



# EMI TEST REPORT

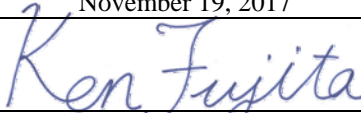
**Test Report No. : 11997862H-A**

**Applicant** : ALPS ELECTRIC CO., LTD.  
**Type of Equipment** : TPMS/KEYLESS TUNER  
**Model No.** : TD1G141  
**Test regulation** : FCC Part 15 Subpart B: 2017  
**FCC ID** : CWTD1G141  
**Test Result** : Complied

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 regulation.
4. The test results in this test report are traceable to the national or international standards.
5. 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.
6. This test report covers EMC technical requirements. It does not cover administrative issues such as Manual or non-EMC test related Requirements. (if applicable)

**Date of test:** November 19, 2017

**Representative test engineer:**

  
Ken Fujita  
Engineer  
Consumer Technology Division

**Approved by:**

  
Shinichi Miyazono  
Engineer  
Consumer Technology Division



NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.

\*As for the range of Accreditation in NVLAP, you may refer to the WEB address,  
[http://japan.ul.com/resources/emc\\_accredited/](http://japan.ul.com/resources/emc_accredited/)

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13-EM-F0429

## REVISION HISTORY

**Original Test Report No.: 11997862H-A**

[illegible]**UL Japan, Inc.**

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## **SECTION 1: Customer information**

Company Name	:	ALPS ELECTRIC CO., LTD.
Address	:	6-3-36, Nakazato, Furukawa, Osaki-city, Miyagi-pref, 989-6181, Japan
Telephone Number	:	+81-229-23-5111
Facsimile Number	:	+81-229-22-6290
Contact Person	:	Yasuhiro Yabe

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

### **2.1 Identification of E.U.T.**

Type of Equipment	:	TPMS/KEYLESS TUNER
Model No.	:	TD1G141
Serial No.	:	Refer to Section 4, Clause 4.2
Receipt Date of Sample	:	November 14, 2017
Rating	:	DC 12.0 V
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 No: TD1G141 (referred to as the EUT in this report) is the TPMS/KEYLESS TUNER.

#### **General Specification**

Feature of EUT	:	This TPMS/KEYLESS TUNER receives and detects RF signal from remote control, and performs locking or unlocking of a door. It also receives RF signal from TPMS sensor, warns trouble of air pressure.
Clock frequency in the system	:	16 MHz (Used at 32 MHz inside the CPU) / 30.32 MHz

#### **Radio Specification**

Frequency of operation	:	433.92 MHz
Oscillator Frequency	:	16 MHz (CPU), 30.32 MHz (RF_IC)
Local Oscillator Frequency	:	1734.56 MHz
Intermediate Frequency	:	280 kHz
Bandwidth	:	280 kHz (-3 dB)
Type of modulation	:	FSK
Operation voltage range	:	DC 9 V to 16 V
Antenna Type	:	Monopole antenna
Operating Temperature	:	-30 deg. C to +80 deg. C

#### **FCC15.111(b)**

The receiving antenna (of this EUT) is installed inside the EUT and cannot be removed (permanently attached). Therefore, Radiated emission test was performed.

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## SECTION 3: Test specification, procedures & results

### 3.1 Test specification

Test specification : FCC Part 15 Subpart B  
FCC Part 15 final revised on November 2, 2017

Title : FCC 47CFR Part15 Radio Frequency Device  
Subpart B Unintentional Radiators

### 3.2 Procedures and results

Item	Test Procedure	Limits	Deviation	Worst margin	Result
Conducted emission	FCC: ANSI C63.4: 2014 7. AC power - line conducted emission measurements	FCC:Part 15 Subpart B 15.107(a)	N/A *1)	N/A	N/A
	IC: RSS-Gen 8.8	IC: RSS-Gen 8.8			
Radiated emission	FCC: ANSI C63.4: 2014 8. Radiated emission measurements	FCC: Part 15 Subpart B 15.109(a)	N/A	18.9 dB 855.997 MHz Vertical, QP	Complied
	IC: RSS-Gen 7	IC: RSS-Gen 7.1.2			
*Note: UL Japan, Inc's EMI Work Procedure 13-EM-W0420.					
*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.					

