EMC TEST REPORT

No. 2401470STO-101

Electromagnetic disturbances

EQUIPMENT UNDER TEST

Equipment:	Electronic control gear for LED / Power Supply
Type/Model:	ICPSW24-7-4
Manufacturer:	IKEA of Sweden AB
Tested by request of:	IKEA of Sweden AB

SUMMARY

Referring to the emission limits, and the operating mode during the tests specified in this report, the equipment complies with the requirements according to the following standards:

FCC 47 CFR Part 15: Radio frequency devices, Subpart B: Unintentional radiators. Class B equipment.

ICES-001 Issue 5: Industrial, Scientific and Medical (ISM) Radio Frequency Generators with emission limits for class B Group 1 equipment

ICES-005 Issue 5: Lighting Equipment, Class B. (2018)

For details, see clause 2 – 4.

Date of issue: February 27, 2024

Tested by: Per Granberg

Approved by: Anna Näslund

Revision History

Test report no.	Release no.	Date of issue	Description
2302359STO-103	1	November 10, 2023	
2401470STO-101	2	February 27, 2024	New rating plates including FCC ID on page 6, and added FCC ID on page 5

Terms, definition and abbreviations

The following terms, definitions and abbreviations may be used throughout the report.

Term/definition/abbreviation	Meaning
AAN	Asymmetrical Artificial Network
AC	Alternating Current
AE	Associated Equipment
AMN	Artificial Mains Network
AV	Average
BW	Bandwidth
CAV	CISPR Average
CM	Common Mode
CMAD	Common Mode Absorption Device
DC	Direct Current
DM	Differential Mode
EM	Electromagnetic
EMC	Electromagnetic Compatibility
EUT	Equipment Under Test
F	Fail
FAR	Fully Anechoic Room
F_X	Highest fundamental frequency generated or used within the EUT, or highest frequency at which it operates
H	Horizontal
ISN	Impedance Stabilizing Network
MU	Measurement Uncertainty
N/A	Not Applicable
P	Pass
PE	Protective Earth
PK	Peak
Pol.	Polarisation
QP / QPK	Quasi-Peak
RBW	Resolution Bandwidth
RF	Radio Frequency
RGP	Reference Ground Plane
RH	Relative Humidity
RMS	Root Mean Square
Rx	Receiver / Receiving
SAC	Semi-Anechoic Chamber
Tx	Transmitter / Transmitting
V	Vertical
VBW	Video Bandwidth

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1. CLIENT INFORMATION

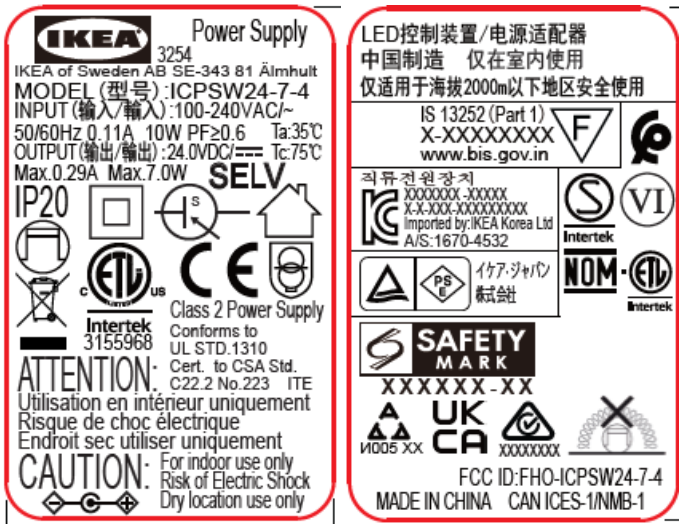
The EUT has been tested by request of

Company	IKEA of Sweden AB Box 702 SE-343 81 Älmhult Sweden
Name of contact	Jonas Filipsson
Client observer	-

2. EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT

Equipment:	Electronic control gear for LED / Power Supply								
Type/Model:	ICPSW24-7-4								
Brand name:	IKEA								
S/N:	-								
Manufacturer:	IKEA of Sweden AB Box 702 SE-343 81 Älmhult Sweden								
Installation class:	☐ I ☒ II ☐ III ☐ N/A								
Highest clock frequency, F_X:	< 108 MHz								
Transmitting freq.:	-								
Software version:	-								
Hardware version:	-								
FCC ID:	FHO-ICPSW24-7-4								
Mounting position: (during normal use)	☐ Table-top ☐ Floor-standing ☐ Wall/ceiling ☐ Hand-held ☒ Other:								
Supplementary information:	-								
Input ratings	**Voltage [V]**	**Freq. [Hz]**	**Current [A]**	**Power [W]**	**Coupling**				
☒ AC	100 – 240	50/60	0.11	10	**L1** ☒	**L2** ☐	**L3** ☐	**N** ☒	**PE** ☐
☐ DC					**V+** ☐	**V-** ☐			**PE** ☐
☐ Battery					**V+** ☐	**V-** ☐			
☐ Other:									
Output ratings	**Voltage [V]**	**Freq. [Hz]**	**Current [A]**	**Power [W]**	**Coupling**				
☒ DC	24	-	0.29	7	**V+** ☒	**V-** ☒			**PE** ☐
☐ Other:									



Photo/copy of marking/rating plate(s)

2.2 Test set up and EUT photos

Test set up and EUT photos are enclosed in Annex 1 to this test report.

2.3 Additional information about the EUT

The ICPSW24-7-4 is a plug in LED-driver for use with LED luminaires, ICPSW24-7-4 can also be used as a power supply for other type of apparatus.

The EUT has the following ports:

Port type	Port name	Length [m]	Shielded
AC I/O			
☒ AC power input	AC power input	-	☐
☐ AC power output			☐
DC I/O			
☐ DC power input			☐
☒ DC power output	DC power output	3*	☐
Signal/control I/O			
☐ Signal/control			☐
☐ Telecom/network			☐

Supplementary information:

*According to the manufacturer: the maximum length of the DC-output cable is 3 m when used as a power supply, however as LED-driver in luminaire systems the cable may be longer.

The EUT ports were connected according to the following:

Port name	Cable type	Connected to
AC power input	Two-core	AC-mains
DC power output	Two-core	Variable LED load

2.4 Associated equipment

Associated equipment is equipment needed for correct operation of the EUT, but not included as part of the testing and evaluation of the EUT.

Equipment	Manufacturer	Type/Model	S/N
Variable LED-load	IKEA	24 V 0,5-7 W LED load	-

2.5 Decision rule

The statements of conformity are reported as:
Passed – When the measured values are within the specified limits.
Failed – When one or more measures values are outside the specified limits.

3. TEST SPECIFICATIONS

3.1 Additions, deviations and exclusions from standards and accreditation

The following editions of basic standards were applied instead of the standards referenced in FCC 47 CFR Part 15 and ICES-005:

Referenced	Applied
ANSI C63.4-2014	ANSI C63.4-2014

The following editions of basic standards were applied instead of the standards referenced in ICES-001:

Referenced	Applied
CSA CISPR 11:19	CISPR 11:2015 + A1:2016

3.2 Test site

Measurements were performed at:

Intertek Semko AB.
Torshamnsgatan 43,
P.O. Box 1103
SE-164 22 Kista

Intertek Semko AB is an FCC listed test site with site registration number 90913
Intertek Semko AB is an FCC accredited conformity assessment body with designation number SE0002
Intertek Semko AB is an Industry Canada listed test facility with IC assigned code 2042G

Measurement chambers

Measurement Chamber	Type of chamber	IC Site filing #
☒ STORA HALLEN	Semi-anechoic 10 m and 3 m	2042G-2
☐ BJÖRKHALLEN	Semi-anechoic 3 m	2042G-1
☐ 5 m CHAMBER	Semi-anechoic 5 m	2042G-3

3.3 Mode of operation during the test

Mode no.	Supply	Description
1	120 V, 60 Hz	Max output load condition, LED-load of 7 W

Test	Mode of operation
Conducted continuous emission	1
Radiated emission of EM fields	1

4. TEST SUMMARY

The test has been carried out at the Intertek Semko AB premises in Kista, Sweden.
The results in this report apply only to sample tested.
Result: P – F – N/A

