

Test Report

FCC-ID: IYASDA-BS900

Product Name:	Blind Spot Detection/ Lane Change Assist System
Trademark:	Pioneer
Model Name :	SDA-BS900 SDA-BS900D, SDA-BS901, SDA-BS9, SDA-BS900X, ND-BS900
Prepared For :	Pioneer Electronics (USA) Inc.
Address :	2050 W. 190th Street, Suite 100, Torrance, CA 90504, USA
Prepared By :	Shenzhen BCTC Testing Co., Ltd.
Address :	BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China
Test Date:	Nov. 13, 2019 - Dec. 03, 2019
Date of Report :	Dec. 03, 2019
Report No.:	BCTC1911000888E

CERTIFICATION

Applicant's name: Pioneer Electronics (USA) Inc.

Address: 2050 W. 190th Street, Suite 100, Torrance, CA 90504, USA

Manufacture's Name: Pioneer Electronics (USA) Inc.

Address: 2050 W. 190th Street, Suite 100, Torrance, CA 90504, USA

Product description

Product name: Blind Spot Detection/ Lane Change Assist System

Trademark: Pioneer

SDA-BS900

Model Name: SDA-BS900D, SDA-BS901, SDA-BS9, SDA-BS900X,
ND-BS900

Test Standards: FCC 47 CFR Part 15, Section 15.245
ANSI C63.10-2013

This device described above has been tested by BCTC, and the test results show that the equipment under test (EUT) is in compliance with the IC requirements. And it is applicable only to the tested sample identified in the report.

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Test Result.....: **Pass**

Prepared by(Engineer): Cai Fangzhong

Cai Fang Zhong

Reviewer(Supervisor): Eric Yang

Eric Yang

Approved(Manager): Zero Zhou



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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC 47 CFR Part 15, Subpart C, Section 15.245			
Standard Section	Test Item	Judgment	Remark
15.245 (b)	Fundamental Radiated	PASS	
15.245 (b)	Spurious Emission Measurement	PASS	
15.215 (c)	Bandwidth	PASS	
15.205 (a)	Band Edge Emission	PASS	

NOTE:

(1) "N/A" denotes test is not applicable in this Test Report

1.1 TEST FACILITY

Shenzhen BCTC Testing Co., Ltd.

Add. : BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China

FCC Test Firm Registration Number: 712850

IC Registered No.: 23583

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 1.38\text{dB}$
2	RF power, conducted	$\pm 0.16\text{dB}$
3	Spurious emissions, conducted	$\pm 0.21\text{dB}$
4	All emissions, radiated (<1G)	$\pm 4.68\text{dB}$
5	All emissions, radiated (>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^{\circ}\text{C}$
7	Humidity	$\pm 2\%$

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	ADD-ON BLIND SPOT DETECTION SYSTEM WITH LANE CHANGE ASSIST										
Trade Name	Pioneer										
Model Name	SDA-BS900										
Serial Model	SDA-BS900D, SDA-BS901, SDA-BS9, SDA-BS900X, ND-BS900										
Model Difference	Consecutive Model Years and sales territories										
Product Description	<table border="1"> <tr> <td>Operation Frequency:</td><td>24125MHz</td></tr> <tr> <td>Bit Rate of Transmitter</td><td>1Mbps</td></tr> <tr> <td>Number Of Channel</td><td>1CH</td></tr> <tr> <td>Max. RF Output Power:</td><td>104.59 dBuV/m</td></tr> <tr> <td>Antenna Designation:</td><td>Please see Note 3.</td></tr> </table> Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.	Operation Frequency:	24125MHz	Bit Rate of Transmitter	1Mbps	Number Of Channel	1CH	Max. RF Output Power:	104.59 dBuV/m	Antenna Designation:	Please see Note 3.
Operation Frequency:	24125MHz										
Bit Rate of Transmitter	1Mbps										
Number Of Channel	1CH										
Max. RF Output Power:	104.59 dBuV/m										
Antenna Designation:	Please see Note 3.										
Channel List	Please refer to the Note 2.										
Power Supply	DC 12V 0.4A										
Connecting I/O Port(s)	Please refer to the User's Manual										
Hardware Version:	20180920-v3.2										
Software Version:	19103116										
Power level set	10dBm										

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- 2.

Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	24125	\	\	\	\

3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Gain (dBi)	NOTE
1	N/A	N/A	PCB Antenna	7.1	

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

For Conducted & Radiated Emission	
Final Test Mode	Description
Mode 1	CH01 Transmitting

Note:

- (1) The measurements are performed at the highest, middle, lowest available channels.
- (2) Fully-charged battery is used during the test

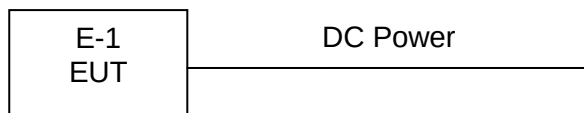
2.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters.

