



EMC TEST REPORT

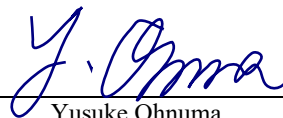
Test Report No.: 13273483S-C

Applicant : **Panasonic Corporation**
Type of EUT : **Seat Back ECU**
Model Number of EUT : **AT2002**
Test standard : **EN 301 489-1 V2.2.3**
EN 301 489-17 V3.1.1
Test result : **Complied (Refer to Section 3.2)**

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above standard.
4. The test results in this test report are traceable to the national or international standards.
5. This test report covers EMC technical requirements.
It does not cover administrative issues such as Manual or non-EMC test related Requirements. (if applicable)
6. The all test items in this test report are conducted by UL Japan, Inc. Shonan EMC Lab.
7. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
8. The information provided from the customer for this report is identified in Section 1.

Date of test: March 24 to 26, 2020

Representative test engineer:


Yusuke Ohnuma

Engineer
Consumer Technology Division

Approved by:


Akira Sato

Engineer
Consumer Technology Division

- ☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.
☒ There is no testing item of "Non-accreditation".



UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone: +81 463 50 6400

Facsimile: +81 463 50 6401

REVISION HISTORY

Original Test Report No.: 13273483S-C

Revision	Test report No.	Date	Page revised	Contents
- (Original)	13273483S-C	April 21, 2020	-	-

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone: +81 463 50 6400

Facsimile: +81 463 50 6401

Reference: Abbreviations (Including words undescribed in this report)

AAN	Asymmetric Artificial Network	ILAC	International Laboratory Accreditation Conference
AC	Alternating Current	ISED	Innovation, Science and Economic Development Canada
AM	Amplitude Modulation	ISN	Impedance Stabilization Network
AMN	Artificial Mains Network	ISO	International Organization for Standardization
Amp, AMP	Amplifier	JAB	Japan Accreditation Board
ANSI	American National Standards Institute	LAN	Local Area Network
Ant, ANT	Antenna	LCL	Longitudinal Conversion Loss
AP	Access Point	LIMS	Laboratory Information Management System
ASK	Amplitude Shift Keying	LISN	Line Impedance Stabilization Network
Atten., ATT	Attenuator	MRA	Mutual Recognition Arrangement
AV	Average	N/A	Not Applicable
BPSK	Binary Phase-Shift Keying	NIST	National Institute of Standards and Technology
BR	Bluetooth Basic Rate	NS	No signal detect.
BT	Bluetooth	NSA	Normalized Site Attenuation
BT LE	Bluetooth Low Energy	NVLAP	National Voluntary Laboratory Accreditation Program
BW	BandWidth	OBW	Occupied Band Width
C.F	Correction Factor	OFDM	Orthogonal Frequency Division Multiplexing
Cal Int	Calibration Interval	PK	Peak
CAV	CISPR AV	P _{LT}	long-term flicker severity
CCK	Complementary Code Keying	POHC(A)	Partial Odd Harmonic Current
CDN	Coupling Decoupling Network	Pol., Pola.	Polarization
Ch., CH	Channel	PR-ASK	Phase Reversal ASK
CISPR	Comite International Special des Perturbations Radioelectriques	P _{ST}	short-term flicker severity
Corr.	Correction	QAM	Quadrature Amplitude Modulation
CPE	Customer premise equipment	QP	Quasi-Peak
CW	Continuous Wave	QPSK	Quadri-Phase Shift Keying
DBPSK	Differential BPSK	r.m.s., RMS	Root Mean Square
DC	Direct Current	RBW	Resolution Band Width
DET	Detector	RE	Radio Equipment
D-factor	Distance factor	REV	Reverse
Dmax	maximum absolute voltage change during an observation period	RF	Radio Frequency
DQPSK	Differential QPSK	RFID	Radio Frequency Identifier
DSSS	Direct Sequence Spread Spectrum	RSS	Radio Standards Specifications
EDR	Enhanced Data Rate	Rx	Receiving
e.i.r.p., EIRP	Equivalent Isotropically Radiated Power	SINAD	Ratio of (Signal + Noise + Distortion) to (Noise + Distortion)
EM clamp	Electromagnetic clamp	S/N	Signal to Noise ratio
EMC	ElectroMagnetic Compatibility	SA, S/A	Spectrum Analyzer
EMI	ElectroMagnetic Interference	SG	Signal Generator
EMS	ElectroMagnetic Susceptibility	SVSWR	Site-Voltage Standing Wave Ratio
EN	European Norm	THC(A)	Total Harmonic Current
e.r.p., ERP	Effective Radiated Power	THD(%)	Total Harmonic Distortion
EU	European Union	TR	Test Receiver
EUT	Equipment Under Test	Tx	Transmitting
Fac.	Factor	VBW	Video BandWidth
FCC	Federal Communications Commission	Vert.	Vertical
FHSS	Frequency Hopping Spread Spectrum	WLAN	Wireless LAN
FM	Frequency Modulation	xDSL	Generic term for all types of DSL technology (DSL: Digital Subscriber Line)
Freq.	Frequency		
FSK	Frequency Shift Keying		
Fund	Fundamental		
FWD	Forward		
GFSK	Gaussian Frequency-Shift Keying		
GNSS	Global Navigation Satellite System		
GPS	Global Positioning System		
Hori.	Horizontal		
ICES	Interference-Causing Equipment Standard		
I/O	Input/Output		
IEC	International Electrotechnical Commission		
IEEE	Institute of Electrical and Electronics Engineers		
IF	Intermediate Frequency		

UL Japan, Inc.**Shonan EMC Lab.**

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone: +81 463 50 6400

Facsimile: +81 463 50 6401

CONTENTS

	Page
Section 1 : Customer information	5
Section 2 : Equipment under test (E.U.T.)	5
Section 3 : Test specification, procedures and results	6
Section 4 : Operation of E.U.T. during testing	11
Section 5 : Conducted emission	13
Section 6 : Radio-frequency electromagnetic field	14
Section 7 : Radio-frequency, common mode	16
Section 8 : Transients and surges (ISO 7637-2)	18
Appendix 1 : Photographs of test setup	21
Appendix 2 : Data of EMC test	25
Appendix 3 : Test instruments	28

Section 1: Customer information

Company Name : Panasonic Corporation
Address : 4261, Ikonobe-cho, Tsuzuki-ku, Yokohama-shi, Kanagawa-ken,
224-8520, Japan
Telephone Number : +81-50-3380-5341
Facsimile Number : +81-45-931-0806
Contact Person : Yuki Tojo

The information provided from the customer is as follows:

- Applicant, Type of Equipment, Model No. on the cover page and other relevant pages
- Section 1: Customer information
- Section 2: Equipment under test (E.U.T.)
- Section 4: Operation of E.U.T. during testing

* The laboratory is exempted from liability of any test results affected from the above information in Section 2 and 4.

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

2.1 Identification of E.U.T.

Type of Equipment : Seat Back ECU
Model No. : AT2002
Serial No. : Refer to SECTION 4.2
Rating : DC 13.2 V
Receipt Date of Sample : March 13, 2020
(Information from test lab.)
Country of Mass-production : Japan
Condition of EUT : Engineering 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: AT2002 (referred to as the EUT in this report) is a Seat Back ECU.

Radio Specification

Radio Type : Transceiver
Frequency of Operation : 2412 MHz - 2472 MHz
Modulation : DSSS, OFDM
Antenna type : Dipole
Antenna Gain : 0.85 dBi
Clock frequency (Maximum) : 48 MHz
Operating Temperature : -30 deg. C to +65 deg. C

List of Model No.

Model: AT2002 includes the following models:

CR-ET3BX0AJ (Tested model), CR-ET3BX1AJ, CR-ET3BX0BJ, CR-ET3BX1BJ

Difference of these models: Vehicle type, Destination

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone: +81 463 50 6400

Facsimile: +81 463 50 6401

Section 3 : Test specification, procedures and results

3.1 Test specification

EMC

Title : EN 301 489-1 V2.2.3
ElectroMagnetic Compatibility (EMC) standard for radio equipment and services;
Part 1: Common technical requirements;
Harmonised Standard for ElectroMagnetic Compatibility

Title : EN 301 489-17 V3.1.1
ElectroMagnetic Compatibility (EMC) standard for radio equipment and services;
Part 17: Specific conditions for Broadband Data Transmission Systems;
Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU

Purpose of test : Compliance with the RE directive 2014/53/EU

3.2 Procedures & results

EMI (vehicular use):

Item	Test procedure	Limits	Deviation	Worst margin	Result
Conducted emission (DC power input/output port)	EN 55032: 2015	Clause 8.3.3 Table 5	N/A	15.3 dB 0.48814 MHz, AV, -	Complied a)
Radiated emission	EN 55032: 2015	EN 55032 Class B	*1)	N/A	N/A

Note: UL Japan's work procedure No. 13-EM-W0420

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.

EMS (vehicular use):

Item	Test procedure	Specification	Criteria	Actual performance	Result
Radio-frequency electromagnetic field	EN 61000-4-3:2006 +A1:2008+A2:2010	Enclosure port: 80 MHz-6000 MHz: 3 V/m (unmodulated, r.m.s.) 80 % AM, 1 kHz	A, CT&CR	Enclosure port: 80 MHz-6000 MHz: 3 V/m (unmodulated, r.m.s.) *2) 80 % AM, 1 kHz	Complied b)
Transients and surges	Pulse 1, 2a, 2b, 3a, 3b: ISO 7637-2:2011 Pulse 4, Starting profile: ISO 7637-2:2004 ISO 16750-2:2012	DC power port: Test level III Pulse 1, 2a, 2b, 4, Starting profile: 10 Pulses Pulse 3a, 3b: 20 min	Refer to 3.4.1	Refer to 9.3.	Complied c)

Note: UL Japan's work procedures No. 13-EM-W0417

*1) The test is not applicable since the EUT does not have ancillary equipment.

