RADIO TEST REPORT

Test Report No. : 12404720H-B-R1

Applicant	:	**FALTEC CO., LTD.**
Type of Equipment	:	**Remote engine starter unit**
Model No.	:	**PZ170-22711**
FCC ID	:	**WKE-722711**
Test regulation	:	**FCC Part 15 Subpart C: 2018**
Test Result	:	**Complied**

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
6. The all test items in this test report are conducted by UL Japan, Inc. Ise EMC Lab.
7. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
8. This report is a revised version of 12404720H-B. 12404720H-B is replaced with this report.

Date of test: October 2 to 4, 2018

Representative test engineer:
Tomohisa Nakagawa
Engineer
Consumer Technology Division

Approved by:
Motoya Imura
Leader
Consumer Technology Division

NVLAP TESTING
NVLAP LAB CODE: 200572-0

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REVISION HISTORY

Original Test Report No.: 12404720H-B

Revision	Test report No.	Date	Page revised	Contents
- (Original)	12404720H-B	October 17, 2018	-	-
1	12404720H-B-R1	October 23, 2018	P.10	Correction of Test Volume in SECTION 5; From 1.5 m to 3.0 m

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SECTION 1: Customer information

Company Name	:	FALTEC CO., LTD.
Address	:	Solid Square West Tower 19th Floor 580 Horikawa-cho, Saiwai-ku, Kawasaki-city Kanagawa, 212- 0013 Japan
Telephone Number	:	+81- 44-520-0019
Facsimile Number	:	+81- 44-520-0018
Contact Person	:	Hiroshi Kurumagawa

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment	:	Remote engine starter unit
Model No.	:	PZ170-22711
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 12.0 V
Receipt Date of Sample	:	September 21, 2018
Country of Mass-production	:	Japan
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No Modification by the test lab

2.2 Product Description

Model: PZ170-22711 (referred to as the EUT in this report) is a Remote engine starter unit.

Radio Specification

Radio Type	:	Transceiver
Frequency of Operation	:	922.8 MHz
Modulation	:	spread spectrum
Antenna type	:	1/4λ helical antenna
Antenna Gain	:	0 dBi
Clock frequency (Maximum)	:	32 MHz(RF Transceiver)

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on March 12, 2018 and effective April 11, 2018

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.247 Operation within the bands 902-928MHz,
2400-2483.5MHz, and 5725-5850MHz

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	**FCC:** ANSI C63.10-2013 6. Standard test methods **IC:** RSS-Gen 8.8	**FCC:** Section 15.207 **IC:** RSS-Gen 8.8	N/A	N/A *1)	-
6dB Bandwidth	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05 **IC:** -	**FCC:** Section 15.247(a)(2) **IC:** RSS-247 5.2(a)	See data.	Complied	Conducted
Maximum Peak Output Power	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05 **IC:** RSS-Gen 6.12	**FCC:** Section 15.247(b)(3) **IC:** RSS-247 5.4(d)		Complied	Conducted
Power Density	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05 **IC:** -	**FCC:** Section 15.247(e) **IC:** RSS-247 5.2(b)		Complied	Conducted
Spurious Emission Restricted Band Edges	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05 **IC:** RSS-Gen 6.13	**FCC:** Section15.247(d) **IC:** RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	0.5 dB 1845.600 MHz, AV, Vertical	Complied#	Conducted (below 30 MHz)/ Radiated (above 30 MHz) *2)

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.
*1) The test is not applicable since the EUT is not the device that is designed to be connected to the public utility (AC) power line.
*2) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 15.247 Meas Guidance v05 8.5 and 8.6.

Symbols:
Complied The data of this test item has enough margin, more than the measurement uncertainty.
Complied# The data of this test item meets the limits unless the measurement uncertainty is taken into consideration.

* In case any questions arise about test procedure, ANSI C63.10: 2013 is also referred.

FCC Part 15.31 (e)
This EUT provides the stable voltage constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement
It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT Therefore, the equipment complies with the antenna requirement of Section 15.203.

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	RSS-Gen 6.7	**IC:** -	N/A	Complied	Conducted

Symbols:
Complied The data of this test item has enough margin, more than the measurement uncertainty.
Complied# The data of this test item meets the limits unless the measurement uncertainty is taken into consideration.

Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

EMI
The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor *k*=2.