Frequency	24125 MHz
Channel	01

2.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious Emission/Conducted Emission Test



2.5 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

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.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Blind Spot Detection System / Lane Change Assist	Pioneer	SDA-BS900	N/A	EUT
E-2	DC Power	N/A	N/A	N/A	Auxiliary

Item	Shielded Type	Ferrite Core	Length	Note
C1	NO	NO	2.5M	DC cable unshielded

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.
- (3) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.

2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	Agilent	E4407B	MY45109572	2019.06.13	2020.06.12
2	Test Receiver (9kHz-7GHz)	R&S	ESR7	101154	2019.06.13	2020.06.12
3	Bilog Antenna (30MHz-3GHz)	SCHWARZBEC K	VULB9163	VULB9163-942	2019.06.22	2020.06.21
4	Horn Antenna (1GHz-18GHz)	SCHWARZBEC K	BBHA9120D	1541	2019.06.22	2020.06.21
5	Horn Antenna (18GHz-40GHz)	SCHWARZBEC K	BBHA9170	822	2019.06.22	2020.06.21
6	Amplifier (9KHz-6GHz)	SCHWARZBEC K	BBV9744	9744-0037	2019.06.25	2020.06.24
7	Amplifier (0.5GHz-18GHz)	SCHWARZBEC K	BBV9718	9718-309	2019.06.25	2020.06.24
8	Amplifier (18GHz-40GHz)	MITEQ	TTA1840-35-H G	2034381	2019.06.17	2020.06.16
9	Loop Antenna (9KHz-30MHz)	SCHWARZBEC K	FMZB1519B	014	2019.06.25	2020.06.24
10	RF cables1 (9kHz-30MHz)	Huber+Suhnar	9kHz-30MHz	B1702988-0008	2019.06.25	2020.06.24
11	RF cables2 (30MHz-1GHz)	Huber+Suhnar	30MHz-1GHz	1486150	2019.06.25	2020.06.24
12	RF cables3 (1GHz-40GHz)	Huber+Suhnar	1GHz-40GHz	1607106	2019.06.25	2020.06.24
13	Power Metter	Keysight	E4419	\	2019.06.17	2020.06.16
14	Power Sensor (AV)	Keysight	E9 300A	\	2019.06.17	2020.06.16
15	Spectrum Analyzer 20kHz-26.5GHz	KEYSIGHT	N9020A	MY49100060	2019.06.13	2020.06.12
16	Spectrum Analyzer 9kHz-40GHz	R&S	FSP40	100363	2019.06.13	2020.06.12
17	D.C. Power Supply	LongWei	TPR-6405D	\	\	\
18	Software	Frad	EZ-EMC	FA-03A2 RE	\	\

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Limit (dBuV)		Standard
	Quasi-peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

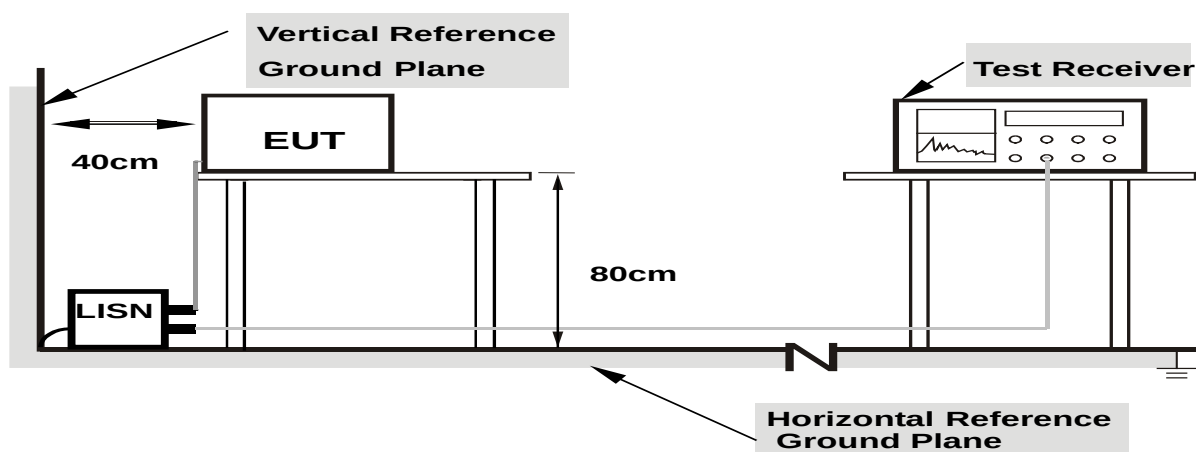
3.1.2 TEST PROCEDURE

- The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 TEST SETUP



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

We pretest AC 120V and AC 240V, the worst voltage was AC 120V and the data recording in the report.