EMISSION TESTS					
Chapter	**Standard(s)**	**Description**	**Port type(s)**	**Note(s)**	**Verdict**
5	ANSI C63.4 CISPR 11	Conducted continuous emission	AC input	-	P
6	ANSI C63.4 CISPR 11	Radiated emission of EM fields	Enclosure	-	P
Supplementary information:					

5. CONDUCTED CONTINUOUS DISTURBANCES in the frequency-range 0.15 – 30 MHz

Date of test	Temp. [°C]	Humidity [%RH]	Tested by
August 7, 2023	23	70	PEG

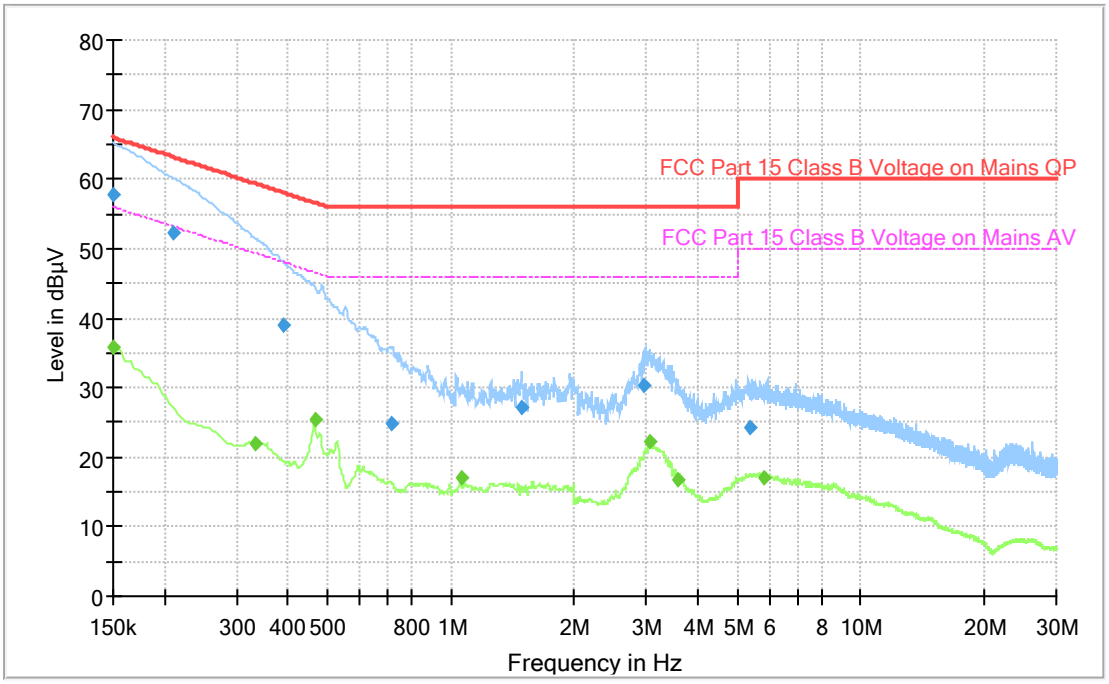
Test setup and procedure:	EUT was placed 0.8 m from the AMN /ISN. Overview sweeps were performed for each lead of the cable(s). AE requiring mains power to operate was/were connected to AMN /ISN terminated with 50 Ω, when applicable.		
EUT position:	☒ Table-top (EUT 0.4 m from the RGP) ☐ Floor-standing (EUT 12 mm from the RGP) ☐ Other:		
Tested port type(s):	**Coupling device**	**Measurement uncertainty**	
		Frequency range	**Value**
☒ AC power	☒ AMN	0.15 – 30 MHz	± 3.3 dB
Supplementary information: Measurement uncertainty is calculated in accordance with CISPR 16-4-2:2011. The measurement uncertainty is given with a confidence of 95 %.			

Port	**Frequency [MHz]**	**Voltage limits [dBµV] (2)**	
		QP	**AV**
Limits FCC Part 15 subpart B and ICES-005			
☐ AC power input Class A	0.15 – 0.50	79	66
	0.50 – 30.0	73	60
☒ AC power input Class B	0.15 – 0.50	66 – 56 (1)	56 – 46 (1)
	0.50 – 5.00	56	46
	5.00 – 30.0	60	50
Supplementary information: (1) The limits decrease linearly with the logarithm of the frequency. (2) At transitional frequencies the lower limit applies.			

