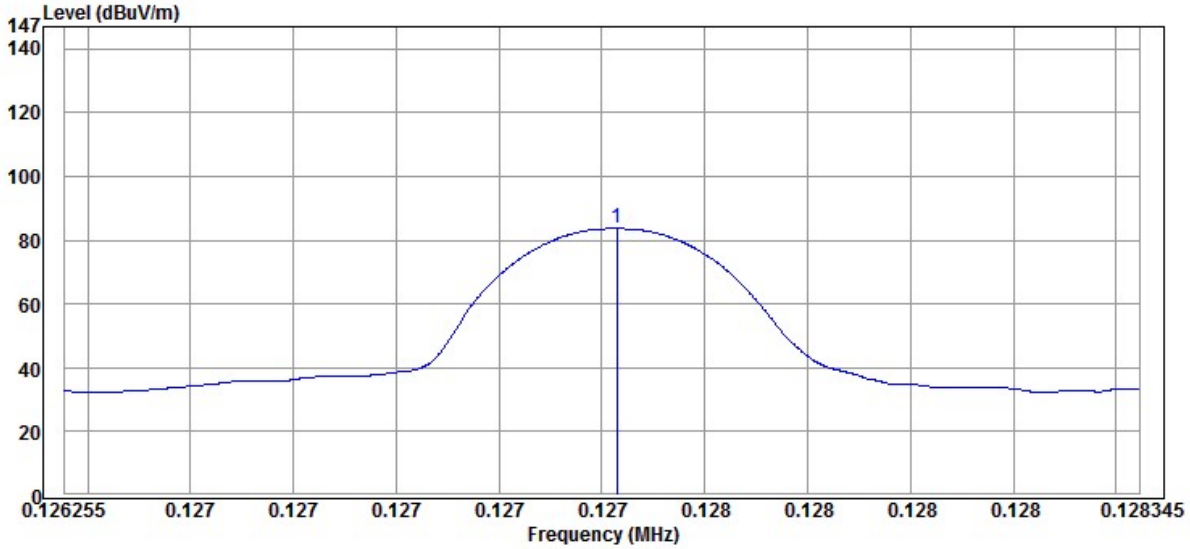
Test Date	2018/09/20	Temp./Hum.	25℃/48%
Test Voltage	AC 120V/60Hz (Via 12V Adapter)		
Test Mode	15W		
Test Frequency	TX 127.3kHz		

Antenna at 0 Degree



Emission Frequency (kHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
127.300	18.88	0.10	67.00	85.88	105.51	19.63	Peak
381.900	18.75	0.10	39.11	57.86	95.97	38.11	Peak
636.500	18.77	0.10	33.38	52.15	71.53	19.38	Peak
891.100	18.87	0.10	30.46	49.33	68.61	19.28	Peak

Antenna at 90 Degree

Emission Frequency (kHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
127.300	18.88	0.10	63.05	81.93	105.51	23.58	Peak
381.900	18.75	0.10	32.90	51.65	95.97	44.32	Peak

Note: 1. All emissions are lower than the ambient level cannot be measured.
2. The Peak value has been compliance with Average limit, thus measurementwithAverage is not needed.
3. We only presented the measurement plot of the worst degree for fundamental frequency.

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Test Date	2018/09/20	Temp./Hum.	25℃/48%
Test Voltage	AC 120V/60Hz (Via 5V Adapter)		
Test Mode	5W		
Test Frequency	TX 127.3kHz		

A.2.2. Frequency 30MHz ~ 1000MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
30.97	24.56	0.45	2.72	27.73	40.00	12.27	Peak
113.42	18.32	0.90	7.39	26.61	43.50	16.89	Peak
210.42	16.58	1.29	13.91	31.78	43.50	11.72	Peak
240.49	18.54	1.40	17.89	37.83	46.00	8.17	Peak
271.53	19.38	1.48	11.03	31.89	46.00	14.11	Peak
949.56	27.60	3.14	1.91	32.65	46.00	13.35	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
37.76	20.87	0.50	15.78	37.15	40.00	2.85	Peak
50.37	14.61	0.58	16.47	31.66	40.00	8.34	Peak
87.23	14.96	0.77	16.54	32.27	40.00	7.73	Peak
112.45	18.26	0.90	13.55	32.71	43.50	10.79	Peak
234.67	18.18	1.38	11.26	30.82	46.00	15.18	Peak
953.44	27.63	3.15	3.02	33.80	46.00	12.20	Peak