3.1.6 TEST RESULTS

N/A

3.2 RADIATED MEASUREMENT.

Applicable Standard

According to FCC§15.245 (b), The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Table F1 — Field Strengths for Field Disturbance Sensors Operating at Different Frequencies

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (millivolts/meter)
902-928 MHz	500	1.6
2435-2465 MHz	500	1.6
5785-5815 MHz	500	1.6
10500-10550 MHz	2500	25.0
24075-24175 MHz	2500	25.0

- (1) Regardless of the limits shown in the above table, harmonic emissions in the restricted bands below 17.7 GHz, as specified in §15.205, shall not exceed the field strength limits shown in §15.209. Harmonic emissions in the restricted bands at and above 17.7 GHz shall not exceed the following field strength limits:
 - (i) For the second and third harmonics of field disturbance sensors operating in the 24075-24175 MHz band and for other field disturbance sensors designed for use only within a building or to open building doors, 25.0 mV/m.
 - (ii) For all other field disturbance sensors, 7.5 mV/m.
 - (iii) Field disturbance sensors designed to be used in motor vehicles or aircraft must include features to prevent continuous operation unless their emissions in the restricted bands, other than the second and third harmonics from devices operating in the 24075-24175 MHz band, fully comply with the limits given in § 15.209. Continuous operation of field disturbance sensors designed to be used in farm equipment, vehicles such as fork lifts that are intended primarily for use indoors or for very specialized operations, or railroad locomotives, railroad cars and other equipment which travels on fixed tracks is permitted. A field disturbance sensor will be considered not to be operating in a continuous mode if its operation is limited to specific activities of limited duration (e.g., putting a vehicle into reverse gear, activating a turn signal, etc.).
- (2) Field strength limits are specified at a distance of 3 meters.
- (3) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.
- (4) The emission limits shown above are based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

3.2.1 TEST PROCEDURE

- a. The EUT is placed on a turntable, which is 1.5 m above ground plane.
- b. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- c. In case from 9 kHz to 18 GHz, EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions. In case from 18 GHz to 40 GHz, EUT is set 1 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- f. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

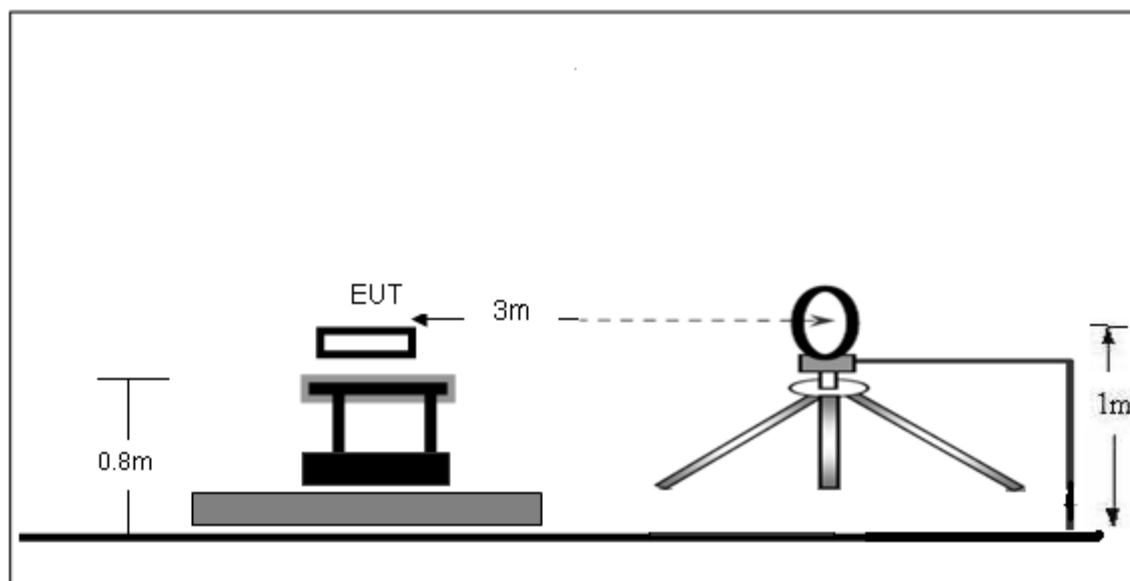
g. Repeat above procedures until the measurements for all frequencies are complete.

