



MEASUREMENT REPORT

FCC PART 15.231(e)

FCC ID: TTETSB60

Applicant: Suzhou Sate Auto Electronic Co., Ltd.

Application Type: Certification

Product: Tire Pressure Monitoring System Sensor

Model No.: TSB60

Serial Model No.: 3641101BKN01A, 3641100XKN02A, 3641100XKZ4NA,
3641100XKZ16B, 01734809, 01741388, 6606737042,
6600273895

Brand Name: SATE

FCC Classification: FCC Part 15 Security/Remote Control Transmitter (DSC)

FCC Rule Part(s): Part 15.231(e)

Test Procedure(s): ANSI C63.10-2013

Test Date: February 21 ~ April 08, 2021

Reviewed By:

Vincent Yu

Vincent Yu

Approved By:

Robin Wu

Robin Wu



The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
2102RSU040-U1	Rev. 01	Initial Report	04-14-2021	Valid

CONTENTS

Description	Page
1. GENERAL INFORMATION	5
1.1. Applicant.....	5
1.2. Manufacturer	5
1.3. Testing Facility.....	5
2. PRODUCT INFORMATION.....	6
2.1. Equipment Description	6
2.2. Test Mode	6
2.3. Test Environment Condition	6
2.4. Test Configuration	6
2.5. Test Software	7
3. ANTENNA REQUIREMENTS	8
4. TEST EQUIPMENT CALIBRATION DATE	9
5. MEASUREMENT UNCERTAINTY	13
6. TEST RESULT	14
6.1. Summary	14
6.2. Conducted Emission	15
6.2.1. Test Limit	15
6.2.2. Test Setup	15
6.2.3. Test Result.....	15
6.3. Radiated Emissions.....	16
6.3.1. Test Limit	16
6.3.2. Test Procedure Used	17
6.3.3. Test Setting.....	17
6.3.4. Test Setup	19
6.3.5. Test Result.....	20
6.4. 20dB Bandwidth	24
6.4.1. Test Limit	24
6.4.2. Test Procedure used	24
6.4.3. Test Setting.....	24
6.4.4. Test Setup	24
6.4.5. Test Result.....	25
6.5. Transmission Time	26
6.5.1. Test Limit	26
6.5.2. Test Procedure	26

6.5.3.	Test Setup	26
6.5.4.	Test Result.....	27
7.	CONCLUSION.....	28
	Appendix A - Test Setup Photograph.....	29
	Appendix B - EUT Photograph	30

2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name	Tire Pressure Monitoring System Sensor
Model No.	TSB60
Serial Model No.	3641101BKN01A, 3641100XKN02A, 3641100XKZ4NA, 3641100XKZ16B, 01734809, 01741388, 6606737042, 6600273895
Working Frequency	433.92MHz
Modulation	ASK & FSK Modulation
Supply Voltage	1.9VDC ~ 3.6VDC
Operating Temperature	-40 ~ 125°C

Note 1: Above information is declared by manufacturer.

Note 2: The different models are only for marketing different clients, others are the same.

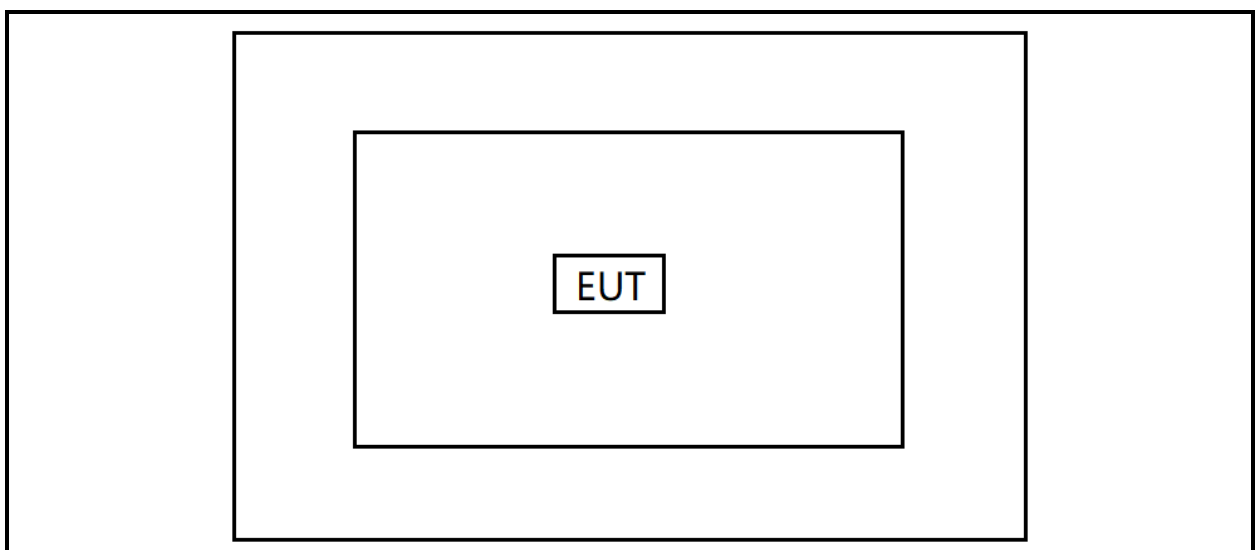
2.2. Test Mode

Test Mode	Mode 1: Transmit by 433.92MHz with ASK Modulation
	Mode 1: Transmit by 433.92MHz with FSK Modulation