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Test Date	2018/09/20	Temp./Hum.	25℃/48%
Test Voltage	AC 120V/60Hz (Via 9V Adapter)		
Test Mode	10W		
Test Frequency	TX 127.3kHz		

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
45.52	16.64	0.55	10.94	28.13	40.00	11.87	Peak
68.80	12.64	0.68	15.96	29.28	40.00	10.72	Peak
111.48	18.17	0.89	10.43	29.49	43.50	14.01	Peak
254.07	19.16	1.44	17.61	38.21	46.00	7.79	Peak
276.38	19.44	1.50	14.09	35.03	46.00	10.97	QP
336.52	20.81	1.66	11.76	34.23	46.00	11.77	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
30.00	25.12	0.44	10.10	35.66	40.00	4.34	QP
86.26	14.79	0.77	21.56	37.12	40.00	2.88	Peak
114.39	18.41	0.91	18.90	38.22	43.50	5.28	Peak
141.55	17.83	1.01	14.82	33.66	43.50	9.84	Peak
276.38	19.44	1.50	15.20	36.14	46.00	9.86	Peak
714.82	25.80	2.59	8.02	36.41	46.00	9.59	Peak

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Test Date	2018/09/20	Temp./Hum.	25℃/48%
Test Voltage	AC 120V/60Hz (Via 12V Adapter)		
Test Mode	15W		
Test Frequency	TX 127.3kHz		

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
30.97	24.56	0.45	11.03	36.04	40.00	3.96	Peak
49.40	14.98	0.58	15.17	30.73	40.00	9.27	Peak
141.55	17.83	1.01	13.09	31.93	43.50	11.57	Peak
232.73	18.03	1.37	17.94	37.34	46.00	8.66	Peak
291.90	19.63	1.53	19.71	40.87	46.00	5.13	Peak
958.29	27.68	3.16	1.91	32.75	46.00	13.25	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
30.00	25.12	0.44	8.90	34.46	40.00	5.54	QP
49.40	14.98	0.58	18.11	33.67	40.00	6.33	Peak
74.62	13.09	0.71	19.18	32.98	40.00	7.02	Peak
110.51	18.12	0.89	15.05	34.06	43.50	9.44	Peak
289.96	19.60	1.53	9.55	30.68	46.00	15.32	Peak
963.14	27.70	3.18	2.77	33.65	54.00	20.35	Peak