### 3.3 Addition to standard

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  $k = 2$ .

Polarity	Radiated emission (Below 1 GHz)			
	(3 m*)(+/-)		(10 m*)(+/-)	
	30 MHz to 200 MHz	200 MHz to 1000 MHz	30 MHz to 200 MHz	200 MHz to 1000 MHz
Horizontal	5.0 dB	5.3 dB	5.0 dB	5.0 dB
Vertical	5.2 dB	6.3 dB	5.0 dB	5.0 dB

Radiated emission (Above 1 GHz)				
(3 m*)(+/-)		(1 m*)(+/-)		(10 m*)(+/-)
1 GHz to 6 GHz	6 GHz to 18 GHz	10 GHz to 26.5 GHz	26.5 GHz to 40 GHz	1 GHz to 18 GHz
5.2 dB	5.5 dB	5.5 dB	5.4 dB	5.5 dB

\* Measurement distance

#### Radiated emission test (3 m)

The data listed in this test report has enough margin, more than the site margin.

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### 3.5 Test Location

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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 2.0 m 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.

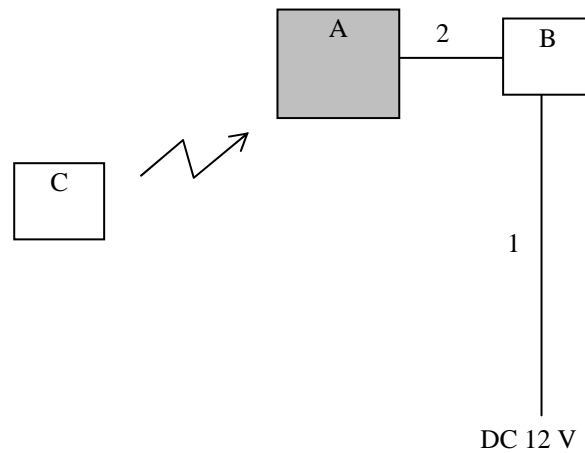
## SECTION 4: Operation of E.U.T. during testing

### 4.1 Operating modes

Mode	Remarks
Receiving mode (Rx) 433.92 MHz	-

\* It was confirmed by using LED of Jig that the EUT receives the signal from the transmitter (pair of EUT).

### 4.2 Configuration and peripherals



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

#### Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	TPMS/KEYLESS TUNER	TD1G141	17111004	ALPS ELECTRIC CO., LTD.	EUT
B	Jig board	-	-	ALPS ELECTRIC CO., LTD.	-
C	Transmitter	TB1G077	17111006	ALPS ELECTRIC CO., LTD.	-

#### List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC Cable	1.5	Unshielded	Unshielded	-
2	Signal Cable	1.0	Unshielded	Unshielded	-

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## **SECTION 5: Radiated Emission**

### **5.1 Operating environment**

Test place : No.2 semi anechoic chamber  
Temperature : See data  
Humidity : See data

### **5.2 Test configuration**

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane.

The EUT was set on the edge of the tabletop.

Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

Photographs of the set up are shown in Appendix 3.

### **5.3 Test conditions**

Frequency range : 30 MHz - 200 MHz (Biconical antenna) / 200 MHz - 1000 MHz (Logperiodic antenna)  
1000 MHz - 6000 MHz (Horn antenna)  
Test distance : 3 m  
EUT position : Table top  
EUT operation mode : See Clause 4.1

### **5.4 Test procedure**

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 intensity.

The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver.

The radiated emission measurements were made with the following detector function of the Test Receiver.

Frequency	Below 1GHz	Above 1GHz *1)
Instrument used	Test Receiver	Test Receiver
IF Bandwidth	QP: BW 120 kHz	PK: BW 1 MHz, CISPR AV: BW 1 MHz

\*1) The measurement data was adjusted to a 3 m distance using the following Distance Factor.