2.3. Test Environment Condition

Ambient Temperature	15°C ~ 35°C
Relative Humidity	20%RH ~ 75%RH

2.4. Test Configuration



2.5. Test Software

The sample provided by the manufacturer is always in the transmitting state after power-on.

3. ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 antenna of the device is **permanently attached**.
- There are no provisions for connection to an external antenna.

Conclusion:

The device unit complies with the requirement of §15.203.

4. TEST EQUIPMENT CALIBRATION DATE

Conducted Emission (WZ-SR2)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2022/01/12
Two-Line V-Network	R&S	ENV216	MRTSUE06002	1 year	2021/09/09
Thermal Hygrometer	testo	608-H1	MRTSUE06404	1 year	2021/07/26
Shielding Room	MIX-BEP	Chamber-SR2	MRTSUE06215	N/A	N/A

Conducted Emission (SIP-SR2)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06613	1 year	2021/07/02
Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2021/09/09
Thermal Hygrometer	testo	608-H1	MRTSUE06621	1 year	2021/12/03

Radiated Emission (WZ-AC1)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2022/01/04
PXA Signal Analyzer	Keysight	N9030B	MRTSUE06395	1 year	2021/08/30
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/11/08
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2021/08/08
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2021/09/27
Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06597	1 year	2021/12/14
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	1 year	2021/11/14
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2021/06/11
Thermal Hygrometer	testo	608-H1	MRTSUE06403	1 year	2021/07/26
Anechoic Chamber	TDK	Chamber-AC1	MRTSUE06212	1 year	2021/04/30

Radiated Emission (WZ-AC2)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
MXE EMI Receiver	Keysight	N9038A	MRTSUE06125	1 year	2021/07/02
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/11/08
Bilog Period Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2021/05/26
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06171	1 year	2021/10/25
Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06597	1 year	2021/12/14
Broadband Coaxial Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2021/11/14
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2021/06/11
Thermal Hygrometer	Minggao	ETH529	MRTSUE06170	1 year	2021/12/08
Anechoic Chamber	RIKEN	Chamber-AC2	MRTSUE06213	1 year	2021/04/30

Radiated Emission (SIP-AC1)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06612	1 year	2021/07/02
EXA Signal Analyzer	Keysight	N9010B	MRTSUE06559	1 year	2021/07/23
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/11/08
Bilog Period Antenna	Schwarzbeck	VULB9168	MRTSUE06645	1 year	2021/08/30
Double Ridged Horn Antenna	R&S	HF907	MRTSUE06610	1 year	2021/08/30
Preamplifier	EMCI	EMC051845SE	MRTSUE06600	1 year	2021/11/12
Thermal Hygrometer	testo	608-H1	MRTSUE06620	1 year	2021/12/03
Anechoic Chamber	RIKEN	SIP-AC1	MRTSUE06554	1 year	2021/12/24

Radiated Emission (SIP-AC2)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06613	1 year	2021/07/02
MXA Signal Analyzer	Keysight	N9020B	MRTSUE06604	1 year	2021/09/26
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/11/08
Bilog Period Antenna	Schwarzbeck	VULB9168	MRTSUE06646	1 year	2021/08/30
Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06648	1 year	2021/11/26
Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06599	1 year	2021/11/26
Preamplifier	EMCI	EMC051845SE	MRTSUE06644	1 year	2021/11/12
Preamplifier	EMCI	EMC184045SE	MRTSUE06602	1 year	2021/10/13
Thermal Hygrometer	testo	608-H1	MRTSUE06624	1 year	2021/12/03
Anechoic Chamber	RIKEN	SIP-AC2	MRTSUE06781	1 year	2021/12/24

Radiated Emission (SIP-AC3)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06612	1 year	2021/07/02
EXA Signal Analyzer	Keysight	N9010B	MRTSUE06559	1 year	2021/07/23
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/11/08
Bilog Period Antenna	Schwarzbeck	VULB9168	MRTSUE06647	1 year	2021/08/08
Double Ridged Horn Antenna	R&S	HF907	MRTSUE06611	1 year	2021/09/13
Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06598	1 year	2021/11/26
Preamplifier	EMCI	EMC012645SE	MRTSUE06642	1 year	2022/01/14
Preamplifier	EMCI	EMC184045SE	MRTSUE06641	1 year	2022/01/14
Thermal Hygrometer	testo	608-H1	MRTSUE06622	1 year	2021/12/03
Anechoic Chamber	RIKEN	SIP-AC3	MRTSUE06782	1 year	2021/12/24

