

RF Test Report

Report No.: AGC08464190809EE16

PRODUCT DESIGNATION : Slot car set

BRAND NAME : N/A

MODEL NAME : C10269S500, C10269S5M0, C10269X500, C10271S500,
C10271S5M0, C10271X500, C10281S500, C10281S5M0,
C10281X500

APPLICANT : Scale Competition Xtreme S.L.

DATE OF ISSUE : Oct. 14, 2019

STANDARD(S) : EN 300 440 V2.2.1 (2018-07)

REPORT VERSION : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd

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REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Oct. 14, 2019	Valid	Initial release



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1. TEST REPORT CERTIFICATION

Applicant	Scale Competition Xtreme S.L.
Address	Marqués de la Ensenada 14, 1 15 28004 Madrid Spain
Manufacturer	Scale Competition Xtreme S.L.
Address	Marqués de la Ensenada 14, 1 15 28004 Madrid Spain
Product Designation	Slot car set
Brand Name	N/A
Test Model	C10269S500
Series Model	C10269S5M0, C10269X500, C10271S500, C10271S5M0, C10271X500, C10281S500, C10281S5M0, C10281X500
Difference Description	All the same except for the model name and different appearance color
Date of test	Oct. 07, 2019 to Oct. 12, 2019
Deviation	None
Test Result	Pass
Condition of Test Sample	Normal

We, Attestation of Global Compliance (Shenzhen) Co., Ltd., for compliance with the requirements set forth in the European Standard ETSI EN 300 440 V2.2.1 The results of testing in this report apply to the product /system which were tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Prepared By



Draven Li
(Project Engineer)

Oct. 12, 2019

Reviewed By



Max Zhang
(Reviewer)

Oct. 14, 2019

Approved By



Forrest Lei
(Authorized Officer)

Oct. 14, 2019

2. GENERAL INFORMATION

2.1. DESCRIPTION OF EUT

Note: the following data is based on the information by the applicant.

Operating Frequency	2407MHz-2470MHz
Support Channels	3 Channels
Modulation	GFSK
Hardware Version	Transmitter: V1.0 Receiver: V1.0
Software Version	Transmitter: V1.0 Receiver: V1.0
Antenna Type	Wire antenna
Antenna Gain	0dBi
Receiver category	2
Power Supply	Transmitter: DC 3.0V by battery Receiver: DC 12V by adapter
Test Frequency	2407MHz, 2440MHz, 2470MHz

Channel list:

Frequency Band	Channel Number	Frequency
2400~2483.5MHZ	1	2407MHz
	2	2440MHz
	3	2470MHz



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2.2. TEST STANDARDS AND RESULTS

The EUT has been tested according to ETSI EN 300 440 V2.2.1.

ETSI EN 300 440 V2.2.1 (2018-07)	Short Range Devices (SRD); Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Harmonised Standard for access to radio spectrum
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2.3. TEST ITEMS AND THE RESULTS

No.	Basic Standard	Test Type	Result
1	ETSI EN 300 440 4.2.2	Equivalent isotropically radiated power (e.i.r.p.)	Pass
2	ETSI EN 300 440 4.2.3	Permitted range of operating frequencies	Pass
3	ETSI EN 300 440 4.2.4	Unwanted emissions in the spurious domain	Pass
4	ETSI EN 300 440 4.2.5	Duty cycle	Pass
5	ETSI EN 300 440 4.2.6	Additional requirements for FHSS equipment	N/A
6	ETSI EN 300 440 4.3.3	Adjacent channel selectivity	N/A
7	ETSI EN 300 440 4.3.4	Blocking or desensitization	Pass
8	ETSI EN 300 440 4.3.5	Spurious emissions	Pass

2.4. ENVIRONMENTAL CONDITIONS

- Temperature: 15-35°C
- Humidity: 30-60 %
- Atmospheric pressure: 86-106 kPa

3. MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in Measurement” (GUM) published by ISO.

- Uncertainty of Radio Frequency, $U_c = \pm 1 \times 10^{-7}$
- Uncertainty of total RF power, conducted, $U_c = \pm 0.8\text{dB}$
- Uncertainty of RF power density, conducted, $U_c = \pm 2.6\text{dB}$
- Uncertainty of spurious emissions, conducted, $U_c = \pm 2.7\text{dB}$
- Uncertainty of spurious emissions, radiated, $U_c = \pm 5.4\text{dB}$
- Uncertainty of Temperature: $\pm 0.5^\circ\text{C}$
- Uncertainty of Humidity: $\pm 1\%$
- Uncertainty of DC and low frequency voltages: $\pm 2\%$