Port	Frequency [MHz]	Rated input power of ≤ 20 kVA (2)		Rated input power of > 20 kVA (2),(3)	
		QP dB(µV)	AV dB(µV)	QP dB(µV)	AV dB(µV)
Limits, Class A ICES-001 group 1 according to CISPR 11					
☐ AC power	0,15 – 0,50	79	66	100	90
	0,50 – 5,00	73	60	86	76
	5,00 – 30,0	73	60	90-73 (1)	80-60 (1)
Limits ICES-001, Class B group 1 according to CISPR 11					
☒ AC power	0,15 – 0,50	66-56 (1)	56-46 (1)	66-56 (1)	56-46 (1)
	0,50 – 5,00	56	46	56	46
	0,50 – 30,0	60	50	60	50

Supplementary information:
(1) The limits decrease linearly with the logarithm of the frequency.
(2) At transitional frequencies the lower limit applies.
(3) These limits apply to equipment with a rated input power > 20 kVA and intended to be powered by a dedicated power transformer or generator, and which is not connected to Low Voltage (LV) overhead power lines. For equipment not intended to be powered by a user specific power transformer, the limits for ≤ 20 kVA apply. The manufacturer and/or supplier shall provide information on installation measures that can be used to reduce emissions from the installed equipment. In particular, it shall be indicated that this equipment is intended to be powered by a dedicated power transformer or generator and not by LV overhead power lines.

5.1 Test results, AC Power input port, Class B



The EUT also fulfil the class B limit for ICES-001 and ICES-005, see limit table on previous page.

Diagram, Peak and AV overview sweep

Measurement results, Quasi-peak and Average

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr (dB)
0.150000	57.76	---	66.00	8.24	1000.0	9.000	N	GND	10.0
0.150000	---	35.69	56.00	20.31	1000.0	9.000	N	GND	10.0
0.210750	52.23	---	63.18	10.95	1000.0	9.000	L1	GND	10.0
0.332250	---	22.04	49.40	27.35	1000.0	9.000	N	GND	10.0
0.388500	38.86	---	58.10	19.24	1000.0	9.000	N	GND	10.0
0.465000	---	25.29	46.60	21.31	1000.0	9.000	N	GND	10.0
0.712500	24.84	---	56.00	31.16	1000.0	9.000	L1	GND	10.0
1.059000	---	16.90	46.00	29.10	1000.0	9.000	N	GND	10.0
1.486500	27.02	---	56.00	28.98	1000.0	9.000	N	GND	10.0
2.958000	30.29	---	56.00	25.71	1000.0	9.000	N	GND	10.1
3.052500	---	22.24	46.00	23.76	1000.0	9.000	N	GND	10.1
3.588000	---	16.89	46.00	29.11	1000.0	9.000	N	GND	10.1
5.385750	24.34	---	60.00	35.66	1000.0	9.000	N	GND	10.2
5.829000	---	17.08	50.00	32.92	1000.0	9.000	N	GND	10.2

The EUT also fulfil the class B limit for ICES-001 and ICES-005, see limit table on previous page.

Result [dBµV] = Analyser reading [dBµV] + cable loss [dB] + LISN insertion loss [dB]

5.2 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement software	Rohde & Schwarz	EMC32 - V10.60.20	--	--	--
Receiver	Rohde & Schwarz	ESU 8	12866	2023-07-07	1 year
AMN / LISN	Rohde & Schwarz	ESH3-Z5	2728	2023-07-05	1 year
Pulse limiter	Rohde & Schwarz	ESH3-Z5	32455	2023-07-05	1 year