Antenna Terminal test

Test Item		Uncertainty (+/-)
RF output power		1.3 dB
Antenna terminal conducted emission / Power dencity /		2.7 dB
Adjacent channnel power / Channnel power		
	Below 3GHz	1.9 dB
	3 GHz ot 6 GHz	2.1 dB

Conducted emission

using Item	Frequency range	Uncertainty (+/-)
AMN (LISN)	0.009 MHz to 0.15 MHz	3.8 dB
	0.15 MHz to 30 MHz	3.4 dB

Radiated emission

Measurement distance	Frequency range	Uncertainty (+/-)
3 m	9 kHz to 30 MHz	3.3 dB
10 m		3.2 dB
3 m	30 MHz to 200 MHz (Horizontal)	4.8 dB
	(Vertical)	5.0 dB
	200 MHz to 1000 MHz (Horizontal)	5.2 dB
	(Vertical)	6.3 dB
10 m	30 MHz to 200 MHz (Horizontal)	4.8 dB
	(Vertical)	4.9 dB
	200 MHz to 1000 MHz (Horizontal)	5.0 dB
	(Vertical)	5.0 dB
3 m	1 GHz to 6 GHz	5.0 dB
	6 GHz to 18 GHz	5.3 dB
1 m	10 GHz to 26.5 GHz	5.8 dB
	26.5 GHz to 40 GHz	5.8 dB
10 m	1 GHz to 18 GHz	5.2 dB

3.5 Test Location

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Telephone: +81 596 24 8999, Facsimile: +81 596 24 8124
NVLAP Lab. code: 200572-0 / FCC Test Firm Registration Number: 199967

Test site	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms	Maximum measurement distance
No.1 semi-anechoic chamber	2973C-1	19.2 x 11.2 x 7.7	7.0 x 6.0	No.1 Power source room	10 m
No.2 semi-anechoic chamber	2973C-2	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	2973C-3	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room	3 m
No.3 shielded room	-	4.0 x 6.0 x 2.7	N/A	-	-
No.4 semi-anechoic chamber	2973C-4	12.0 x 8.5 x 5.9	6.8 x 5.75	No.4 Preparation room	3 m
No.4 shielded room	-	4.0 x 6.0 x 2.7	N/A	-	-
No.5 semi-anechoic chamber	-	6.0 x 6.0 x 3.9	6.0 x 6.0	-	-
No.6 shielded room	-	4.0 x 4.5 x 2.7	4.0 x 4.5	-	-
No.6 measurement room	-	4.75 x 5.4 x 3.0	4.75 x 4.15	-	-
No.7 shielded room	-	4.7 x 7.5 x 2.7	4.7 x 7.5	-	-
No.8 measurement room	-	3.1 x 5.0 x 2.7	N/A	-	-
No.9 measurement room	-	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.11 measurement room	-	6.2 x 4.7 x 3.0	4.8 x 4.6	-	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 m x 2.0m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Test data, Test instruments, and Test set up

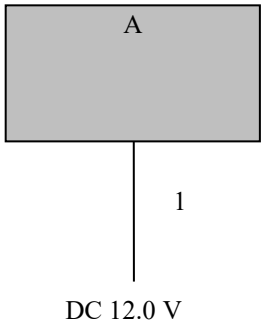
Refer to APPENDIX.

SECTION 4: Operation of E.U.T. during testing

4.1 Operating Mode(s)

Test Item	Mode	Tested frequency
6dB Bandwidth, 99% Occupied Bandwidth, Maximum Peak Output Power, Power Density, Spurious Emission (Conducted / Radiated)	Transmitting mode (Tx)	922.8 MHz
The system was configured in typical fashion (as a customer would normally use it) for testing. *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.		

4.2 Configuration and peripherals



* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Remote engine starter unit	PZ170-22711	52	FALTEC CO., LTD.	EUT

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	2.0	Unshielded	Unshielded	-

SECTION 5: Radiated Spurious Emission

Test Procedure

It was measured based on "8.5 and 8.6 of KDB 558074 D01 15.247 Meas Guidance v05".

[For below 1 GHz]
EUT was placed on a urethane platform of nominal size, 0.5 m by 1.0 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1 GHz]
EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane.
The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with absorbent materials lined on a ground plane.

The height of the measuring antenna varied between 1 and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.
The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.
The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).
The test was made with the detector (RBW/VBW) in the following table.
When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Test Antennas are used as below;

Frequency	30 MHz to 200 MHz	200 MHz to 1 GHz	Above 1 GHz
Antenna Type	Biconical	Logperiodic	Horn

In any 100 kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

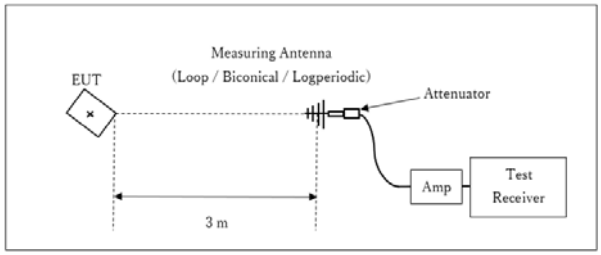
20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9(IC) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (IC).