4. IDENTIFICATION OF THE RESPONSIBLE TESTING LOCATION

Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

Description	Manufacturer	Model No.	S/N	Calibration Due.	Calibration Due.
MXG X-Series Vector Signal Generator	Agilent	N5182B	MY50140530	Sep. 09, 2019	Sep. 08, 2020
Signal Generator	Agilent	N5171B	MY45141029	Sep. 09, 2019	Sep. 08, 2020
EXA Signal Analyzer	Agilent	N9020A	MY52090123	Sep. 09, 2019	Sep. 08, 2020
Signal Analyzer	Agilent	E4440A	MY44303916	Feb. 27, 2019	Feb. 26, 2020
USB Wideband Power Sensor	Agilent	U2021XA	MY54110007	Sep. 09, 2019	Sep. 08, 2020
USB Wideband Power Sensor	Agilent	U2021XA	MY54110009	Sep. 09, 2019	Sep. 08, 2020
RF Communication Tester	R&S	CMW270	1201.0002K75 -100528-Tu WIRELESSCO NN.TESTER	Sep. 09, 2019	Sep. 08, 2020
Attenuator	Warriors	W13	11324	Sep. 09, 2019	Sep. 08, 2020
Power splitter	Mini-Circuits	ZFRSC-183-s	3122	Sep. 09, 2019	Sep. 08, 2020
2.4G Band Fliter	EM Electronics	2400-2500	N/A	Feb. 27, 2019	Feb. 26, 2020
Small environment tester	ESPEC	SH-242	N/A	Oct. 23, 2018	Oct. 22, 2019
AMPLIFIER	ETS-LINDGREN	3117PA	00225134	Oct. 25, 2018	Oct. 24, 2019
ANTENNA	SCHWARZBECK	VULB9168	494	Jan. 09, 2019	Jan. 08, 2021
ANTENNA	ETS-LINDGREN	3142C	00060447	May. 17, 2019	May. 16, 2021
HORN ANTENNA	ETS-LINDGREN	3117	00154520	Oct. 21, 2018	Oct. 20, 2020
HORN ANTENNA	ETS-LINDGREN	3117	00034609	May. 17, 2019	May. 16, 2021
RF Cable	Harbour	SHWCB-3000-N	N/A	May. 14, 2019	May. 13, 2020

5. ETSI EN 300 440 REQUIREMENTS

5.1. EQUIVALENT ISOTROPICALLY RADIATED POWER (E.I.R.P.)

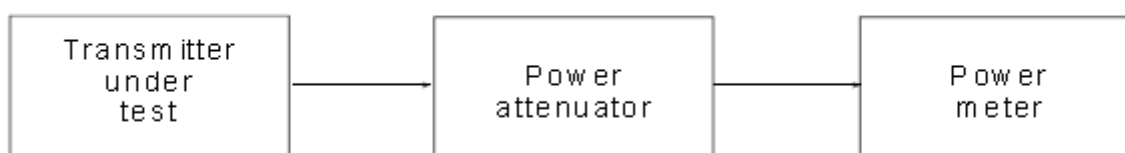
EN 300 440 Clause 4.2.2.4

Radiated Power $\leq 10\text{mW}$ (10dBm) EIRP over Normal and Extreme conditions.

Test Configuration

Temperature and Voltage Measurement (under normal and extreme test conditions)

Equipment measured as constant envelope modulation equipment



Remarks:

For peak power measurements, a spectrum analyser or frequency-selective voltmeter shall be used and tuned to the Presenter carrier at which the highest level is detected.



TEST PROCEDURE

Please refer to ETSI EN 300 440 clause 4.2.2.3 for the test conditions and measurement method.

