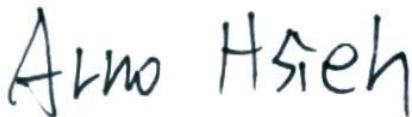


## ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT



**Applicant:** Jay Switches India Private Limited  
Plot No.407, Udyog Vihar, Phase-3, Gurugram, Haryana-122016, India  
**Product Name:** Assy RKE(Remote Key Entry)  
**Brand Name:** Jay with Citroen Logo  
**Model No.:** J-2814-00-00  
**Model Difference:** N/A  
**Report Number:** E2/2021/C0137  
**FCC ID** 2A4CI-J-2814-00-00  
**Issue Date:** January 26, 2022  
**Date of Test:** January 3, 2022 ~ January 5, 2022  
**Date of EUT Received:** December 28, 2021

Approved By



Arno Hsieh

**We hereby certify that:**

The above equipment was tested by SGS Taiwan Ltd. Central RF Lab. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013 and the energy emitted by the sample EUT comply with FCC rule part §15C.

The results of this report relate only to the sample identified in this report.

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Revision History					
Report Number	Revision	Description	Issue Date	Revised By	Remark
E2/2021/C0137	00	Original.	January 26, 2022	Susan Lin	

**Note:**

- 1、The remark "\*" indicates modification of the report upon requests from certification body.

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## 1 GENERAL INFORMATION

### 1.1 Product Description

Product Name:	Assy RKE(Remote Key Entry)
Brand Name:	Jay with Citroen Logo
Model No.:	J-2814-00-00
Model Difference:	N/A
Hardware Version:	SCX Version V0.3
Firmware Version:	Version 2.6
EUT Series No.:	Conducted: PJ21C192014 Radiated: PJ21C192019
Power Supply:	3Vdc from Lithium Battery
Test Software (Name/Version):	Default

### 1.2 RF specification

Radio Technology:	RFID
Operating Frequency:	125 kHz
Transmit Power:	6.32dBuV/m at 300m.
Number of Channels:	1
Modulation Type:	ASK
Antenna Type:	Inductor Coil Antenna

**Note:** Antenna information is provided by the applicant.

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### 1.3 Test Methodology

FCC Part 15, Subpart C  
ANSI C63.10:2013

### 1.4 Test Facility

Laboratory	Test Site Address	Test Site Name	FCC Designation number	IC CAB identifier
SGS Taiwan Ltd. Central RF Lab. (TAF code 3702)	No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan.	SAC 1 SAC 3 Conduction 1 Conducted 1 Conducted 2 Conducted 3 Conducted 4 Conducted 5 Conducted 6	TW0027	TW3702
	No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333	Conduction C SAC C SAC D SAC G Conducted A Conducted B Conducted C Conducted D Conducted E Conducted F Conducted G	TW0028	

**Note:** Test site name is remarked on the equipment list in each section of this report as an indication where measurements occurred in specific test site and address.

### 1.5 Special Accessories

There is no other accessory attached. This is the worst case condition.

### 1.6 Equipment Modifications

There was no modification incorporated into the EUT.

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## 2 SYSTEM TEST CONFIGURATION

### 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 2.2 EUT Exercise

The Transmitter was operated in the normal operating mode. The Tx frequency was fixed which was for the purpose of the measurements.

### 2.3 Test Procedure

#### 2.3.1 Conducted Emissions

The EUT is a placed on a table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz. The CISPR Quasi-Peak and Average detector mode is employed. The two LISNs provide 50uH/50 ohm of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

#### 2.3.2 Radiated Emissions

The EUT is a placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.

#### 2.3.3 Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

Radiated emission below 30MHz is measured in a 9m\*6m\*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

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Remark 1. Emission level in dBuV/m=20 log (uV/m)

: 2. Measurement was performed at an antenna to the closed point of EUT distance of 3 meters.

3. Distance extrapolation factor = 40 log (required distance/ test distance) (dB);

4. The measurement was undertaken in closer distance at 3m, where extrapolation factor is offset to convert the limit of the measurement.  
Ex. $20 \cdot \log(30) + 40 \cdot \log(30/3) = 69.54 \text{ dBuV/m}$

5. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of §15.205.

6. The general radiated emission limits in §15.209 apply for the spurious emission generate from UE, except for the fundamental emission where the respective section specifies otherwise.

