RADIO TEST REPORT

Test Report No. : 13278171S-R2

Applicant	:	**DARTSLIVE INTERNATIONAL Ltd.**
Type of EUT	:	**DARTSLIVE CREDIT CARD READER**
Model Number of EUT	:	**DLI-00524-B**
FCC ID	:	**2ARUU-DLI00524B**
Test regulation	:	**FCC Part 15 Subpart C: 2020**
Test Result	:	**Complied (Refer to SECTION 3.2)**

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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.
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6. This test report covers Radio technical requirements.
   It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. The all test items in this test report are conducted by UL Japan, Inc. Shonan EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
9. The information provided from the customer for this report is identified in SECTION 1.
10. This report is a revised version of 13278171S-R1. 13278171S-R1 is replaced with this report.

Date of test: April 16 to May 7, 2020

Representative test engineer:
Makoto Hosaka
Engineer
Consumer Technology Division

Approved by:
Akira Sato
Engineer
Consumer Technology Division

CERTIFICATE 1266.03

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

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REVISION HISTORY

Original Test Report No.: 13278171S

Revision	Test report No.	Date	Page revised	Contents
- (Original)	13278171S	May 28, 2020	-	-
1	13278171S-R1	June 15, 2020	7	Modification of description on FCC Part 15.31 (e): From "The stable voltage was supplied by the end product which was required to have a power supply regulator. Therefore, the EUT complies with the requirement. However, the supply voltage was varied and tested at 85 % and 115 % of the nominal rated supply voltage during frequency tolerance test according to Section 15.225(e)." To "This EUT provides stable voltage constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement."
2	13278171S-R2	June 17, 2020	7	Modification of description on FCC Part 15.31 (e): From "This EUT provides stable voltage constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement." To "The RF Module has its own regulator. The RF Module is constantly provided voltage through the regulator regardless of input voltage. Therefore, this EUT complies with the requirement."
				Modification of description on FCC Part 15.203/212 Antenna requirement: From "It is impossible for end users to replace the antenna, because it is soldered on the circuit board. Therefore the equipment complies with the requirement of 15.203/212." To "The antenna is not removable from the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203."

Reference: Abbreviations (Including words undescribed in this report)

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

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SECTION 1: Customer information

Company Name	:	DARTSLIVE INTERNATIONAL Ltd.
Brand	:	DARTSLIVE
Address	:	12th Floor, Linkchart Centre, 2 Tai Yip Street, Kwun Tong, Kowloon, Hong Kong
Telephone Number	:	+852-3568-6302
Facsimile Number	:	+852-3568-6303
Contact Person	:	Kengo Tsoi Wai Ho

The information provided from the customer is as follows;
- Applicant, Type of Equipment, Model No., FCC ID on the cover 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	:	DARTSLIVE CREDIT CARD READER
Model No.	:	DLI-00524-B
Serial No.	:	Refer to SECTION 4.2
Rating	:	DC 5.0 V (USB)
Receipt Date of Sample (Information from test lab.)	:	April 7, 2020
Country of Mass-production	:	China
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: DLI-00524-B (referred to as the EUT in this report) is a DARTSLIVE CREDIT CARD READER.

General Specification

Clock frequency(ies) in the system	:	11.0592 MHz, 27.12 MHz

Radio Specification

Radio Type	:	Transceiver
Frequency of Operation	:	13.56 MHz
Modulation	:	ASK
Antenna type	:	PCB Antenna
Operating Temperature	:	-0 deg.C to +45 deg C.

SECTION 3: Test specification, procedures & results

3.1 Test specification

Test Specification	:	FCC Part 15 Subpart C FCC Part 15 final revised on April 1, 2020 and effective June 1, 2020 except 15.258 * The revision does not affect the test result conducted before its effective date.
Title	:	FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators Section 15.207 Conducted limits Section 15.209 Radiated emission limits, general requirements Section 15.215 Additional provisions to the general radiated emission limitations. Section 15.225 Operation within the band 13.110 - 14.010 MHz.

3.2 Procedures & Results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	ANSI C63.10:2013 6 Standard test methods <ISED>RSS-Gen 8.8	Section 15.207 <ISED>RSS-Gen 8.8	0.6 dB 13.56000 MHz AV, L1	Complied# a)	-
Electric Field Strength of Fundamental Emission	ANSI C63.10:2013 6 Standard test methods <ISED> RSS-Gen 6.4, 6.12	Section 15.225(a) <ISED>RSS-210 B.6	63.6 dB 13.560 MHz Vertical	Complied b)	Radiated
Electric Field Strength of Spurious Emission (within the 13.110-14.010 MHz band)	ANSI C63.10:2013 6 Standard test methods <ISED>RSS-Gen 6.4, 6.13	Section 15.225(b)(c) <ISED> RSS-210 B.6	43.1 dB 13.553 MHz Vertical	Complied b)	Radiated
20 dB Bandwidth	ANSI C63.10:2013 6 Standard test methods <ISED> -	Section15.215(c) <ISED> -	See data	Complied c)	Radiated
Electric Field Strength of Spurious Emission (outside of the 13.110-14.010 MHz band)	ANSI C63.10:2013 6 Standard test methods <ISED>RSS-Gen 6.4, 6.13	Section 15.209, Section 15.225 (d) <ISED>RSS-210 B.6	8.0 dB 406.780 MHz Vertical	Complied d)	Radiated
Frequency Tolerance	ANSI C63.10:2013 6 Standard test methods <ISED>RSS-Gen 6.11, 8.11	Section 15.225(e) <ISED> RSS-210 B.6	See data	Complied e)	Radiated

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422

a) Refer to APPENDIX 1 (data of Conducted Emission)
b) Refer to APPENDIX 1 (data of Electric field strength of Fundamental emission and Spurious emission)
c) Refer to APPENDIX 1 (data of -20 dB Bandwidth and 99% Occupied Bandwidth)
d) Refer to APPENDIX 1 (data of Radiated emission)
e) Refer to APPENDIX 1 (data of Frequency Tolerance)

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.

FCC Part 15.31 (e)

The RF Module has its own regulator.
The RF Module is constantly provided voltage through the regulator regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203/212 Antenna requirement

The antenna is not removable from 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 Band Width	<ISED>RSS-Gen 6.7	-	N/A	- c)	Radiated
Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422. c) Refer to APPENDIX 1 (data of -20 dB Bandwidth and 99% Occupied Bandwidth)					
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

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.

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

Shonan EMC Lab.

