


Prüfbericht-Nr.: Test report no.:	CN21QZS0 001	Auftrags-Nr.: Order no.:	244350488	Seite 1 von 18 Page 1 of 18
Kunden-Referenz-Nr.: Client reference no.:	244099823	Auftragsdatum: Order date:	2021-08-02	
Auftraggeber: Client:	Baolong Huf Shanghai Electronics Co., Ltd. 1st Floor, Building 5, 5500 Shenzhuan Rd, Songjiang, Shanghai, China			
Prüfgegenstand: Test item:	TPMS SENSOR			
Bezeichnung / Typ-Nr.: Identification / Type no.:	TMSS6A3 FCC ID: 2ATCK-TMSS6A3			
Auftrags-Inhalt: Order content:	Complete test			
Prüfgrundlage: Test specification:	FCC CFR47 Part 15, Subpart C Section 15.231 ANSI C63.10: 2013			
Wareneingangsdatum: Date of sample receipt:	2021-09-02			
Prüfmuster-Nr.: Test sample no.:	A003121703-001			
Prüfzeitraum: Testing period:	Refer to test report			
Ort der Prüfung: Place of testing:	TÜV Rheinland (Shanghai) Co., Ltd.			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland (Shanghai) Co., Ltd.			
Prüfergebnis*: Test result*:	Pass			
geprüft von: tested by:	X <u>Hongfei Wu</u>	genehmigt von: authorized by:	X <u>Elliot Zhang</u>	
Datum: Date:	2021-10-18 <small>Signed by: Hongfei Wu</small>	Ausstellungsdatum: Issue date:	2021-10-18 <small>Signed by: Elliot Zhang</small>	
Stellung / Position:	PE	Stellung / Position:	Reviewer	
Sonstiges / Other:				
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:	Prüfmuster vollständig und unbeschädigt Test item complete and undamaged			
* Legende:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
* Legend:	P(ass) = passed a.m. test specification(s)	F(ail) = failed a.m. test specification(s)	N/A = not applicable	N/T = not tested
<p>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. 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.</p>				

TEST SUMMARY

5.1.1 ANTENNA REQUIREMENT*RESULT: Pass***5.1.2 20dB BANDWIDTH***RESULT: Pass***5.1.3 DEACTIVATION TIME***RESULT: Pass***5.1.4 CONDUCTED EMISSION***RESULT: N/A***5.1.5 FIELD STRENGTH OF FUNDAMENTAL AND RADIATED SPURIOUS EMISSION***RESULT: Pass*

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1. General Remarks

1.1 Complementary Materials

Null.

2. Test Sites

2.1 Test Facilities

TÜV Rheinland (Shanghai) Co., Ltd.
Shanghai TUV Rheinland Building No. 177, 178 Lane 777, West Guangzhong Rd, Jing'an District, Shanghai, China

The used test equipment is in accordance with CISPR 16 for measurement of radio interference.

The Federal Communications Commission has reviewed the technical characteristics of the radiated and conducted emission facility, and has found these test facilities to be in compliance with the requirements of section 2.948 of the FCC rules. The description of the test facility is listed under FCC registration number 958801.

The Innovation, Science and Economic Development Canada has reviewed the technical characteristics of the radiated and conducted emission facility, and has found these test facilities to be in compliance. The description of the test facility is listed under chambers filing number 2932F.

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Instrument	Manufacturer	Type No.	Asset No.	Cali. Due Date
3m modified semi-anechoic chamber	Frankonia	SAC3	G1811378	2022-06-27
EMI test receiver	Rohde&Schwarz	ESCI	G1811402	2022-09-01
Bilog antenna	Teseq	CBL 6112D	G1811425	2023-03-10
Log periodic antenna	Rohde&Schwarz	HL050	G1811417	2023-03-10
Spectrum analyser	Rohde&Schwarz	FSV40	G1822702	2021-11-01
Preamplifier	Taiwan EMCI	EMC051845SE	G1825371	2023-05-14
Spectrum Analyzer	Keysight	N9020A	MY54500180	2022-09-08

2.3 Traceability

All measurement equipment calibrations are traceable to NIST or where calibration is performed outside the United States, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Measurement Uncertainty

Table 2: Measurement Uncertainty

Measurement Type	Frequency	Uncertainty
Radiated Emission	9kHz – 30MHz	±2.93dB
	30MHz - 1GHz	±5.34dB
	> 1GHz	±5.40dB

3. General Product Information

3.1 Product Function and Intended Use

The EUT (Equipment Under Test) is a tire pressure monitoring sensor working on the frequency of 315MHz and 125kHz.

