

EMI TEST REPORT

Test Report No. 15385574H-E-R1

Customer	ASAHI DENSO CO.,LTD.
Description of EUT	Holder
Model Number of EUT	FZ135
FCC ID	T8VFZ135
Test Regulation	FCC Part 18
Test Result	Complied
Issue Date	January 14, 2025
Remarks	-

Representative test engineerKen Fujita
Engineer**Approved by**Shinichi Miyazono
Leader

CERTIFICATE 5107.02

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

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REVISION HISTORY

Original Test Report No.: 15385574H-E

This report is a revised version of 15385574H-E. 15385574H-E is replaced with this report.

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	15385574H-E	October 21, 2024	-
1	15385574H-E-R1	January 14, 2025	Correction of the following value for the test data (below 30 MHz). - Freq. 0.2722 MHz reading (10m); from "35.4" to "NS" - Freq. 0.4083 MHz extrapolation factor; from "-40" to "-79.2"

Reference: Abbreviations (Including words undescribed in this report)

A2LA	The American Association for Laboratory Accreditation	ICES	Interference-Causing Equipment Standard
AC	Alternating Current	IEC	International Electrotechnical Commission
AFH	Adaptive Frequency Hopping	IEEE	Institute of Electrical and Electronics Engineers
AM	Amplitude Modulation	IF	Intermediate Frequency
Amp, AMP	Amplifier	ILAC	International Laboratory Accreditation Conference
ANSI	American National Standards Institute	ISED	Innovation, Science and Economic Development Canada
Ant, ANT	Antenna	ISO	International Organization for Standardization
AP	Access Point	JAB	Japan Accreditation Board
ASK	Amplitude Shift Keying	LAN	Local Area Network
Atten., ATT	Attenuator	LIMS	Laboratory Information Management System
AV	Average	MCS	Modulation and Coding Scheme
BPSK	Binary Phase-Shift Keying	MRA	Mutual Recognition Arrangement
BR	Bluetooth Basic Rate	N/A	Not Applicable
BT	Bluetooth	NIST	National Institute of Standards and Technology
BT LE	Bluetooth Low Energy	NS	No signal detect.
BW	BandWidth	NSA	Normalized Site Attenuation
Cal Int	Calibration Interval	NVLAP	National Voluntary Laboratory Accreditation Program
CCK	Complementary Code Keying	OBW	Occupied Band Width
Ch., CH	Channel	OFDM	Orthogonal Frequency Division Multiplexing
CISPR	Comite International Special des Perturbations Radioelectriques	P/M	Power meter
CW	Continuous Wave	PCB	Printed Circuit Board
DBPSK	Differential BPSK	PER	Packet Error Rate
DC	Direct Current	PHY	Physical Layer
D-factor	Distance factor	PK	Peak
DFS	Dynamic Frequency Selection	PN	Pseudo random Noise
DQPSK	Differential QPSK	PRBS	Pseudo-Random Bit Sequence
DSSS	Direct Sequence Spread Spectrum	PSD	Power Spectral Density
EDR	Enhanced Data Rate	QAM	Quadrature Amplitude Modulation
EIRP, e.i.r.p.	Equivalent Isotropically Radiated Power	QP	Quasi-Peak
EMC	ElectroMagnetic Compatibility	QPSK	Quadri-Phase Shift Keying
EMI	ElectroMagnetic Interference	RBW	Resolution Band Width
EN	European Norm	RDS	Radio Data System
ERP, e.r.p.	Effective Radiated Power	RE	Radio Equipment
EU	European Union	RF	Radio Frequency
EUT	Equipment Under Test	RMS	Root Mean Square
Fac.	Factor	RSS	Radio Standards Specifications
FCC	Federal Communications Commission	Rx	Receiving
FHSS	Frequency Hopping Spread Spectrum	SA, S/A	Spectrum Analyzer
FM	Frequency Modulation	SG	Signal Generator
Freq.	Frequency	SVSWR	Site-Voltage Standing Wave Ratio
FSK	Frequency Shift Keying	TR	Test Receiver
GFSK	Gaussian Frequency-Shift Keying	Tx	Transmitting
GNSS	Global Navigation Satellite System	VBW	Video BandWidth
GPS	Global Positioning System	Vert.	Vertical
Hori.	Horizontal	WLAN	Wireless LAN