Item	Frequency range	Uncertainty (+/-)			
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR	No. 4,5,6,8 SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.6 dB	2.6 dB	2.5 dB	2.6 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.0 dB	3.0 dB	3.0 dB	-
	30 MHz-200 MHz	4.6 dB	4.6 dB	4.6 dB	-
	200 MHz-1 GHz	6.0 dB	6.0 dB	6.0 dB	-
	1 GHz-6 GHz	4.9 dB	4.9 dB	4.9 dB	-

SAC=Semi-Anechoic Chamber

SR= Shielded Room is applied besides radiated emission

Antenna terminal test	Uncertainty (+/-)
Bandwidth Measurement	0.07 %
Temperature	0.95 deg.C.
Voltage	0.83 %

3.5 Test location

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
A2LA Certificate Number: 1266.03
FCC Test Firm Registration Number: 626366

Test site	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Semi-anechoic chamber	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.2 Semi-anechoic chamber	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.3 Semi-anechoic chamber	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
No.4 Semi-anechoic chamber	8.1 x 5.1 x 3.55	8.1 x 5.1	-
No.1 Shielded room	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.2 Shielded room	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.3 Shielded room	6.3 x 4.7 x 2.7	6.3 x 4.7	-
No.4 Shielded room	4.4 x 4.7 x 2.7	4.4 x 4.7	-
No.5 Shielded room	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.6 Shielded room	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.8 shielded room	3.45 x 5.5 x 2.4	3.45 x 5.5	-
No.1 Measurement room	2.55 x 4.1 x 2.5	-	-

3.6 Test setup, Data of EMI & Test instruments

Refer to APPENDIX 1 to 3.

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

4.1 Operating mode

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

Test item	Operating mode	Tested frequency
All items	Transmitting 13.56 MHz	13.56 MHz

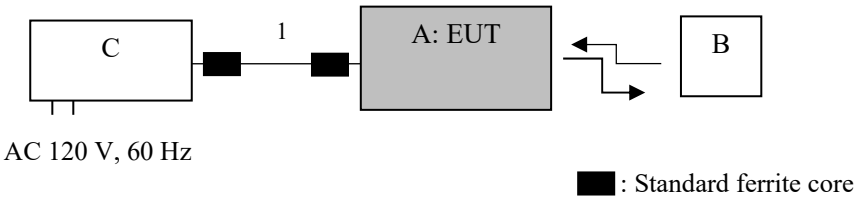
Power setting : Fixed
Software (Version) : V5.3
Date : November 22, 2019

The carrier level and noise levels were confirmed with and without Tag, and the test was made with the condition that has the maximum noise.
Combinations of the worst case:

Conducted emission	Radiated emission (Carrier)	Radiated emission (Below 30MHz)	Radiated emission (Above 30MHz)
Without Tag	Without Tag	Without Tag	Without Tag

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

4.2 Configuration of tested system



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

*As a result of comparing AC 120 V and AC 240 V at pre-check, conducted emission test was performed with AC 120 V of the worst voltage as representative.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	DARTSLIVE CREDIT CARD READER	DLI-00524-B	No.1 No.2 (Antenna terminated sample)	DARTSLIVE INTERNATIONAL Ltd.	EUT
B	DARTSLIVE Credit IC card (Tag)	DLI-00528	No.1	DARTSLIVE INTERNATIONAL Ltd.	-
C	AC Adaptor	AD2068320	-	ASUS	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	USB	1.0	Sshielded	Shielded	DLI-00526-B

SECTION 5: Conducted emission

Test Procedure and conditions

EUT was placed on a platform of nominal size, 1.0 m by 1.5 m, raised 80 cm above the conducting ground plane. The table is made of expanded polystyrol and expanded polypropylene and the table top is covered with polycarbonate. That has very low permittivity.

The rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80 cm from any other grounded conducting surface. EUT was located 80 cm from a Line Impedance Stabilization Network (LISN) / Artificial mains Network (AMN) and excess AC cable was bundled in center.

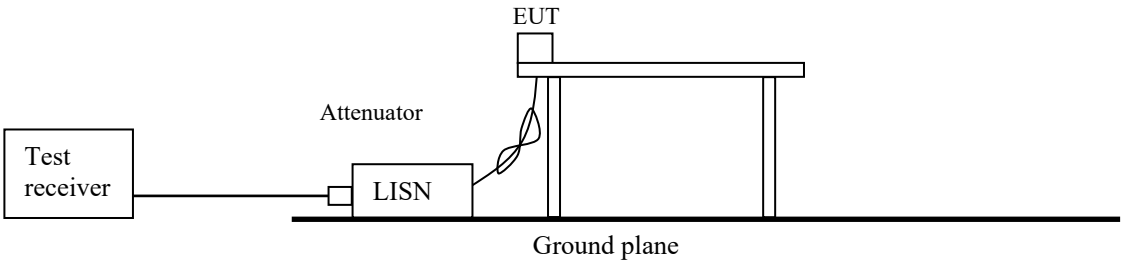
Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN / (AMN) to the input power source.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Shielded Room..
The EUT was connected to a LISN (AMN) via AC adaptor.
An overview sweep with peak detection has been performed.

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

Detector : **QP and CISPR AV**
Measurement range : **0.15 MHz - 30 MHz**
Test data : **APPENDIX**
Test result : **Pass**

Figure 1: Test Setup



SECTION 6: Radiated emission

6.1 Operating environment

Test place : See test data (APPENDIX 1)
Temperature : See test data (APPENDIX 1)
Humidity : See test data (APPENDIX 1)

6.2 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 expanded polystyrol and expanded polypropylene and the table top is covered with polycarbonate. That has very low permittivity.
The rear of EUT, including its peripherals was aligned and flushed with rear of tabletop.
Photographs of the set up are shown in APPENDIX 3.

6.3 Test procedure

The Radiated Electric Field Strength intensity has been measured on a semi-anechoic chamber witha ground plane at a distance of 3 m.
Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.
These tests were performed in semi anechoic chamber. Therefore the measured level of emissions may be higher than if measurements were made without a ground plane.
However test results were confirmed to pass against standard limit.

The Radiated Electric Field Strength intensity has been measured with a ground plane and at a distance of 3 m.

Frequency: From 9 kHz to 30 MHz at distance 3 m (Refer to Figure 2)
The EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.
The measurements were performed for vertical polarization (antenna angle: 0 deg., 45 deg., 90 deg. and 135 deg.) and horizontal polarization. Drawing of the antenna direction is shown in Figure 1.

Frequency: From 30 MHz to 1 GHz at distance 3 m (Refer to Figure 2).
The measuring antenna height was 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.

Measurements were performed with QP, PK, and AV detector.
The radiated emission measurements were made with the following detector function of the test receiver.

