NCC Test Report

Report No.:	NCC_RF_SL18121801-KLA-021_ALC100 Rev_2.0
Test Model:	ALC100
Serial Model:	N/A
Received Date:	03/19/2020
Test Date:	03/01/2019 – 03/10/2019
Issued Date:	07/21/2020
Applicant:	KLA Corporation
Address:	1 Technology Dr, Milpitas, CA 95035,USA
Manufacturer:	KLA Corporation
Address:	1 Technology Dr, Milpitas, CA 95035,USA
Issued By:	Bureau Veritas Consumer Products Services, Inc.
Lab Address:	775 Montague Expressway, Milpitas, CA 95035
Test Location (1):	775 Montague Expressway, Milpitas, CA 95035
FCC Registration / Designation Number:	540430
ISED# / CAB identifier:	4842D

TESTING CERT # 2742-01

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Release Control Record

Issue No.	Description	Date Issued
NCC_RF_SL18121801-KLA-021_ALC100	Initial Release	05/26/2020
NCC_RF_SL18121801-KLA-021_ALC100 Rev_1.0	Update Product information	05/27/2020
NCC_RF_SL18121801-KLA-021_ALC100 Rev_2.0	Update Per Review	07/21/2020

1 Certificate of Conformity

Product: SensArray® Automation Leveling Charger

Brand: KLA Corporation

Test Model: ALC100

Serial Model: N/A

Sample Status: Engineering sample

Applicant: KLA Corporation

Test Date: 03/01/2019 – 03/10/2019

Standards: LP0002:2018

The above equipment has been tested by **Bureau Veritas Consumer Products Services, Inc., Milpitas Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : _____ , **Date:** 07/21/2020

Deon Dai / Test Engineer

Approved by : _____ , **Date:** 07/21/2020

Chen Ge / Engineer Reviewer

2 Summary of Test Results

LP0002:2018			
Clause	Test Item	Result	Remarks
2.8	Radiated emission below 30MHz	Pass	Meet the requirement of limit.
2.8	Radiated emission above 30MHz	Pass	Meet the requirement of limit.
3.1.1.2(3)	Occupied Bandwidth	Pass	Meet the requirement of limit.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	3.51dB
Radiated Emissions up to 1 GHz	0.09MHz ~ 1GHz	3.73dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	SensArray® Automation Leveling Charger
Brand	KLA Corporation
Test Model	ALC100
Serial Model	N/A
Status of EUT	Engineering sample
Power Supply Rating	100-240 Vac
Modulation Type	ASK
Operating Frequency	130KHz
Antenna Type	Loop PCB antenna
Antenna Gain	0 dBi

Note:

1. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

3.2.1 1 channel is provided to this EUT

Channel	Freq. (KHz)
1	125

Radiated Emission Test:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
1	1	1	ASK

Occupied Bandwidth:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
1	1	1	ASK

3.3 Description of Support Units

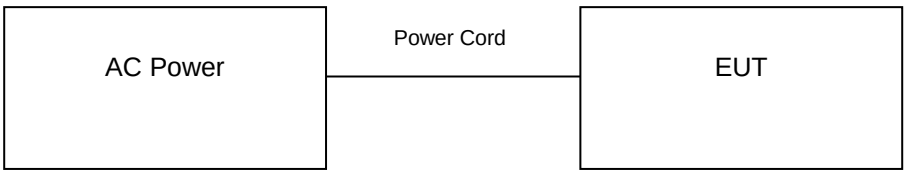
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	-	-	-	-	-	-
B.						

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	-	-	-	-	-	-

Note: The core(s) is(are) originally attached to the cable(s).

3.3.1 Configuration of System under Test



3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

LP0002 :2018

All test items have been performed and recorded as per the above standards.

4 Test Types and Results

4.1 Radiated Emission Measurement

4.1.1 Limits of Radiated Emission Measurement

The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits.

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Distance extrapolation factor = 40 log (specific distance / test distance)
   Limit Line (dBuV/m) = 20 log Emission level (uV/m) + Distance extrapolation factor
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
EMI Test Receiver ROHDE & SCHWARZ	ESW 44	100179	08/30/2019	08/30/2020
Passive Loop Antenna (9k-30MHz)	6512	49120	07/14/2019	07/14/2020
Hybrid Antenna SUNAR	JB6	A111717	03/09/2020	03/09/2021
Preamplifier RF-BAY	LPA-6-30	11170602	05/06/2019	05/06/2020
Preamplifier RF-BAY	LNA-150	12170607	02/16/2020	02/16/2021

4.1.3 Test Procedures

For Radiated emission below 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz at frequency below 30MHz.