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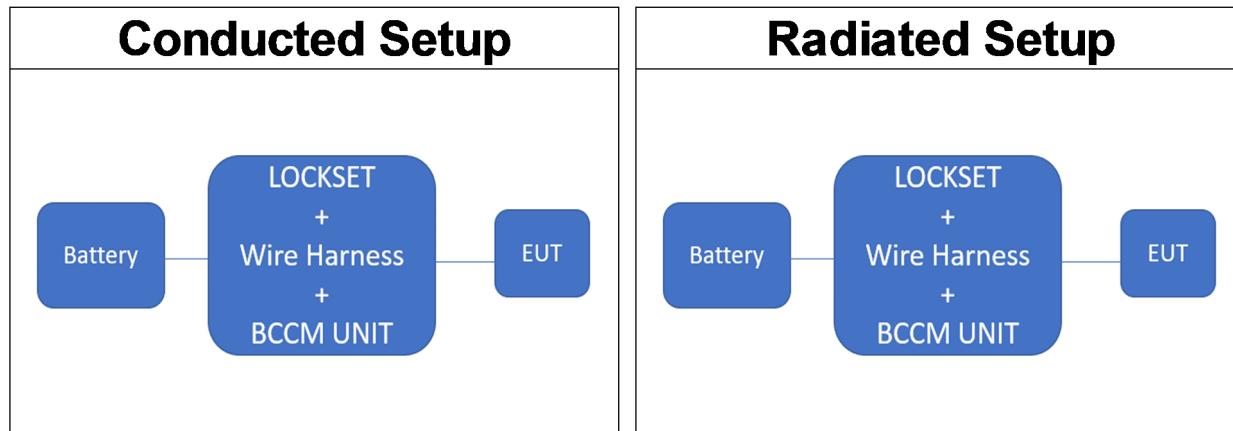
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## 2.4 Test Configuration

### 2.4.1 Emission Measurements



### 2.4.2 Equipment used for test

Conducted Emission Test Site: Conducted A					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
LOCKSET	Jay Switches India Pvt Ltd	J-1528-01K01	N/A	N/A	N/A
Wire Harness	APTIV	N/A	9848564780	N/A	N/A
BCCM UNIT	Magnetti Marelli	9847012980 02	N/A	N/A	N/A
Battery	YUASA	ST-CLN131-6S	N/A	N/A	N/A

Radiated Emission Test Site: SAC C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Battery	YUASA	ST-CLN131-6S	N/A	N/A	N/A
LOCKSET	Jay Switches India Pvt Ltd	J-1528-01K01	N/A	N/A	N/A
Wire Harness	APTIV	N/A	9848564780	N/A	N/A
BCCM UNIT	Magnetti Marelli	9847012980 02	N/A	N/A	N/A

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### 3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207	AC Power Line Conducted Emission	N/A
§15.209	Radiated Emission Limits, general requirement	Compliant
§15.215 (c)	20 dB OCCUPIED BANDWIDTH	Compliant
§15.203	Antenna Requirement	Compliant

### 4 DESCRIPTION OF TEST MODES

The EUT stay in continuous transmitting mode. The frequency is the default channel to test, where it is the only manipulative channel as this application supports.

The field strength of radiated emission was measured as the EUT positioned in different orthogonal planes (E1/E2/H) based on actual usage of the EUT to pre-scan the emissions for determining the worst case scenario.

The data rate as the lowest supported is selected while tests are conducted.

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## 5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty		
AC Power Line Conducted Emission	+/-	2.34	dB
Frequency Stability	+/-	1.53	Hz
Emission Bandwidth	+/-	1.53	Hz
Temperature	+/-	0.4	°C
Humidity	+/-	3.5	%
DC / AC Power Source	+/-	1	%

Radiated Spurious Emission Measurement Uncertainty			
Polarization: Vertical	+/-	2.57	dB
	+/-	4.85	dB
	+/-	4.45	dB
	+/-	4.24	dB
Polarization: Horizontal	+/-	2.57	dB
	+/-	4.37	dB
	+/-	4.45	dB
	+/-	4.24	dB

**Note:**

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
2. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

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## 6 CONDUCTED EMISSIONS TEST

### 6.1 Standard Applicable

According to §15.207 and frequency within 150 kHz to 30MHz shall not exceed the limit table as below.

