



<b>Prüfbericht-Nr.:</b> <i>Test report no.:</i>	CN2195TF (P15C-125k) 001	<b>Auftrags-Nr.:</b> <i>Order no.:</i>	238515744	Seite 1 von 17 Page 1 of 17
<b>Kunden-Referenz-Nr.:</b> <i>Client reference no.:</i>	N/A	<b>Auftragsdatum:</b> <i>Order date:</i>	2021-05-27	
<b>Auftraggeber:</b> <i>Client:</i>	Whetron Electronics CO.,LTD. No.16, Xingye Rd.,Ta Fa Ind., Daliao Dist., Kaohsiung City 831, Taiwan (R.O.C.)			
<b>Prüfgegenstand:</b> <i>Test item:</i>	SMART KEY SYSTEM Host			
<b>Bezeichnung / Typ-Nr.:</b> <i>Identification / Type no.:</i>	S100371700T1			
<b>Auftrags-Inhalt:</b> <i>Order content:</i>	FCC Part 15C Test report			
<b>Prüfgrundlage:</b> <i>Test specification:</i>	FCC 47CFR Part 15: Subpart C Section 15.207 and 15.209			
<b>Wareneingangsdatum:</b> <i>Date of sample receipt:</i>	2021-05-27			
<b>Prüfmuster-Nr.:</b> <i>Test sample no.:</i>	A003060884-003			
<b>Prüfzeitraum:</b> <i>Testing period:</i>	2021-06-02			
<b>Ort der Prüfung:</b> <i>Place of testing:</i>	EMC/RF Taipei Testing Site			
<b>Prüflaboratorium:</b> <i>Testing laboratory:</i>	Taipei Testing Laboratories			
<b>Prüfergebnis*:</b> <i>Test result*:</i>	Pass			
<b>überprüft von:</b> <i>compiled by:</i>	 Ryan Chen	<b>genehmigt von:</b> <i>authorized by:</i>	 Brenda Chen	
<b>Datum:</b> <i>Date:</i>	2021-06-24	<b>Ausstellungsdatum:</b> <i>Issue date:</i>	2021-06-24	
<b>Stellung / Position:</b>	Senior Project Manager	<b>Stellung / Position:</b>	Senior Project Manager	
<b>Sonstiges / Other:</b>				
<b>Zustand des Prüfgegenstandes bei Anlieferung:</b> <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend N/A = nicht anwendbar	4 = ausreichend N/T = nicht getestet
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory N/A = not applicable	4 = sufficient N/T = not tested
<b>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</b> <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

## TEST SUMMARY

Report Section	FCC Clause	Test Item	Result
5.1.1	15.203	Antenna Requirement	Pass
5.1.2	15.209	Radiated Spurious Emissions	Pass
-	15.207	Mains Conducted Emission	Not Applicable (Note 1)

**Note:**

1. This device only DC powered and not connect to AC utility.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

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**APPENDIX A - TEST RESULT OF RADIATED EMISSIONS**

**APPENDIX SP - PHOTOGRAPHS OF TEST SETUP**

**APPENDIX EP – PHOTOGRAPHS OF EUT**

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### HISTORY OF THIS TEST REPORT

Report No.	Description	Date Issued
CN2195TF (P15C-125k) 001	Original Release	2021-06-24

## 1. General Remarks

### 1.1 Complementary Materials

The following attachments are integral parts of this test report:

**Appendix A - Test Result of Radiated Emissions**

**Appendix SP - Photographs of Test Setup**

**Appendix EP – Photographs of EUT**

Test Specifications

The following standards were applied.

#### Applied Standard and Test Levels

Radio
FCC 47CFR Part 15: Subpart C Section 15.207 and 15.209
ANSI C63.10:2013

### 1.2 Decision Rule of Conformity

The decision rule of conformity of this test report is following the requirements of the requested standard in the quotation, and agreed among testing laboratory and manufacturer (applicant) to exclude the consideration of Measurement Uncertainty, unless it is required by the specific standard.

## 2. Test Sites

### 2.1 Test Laboratory

Taipei Testing Laboratories

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.  
Taipei City 105  
Taiwan (R.O.C.)

### 2.2 Test Facility

Taipei Testing Laboratories

No.458-18, Sec. 2, Fenliao Rd., Linkou Dist.,  
New Taipei City 244  
Taiwan (R.O.C.)  
FCC Registration No.: 226631  
ISED Registration No.: 25563

## 2.3 Traceability

All measurement equipment calibrations are traceable to NML(Taiwan)/NIST(USA) or where calibration is performed outside Taiwan, to equivalent nationally recognized standards organizations.