The aim of this report is to evaluate 315MHz transmitter of the EUT for FCC Part 15C .

For details refer to the User Manual and Circuit Diagram.

3.2 Ratings and System Details

Table 3: Technical Specification of EUT

General Description of EUT	
Product Name:	TPMS SENSOR
Model No.:	TMSS6A3
Operating Voltage:	DC 3V (CR2032)
Technical Specification of Transmitter	
Frequency Range:	315 MHz
Modulation Type:	FSK
Antenna Type:	Monopole Antenna
Technical Specification of Receiver	
Frequency Range:	125 kHz

3.3 Independent Operation Modes

Table 4: Independent Operation Modes

Test Mode	Channel Frequency [MHz]	Mode
TM1	315	Transmitting continually
TM2	315	Normal operation

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

- Bill of Material
- PCB Layout
- Photo Document
- Circuit Diagram
- Instruction Manual
- Rating Label

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

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

4.2 Test Operation and Test Software

Null.

4.3 Special Accessories and Auxiliary Equipment

Null.

4.4 Countermeasures to achieve EMC Compliance

Null.

5. Test Results

5.1 Conducted Testing at Antenna Port

5.1.1 Antenna Requirement

RESULT: **Pass**

According to the manufacturer declared, the EUT has one monopole antenna, the antenna is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.

Table 5: Antenna Requirement

FCC 15.203 – Antenna Requirement 1	
Requirement:	No antenna other than that furnished by the responsible party shall be used with the device
Results:	Antenna type: Monopole Antenna
Verdict:	Pass

FCC 15.204 – Antenna Requirement 2	
Requirement:	An intentional radiator may be operated only with the antenna with which it is authorized. If an antenna is marketed with the intentional radiator, it shall be of a type which is authorized with the intentional radiator.
Results:	Only one monopole antenna can be used
Verdict:	Pass