Frequency range MHz	Limits (dBuV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

#### Note

1. The lower limit shall apply at the transition frequencies

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

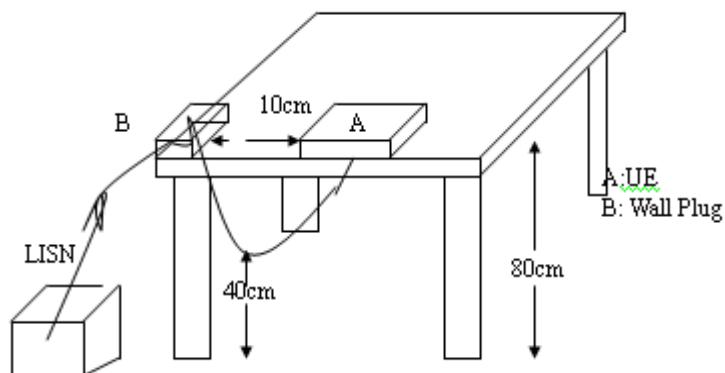
### 6.2 Measurement Equipment Used:

N/A

### 6.3 EUT Setup

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

### 6.4 Test Setup



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## 6.5 Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

## 6.6 Measurement Result

N/A; Powered from Lithium Battery.

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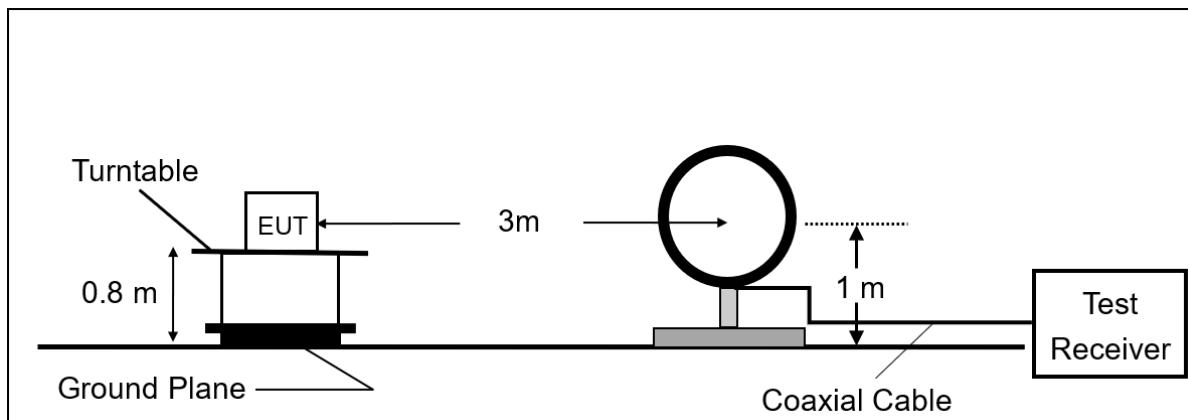
## 7 RADIATED EMISSION TEST

### 7.1 Measurement Procedure

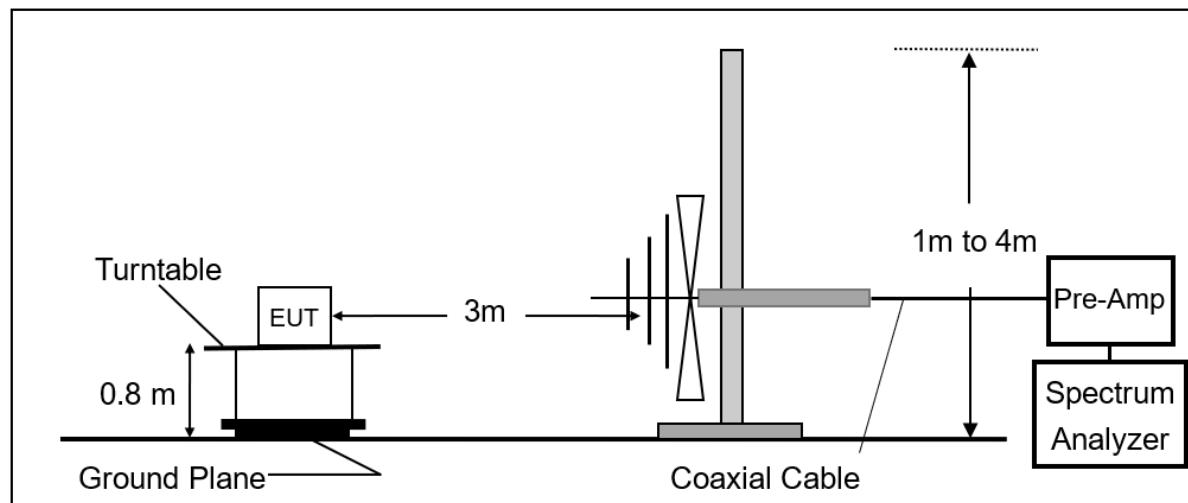
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

### 7.2 Test Setup

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



(B) Radiated Emission Test Set-Up, Frequency From 30MHz to 1000MHz.