3.2.2 DEVIATION FROM TEST STANDARD

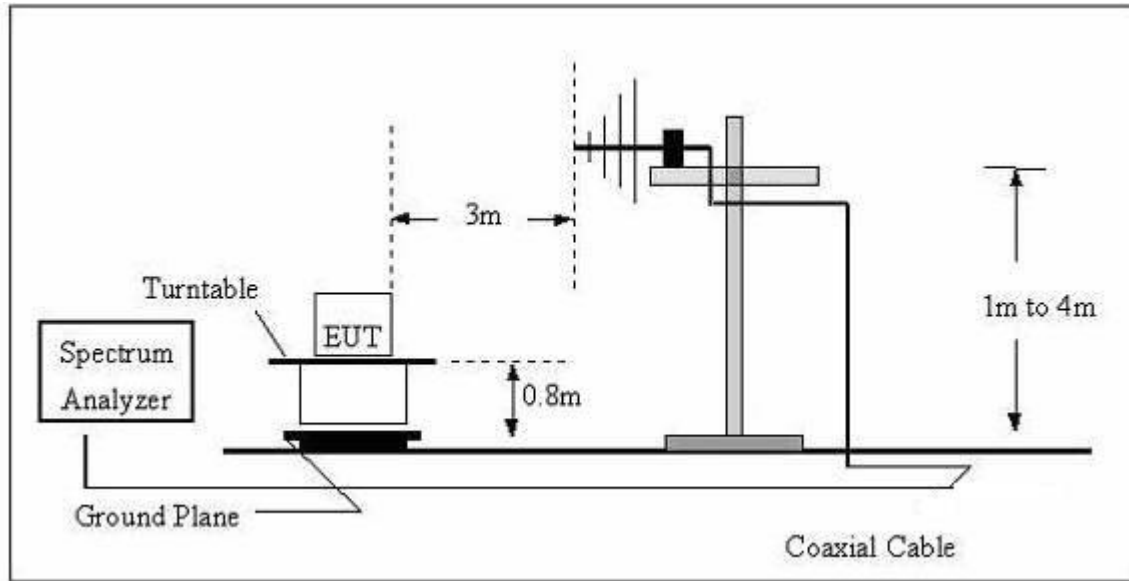
No deviation

3.2.3 TEST SETUP

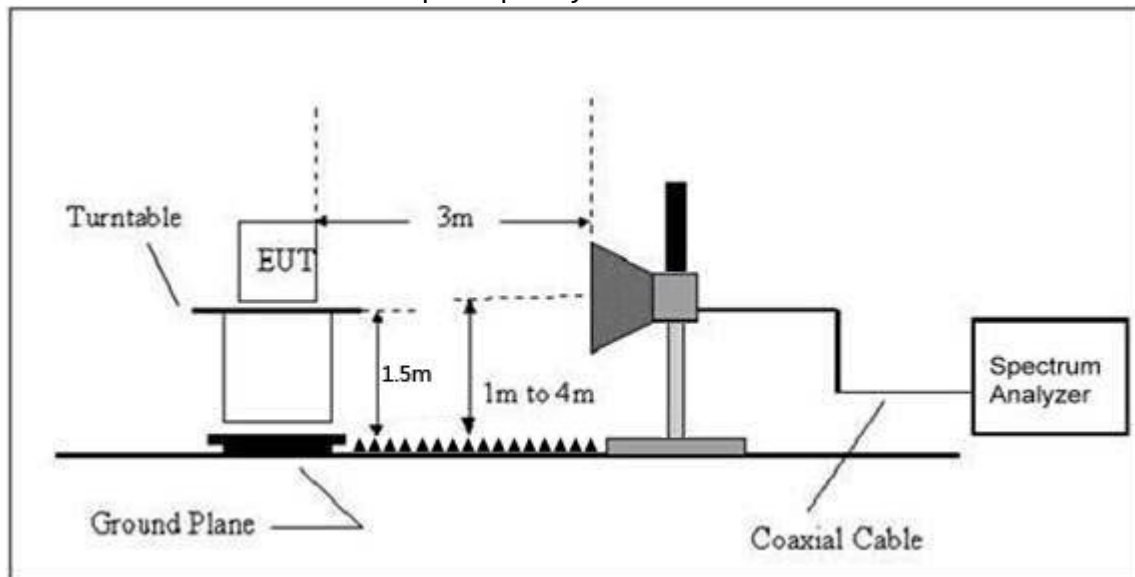
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



3.2.4 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

3.2.5 TEST RESULTS

FIELD STRENGTH OF FUNDAMENTAL TEST RESULTS

Polar (H/V)	Frequency	Meter Reading	A.F+C.L	D.E.F	Total	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
V	24125	72.63	41.36	-9.46	104.53	147.96	-43.43	PK
V	24125	72.52	41.36	-9.46	104.42	127.96	-23.54	AV
H	24125	72.69	41.36	-9.46	104.59	147.96	-43.37	PK
H	24125	72.58	41.36	-9.46	104.48	127.96	-23.48	AV

A·F: ANTENNA FACTOR

C·L: CABLE LOSS

Note :

1. Total = Reading Value + Antenna Factor + Cable Loss + Distance Factor
2. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