	9 kHz to 90 kHz & 110 kHz to 150 kHz	90 kHz to 110 kHz	150 kHz to 490 kHz	490 kHz to 30 MHz	30 MHz to 1 GHz
Detector Type	PK/AV	QP	PK/AV	QP	QP
IF Bandwidth	200 Hz	200 Hz	10 kHz	9 kHz	120 kHz
Distance factor *1)	-80 dB	-80 dB	-80 dB	-40 dB	-
Measuring antenna	Loop antenna				Biconical (30 MHz - 199.999 MHz) Logperiodic (200 MHz - 1 GHz)

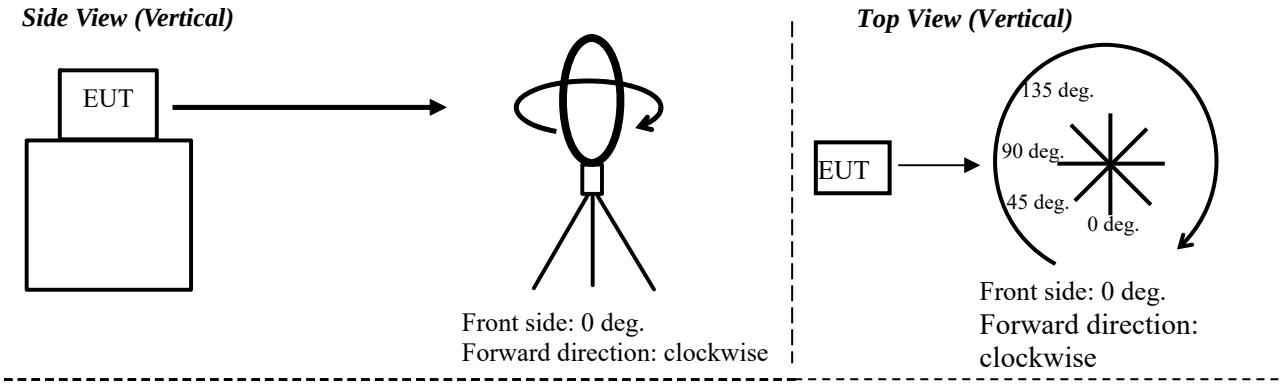
*1) FCC 15.31 (f)(2) (9 kHz-30 MHz)
Distance Factor: 40 x log (3 m / 300 m) = -80 dB
Distance Factor: 40 x log (3 m / 30 m) = -40 dB

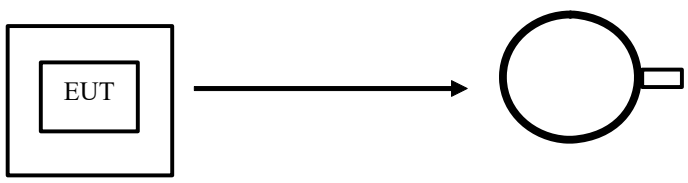
The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Combinations of the worst case

Frequency / Antenna polarization	Below 30 MHz (Carrier)	Below 30 MHz	Above 30 MHz
Horizontal	Y	Y	X
Vertical	Z	Y	Z

Figure 1: Direction of the Loop Antenna





Antenna was not rotated.

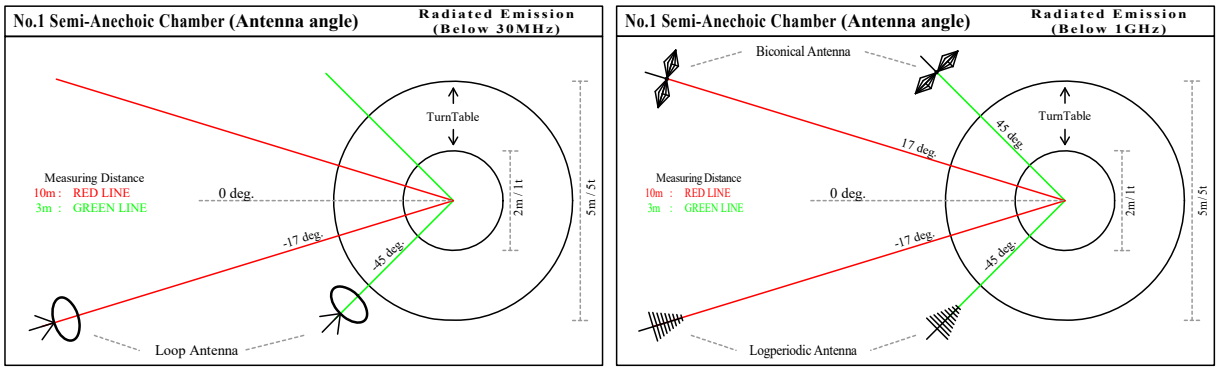
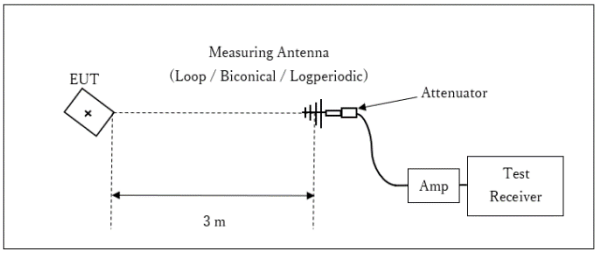


Figure 2. Antenna angle

[Test Setup]
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

6.4 Results

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

Measurement range : 9 kHz - 1 GHz
Test data : APPENDIX 1
Test result : Pass

SECTION 7: 20 dB bandwidth & 99 % Occupied bandwidth

Test procedure

The test was measured with a spectrum analyzer using a test fixture.

Test	Span	RBW	VBW	Sweep	Detector	Trace	Instrument used
20 dB Bandwidth	100 kHz	1 kHz	3 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99 % Occupied Bandwidth (OBW)	Enough width to display	1 to 5 % of OBW	Three times of RBW	Auto	Peak *1)	Max Hold *1)	Spectrum Analyzer
*1) The measurement was performed with Peak detector, Max Hold since the duty cycle was not 100%.							

Summary of the test results:Pass
Refer to APPENDIX 1

SECTION 8: Frequency Tolerance

Test procedure

The test was measured with a spectrum analyzer (with marker frequency counter function) using a test fixture.
The temperature test was started after the temperature stabilization time of 30 minutes.
The test was begun from 50 deg.C and the temperature was lowered each 10 deg.C.