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### 7.3 Measurement Equipment Used:

Radiated Emission Test Site: SAC C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Broadband Antenna	SCHWARZBECK	VULB 9168	9168-300	10/19/2021	10/18/2022
Horn Antenna	SCHWARZBECK	BBHA9120D	1187	01/11/2021	01/10/2022
Loop Antenna	ETS.LINDGREN	6502	143303	05/07/2021	05/06/2022
EMI Test Receiver	R&S	ESU 40	100363	04/28/2021	04/27/2022
Pre-Amplifier	EMC Instruments	EMC330	980096	11/18/2021	11/17/2022
Pre-Amplifier	EMC Instruments	EMC0011830	980199	11/18/2021	11/17/2022
Pre-Amplifier	EMC Instruments	EMC184045B	980135	10/27/2021	10/26/2022
Attenuator	Marvelous	WATT-218FS-10	RF20	11/18/2021	11/17/2022
Band Rejection Filter	Micro-Tronics	BRM50701-01	RF201	11/18/2021	11/17/2022
Coaxial Cable	Huber Suhner	SUCOFLEX 104	MY17388/4	11/18/2021	11/17/2022
Coaxial Cable	Huber Suhner	RG 214/U	W22.03	11/18/2021	11/17/2022
Test Software	audix	e3	20923 sgs Ver.9	N.C.R	N.C.R

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## 7.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

## 7.5 Limit

The field strength of any emissions appearing outside of operation frequency shall not exceed the general radiated emission limits in section 15.209 as below.

Frequency (MHz)	Field strength ( $\mu$ V/m)	Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

### Note:

1. Emission level in  $\text{dB}\mu\text{V}/\text{m} = 20 \log (\mu\text{V}/\text{m})$
2. Distance extrapolation factor =  $40 \log (\text{required distance}/ \text{test distance})$  (dB)
3.  $20 \log (30 \mu\text{V}/\text{m}) + 40 \text{dB} = 69.54 \text{ dB}\mu\text{V}/\text{m}$
4. The lower limit shall apply at the transition frequencies.
5. The measurement was undertaken in closer distance at 3m, where extrapolation factor is offset to convert the limit of the measurement.
6. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of §15.205.
7. The general radiated emission limits in §15.209 apply for the spurious emission generate from UE, except for the fundamental emission where the respective section specifies otherwise.
8. Actual FS( $\text{dB}\mu\text{V}/\text{m}$ ) = Spectrum. Reading level( $\text{dB}\mu\text{V}$ ) + Factor(dB)  
Factor(dB) = Antenna Factor(dB) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

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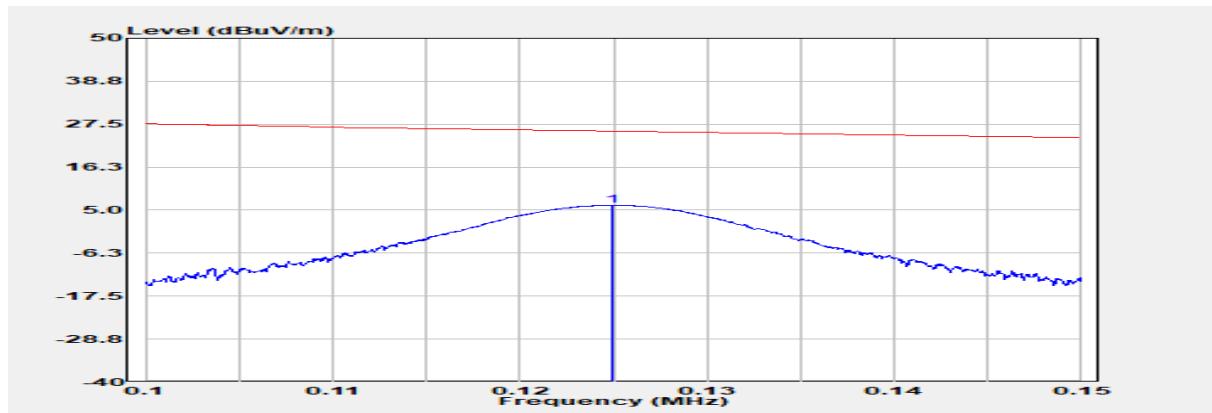
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## 7.6 Main