TEST RESULTS

Operation Mode	Single TX	Test Date	Oct. 12, 2019
Temperature	25°C	Tested by	Draven
Humidity	55 % RH	Polarity	--

Transmitter:

TEST CONDITIONS		Transmitter Power (dBm)				
		Temp (25)°C	Temp (-10)°C		Temp (40)°C	
CHANNEL	VOL POWER	DC 4.5V	DC 4.5V	DC 5.5V	DC 4.5V	DC 5.5V
2407MHz	EIRP	-8.68	-8.76	-8.69	-9.15	-8.97
2440MHz	EIRP	-8.57	-8.69	-8.69	-8.74	-8.80
2470MHz	EIRP	-7.65	-7.88	-7.73	-8.07	-7.95
Limit		10dBm				
Measurement uncertainty		+ 0.28dB / - 0.30dB				

Conclusion: PASS

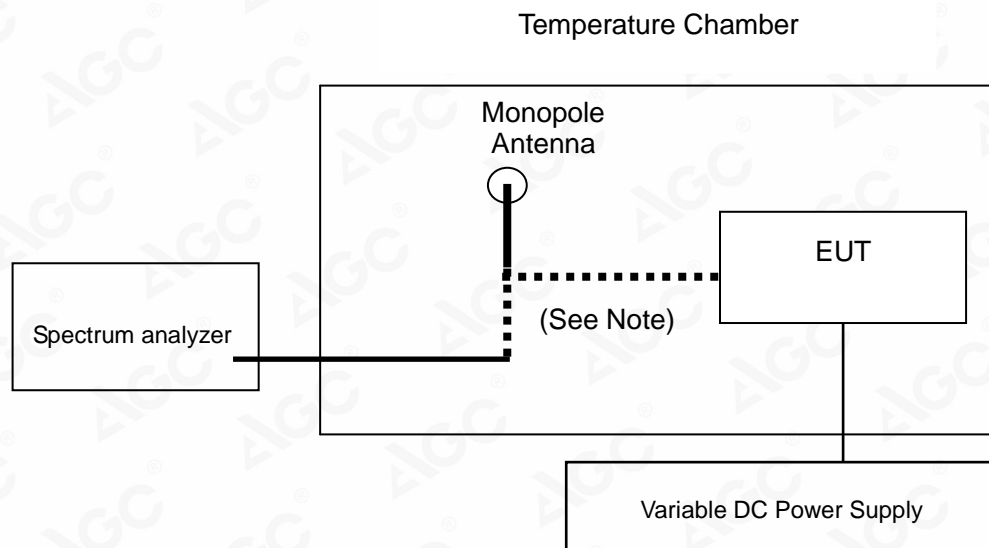
5.2. PERMITTED RANGE OF OPERATING FREQUENCIES

ETSI EN 300 440 clause 4.2.3.5

For all equipment the frequency shall lie within the band 2.4GHz to 2.4835GHz ($f_L > 2.4\text{GHz}$ and $f_H < 2.4835\text{GHz}$)

TEST CONFIGURATION

Temperature and Voltage Measurement (under normal and extreme test conditions)



Remarks:

The spectrum analyzer could be connected to a monopole antenna or directly connected to the EUT, if the EUT has already employing an antenna connector.

TEST PROCEDURE

Please refer to ETSI EN 300 440 clause 4.2.3.3 for the test conditions and measurement method.



TEST RESULTS FOR FREQUENCY RANGE

TEST CONDITION		Frequency Range	
		Low Frequency	High Frequency
Temperature	Voltage	MHz	MHz
25°C	DC5.0V	2405.924	2470.861
-10°C	DC4.5V	2405.925	2470.859
	DC5.5V	2405.926	2470.861
40°C	DC4.5V	2405.924	2470.858
	DC5.5V	2405.924	2470.857
Measured frequencies (lowest and Highest)		2405.924	2470.861
Limit		FL > 2400MHz	FH < 2483.5MHz

TEST RESULTS FOR 99% OCCUPIED BANDWIDTH

TEST CONDITION	Channel	OBW [MHz]	FL@OBW	FH@OBW	Limit
Normal	LCH	1.642	2406.053	---	> 2400MHz
Normal	HCH	1.216	---	2470.806	< 2483.5MHz

Conclusion: PASS



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5.3. UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

ETSI EN 300 440 clause 4.2.4

Unwanted emissions in the spurious domain (spurious emissions) are those at frequencies beyond the limit of 250 % of the necessary bandwidth above and below the centre frequency of the emission.