Summary of the test results:Pass
Refer to APPENDIX 1

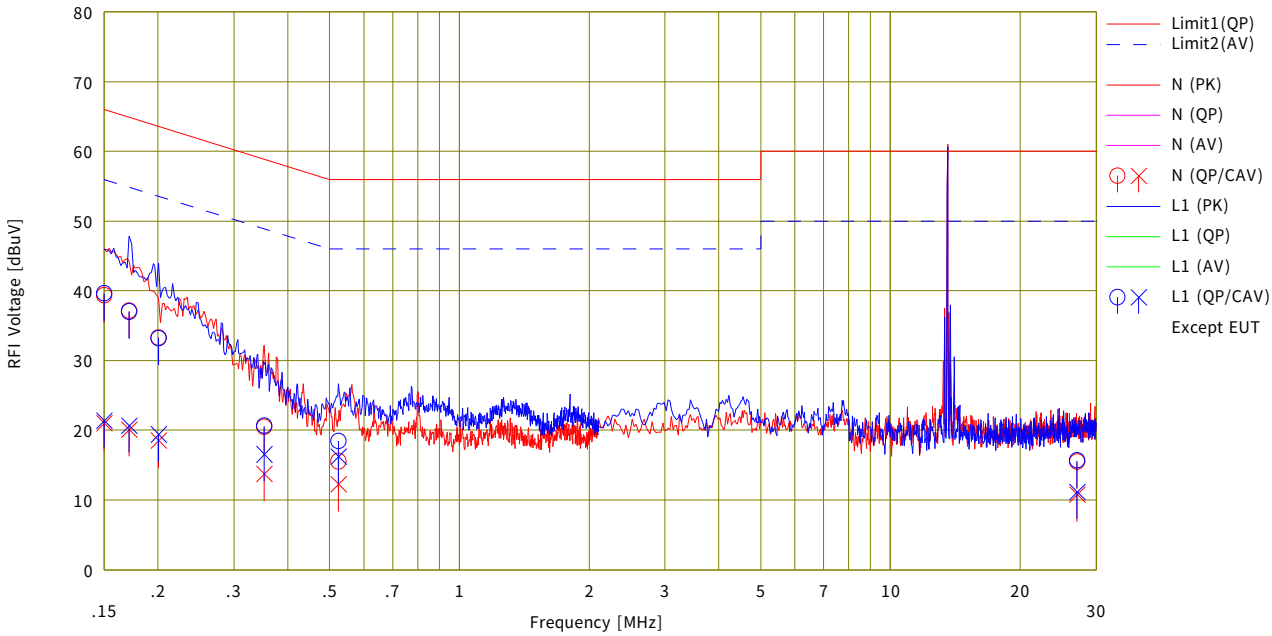
DATA OF CONDUCTED EMISSION TEST

UL Japan,Inc. Shonan EMC Lab. No.1 Shielded Room
Date : 2020/04/16

Company	: DARTSLIVE INTERNATIONAL Ltd.	Mode	: NFC Transmitting
Kind of EUT	: DARTSLIVE CREDIT CARD READER	Order No.	: 13278171S
Model No.	: DLI-00524-B	Power	: DC 5.0 V (USB), AC adaptor:AC120V/60Hz
Serial No.	: No.1	Temp./Humi.	: 19 deg.C / 42 %RH
Remarks	: (NFC Tag) without tag		

Limit : FCC_Part 15 Subpart C(15.207)

Engineer : Makoto Hosaka



No.	Freq.	Reading <QP>	Reading <CAV>	C.Fac	Results <QP>	Results <CAV>	Limit <QP>	Limit <AV>	Margin <QP>	Margin <AV>	Phase	Comment
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15000	26.70	8.40	12.60	39.30	21.00	66.00	56.00	26.7	35.0	N	
2	0.17145	24.50	7.50	12.59	37.09	20.09	64.89	54.89	27.8	34.8	N	
3	0.20071	20.70	5.90	12.59	33.29	18.49	63.58	53.58	30.2	35.0	N	
4	0.35248	7.80	1.10	12.62	20.42	13.72	58.90	48.90	38.4	35.1	N	
5	0.52440	2.90	-0.40	12.63	15.53	12.23	56.00	46.00	40.4	33.7	N	
6	27.12000	0.90	-3.80	14.55	15.45	10.75	60.00	50.00	44.5	39.2	N	
7	0.15000	27.00	8.80	12.58	39.58	21.38	66.00	56.00	26.4	34.6	L1	
8	0.17145	24.40	8.10	12.58	36.98	20.68	64.89	54.89	27.9	34.2	L1	
9	0.20071	20.60	6.80	12.59	33.19	19.39	63.58	53.58	30.3	34.1	L1	
10	0.35248	8.00	3.90	12.64	20.64	16.54	58.90	48.90	38.2	32.3	L1	
11	0.52440	5.80	3.60	12.65	18.45	16.25	56.00	46.00	37.5	29.7	L1	
12	27.12000	1.20	-3.30	14.47	15.67	11.17	60.00	50.00	44.3	38.8	L1	

Calculation:Result[dBuV]=Reading[dBuV]+C.Fac(LISN(AMN)+Cable+ATT)[dB]
LISN(AMN):SLS-02