Report Number	:E2/2021/C0137	Test Site	:SAC C
Operation Mode	:125 KHz	Test Date	:2022-01-05
Test Frequency	:125 KHz	Temp./Humi.	:20.8/70
Test Mode	:Main	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Andy Wang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB
0.125	Peak	75.35	-69.04	6.32	25.67	-19.35

Actual level = Reading level + Factor

Factor = Antenna factor + cable loss – Pre\_Amplifier Gain – distance factor

Test distance= 3m

For Actual level and limit:

Field strength (dB $\mu$ V/m) at 300m, within the band 9 kHz - 490 kHz.

Field strength (dB $\mu$ V/m) at 30m, within the band 490 kHz - 30 MHz.

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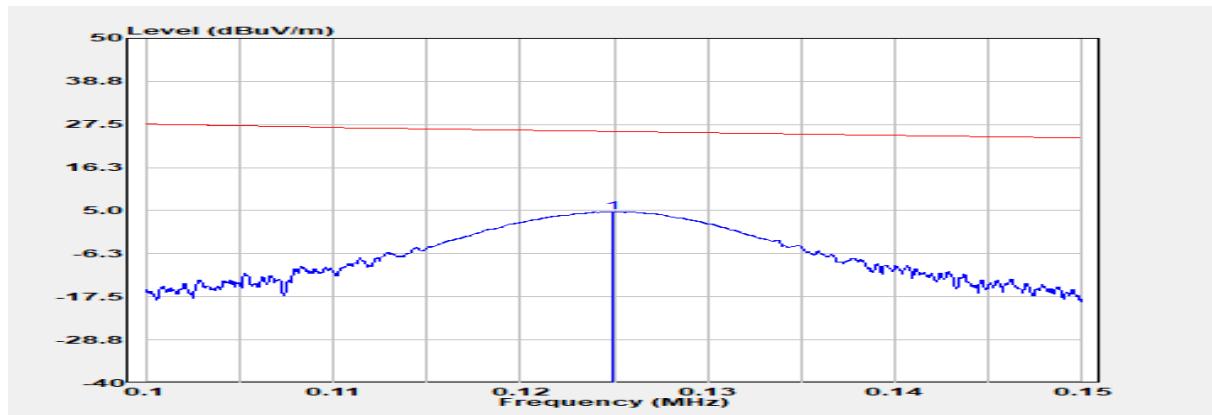
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Report Number	:E2/2021/C0137	Test Site	:SAC C
Operation Mode	:125 KHz	Test Date	:2022-01-05
Test Frequency	:125 KHz	Temp./Humi.	:20.8/70
Test Mode	:Main	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Andy Wang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB
0.125	Peak	73.81	-69.04	4.77	25.67	-20.90

Actual level = Reading level + Factor

Factor = Antenna factor + cable loss – Pre\_Amplifier Gain – distance factor

Test distance= 3m

For Actual level and limit:

Field strength (dBuV/m) at 300m, within the band 9 kHz - 490 kHz.

Field strength (dBuV/m) at 30m, within the band 490 kHz - 30 MHz.

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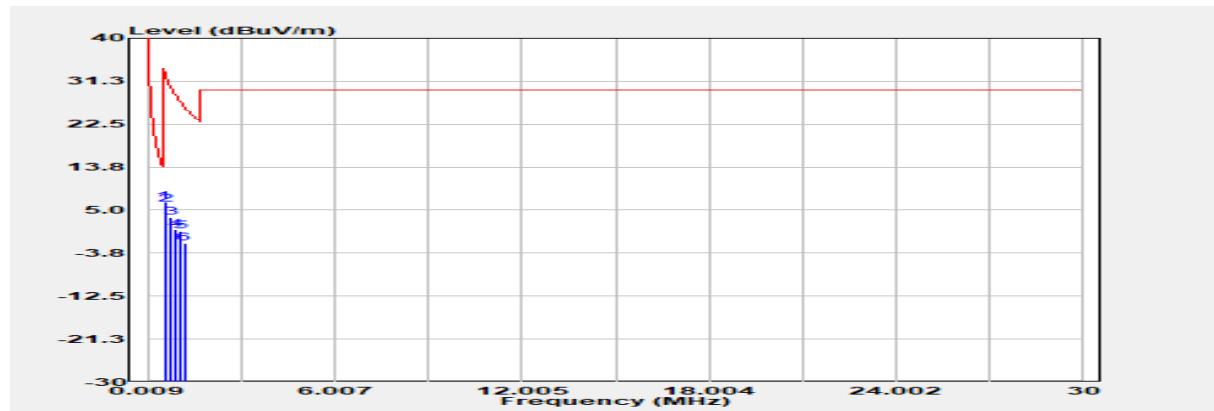
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## 7.7 Tx