Conducted Test Equipment (WZ-TR3)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EXA Signal Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2021/04/14
EXA Signal Analyzer	Keysight	N9010B	MRTSUE06607	1 year	2022/01/07
Signal Analyzer	R&S	FSV40	MRTSUE06218	1 year	2021/04/14
Power Meter	Agilent	U2021XA	MRTSUE06030	1 year	2021/10/22
USB wideband power sensor	Keysight	U2021XA	MRTSUE06446	1 year	2021/08/30
USB wideband power sensor	Keysight	U2021XA	MRTSUE06447	1 year	2021/08/08
Bluetooth Test Set	Anritsu	MT8852B-042	MRTSUE06389	1 year	2021/06/11
Audio Analyzer	Agilent	U8903B	MRTSUE06143	1 year	2021/06/11
Modulation Analyzer	HP	HP8901A	MRTSUE06098	1 year	2021/09/26
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2021/10/20
DC Power Supply	GWINSTEK	DPS-3303C	MRTSUE06064	N/A	N/A
Temperature & Humidity Chamber	BAOYT	BYH-150CL	MRTSUE06051	1 year	2021/10/22
Thermal Hygrometer	testo	608-H1	MRTSUE06401	1 year	2021/07/26

Conducted Test Equipment (SIP-SR5)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Signal Analyzer	R&S	FSV40	MRTSUE06218	1 year	2021/04/14
PXA Signal Analyzer	Keysight	N9030B	MRTSUE06395	1 year	2021/08/30
USB wideband power sensor	Agilent	U2021XA	MRTSUE06595	1 year	2021/09/26
USB wideband power sensor	Agilent	U2021XA	MRTSUE06596	1 year	2021/09/26
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2021/10/20
Bluetooth Test Set	Anritsu	MT8852B-042	MRTSUE06389	1 year	2021/06/11
Temperature Chamber	BAOYT	BYG-408CS	MRTSUE06847	1 year	2022/02/23
Thermal Hygrometer	testo	622	MRTSUE06629	1 year	2021/11/25

Software	Version	Function
EMI Software	V3	EMI Test Software

5. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.

AC Conducted Emission Measurement

Measurement Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$):

9kHz~150kHz: 3.74dB

150kHz~30MHz: 3.44dB

Radiated Emission Measurement

Measurement Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$):

Horizontal: 30MHz~300MHz: 5.04dB

300MHz~1GHz: 4.95dB

1GHz~40GHz: 6.40dB

Vertical: 30MHz~300MHz: 5.24dB

300MHz~1GHz: 6.03dB

1GHz~40GHz: 6.40dB

6. TEST RESULT

6.1. Summary

FCC Section(s)	Test Description	Test Condition	Test Result	Reference
15.207	AC Conducted Emissions	Line Conducted	N/A	Section 6.2
15.205, 15.231(e)	Radiated Spurious Emissions	Radiated	Pass	Section 6.3
15.231(c)	20dB Bandwidth		Pass	Section 6.4
15.231(e)	Transmission Time		Pass	Section 6.5

Notes:

1. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.
2. "N/A" means not applicable.

6.2. Conducted Emission

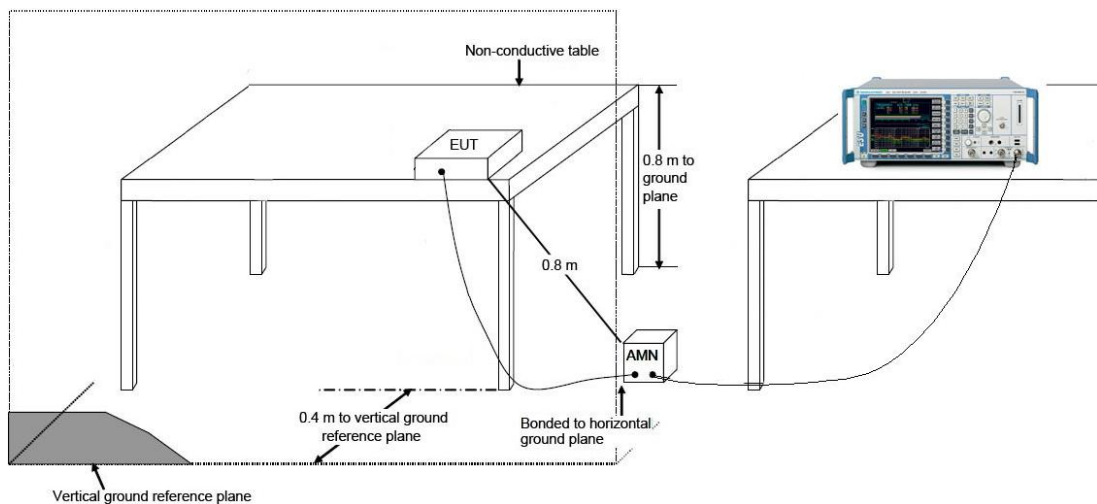
6.2.1. Test Limit

FCC Part 15.207 Limits		
Frequency (MHz)	QP (dB μ V)	AV (dB μ V)
0.15 ~ 0.50	66 ~ 56	56 ~ 46
0.50 ~ 5.0	56	46
5.0 ~ 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

6.2.2. Test Setup



6.2.3. Test Result

This device is powered by internal battery, so this requirement is not applicable.