Frequency	Below 1 GHz	Above 1 GHz		20 dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV *1)	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	11.12.2.5.1 RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: 100 traces 11.12.2.5.2 The duty cycle was less than 98% for detected noise, a duty factor was added to the 11.12.2.5.1 results.	RBW: 100 kHz VBW: 300kHz

*1) Average Power Measurement was performed based on ANSI C63.10-2013.

Figure 1: Test Setup

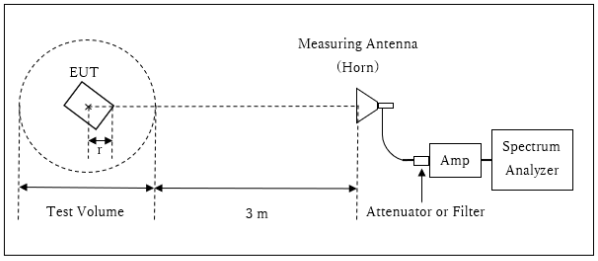
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz - 10 GHz



r : Radius of an outer periphery of EUT
× : Center of turn table

Distance Factor: 20 x log (4.5 m / 3.0 m) = 3.53 dB
* Test Distance: (3 + Test Volume /2) - r = 4.5 m

Test Volume : 3.0 m
(Test Volume has been calibrated based on CISPR 16-1-4.)
r = 0.0 m

* The test was performed with r = 0.0 m since EUT is small and it was the rather conservative condition.

- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

Measurement range : 30 MHz - 10 GHz
Test data : APPENDIX
Test result : Pass

SECTION 6: Antenna Terminal Conducted Tests

Test Procedure

The tests were made with below setting connected to the antenna port.

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
6dB Bandwidth	3 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth *1)	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak/ Average *2)	-	Power Meter (Sensor: 50 MHz BW)
Peak Power Density	1.5 times the 6dB Bandwidth	3 kHz	10 kHz	Auto	Peak	Max Hold	Spectrum Analyzer *3)
Conducted Spurious Emission *4)	9kHz to 150kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	9.1 kHz	27 kHz				

*1) Peak hold was applied as Worst-case measurement.
*2) Reference data
*3) Section 11.10.2 Method PKPSD (peak PSD) of "ANSI C63.10-2013".
*4) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.
Then, wide-band noise near the limit was checked separately, however the noise was low enough as shown in the chart.
(9 kHz - 150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 9.1 kHz).

The test results and limit are rounded off to two decimals place, so some differences might be observed.

Test data : APPENDIX
Test result : Pass

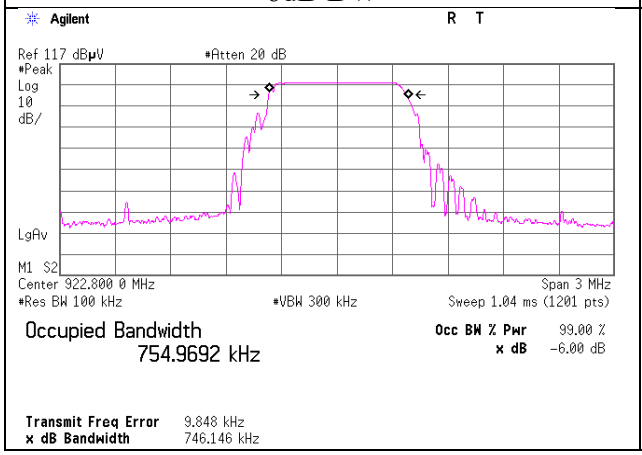
APPENDIX 1: Test data

6 dB Bandwidth and 99 % Occupied Bandwidth

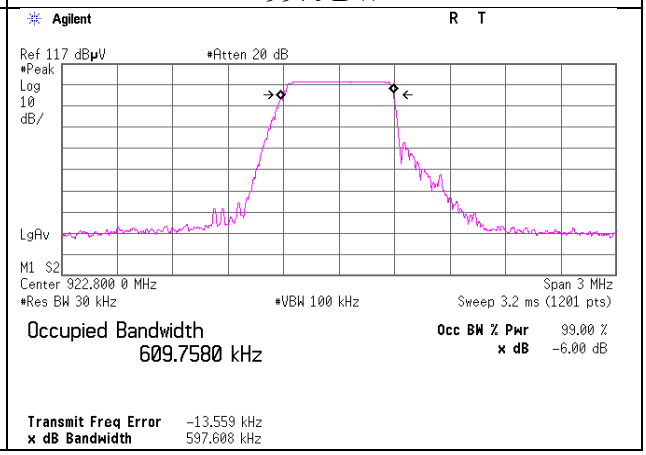
Report No.	12404720H
Test place	Ise EMC Lab. No.5 Shielded Room
Date	October 3, 2018
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx

Mode	Frequency [MHz]	99% Occupied Bandwidth [kHz]	6dB Bandwidth [kHz]	Limit for 6dB Bandwidth [kHz]
Tx	922.80	609.758	746.146	> 500

6dB BW



99% BW



Maximum Peak Output Power

Report No.	12404720H
Test place	Ise EMC Lab. No.5 Shielded Room
Date	October 3, 2018
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx

				Conducted Power					e.i.r.p. for RSS-247					
Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	[dBi]	[dBm]	[mW]	[dBm]	[mW]	[dB]
922.8	0.82	0.54	9.91	11.27	13.40	30.00	1000	18.73	0.00	11.27	13.40	36.02	4000	24.75

Sample Calculation:
Result = Reading + Cable Loss + Attenuator Loss
e.i.r.p. Result = Conducted Power Result + Antenna Gain

Average Output Power
(Reference data for RF Exposure)

Report No.	12404720H
Test place	Ise EMC Lab. No.5 Shielded Room
Date	October 3, 2018
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx

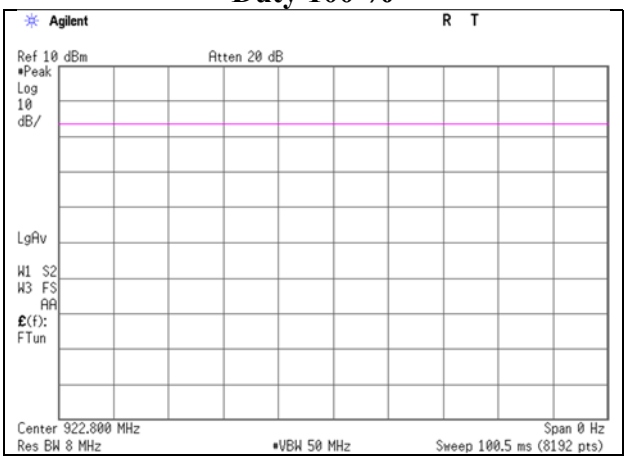
Freq.	Reading	Cable Loss	Atten. Loss	Result (Time average)		Duty factor	Result (Burst power average)	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]
922.8	-0.51	0.54	9.91	9.94	9.86	0.00	9.94	9.86

Sample Calculation:
Result (Time average) = Reading + Cable Loss + Attenuator Loss
Result (Burst power average) = Time average + Duty factor

Burst rate confirmation

Report No.	12404720H
Test place	Ise EMC Lab. No.5 Shielded Room
Date	October 3, 2018
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx

Duty 100 %



Radiated Spurious Emission

Report No.	12404720H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	October 4, 2018
Temperature / Humidity	23 deg. C / 67 % RH
Engineer	Akihiko Maeda
Mode	Tx 922.8 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	31.703	QP	21.6	17.7	7.2	32.1	-	14.4	40.0	25.6	
Hori	46.012	QP	21.5	12.6	7.5	32.1	-	9.5	40.0	30.5	
Hori	186.033	QP	20.7	16.4	9.1	32.0	-	14.2	43.5	29.3	
Hori	398.798	QP	20.9	15.8	10.6	32.0	-	15.3	46.0	30.7	
Hori	565.532	QP	20.4	18.4	11.6	32.1	-	18.3	46.0	27.7	
Hori	891.068	QP	23.7	22.1	13.2	31.3	-	27.7	46.0	18.3	
Hori	1845.600	PK	54.2	25.8	6.7	32.6	-	54.1	73.9	19.8	
Hori	2768.400	PK	47.8	28.5	7.0	31.9	-	51.4	73.9	22.5	
Hori	3691.200	PK	52.3	29.1	7.4	31.6	-	57.2	73.9	16.7	
Hori	4614.000	PK	48.0	30.7	7.8	31.3	-	55.2	73.9	18.7	
Hori	5536.800	PK	42.4	32.0	8.2	31.4	-	51.2	73.9	22.7	
Hori	6459.600	PK	40.8	33.8	8.7	31.8	-	51.5	73.9	22.4	Floor noise
Hori	7382.400	PK	40.4	36.3	8.9	32.5	-	53.1	73.9	20.8	Floor noise
Hori	8305.200	PK	40.6	36.3	9.1	32.6	-	53.4	73.9	20.5	Floor noise
Hori	9228.000	PK	39.7	37.5	9.6	32.4	-	54.4	73.9	19.5	Floor noise
Hori	1845.600	AV	51.7	25.8	6.7	32.6	-	51.6	53.9	2.3	
Hori	2768.400	AV	43.0	28.5	7.0	31.9	-	46.6	53.9	7.3	
Hori	3691.200	AV	47.5	29.1	7.4	31.6	-	52.4	53.9	1.5	
Hori	4614.000	AV	41.9	30.7	7.8	31.3	-	49.1	53.9	4.8	
Hori	5536.800	AV	35.7	32.0	8.2	31.4	-	44.5	53.9	9.4	
Hori	6459.600	AV	32.5	33.8	8.7	31.8	-	43.2	53.9	10.7	Floor noise
Hori	7382.400	AV	33.1	36.3	8.9	32.5	-	45.8	53.9	8.1	Floor noise
Hori	8305.200	AV	33.2	36.3	9.1	32.6	-	46.0	53.9	7.9	Floor noise
Hori	9228.000	AV	32.6	37.5	9.6	32.4	-	47.3	53.9	6.6	Floor noise
Vert	31.703	QP	21.6	17.7	7.2	32.1	-	14.4	40.0	25.6	
Vert	46.012	QP	21.6	12.6	7.5	32.1	-	9.6	40.0	30.4	
Vert	186.033	QP	20.7	16.4	9.1	32.0	-	14.2	43.5	29.3	
Vert	398.798	QP	21.0	15.8	10.6	32.0	-	15.4	46.0	30.6	
Vert	565.532	QP	20.3	18.4	11.6	32.1	-	18.2	46.0	27.8	
Vert	891.068	QP	20.6	22.1	13.2	31.3	-	24.6	46.0	21.4	
Vert	1845.600	PK	55.7	25.8	6.7	32.6	-	55.6	73.9	18.3	
Vert	2768.400	PK	48.2	28.5	7.0	31.9	-	51.8	73.9	22.1	
Vert	3691.200	PK	49.6	29.1	7.4	31.6	-	54.5	73.9	19.4	
Vert	4614.000	PK	47.0	30.7	7.8	31.3	-	54.2	73.9	19.7	
Vert	5536.800	PK	43.0	32.0	8.2	31.4	-	51.8	73.9	22.1	
Vert	6459.600	PK	39.9	33.8	8.7	31.8	-	50.6	73.9	23.3	Floor noise
Vert	7382.400	PK	40.5	36.3	8.9	32.5	-	53.2	73.9	20.7	Floor noise
Vert	8305.200	PK	40.5	36.3	9.1	32.6	-	53.3	73.9	20.6	Floor noise
Vert	9228.000	PK	39.9	37.5	9.6	32.4	-	54.6	73.9	19.3	Floor noise
Vert	1845.600	AV	53.5	25.8	6.7	32.6	-	53.4	53.9	0.5	
Vert	2768.400	AV	43.2	28.5	7.0	31.9	-	46.8	53.9	7.1	
Vert	3691.200	AV	44.9	29.1	7.4	31.6	-	49.8	53.9	4.1	
Vert	4614.000	AV	40.1	30.7	7.8	31.3	-	47.3	53.9	6.6	
Vert	5536.800	AV	35.4	32.0	8.2	31.4	-	44.2	53.9	9.7	
Vert	6459.600	AV	32.8	33.8	8.7	31.8	-	43.5	53.9	10.4	Floor noise
Vert	7382.400	AV	33.5	36.3	8.9	32.5	-	46.2	53.9	7.7	Floor noise
Vert	8305.200	AV	33.0	36.3	9.1	32.6	-	45.8	53.9	8.1	Floor noise
Vert	9228.000	AV	32.5	37.5	9.6	32.4	-	47.2	53.9	6.7	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (4.5 m / 3.0 m) = 3.53 dB

Radiated Spurious Emission

Report No.	12404720H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	October 4, 2018
Temperature / Humidity	23 deg. C / 67 % RH
Engineer	Akihiko Maeda
Mode	Tx 922.8 MHz