FIELD STRENGTH OF HARMONICS and RADIATED SPURIOUS EMISSIONS TEST RESULTS

Radiated Spurious Emission (Below 30MHz)

EUT :	Blind Spot Detection/ Lane Change Assist System	Model Name :	SDA-BS900
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Polarization :	---
Test Voltage :	DC 12V		
Test Mode :	Mode 1		

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

NOTE:

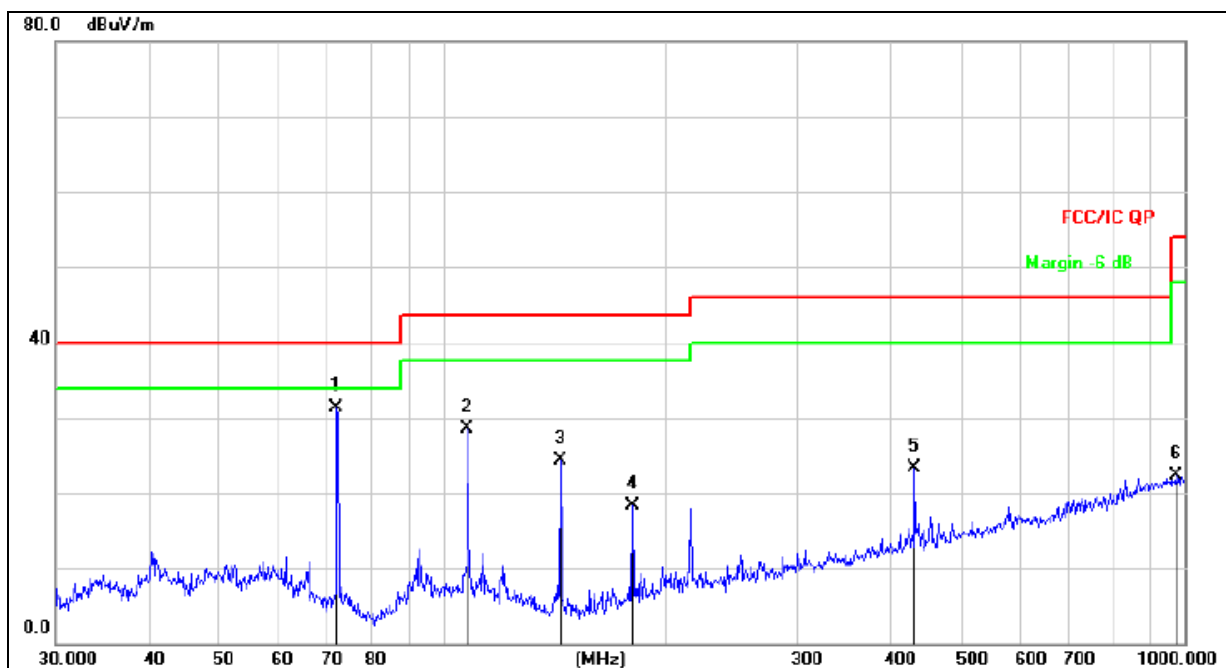
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor =40 log (specific distance/test distance)(dB);

Limit line = specific limits(dBuV) + distance extrapolation factor.

Radiated Spurious Emission (Between 30MHz – 1GHz)

EUT :	Blind Spot Detection/ Lane Change Assist System	Model Name :	SDA-BS900
Temperature :	25 °C	Relative Humidity :	55%
Pressure :	101kPa	Polarization :	Horizontal
Test Voltage :	DC 12V		
Test Mode :	Model 1		