*2) 2280 MHz to 2603.5 MHz: The exclusion band for 2.4 GHz equipment (clause 4.3 of EN 301 489-17)

- a) Refer to Appendix 2 (data of Conducted emission)
- b) Refer to Appendix 2 (data of Radio-frequency electromagnetic field)
- c) Refer to Appendix 2 (data of Transients and surges)

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone: +81 463 50 6400

Facsimile: +81 463 50 6401

3.3 Addition to standard

Item	Test procedure	Criteria	Actual performance	Result
Radio-frequency, common mode	EN 61000-4-6:2014	A, CT&CR	DC power/ Signal/control/ port: 0.15 MHz - 80 MHz: 3 V (unmodulated, r.m.s.) 80 % AM, 1 kHz	Complied d)
Note: UL Japan's work procedures No. 13-EM-W0417				

* Although the test is not applicable to the vehicle use equipment, the test has been performed according to the customer's request.

d) Refer to Appendix 2 (data of Radio-frequency, common mode)

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

3.4 Confirmation

UL Japan, Inc. hereby confirms that E.U.T., in the configuration tested, complies with the specifications EN 301 489-17 V3.1.1 and EN 301 489-1 V2.1.1.

3.5 Performance criteria (EN 301 489-17)

3.5.1 EN 301 489-1 (ISO 7637-2)

For transmitters, pulse 3a and 3b the performance criteria for continuous phenomena for transmitters shall apply.

For pulse 1, 2a, 2b, and 4 the performance criteria for transient phenomena for transmitter shall apply, with the exception that a communication link need not to be maintained during the EMC exposure and may have to be re-established.

For receivers, pulse 3a and 3b the performance criteria for continuous phenomena for receivers shall apply.

For pulse 1, 2a, 2b, and 4 the performance criteria for transient phenomena for receivers shall apply, with the exception that a communication link need not to be maintained during the EMC exposure and may have to be re-established.

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone: +81 463 50 6400

Facsimile: +81 463 50 6401

3.5.2 EN 301 489-17

The performance criteria are:

- Performance criteria A for immunity tests with phenomena of a continuous nature;
 - Performance criteria B for immunity tests with phenomena of a transient nature;
 - Performance criteria C for immunity tests with power interruptions exceeding a certain time.
- The equipment shall meet the minimum performance criteria as specified in the following clauses.

Performance table (clause 6.2, in EN 301 489-17)

Criteria	During test	After test
A	Shall operate as intended. (see note 1). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance (see note 3). Shall be no loss of function. Shall be no loss of stored data or user programmable functions.
B	May show loss of function (one or more) May show degradation of performance (see note 2). Shall be no unintentional transmissions.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3). Shall be no loss of stored data or user programmable functions.
C	May be loss of function (one or more)	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3).
<p>NOTE 1: Operate as intended during the test allows a level of degradation not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.</p> <p>NOTE 2: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.</p> <p>NOTE 3: No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.</p>		

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone: +81 463 50 6400

Facsimile: +81 463 50 6401

Performance criteria for Continuous phenomena applied to Transmitters (CT) (clause 6.3, in EN 301 489-17)

The performance criteria A shall apply.

Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an ACKnowledgement (ACK) or Not ACKnowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

Performance criteria for Transient phenomena applied to Transmitters (TT) (clause 6.4, in EN 301 489-17)

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply.

Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an acknowledgement (ACK) or not-acknowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

Performance criteria for Continuous phenomena applied to Receivers (CR) (clause 6.5, in EN 301 489-17)

The performance criteria A shall apply.

Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

Performance criteria for Transient phenomena applied to Receivers (TR) (clause 6.6, in EN 301 489-17)

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration for which performance criteria C shall apply.

Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

3.6 Uncertainty

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

EMI

There is no applicable rule of uncertainty in this applied standard. Therefore, the results are derived depending on whether or not laboratory uncertainty is applied.

Item	Frequency range	No.1 SAC ^{*1} /SR ^{*2} (±)	No.2 SAC/SR (±)	No.3 SAC/SR (±)
Conducted emission (AC Mains) AMN/LISN	150 kHz-30 MHz	2.6 dB	2.6 dB	2.5 dB

*1: SAC=Semi-Anechoic Chamber

*2: SR= Shielded Room is applied besides radiated emission

EMS

These tests are qualitative tests and uncertainties do not apply directly to the results.

The uncertainty of the EMS testing of the laboratory is within the tolerance specified by the each standard.

3.7 Test Location

UL Japan, Inc. Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken 259-1220 JAPAN

Telephone number : +81 463 50 6400

Facsimile number : +81 463 50 6401

JAB Accreditation No. : RTL02610

Test room	Width x Depth x Height (m)	Test room	Width x Depth x Height (m)
No.1 Semi-anechoic chamber	20.6 x 11.3 x 7.65 Maximum measurement distance: 10 m	No.1 Shielded room	6.8 x 4.1 x 2.7
No.2 Semi-anechoic chamber	20.6 x 11.3 x 7.65 Maximum measurement distance: 10 m	No.2 Shielded room	6.8 x 4.1 x 2.7
No.3 Semi-anechoic chamber	12.7 x 7.7 x 5.35 Maximum measurement distance: 5 m	No.3 shielded room	6.3 x 4.7 x 2.7
No.4 Semi-anechoic chamber	8.1 x 5.1 x 3.55	No.4 Shielded room	4.4 x 4.7 x 2.7
		No.5 Shielded room	7.8 x 6.4 x 2.7
		No.6 Shielded room	7.8 x 6.4 x 2.7
		No.7 Shielded room	2.76 x 3.76 x 2.4
		No.8 Shielded room	3.45 x 5.5 x 2.4
		No.1 Measurement room	2.55 x 4.1 x 2.5

3.8 Test setup, Data of EMC & Test instruments

Refer to Appendix 1 to 3.

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone: +81 463 50 6400

Facsimile: +81 463 50 6401

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

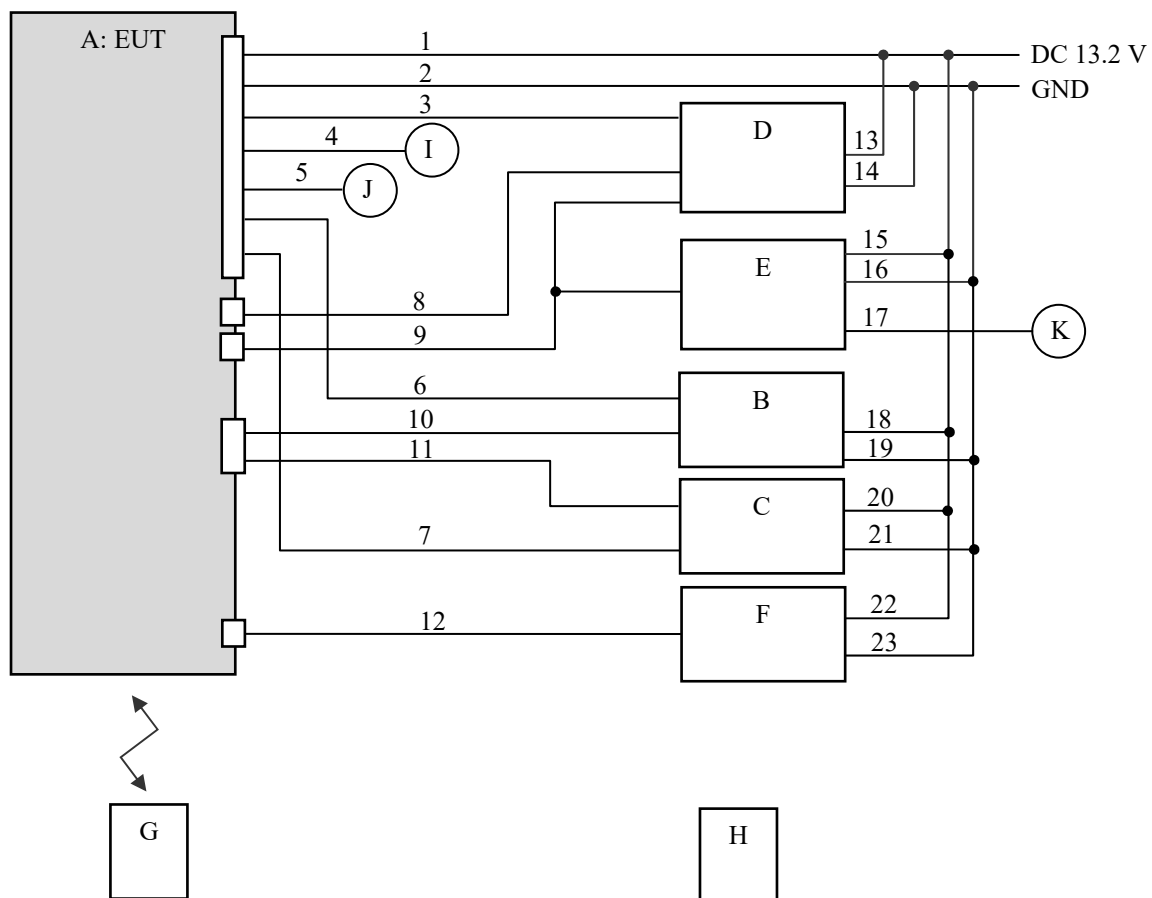
4.1 Operating modes

The EUT exercise program used during testing was designed to exercise the various system components in a manner similar to typical use.