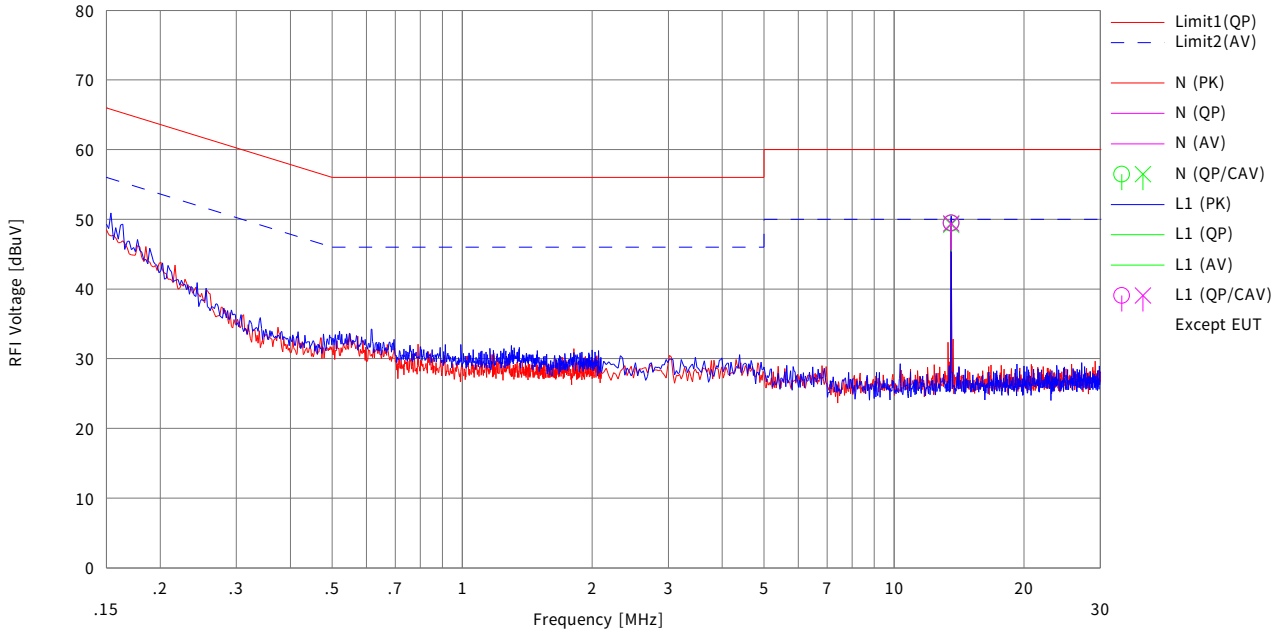
DATA OF CONDUCTED EMISSION TEST

UL Japan,Inc. Shonan EMC Lab. No.2 Shielded Room
Date : 2020/05/07

Company	: DARTSLIVE INTERNATIONAL Ltd.	Mode	: NFC Transmitting
Kind of EUT	: DARTSLIVE CREDIT CARD READER	Order No.	: 13278171S
Model No.	: DLI-00524-B	Power	: DC 5.0 V (USB), AC adaptor:AC120V/60Hz
Serial No.	: No.2	Temp./Humi.	: 22 deg.C / 48 %RH
Remarks	: Antenna: terminated, without tag		

Limit : FCC_Part 15 Subpart C(15.207)

Engineer : Makoto Hosaka



No.	Freq.	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP>	<CAV>		<QP>	<CAV>	<QP>	<AV>	<QP>	<AV>		
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	13.56000	35.50	35.30	13.93	49.43	49.23	60.00	50.00	10.5	0.7	N	
2	13.56000	35.80	35.70	13.70	49.50	49.40	60.00	50.00	10.5	0.6	L1	

Calculation:Result[dBuV]=Reading[dBuV]+C.Fac(LISN(AMN)+Cable+ATT)[dB]
LISN(AMN)=SLS-02

Data of Electric field strength of Fundamental emission and Spurious emission within the band: FCC15.225(a)(b)(c)

UL Japan, Inc.
Shonan EMC Lab., No.1 Semi Anechoic Chamber

Company:	DARTSLIVE INTERNATIONAL Ltd.	Regulation:	FCC Part15 Subpart C 15.225
Equipment:	DARTSLIVE CREDIT CARD READER	Test Distance:	3m
Model:	DLI-00524-B	Date:	April 16, 2020
Sample No.:	No.1	Temperature:	19 deg.C
Power:	DC 5 V	Humidity:	42 %RH
Mode:	Transmitting 13.56MHz	ENGINEER:	Makoto Hosaka

Remarks: : without Tag (Axis:Hor_Y / Ver_Z) , Vertical polarization (antenna angle) of the worst case: 45 deg

Fundamental emission

No.	FREQ	Test Receiver Reading		Antenna Factor	Loss	AMP GAIN	Distance factor	RESULT		LIMIT (30m)	MARGIN	
		Hor	Ver					Hor	Ver		Hor	Ver
	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]
1	13.560	54.0	64.7	20.9	6.6	31.9	-40.0	9.6	20.3	83.9	74.3	63.6

Calculation:Result[dBuV/m]=Reading[dBuV]+Ant.Fac[dB/m]+Loss(Cable+ATT)[dB]-Gain(AMP)[dB]+Distance factor[dB]

Distance factor: 40 x log (3m/30m) = -40 dB

Limits (30m)

・13.553MHz to 13.567MHz : 83.9dBuV/m (FCC 15.225(a))

Spurious emission within the band

No.	FREQ	Test Receiver Reading		Antenna Factor	Loss	AMP GAIN	Distance factor	RESULT		LIMIT (30m)	MARGIN	
		Hor	Ver					Hor	Ver		Hor	Ver
	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]
1	13.110	29.4	29.3	20.8	6.5	31.9	-40.0	-15.1	-15.2	29.5	44.6	44.7
2	13.351	29.5	34.6	20.9	6.5	31.9	-40.0	-15.0	-9.86	40.5	55.5	50.4
3	13.410	29.5	31.1	20.9	6.6	31.9	-40.0	-15.0	-13.3	40.5	55.5	53.8
4	13.428	29.9	36.4	20.9	6.6	31.9	-40.0	-14.6	-8.0	50.4	65.0	58.4
5	13.479	30.3	37.9	20.9	6.6	31.9	-40.0	-14.1	-6.47	50.4	64.5	56.9
6	13.553	41.5	51.7	20.9	6.6	31.9	-40.0	-2.9	7.3	50.4	53.3	43.1
7	13.567	38.3	48.4	20.9	6.6	31.9	-40.0	-6.1	4.0	50.4	56.5	46.4
6	13.638	30.3	38.9	20.9	6.6	31.9	-40.0	-14.1	-5.5	50.4	64.5	55.9
7	13.692	29.9	37.7	20.9	6.6	31.9	-40.0	-14.4	-6.7	50.4	64.8	57.1
8	13.710	29.2	31.7	20.9	6.6	31.9	-40.0	-15.1	-12.7	40.5	55.6	53.2
9	13.771	29.9	37.0	21.0	6.6	31.9	-40.0	-14.4	-7.36	40.5	54.9	47.9
10	14.010	29.4	29.3	21.0	6.6	31.9	-40.0	-14.9	-14.98	29.5	44.4	44.5

Calculation:Result[dBuV/m]=Reading[dBuV]+Ant.Fac[dB/m]+Loss(Cable+ATT)[dB]-Gain(AMP)[dB]+Distance factor[dB]

Outside filed strength frequencies
・Fc±7kHz:13.553MHz to 13.567MHz
・Fc±150kHz:13.410MHz to 13.710MHz
・Fc±450kHz:13.110MHz to 14.010MHz
Fc = 13.56MHz

Limits (30m)
・13.410MHz to 13.553MHz and 13.567MHz to 13.710MHz : 50.4dBuV/m (FCC 15.225(b))
・13.110MHz to 13.410MHz and 13.710MHz to 14.010MHz : 40.5dBuV/m (FCC 15.225(c))
・Below 13.110MHz and Above 14.010MHz : 29.5dBuV/m (FCC 15.225(d)and FCC 15.209)