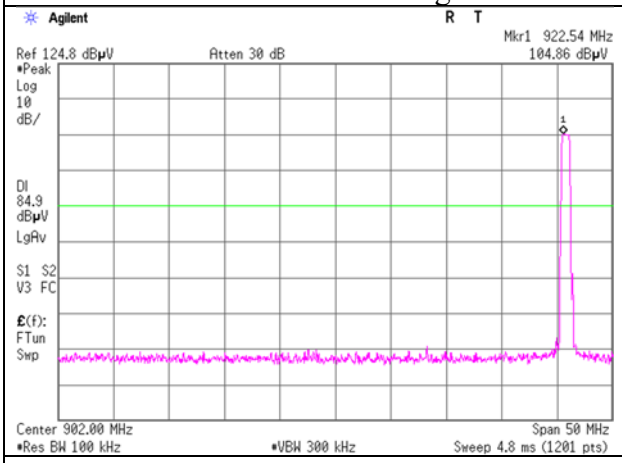
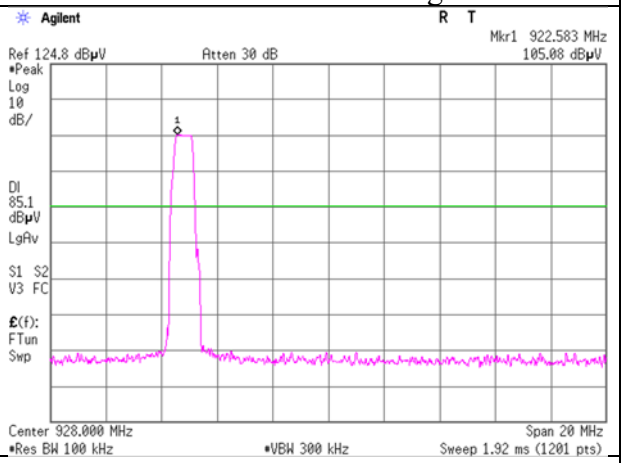
20dBc Data Sheet

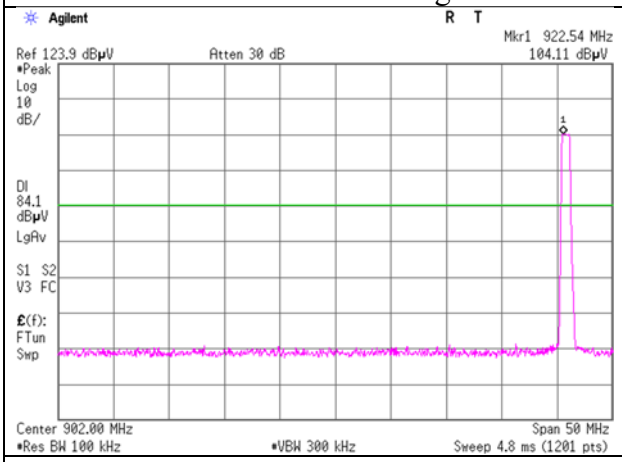
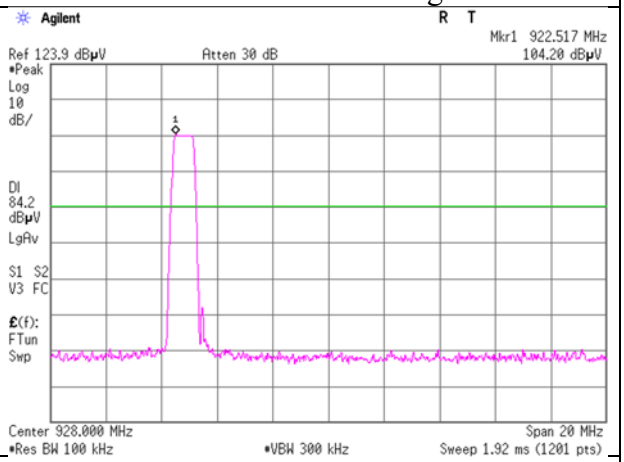
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	922.800	PK	105.1	22.1	13.3	31.1	109.4	-	-	Carrier
Hori	902.000	PK	27.9	22.1	13.2	31.2	32.0	89.4	57.4	
Hori	928.000	PK	28.6	22.1	13.3	31.1	32.9	89.4	56.5	
Vert	922.800	PK	104.2	22.1	13.3	31.1	108.5	-	-	Carrier
Vert	902.000	PK	29.0	22.1	13.2	31.2	33.1	88.5	55.4	
Vert	928.000	PK	31.3	22.1	13.3	31.1	35.6	88.5	52.9	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amprifier)

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	12404720H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	October 4, 2018
Temperature / Humidity	23 deg. C / 67 % RH
Engineer	Akihiko Maeda
Mode	Tx 922.8 MHz

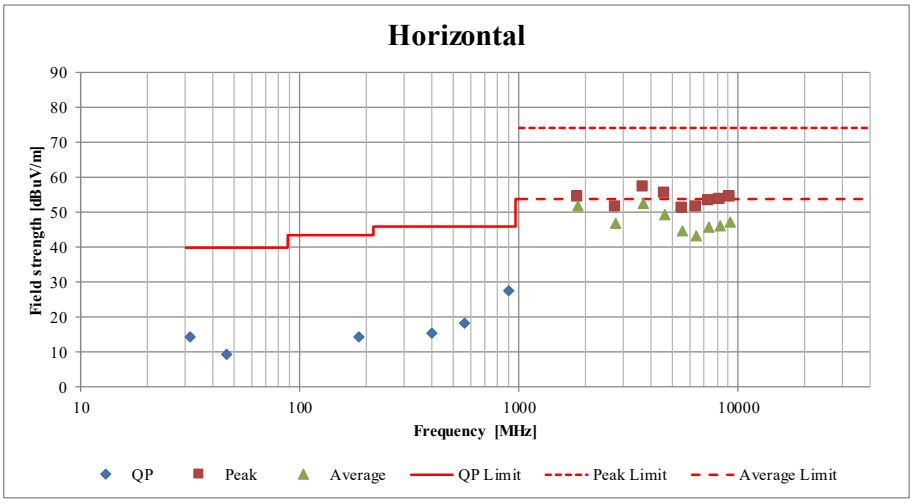
Horizontal	
Authorized-band band-edge Plot	Authorized-band band-edge Plot
	