Test sequence is used: WLAN Communication
Software (Firmware): WIFI Diag ver.9.94

Justification: The system was configured in a typical fashion, as a customer would normally use it, for testing.

4.2 Configuration and peripherals



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

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone: +81 463 50 6400

Facsimile: +81 463 50 6401

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Seat Back ECU	AT2002	ECU2_061	Panasonic	EUT
B	SB-Disp	CR-FL1AX0AJ	1S-058	Panasonic	-
C	SB-Disp	CR-FL1AX0AJ	1S-059	Panasonic	-
D	Main Unit	CV-BS48J2AJ	500778	Panasonic	-
E	Audio Amplifier	GM-4078ZT02	RKJA014303WL	PIONEER	-
F	BD Player	CR-BL17J0AJ	502876	Panasonic	-
G	Tablet Computer	PC-TE507FAW	HGEQZYDN	NEC	-
H	Remote Controller	CA-RLM7N0AJ	003	Panasonic	-
I	Earphone	-	-	-	-
J	Earphone	-	-	-	-
K	Speaker	KFC-RS160	-	KENWOOD	-

List of cables used

No.	Name	Length (m)	Shield- Cable	Shield- Connector	Remarks
1	DC+	3.9 0.3 *1) 3.0 *2) 0.5 *3)	Unshielded	Unshielded	System Harness1
2	GND	3.9 0.3 *1) 3.0 *2) 0.5 *3)	Unshielded	Unshielded	System Harness1
3	Signal	2.5	Unshielded	Unshielded	System Harness1
4	Earphone	2.5+1.2	Shielded	Shielded	System Harness2
5	Earphone	2.5+1.2	Shielded	Shielded	System Harness2
6	Signal	2.5	Unshielded	Unshielded	System Harness2
7	Signal	2.5	Unshielded	Unshielded	System Harness3
8	GVIF	2.5	Shielded	Shielded	GVIF Harness2
9	Step3 Harness	2.5	Shielded	Shielded	-
10	GVIF	2.5	Shielded	Shielded	GVIF Harness1
11	GVIF	2.5	Shielded	Shielded	GVIF Harness1
12	HDMI	2.5	Shielded	Shielded	-
13	DC+	3.9	Unshielded	Unshielded	-
14	GND	3.9	Unshielded	Unshielded	-
15	DC+	3.9	Unshielded	Unshielded	-
16	GND	3.9	Unshielded	Unshielded	-
17	Speaker	2.5+1.9	Unshielded	Unshielded	-
18	DC+	3.9	Unshielded	Unshielded	-
19	GND	3.9	Unshielded	Unshielded	-
20	DC+	3.9	Unshielded	Unshielded	-
21	GND	3.9	Unshielded	Unshielded	-
22	DC+	3.9	Unshielded	Unshielded	-
23	GND	3.9	Unshielded	Unshielded	-

*1) Radio-frequency, common mode test

*2) Radiated electromagnetic fields test

*3) Transients and surges test

UL Japan, Inc.**Shonan EMC Lab.**

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone: +81 463 50 6400

Facsimile: +81 463 50 6401

Section 5 : Conducted emission

5.1 Operating environment

Test room : Refer to data
Temperature : Refer to data
Humidity : Refer to data

5.2 Test configuration

EUT was placed on a platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity. The rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT, including peripherals was aligned and was flushed with rear of tabletop. All other surfaces of tabletop were at least 80 cm from any other grounded conducting surface. The EUT was connected to an Artificial Mains Network (AMN). EUT was located 80 cm from AMN and excess DC cable was bundled in center. Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through an AMN to the input power source. All unused 50 ohm connectors of the AMN were resistively terminated in 50 ohm when not connected to the measuring equipment. Photographs of the set up are shown in Appendix 1.

5.3 Test conditions

Frequency range : 0.15 MHz - 30 MHz
EUT position : Table top

5.4 Test procedure

The emission had been measured with the EUT in the shielded room. The EUT was connected to an Artificial Mains Network (AMN).

An overview sweep with peak detection has been performed.

The measurements had been performed with a quasi-peak detector and if required, with a CISPR average detector (CAV).

The conducted emission measurements were made with the following detector function of the test receiver.

Detector Type : QP / CAV
IF Bandwidth : 9 kHz / 9 kHz

5.5 Results

Summary of the test results : Pass

Section 6 : Radio-frequency electromagnetic field

6.1 Operating environment

Test room : Refer to data
Temperature : Refer to data
Humidity : Refer to data
Atmosphere : Refer to data

6.2 Test configuration

The EUT was placed on non-metallic table height of 0.8 m above the reference ground plane.
Photographs of the set up are shown in Appendix 1.

6.3 Test condition

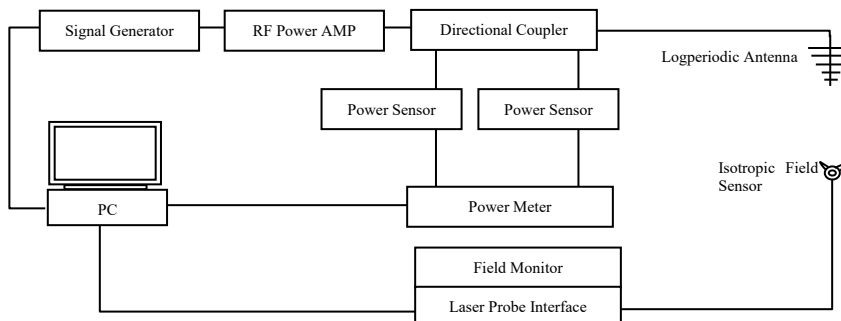
Frequency range : 80 MHz - 6000 MHz
Antenna : Logperiodic (80 MHz-1000 MHz), Horn (1 GHz-6 GHz)
EUT position : Table top

6.4 Generation of the electromagnetic field

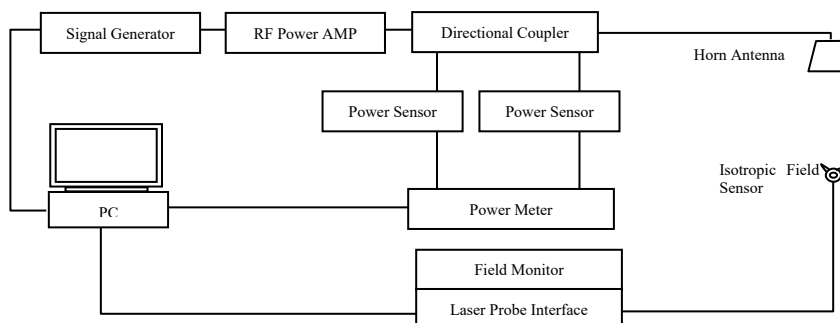
The electromagnetic field is generated from a signal generator controlled by a computer.
The output power is amplified and then radiated from broadband antenna.
At every test frequency the field strength is checked prior to the actual test by placing the field sensor at the same distance from and in the same relative location to, the field generating antenna, as will be used by the EUT.

RS test system:

Frequency range: 80 MHz to 1000 MHz



Frequency range from 1 GHz to 6 GHz



UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone: +81 463 50 6400

Facsimile: +81 463 50 6401

6.5 Test procedure

The verification of performance was established by monitoring the operating EUT with a video camera during the test. The test was divided to cover the complete frequency span; 2 polarizations and 4 sides of the EUT facing the antenna.

6.6 Results

Summary of the test results : Pass

Tested Frequency List: 80 MHz -1000 MHz

80.000	102.582	131.539	168.681	216.305	277.386	355.714	456.163	584.982	750.187	962.052
80.800	103.607	132.854	170.367	218.468	280.159	359.271	460.724	590.831	757.688	971.672
81.608	104.643	134.182	172.070	220.652	282.960	362.863	465.331	596.739	765.264	981.388
82.424	105.689	135.523	173.790	222.858	285.789	366.491	469.984	602.706	772.916	991.201
83.248	106.745	136.878	175.527	225.086	288.646	370.155	474.683	608.733	780.645	1000.000
84.080	107.812	138.246	177.282	227.336	291.532	373.856	479.429	614.820	788.451	
84.920	108.890	139.628	179.054	229.609	294.447	377.594	484.223	620.968	796.335	
85.769	109.978	141.024	180.844	231.905	297.391	381.369	489.065	627.177	804.298	
86.626	111.077	142.434	182.652	234.224	300.364	385.182	493.955	633.448	812.341	
87.492	112.187	143.858	184.478	236.566	303.367	389.033	498.894	639.782	820.464	
88.366	113.308	145.296	186.322	238.931	306.40	392.923	503.882	646.179	828.668	
89.249	114.441	146.749	188.185	241.320	309.464	396.852	508.920	652.640	836.954	
90.141	115.585	148.216	190.066	243.733	312.558	400.820	514.009	659.166	845.323	
91.042	116.740	149.698	191.966	246.170	315.683	404.828	519.149	665.757	853.776	
91.952	117.907	151.195	193.885	248.631	318.839	408.876	524.340	672.414	862.313	
92.871	119.086	152.707	195.823	251.117	322.027	412.964	529.583	679.138	870.936	
93.799	120.276	154.234	197.781	253.628	325.247	417.093	534.878	685.929	879.645	
94.737	121.478	155.776	199.758	256.164	328.499	421.263	540.226	692.788	888.441	
95.684	122.692	157.333	201.755	258.725	331.784	425.475	545.628	699.715	897.325	
96.640	123.918	158.906	203.772	261.312	335.101	429.729	551.084	706.712	906.298	
97.606	125.157	160.495	205.809	263.925	338.452	434.026	556.594	713.779	915.361	
98.582	126.408	162.100	207.867	266.564	341.836	438.366	562.159	720.916	924.514	
99.567	127.672	163.721	209.945	269.229	345.254	442.749	567.780	728.125	933.759	
100.562	128.948	165.358	212.044	271.921	348.706	447.176	573.457	735.406	943.096	
101.567	130.237	167.011	214.164	274.640	352.193	451.647	579.191	742.760	952.527	