For Radiated emission above 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

f. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

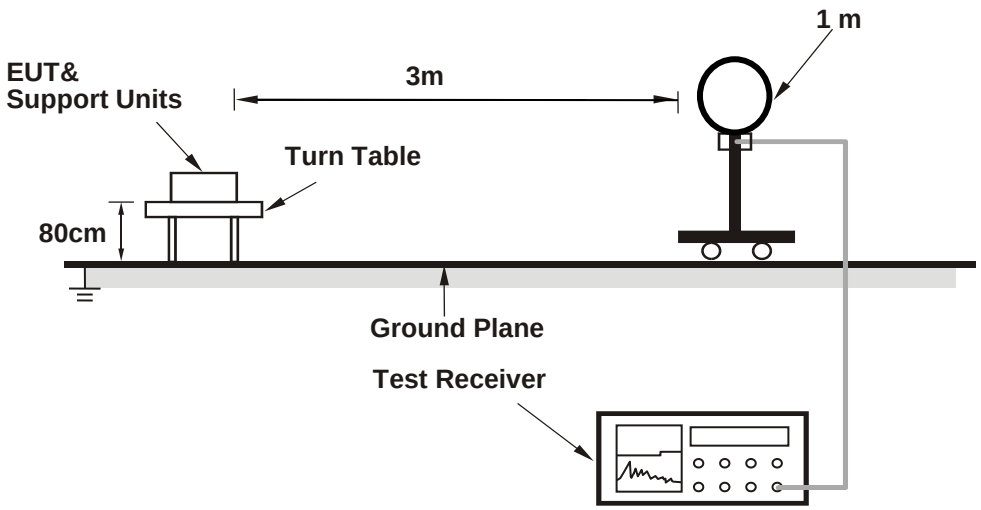
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

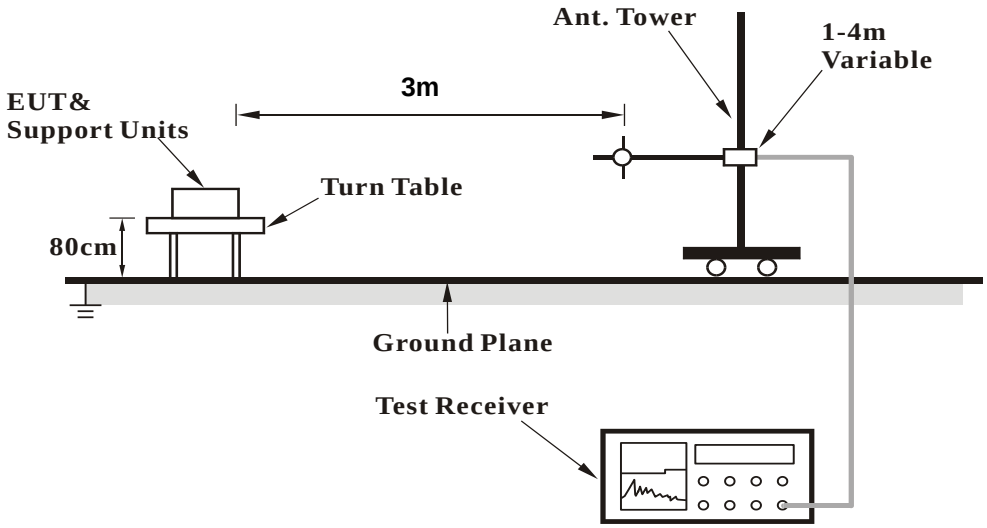
No deviation.

4.1.5 Test Setup

For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



4.1.6 EUT Operating Conditions

a. Connected the EUT with the Notebook Computer which is placed on remote site.
b. Controlling software has been activated to set the EUT on specific status.

