

Produkte
Products

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<i>Test Report No.:</i>			
Auftraggeber: <i>Client:</i>	Max Co., Ltd. 1848 Kawai, Tamamura-machi, Sawa-gun, Gunma 370-1117, JAPAN		
Gegenstand der Prüfung: <i>Test Item:</i>	Sign and Label Printer		
Bezeichnung: <i>Identification:</i>	CPM-100HG5U	Serien-Nr.: <i>Serial No.:</i>	V50.01
Wareneingangs-Nr.: <i>Receipt No.:</i>	A000743624	Eingangsdatum: <i>Date of Receipt:</i>	2018-05-21
Zustand des Prüfgegenstandes bei Anlieferung: Good <i>Condition of Test Item at Delivery:</i>			
Prüfört: <i>Testing Location:</i>	TÜV Rheinland Japan Ltd. – Global Technology Assessment Center 4-25-2 Kita-Yamata, Tsuzuki-ku, Yokohama 224-0021, Japan		
Prüfgrundlage: <i>Test Specification:</i>	FCC 47 CFR Part 15, Subpart C, Section 15.225 RSS-210 (Issue 9): 2016 RSS-Gen (Issue 4): 2014 ANSI C63.10-2013		
Prüfergebnis: Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n). <i>Test Result:</i> <i>The test item passed the test specification(s).</i>			
Prüflaboratorium: <i>Testing Laboratory:</i>	TÜV Rheinland Japan Ltd. – Global Technology Assessment Center 4-25-2 Kita-Yamata, Tsuzuki-ku, Yokohama 224-0021, Japan		
geprüft/ tested by:		kontrolliert/ reviewed by:	
			
2018-07-30	Quek Liang Wee / Inspector	2018-07-30	Pin Zhang / Reviewer
Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>
Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>
Sonstiges / Other Aspects:			
Abkürzungen: P(ass) = entspricht Prüfgrundlage F(ail) = entspricht nicht Prüfgrundlage N/A = nicht anwendbar N/T = nicht getestet Abbreviations: P(ass) = passed F(ail) = failed N/A = not applicable N/T = not tested			
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.</i>			

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TEST SUMMARY

5.1.1 ANTENNA REQUIREMENTS

RESULT: PASS

5.1.2 RESTRICTED BANDS OF OPERATION

RESULT: PASS

5.2.1 20dB BANDWIDTH

RESULT: PASS

5.2.2 99% BANDWIDTH

5.2.3 FREQUENCY STABILITY

RESULT: Pass

5.2.4 FIELD STRENGTH OF FUNDAMENTAL

RESULT: Pass

5.2.5 RADIATED SPURIOUS EMISSIONS OF TRANSMITTER

RESULT: PASS

5.3.1 AC POWER LINE CONDUCTED EMISSION OF TRANSMITTER

RESULT: PASS

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1. General Remarks

1.1 Complementary Materials

There is no attachment to this test report.

2. Test Sites

2.1 Test Facilities

TÜV Rheinland Japan Ltd. – Global Technology Assessment Center
4-25-2 Kita-Yamata, Tsuzuki-ku, Yokohama 224-0021, Japan

The used test equipment is in accordance with CISPR 16 for measurement of radio interference.

Innovation, Science and Economic Development Canada has reviewed the technical characteristics of the radiated and conducted emission facilities and has found these test sites to be in compliance with Canadian requirements. The description of the test facility is listed under OATS filing number 3466B-1.

The test facility is accredited by VLAC (member of ILAC) under number VLAC-017 according to ISO/IEC 17025:2005.



TÜV Rheinland Japan Ltd. is accredited by the Federal Communications Commission as a Conformity Assessment Body under Designation Number JP0017 and Test Firm Registration Number 386498.

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Kind of Equipment	Manufacturer	Model Name	Serial Number	Equip. ID	Cal. Interval	Cal. Date	Next Cal.
For Power Port Conducted Emission (CE)							
Conducted Emission Measurement Software	Toyo Corporation	EP5/CE	Ver. 5.0.20	RF-0025	1 year	2018-03-30	2019-03-30
Receiver	Rohde & Schwarz	ESU 40	100029	RF-0021	1 year	2017-07-30	2018-07-30
LISN	Rohde & Schwarz	ENV216	100276	RF-0016	1 year	2018-05-24	2019-05-24
LISN	Rohde & Schwarz	ENV216	101958	RF-0708	1 year	2018-05-24	2019-05-24
For Radiated Emission (RE)							
Radiated Emission Measurement Soft-ware (below 30MHz)	Toyo Corporation	EP5/ME	Ver. 5.0.10	RF-0172	1 year	2018-03-30	2019-03-30
Radiated Emission Measurement Soft-ware (above 30MHz)	Toyo Corporation	EP7/RE	Ver. 5.0.2	RF-0026	1 year	2018-03-30	2019-03-30
Receiver	Rohde & Schwarz	ESU 8	100025	RF-0020	1 year	2018-04-23	2019-04-23
Receiver	Rohde & Schwarz	ESU 40	100029	RF-0021	1 year	2017-07-30	2018-07-30
RF Selector (10m Chamber)	Toyo Corporation	NS4900	0703-182	RF-0029	1 year	2018-03-30	2019-03-30
Loop Antenna with Amplifier, 9kHz-30MHz	Rohde & Schwarz	HFH2-Z2	100139	RF-0048	1 year	2018-05-18	2019-05-18
Trilog Antenna No. 2, 30-1000MHz	Schwarzbeck	VULB 9168	9168-475	RF-0462	1 year	2018-04-24	2019-04-24
5dB Attenuator	Pasternack	PE7047-5	-	RF-0731	1 year	2018-01-16	2019-01-16
Biconical Antenna, 30-300MHz	Schwarzbeck	BBA9106-VHBB912	00235-00963	RF-0784	1 year	2017-07-19	2018-07-19
5dB Attenuator	Pasternack	PE7047-5	-	RF-0732	1 year	2018-01-16	2019-01-16
Low Noise Preamplifier, 9kHz-1GHz	TSJ	MLA-10K01-B01-35	1370750	RF-0253	1 year	2018-01-18	2019-01-18
Low Pass Filter, DC-1GHz	R&K	LP1000CH 3	12104001	RF-0515	1 year	2018-01-16	2019-01-16
Temperature Chamber	Voetsch	VT-4018	58566025 090010	BT-8012	1 year	2017-07-21	2018-07-21
Constant Voltage Constant Frequency Stabilizers and Power Accessories							
CVCF (Shielded Room)	NF Corporation	ES2000S	9075612	RF-0210	1 year	2018-03-19	2019-03-19
CVCF Booster (Shielded Room)	NF Corporation	ES2000B	9074403	RF-0211	1 year	2018-03-19	2019-03-19