Tested Frequency List: 1000 MHz -6000 MHz

1000.000	1184.298	1402.562	1661.053	1967.184	2329.735	2754.270	3261.894	3863.076	4575.058	5418.261
1010.000	1196.141	1416.587	1677.663	1986.855	2353.032	2781.813	3294.513	3901.706	4620.808	5472.444
1020.100	1208.102	1430.752	1694.439	2006.723	2376.562	2809.631	3327.458	3940.724	4667.016	5527.168
1030.301	1220.183	1445.059	1711.383	2026.790	2400.327	2837.727	3360.733	3980.131	4713.687	5582.440
1040.604	1232.384	1459.509	1728.496	2047.057	2424.33	2866.104	3394.340	4019.932	4760.823	5638.264
1051.010	1244.707	1474.104	1745.781	2067.527	2448.573	2894.765	3428.284	4060.131	4808.432	5694.647
1061.520	1257.154	1488.845	1763.238	2088.202	2473.058	2923.713	3462.566	4100.733	4856.516	5751.593
1072.135	1269.725	1503.733	1780.870	2109.084	2497.788	2952.950	3497.192	4141.740	4905.081	5809.109
1082.856	1282.422	1518.770	1798.678	2130.174	2522.765	2982.480	3532.164	4183.157	4954.132	5867.200
1093.684	1295.246	1533.957	1816.664	2151.475	2547.992	3012.305	3567.486	4224.989	5003.673	5925.872
1104.620	1308.198	1549.296	1834.830	2172.989	2573.471	3042.428	3603.160	4267.239	5053.710	5985.131
1115.666	1321.28	1564.789	1853.178	2194.718	2599.205	3072.852	3639.192	4309.911	5104.247	6000.000
1126.822	1334.492	1580.436	1871.709	2216.665	2625.197	3103.580	3675.584	4353.010	5155.290	
1138.090	1347.836	1596.240	1890.426	2238.831	2651.449	3134.616	3712.340	4396.541	5206.842	
1149.470	1361.314	1612.202	1909.330	2261.219	2677.963	3165.962	3749.463	4440.506	5258.911	
1160.964	1374.927	1628.324	1928.423	2283.831	2700.000	3197.622	3786.958	4484.911	5311.500	
1172.573	1388.676	1644.607	1947.707	2306.669	2727.000	3229.598	3824.827	4529.760	5364.615	

* 2280 MHz to 2603.5 MHz: The exclusion band for equipment operating in the 2.4 GHz band (clause 4.3 of EN 301 489-17)

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone: +81 463 50 6400

Facsimile: +81 463 50 6401

Section 7 : Radio-frequency, common mode

7.1 Operating environment

Test room : Refer to data
Temperature : Refer to data
Humidity : Refer to data
Atmosphere : Refer to data

7.2 Test configuration

The EUT was placed on non-metallic pallet height of 0.1 m above the reference ground plane.
Photographs of the set up are shown in Appendix 1.

7.3 Test condition

Frequency range : 0.15 MHz - 80 MHz
EUT position : Floor standing

7.4 Test procedure

The performance of the EUT was monitored continuously.

7.5 Results

Summary of the test results : Pass

The EUT operated without any recorded disturbance during the test.

Tested Frequency List: 0.15 MHz - 80 MHz

0.1500	0.2461	0.4057	0.6704	1.1103	1.8415	3.0556	5.0722	8.4220	13.9861	23.2284	38.5809	64.0826
0.1515	0.2485	0.4097	0.6771	1.1214	1.8599	3.0861	5.1229	8.5062	14.1259	23.4606	38.9667	64.7234
0.1530	0.2509	0.4137	0.6838	1.1326	1.8784	3.1169	5.1741	8.5912	14.2671	23.6952	39.3563	65.3706
0.1545	0.2534	0.4178	0.6906	1.1439	1.8971	3.1480	5.2258	8.6771	14.4097	23.9321	39.7498	66.0243
0.1560	0.2559	0.4219	0.6975	1.1553	1.9160	3.1794	5.2780	8.7638	14.5537	24.1714	40.1472	66.6845
0.1575	0.2584	0.4261	0.7044	1.1668	1.9351	3.2111	5.3307	8.8514	14.6992	24.4131	40.5486	67.3513
0.1590	0.2609	0.4303	0.7114	1.1784	1.9544	3.2432	5.3840	8.9399	14.8461	24.6572	40.9540	68.0248
0.1605	0.2635	0.4346	0.7185	1.1901	1.9739	3.2756	5.4378	9.0292	14.9945	24.9037	41.3635	68.7050
0.1621	0.2661	0.4389	0.7256	1.2020	1.9936	3.3083	5.4921	9.1194	15.1444	25.1527	41.7771	69.3920
0.1637	0.2687	0.4432	0.7328	1.2140	2.0135	3.3413	5.5470	9.2105	15.2958	25.4042	42.1948	70.0859
0.1653	0.2713	0.4476	0.7401	1.2261	2.0336	3.3747	5.6024	9.3026	15.4487	25.6582	42.6167	70.7867
0.1669	0.2740	0.4520	0.7475	1.2383	2.0539	3.4084	5.6584	9.3956	15.6031	25.9147	43.0428	71.4945
0.1685	0.2767	0.4565	0.7549	1.2506	2.0744	3.4424	5.7149	9.4895	15.7591	26.1738	43.4732	72.2094
0.1701	0.2794	0.4610	0.7624	1.2631	2.0951	3.4768	5.7720	9.5843	15.9166	26.4355	43.9079	72.9314
0.1718	0.2821	0.4656	0.7700	1.2757	2.1160	3.5115	5.8297	9.6801	16.0757	26.6998	44.3469	73.6607
0.1735	0.2849	0.4702	0.7777	1.2884	2.1371	3.5466	5.8879	9.7769	16.2364	26.9667	44.7903	74.3973
0.1752	0.2877	0.4749	0.7854	1.3012	2.1584	3.5820	5.9467	9.8746	16.3987	27.2363	45.2382	75.1412
0.1769	0.2905	0.4796	0.7932	1.3142	2.1799	3.6178	6.0061	9.9733	16.5626	27.5086	45.6905	75.8926
0.1786	0.2934	0.4843	0.8011	1.3273	2.2016	3.6539	6.0661	10.0730	16.7282	27.7836	46.1474	76.6515
0.1803	0.2963	0.4891	0.8091	1.3405	2.2236	3.6904	6.1267	10.1737	16.8954	28.0614	46.6088	77.4180
0.1821	0.2992	0.4939	0.8171	1.3539	2.2458	3.7273	6.1879	10.2754	17.0643	28.3420	47.0748	78.1921
0.1839	0.3021	0.4988	0.8252	1.3674	2.2682	3.7645	6.2497	10.3781	17.2349	28.6254	47.5455	78.9740
0.1857	0.3051	0.5037	0.8334	1.3810	2.2908	3.8021	6.3121	10.4818	17.4072	28.9116	48.0209	79.7637
0.1875	0.3081	0.5087	0.8417	1.3948	2.3137	3.8401	6.3752	10.5866	17.5812	29.2007	48.5011	80.0000
0.1893	0.3111	0.5137	0.8501	1.4087	2.3368	3.8785	6.4389	10.6924	17.7570	29.4927	48.9861	
0.1911	0.3142	0.5188	0.8586	1.4227	2.3601	3.9172	6.5032	10.7993	17.9345	29.7876	49.4759	
0.1930	0.3173	0.5239	0.8671	1.4369	2.3837	3.9563	6.5682	10.9072	18.1138	30.0854	49.9706	
0.1949	0.3204	0.5291	0.8757	1.4512	2.4075	3.9958	6.6338	11.0162	18.2949	30.3862	50.4703	
0.1968	0.3236	0.5343	0.8844	1.4657	2.4315	4.0357	6.7001	11.1263	18.4778	30.6900	50.9750	
0.1987	0.3268	0.5396	0.8932	1.4803	2.4558	4.0760	6.7671	11.2375	18.6625	30.9969	51.4847	
0.2006	0.3300	0.5449	0.9021	1.4951	2.4803	4.1167	6.8347	11.3498	18.8491	31.3068	51.9995	
0.2026	0.3333	0.5503	0.9111	1.5100	2.5051	4.1578	6.9030	11.4632	19.0375	31.6198	52.5194	
0.2046	0.3366	0.5558	0.9202	1.5251	2.5301	4.1993	6.9720	11.5778	19.2278	31.9359	53.0445	
0.2066	0.3399	0.5613	0.9294	1.5403	2.5554	4.2412	7.0417	11.6935	19.4200	32.2552	53.5749	
0.2086	0.3432	0.5669	0.9386	1.5557	2.5809	4.2836	7.1121	11.8104	19.6142	32.5777	54.1106	
0.2106	0.3466	0.5725	0.9479	1.5712	2.6067	4.3264	7.1832	11.9285	19.8103	32.9034	54.6517	
0.2127	0.3500	0.5782	0.9573	1.5869	2.6327	4.3696	7.2550	12.0477	20.0084	33.2324	55.1982	
0.2148	0.3535	0.5839	0.9668	1.6027	2.6590	4.4132	7.3275	12.1681	20.2084	33.5647	55.7501	
0.2169	0.3570	0.5897	0.9764	1.6187	2.6855	4.4573	7.4007	12.2897	20.4104	33.9003	56.3076	
0.2190	0.3605	0.5955	0.9861	1.6348	2.7123	4.5018	7.4747	12.4125	20.6145	34.2393	56.8706	
0.2211	0.3641	0.6014	0.9959	1.6511	2.7394	4.5468	7.5494	12.5366	20.8206	34.5816	57.4393	
0.2233	0.3677	0.6074	1.0058	1.6676	2.7667	4.5922	7.6248	12.6619	21.0288	34.9274	58.0136	
0.2255	0.3713	0.6134	1.0158	1.6842	2.7943	4.6381	7.7010	12.7885	21.2390	35.2766	58.5937	
0.2277	0.3750	0.6195	1.0259	1.7010	2.8222	4.6844	7.7780	12.9163	21.4513	35.6293	59.1796	
0.2299	0.3787	0.6256	1.0361	1.7180	2.8504	4.7312	7.8557	13.0454	21.6658	35.9855	59.7713	
0.2321	0.3824	0.6318	1.0464	1.7351	2.8789	4.7785	7.9342	13.1758	21.8824	36.3453	60.3690	
0.2344	0.3862	0.6381	1.0568	1.7524	2.9076	4.8262	8.0135	13.3075	22.1012	36.7087	60.9726	
0.2367	0.3900	0.6444	1.0673	1.7699	2.9366	4.8744	8.0936	13.4405	22.3222	37.0757	61.5823	
0.2390	0.3939	0.6508	1.0779	1.7875	2.9659	4.9231	8.1745	13.5749	22.5454	37.4464	62.1981	
0.2413	0.3978	0.6573	1.0886	1.8053	2.9955	4.9723	8.2562	13.7106	22.7708	37.8208	62.8200	
0.2437	0.4017	0.6638	1.0994	1.8233	3.0254	5.0220	8.3387	13.8477	22.9985	38.1990	63.4482	