6.3. Radiated Emissions

6.3.1. Test Limit

FCC Part 15.231(e) Limits		
Fundamental Frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emission (microvolts/meter)
40.66 - 40.70	1000	100
70 - 130	500	50
130 - 174	500 to 1500	50 to 150
174 - 260	1500	150
260 - 470	1500 to 5000	150 to 500
Above 470	5000	500

Note: The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

FCC Part 15.209 Limits		
Frequency [MHz]	Field Strength [μ V/m]	Measured 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

For 15.205 requirement:

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a).

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41	--	--	--

6.3.2.Test Procedure Used

ANSI C63.10-2013 Section 6.3 & 6.4 & 6.5 & 6.6 & 7.5

6.3.3.Test Setting

Table 1 - RBW as a function of frequency

Frequency	RBW
9 ~ 150 kHz	200 Hz
0.15 ~ 30 MHz	9 kHz
30 ~ 1000 MHz	120 kHz
> 1000 MHz	1 MHz

Measurements below 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = as specified in Table 1
3. Detector = Peak
4. Sweep time = auto couple
5. Trace was allowed to stabilize

Peak Measurements above 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

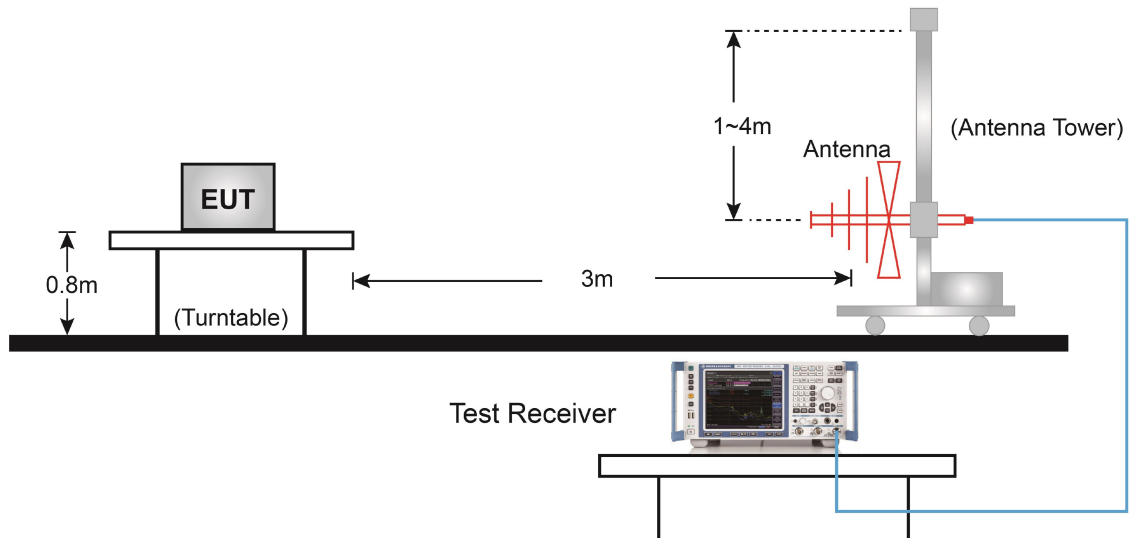
Average Measurement of pulsed emissions

1. Make EUT is transmitting to obtain the “worst-case” pulse ON time.
2. Couple the final radio frequency output signal to the input of a spectrum analyzer.
3. Adjust the center frequency of the spectrum analyzer to the center of the RF signal.
4. Set the spectrum analyzer for ZERO SPAN.
5. Sweep time = 100ms
6. Set the TRIGGER on the spectrum analyzer to capture at least one period of the pulse train, including any blanking intervals.
7. Determine the total maximum pulse “ON time” (t_{ON}) over one period of the pulse train.
8. The duty cycle is then determined by dividing the total maximum “ON time” by the period of the pulse train ($t_{ON}/100ms$).
9. Determine the duty cycle correction factor. Duty Cycle Factor = $20 \cdot \log(\text{Duty Cycle})$