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Kind of Equipment	Manufacturer	Model Name	Serial Number	Equip. ID	Cal. Interval	Cal. Date	Next Cal.
CVCF (10m Chamber)	NF Corporation	ES2000U	9067307	RF-0212	1 year	2018-03-19	2019-03-19
CVCF Booster (10m Chamber)	NF Corporation	ES2000B	9074408	RF-0213	1 year	2018-03-19	2019-03-19
AC Power Supply	EXTECH Electronics	6205	1140726	E-7024	1 year	2017-10-20	2018-10-20
True RMS Multimeter	Fluke	87V	16110176	RF-0414	1 year	2018-06-27	2019-06-27

Conformance of the used measurement and test equipment with the requirements of ISO/IEC 17025:2005 has been confirmed before testing.

2.3 Measurement Uncertainty

Table 2: Emission Measurement Uncertainty

Measurement Type	Frequency	Uncertainty
AC Power Line Conducted Emission	150kHz - 30MHz	±2.0dB
Antenna Port Conducted Emission	20Hz - 40GHz	±1.5dB
Radiated Emission	150kHz - 30MHz	±4.7dB
	30MHz - 1GHz	±4.8dB
	> 1GHz	±3.8dB

3. General Product Information

3.1 Product Function and Intended Use

The EUT (Equipment Under Test) is a sign and label printer that prints on paper rolls and cuts the paper into desired shape. The paper is cut off by a separate cutter once printing or cutting is completed. An RFID interrogator is embedded inside the main body and each ink ribbon is attached with a tag. Information regarding the ink ribbon (e.g. ink color, remaining length of ink ribbon) is communicated to the main body through RFID interface.

3.2 System Details

Radio standard:	ISO 15693
Electric Field Strength:	-1.4dB μ V/m@30m
Antenna gain:	-60.9dBi
Antenna type:	Pattern antenna (printed on PCB)
Antenna mounting type:	Internal
Operation frequency:	13.56MHz
Number of channels:	1
Modulation type:	FSK 100%
FCC classification:	DXC – Part 15 Low Power Communication Device Transmitter
ISED classification:	RFID Device
Emission designator:	098HF1D
Rated voltage:	AC 100 – 240V
Rated frequency:	50/60Hz
Rated current:	1A
Protection class:	I
Test voltage:	AC 120V
Test frequency:	60Hz

3.3 Clock Frequencies

The highest frequency generated or used by the EUT is 256MHz for the digital interface.

3.4 Noise Suppressing Parts

Refer to schematics.

4. Test Set-up and Operation Modes

4.1 Test Methodology

The test methodology used is based on the requirements of 47 CFR Part 15, Sections 15.31, 15.33, 15.35, 15.205, 15.207, 15.209 and 15.225.

The test methods, which have been used, are based on ANSI C63.10 and RSS-Gen.
For details, see under each test item.

4.2 Operation Modes

The basic operation modes used for testing are:

- A. EUT continuously transmits un-modulated carrier (100% duty cycle)
- B. EUT continuously transmits modulated carrier (100% duty cycle)
- C. EUT transmits and receives signals continuously with tag

4.3 Physical Configuration for Testing

The test system was configured in a typical fashion (as a customer would normally use it).

The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C63.10.

Figure 1: Block Diagram

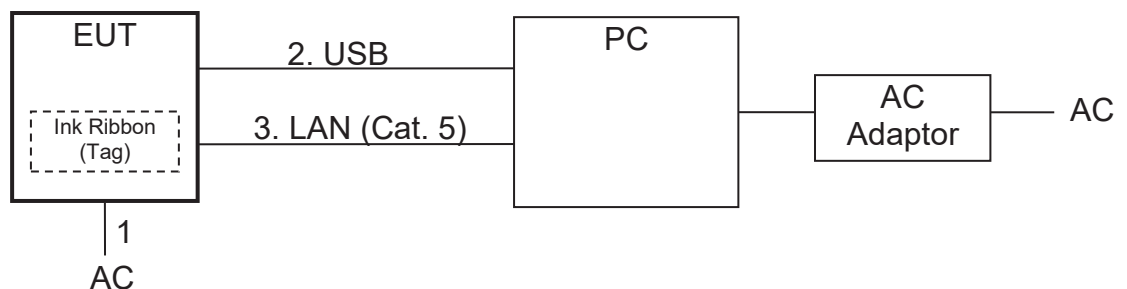


Table 3: Interfaces present on the EUT

No.	Interface	Cable Length for Testing, Shielding	Interface Classification
1.	AC Input	2m, un-shielded	AC input power port
2.	USB	2m, shielded	Signal port
3.	LAN	2m, un-shielded	Signal port

Note:

For more details, refer to section: Photographs of the Test Set-Up.