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone: +81 463 50 6400

Facsimile: +81 463 50 6401

Section 8 : Transients and surges (ISO 7637-2)

8.1 Operating environment

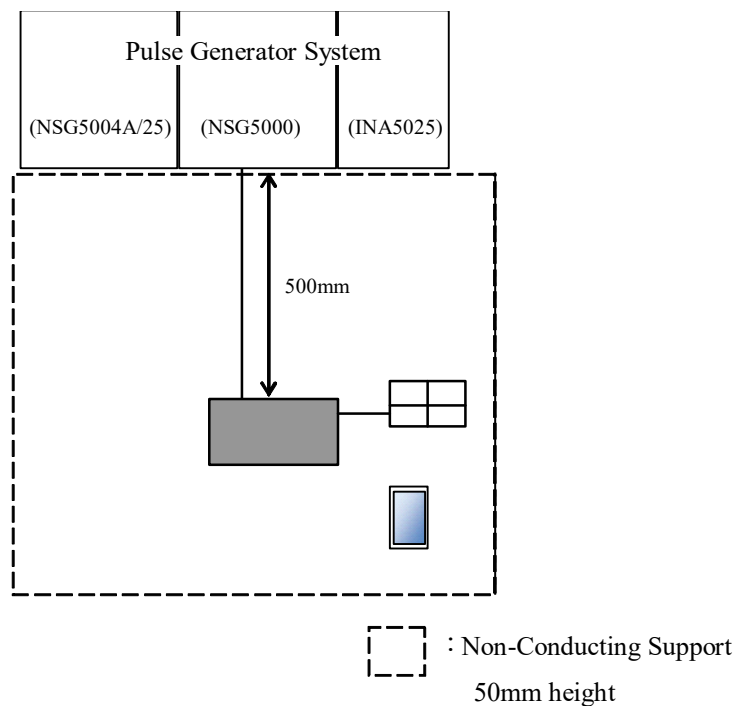
The test was carried out on a reference ground plane in No.3 shielded room.

Temperature : 23 deg. C.
Humidity : 39 % RH
Atmosphere : 1009 hPa

8.2 Test configuration

The EUT was placed on a non-metallic pallet height of 50 mm above the reference ground plane. Photographs of the set up are shown in Appendix 1.

Figure 2. Drawing of the test set-up



8.3 Test condition

Performance criterion : Refer to 3.5.1.
EUT position : Floor standing
EUT operation mode : WLAN Communication

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone: +81 463 50 6400

Facsimile: +81 463 50 6401

Test level specified in EN 301 489-1 V2.1.1, clause 9.6 was applied.

1) Pulse 1

Test level (Us) : III (-112 V)
Number of Pulses : 10
Ri : 10 ohm
Pulse cycle time (t1) : 0.5 sec
Ua : 13.5 V

2) Pulse 2a

Test level (Us) : III (+55 V)
Number of Pulses : 10
Ri : 2 ohm
Pulse cycle time (t1) : 0.2 sec
Ua : 13.5 V

3) Pulse 2b

Test level (Us) : III (+10 V)
Number of Pulses : 10
Ri : 0 ohm
Td : 200 msec / 2000 msec
Ua : 13.5 V

4) Pulse 3a

Test level (Us) : III (-165 V)
Duration of each test : 20 min
Ua : 13.5 V

5) Pulse 3b

Test level (Us) : III (+112 V)
Duration of each test : 20 min
Ua : 13.5 V

6) Pulse 4

Test level (Us) : III (-6 V)
Number of Pulses : 10
T7 : 40 msec
T9 : 20 sec
T11 : 5 msec / 100 msec
Ua : -2.5 V / -6 V
Ub : 12 V

7) Starting profile

Test level (Us6) : III (+3 V)
Test level (Us) : III (+5 V)
Tf : 5 V
T6 : 15 ms
T7 : 50 ms
T8 : 1000 ms
Tr : 100 ms
Number of Pulses : 10

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone: +81 463 50 6400

Facsimile: +81 463 50 6401

8.4 Test procedure

The test Voltage was applied to the supply line. The performance of the EUT was monitored continuously.

8.5 Results

Date: March 24, 2020 by: Tsuyoki Yamagata

Summary of the test results : Pass

The equipment operated without any recorded disturbances.

Table 1. Test protocol

ISO 7637-2: 2011

Test No.	Pulse	Test level (V)	Pass / Fail
1	1	-112	Pass
2	2a	+55	Pass
3	2b	+10	Pass
4	3a	-165	Pass
5	3b	+112	Pass

ISO 7637-2: 2004

Test No.	Pulse	Test level (V)	Pass / Fail
1	4	-6	Pass

ISO 16750-2: 2012

Test No.	Test item	Test level	Pass / Fail
1	Starting profile	III	Pass

Appendix 1: Photographs of test setup

Conducted emission



UL Japan, Inc.

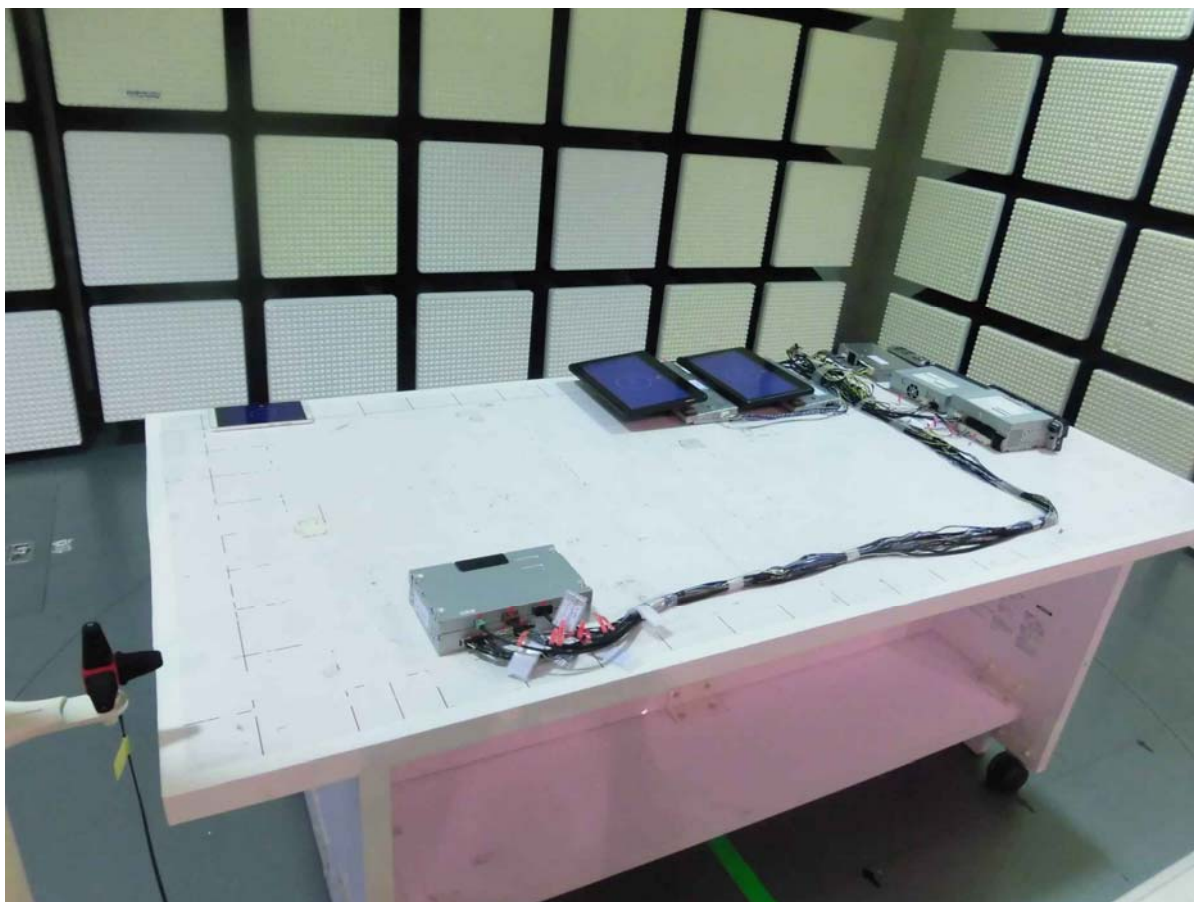
Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone: +81 463 50 6400