Radiated Emission

UL Japan, Inc.
Shonan EMC Lab. No.1 Semi Anechoic Chamber

Company:	DARTSLIVE INTERNATIONAL Ltd.	Regulation:	FCC Part15 Subpart C 15.225
Equipment:	DARTSLIVE CREDIT CARD READER	Test Distance:	3m
Model:	DLI-00524-B	Date:	April 16, 2020
Sample No.:	No.1	Temperature:	19 deg.C
Power:	DC 5 V	Humidity:	42 %RH
Mode:	Transmitting 13.56MHz	ENGINEER:	Makoto Hosaka
EUT axis:	Below 30MHz(Horizontal Y-axis, Vertical Y-axis) Above 30MHz(Horizontal: X-axis, Vertical: Z-axis),		
Remarks:	without Tag		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	27.12	QP	28.4	22.3	6.9	31.8	-40.0	-14.3	29.5	43.8	-	0	* Limit: 30m
Hori.	40.68	QP	21.7	14.5	7.3	31.8	0.0	11.7	29.5	17.9	100	0	
Hori.	54.24	QP	25.1	9.7	7.5	31.8	0.0	10.4	29.5	19.1	358	330	
Hori.	67.800	QP	24.6	6.8	7.4	31.8	0.0	7.0	43.5	36.5	295	139	
Hori.	81.360	QP	29.8	6.6	8.4	31.8	0.0	13.0	43.5	30.5	204	312	
Hori.	406.792	QP	36.2	16.0	8.1	31.9	0.0	28.4	46.0	17.6	100	24	
Hori.	827.187	QP	33.3	21.0	9.6	31.9	0.0	32.0	43.5	11.5	100	224	
Hori.	908.598	QP	31.7	22.1	9.9	31.4	0.0	32.3	43.5	11.2	100	18	
Hori.	922.082	QP	31.3	22.0	9.9	31.3	0.0	31.9	46.0	14.1	100	51	
Hori.	949.186	QP	33.6	22.0	10.0	31.1	0.0	34.5	46.0	11.6	100	17	
Vert.	27.12	QP	28.5	22.3	6.9	31.8	-40.0	-14.1	29.5	43.6	-	0	* Limit: 30m
Vert.	40.68	QP	25.7	14.5	7.3	31.8	0.0	15.7	29.5	13.8	100	0	
Vert.	54.24	QP	31.1	9.7	7.5	31.8	0.0	16.5	29.5	13.0	100	208	
Vert.	66.337	QP	40.4	7.0	7.3	31.8	0.0	22.9	40.0	17.1	100	194	
Vert.	67.800	QP	38.5	6.8	7.4	31.8	0.0	20.9	43.5	22.6	100	229	
Vert.	81.360	QP	43.4	6.6	8.4	31.8	0.0	26.6	46.0	19.4	100	215	
Vert.	145.547	QP	40.0	14.7	8.8	31.8	0.0	31.7	46.0	14.3	100	309	
Vert.	406.780	QP	39.8	16.0	8.1	31.9	0.0	32.0	40.0	**8.0**	100	353	
Vert.	596.618	QP	35.2	19.2	8.5	32.1	0.0	30.8	43.5	12.7	100	84	
Vert.	949.171	QP	30.5	22.0	10.0	31.1	0.0	31.4	46.0	14.6	114	320	

Result = Reading + Ant Factor + Loss (Cable+ATT+ΔAF(above 30MHz)) - Gain(Amprifier) + Distance factor(below 30MHz)

* Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

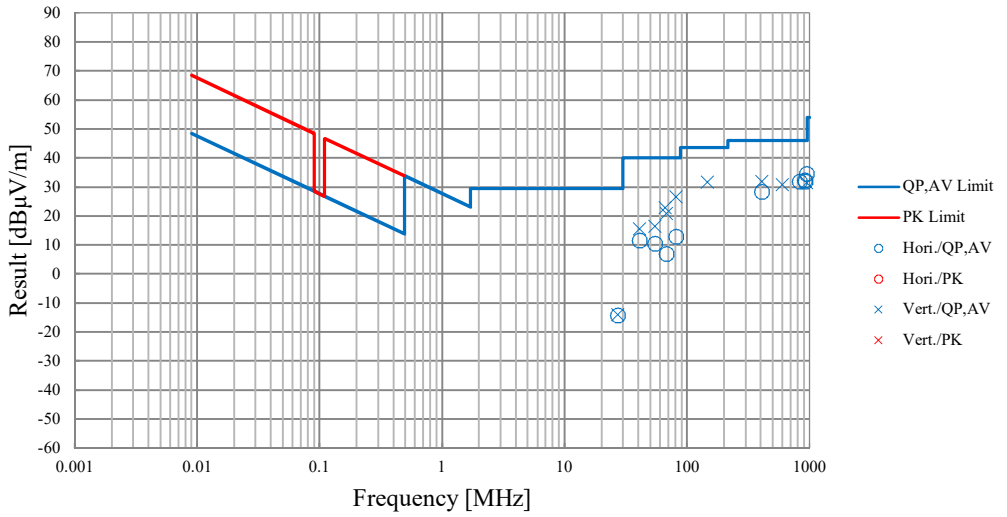
* Carrier level (Result at 3m): Hor= 49.6dBuV/m, Ver= 60.3 dBuV/m

Radiated Emission (Worst mode plot)

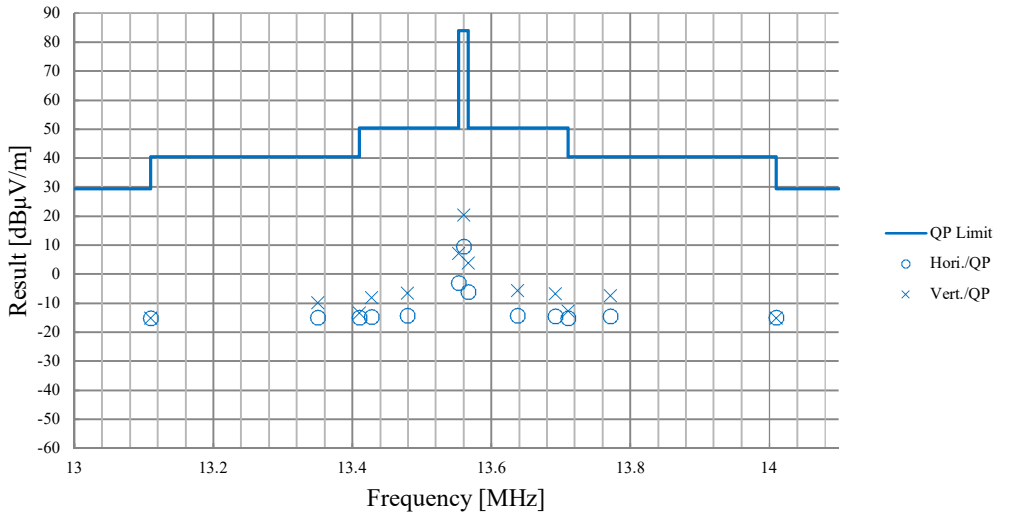
UL Japan, Inc.
Shonan EMC Lab. No.1 Semi Anechoic Chamber