4.4 Test Software

Software used for testing: BepopPC EX version 9.90.00 by Max Co., Ltd.

This software was running on the laptop computer connected to the EUT. It was used to enable the test operation modes listed in section 4.2 as appropriate.

4.5 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

- Product: Laptop Computer
Manufacturer: Hewlett-Packard
Model: EliteBook 820 G3
Rated Voltage: DC 19.5V
Input Current: 2.31A
Protection Class: III
Serial Number: JPH819C74P
- Product: AC Adaptor for Laptop Computer
Manufacturer: Hewlett-Packard
Model: HSTNN-CA41
Rated Voltage: AC 100-240V
Input Current: 1.4A
Frequency: 50-60Hz
Protection Class: II
Serial Number: WFULP0CNJA3121
- Product: Ink Ribbon with RFID Tag
Manufacturer: Max
Model: SL-R101T
LOT Number: 80403

4.6 Countermeasures to Achieve Compliance

No additional measures were employed to achieve compliance.

5. Test Results RADIO

5.1 Technical Requirements

5.1.1 Antenna Requirements

RESULT: **PASS**

Requirements:

FCC 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.

Verdict:

The EUT has an internal antenna which is not user accessible. Hence it complies with the antenna requirements.

5.1.2 Restricted Bands of Operation

RESULT: **PASS**

Requirements:

FCC 15.205 and RSS-Gen §8.10

Only spurious emissions are permitted in any of the restricted frequency bands, unless otherwise specified.

Verdict:

The EUT operation frequency range is 13.110-14.010MHz. Therefore only spurious emissions may be found in the restricted bands of operation and the EUT complies with the restricted frequency band requirement.

5.2 Radiated Measurements

5.2.1 20dB Bandwidth

RESULT:

PASS

Date of testing: 2018-06-06

Ambient temperature: 22°C

Relative humidity: 64%

Atmospheric pressure: 1010hPa

Requirements:

FCC 15.215(c) and FCC 15.225

The 20dB bandwidth of the emission shall be contained within the frequency band designated in the rule section under which the equipment is operated.

Test procedure:

ANSI C63.10 §6.9.2

The EUT was placed on a nonconductive turntable 0.8m above the ground plane in a semi-anechoic chamber.

The 20dB bandwidth was measured with a loop antenna connected to a spectrum using a peak detector with the following settings: RBW = 10Hz, VBW = 30Hz. Markers were placed at the lowest and highest intersections of the trace with a 20dBc line to obtain the value of the emission bandwidth.

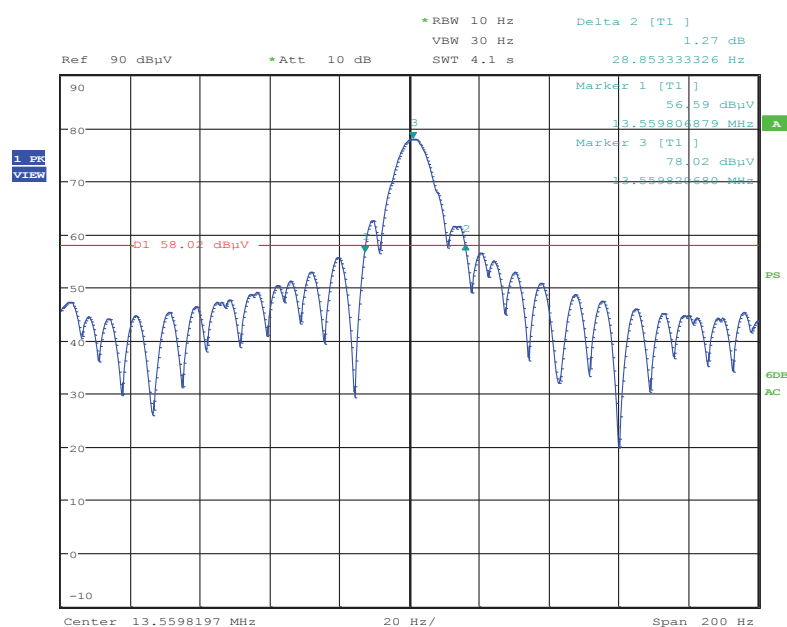
Table 4: 20dB Bandwidth Edge Frequencies, Mode B

20dB Bandwidth Edge Side	Operating Frequency [MHz]	Edge Frequency [MHz]	Limit [MHz]	Margin [MHz]
Lower freq.	13.560	13.55980	13.11	0.44980
Upper freq.	13.560	13.55984	14.01	0.45016