Facsimile: +81 463 50 6401

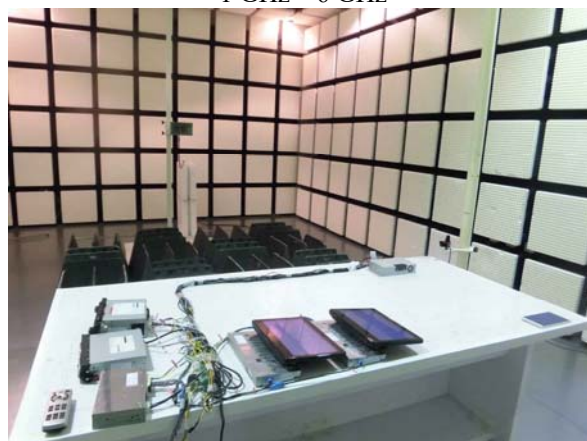
Radio-frequency electromagnetic field



80 MHz – 1000 MHz



1 GHz – 6 GHz



UL Japan, Inc.

Shonan EMC Lab.

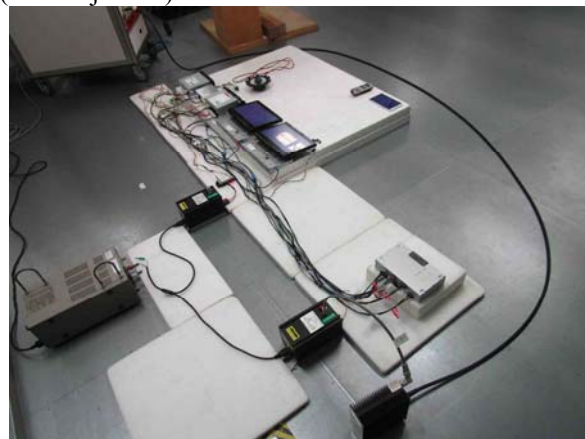
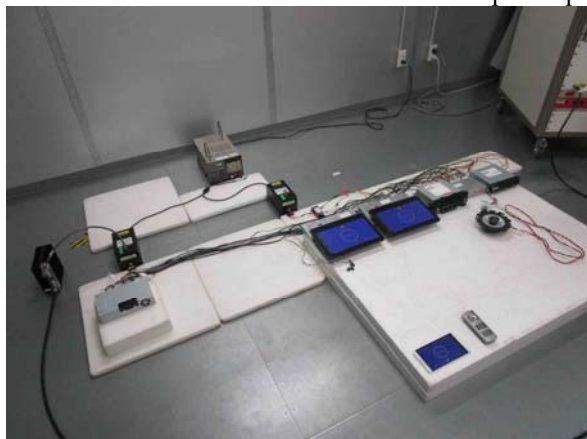
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone: +81 463 50 6400

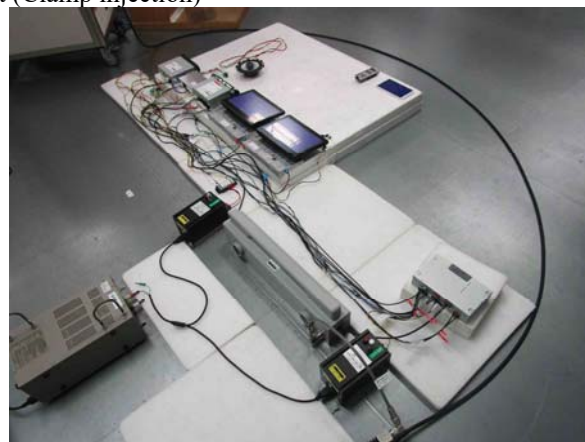
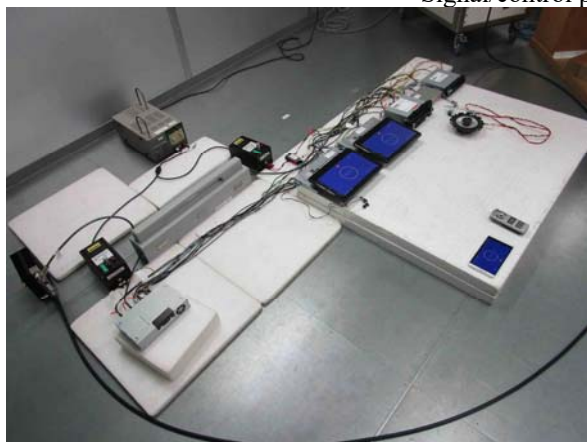
Facsimile: +81 463 50 6401

Radio-frequency, common mode

DC power port (CDN injection)



Signal/control port (Clamp injection)



UL Japan, Inc.

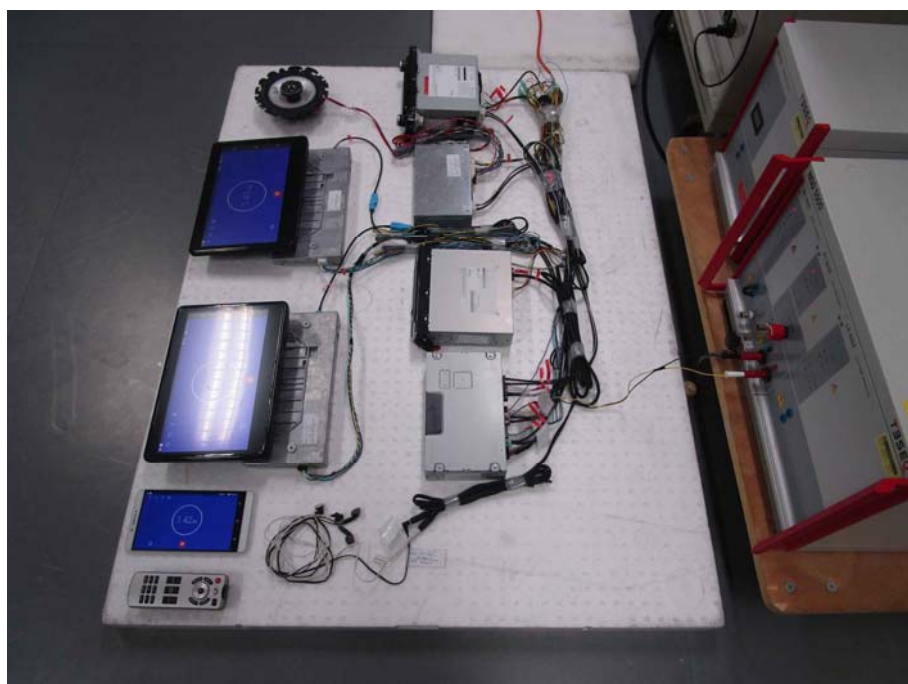
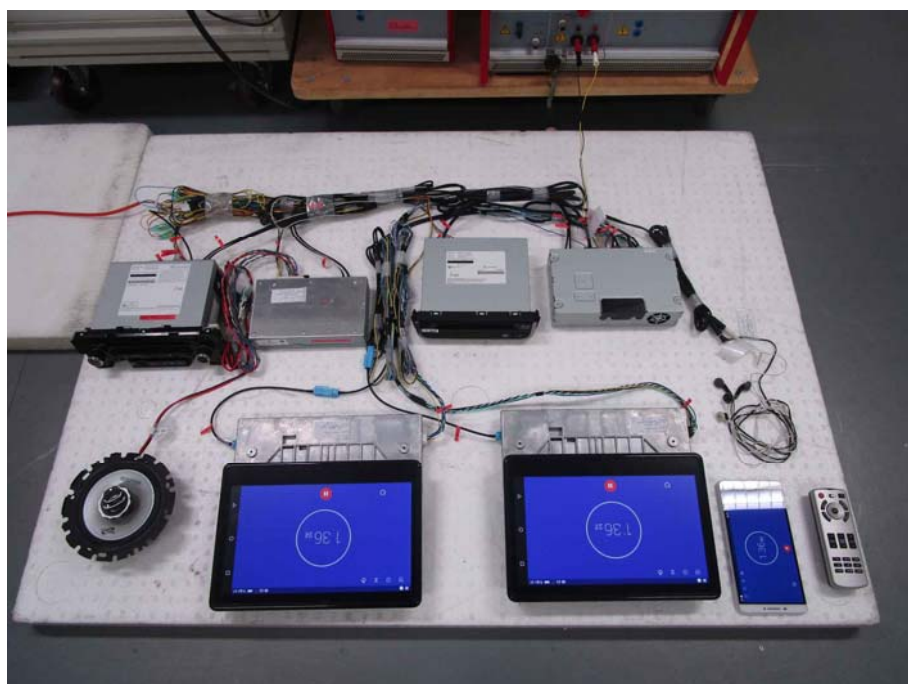
Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone: +81 463 50 6400