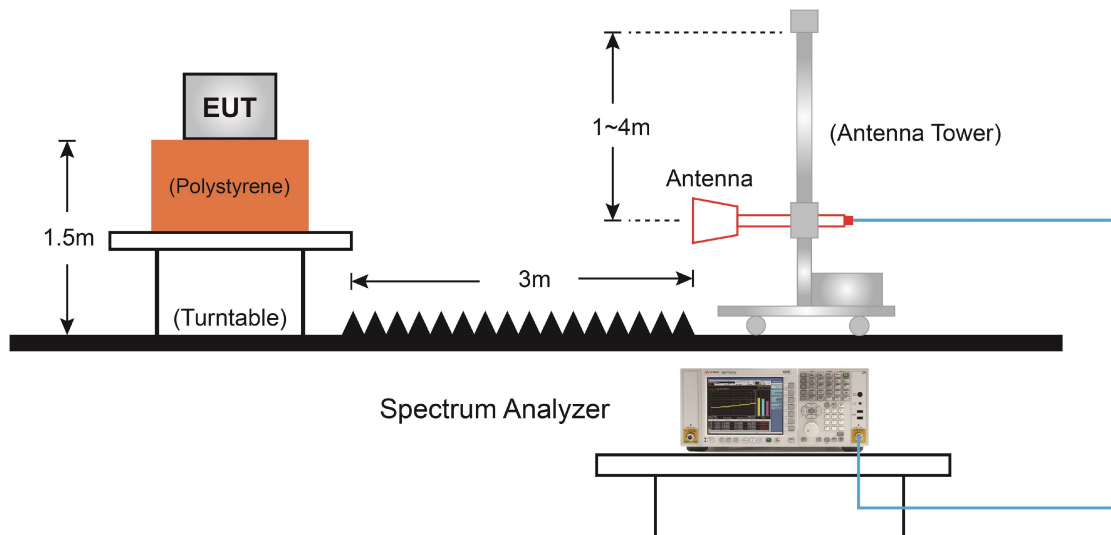
10. This correction factor may then be subtracted from the peak pulse amplitude (in dB) to find the average emission.

6.3.4. Test Setup

Below 1GHz Test Setup:



Above 1GHz Test Setup:



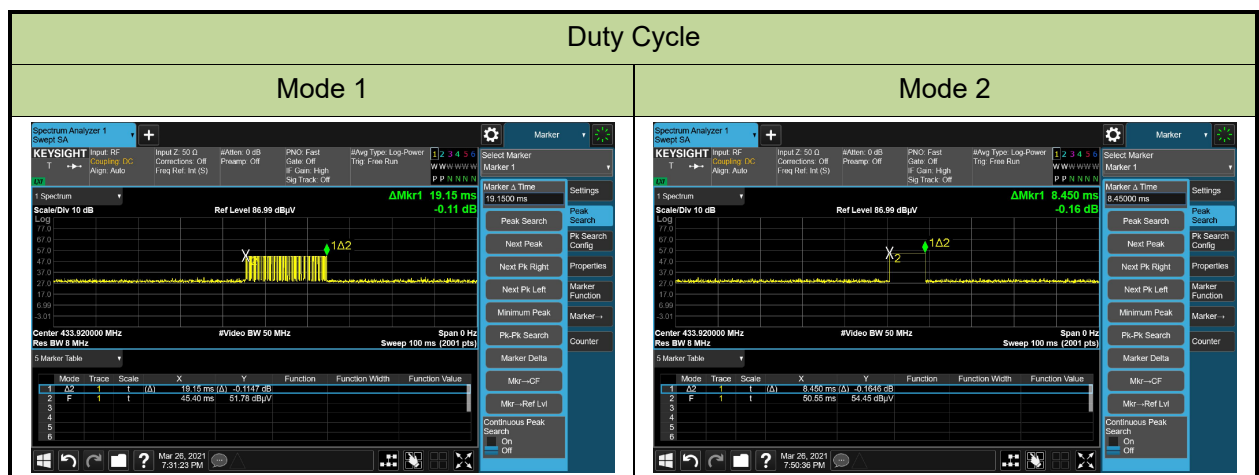
6.3.5. Test Result

Test Site	WZ-AC1	Test Engineer	Bruce Wang
Test Date	2021/03/26		
Remark	Duty Cycle		

Test Mode	Time On (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Factor (dB)
Mode 1	19.15	100	19.15	-14.36
Mode 2	8.45	100	8.45	-21.46

Note 1: Duty Cycle = Time On / Period * 100%

Note 2: Duty Cycle Factor = 20*Log (Duty Cycle)



Test Site	WZ-AC1	Test Engineer	Buter Shi
Test Date	2021/02/21~2021/03/01		
Remark	Fundamental Radiated Emission		

Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Duty Cycle Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
Mode 1								
433.92	53.61	22.25	--	75.86	92.87	-17.01	PK	Horizontal
	53.61	22.25	-14.36	61.50	72.87	-11.37	AV	Horizontal
	53.95	22.25	--	76.20	92.87	-16.67	PK	Vertical
	53.95	22.25	-14.36	61.84	72.87	-11.03	AV	Vertical
Mode 2								
433.92	54.40	22.25	--	76.65	92.87	-16.22	PK	Horizontal
	54.40	22.25	-21.46	55.19	72.87	-17.68	AV	Horizontal
	53.08	22.25	--	75.33	92.87	-17.54	PK	Vertical
	53.08	22.25	-21.46	53.87	72.87	-19.00	AV	Vertical
Note 1: Peak Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)								
Note 2: Average Measure Level (dBμV/m) = Peak Measure Level (dBμV/m) + Duty Cycle Factor (dB)								