Table 5: 20dB Bandwidth, Mode B

Operating Frequency [MHz]	20dB Bandwidth [kHz]
13.560	0.029

Figure 2: 20dB Bandwidth, Mode B



Date: 6.JUN.2018 11:29:27

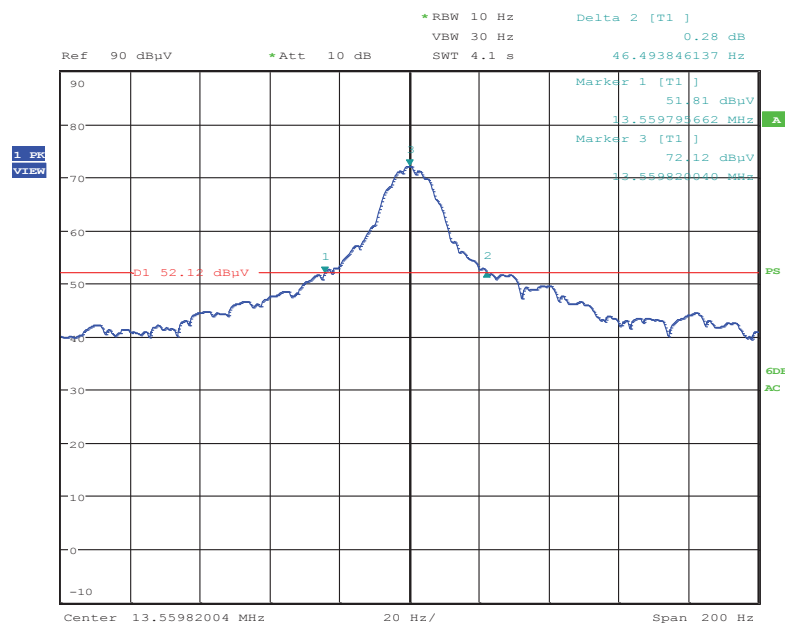
Table 6: 20dB Bandwidth Edge Frequencies, Mode C

20dB Bandwidth Edge Side	Operating Frequency [MHz]	Edge Frequency [MHz]	Limit [MHz]	Margin [MHz]
Lower freq.	13.560	13.55979	13.11	0.44979
Upper freq.	13.560	13.55984	14.01	0.45016

Table 7: 20dB Bandwidth, Mode C

Operating Frequency [MHz]	20dB Bandwidth [kHz]
13.560	0.046

Figure 3: 20dB Bandwidth, Mode C



Date: 6.JUN.2018 11:32:39

5.2.2 99% Bandwidth

Date of testing: 2018-06-06

Ambient temperature: 22°C

Relative humidity: 64%

Atmospheric pressure: 1010hPa

Requirements:

RSS-Gen §6.6

The 99% bandwidth shall be reported according to RSS-Gen §6.6.

Test procedure:

ANSI C63.10 §6.9.3 and RSS-Gen §6.6

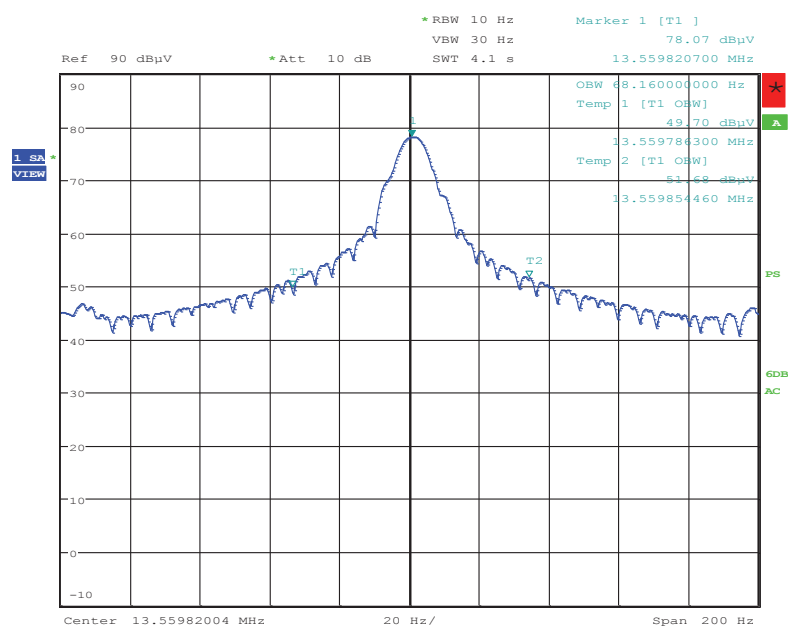
The EUT was placed on a nonconductive turntable 0.8m above the ground plane in a semi-anechoic chamber.

The 99% bandwidth was measured with a loop antenna connected to a spectrum analyzer using a sample detector with the following settings: RBW = 10Hz, VBW = 30Hz. The value of the emission bandwidth was obtained by using the OBW function of the analyzer with a 99% coverage setting.

Table 8: 99% Bandwidth, Mode B

Operating Frequency [MHz]	99% Bandwidth [kHz]
13.560	0.068

Figure 4: 99% Bandwidth, Mode B

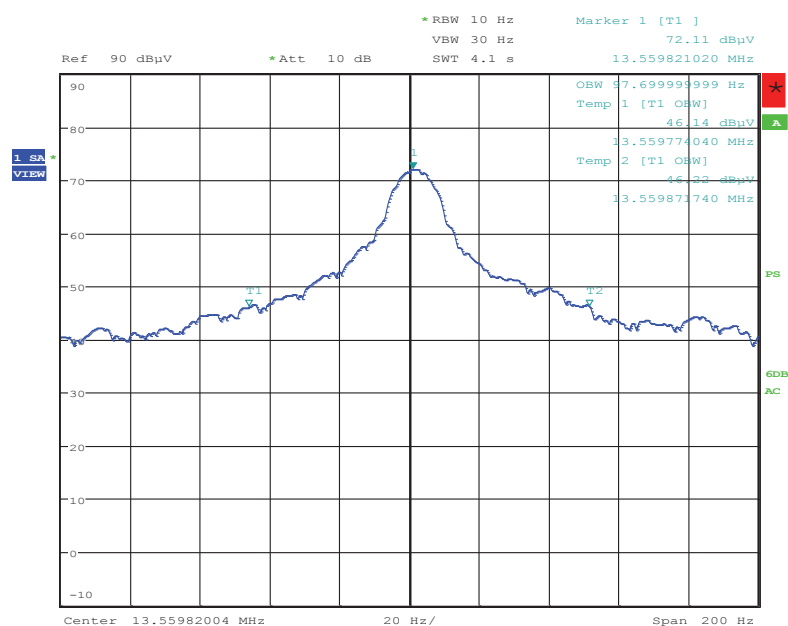


Date: 6.JUN.2018 11:37:32

Table 9: 99% Bandwidth, Mode C

Operating Frequency [MHz]	99% Bandwidth [kHz]
13.560	0.098

Figure 5: 99% Bandwidth, Mode C



Date: 6.JUN.2018 11:34:08

5.2.3 Frequency Stability

RESULT:

Pass

Date of testing: 2018-06-08

Ambient temperature: 25°C
Relative humidity: 56%
Atmospheric pressure: 1001hPa

Requirements:

FCC 15.225(e), RSS-Gen §6.11 and 8.11 and RSS-210 §B.6

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20°C to $+50^{\circ}\text{C}$ at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20°C . For hand-held device with internal battery, voltage variation measurement shall be repeated at the battery's operating end-point voltage declared by the manufacturer.