5.1.2 20dB Bandwidth

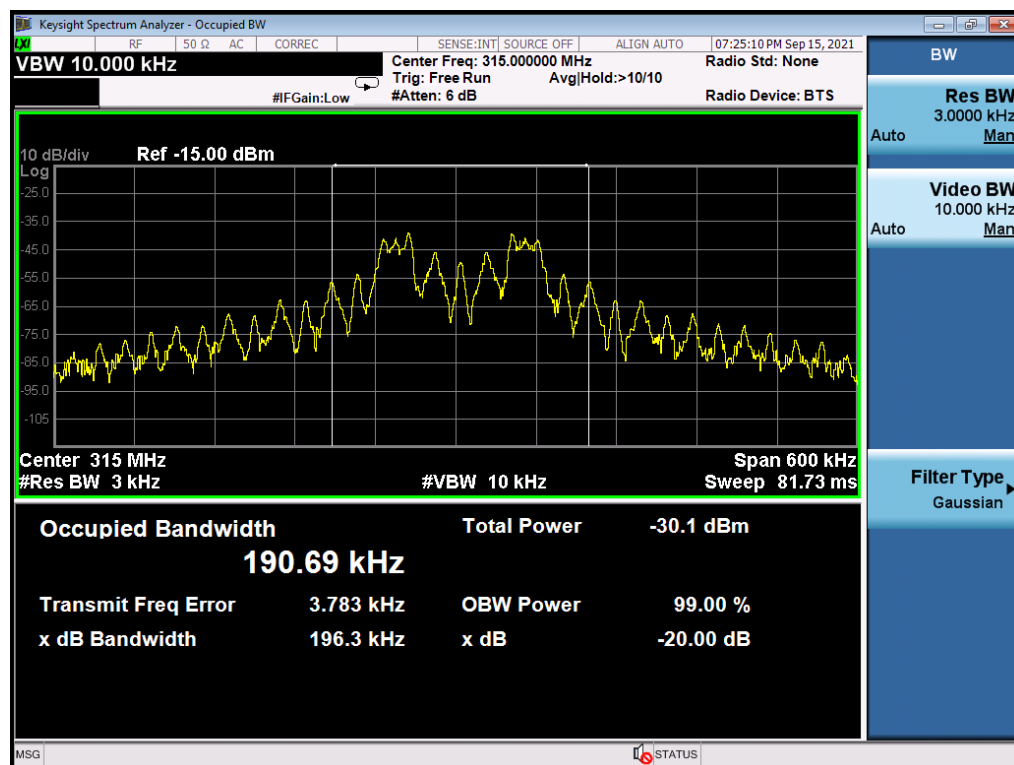
RESULT:
Pass

Date of testing : 2021-09-15
 Ambient temperature : 24.3°C
 Relative humidity : 53.2%
 Atmospheric pressure : 101kPa
 Test requirement : FCC Part 15.231(c)
 Test procedure : ANSI C63.10: 2013
 Test voltage : DC 3V
 Test modes applied : TM1

Table 6: 20dB Bandwidth

Channel Frequency [MHz]	20dB Bandwidth [kHz]	Limit [kHz]	Result
315	190.69	787.5	Pass

Note:

 $\text{Limit} = 315000 \times 0.25\% = 787.5 \text{ kHz}$
Figure 1: 20dB Bandwidth


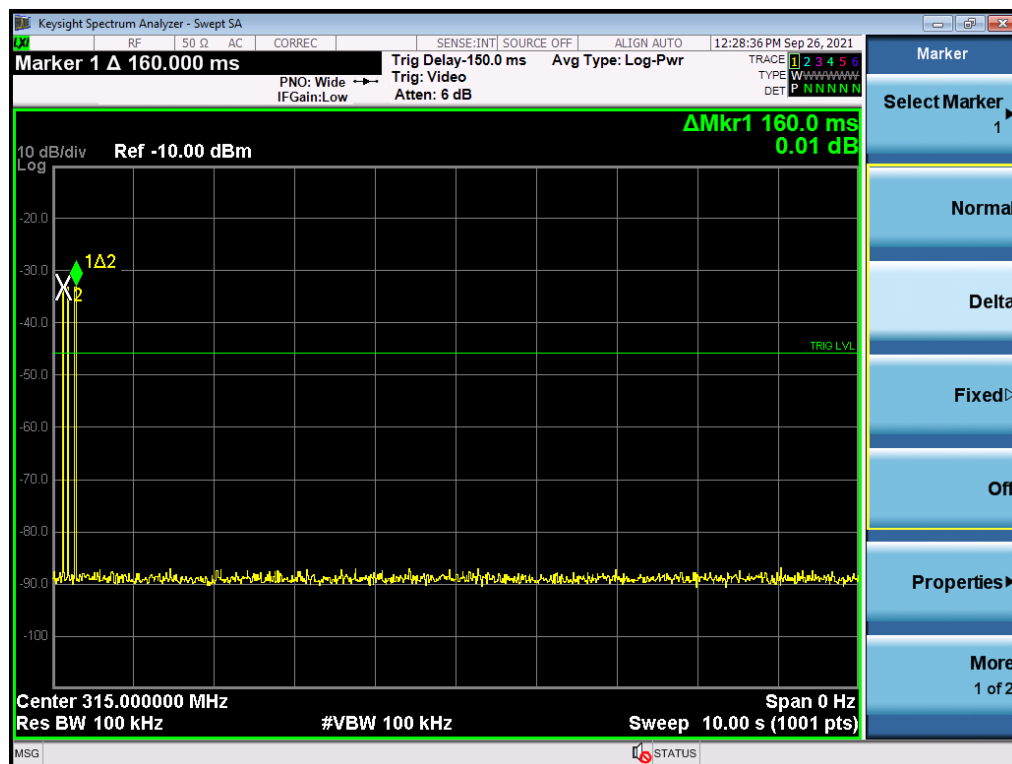
5.1.3 Deactivation Time

RESULT:
Pass

Date of testing : 2021-9-26
 Ambient temperature : 24.8°C
 Relative humidity : 56.1%
 Atmospheric pressure : 101kPa
 Test requirement : FCC Part 15.231(a)(1)
 Test procedure : ANSI C63.10: 2013
 Test voltage : DC 3V
 Test modes applied : TM2