The level of spurious emissions shall be measured as either:

- a)
 - i) Their power level in a specified load (conducted emission); and
 - ii) Their effective radiated power when radiated by the cabinet and structure of the equipment (cabinet radiation); or
- b) Their effective radiated power when radiated by the cabinet and the integral or dedicated antenna, in the case of equipment fitted with such an antenna and no permanent RF connector.

For measurements above 1 000 MHz the peak value shall be measured using a spectrum analyser. The "max hold" function of a spectrum analyser shall be used. For measurements up to 1 000 MHz the quasi-peak detector set in accordance with the specification of CISPR 16 [1] shall be used.

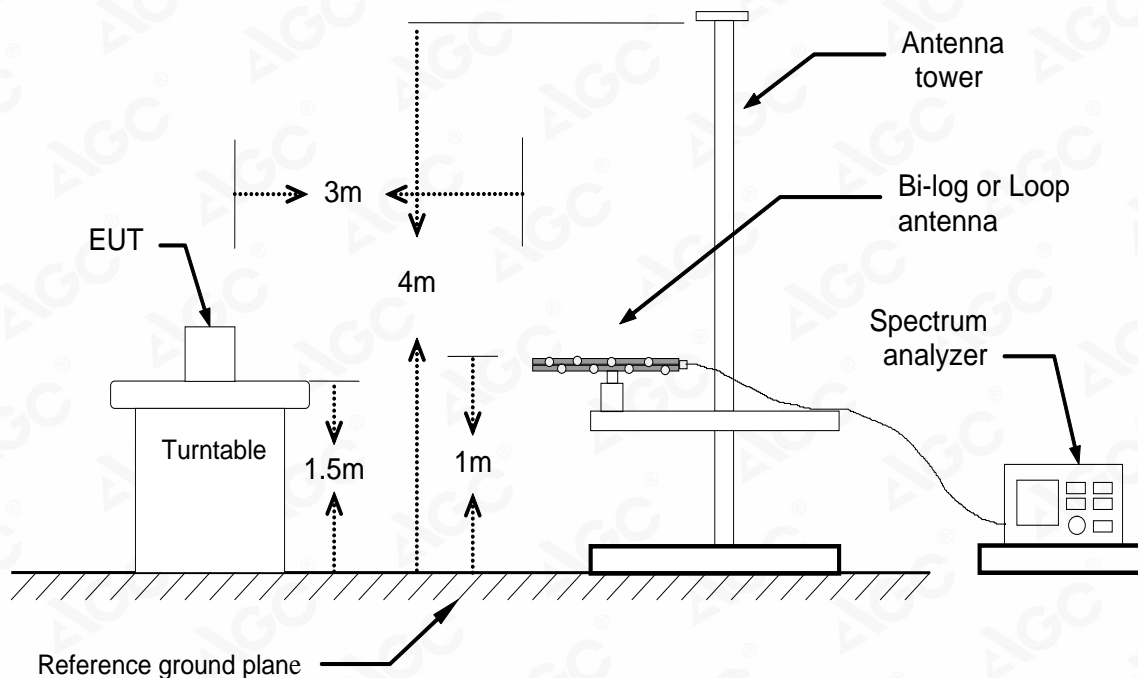
The power of any spurious emission shall not exceed the following values given in table 5.

Frequency ranges	47 MHz to 74 MHz 87,5 MHz to 108 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz	Other frequencies ≤ 1 000 MHz	Frequencies > 1 000 MHz
State			
Operating	4 nW	250 nW	1 µW
Standby	2 nW	2 nW	20 nW