Test procedure:

ANSI C63.10 §6.8

The EUT was placed inside a temperature chamber and was set to produce an unmodulated carrier (mode A).

The carrier frequency was measured with a loop antenna connected to a spectrum analyzer. Measurements were performed from 50°C down to -20°C for every 10°C . For each temperature step, the measurements started after the temperature was sufficiently stabilized and were performed at start-up of the EUT, and then after 2, 5 and 10 minutes. The EUT was turned off during temperature changes.

The carrier frequency measurement was then performed at a temperature of 20°C for a variation of $\pm 15\%$ of the nominal input voltage.

Test temperatures: $-20, -10, 0, 10, 20, 30, 40, 50^{\circ}\text{C}$

Low test voltage (85%): AC 102V

Normal test voltage (100%): AC 120V

High test voltage (115%): AC 138V

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Table 10: Frequency Stability at 50°C, AC 120V

Elapsed Time [min]	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
Start-up	13.56	13.5599	0.0007%	±0.01%	Pass
2	13.56	13.5599	0.0007%	±0.01%	Pass
5	13.56	13.5599	0.0007%	±0.01%	Pass
10	13.56	13.5599	0.0007%	±0.01%	Pass

Table 11: Frequency Stability at 40°C, AC 120V

Elapsed Time [min]	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
Start-up	13.56	13.5599	0.0007%	±0.01%	Pass
2	13.56	13.5599	0.0007%	±0.01%	Pass
5	13.56	13.5599	0.0007%	±0.01%	Pass
10	13.56	13.5599	0.0007%	±0.01%	Pass

Table 12: Frequency Stability at 30°C, AC 120V

Elapsed Time [min]	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
Start-up	13.56	13.5599	0.0007%	±0.01%	Pass
2	13.56	13.5599	0.0007%	±0.01%	Pass
5	13.56	13.5599	0.0007%	±0.01%	Pass
10	13.56	13.5599	0.0007%	±0.01%	Pass

Table 13: Frequency Stability at 20°C, AC 120V

Elapsed Time [min]	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
Start-up	13.56	13.5600	0%	±0.01%	Pass
2	13.56	13.5600	0%	±0.01%	Pass
5	13.56	13.5600	0%	±0.01%	Pass
10	13.56	13.5600	0%	±0.01%	Pass

Table 14: Frequency Stability at 10°C, AC 120V

Elapsed Time [min]	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
Start-up	13.56	13.5600	0%	±0.01%	Pass
2	13.56	13.5600	0%	±0.01%	Pass
5	13.56	13.5600	0%	±0.01%	Pass
10	13.56	13.5600	0%	±0.01%	Pass

Table 15: Frequency Stability at 0°C, AC 120V

Elapsed Time [min]	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
Start-up	13.56	13.5600	0%	±0.01%	Pass
2	13.56	13.5600	0%	±0.01%	Pass
5	13.56	13.5600	0%	±0.01%	Pass
10	13.56	13.5600	0%	±0.01%	Pass

Table 16: Frequency Stability at -10°C, AC 120V

Elapsed Time [min]	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
Start-up	13.56	13.5600	0%	±0.01%	Pass
2	13.56	13.5600	0%	±0.01%	Pass
5	13.56	13.5600	0%	±0.01%	Pass
10	13.56	13.5600	0%	±0.01%	Pass

Table 17: Frequency Stability at -20°C, AC 120V

Elapsed Time [min]	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
Start-up	13.56	13.5600	0%	±0.01%	Pass
2	13.56	13.5600	0%	±0.01%	Pass
5	13.56	13.5600	0%	±0.01%	Pass
10	13.56	13.5600	0%	±0.01%	Pass

Table 18: Frequency Stability with Supply Voltage at 20°C

Supply Voltage	Nominal Frequency [MHz]	Measured Frequency [MHz]	Deviation [%]	Limit [%]	Result
AC 102V	13.56	13.5600	0%	±0.01%	Pass
AC 120V	13.56	13.5600	0%	±0.01%	Pass
AC 138V	13.56	13.5600	0%	±0.01%	Pass

5.2.4 Field Strength of Fundamental

RESULT:

Pass

Date of testing:	2018-06-06
Ambient temperature:	22°C
Relative humidity:	64%
Atmospheric pressure:	1010hPa
Frequency range:	13.110 - 14.010MHz
Measurement distance:	3m
Kind of test site:	Semi Anechoic Chamber

Requirements:

FCC 15.225(a)(b)(c) and RSS-210 §B.6(a)(b)(c)

The field strength of fundamental shall not exceed the level specified in FCC 15.225(a)(b)(c) and RSS-210 B.6(a)(b)(c).

Test procedure:

ANSI C63.10 §6.3 and 6.4 and RSS-Gen §8.1

The EUT was placed on a nonconductive turntable 0.8m above the ground plane. Measurements were made at 3m distance. The EUT was rotated 360° in order to determine the emission's maximum level.