## 2.4 Calibration

Equipment requiring calibration is calibrated periodically in a suitably accredited Calibration Lab. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

## 2.5 Measurement Uncertainty

All measurement uncertainty values are shown with a coverage factor of  $k=2$  to indicate a 95% level of confidence.

### Emission Measurement Uncertainty

Parameter	Uncertainty
Radiated Emission (9 kHz ~ 30 MHz)	$\pm 1.15$ dB
Radiated Emission (30 MHz ~ 200 MHz)	$\pm 1.32$ dB
Radiated Emission (200 MHz ~ 1 GHz)	$\pm 1.31$ dB
Mains Conducted Emission	$\pm 1.65$ dB

### 3. General Product Information

#### 3.1 Product Function and Intended Use

The EUT is a SMART KEY SYSTEM Host. It contains a 125 kHz compatible module enabling the user to communicate data through a Wireless interface.

For details refer to the User Guide, Data Sheet and Circuit Diagram.

#### 3.2 System Details and Ratings

##### Basic Information of EUT

Item	EUT information
Kind of Equipment/Test Item	SMART KEY SYSTEM Host
Type Identification	S100371700T1
FCC ID	2ABPM-S100371700T1

##### Technical Specification of EUT

Item	EUT information
Operating Frequency	125 kHz
Operation Voltage	12 Vdc
Modulation	ASK
Antenna Information	Refer to 5.1.1
Accessory Device	Refer to 4.3



### **3.3 Noise Generating and Noise Suppressing Parts**

Refer to the Circuit Diagram.

### **3.4 Submitted Documents**

- Circuit Diagram
- Instruction Manual
- Rating Label
- Technical Description

## 4. Test Set-up and Operation Modes

### 4.1 Principle of Configuration Selection

The equipment under test (EUT) was configured to measure its maximum emission level. The test modes were adapted accordingly in reference to the instructions for use.

### 4.2 Test Operation and Test Software

Setup for testing: Test samples are provided with a modified firmware which makes it possible to continuously transmit when power on the device.

The samples were used as follows:  
A003060884-003

Full test was applied on all test modes, but only worst case was shown.

EUT Configure Mode	Applicable To	Description
	Radiated Spurious Emissions	
-	√	-

Note: "-" means no effect.

#### Radiated Spurious Emissions

- Pre-Scan full test was applied on all test modes, but only worst case was shown.
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Frequency (kHz)	Tested Frequency (kHz)
-	125	125

#### Test Condition

Test Item	Ambient Temperature	Relative Humidity	Tested by
Radiated Spurious Emissions	23.1-25.1 °C	55-60 %	Simon Tsai

### 4.3 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

#### Accessory of EUT

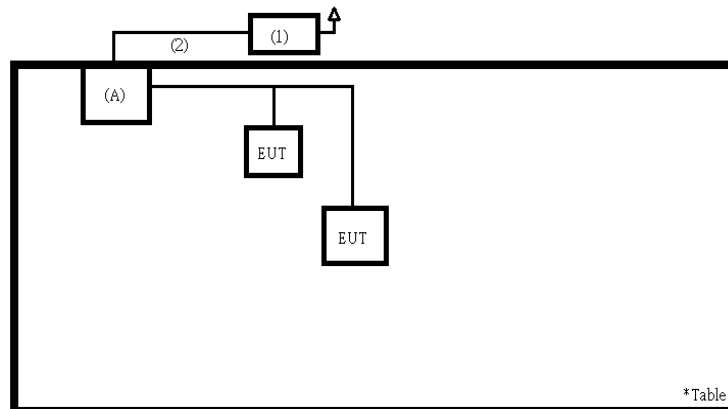
None

#### Support Unit

Support Unit								
No	Description	Brand	Model	S/N	Shielded	Ferrite Core (Qty)	Length (cm)	Remark
A	Fixture_Conroller	Kwang Yang	Kwang Yang-001	N/A	No	0	170	--
1	DC Power Supply	Gwinstek	GPS-3030	N/A	-	-	-	--
2	DC Power Cable	TUV	TUV-006	N/A	NO	NO	180	--

### 4.4 Test Setup Diagram

<Radiated Spurious Emissions mode>



\*Table

## 5. Test Results

### 5.1 Transmitter Requirement & Test Suites

#### 5.1.1 Antenna Requirement

**Requirement** Use of approved antennas only

The antenna is a PKE antenna with no possibility of replacement with a non-approved antenna by the end-user. Therefore, the EUT is considered to comply with this provision.