Company:	DARTSLIVE INTERNATIONAL Ltd.	Regulation:	FCC Part15 Subpart C 15.225
Equipment:	DARTSLIVE CREDIT CARD READER	Test Distance:	3m
Model:	DLI-00524-B	Date:	April 16, 2020
Sample No.:	No.1	Temperature:	19 deg.C
Power:	DC 5 V	Humidity:	42 %RH
Mode:	Transmitting 13.56MHz	ENGINEER:	Makoto Hosaka
EUT axis:	Below 30MHz(Horizontal Y-axis, Vertical Y-axis)		
	Above 30MHz(Horizontal: X-axis, Vertical: Z-axis),		
Remarks:	These plots data contains sufficient number to show the trend of characteristic features for EUT.		

Spurious emission plot



Within band plot



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Data of Frequency Tolerance

UL Japan, Inc.
Shonan EMC Lab. No.5 Shielded room

Company	DARTSLIVE INTERNATIONAL Ltd.		
Equipment	DARTSLIVE CREDIT CARD READER	Regulation	FCC Part15 Subpart C 15.225 (e)
Model	DLI-00524-B	Date	April 21, 2020
Serial No.	No.1	Temperature	24 deg.C
Power	DC 5V	Humidity	49 %RH
Mode	Transmitting 13.56 MHz	ENGINEER	Makoto Hosaka

Temperature Variation: -20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559615	-0.000385	-0.00284	0.010
after 2minutes	13.56	13.559620	-0.000380	-0.00280	0.010
after 5minutes	13.56	13.559621	-0.000379	-0.00279	0.010
after 10minutes	13.56	13.559621	-0.000379	-0.00279	0.010

Temperature Variation: -10deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559651	-0.000349	-0.00257	0.010
after 2minutes	13.56	13.559653	-0.000347	-0.00256	0.010
after 5minutes	13.56	13.559653	-0.000347	-0.00256	0.010
after 10minutes	13.56	13.559653	-0.000347	-0.00256	0.010

Temperature Variation: 0deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559655	-0.000345	-0.00254	0.010
after 2minutes	13.56	13.559654	-0.000346	-0.00255	0.010
after 5minutes	13.56	13.559654	-0.000346	-0.00255	0.010
after 10minutes	13.56	13.559654	-0.000346	-0.00255	0.010

Temperature Variation: 10deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559637	-0.000363	-0.00268	0.010
after 2minutes	13.56	13.559634	-0.000366	-0.00270	0.010
after 5minutes	13.56	13.559633	-0.000367	-0.00271	0.010
after 10minutes	13.56	13.559633	-0.000367	-0.00271	0.010

Temperature Variation: 20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559605	-0.000395	-0.00291	0.010
after 2minutes	13.56	13.559601	-0.000399	-0.00294	0.010
after 5minutes	13.56	13.559600	-0.000400	-0.00295	0.010
after 10minutes	13.56	13.559600	-0.000400	-0.00295	0.010

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Data of Frequency Tolerance

Temperature Variation: 30deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559568	-0.000432	-0.00319	0.010
after 2minutes	13.56	13.559563	-0.000437	-0.00322	0.010
after 5minutes	13.56	13.559563	-0.000437	-0.00322	0.010
after 10minutes	13.56	13.559563	-0.000437	-0.00322	0.010

Temperature Variation: 40deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559530	-0.000470	-0.00347	0.010
after 2minutes	13.56	13.559526	-0.000474	-0.00350	0.010
after 5minutes	13.56	13.559526	-0.000474	-0.00350	0.010
after 10minutes	13.56	13.559526	-0.000474	-0.00350	0.010

Temperature Variation: 50deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559503	-0.000497	-0.00367	0.010
after 2minutes	13.56	13.559500	-0.000500	-0.00369	0.010
after 5minutes	13.56	13.559500	-0.000500	-0.00369	0.010
after 10minutes	13.56	13.559500	-0.000500	-0.00369	0.010

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Data of Frequency Tolerance

UL Japan, Inc.
Shonan EMC Lab. No.5 Shielded room

Company	DARTSLIVE INTERNATIONAL Ltd.		
Equipment	DARTSLIVE CREDIT CARD READER	Regulation	FCC Part15 Subpart C 15.225 (e)
Model	DLI-00524-B	Date	April 21, 2020
Serial No.	No.1	Temperature	24 deg.C
Power	DC 5V	Humidity	49 %RH
Mode	Transmitting 13.56 MHz	ENGINEER	Makoto Hosaka

Voltage Variation: DC 4.25 V
Temperature Variation: 20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559601	-0.000399	-0.00294	0.010
after 2minutes	13.56	13.559601	-0.000399	-0.00294	0.010
after 5minutes	13.56	13.559600	-0.000400	-0.00295	0.010
after 10minutes	13.56	13.559600	-0.000400	-0.00295	0.010