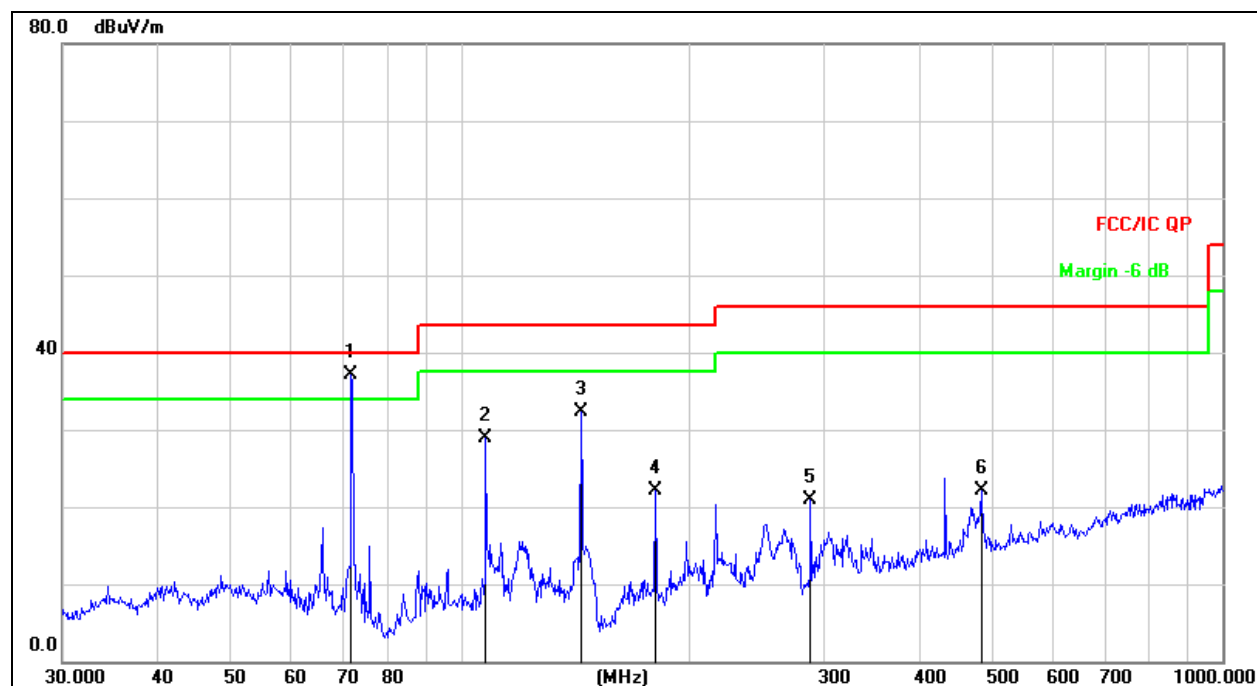


Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1	*	71.8320	49.82	-18.60	31.22	40.00	-8.78	QP
2		107.8877	45.33	-16.79	28.54	43.50	-14.96	QP
3		143.8295	43.43	-19.10	24.33	43.50	-19.17	QP
4		180.0165	35.90	-17.58	18.32	43.50	-25.18	QP
5		432.5457	33.62	-10.36	23.26	46.00	-22.74	QP
6		972.3374	23.22	-0.98	22.24	54.00	-31.76	QP

EUT :	Blind Spot Detection/ Lane Change Assist System	Model Name :	SDA-BS900
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	101kPa	Polarization :	Vertical
Test Voltage :	DC 12V		
Test Mode :	Model 1		



Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1	*	71.8320	55.65	-18.60	37.05	40.00	-2.95	QP
2		107.8877	45.69	-16.79	28.90	43.50	-14.60	QP
3		143.8295	51.45	-19.10	32.35	43.50	-11.15	QP
4		180.0165	39.66	-17.58	22.08	43.50	-21.42	QP
5		287.9904	34.81	-13.97	20.84	46.00	-25.16	QP
6		482.2155	31.38	-9.31	22.07	46.00	-23.93	QP

Radiated Spurious Emission (Between 1GHz – 18GHz)

EUT :	Blind Spot Detection/ Lane Change Assist System	Model Name :	SDA-BS900
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Polarization :	Vertical
Test Voltage :	DC 12V (form adapter)		
Test Mode : (Worst)	Mode 1		

Between 1-25GHz

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-ampli fier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Channel:24125MHz									
V	1642.60	50.60	39.55	7.77	25.66	44.48	74.00	-29.52	Pk
V	1642.60	43.37	39.55	7.77	25.66	37.25	54.00	-16.75	AV
V	3199.80	50.71	38.33	7.3	24.55	44.23	74.00	-29.77	Pk
V	3199.80	43.60	38.33	7.3	24.55	37.12	54.00	-16.88	AV
H	5066.40	50.08	38.78	7.35	24.54	43.19	74.00	-30.81	Pk
H	5066.40	43.98	38.78	7.35	24.54	37.09	54.00	-16.91	AV
H	7164.20	50.97	38.65	7.15	24.52	43.99	74.00	-30.01	Pk
H	7164.20	43.43	38.65	7.15	24.52	36.45	54.00	-17.55	AV
H	10200.40	52.10	36.68	6.42	26.47	48.31	74.00	-25.69	Pk
H	10200.40	41.37	36.68	6.42	26.47	37.58	54.00	-16.42	AV
V	17510.40	54.62	36.42	8.62	26.45	53.27	74.00	-20.73	Pk
V	17510.40	44.69	36.42	8.62	26.45	43.34	54.00	-10.66	AV

NOTE:

Distance extrapolation factor =20 log (specific distance/test distance)(dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.