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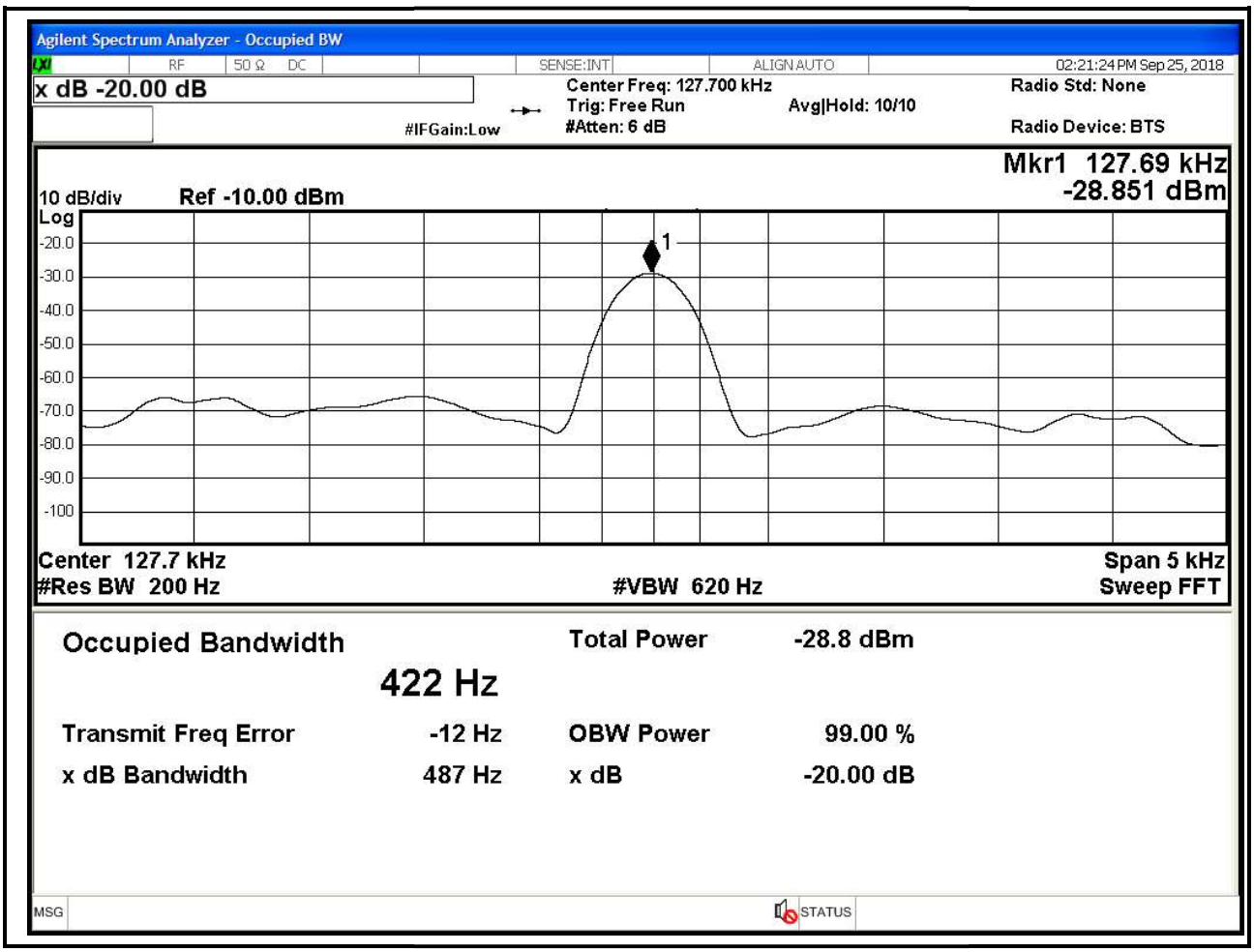
A.3 20dB BANDWIDTH

Test Date	2018/09/25	Temp./Hum.	20℃/50%
Cable Loss	N/A	Test Mode	5W
Test Voltage	AC 120V/60Hz (Via 5V Adapter)		

A.3.1 20dB Bandwidth Result

Centre Frequency (kHz)	20dB Occupied Bandwidth (Hz)	99% Occupied Bandwidth (Hz)
127.7	551	436