Table 7: Deactivation Time

On Transmission Time [s]	Limit [s]	Result
0.16	< 5	Pass

Figure 2: Deactivation Time


5.1.4 Conducted Emission

RESULT:**N/A**

Test requirement : FCC Part 15.207 (a)
Test procedure : ANSI C63.10: 2013

Note:

This product is power by battery.
So, this test is not applicable

5.1.5 Field strength of fundamental and Radiated Spurious Emission

RESULT:
Pass

Date of testing : 2021-09-22~2021-09-26
 Ambient temperature : 23.8°C
 Relative humidity : 56.3%
 Atmospheric pressure : 101kPa
 Test requirement : FCC Part 15.205
 FCC Part 15.209
 FCC Part 15.231(b)
 Test procedure : ANSI C63.10: 2013
 Test voltage : DC 3V
 Test modes applied : TM1 for Field strength of fundamental and Radiated Spurious Emission
 TM2 for Duty Cycle

Table 8: Duty Cycle

Frequency [MHz]	Total Time (Ton) [ms]	The duration of one cycle [ms]	Duty Cycle	Duty Cycle Factor [dB]
315	16	100	16%	-15.9

Note: Duty Cycle Factor = 20*Log(Duty Cycle)

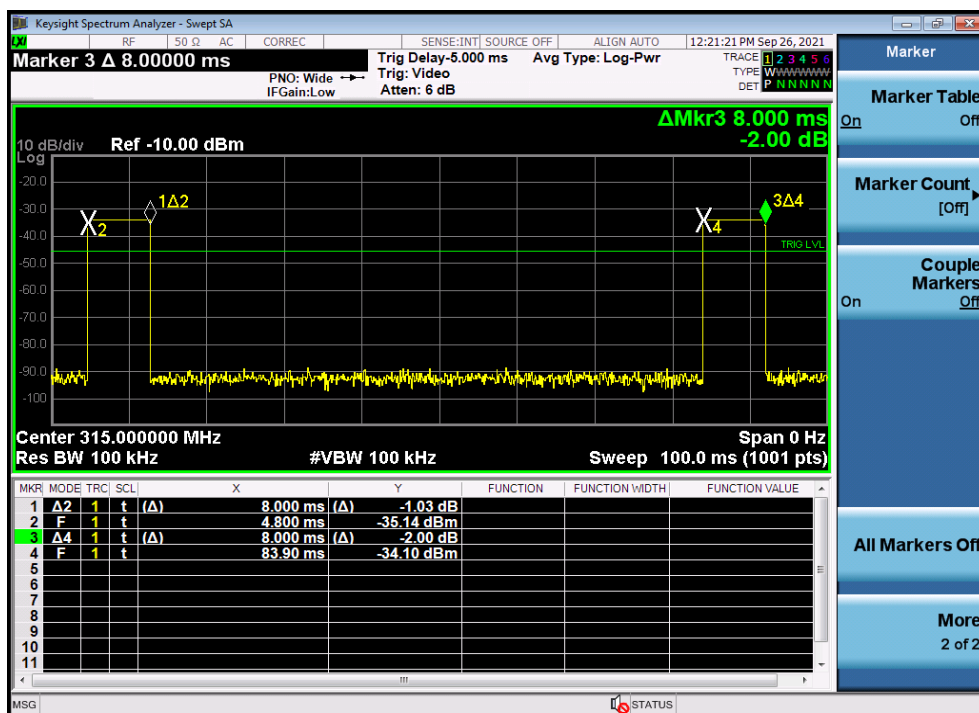
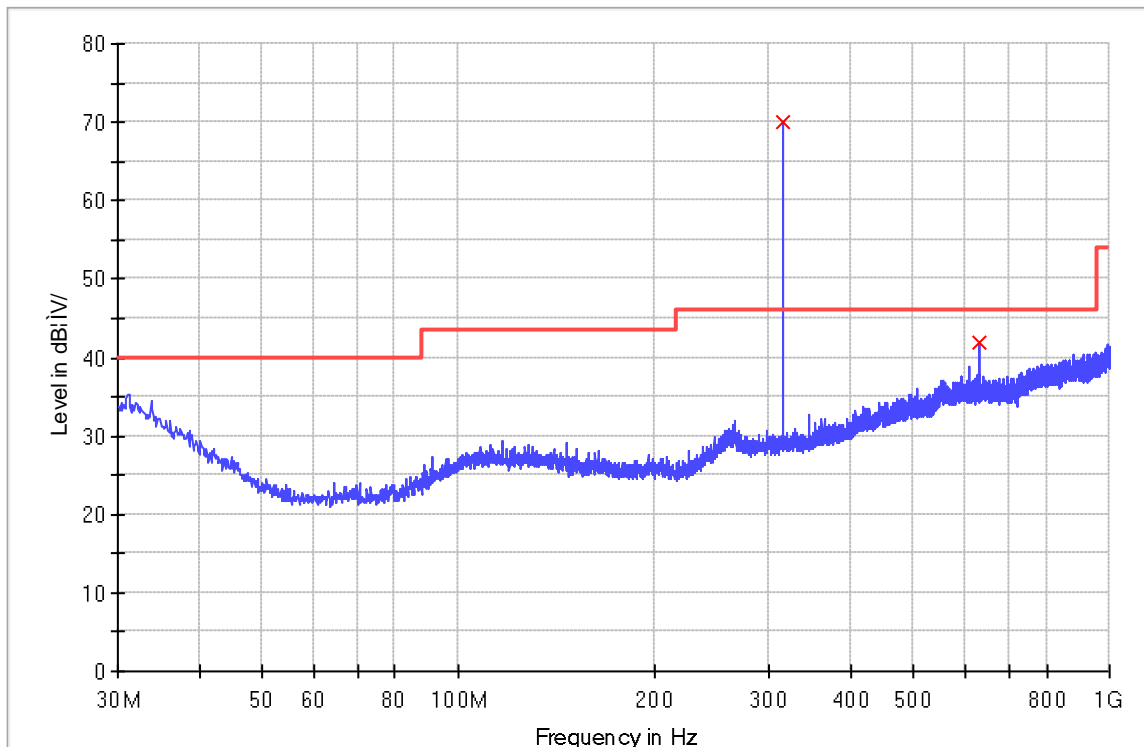
Figure 3: Duty Cycle


Figure 4: Field strength of fundamental and Radiated Spurious Emission, 30MHz to 1GHz, H