6. RADIATED RF EMISSION IN THE FREQUENCY-RANGE 30 MHZ – 1 GHZ

Date of test	Temp. [°C]	Humidity [%RH]	Tested by
August 8, 2023	22	71	PEG

Test setup and procedure:	The EUT was placed on a non-conductive support on the RGP. Overview sweeps were performed with the measurement receiver in max hold mode and the peak detector activated in the frequency range 30 – 1000 MHz. Above 1 GHz, both the peak and average detectors were activated, when applicable. During height scan above 1 GHz the EUT was kept in antennas cone of radiation.
EUT position:	☒ Table-top (EUT 0.8 m from the RGP) ☐ Floor-standing (EUT 12 mm from the RGP) ☐ Other:
Highest measured frequency:	☒ F_X ≤ 108 MHz: 1 GHz ☐ 108 MHz < F_X ≤ 500 MHz: 2 GHz ☐ 500 MHz < F_X ≤ 1 GHz: 5 GHz ☐ F_X > 1 GHz: 5 x F_X up to a max. of 40 GHz ☐ F_X is unknown: 40 GHz

Frequency range:	Measuring distance	Measurement uncertainty
☒ 30 to 1000 MHz	3 m	± 5.1 dB
☐ 30 to 1000 MHz	10 m	± 5.0 dB
☐ 1.0 to 18 GHz	3 m	± 4.5 dB
☐ 18 to 26 GHz	3 m	± 4.8 dB
☐ 26 to 40 GHz	3 m	± 5.7 dB

Supplementary information: Measurement uncertainty is calculated in accordance with CISPR 16-4-2:2011. The measurement uncertainty is given with a confidence of 95 %.

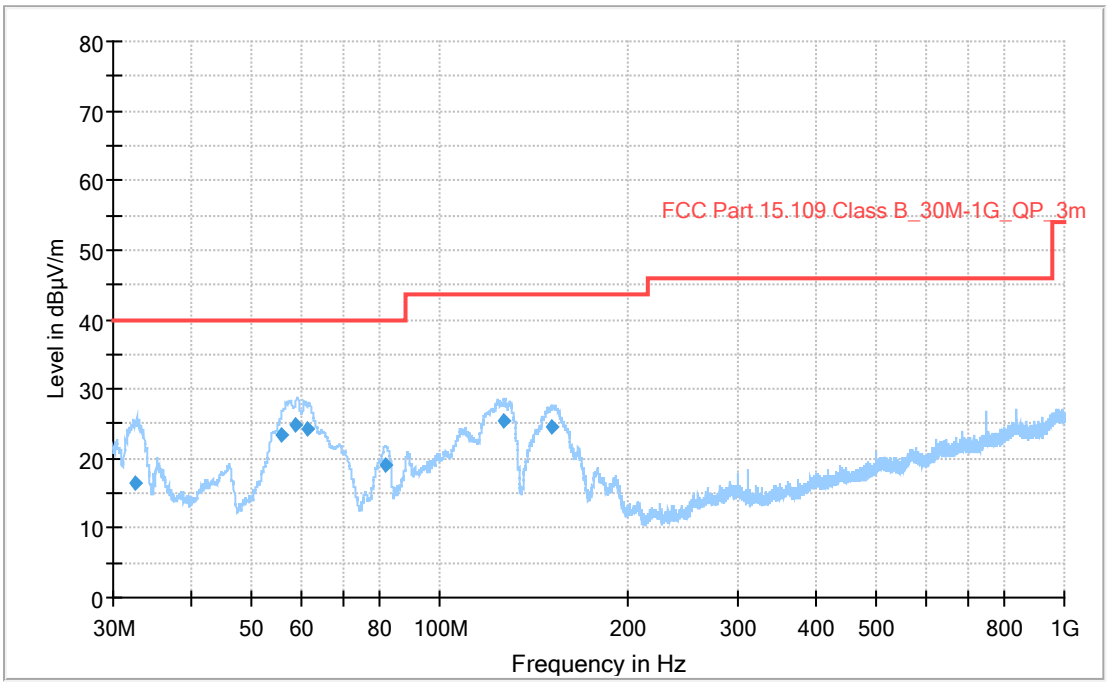
Test	Freq. [MHz]	Meas. angle [°]	Antenna			RBW [kHz]			VBW [kHz]
			Type	Height	Pol.	QP	PK	AV	PK
Preview	30 – 1000	0 – 359	Bilog	1 – 4 m	V and H	-	120	-	1000
Final						120	-	-	-
Preview	1000 – 40000	0 – 359	Horn	1 – 4 m		-	1000	1000	3000
Final						-	1000	1000	-