Refer to EUT photo for details.

## 5.1.2 Radiated Spurious Emissions

### Limit

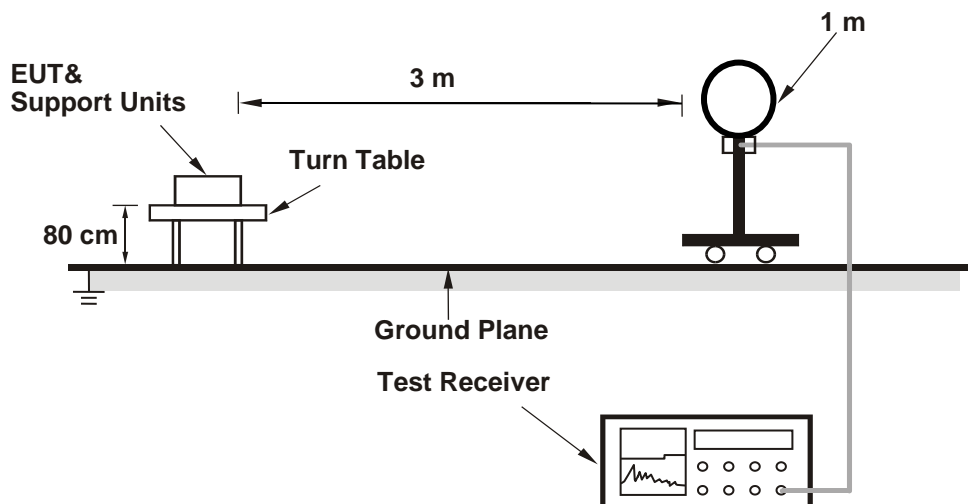
The field strength of any emissions shall not exceed the general radiated emission limits in §15.209 as below table:

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

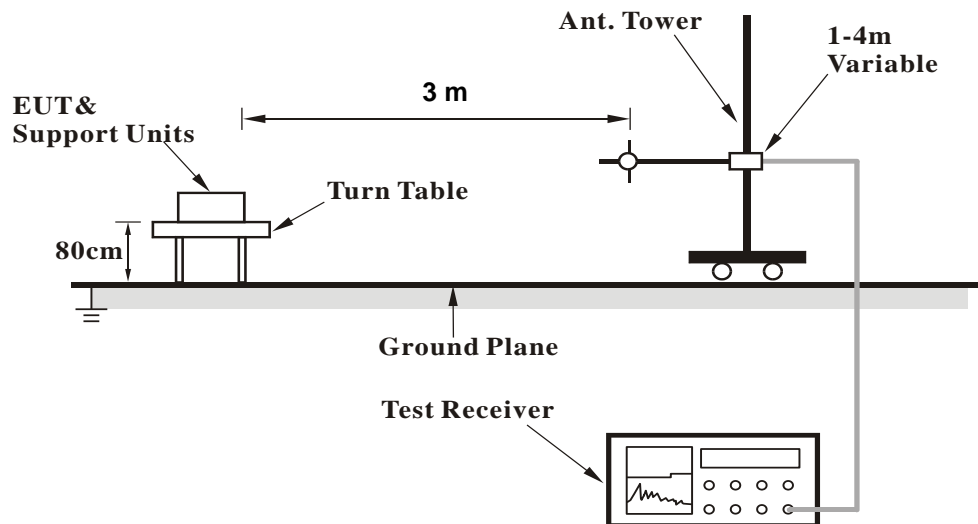
**Kind of Test Site** 3m Semi-Anechoic Chamber

### Test Setup

<Radiated Emissions below 30 MHz>



## &lt;Radiated Emissions 30 MHz to 1 GHz&gt;



For the actual test configuration, please refer to the attached file (Test Setup Photo).

**Test Instruments**

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
Signal Analyzer	R&S	FSV40	101509	2021/3/24	2022/3/23
Receiver	R&S	ESR7	102108	2021/3/17	2022/3/16
Bilog Antenna	SCHWARZBECK	VULB-9168	00950	2021/1/25	2022/1/24
Horn Antenna	ETS-Lindgren	3117	00218929	2020/11/6	2021/11/5
LF-AMP	Agilent	8447D	2727A05146	2021/2/1	2022/1/31
HF-AMP + AC source	EMCI	EMC051845SE	980635	2021/2/1	2022/1/31
HF-AMP + AC source	EMCI	EMC184045SE	980656	2021/2/9	2022/2/8
Horn Antenna	SCHWARZBECK	BBHA 9170	00890	2021/4/14	2022/4/13
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104EA	800057/4EA	2021/4/14	2022/4/13
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104	802244/4	2021/4/14	2022/4/13
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104	MY37203/4	2021/4/14	2022/4/13
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	800897/2EA	2021/3/11	2022/3/10
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	800902/2EA	2021/3/11	2022/3/10
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	801026/2EA	2021/3/11	2022/3/10
Loop Antenna	Chance Most	EMCILPA600 +calibration	287	2021/1/18	2022/1/15