Radiated Spurious Emission (18GHz-40GHz)

Polar (H/V)	Frequency	Meter Reading	A.F+C.L	D.E.F	Total	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
V	*24075	32.32	41.36	-9.46	64.22	74	-9.78	PK
V	*24075	10.38	41.36	-9.46	42.28	54	-11.72	AV
V	*24175	32.66	41.36	-9.46	64.56	74	-9.44	PK
V	*24175	10.46	41.36	-9.46	42.36	54	-11.64	AV

A·F: ANTENNA FACTOR

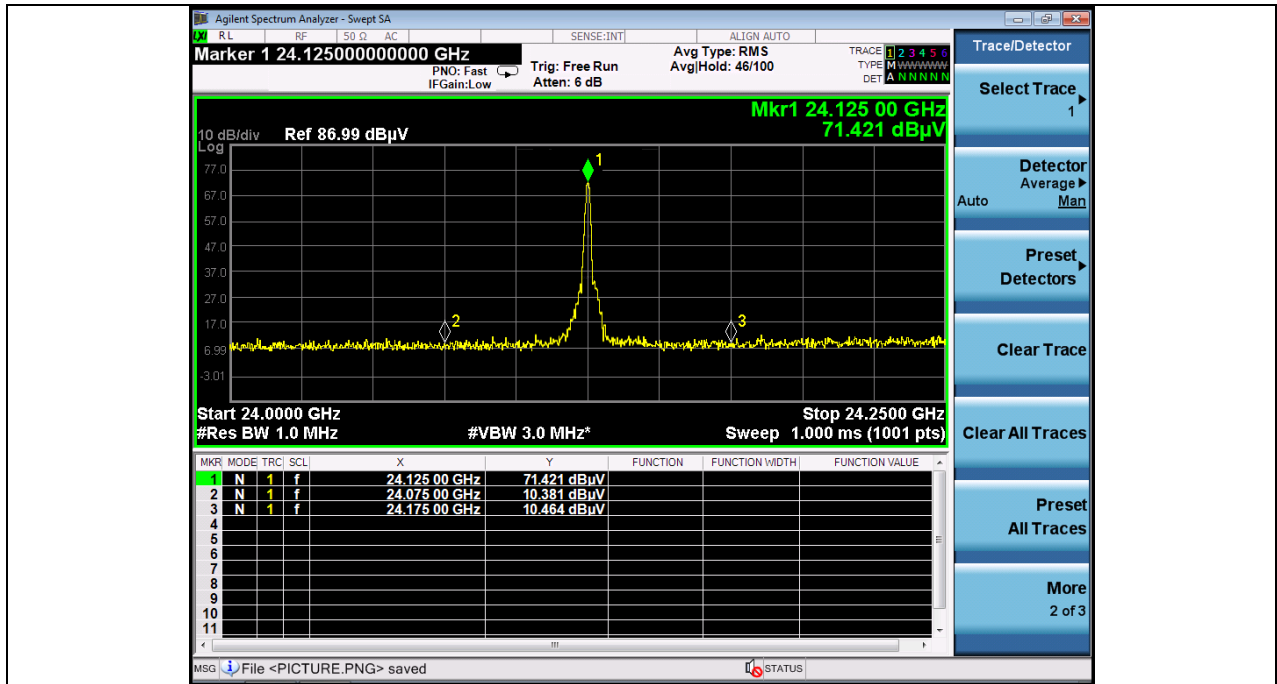
C·L: CABLE LOSS

Note :

1. Total = Reading Value + Antenna Factor + Cable Loss + Distance Factor
2. Distance extrapolation factor = $20 \log (\text{test distance} / \text{specific distance})$ (dB)
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
Worst case is y plane and vertical polarization.
4. '*' is band edge frequency.



Band Edge Plot (Y-V)



4. BANDWIDTH TEST

4.1 APPLIED PROCEDURES / LIMIT

RSS-210/RSS-GEN				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.205 (a)	Bandwidth	(20dB bandwidth)	24075-24175	PASS

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	100KHz
VB	$\geq$ RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting : RBW= 100KHz, VBW $\geq$ RBW, Sweep time = Auto.