A.3.2 Measurement Plots



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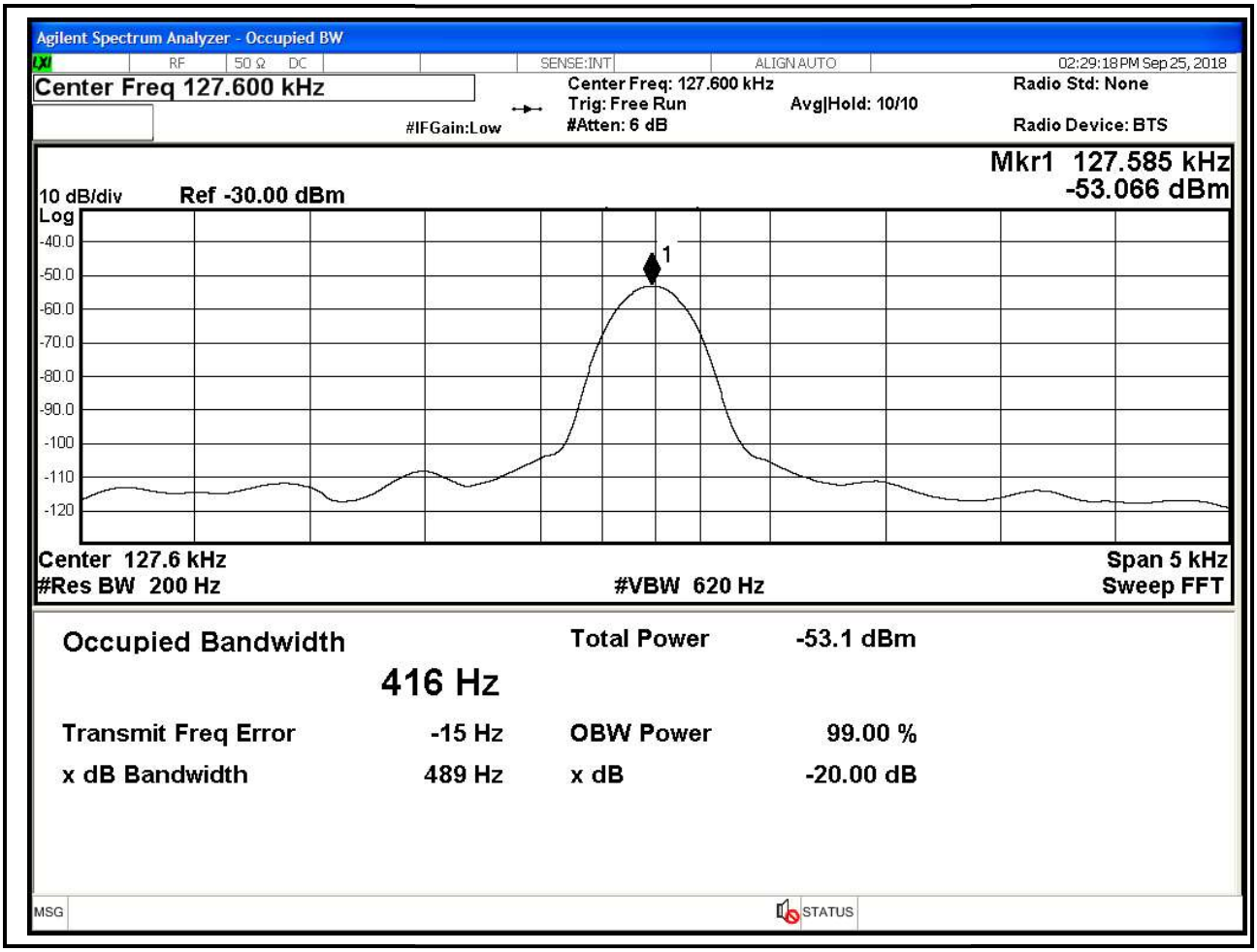
Test Date	2018/09/25	Temp./Hum.	20℃/50%
Cable Loss	N/A	Test Mode	10W
Test Voltage	AC 120V/60Hz (Via 9V Adapter)		

A.3.3 20dB Bandwidth Result

Centre Frequency (kHz)	20dB Occupied Bandwidth (Hz)	99% Occupied Bandwidth (Hz)
127.6	549	419