Distance Factor:  $20 \times \log(3.2 \text{ m} / 3 \text{ m}) = 1.46 \text{ dB}$

- The 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.

### **5.5 Test result**

Summary of the test results: Pass

The limit is rounded down to one decimal place.

The test result is rounded off to one or two decimal places, so some differences might be observed.

Date: November 19, 2017

Test engineer: Ken Fujita

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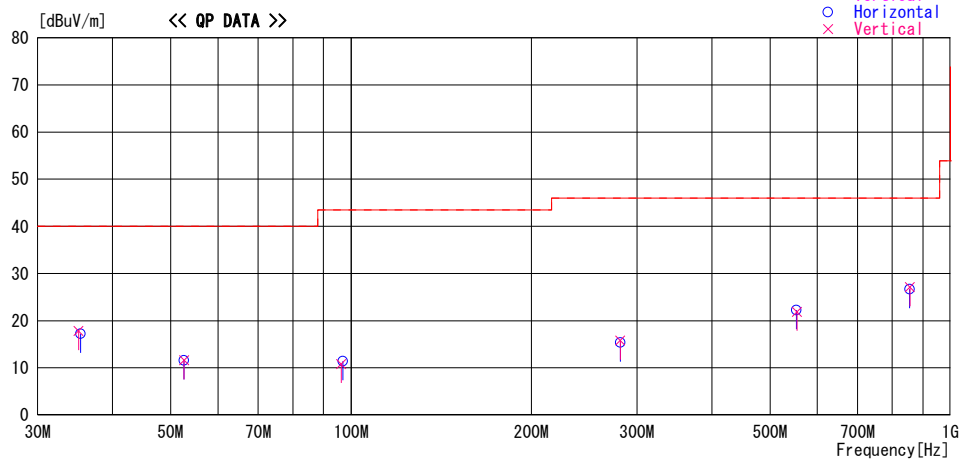


## APPENDIX 1: Test data

### Radiated Emission

Report No. 11997862H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.2  
Date November 19, 2017  
Temperature / Humidity 22 deg. C / 34 % RH  
Engineer Ken Fujita  
(Below 1 GHz)  
Mode Receiving mode

LIMIT : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:PK  
FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:AV



Frequency	Reading	DET	Antenna	Loss&	Level	Angle	Height	Polar.	Limit	Margin	Comment
[MHz]	[dBuV]		Factor	Gain	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]	
35.100	25.3	QP	16.2	-23.7	17.8	0	100	Vert.	40.0	22.2	
35.383	24.8	QP	16.1	-23.7	17.2	0	300	Hori.	40.0	22.8	
52.667	24.9	QP	10.1	-23.4	11.6	0	300	Hori.	40.0	28.4	
52.667	24.9	QP	10.1	-23.4	11.6	0	100	Vert.	40.0	28.4	
96.300	24.3	QP	9.4	-22.9	10.8	0	100	Vert.	43.5	32.7	
96.867	24.8	QP	9.5	-22.9	11.4	0	300	Hori.	43.5	32.1	
281.333	23.1	QP	12.8	-20.5	15.4	0	100	Hori.	46.0	30.6	
281.333	23.5	QP	12.8	-20.5	15.8	0	200	Vert.	46.0	30.2	
553.334	23.6	QP	18.4	-19.8	22.2	0	100	Hori.	46.0	23.8	
554.668	23.2	QP	18.5	-19.8	21.9	0	200	Vert.	46.0	24.1	
854.663	22.4	QP	21.5	-17.2	26.7	0	100	Hori.	46.0	19.3	
855.997	22.7	QP	21.6	-17.2	27.1	0	200	Vert.	46.0	18.9	