Test Site	WZ-AC1	Test Engineer	Buter Shi
Test Date	2021/02/21 ~ 2021/03/01		
Remark	Radiated Spurious Emissions, Mode 1		

Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Duty Cycle Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
867.84	14.19	29.50	--	43.69	72.87	-29.18	PK	Horizontal
1735.00	53.27	-5.17	--	48.10	72.87	-24.77	PK	Horizontal
2170.00	48.53	-1.44	--	47.09	72.87	-25.78	PK	Horizontal
2602.50	43.26	-0.97	--	42.29	72.87	-30.58	PK	Horizontal
3037.50	63.89	0.68	--	64.57	72.87	-8.30	PK	Horizontal
3037.50	63.89	0.68	-14.36	50.21	52.87	-2.66	AV	Horizontal
3472.50	57.17	1.29	--	58.46	72.87	-14.41	PK	Horizontal
3472.50	57.17	1.29	-14.36	44.10	52.87	-8.77	AV	Horizontal
3905.00	62.85	2.53	--	65.38	72.87	-7.49	PK	Horizontal
3905.00	62.85	2.53	-14.36	51.02	52.87	-1.85	AV	Horizontal
4340.00	56.56	3.80	--	60.36	72.87	-12.51	PK	Horizontal
4340.00	56.56	3.80	-14.36	46.00	52.87	-6.87	AV	Horizontal
867.84	14.86	29.50	--	44.36	72.87	-28.51	PK	Vertical
1735.00	46.13	-5.17	--	40.96	72.87	-31.91	PK	Vertical
2170.00	41.78	-1.47	--	40.31	72.87	-32.56	PK	Vertical
2602.50	42.93	-0.97	--	41.96	72.87	-30.91	PK	Vertical
3037.50	60.09	0.68	--	60.77	72.87	-12.10	PK	Vertical
3037.50	60.09	0.68	-14.36	46.41	52.87	-6.46	AV	Vertical
3472.50	54.13	1.29	--	55.42	72.87	-17.45	PK	Vertical
3472.50	54.13	1.29	-14.36	41.06	52.87	-11.81	AV	Vertical
3905.00	60.26	2.53	--	62.79	72.87	-10.08	PK	Vertical
3905.00	60.26	2.53	-14.36	48.43	52.87	-4.44	AV	Vertical
4340.00	53.69	3.80	--	57.49	72.87	-15.38	PK	Vertical
4340.00	53.69	3.80	-14.36	43.13	52.87	-9.74	AV	Vertical

Note 1: Peak Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Note 2: Average Measure Level (dBμV/m) = Peak Measure Level (dBμV/m) + Duty Cycle Factor (dB)

Note 3: Average measurement was not performed when the peak level lower than average limit.

Note 4: The test trace is same as the ambient noise (the test frequency range: 9 kHz ~ 30 MHz), therefore no data appear in the report.

Test Site	WZ-AC1	Test Engineer	Buter Shi
Test Date	2021/02/21 ~ 2021/03/01		
Remark	Radiated Spurious Emissions, Mode 2		

Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Duty Cycle Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
867.84	15.14	29.50	--	44.64	72.87	-28.23	PK	Horizontal
1735.00	59.59	-5.17	--	54.42	72.87	-18.45	PK	Horizontal
1735.00	59.59	-5.17	-21.46	32.96	52.87	-19.91	AV	Horizontal
2170.00	50.94	-1.44	--	49.50	72.87	-23.37	PK	Horizontal
2605.00	47.85	-0.86	--	46.99	72.87	-25.88	PK	Horizontal
3037.50	62.07	0.68	--	62.75	72.87	-10.12	PK	Horizontal
3037.50	62.07	0.68	-21.46	41.29	52.87	-11.58	AV	Horizontal
3472.50	56.69	1.29	--	57.98	72.87	-14.89	PK	Horizontal
3472.50	56.69	1.29	-21.46	36.52	52.87	-16.35	AV	Horizontal
3905.00	55.31	2.53	--	57.84	72.87	-15.03	PK	Horizontal
3905.00	55.31	2.53	-21.46	36.38	52.87	-16.49	AV	Horizontal
4340.00	58.11	3.80	--	61.91	72.87	-10.96	PK	Horizontal
4340.00	58.11	3.80	-21.46	40.45	52.87	-12.42	AV	Horizontal
867.84	14.14	29.50	--	43.64	72.87	-29.23	PK	Vertical
1735.00	50.46	-5.17	--	45.29	72.87	-27.58	PK	Vertical
2170.00	41.64	-1.47	--	40.17	72.87	-32.70	PK	Vertical
2602.50	42.50	-0.97	--	41.53	72.87	-31.34	PK	Vertical
3037.50	57.17	0.68	--	57.85	72.87	-15.02	PK	Vertical
3037.50	57.17	0.68	-21.46	36.39	52.87	-16.48	AV	Vertical
3470.00	53.73	1.30	--	55.03	72.87	-17.84	PK	Vertical
3470.00	53.73	1.30	-21.46	33.57	52.87	-19.30	AV	Vertical
3905.00	52.74	2.53	--	55.27	72.87	-17.60	PK	Vertical
3905.00	52.74	2.53	-21.46	33.81	52.87	-19.06	AV	Vertical
4340.00	59.30	3.80	--	63.10	72.87	-9.77	PK	Vertical
4340.00	59.30	3.80	-21.46	41.64	52.87	-11.23	AV	Vertical