A.3.4Measurement Plots



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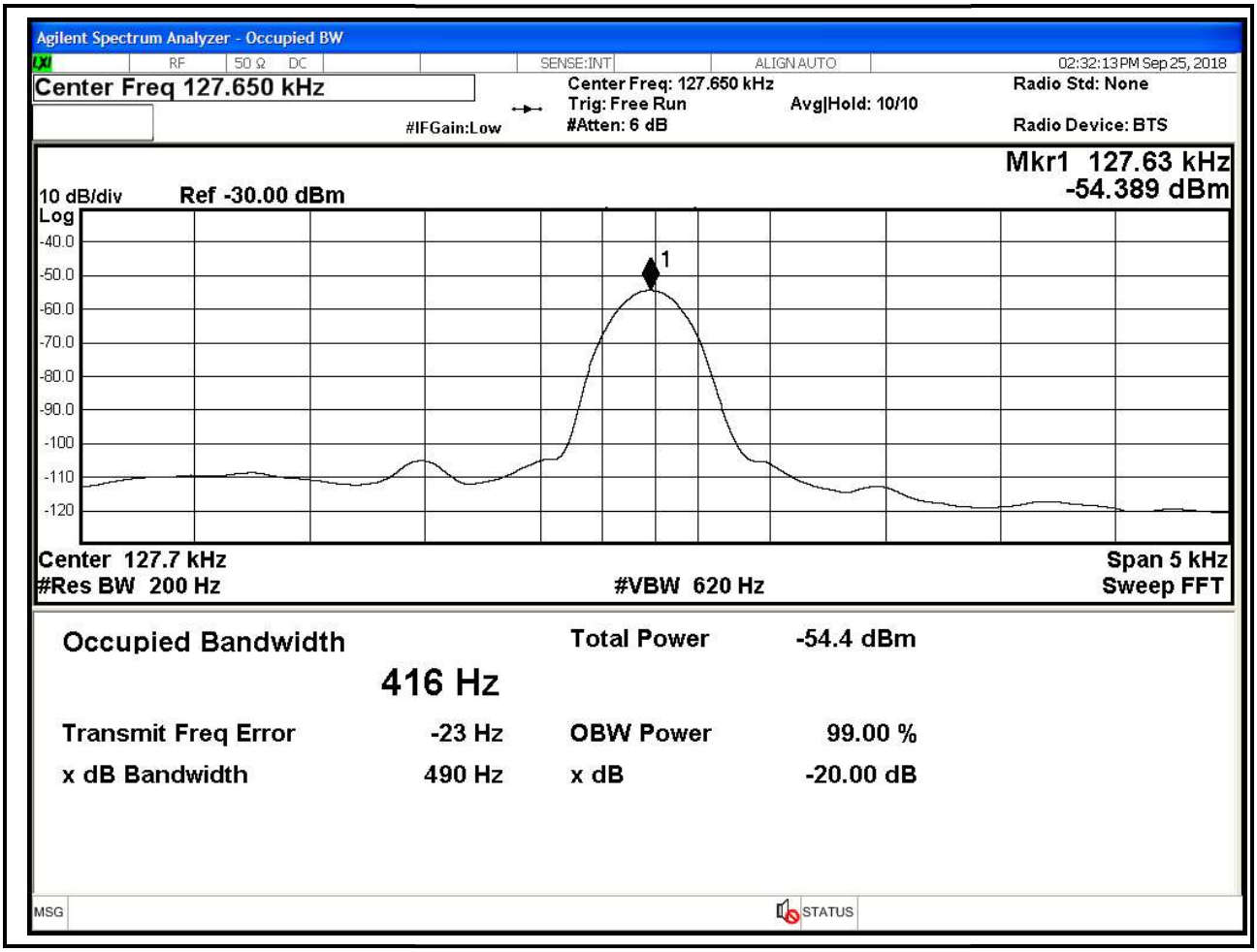
Test Date	2018/09/25	Temp./Hum.	20℃/50%
Cable Loss	N/A	Test Mode	15W
Test Voltage	AC 120V/60Hz (Via 12V Adapter)		

A.3.5 20dB Bandwidth Result

Centre Frequency (kHz)	20dB Occupied Bandwidth (Hz)	99% Occupied Bandwidth (Hz)
127.7	547	418

A.3.6Measurement Plots



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APPDNDIX B

TEST PHOTOGRAPHS

(Model: (1)HLW-TNMP7 (2)HLW-TNMP7A
(3)HLW-TNMP7B (4)HLW-TNMP7C
(5)HLW-TNMP7*)