Voltage Variation: DC 5.75 V
Temperature Variation: 20deg.C

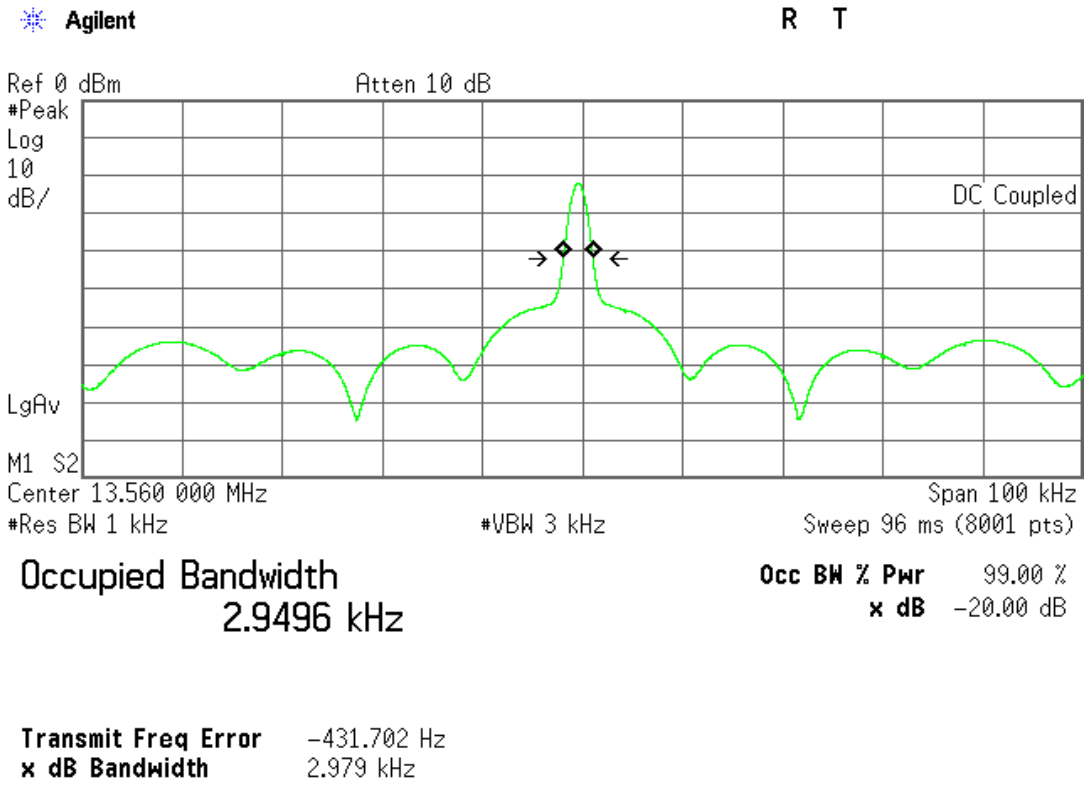
Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559602	-0.000398	-0.00294	0.010
after 2minutes	13.56	13.559599	-0.000401	-0.00296	0.010
after 5minutes	13.56	13.559599	-0.000401	-0.00296	0.010
after 10minutes	13.56	13.559599	-0.000401	-0.00296	0.010

20dB bandwidth & 99% Occupied bandwidth: FCC 15.215 / RSS-Gen

UL Japan, Inc.
Shonan EMC Lab. No.5 Shielded Room

Company:	DARTSLIVE INTERNATIONAL Ltd.	Regulation:	FCC Part15 Subpart C 15.215
Equipment:	DARTSLIVE CREDIT CARD READER		
Model:	DLI-00524-B	Date:	April 21, 2020
Sample No.:	No.1	Temperature:	24 deg.C
Power:	DC 5 V	Humidity:	49 %RH
Mode:	Transmitting 13.56MHz	ENGINEER:	Makoto Hosaka

20dB Bandwidth: 2.979 kHz
99% Occupied Bandwidth: 2.9496 kHz



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APPENDIX 2

Test Instruments

EMI test equipment

Test Name	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Interval (Month)
CE	SAT3-13	150923	Attenuator	JFW	50HF-003N	-	2020/01/30	12
CE	SCC-A12/A13/SRSE-01	144966	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-269(RF Selector)	2020/04/12	12
CE	SCC-B12/B13/SRSE-02	144969	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-270(RF Selector)	2020/04/17	12
CE	SJM-09	145336	Measure	PROMART	SEN1935	-	-	-
CE	SLS-02	145539	LISN	Rohde & Schwarz	ENV216	100512	2020/02/18	12
CE	SOS-16	167990	Humidity Indicator	CUSTOM	CTH-202	708Q08R	2019/12/19	12
CE	SOS-22	191839	Humidity Indicator	CUSTOM	CTH-201	-	2019/12/12	12
CE	STR-07	146209	Test Receiver	Rohde & Schwarz	ESU26	100484	2019/09/13	12
CE	STS-02	145793	Digital Hitester	Hioki	3805-50	80997819	2020/04/09	12
CE,RE	COTS-SEMI-5	170932	EMI Software	TSJ	TEPTO-DV3(RE,CE,ME,PE)	-	-	-
CE,RE	KJM-09	145929	Measure	KOMELON	KMC-36	-	-	-
CE,RE	STR-02	145791	Test Receiver	Rohde & Schwarz	ESCI	100575	2019/09/25	12
CE,RE	STS-01	145792	Digital Hitester	Hioki	3805-50	80997812	2019/10/01	12
RE	KAT6-04	144899	Attenuator	Inmet	18N-6dB	-	2019/12/05	12
RE	SAEC-01(NSA)	145597	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	2020/04/08	12
RE	SAEC-ALL	145568	Semi Anechoic Chamber(ME)	TDK	Semi Anechoic Chamber 3m/10m	1, 2, 3	2018/12/27	24
RE	SAF-01	145003	Pre Amplifier	SONOMA	310N	290211	2020/02/19	12
RE	SAT3-09	144959	Attenuator	JFW	50HF-003N	-	2019/08/06	12
RE	SAT6-15	167096	Attenuator	JFW	50HF-006N	-	2020/02/21	12
RE	SBA-01	145161	Biconical Antenna	Schwarzbeck Mess - Elektronik	BBA9106	91032664	2020/04/04	12
RE	SCC-A1/A3/A5/A7/A8/A13/SRSE-01	144967	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	2020/04/12	12
RE	SCC-A2/A4/A6/A7/A8/A13/SRSE-01	144968	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	2020/04/12	12
RE	SCC-M1	194601	Coaxial Cable	Fjikura	5D-2W	-	2019/12/17	12
RE	SLA-05	145527	Logperiodic Antenna	Schwarzbeck Mess - Elektronik	VUSLP9111B	193	2020/04/04	12
RE	SOS-20	191837	Humidity Indicator	CUSTOM	CTH-201	-	2019/12/12	12
RE	TLP-05	174863	Loop Antenna	Rohde & Schwarz	HFH2-Z2	826532/009	2019/11/12	12
FT,BW	KTS-07	145111	Digital Tester	SANWA	PC500	7019232	2019/10/01	12
FT	SCH-01	145200	Temperature and Humidity Chamber	ESPEC	PL-1KT	14020837	2020/04/02	12
FT,BW	SOS-19	175823	Humidity Indicator	CUSTOM	CTH-201	-	2019/12/19	12
FT,BW	SRENT-15	160899	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46185516	2020/01/15	12
FT,BW	SSCA-01	146178	Search coil	Langer	RF-R 400-1	02-0634	-	-

*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,
RE: Radiated emission,
FT: Frequency Toleramce
BW: Bandwidth