CHART: WITH FACTOR

ANT TYPE: - 30 MHz: LOOP, 30 MHz - 200 MHz: BICONICAL, 200 MHz - 1000 MHz: LOGPERIODIC, 1000 MHz -: HORN

CALCULATION: RESULT = READING + ANT FACTOR + LOSS & GAIN (CABLE + ATT - GAIN(AMP))

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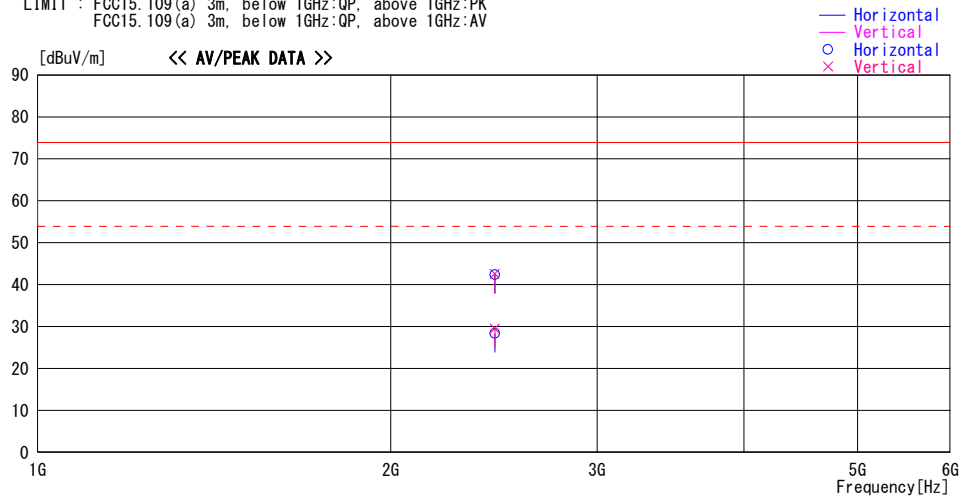
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## Radiated Emission

Report No. 11997862H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.2  
Date November 19, 2017  
Temperature / Humidity 22 deg. C / 34 % RH  
Engineer Ken Fujita  
(Above 1 GHz)  
Mode Receiving mode

LIMIT : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:PK  
FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:AV



Frequency [MHz]	Reading [dBuV]	DET	Antenna	Loss&	Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit	Margin	Comment
			Factor	Gain					[dBuV/m]	[dB]	
2453.336	47.4	PK	27.0	-32.0	42.4	0	100	Hori.	73.9	31.5	
2453.336	47.6	PK	27.0	-32.0	42.6	0	100	Vert.	73.9	31.3	
2453.336	33.4	AV	27.0	-32.0	28.4	0	100	Hori.	53.9	25.5	
2453.336	34.5	AV	27.0	-32.0	29.5	0	100	Vert.	53.9	24.4	

CHART: WITH FACTOR

ANT TYPE: - 30 MHz: LOOP, 30 MHz - 200 MHz: BICONICAL, 200 MHz - 1000 MHz: LOGPERIODIC, 1000 MHz -: HORN

CALCULATION: RESULT = READING + ANT FACTOR + LOSS & GAIN (CABLE - GAIN(AMP) + D-factor)

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## **APPENDIX 2: Test instruments**

### **EMI test equipment**

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE	2017/08/31 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE	2016/12/13 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE	2017/11/07 * 12
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	RE	2017/08/21 * 12
MBA-08	Biconical Antenna	Schwarzbeck	VHA9103B	08031	RE	2017/09/13 * 12
MLA-21	Logperiodic Antenna(200-1000MHz)	Schwarzbeck	VUSLP9111B	911B-190	RE	2017/01/05 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	-	RE	2017/02/24 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	BK7970	RE	2017/11/14 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2017/09/27 * 12
MMM-01	Digital Tester	Fluke	FLUKE 26-3	78030611	RE	2017/08/07 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2017/02/24 * 12
MCC-216	Microwave Cable	Junkosha	MWX221	1604S253(1 m) / 1608S087(5 m)	RE	2017/08/04 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2017/01/16 * 12

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

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