_Radiated emission (30M-1GHz) 1 Range_FCC

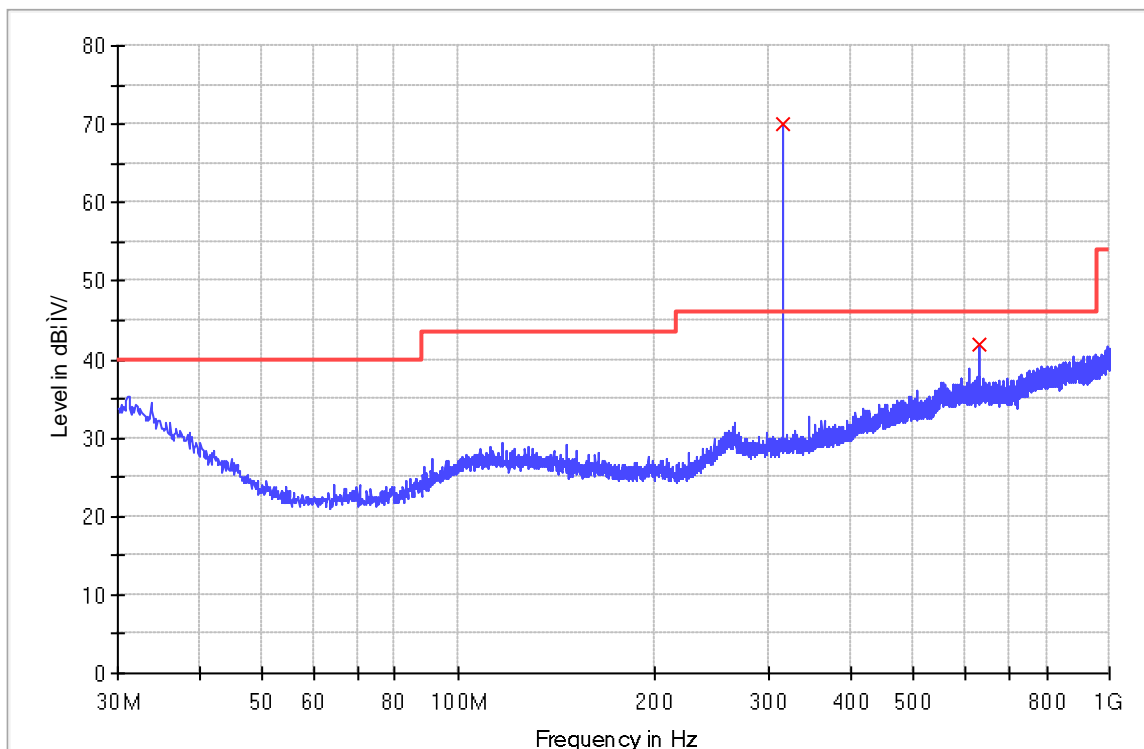

Limit and Margin

Frequency [MHz]	MaxPeak [dBuV/m]	Duty Cycle Factor [dB]	Average [dBuV/m]	Limit [dBuV/m]	Over Limit [dB]	Type	Pol.
315.058750	70.0	N/A	N/A	95.6	-25.6	PK	H
315.058750	70.0	-15.9	54.1	75.6	-21.5	AV	H
630.066250	42.0	N/A	N/A	75.6	-33.6	PK	H
630.066250	42.0	-15.9	26.1	55.6	-29.5	AV	H

Note: Average Level= MaxPeak Level + Duty Cycle

Figure 5: Field strength of fundamental and Radiated Spurious Emission, 30MHz to 1GHz, V