Report Number	:E2/2021/C0137	Test Site	:SAC C
Operation Mode	:125 KHz	Test Date	:2022-01-05
Test Frequency	:125 KHz	Temp./Humi.	:20.8/70
Test Mode	:TX	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Andy Wang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB
0.549	Peak	35.24	-28.62	6.61	32.82	-26.20
0.609	Peak	34.78	-28.59	6.19	31.92	-25.73
0.729	Peak	32.01	-28.52	3.48	30.35	-26.87
0.879	Peak	29.47	-28.46	1.01	28.73	-27.72
1.089	Peak	29.11	-28.45	0.66	26.87	-26.21
1.179	Peak	26.76	-28.48	-1.71	26.18	-27.89

Actual level = Reading level + Factor

Factor = Antenna factor + cable loss – Pre\_Amplifier Gain – distance factor

Test distance= 3m

For Actual level and limit:

Field strength (dB $\mu$ V/m) at 300m, within the band 9 kHz - 490 kHz.

Field strength (dB $\mu$ V/m) at 30m, within the band 490 kHz - 30 MHz.

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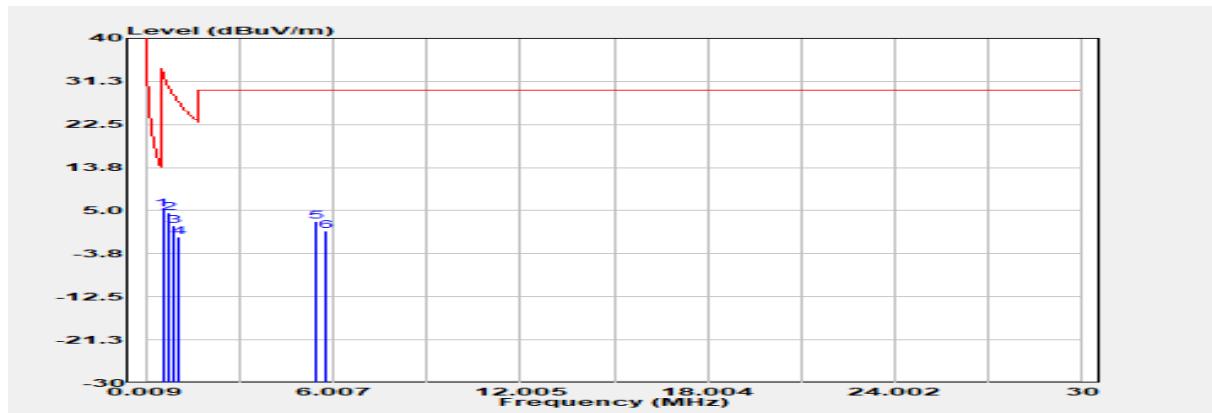
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Report Number :E2/2021/C0137 Test Site :SAC C  
 Operation Mode :125 KHz Test Date :2022-01-05  
 Test Frequency :125 KHz Temp./Humi. :20.8/70  
 Test Mode :TX Antenna Pol. :Horizontal  
 EUT Pol :E2 Plane Engineer :Andy Wang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB
0.549	Peak	33.89	-28.62	5.27	32.82	-27.55
0.729	Peak	33.02	-28.52	4.50	30.35	-25.86
0.879	Peak	30.38	-28.46	1.92	28.73	-26.81
1.089	Peak	28.13	-28.45	-0.32	26.87	-27.19
5.497	Peak	31.45	-28.67	2.78	29.54	-26.76
5.737	Peak	29.48	-28.61	0.87	29.54	-28.67

Actual level = Reading level + Factor

Factor = Antenna factor + cable loss – Pre\_Amplifier Gain – distance factor

Test distance= 3m

For Actual level and limit:

Field strength (dBuV/m) at 300m, within the band 9 kHz - 490 kHz.