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SECTION 1: Customer Information

Company Name	ASAHI DENSO CO.,LTD.
Address	6-2-1 Somejidai, Hamana-ku, Hamamatsu City, Shizuoka, 434-0046 Japan
Telephone Number	+81-53-586-7383
Contact Person	Tomohiro Yaguchi

The information provided by the customer is as follows;

- Customer, Description of EUT, Model Number of EUT, FCC ID on the cover and other relevant pages
- Operating/Test Mode(s) (Mode(s)) on all the relevant pages
- SECTION 1: Customer Information
- SECTION 2: Equipment Under Test (EUT) other than the Receipt Date and Test Date
- SECTION 4: Operation of EUT during testing

SECTION 2: Equipment Under Test (EUT)

2.1. Identification of EUT

Description	Holder
Model Number	FZ135
Serial Number	Refer to SECTION 4.2
Condition	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	No Modification by the test lab
Receipt Date	June 17, 2024
Test Date	August 15, 2024

2.2. Product Description

General Specification

Rating	DC 12 V
Operating frequency	Radio operating temperature range: -18 deg. C to 60 deg. C
	Usable temperature range in combination with FZ134: 0 deg. C to 40 deg. C
Clock frequency (ies) in the system	32 MHz (Main CPU)

Radio Specification

Wireless Power Transmission

Operating Frequency	136.75 kHz
Rated Output Power	2 W
Coil system	Single Coil
Charging distance	Contact

SECTION 3: Test Specification, Procedures & Results

3.1 Test specification

Test Specification	FCC Part 18 The latest version on the first day of the testing period
Title	FCC 47CFR Part18 Industrial, scientific, and medical equipment

3.2 Procedures and results

Item	Test Procedure & Limits	Worst margin	Result	Remarks
Radiated Emission	Section 18.305 FCC/OET MP-5	8.8 dB 135.112 MHz, Horizontal	Complied	-
Conducted Emission	Section 18.307 FCC/OET MP-5	-	N/A	*1)

* Note: UL Japan, Inc.'s EMI Work Procedure: Work Instructions-ULID-003591.

*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

Measurement uncertainty is not taken into account when stating conformity with a specified requirement.
Note: When margins obtained from test results are less than the measurement uncertainty, the test results may exceed the limit.

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

Radiated emission

Measurement distance	Frequency range		Unit	Calculated Uncertainty (+/-)
3 m	9 kHz to 30 MHz		dB	3.3
10 m			dB	3.1
3 m	30 MHz to 200 MHz	Horizontal	dB	5.0
		Vertical	dB	5.0
	200 MHz to 1000 MHz	Horizontal	dB	5.2
		Vertical	dB	6.2
10 m	30 MHz to 200 MHz	Horizontal	dB	5.5
		Vertical	dB	5.4
	200 MHz to 1000 MHz	Horizontal	dB	5.5
		Vertical	dB	5.5

3.5 Test Location

UL Japan, Inc. Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 Japan

Telephone: +81-596-24-8999

A2LA Certificate Number: 5107.02 / FCC Test Firm Registration Number: 884919

ISED Lab Company Number: 2973C / CAB identifier: JP0002

Test site	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	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	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	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	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.5 measurement room	6.4 x 6.4 x 3.0	6.4 x 6.4	-	-
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	3.1 x 5.0	-	-
No.9 measurement room	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.10 shielded room	3.8 x 2.8 x 2.8	3.8 x 2.8	-	-
No.11 measurement room	4.0 x 3.4 x 2.5	N/A	-	-
No.12 measurement room	2.6 x 3.4 x 2.5	N/A	-	-
Large Chamber	16.9 x 22.1 x 10.17	16.9 x 22.1	-	10 m
Small Chamber	5.3 x 6.69 x 3.59	5.3 x 6.69	-	-

3.6 Test data, Test instruments, and Test set up

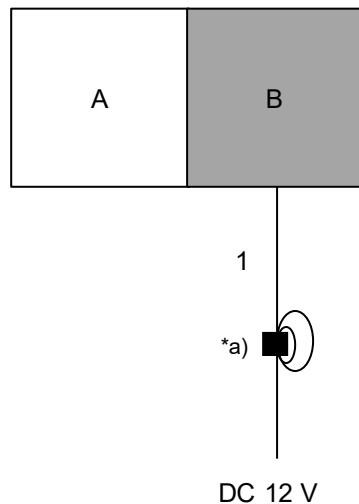
Refer to APPENDIX.