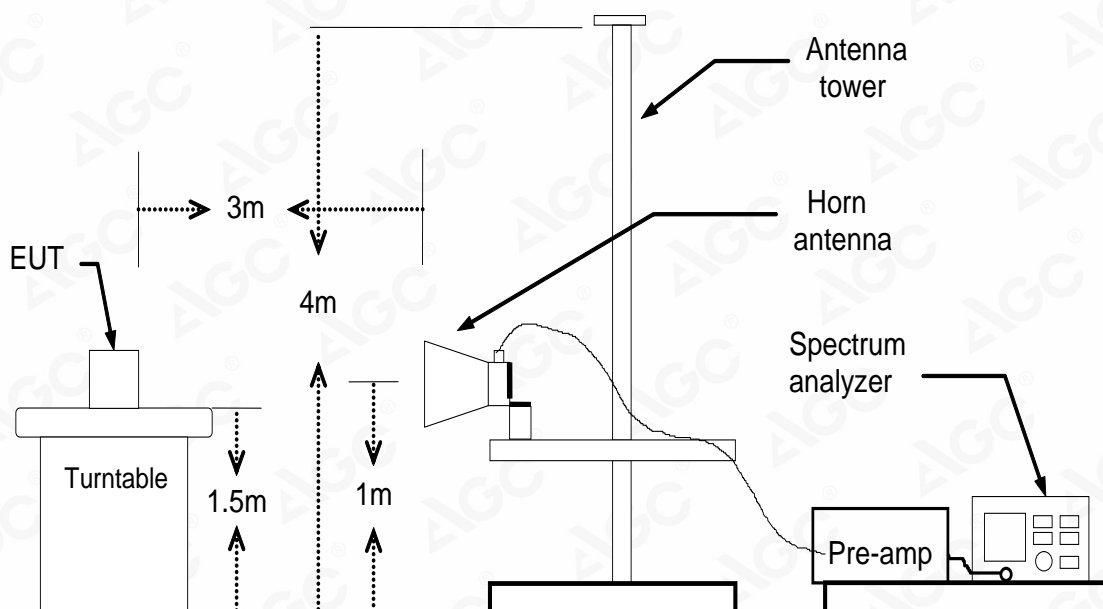


Test Configuration

Below 1GHz



Above 1GHz



TEST PROCEDURE

Please refer to ETSI EN 300 440 clause 4.2.4.3 for the test conditions and measurement methods.

TEST RESULT Transmitter Operating Mode

NO.	Frequency	Measurement Bandwidth	Level	Limit	Margin
	MHz	KHz	EIRP	dBm	dB
TX:2407MHz ,Antenna Polarization: Vertical					
1	4814	1000	-33.41	-30	3.41
2	7221	1000	-35.62	-30	5.62
3	9628	1000	\	-30	>20
4	12035	1000	\	-30	>20
5	Other(25-1000)	100	\	-36 or -54	>20
6	Other(1000-25000)	1000	\	-30	>20
TX:2407MHz ,Antenna Polarization: Horizontal					
1	4814	1000	-34.52	-30	4.52
2	7221	1000	-33.25	-30	3.25
3	9628	1000	\	-30	>20
4	12035	1000	\	-30	>20
5	Other(25-1000)	100	\	-36 or -54	>20
6	Other(1000-25000)	1000	\	-30	>20
TX:2440MHz ,Antenna Polarization: Vertical					
1	4880	1000	-33.51	-30	3.51
2	7320	1000	-38.81	-30	8.81
3	9760	1000	\	-30	>20
4	12200	1000	\	-30	>20
5	Other(25-1000)	100	\	-36 or -54	>20
6	Other(1000-25000)	1000	\	-30	>20
TX:2440MHz ,Antenna Polarization: Horizontal					
1	4880	1000	-37.14	-30	7.14
2	7320	1000	-35.63	-30	5.63
3	9760	1000	\	-30	>20
4	12200	1000	\	-30	>20
5	Other(25-1000)	100	\	-36 or -54	>20
6	Other(1000-25000)	1000	\	-30	>20

TX:2470MHz ,Antenna Polarization: Vertical					
1	4940	1000	-35.62	-30	5.62
2	7410	1000	-37.89	-30	7.89
3	9880	1000	\	-30	>20
4	12350	1000	\	-30	>20
5	Other(25-1000)	100	\	-36 or -54	>20
6	Other(1000-25000)	1000	\	-30	>20
TX:2470MHz ,Antenna Polarization: Horizontal					
1	4940	1000	-37.24	-30	7.24
2	7410	1000	-36.14	-30	6.14
3	9880	1000	\	-30	>20
4	12350	1000	\	-30	>20
5	Other(25-1000)	100	\	-36 or -54	>20
6	Other(1000-25000)	1000	\	-30	>20
Measurement uncertainty:±3.2dB					

Transmitter Standby Mode

NO.	Frequency	Measurement Bandwidth	Level	Limit	Margin
	MHz	KHz	EIRP	dBm	dB
Standby Mode ,Antenna Polarization: Vertical					
1	25-1000	100	\	-57	>20
2	1000-25000	1000	\	-47	>20
Standby Mode ,Antenna Polarization: Horizontal					
1	25-1000	100	\	-57	>20
2	1000-25000	1000	\	-47	>20

Notes: “\” in the table above means that the emissions are too small to be measured and are at least 10 dB below the limit.