Measurements were performed with a test receiver operating in the CISPR quasi-peak detection mode with a 6dB bandwidth set to 9kHz.

The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report. The field strength values taken at 3m measurement distance were recalculated for a 30m distance using a factor of 40dB/decade according to FCC 15.31(f) and RSS §6.4.

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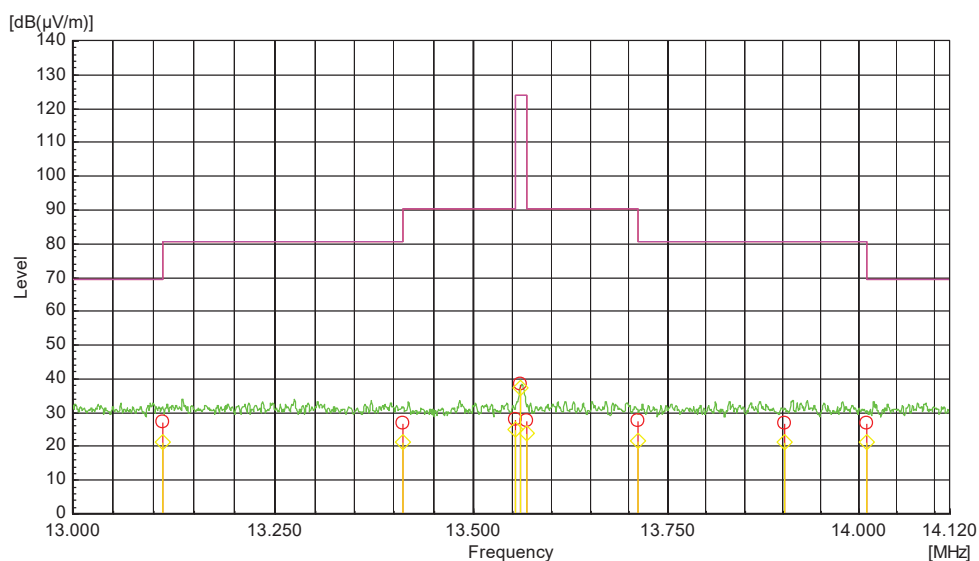
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Table 19: Field Strength of Fundamental, Mode B

Frequency [MHz]	Reading QP at 3m [dB(μV)]	Factor [dB(1/m)]	Level QP at 3m [dBμV/m]	Level QP at 30m [dBμV/m]	Limit QP at 30m [dBμV/m]	Margin QP [dB]	Angle [°]
13.11000	7.8	19.5	27.3	-12.7	29.5	42.2	190
13.41000	7.5	19.5	27.0	-13.0	40.5	53.5	3
13.55300	8.7	19.5	28.2	-11.8	50.5	62.3	69
13.56000	19.1	19.5	38.6	-1.4	84.0	85.4	62
13.56700	8.0	19.5	27.5	-12.5	50.5	63.0	65
13.71000	8.2	19.5	27.7	-12.3	40.5	52.8	12
13.90210	7.5	19.5	27.0	-13.0	40.5	53.5	49
14.01000	7.5	19.5	27.0	-13.0	29.5	42.5	0

Notes: Level QP at 3m = Reading QP at 3m + Factor
Level QP at 30m = Level QP at 3m - distance extrapolation factor for one decade
Distance extrapolation factor = 40dB/decade
Margin QP = Limit QP at 30m – Level QP at 30m

Figure 6: Field Strength of Fundamental, Spectral Diagram, Mode B



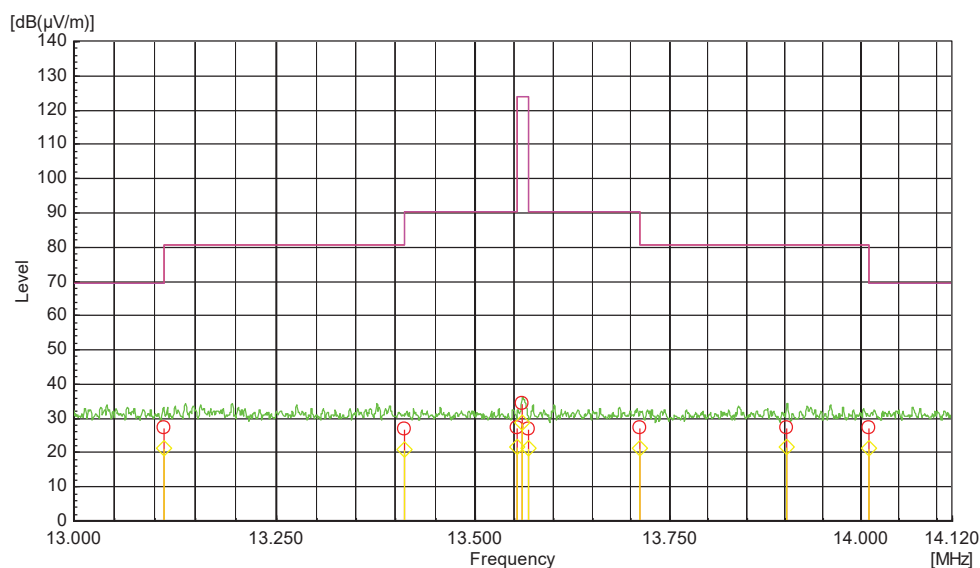
Note: This spectral diagram is given for reference purpose only.
Measurement distance: 3m (limit is adjusted from 30m to 3m with 40dB correction factor)
Detector: Peak, RBW: 10kHz