SECTION 4: Operation of EUT during testing

4.1. Operating mode(s)

Test mode	Remarks
1) Charging mode	-

4.2. Configuration and peripherals



■ : Standard Ferrite Core

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

*a) Ferrite Core Model No. E04sr2000935A (Manufacture seiwa) 10 cm from Item B, 3 turns

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Controller	FZ134	1	ASAHI DENSO CO.,LTD.	-
B	Holder	FZ135	1	ASAHI DENSO CO.,LTD.	EUT

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC Cable	2.3	Unshielded	Unshielded	-

SECTION 5: Radiated Emission

5.1 Operating environment

Date	See data
Test place	See data
Temperature	See data
Humidity	See data
Test engineer	See data
Mode	See data

5.2 Test configuration

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

The EUT was set on the edge of the tabletop.

Test was made with the antenna positioned in 0 deg., 45 deg., 90 deg., 135 deg., 180 deg., and Horizontal. 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.

*Refer to Figure 1 about Direction of the Loop Antenna.

5.3 Test conditions

Frequency range	9 kHz to 30 MHz (Loop antenna)
	30 MHz to 200 MHz (Biconical antenna)
	200 MHz to 400 MHz (Logperiodic antenna)
Test distance	3 m / 10 m
EUT position	Table top
EUT operation mode	See Clause 4.1

5.4 Test procedure

[Below 30 MHz]

The height of antenna was fixed in 2 m.

EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed in 0 deg., 45 deg., 90 deg., 135deg., 180 deg., and Horizontal with the Test Receiver.

The electric field intensity at a distance of 300 m was calculated from the measurement results at distances of 3 m and 10 m.

[Above 30 MHz]

Maximum electric field intensity was confirmed with the measurements at distances of 3 m and 10 m. The electric field intensity at a distance of 300 m was calculated from the measurement results at distances of 3 m and 10 m.

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

The test was made with the detector (RBW) in the following table.

Frequency	9 kHz to 150 kHz	150 kHz to 30 MHz	30 MHz to 400 MHz
Instrument used	Test Receiver		
IF Bandwidth	AV: 200 Hz	AV: 9 kHz	AV: 120 kHz

The measurement result was calculated by the following formula:

[Frequency at which the signal was confirmed at both 10 m and 3 m]

Result = Reading + ANT Factor + Cable loss + Atten loss + Extrapolation Factor - AMP gain

Extrapolation Factor = decade * Log (Test distance (3 m) / Separate distance (300 m))

decade = (10 m reading - 3 m reading) / (log 3 m - log 10 m)

*Refer to Part 18 Section 305 Notes 2 and KDB 629601.

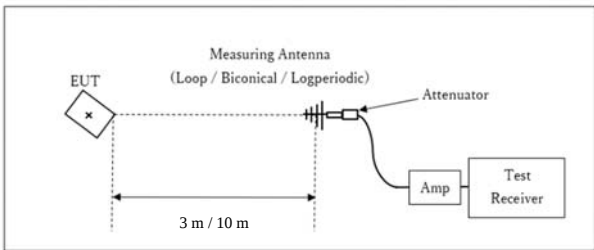
[Other Frequency]

Result = Reading + ANT Factor + Cable loss + Atten loss + Extrapolation Factor - AMP gain

Extrapolation Factor = 20 * Log (Test distance (3 m) / Separate distance (300 m))

<Test Setup>

Below 1 GHz



x : Center of turn table

Test Distance: 3 m / 10 m

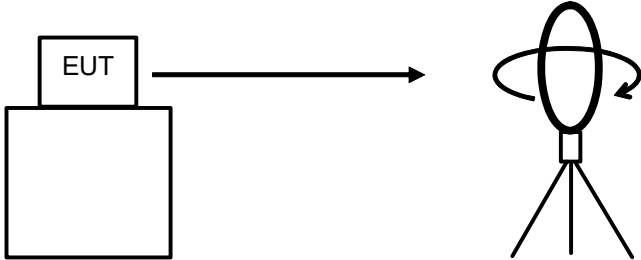
The test results and limit are rounded off to one decimal place, so some differences might be observed.