4.1.7 Test Results

Radiated Emissions (9 kHz~30 MHz)

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	13.56MHz
Input Power	120V/60Hz	Detector Function	Quasi-Peak
Environmental Conditions	25 deg. C, 70% RH	Tested By	Cipher Chu

f= 9kHz – 30MHz and loop antenna at 0 degree

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol (0/90)	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
1.45	-33.53	0.48	42.87	9.82	Quasi Max	0	100	7	33.36	-23.54	Pass
3.01	-28.25	0.54	37.98	10.27	Quasi Max	0	100	4	39.08	-28.81	Pass
3.37	-27.28	0.55	37.27	10.54	Quasi Max	0	100	7	39.08	-28.54	Pass
1.32	-34.45	0.47	44.07	10.09	Quasi Max	0	100	4	34.73	-24.64	Pass
2.82	-28.87	0.54	38.44	10.11	Quasi Max	0	100	7	39.08	-28.97	Pass
3.23	-28.75	0.55	37.53	9.33	Quasi Max	0	100	4	39.08	-29.75	Pass

f= 9kHz – 30MHz and loop antenna at 90 degree

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol (0/90)	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
1.49	-33.41	0.48	43.15	10.22	Quasi Max	90	100	6	33.68	-23.46	Pass
3.28	-27.63	0.55	37.43	10.35	Quasi Max	90	100	4	39.08	-28.73	Pass
2.85	-28.76	0.54	38.37	10.15	Quasi Max	90	100	8	39.08	-28.93	Pass
2.91	-28.56	0.54	38.22	10.2	Quasi Max	90	100	4	39.08	-28.88	Pass
3.74	-27.91	0.56	36.62	9.27	Quasi Max	90	100	7	39.08	-29.81	Pass
3.00	-28.34	0.54	37.99	10.19	Quasi Max	90	100	4	39.08	-28.89	Pass

Loop antenna at 0 degree

Frequency	Amplitude (dBµV)
130KHz	11.58

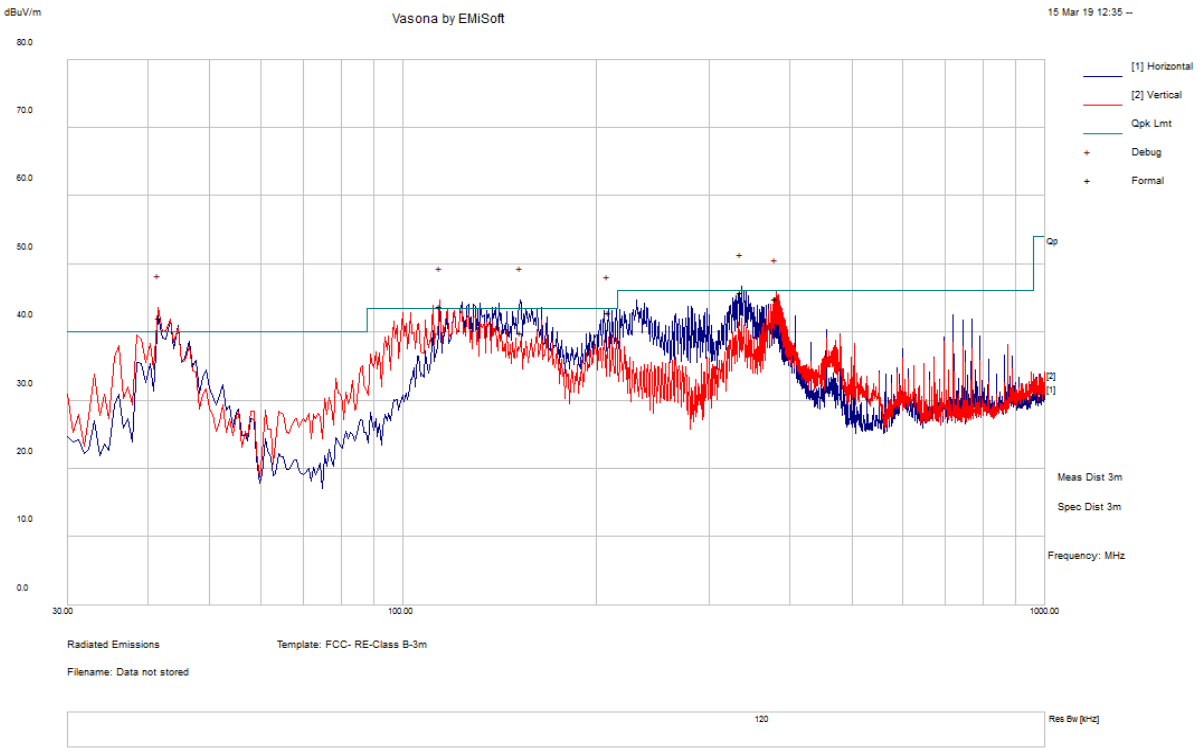
Loop antenna at 90 degree

Frequency	Amplitude (dBµV)
130KHz	8.69

Radiated Emissions (30 MHz~1000 MHz)