_Radiated emission (30M-1GHz) 1 Range_FCC

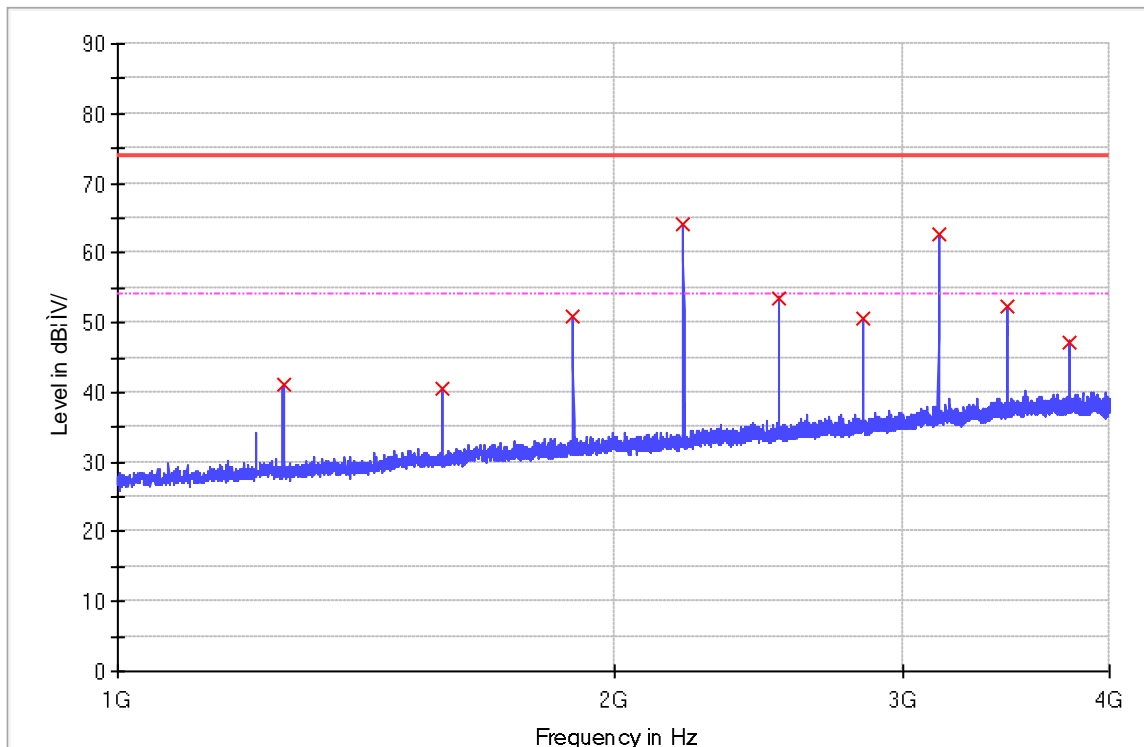

Limit and Margin

Frequency [MHz]	MaxPeak [dBuV/m]	Duty Cycle Factor [dB]	Average [dBuV/m]	Limit [dBuV/m]	Over Limit [dB]	Type	Pol.
314.937500	72.7	N/A	N/A	95.6	-22.9	PK	V
314.937500	72.7	-15.9	56.8	75.6	-18.8	AV	V
629.945000	43.2	N/A	N/A	75.6	-32.4	PK	V
629.945000	43.2	-15.9	27.3	55.6	-28.3	AV	V

Note: Average Level= MaxPeak Level + Duty Cycle

Figure 6: Field strength of fundamental and Radiated Spurious Emission, 1GHz to 4GHz, H