5.5 Test result

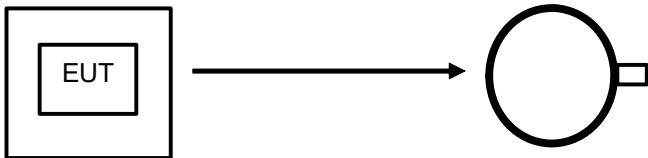
Summary of the test results: Pass

Figure 1: Direction of the Loop Antenna

Side View (Vertical)

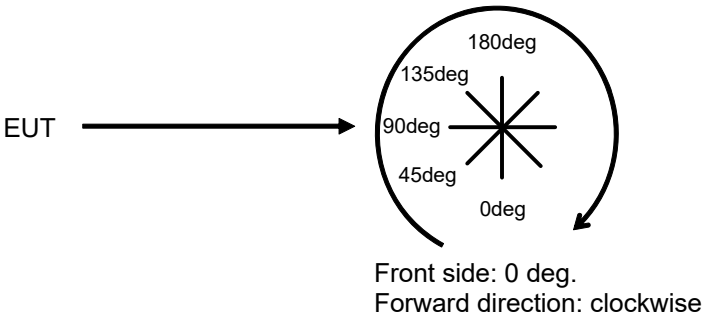


Top View (Horizontal)



Antenna was not rotated.

Top View (Vertical)



APPENDIX 1: Test Data

Radiated Emission

Test place Ise EMC Lab.
Semi Anechoic Chamber No.1
Date August 15, 2024
Temperature / Humidity 23 deg. C / 39 % RH
Engineer Ken Fujita
(Below 30 MHz)
Mode Mode 1

FREQ [MHz]	Reading (3m) [dBμV]	Reading (10m) [dBμV]	ANT Factor [dB/m]	Atten + Cable loss [dB]	AMP Gain [dB]	Extrapolation Factor [dB]	Result (300 m) [dBμV/m]	Limit (300 m) [dBμV/m]	Margin [dB]	Antenna [deg]
0.1361	80.3	52.0	19.5	6.0	32.2	-108.2	-34.6	23.5	58.1	0
0.1361	78.3	51.7	19.5	6.0	32.2	-101.7	-30.1	23.5	53.6	45
0.1361	77.0	51.2	19.5	6.0	32.2	-98.7	-28.3	23.5	51.8	90
0.1361	78.9	51.8	19.5	6.0	32.2	-103.7	-31.4	23.5	54.9	135
0.1361	80.2	51.9	19.5	6.0	32.2	-108.2	-34.7	23.5	58.2	180
0.1361	79.0	50.3	19.5	6.0	32.2	-109.8	-37.4	23.5	60.9	Horizontal
0.2722	35.6	NS	19.6	6.0	32.2	-40.0	-10.9	23.5	34.4	0
0.4083	56.8	36.1	19.7	6.1	32.2	-79.2	-28.8	23.5	52.3	0
0.5444	33.6	NS	19.7	6.1	32.2	-40.0	-12.8	23.5	36.3	0
0.6805	48.2	NS	19.7	6.1	32.2	-40.0	1.9	23.5	21.6	0
0.8166	32.8	NS	19.7	6.2	32.2	-40.0	-13.5	23.5	37.0	0
0.9527	41.7	NS	19.7	6.2	32.2	-40.0	-4.6	23.5	28.1	0
1.0888	31.5	NS	19.7	6.2	32.2	-40.0	-14.8	23.5	38.3	0
1.2249	38.9	NS	19.7	6.2	32.2	-40.0	-7.3	25.5	32.8	0
1.3610	31.7	NS	19.7	6.2	32.2	-40.0	-14.5	23.5	38.0	0

CALCULATION(Result) : Reading + ANT Factor + Cable loss + Atten loss + Extrapolation Factor - AMP gain
Extrapolation Factor = decade * Log (Test distance(3m) / Separate distance(300m))
decade = (10m reading - 3m reading) / (log 3m - log 10m)

NS : No-Signal
Except for the above table : adequate margin data below the limits.

10 m Reading of Extrapolation Factor is used the value of 0 deg.
Worst direction of EUT was decided by test result performed on test distance at 3 m, and test distance at 10 m was performed worst direction.