Test specification:	Radiated Emissions			
Mains Power:	120VAC, 60Hz		Result:	☒ Pass ☐ Fail
Tested by:	Cipher Chu			
Test Date:	03/01/2019 – 03/10/2019			
Remarks:	N/A			

f=30MHz – 1000MHz plot and 3 meter distance



f=30MHz – 1000MHz Measurements

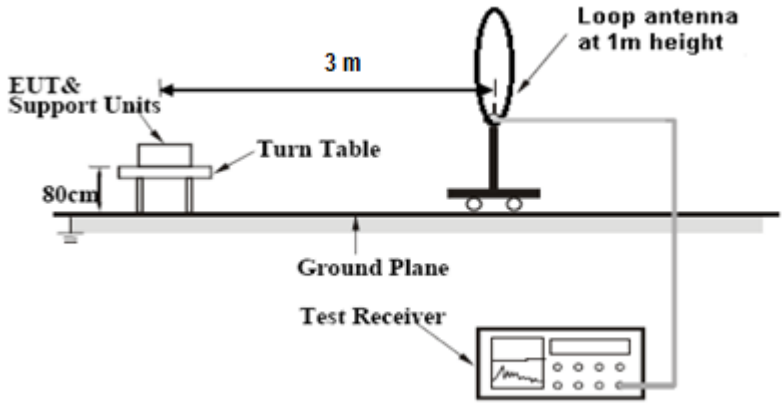
Frequency MHz	Raw dBµV/m	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
48.21	49.06	11.43	-25.54	34.96	Quasi Max	V	113	106	40	-5.04	Pass
797.99	35.19	15.47	-14.28	36.38	Quasi Max	H	171	107	46	-9.62	Pass
931.02	34.76	15.89	-12.69	37.95	Quasi Max	H	101	61	46	-8.05	Pass
203.75	44.03	12.66	-24.25	32.44	Quasi Max	H	133	149	43.5	-11.06	Pass
233.23	43.8	12.87	-24.52	32.15	Quasi Max	H	150	105	46	-13.86	Pass
917.37	24.21	15.86	-12.32	27.75	Quasi Max	H	125	237	46	-18.25	Pass

4.2 Occupide Bandwidth

4.2.1 Requirement of Occupied bandwidth

The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual. The trace data points are recovered and directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth.

4.2.2 Test Setup



4.2.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.2.4 Test Procedure

a. The EUT was switched on and allowed to warm up to its normal operating condition.
b. To measure conducted, a SMA Cable was used to replace the EUT antenna. To measure radiated, an external antenna was used to detect EUT transmission signal.
c. Measurement of the 99% Occupied Bandwidth of EUT transmission signal and make record.

4.2.5 Deviation fromTest Standard

No deviation.

4.2.6 EUT Operating Conditions

Same as Item 4.1.6.

4.2.7 Test Result

Frequency	Occupied Bandwidth
130KHz	230 Hz

Appendix – Information on the Testing Laboratories

Bureau Veritas is a global leader in testing, inspection and certification (TIC) services. We help businesses improve safety, sustainability and productivity; and our clients include the majority of leading brands in retail, manufacturing and other industries. With a presence in every major country around the world, our quality assurance and compliance solutions are vital in helping our customers enhance product quality and concept-to-consumer journeys. We also assist with increasing speed to market, profitability and brand equity throughout the supply chain. Bureau Veritas is a leading wireless/IoT testing, inspection, audit and certification provider, with a global network of test laboratories to support the IoT industry in areas of connectivity, security, interoperability as well as quality, health & safety, and environmental/chemical requirements.

If you have any comments, please feel free to contact us at the following:

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The address and road map of all our labs can be found in our web site also.

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