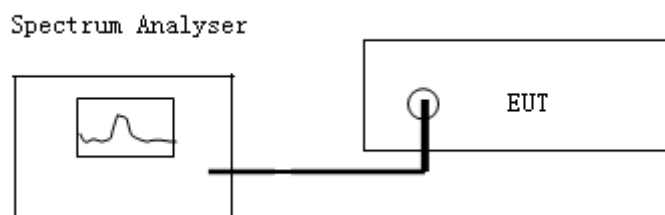
Conclusion: PASS

5.4 DUTY CYCLE

ETSI EN 300 440 clause 4.2.5.4:

Limit: up to 100%

Test Configuration



TEST PROCEDURE

Please refer to ETSI EN 300 440 clause 4.2.5.3 for the test conditions and measurement methods.

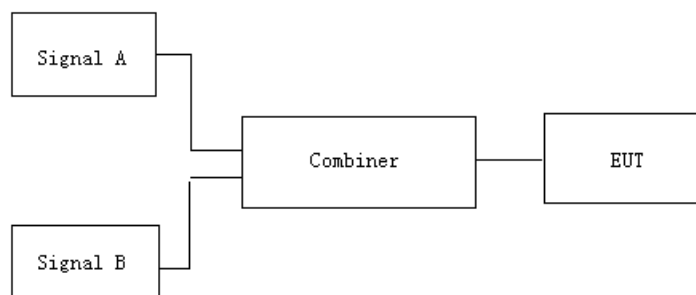
TEST RESULTS

Note: Since the duty cycle limit is up to 100% for the device, it is deemed to comply without testing.

Conclusion: PASS

5.5 BLOCKING OR DESENSITIZATION

TEST SETUP:



TEST LIMITS:

The blocking level, for any frequency within the specified ranges, shall not be less than the values given in table 6, except at frequencies on which spurious responses are found.

Table 6: Limits for blocking or desensitization

Receiver category	Limit
1	-30 dBm + k
2	-45 dBm + k
3	-60 dBm + k

The correction factor, k, is as follows:

$$K = -20 \log f - 10 \log BW$$

Where: - f is the frequency in GHz; - BW is the occupied bandwidth in MHz..

The factor k is limited within the following: $-40\text{dB} < k < 0\text{ dB}$.

TEST PROCEDURE:

- Two signal generators A and B shall be connected to the receiver via a combining network to the receiver.
- Signal generator A shall be at the nominal frequency of the receiver, with normal modulation of the wanted signal. Signal generator B shall be unmodulated and shall be adjusted to a test frequency at approximately 10 times, 20 times and 50 times of the occupied bandwidth above upper band edge of occupied bandwidth.
- Initially signal generator B shall be switched off and using signal generator A the level that still gives sufficient response shall be established. The output level of generator A shall then be increased by 3 dB.
- Signal generator B is then switched on and adjusted until the wanted criteria are met. This level shall be recorded.
- The measurement shall be repeated with the test frequency for signal generator B at approximately 10 times, 20 times and 50 times of the occupied bandwidth above upper band edge of occupied bandwidth.
- The blocking or desensitization shall be recorded as the level in dBm of lowest level of the unwanted signal (generator B).

TEST RESULT:

Blocking or Desensitization			
Receiver category: 2			
Coupling method: Test antenna to the receiver integrated antenna			
Lower band edge of occupied bandwidth (LBE):MHz		2406.053	
Upper band edge of occupied bandwidth (LBE):MHz		2470.806	
Unwanted Frequency Offset (MHz)	Unwanted Signal Level (dBm)	Unwanted Level Limit (dBm)	Verdict
LBE – 50 x OBW	-32	≥ -45.0+k	Comply with receiver category 2 limit
LBE – 20 x OBW	-34	≥ -45.0+k	
LBE – 10 x OBW	-38	≥ -45.0+k	
UBE + 10 x OBW	-40	≥ -45.0+k	
UBE + 20 x OBW	-37	≥ -45.0+k	
UBE + 50 x OBW	-33	≥ -45.0+k	
Measurement uncertainty: 6 dB			