20dBc Plot	20dBc Plot

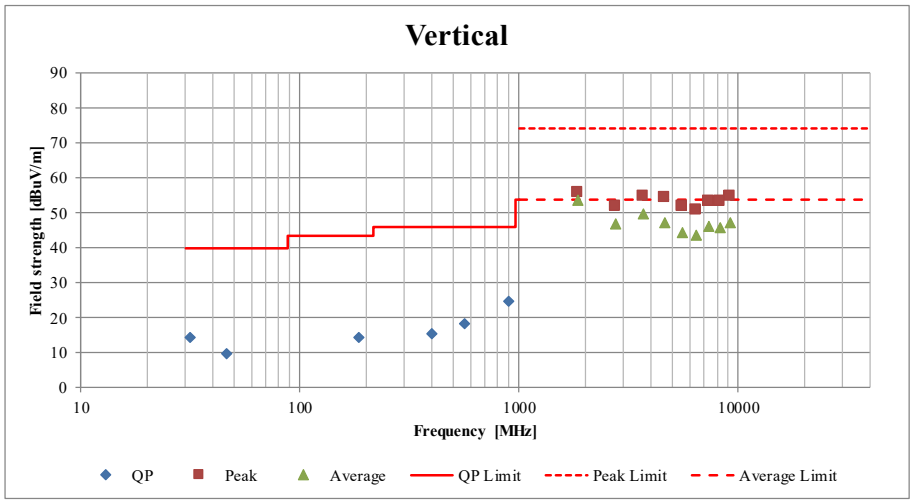
Vertical	
Authorized-band band-edge Plot	Authorized-band band-edge Plot
	
20dBc Plot	20dBc Plot

* Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission
(Plot data, Worst case)

Report No.	12404720H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	October 4, 2018
Temperature / Humidity	23 deg. C / 67 % RH
Engineer	Akihiko Maeda
Mode	Tx 922.8 MHz



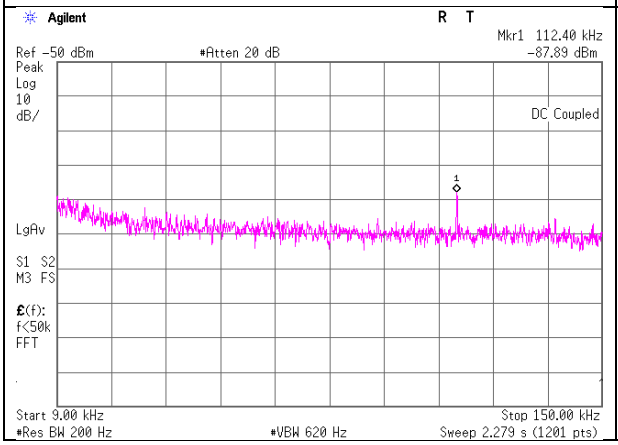


*These plots data contains sufficient number to show the trend of characteristic features for EUT.

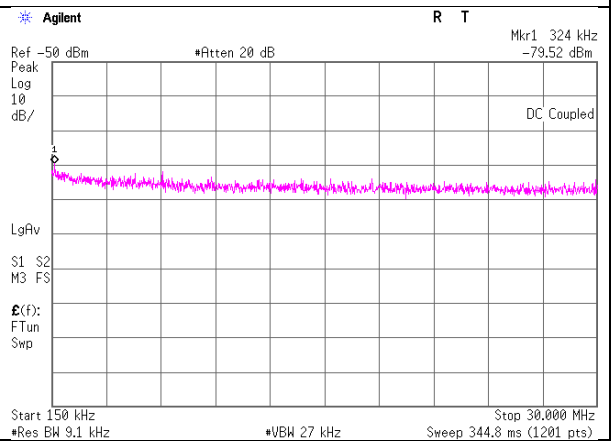
Conducted Spurious Emission

Report No.	12404720H
Test place	Ise EMC Lab. No.5 Shielded Room
Date	October 3, 2018
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx

9 kHz - 150 kHz



150 kHz - 30 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain* [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
112.40	-87.9	0.07	9.8	2.0	1	-76.0	300	6.0	-14.7	26.5	41.2	
324.00	-79.5	0.07	9.8	2.0	1	-67.6	300	6.0	-6.4	17.3	23.7	

E [dBuV/m] = EIRP [dBm] - 20 log (Distance [m]) + Ground bounce [dB] + 104.8 [dBuV/m]

EIRP[dBm] = Reading [dBm] + Cable loss [dB] + Attenuator Loss [dB] + Antenna gain [dBi] + 10 * log (N)

N: Number of output

*2.0 dBi was applied to the test result based on KDB 558074 since antenna gain was less than 2.0 dBi.