RE_1-18GHz_HL050_FSV40_Pre

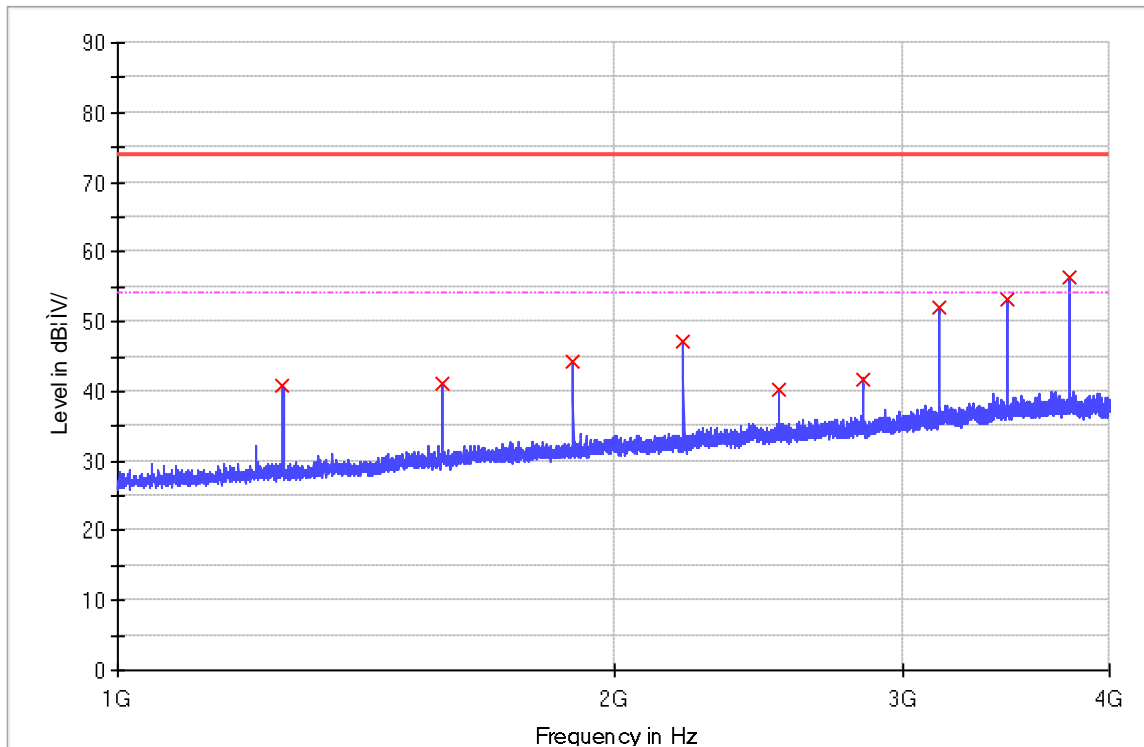

Limit and Margin

Frequency [MHz]	MaxPeak [dBµV/m]	Duty Cycle Factor [dB]	Average [dBµV/m]	Limit [dBµV/m]	Over Limit [dB]	Type	Pol.
1260.000000	41.1	N/A	N/A	75.6	-34.5	PK	H
1260.000000	41.1	-15.9	25.2	55.6	-30.4	AV	H
1574.687500	40.7	N/A	N/A	75.6	-34.9	PK	H
1574.687500	40.7	-15.9	24.8	55.6	-30.8	AV	H
1890.000000	50.8	N/A	N/A	75.6	-24.8	PK	H
1890.000000	50.8	-15.9	34.9	55.6	-20.7	AV	H
2204.687500	64.1	N/A	N/A	75.6	-11.5	PK	H
2204.687500	64.1	-15.9	48.2	55.6	-7.4	AV	H
2519.687500	53.6	N/A	N/A	75.6	-22.0	PK	H
2519.687500	53.6	-15.9	37.7	55.6	-17.9	AV	H
2834.375000	50.7	N/A	N/A	75.6	-24.9	PK	H
2834.375000	50.7	-15.9	34.8	55.6	-20.8	AV	H
3149.687500	62.8	N/A	N/A	75.6	-12.8	PK	H
3149.687500	62.8	-15.9	46.9	55.6	-8.7	AV	H
3464.687500	52.3	N/A	N/A	75.6	-23.3	PK	H
3464.687500	52.3	-15.9	36.4	55.6	-19.2	AV	H
3779.375000	47.3	N/A	N/A	75.6	-28.3	PK	H
3779.375000	47.3	-15.9	31.4	55.6	-24.2	AV	H

Note: Average Level= MaxPeak Level + Duty Cycle

Figure 7: Field strength of fundamental and Radiated Spurious Emission, 1GHz to 4GHz, V