Table 20: Field Strength of Fundamental, Mode C

Frequency [MHz]	Reading QP at 3m [dB(μV)]	Factor [dB(1/m)]	Level QP at 3m [dBμV/m]	Level QP at 30m [dBμV/m]	Limit QP at 30m [dBμV/m]	Margin QP [dB]	Angle [°]
13.11000	7.8	19.5	27.3	-12.7	29.5	42.2	11
13.41000	7.3	19.5	26.8	-13.2	40.5	53.7	347
13.55300	7.6	19.5	27.1	-12.9	50.5	63.4	41
13.56000	14.8	19.5	34.3	-5.7	84.0	89.7	63
13.56700	7.4	19.5	26.9	-13.1	50.5	63.6	352
13.71000	7.6	19.5	27.1	-12.9	40.5	53.4	3
13.90210	7.8	19.5	27.3	-12.7	40.5	53.2	214
14.01000	7.8	19.5	27.3	-12.7	29.5	42.2	155

Notes: Level QP at 3m = Reading QP at 3m + Factor
Level QP at 30m = Level QP at 3m - distance extrapolation factor for one decade
Distance extrapolation factor = 40dB/decade
Margin QP = Limit QP at 30m – Level QP at 30m

Figure 7: Field Strength of Fundamental, Spectral Diagram, Mode C



Note: This spectral diagram is given for reference purpose only.
Measurement distance: 3m (limit is adjusted from 30m to 3m with 40dB correction factor)
Detector: Peak, RBW: 10kHz

5.2.5 Radiated Spurious Emissions of Transmitter

RESULT:

PASS

Date of testing:	2018-06-05, 2018-06-06
2018-06-06	
Ambient temperature:	21, 22°C
Relative humidity:	58, 64%
Atmospheric pressure:	1011, 1010hPa
Frequency range:	9kHz - 136MHz (except 13.11 - 14.01MHz)
Measurement distance:	3m
Kind of test site:	Semi Anechoic Chamber

Requirements:

FCC 15.209, FCC 15.225(d), RSS-Gen §8.9 and 8.10 and RSS-210 §B.6(d)

Emission radiated outside the band 13.110-14.010MHz must comply with the radiated emission limits specified in FCC 15.209(a), RSS-Gen §8.9 (tables 4 and 5) and RSS-210 §B.6(d).

Test procedure:

ANSI C63.10 §6.3, 6.4, 6.5 and RSS-Gen §6.13 and 8.1

The EUT was placed on a nonconductive turntable 0.8m above the ground plane. Before final measurements of radiated emissions were performed, the EUT was scanned to determine its emission spectrum profile. The physical arrangement of the test system, the associated cabling were varied in order to ensure that maximum emission amplitudes were attained.

The spectrum was examined from 9kHz to 136MHz. Final radiated emission measurements were made at 3m distance.

At each frequency where a spurious emission was found, the EUT was rotated 360° in order to determine the emission's maximum level. For frequencies above 30MHz, the antenna was raised and lowered from 1 to 4m and measurements were taken using both horizontal and vertical antenna polarizations.

For emissions below 30MHz, measurements were performed with a test receiver operating in the CISPR quasi-peak detection mode with a 6dB bandwidth set to 9kHz. For emissions between 30MHz and 1GHz, measurements were performed with a test receiver operating in the CISPR quasi-peak detection mode with a 6dB bandwidth set to 120kHz.

The highest emission amplitudes relative to the appropriate limit were recorded in this report. Emissions other than those mentioned are small or not detectable.

For measurements below 30MHz, the field strength values taken at 3m measurement distance were recalculated for a 30m distance using a factor of 40dB/decade according to FCC 15.31(f) and RSS-Gen §6.4.

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Table 21: Radiated Emissions, Quasi Peak Data, 9kHz – 30MHz, Mode B

Frequency [MHz]	Reading QP at 3m [dB(μV)]	Factor [dB(1/m)]	Level QP at 3m [dBμV/m]	Level QP at 30m [dBμV/m]	Limit QP at 30m [dBμV/m]	Margin QP [dB]	Angle [°]
29.48942	11.4	20.9	32.3	-7.7	29.5	37.2	253

Notes: Level QP at 3m = Reading QP at 3m + Factor

Level QP at 30m = Level QP at 3m - distance extrapolation factor for one decade

Distance extrapolation factor = 40dB/decade

Margin QP = Limit QP at 30m – Level QP at 30m

Table 22: Radiated Emissions, Quasi Peak Data, 30MHz - 1GHz, Horizontal and Vertical Antenna Orientations, Mode B

Frequency [MHz]	Antenna Orientation	Reading QP [dBμV]	Factor [dB(1/m)]	Level QP [dBμV/m]	Limit [dBμV/m]	Margin QP [dB]	Height [cm]	Angle [°]
57.756	V	44.1	-25.7	18.4	40.0	21.6	134	191
64.000	V	52.9	-25.6	27.3	40.0	12.7	100	56
81.358	V	51.8	-25.3	26.5	40.0	13.5	100	210
108.470	V	47.9	-24.5	23.4	43.5	20.1	101	98
108.477	H	48.1	-24.4	23.7	43.5	19.8	169	170
117.460	V	51.3	-23.9	27.4	43.5	16.1	100	102
119.840	H	53.2	-23.6	29.6	43.5	13.9	175	255
122.038	H	52.3	-23.4	28.9	43.5	14.6	169	239
135.598	H	46.9	-22.7	24.2	43.5	19.3	135	123
135.599	V	46.5	-22.8	23.7	43.5	19.8	100	99

Note: Level QP = Reading QP + Factor

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Table 23: Radiated Emissions, Quasi Peak Data, 9kHz – 30MHz, Mode C