Field strength (dBuV/m) at 30m, within the band 490 kHz - 30 MHz.

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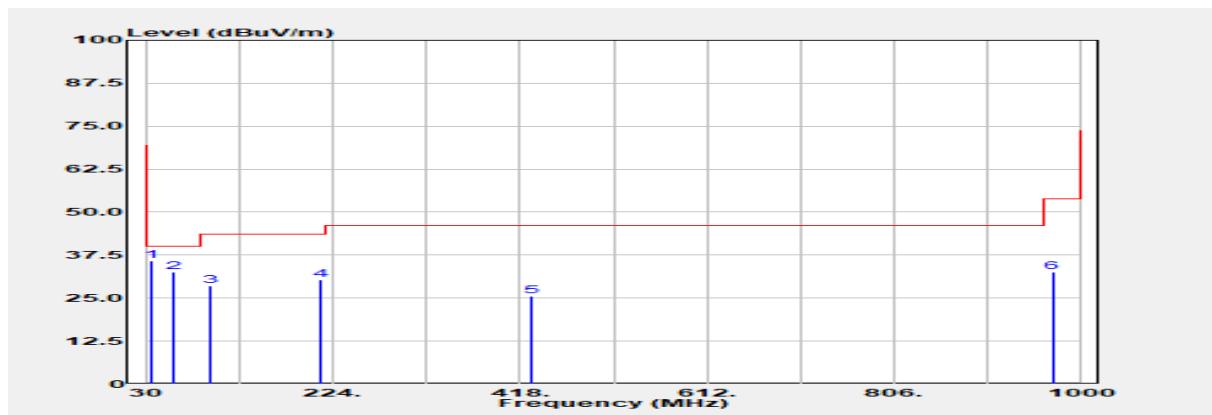
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Report Number :E2/2021/C0137 Test Site :SAC C  
Operation Mode :125 KHz Test Date :2022-01-05  
Test Frequency :125 KHz Temp./Humi. :20.8/70  
Test Mode :TX Antenna Pol. :Vertical  
EUT Pol :E2 Plane Engineer :Andy Wang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
36.790	Peak	51.59	-15.81	35.78	40.00	-4.22
59.100	Peak	47.61	-15.04	32.57	40.00	-7.43
96.930	Peak	47.88	-19.36	28.52	43.50	-14.98
210.420	Peak	47.46	-17.03	30.43	43.50	-13.07
430.610	Peak	34.46	-8.97	25.49	46.00	-20.51
969.930	Peak	30.17	2.29	32.46	54.00	-21.54

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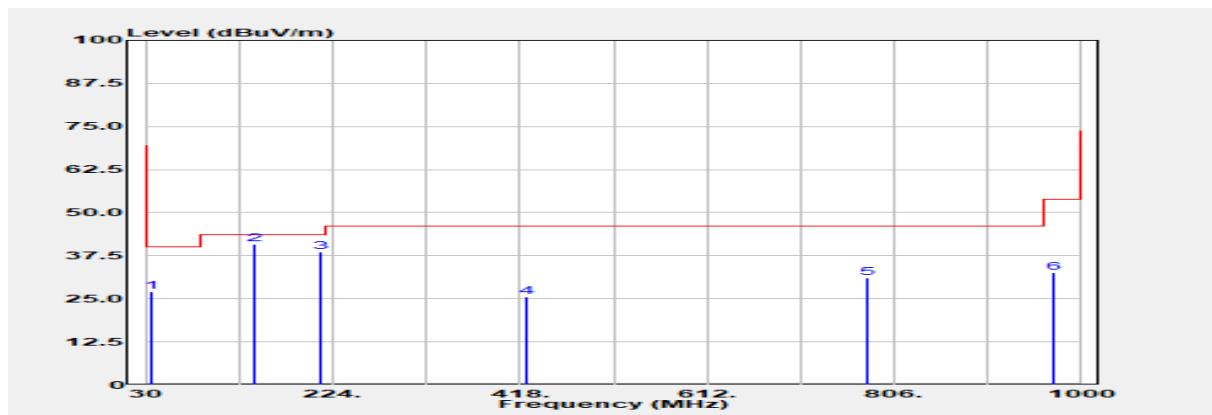
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Report Number :E2/2021/C0137 Test Site :SAC C  
Operation Mode :125 KHz Test Date :2022-01-05  
Test Frequency :125 KHz Temp./Humi. :20.8/70  
Test Mode :TX Antenna Pol. :Horizontal  
EUT Pol :E2 Plane Engineer :Andy Wang