**Test Procedures****For Radiated Emissions below 30 MHz**

- 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 (OPEN), perpendicular (CLOSE), and ground-parallel (GROUND) 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 30 MHz.
2. All modes of operation were investigated and the worst-case emissions are reported.

**For Radiated Emissions above 30 MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30 MHz ~ 1 GHz) / 1.5 meters (for above 1 GHz) 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 detected 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) or Peak detection (PK) at frequency below 1 GHz.
2. All modes of operation were investigated and the worst-case emissions are reported.
3. The Radiated Emissions testing was performed in the X, Y and Z axis orientation. The worst-case Axis orientation is recorded in this test report.



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**Test Results**

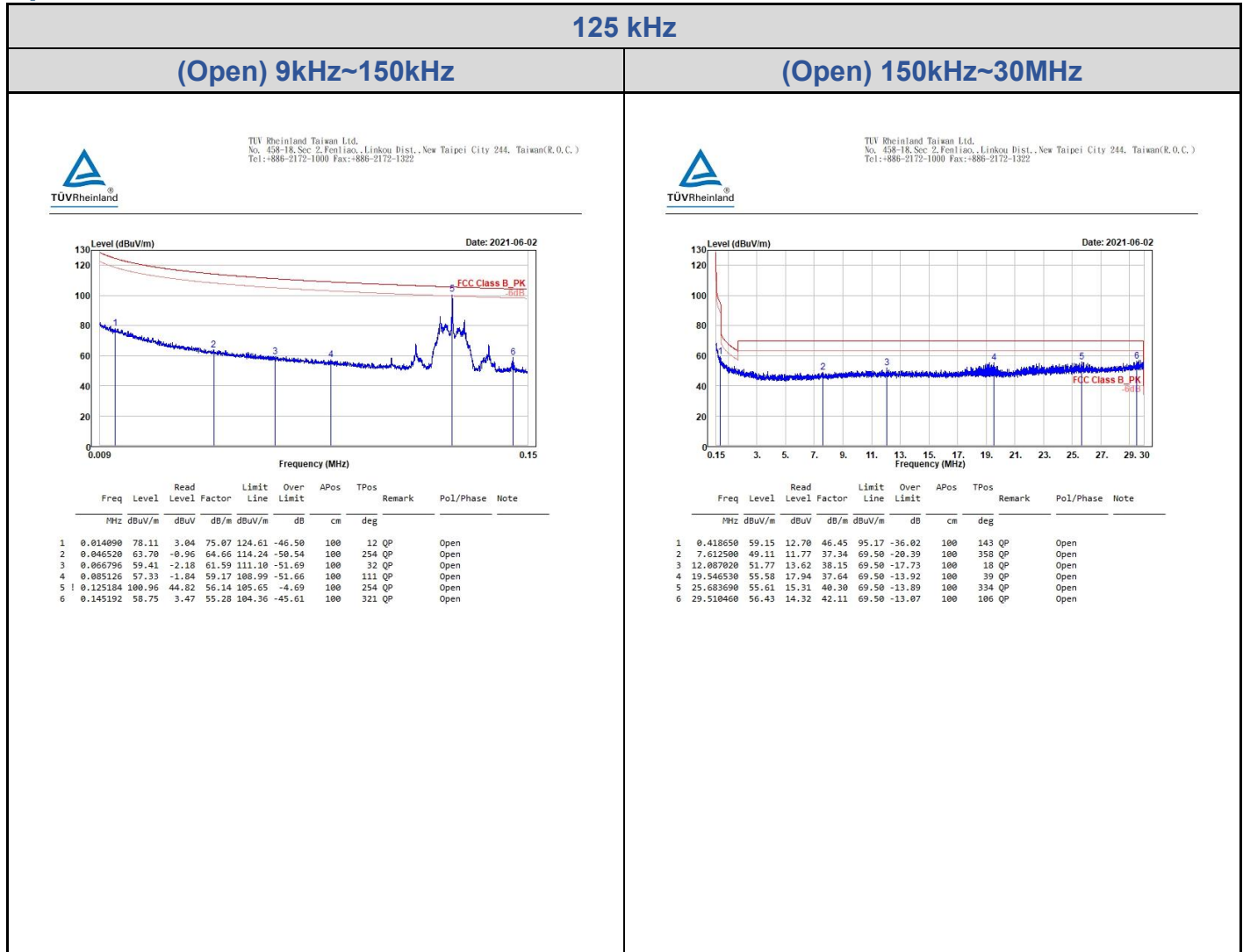
Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB)

Level (dBuV/m) = Reading (dBuV) + Factor (dB/m)

Please refer to Appendix A.