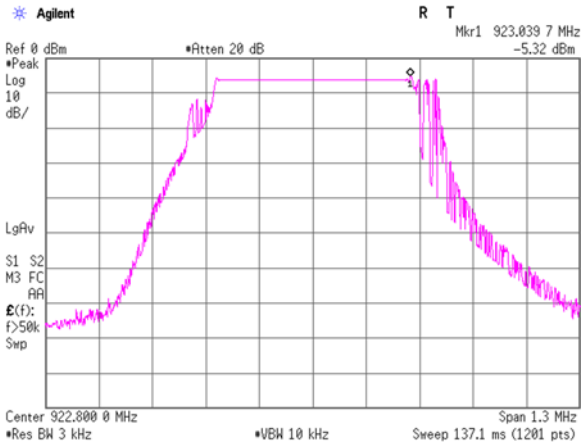
Power Density

Report No.	12404720H
Test place	Ise EMC Lab. No.5 Shielded Room
Date	October 3, 2018
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
922.80	-5.32	0.54	9.91	5.13	8.00	2.87

Sample Calculation:

Result = Reading + Cable Loss + Attenuator Loss



APPENDIX 2: Test instruments

Test Instruments

Test item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Cal Int
RE	141397	Coaxial Cable	UL Japan	-	-	6/13/2018	6/30/2019	12
RE	141545	DIGITAL HiTESTER	HIOKI	3805	51201148	1/9/2018	1/31/2019	12
RE	141951	EMI Test Receiver	Rohde & Schwarz	ESR26	101408	1/30/2018	1/31/2019	12
RE	141902	Spectrum Analyzer	AGILENT	E4440A	MY46187105	10/4/2018	10/31/2019	12
RE	142227	Measure	KOMELON	KMC-36	-	-	-	-
RE	141562	Thermo-Hygrometer	CUSTOM	CTH-180	1501	1/24/2018	1/31/2019	12
RE	148898	Attenuator	KEYSIGHT	8491A	MY52462282	10/3/2018	10/31/2019	12
RE	142017	AC4_Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 3m	DA-10005	4/7/2018	4/30/2019	12
RE	141412	Microwave Cable	Junkosha	MWX221	1305S002R(1m) / 1405S146(5m)	6/14/2018	6/30/2019	12
RE	141152	EMI measurement program	TSJ	TEPTO-DV	-	-	-	-
RE	142011	AC4_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	6/28/2018	6/30/2020	24
RE	141297	High Pass Filter(1.1-10GHz)	TOKYO KEIKI	TF219CD1	1001	1/18/2018	1/31/2019	12
RE	141508	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	6/8/2018	6/30/2019	12
RE	141267	Logperiodic Antenna(200-1000MHz)	Schwarzbeck	VUSLP9111B	911B-192	6/1/2018	6/30/2019	12
RE	141425	Biconical Antenna	Schwarzbeck	BBA9106	1302	6/1/2018	6/30/2019	12
AT	141343	Barometer	Sunoh	SBR121	596	2/8/2018	2/28/2021	36
AT	141812	Power Meter	AGILENT	8990B	MY51000271	8/21/2018	8/31/2019	12
AT	141156	Attenuator(10dB)	Weinschel Corp	2	BL1173	11/14/2017	11/30/2018	12
AT	141900	Spectrum Analyzer	AGILENT	E4440A	MY46185823	11/16/2017	11/30/2018	12
AT	141415	Microwave Cable	Murata	MXGS83RK3000	-	11/8/2017	11/30/2018	12
AT	141842	Power sensor	AGILENT	N1923A	MY54070003	8/21/2018	8/31/2019	12
AT	141563	Thermo-Hygrometer	CUSTOM	CTH-180	1701	1/24/2018	1/31/2019	12

***Hyphens for Last Calibration Date, Calibration Due Date and Cal Int (month) are instruments that Calibration is not required (e.g. software), or instruments checked in advance before use.**

The expiration date of the calibration is the end of the expired month.
All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test item: RE: Radiated Emission test
AT: Antenna Terminal Conducted test