Note 1: Peak Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Note 2: Average Measure Level (dBμV/m) = Peak Measure Level (dBμV/m) + Duty Cycle Factor (dB)

Note 3: Average measurement was not performed when the peak level lower than average limit.

Note 4: The test trace is same as the ambient noise (the test frequency range: 9 kHz ~ 30 MHz), therefore no data appear in the report.

6.4. 20dB Bandwidth

6.4.1. Test Limit

According to FCC Part 15.231(c), the bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

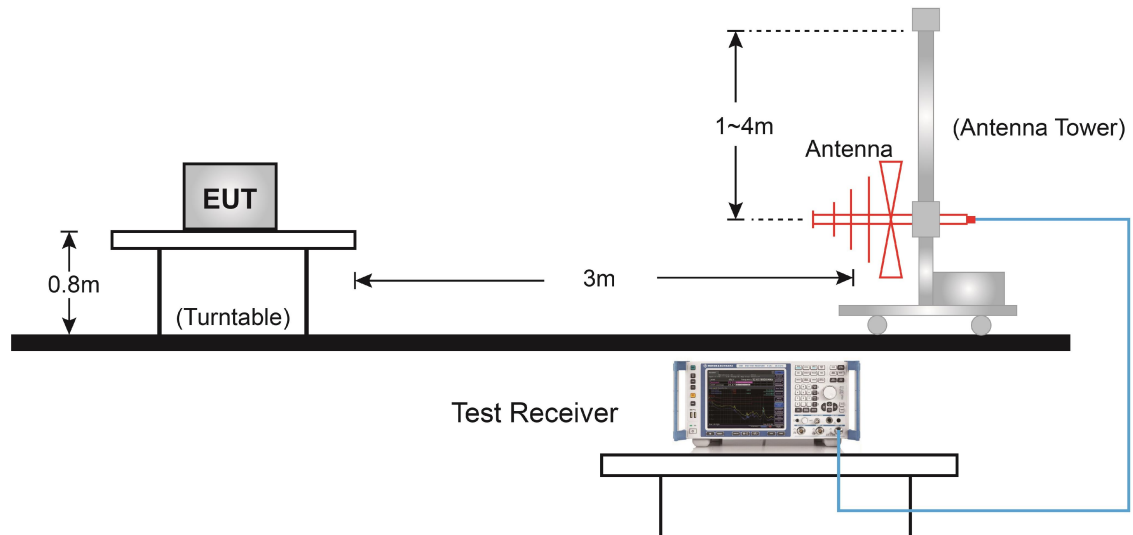
6.4.2. Test Procedure used

ANSI C63.10-2013 Clause 6.9.2

6.4.3. Test Setting

1. Set the spectrum span shall be between 2 times and 5 times the OBW
2. Set RBW = 1% to 5% of the OBW
3. VBW $\geq 3 \times$ RBW
4. Detector = Peak
5. Trace mode = Max hold
6. Sweep = Auto couple