RE_1-18GHz_HL050_FSV40_Pre


Limit and Margin

Frequency [MHz]	MaxPeak [dBuV/m]	Duty Cycle Factor [dB]	Average [dBuV/m]	Limit [dBuV/m]	Over Limit [dB]	Type	Pol.
1259.687500	40.7	N/A	N/A	75.6	-34.9	PK	V
1259.687500	40.7	-15.9	24.8	55.6	-30.8	AV	V
1574.687500	41.1	N/A	N/A	75.6	-34.5	PK	V
1574.687500	41.1	-15.9	25.2	55.6	-30.4	AV	V
1889.687500	44.2	N/A	N/A	75.6	-31.4	PK	V
1889.687500	44.2	-15.9	28.3	55.6	-27.3	AV	V
2205.312500	47.2	N/A	N/A	75.6	-28.4	PK	V
2205.312500	47.2	-15.9	31.3	55.6	-24.3	AV	V
2520.312500	40.3	N/A	N/A	75.6	-35.3	PK	V
2520.312500	40.3	-15.9	24.4	55.6	-31.2	AV	V
2834.687500	41.6	N/A	N/A	75.6	-34.0	PK	V
2834.687500	41.6	-15.9	25.7	55.6	-29.9	AV	V
3149.687500	52.0	N/A	N/A	75.6	-23.6	PK	V
3149.687500	52.0	-15.9	36.1	55.6	-19.5	AV	V
3464.687500	53.2	N/A	N/A	75.6	-22.4	PK	V
3464.687500	53.2	-15.9	37.3	55.6	-18.3	AV	V
3779.687500	56.4	N/A	N/A	75.6	-19.2	PK	V
3779.687500	56.4	-15.9	40.5	55.6	-15.1	AV	V

Note: Average Level= MaxPeak Level + Duty Cycle

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