Radiated Emission

Test place Ise EMC Lab.
Semi Anechoic Chamber No.1
Date August 15, 2024
Temperature / Humidity 23 deg. C / 39 % RH
Engineer Ken Fujita
 (Above 30 MHz)
Mode Mode 1

FREQ [MHz]	Reading (3 m) [dBμV]	Reading (10 m) [dBμV]	ANT Factor [dB/m]	AMP gain [dB]	Atten + Cable loss [dB]	Extrapolation Factor [dB]	Result (300 m) [dBμV/m]	Limit (300 m) [dBμV/m]	Margin [dB]	Antenna Polarization	Remarks
35.625	29.8	30.1	16.4	38.9	7.4	-40.0	-25.3	23.5	48.8	Horizontal	
86.191	43.7	33.1	7.9	38.9	8.3	-40.5	-19.6	23.5	43.2	Horizontal	
95.694	51.2	51.2	9.4	38.9	8.4	-40.0	-10.0	23.5	33.5	Horizontal	
135.112	37.3	35.6	14.1	39.0	8.9	-6.5	14.7	23.5	8.8	Horizontal	
185.403	40.1	36.1	16.3	39.0	9.4	-15.3	11.5	23.5	12.0	Horizontal	
293.630	38.4	30.1	13.6	38.8	10.4	-31.7	-8.1	23.5	31.6	Horizontal	
35.625	42.0	38.3	16.4	38.9	7.4	-14.2	12.7	23.5	10.8	Vertical	
86.191	50.2	42.5	7.9	38.9	8.3	-29.5	-2.1	23.5	25.6	Vertical	
95.694	46.1	43.2	9.4	38.9	8.4	-11.1	13.8	23.5	9.7	Vertical	
135.112	46.3	28.9	14.1	39.0	8.9	-66.6	-36.3	23.5	59.8	Vertical	
185.403	47.2	28.2	16.3	39.0	9.4	-72.7	-38.7	23.5	62.3	Vertical	
293.630	33.1	28.8	13.6	38.8	10.4	-16.4	1.9	23.5	21.6	Vertical	

CALCULATION(Result) : Reading + ANT Factor + Cable loss + Atten loss + Extrapolation Factor - AMP gain
Extrapolation Factor = decade * Log (Test distance(3m) / Separate distance(300m))
decade = (10m reading - 3m reading) / (log 3m - log 10m)

*1) Used for the square of an inverse linear distance extrapolation factor (20 dB/decade)
Except for the above table : adequate margin data below the limits.

Worst direction of EUT was decided by test result performed on test distance at 3 m, and test distance at 10 m was performed worst direction.

APPENDIX 2: Test Instruments

Test equipment

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	141198	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	VHA9103+BBA9106	2513	07/10/2024	12
RE	141213	Attenuator(6dB)	Weinschel Corp	2	BK7971	11/16/2023	12
RE	141215	Coaxial Cable	Fujikura/Suhner/TSJ	5D-2W/3D-2W/ RG400u/ RFM-E421(SW)	-/01068 (Switcher)	06/24/2024	12
RE	141350	Coaxial Cable	Suhner/storm/Agilent/TSJ	-	-	03/05/2024	12
RE	141530	Digital Tester	Fluke Corporation	FLUKE 26-3	78030621	02/01/2024	12
RE	141568	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	2901	01/10/2024	12
RE	141583	Pre Amplifier	SONOMA INSTRUMENT	310	260833	04/04/2024	12
RE	141585	Pre Amplifier	L3 Narda-MITEQ	MLA-10K01-B01-35	1237616	02/17/2024	12
RE	141950	EMI Test Receiver	Rohde & Schwarz	ESU26	100412	11/20/2023	12
RE	141998	AC1_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 10m	DA-06881	12/06/2023	24
RE	142152	Loop Antenna	Rohde & Schwarz	HFH2-Z2	836553/009	10/17/2023	12
RE	142226	Measure, Tape, Steel	KOMELON	KMC-36	-	-	-
RE	159670	Coaxial Cable	UL Japan	-	-	11/21/2023	12
RE	160924	Logperiodic Antenna	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	225	11/29/2023	12
RE	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-

*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:

RE: Radiated Emission