Frequency [MHz]	Reading QP at 3m [dB(μV)]	Factor [dB(1/m)]	Level QP at 3m [dBμV/m]	Level QP at 30m [dBμV/m]	Limit QP at 30m [dBμV/m]	Margin QP [dB]	Angle [°]
18.23443	6.0	19.7	25.7	-14.3	29.5	43.8	73
28.15112	5.6	20.8	26.4	-13.6	29.5	43.1	161

Notes: Level QP at 3m = Reading QP at 3m + Factor
Level QP at 30m = Level QP at 3m - distance extrapolation factor for one decade
Distance extrapolation factor = 40dB/decade
Margin QP = Limit QP at 30m – Level QP at 30m

Table 24: Radiated Emissions, Quasi Peak Data, 30MHz - 1GHz, Horizontal and Vertical Antenna Orientations, Mode C

Frequency [MHz]	Antenna Orientation	Reading QP [dBμV]	Factor [dB(1/m)]	Level QP [dBμV/m]	Limit [dBμV/m]	Margin QP [dB]	Height [cm]	Angle [°]
64.030	V	53.0	-25.6	27.4	40.0	12.6	102	49
77.195	H	48.5	-25.8	22.7	40.0	17.3	348	161
80.323	V	52.0	-25.3	26.7	40.0	13.3	105	213
117.437	V	51.3	-23.9	27.4	43.5	16.1	102	101
120.769	H	52.7	-23.5	29.2	43.5	14.3	186	245
135.599	V	45.3	-22.8	22.5	43.5	21.0	100	99

Note: Level QP = Reading QP + Factor

5.3 AC Power Line Conducted Measurements

5.3.1 AC Power Line Conducted Emission of Transmitter

RESULT:

PASS

Date of testing: 2018-06-06

Ambient temperature: 24°C

Relative humidity: 64%

Atmospheric pressure: 1008hPa

Frequency range: 0.15 - 30MHz

Kind of test site: Shielded Room

Requirements:

FCC 15.207 and RSS-Gen §8.8

The AC power line conducted emission on any frequency within the band 150kHz to 30MHz shall not exceed the limits specified in FCC 15.207 and RSS-Gen §8.8 (table 3).

Test procedure:

ANSI C63.10 §6.2 and RSS-Gen §8.1

The EUT was placed on a wooden table raised 80cm above the reference ground plane. A vertical conducting plane of the screened room was located 40cm to the rear of the EUT. The EUT was connected to a Line Impedance Stabilization Network (LISN).

The physical arrangement of the test system and associated cabling was varied to determine the effect on the EUT's emissions in amplitude and frequency in order to ensure that maximum emission amplitudes were attained.

The measurements were performed with a test receiver operating in the CISPR quasi-peak and average detection modes. The receiver's 6dB bandwidth was set to 9kHz.

Pre-check has been done for mode B and mode C, the final measurement was conducted for the worst mode (mode B).

Disturbances other than those mentioned are small or not detectable.

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Table 25: AC Power Line Conducted Emission, Quasi Peak and Average Data, 0.15 - 30MHz, Phase N (N) and L1 (L), Mode B

Freq. [MHz]	Phase	Reading QP [dBµV]	Reading AV [dBµV]	Factor [dB]	Level QP [dBµV]	Level AV [dBµV]	Limit QP [dBµV]	Limit AV [dBµV]	Margin QP [dB]	Margin AV [dB]
0.15036	L1	34.7	11.5	9.7	44.4	21.2	66.0	56.0	21.6	34.8
0.15106	N	34.6	11.3	9.7	44.3	21.0	65.9	55.9	21.6	34.9
0.17346	N	30.1	12.6	9.7	39.8	22.3	64.8	54.8	25.0	32.5
0.17505	L1	30.1	11.6	9.7	39.8	21.3	64.7	54.7	24.9	33.4
0.17696	L1	30.2	10.4	9.7	39.9	20.1	64.6	54.6	24.7	34.5
0.17970	N	29.9	9.6	9.7	39.6	19.3	64.5	54.5	24.9	35.2
0.26740	N	25.8	12.6	9.7	35.5	22.3	61.2	51.2	25.7	28.9
0.26861	N	26.1	9.9	9.7	35.8	19.6	61.2	51.2	25.4	31.6
0.27354	L1	25.1	7.5	9.7	34.8	17.2	61.0	51.0	26.2	33.8
0.41021	N	17.0	5.3	9.7	26.7	15.0	57.6	47.6	30.9	32.6
0.85813	N	23.5	11.8	9.7	33.2	21.5	56.0	46.0	22.8	24.5
0.85830	L1	23.5	11.8	9.7	33.2	21.5	56.0	46.0	22.8	24.5
0.94308	L1	28.7	20.5	9.7	38.4	30.2	56.0	46.0	17.6	15.8
0.94328	N	28.7	20.4	9.7	38.4	30.1	56.0	46.0	17.6	15.9
1.02675	L1	20.5	11.3	9.7	30.2	21.0	56.0	46.0	25.8	25.0
1.88794	L1	16.9	7.2	9.8	26.7	17.0	56.0	46.0	29.3	29.0
6.25853	L1	20.5	15.1	9.9	30.4	25.0	60.0	50.0	29.6	25.0
6.39957	N	16.7	11.3	10.0	26.7	21.3	60.0	50.0	33.3	28.7
13.55980	L1	28.4	27.7	10.1	38.5	37.8	60.0	50.0	21.5	12.2
13.56024	N	28.5	27.8	10.2	38.7	38.0	60.0	50.0	21.3	12.0
18.48904	N	21.6	14.0	10.3	31.9	24.3	60.0	50.0	28.1	25.7
18.53801	L1	21.7	13.7	10.2	31.9	23.9	60.0	50.0	28.1	26.1

Note: Level QP = Reading QP + Factor, Level AV = Reading AV + Factor

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