Facsimile: +81 463 50 6401

Transients and surges (ISO 7637-2)



UL Japan, Inc.
Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone: +81 463 50 6400

Facsimile: +81 463 50 6401

DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.1 Shielded Room
Date : 2020/03/24

Company : Panasonic Corporation

Kind of EUT : Seat Back ECU

Model No. : AT2002

Serial No. : ECU2_061

Remarks : -

Mode : WLAN Communication

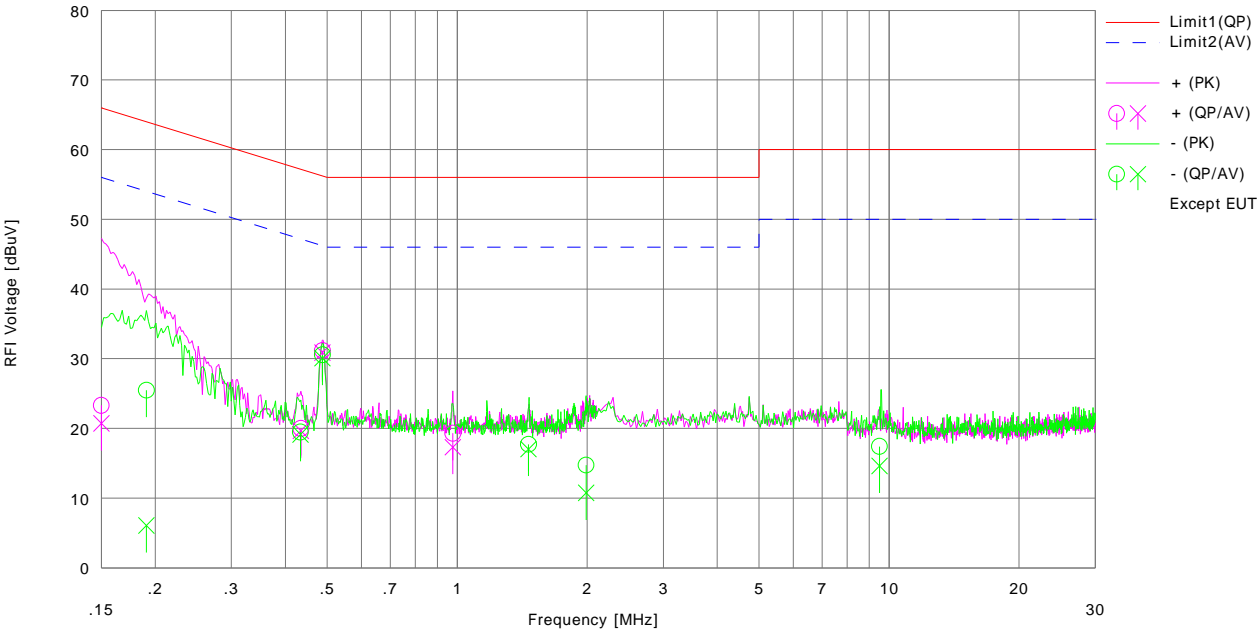
Order No. : 13273483S

Power : DC 13.2 V

Temp./Humi. : 23 deg.C / 39 %RH

Limit : EN 301489_DC mains(Table 5)

Engineer : Yusuke Ohnuma



No.	Freq. [MHz]	Reading		C.Fac [dB]	Results		Limit		Margin		Phase	Comment
		<QP>	<AV>		<QP>	<AV>	<QP>	<AV>	<QP>	<AV>		
		[dBuV]	[dBuV]		[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15000	10.00	7.40	13.31	23.31	20.71	66.00	56.00	42.6	35.2	+	
2	0.43470	6.80	6.50	13.17	19.97	19.67	57.16	47.16	37.1	27.4	+	
3	0.48814	18.00	17.70	13.17	31.17	30.87	56.20	46.20	25.0	15.3	+	
4	0.97724	6.10	4.10	13.20	19.30	17.30	56.00	46.00	36.7	28.7	+	
5	0.19095	12.20	-7.20	13.27	25.47	6.07	64.00	54.00	38.5	47.9	-	
6	0.43372	6.30	6.00	13.17	19.47	19.17	57.18	47.18	37.7	28.0	-	
7	0.48818	17.40	16.90	13.17	30.57	30.07	56.20	46.20	25.6	16.1	-	
8	1.46380	4.50	3.80	13.22	17.72	17.02	56.00	46.00	38.2	28.9	-	
9	1.99030	1.50	-2.50	13.24	14.74	10.74	56.00	46.00	41.2	35.2	-	
10	9.50070	3.90	1.10	13.51	17.41	14.61	60.00	50.00	42.5	35.3	-	



Radio frequency electromagnetic field

UL Japan, Inc. Shonan EMC Lab.
 Test Room : No.4 Semi-anechoic chamber
 Order No. : 13273483S

Company : Panasonic Corporation

Equipment : Seat Back ECU

Model No. : AT2002

Serial No. : ECU2_061

Test Mode : WLAN Communication

Power : DC 13.2 V

Standard : EN 301489

: EN 61000-4-3

Criterion : CT&CR, A

Date of test. : March 25, 2020

Temp. / Humid. : 25 deg.C / 32 %RH

Atmosphere : 1017 hPa

Engineer : Masahide Ozaki

EUT Setup : ☒ Table Top (Non-metallic table height of 0.8 m)

☐ Floor Standing (Non-metallic pallet height of 0.1 m)

Frequency step size : 1 %

Dwell time : 2 sec

Freq. Range		80 - 1000 MHz	1000 - 2700 MHz	2700 - 6000 MHz	Remarks
Test level		3 V/m	3 V/m	3 V/m	
Modulation		<input checked="" type="checkbox"/> AM 80 % 1 kHz	<input checked="" type="checkbox"/> AM 80 % 1 kHz	<input checked="" type="checkbox"/> AM 80 % 1 kHz	
		<input type="checkbox"/> Pulse Hz %	<input type="checkbox"/> Pulse Hz %	<input type="checkbox"/> Pulse Hz %	
		<input type="checkbox"/> Unmodulated	<input type="checkbox"/> Unmodulated	<input type="checkbox"/> Unmodulated	
Antenna Height		1.55 m	1.55 m	1.55 m	Remarks
Distance		2.5 m	3.0 m	3.0 m	
Note					
<input checked="" type="checkbox"/> Front	Hor.	Pass	Pass	Pass	
	Ver.	Pass	Pass	Pass	
<input checked="" type="checkbox"/> Rear	Hor.	Pass	Pass	Pass	
	Ver.	Pass	Pass	Pass	
<input checked="" type="checkbox"/> Right	Hor.	Pass	Pass	Pass	
	Ver.	Pass	Pass	Pass	
<input checked="" type="checkbox"/> Left	Hor.	Pass	Pass	Pass	
	Ver.	Pass	Pass	Pass	
<input type="checkbox"/> Top	Hor.				
	Ver.				
<input type="checkbox"/> Bottom	Hor.				
	Ver.				

Test Result: ☒ Pass ☐ Fail



Conducted disturbances, induced by radio frequency fields

UL Japan, Inc. Shonan EMC Lab.
 Test Room : No.5 Shielded room
 Order No. : 13273483S

Company : Panasonic Corporation

Equipment : Seat Back ECU

Model No. : AT2002

Serial No. : ECU2_061

Test Mode : WLAN Communication

Power : DC 13.2 V

Standard : EN 301489

: EN 61000-4-6

Criterion : CT&CR, A

Date of test. : March 26, 2020

Temp. / Humid. : 24 deg.C / 39 %RH

Atmosphere : 1015 hPa

Engineer : Tsuyoki Yamagata

EUT Setup : ☒ Floor Standing (Non-metallic pallet height of 0.1 m)

Elevated Ground Plane : ☒ Not used ☐ Used (*1 Refer to line name)