6.4.4. Test Setup

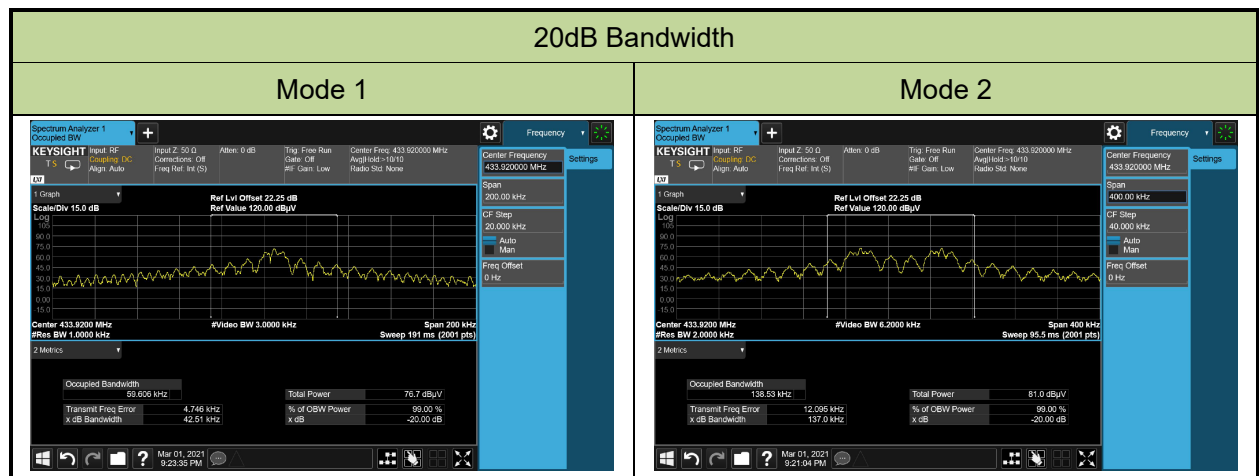


6.4.5. Test Result

Test Site	WZ-AC1	Test Engineer	Bruce Wang
Test Date	2021/03/01		

Test Mode	20dB Bandwidth (kHz)	Limit (kHz)	Result
Mode 1	42.51	≤ 1084.8	Pass
Mode 2	137.0	≤ 1084.8	Pass

Note: Limit (kHz) = Fundamental Frequency * 0.25% = 433.92 MHz * 0.25% = 1084.8 kHz



6.5. Transmission Time

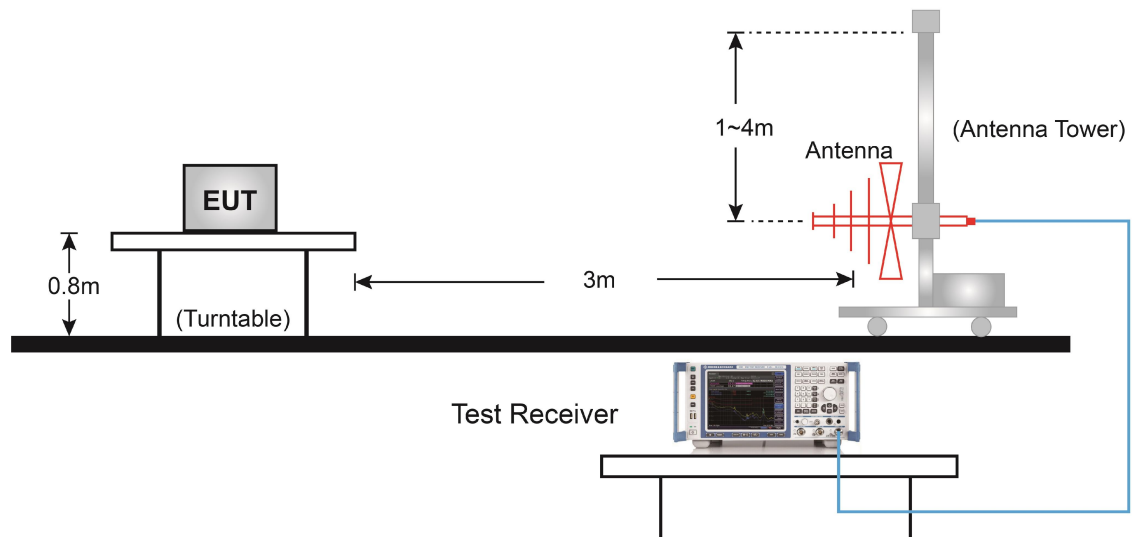
6.5.1. Test Limit

According to FCC 15.231(e), devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

6.5.2. Test Procedure

With the EUT's antenna attached, the EUT's output signal was received by the test antenna, which was connected to the spectrum analyzer. Set the center frequency to 433.92MHz, then set the spectrum analyzer to Zero Span for the release time reading. During the testing, the switch was released then the EUT automatically deactivated.

6.5.3. Test Setup



6.5.4. Test Result

Test Site	WZ-AC1	Test Engineer	Bruce Wang
Test Date	2021/03/26 ~ 2021/04/08		

Test Mode	Item	Measured Value	Limit	Result
Mode 1	Transmission Time (T_{on})	76.6 ms	≤ 1 s	Pass
	Silent Time	14.07 s	≥ 10 s	Pass
	Silent Time/Transmission Time	184	≥ 30 times	Pass
Mode 2	Transmission Time (T_{on})	33.8 ms	≤ 1 s	Pass
	Silent Time	14.01 s	≥ 10 s	Pass
	Silent Time/Transmission Time	414	≥ 30 times	Pass

Note:

For Mode 1: $T_{on} = 19.15 \text{ ms} * 4 = 76.6 \text{ ms}$

For Mode 2: $T_{on} = 8.45 \text{ ms} * 4 = 33.8 \text{ ms}$



7. CONCLUSION

The data collected relate only the item(s) tested and show that the unit is compliance with FCC Rules.

The End

Appendix A - Test Setup Photograph

Refer to "2102RSU040-UT" file.

Appendix B - EUT Photograph

Refer to "2102RSU040-UE" file.