Measurement distance [m]	Frequency [MHz]	Limits [dBµV/m]		
		QP	PK	AV
Limits, FCC, Class A				
☐ 3 / ☐ 10	30 – 88	49.5 / 39.1	-	-
	88 – 216	54.0 / 43.5	-	-
	216 – 960	56.9 / 46.4	-	-
	960 – 1000	60.0 / 49.5	-	-
☐ 3	Above 1000	-	80.0	60.0
Limits, FCC, Class B				
☒ 3 / ☐ 10	30 – 88	40.0 / 29.5	-	-
	88 – 216	43.5 / 33.1	-	-
	216 – 960	46.0 / 35.6	-	-
	960 – 1000	54.0 / 43.5	-	-
☐ 3	Above 1000	-	74.0	54.0
Limits, ICES-005 Class A				
☐ 3 / ☐ 10	30 – 88	49.5 / 39.1	-	-
	88 – 216	54.0 / 43.5		
	216 – 1000	56.9 / 46.4	-	-
Limits, ICES-005, Class B				
☒ 3 / ☐ 10	30 – 88	40.0 / 29.5	-	-
	88 – 216	43.5 / 33.1	-	-
	216 – 1000	46.0 / 35.6	-	-

Test facility & measurement distance	Frequency [MHz]	Limits [dBµV/m]	
		Rated input power ≤ 20 kVA	Rated input power > 20 kVA (1)
		QP	QP
Limits ICES-001, Class A group 1 according to CISPR 11			
☐ SAC, 10 m	30 – 230	40	50
	230 – 1000	47	50
☐ SAC, 3 m	30 – 230	50	60
	230 – 1000	57	60
Limits ICES-001, Class B group 1 according to CISPR 11			
☐ SAC, 10 m	30 – 230	30	30
	230 – 1000	37	37
☒ SAC, 3 m	30 – 230	40	40
	230 – 1000	47	47

Supplementary information:
(1): These limits apply to equipment with a rated input power of > 20 kVA and intended to be used at locations where there is a distance greater than 30 m between the equipment and third party sensitive radio communications. The manufacturer shall indicate in the technical documentation that this equipment is intended to be used at locations where the separation distance to third party sensitive radio services is > 30 m. If the manufacturer does not include the particular conditions of use of the equipment in the technical documentation for the user, then the limits for equipment with a rated input power of ≤ 20 kVA shall apply

6.1 Test results, 30 – 1000 MHz, FCC, Class B, ICES-001, Group 1, Class B, ICES-005, Class B



The EUT also fulfil the class B limit for ICES-001 and ICES-005, see measurement result below.

Diagram, Peak overview sweep

Measurement results, Quasi-peak, FCC, Class B

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
32.580	16.51	40.00	23.49	1000.0	120.0	259.0	V	-130.0	-17
55.920	23.45	40.00	16.55	1000.0	120.0	100.0	V	25.0	-28
58.770	24.97	40.00	15.03	1000.0	120.0	102.0	V	159.0	-28
61.230	24.33	40.00	15.67	1000.0	120.0	151.0	V	-177.0	-28
82.080	19.18	40.00	20.82	1000.0	120.0	128.0	V	46.0	-26
126.330	25.31	43.52	18.21	1000.0	120.0	106.0	V	-41.0	-21
151.320	24.54	43.52	18.98	1000.0	120.0	104.0	V	-73.0	-22

Result [dBµV/m] = Analyser reading [dBµV] + Antenna factor [1/m] - Amplifier gain [dB] + Cable loss [dB]

The EUT also fulfil the limits according to ICES-005, Class B and ICES-001 Group 1, Class B see limit tables on page 15.

6.2 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement software	Rohde & Schwarz	EMC32 - V11.30.00	--	--	--
Measurement Receiver	Rohde & Schwarz	ESW44	33890	2023-07-21	1 year
Antenna	Chase	CBL 6111A	8578	2022-12-20	3 years
Pre-amplifier	SEMKO	AM1331	7992	2022-10-19	1 year