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
35.820	Peak	43.12	-16.13	26.99	40.00	-13.01
142.520	Peak	55.24	-14.36	40.88	43.50	-2.62
210.420	Peak	55.59	-17.03	38.56	43.50	-4.94
424.790	Peak	34.67	-9.19	25.48	46.00	-20.52
777.870	Peak	31.85	-0.68	31.17	46.00	-14.83
971.870	Peak	30.24	2.25	32.50	54.00	-21.50

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## 8 20 dB OCCUPIED BANDWIDTH MEASUREMENT

### 8.1 Standard Applicable:

§2.1049 & §15.215 (c)

### 8.2 Limit:

None

### 8.3 Test Setup

Refer to section 6.2 in this report

### 8.4 Measurement Procedure

20dB bandwidth

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak mode.
2. 20dB Bandwidth the resolution bandwidth of 200 Hz and the video bandwidth of 1 kHz were used.
3. Measured the spectrum width with power higher than 20dB below carrier.

### 8.5 Measurement Equipment Used:

Conducted Emission Test Site: Conducted A					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
H-Loop Near Field Antenna	LANGER EMV-Technik	LF-R 400	02-1597	N.C.R	N.C.R
Spectrum Analyzer	KEYSIGHT	N9010A	MY57120290	04/06/2021	04/05/2022
Attenuator	Marvelous	MVE2213-10	RF12	11/18/2021	11/17/2022
DC Block	PASTERNACK	PE8210	RF151	11/18/2021	11/17/2022

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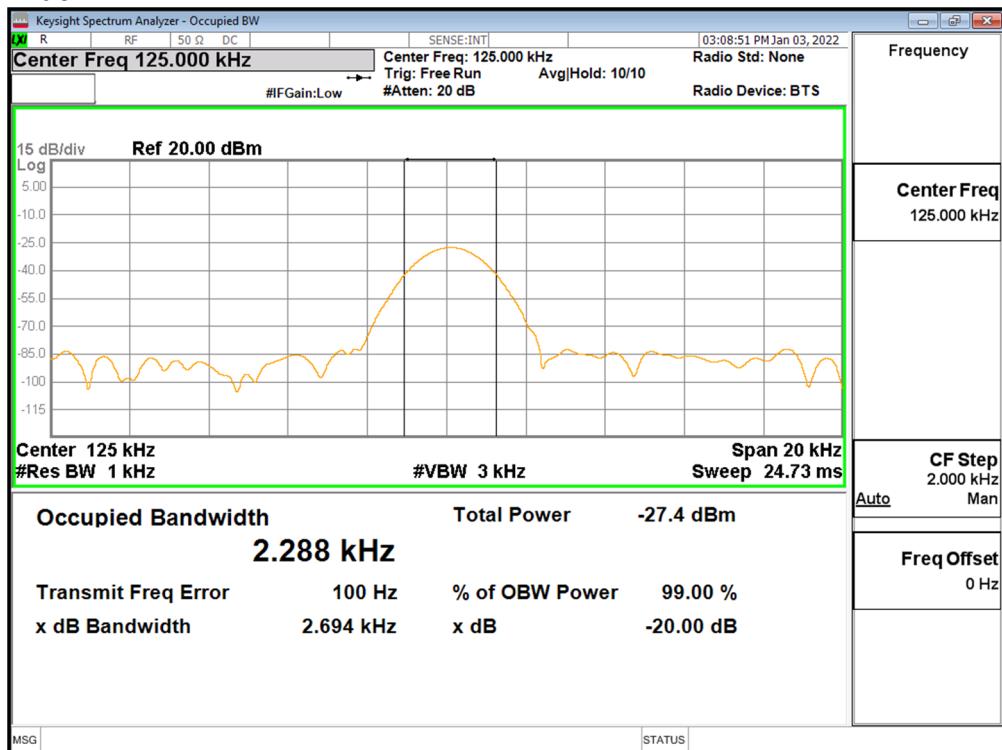
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## 8.6 Measurement Result

### -20dB Bandwidth



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## 9 ANTENNA REQUIREMENT

### 9.1 Standard Applicable:

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§ 15.211, 15.213, 15.217, 15.219, 15.221, or § 15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

### 9.2 Antenna Connected Construction:

The antenna is designed as permanently attached and no consideration of replacement. Please see EUT photo and antenna spec. for details.

~ *End of Report* ~

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