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



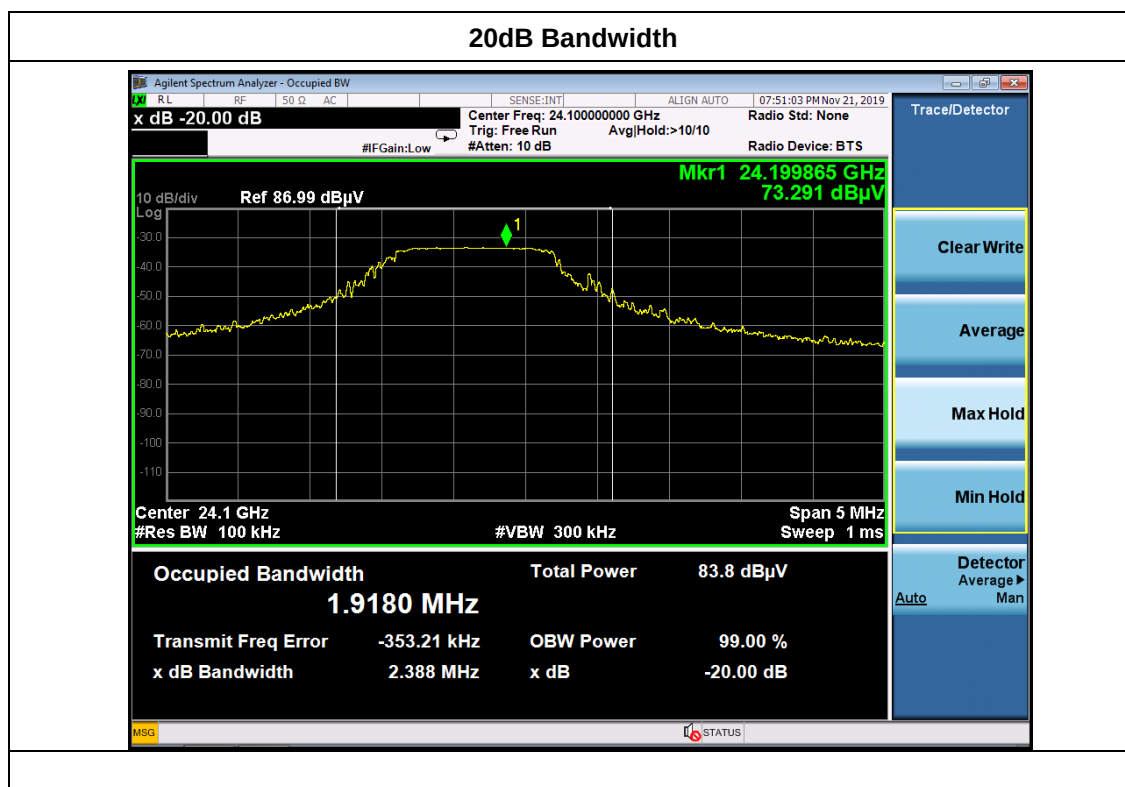
4.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

4.1.5 TEST RESULTS

EUT :	Blind Spot Detection/ Lane Change Assist System	Model Name :	SDA-BS900
Temperature :	25 °C	Relative Humidity :	55%
Pressure :	1012 hPa	Test Voltage :	DC 12V
Test Mode :	CH01		

Frequency	20dB Bandwidth (MHz)	99% Bandwidth (MHz)	Result
24125MHz	2.388	1.9180	PASS



5. ANTENNA REQUIREMENT

5.1 STANDARD REQUIREMENT

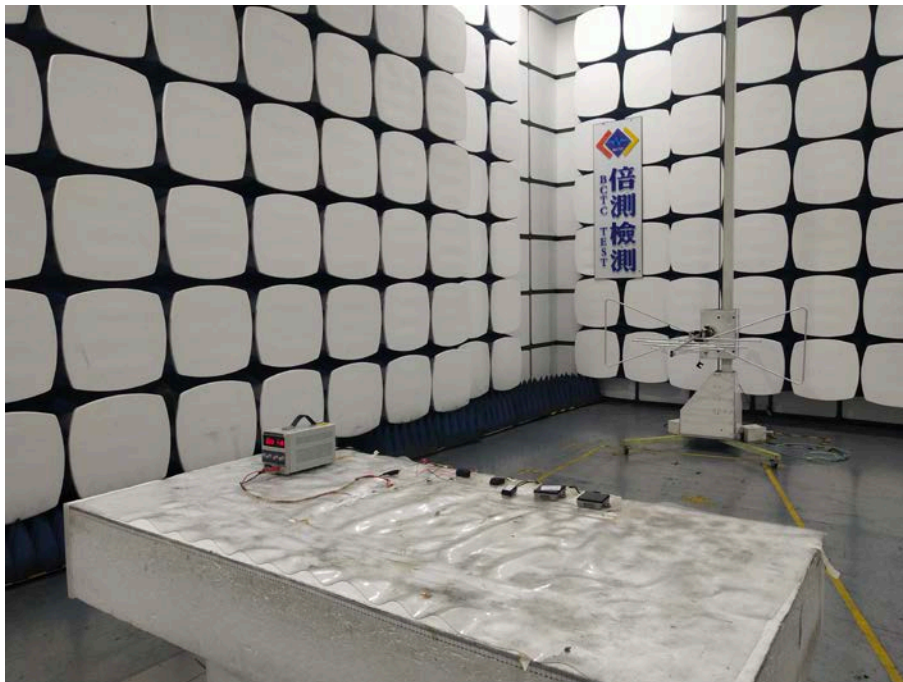
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

5.2 EUT ANTENNA

The EUT antenna is Internal antenna, fulfill the requirement of this section.

6. EUT TEST PHOTO

Radiated Measurement Photos 30-1GHz



1-18GHz





18-40GHz



7. PHOTOS OF THE EUT





***** END OF REPORT *****