## Appendix B: Test Results of Radiated Spurious Emissions

### Spurious Emissions, Tx Mode, 9kHz ~ 30MHz



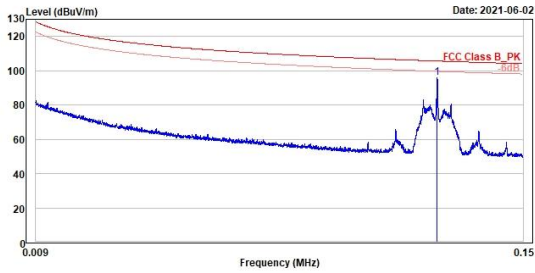
125 kHz

(Close) 9kHz~150kHz

(Grounding) 9kHz~150kHz



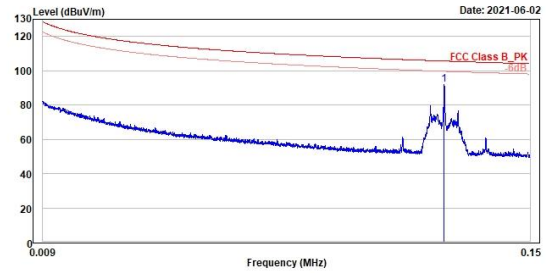
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1	0.125198	95.88	39.74	56.14	105.65	-9.77	100	0	QP	Close
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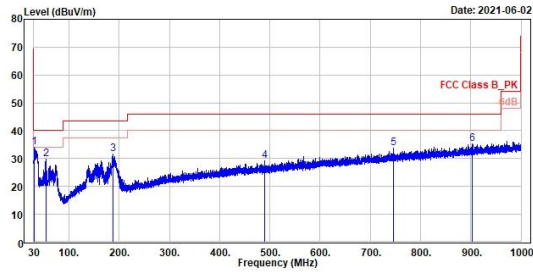


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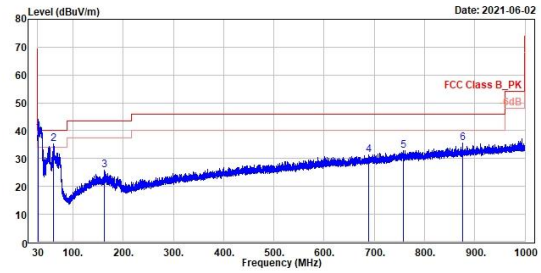


1	0.125198	92.14	36.00	56.14	105.65	-13.51	100	360	QP	Ground
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**Spurious Emissions, Tx Mode, 30MHz ~ 1GHz**
**125 kHz**
**(Horizontal)**
**(Vertical)**

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Freq	Level	Read	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	31.455800	33.98	41.48	-7.50	40.00	-6.02	100	73 QP	Horizontal
2	54.056000	29.77	36.07	-6.30	40.00	-10.23	300	145 QP	Horizontal
3	187.334000	31.70	39.58	-7.88	43.50	-11.80	200	83 QP	Horizontal
4	490.168000	29.21	30.85	-1.64	46.00	-16.79	300	215 QP	Horizontal
5	745.957000	33.76	31.17	2.59	46.00	-12.24	400	322 QP	Horizontal
6	902.321000	35.35	36.40	4.95	46.00	-10.65	100	65 QP	Horizontal


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Freq	Level	Read	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	131.649000	39.19	46.61	-7.42	40.00	-0.81	100	254 QP	Vertical
2	161.331000	35.35	42.64	-7.29	40.00	-4.65	100	186 QP	Vertical
3	163.181000	25.97	31.64	-5.67	43.50	-17.53	100	192 QP	Vertical
4	688.339000	31.45	29.82	1.63	46.00	-14.55	100	123 QP	Vertical
5	757.306000	32.84	29.95	2.89	46.00	-13.16	100	308 QP	Vertical
6	875.549000	35.57	31.24	4.33	46.00	-10.43	223	0 QP	Vertical