Frequency step size : 1 %

Dwell time : 2 sec

Freq. Range	0.15 - 80 MHz	- MHz	- MHz	Remarks
Test level	3 V	V	V	
Modulation	<input checked="" type="checkbox"/> AM 80 % 1 kHz	<input type="checkbox"/> AM 80 % kHz	<input type="checkbox"/> AM 80 % kHz	
	<input type="checkbox"/> Pulse Hz %	<input type="checkbox"/> Pulse Hz %	<input type="checkbox"/> Pulse Hz %	
	<input type="checkbox"/> Unmodulated	<input type="checkbox"/> Unmodulated	<input type="checkbox"/> Unmodulated	
Note				
DC Line <input type="checkbox"/> *1	Pass			<input checked="" type="checkbox"/> CDN M2 <input type="checkbox"/> EM Clamp
System Harness1 <input type="checkbox"/> *1	Pass			<input type="checkbox"/> CDN <input checked="" type="checkbox"/> EM Clamp
System Harness2 <input type="checkbox"/> *1	Pass			<input type="checkbox"/> CDN <input checked="" type="checkbox"/> EM Clamp
System Harness3 <input type="checkbox"/> *1	Pass			<input type="checkbox"/> CDN <input checked="" type="checkbox"/> EM Clamp
GVIF Harness1 <input type="checkbox"/> *1	Pass			<input type="checkbox"/> CDN <input checked="" type="checkbox"/> EM Clamp
GVIF Harness2 <input type="checkbox"/> *1	Pass			<input type="checkbox"/> CDN <input checked="" type="checkbox"/> EM Clamp
Step3 Harness <input type="checkbox"/> *1	Pass			<input type="checkbox"/> CDN <input checked="" type="checkbox"/> EM Clamp
HDMI Harness <input type="checkbox"/> *1	Pass			<input type="checkbox"/> CDN <input checked="" type="checkbox"/> EM Clamp
<input type="checkbox"/> *1				<input type="checkbox"/> CDN <input type="checkbox"/> EM Clamp
<input type="checkbox"/> *1				<input type="checkbox"/> CDN <input type="checkbox"/> EM Clamp
<input type="checkbox"/> *1				<input type="checkbox"/> CDN <input type="checkbox"/> EM Clamp
<input type="checkbox"/> *1				<input type="checkbox"/> CDN <input type="checkbox"/> EM Clamp
<input type="checkbox"/> *1				<input type="checkbox"/> CDN <input type="checkbox"/> EM Clamp
<input type="checkbox"/> *1				<input type="checkbox"/> CDN <input type="checkbox"/> EM Clamp

Test Result: ☒ Pass ☐ Fail

APPENDIX 3**Test Instruments****EMI test equipment**

Test Name	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Interval (Month)
CE	COTS-SEMI-5	170932	EMI Software	TSJ	TEPTO-DV3(RE,CE,ME,PE)	-	-	-
CE	KJM-02	146432	Measure	TAJIMA	GL19-55	-	-	-
CE	KLS-04	145100	LISN(AMN)	Schwarzbeck Mess - Elektronik	NNBM8125	8125520	2020/02/20	12
CE	KLS-09	145101	LISN(AMN)	Schwarzbeck Mess - Elektronik	NNBM8125	81251014	2020/02/20	12
CE	SAT13-01	145140	Attenuator	JFW	50FP-013-H2 N	-	2020/02/21	12
CE	SCC-C9/C10/SRSE-03	145036	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-271(RF Selector)	2019/04/19	12
CE	SLS-11	145548	LISN	FCC	FCC-LISN	8139	2020/03/24	12
CE	SLS-12	145549	LISN	FCC	FCC-LISN-5-50-1-01-CISPR25	9598	2019/09/26	12
CE	SOS-24	191841	Humidity Indicator	CUSTOM	CTH-201	-	2019/12/12	12
CE	STM-05	145762	Terminator	TME	CT-01 BP	-	2019/12/05	12
CE	STM-09	146191	Terminator	TME	CT-01 BP	-	2019/12/05	12
CE	STM-10	146192	Terminator	TME	CT-01 BP	-	2016/12/15	-
CE	STR-08	150463	Test Receiver	Rohde & Schwarz	ESW44	101581	2019/11/22	12
CE	STS-03	146210	Digital Hitester	Hioki	3805-50	80997823	2019/10/01	12

*Hyphens for Last Calibration 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.

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

All equipment is calibrated with valid calibrations . Each measurement data is traceable to the national or international standards

Test Item:

CE: Conducted emission

EMS test equipment

Test Name	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Interval (Month)
CS	COTS-SCS	144911	Radio-frequency conducted disturbances soft	TSJ	TEPT-CS2	-	-	-
CS	SAT6-CS01	145048	Attenuator	Bird Electronic	100-SA-FFN-06	1002481	2019/04/08	12
CS	SBM-09	144962	Barometer	Sunoh	SBR121	1074	2017/12/13	36
CS	SCEMS-J07	144981	Coaxial Cable	Huber+Suhner	RG 223/U 50ohm 530442WP	-	2019/04/08	12
CS	SCN-08	145014	Coupling Decoupling Network	LUTHI	CDN L801-M2/M3	2506	2019/11/08	12
CS	SCN-09	145015	Coupling Decoupling Network	LUTHI	CDN L801-M2/M3	2507	2019/11/08	12
CS	SCP-CS01	145434	Current Probe	FCC	TSMC-33-1	9312	2019/04/08	12
CS	SDCPL-06	145437	Directional Coupler	WERLATONE	C5086-10	81073	2019/04/08	12
CS	SJM-17	145339	Measure	ASKUL	-	-	-	-
CS	SOS-27	191845	Humidity Indicator	Not Indicated or Known	CTH-201	-	2019/12/12	12
CS	SPA-06	145578	RF Power Amplifier	AMPLIFIER RESEARCH	75A250	330792	2019/04/10	12
CS	SPM-03	146246	Power Meter	Keysight Technologies Inc	E4418B	MY45109208	2019/09/09	12
CS	SPSO-05	146307	Power Sensor	Keysight Technologies Inc	E9304A	MY41498830	2019/09/09	12
CS	SSA-CS01	145802	Spectrum Analyzer	Keysight Technologies Inc	N9320B	CN03224782	2019/05/21	12
CS	SSG-05	146229	Signal Generator	Keysight Technologies Inc	N5181A	MY48181132	2020/01/28	12
CS	STM-17	146196	Terminator	TME	CT-01 BP	-	2020/01/30	12
CS	STM-22	145768	Terminator	TME	CT-01 BP	-	2020/01/30	12
CS	STS-05	146212	Digital Hitester	Hioki	3805-50	80997828	2019/10/01	12
RS	COTS-SRS	159176	Radiated RF electromagnetic field soft	TSJ	TEPTO-DV(RS)	-	-	-
RS	SAEC-04(UFA)	145567	Semi-Anechoic Chamber	TDK	SAEC-04(UFA)	4	2019/05/01	12
RS	SBM-07	145027	Barometer	Sunoh	SBR121	1075	2017/12/13	36
RS	SDCPL-04	145390	Directional Coupler	WERLATONE	C3908-10	80906	2019/09/01	12
RS	SDCPL-05	145391	Directional Coupler	RLC	CHP-1040-D-50-50-MF	909002	2019/09/01	12
RS	SDCPL-13	191631	Directional Coupler	RLC	CHP-2080-D-40-40-FF	1940	2019/12/02	12
RS	SFS-04	146657	Isotropic field Probe	ETS LINDGREN	HI-6005/HI-4413P	00033981	2019/07/25	12
RS	SHA-RS01	145516	Horn Antenna	Schwarzbeck Mess - Elektronik	BBHA9120D	770	-	-
RS	SJM-15	145338	Measure	ASKUL	-	-	-	-
RS	SLA-RS02	145829	Logperiodic Antenna	Schwarzbeck Mess - Elektronik	VULP9118E	VULP9118 E-846	-	-
RS	SOS-25	191843	Humidity Indicator	CUSTOM	CTH-201	-	2019/12/12	12
RS	SPA-04	145607	RF Power Amplifier	PRANA	AP32MT235	0302-929	2019/12/02	12
RS	SPA-05	145608	RF Power Amplifier	PRANA	AP32SW210	0902-330	2019/07/03	12
RS	SPA-14	191630	RF Power Amplifier	PRANA	UX55DC	1910-2589	2019/12/02	12
RS	SPM-01	146244	Power Meter	Keysight Technologies Inc	E4419B	MY45104212	2020/01/27	12
RS	SPSO-01	146303	Power Sensor	Keysight Technologies Inc	E9304A	MY41498787	2020/01/27	12
RS	SPSO-02	146304	Power Sensor	Keysight Technologies Inc	E9304A	MY41498786	2020/01/27	12
RS	SSG-04	146228	Signal Generator	Keysight Technologies Inc	N5181A	MY48181114	2019/05/23	12
RS	SSW-02	145736	RF Switch	TSJ	RFM-3SA3CIL	4333	-	-
RS	STS-04	146211	Digital Hitester	Hioki	3805-50	80997827	2019/04/02	12
TI	COTS-STI-01	144922	AUTOSTAR Software	Teseq	-	-	-	-

EMS test equipment

Test Name	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Interval (Month)
TI	KJM-02	146432	Measure	TAJIMA	GL19-55	-	-	-
TI	SBM-06	144961	Barometer	Sunoh	SBR121	1071	2017/10/27	36
TI	SOS-24	191841	Humidity Indicator	CUSTOM	CTH-201	-	2019/12/12	12
TI	STI-01	146186	Transient Generator	Teseq	NSG 5500	090430-01	2019/09/28	12
TI	STI-02	145743	Power Amplifier 60V-10A	TESEQ GmbH	PA5740	571-0038	2019/09/28	12
TI	STI-03	146187	Function Generator	Teseq	FG 5620	1271	2019/09/28	12
TI	STI-04	145744	Resistance Module	Teseq	INA 5025	115	2019/09/28	12
TI	STS-03	146210	Digital Hitester	Hioki	3805-50	80997823	2019/10/01	12

*Hyphens for Last Calibration 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.

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

All equipment is calibrated with valid calibrations . Each measurement data is traceable to the national or international standards

Test Item:

- RS: Radiated RF electromagnetic field,
- CS: Radio-frequency conducted disturbances,
- TI: Transients and surges immunity (ISO7637-2)

End of Report