5.6. RECEIVER SPURIOUS EMISSIONS

ETSI EN 300 440 clause 4.3.5

These requirements do not apply to receivers used in combination with permanently co-located Presenters continuously transmitting. Co-located is defined as < 3 m. In these cases the receivers will be tested together with the Presenter in operating mode

The spurious emissions of the receivers shall not exceed the values in tables in the indicated bands:

Frequency Range	Limit when in stand-by
25 MHz to 1 GHz	-57dBm
Above 1 GHz	-47dBm

TEST CONFIGURATION

Radiated Spurious Emissions

Same as section 5.3 in this test report

TEST PROCEDURE

Please refer to ETSI EN 300 440 clause 4.3.5.3 for the test conditions and measurement methods.



TEST RESULTS

Measurement Data for Receiver (worst case 2470MHz)

Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
256.50	Vertical	-65.25	2nW/ -57dBm below 1GHz,	Pass
488.82	V	-65.31		
634.03	V	-61.83		
746.03	V	-59.60		
952.04	V	-58.13		
1529.02	V	-57.50		
Other(25-26000)	V	--		
247.55	Horizontal	-64.99	20nW/ -47dBm above 1GHz.	
486.24	H	-63.20		
693.48	H	-60.50		
713.20	H	-59.51		
967.34	H	-59.14		
1526.27	H	-55.42		
Other(25-26000)	H	--		

Notes:

- Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "--" remark, if no specific emission from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
- All the modes had been tested, only the worst case recorded in the report.

Conclusion: PASS



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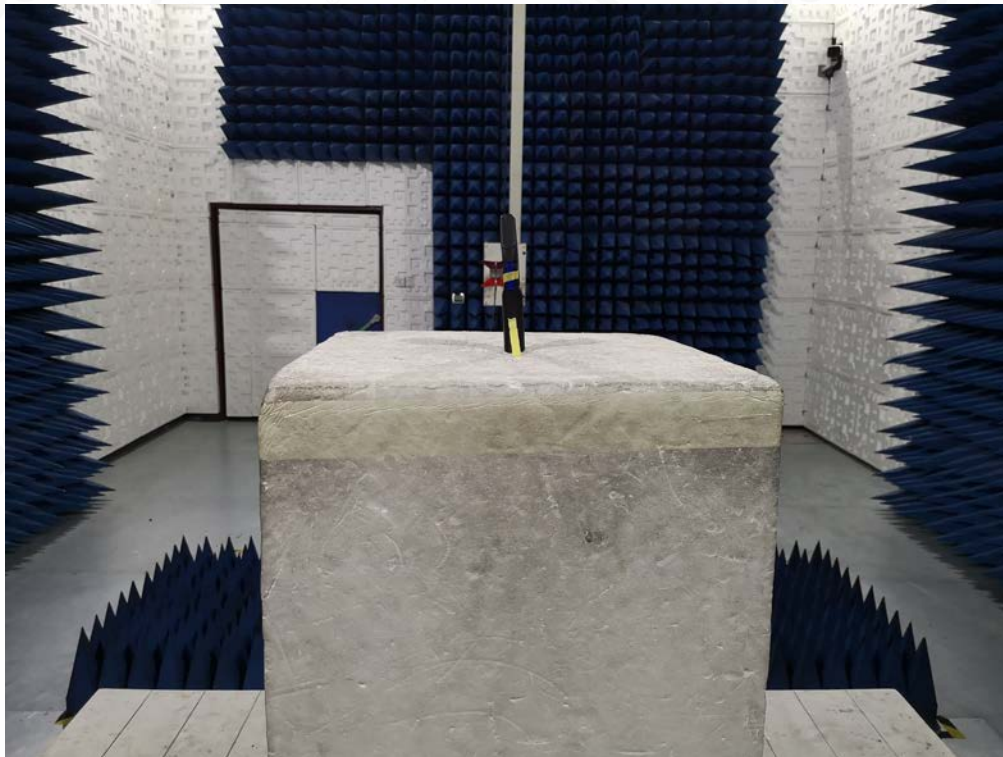
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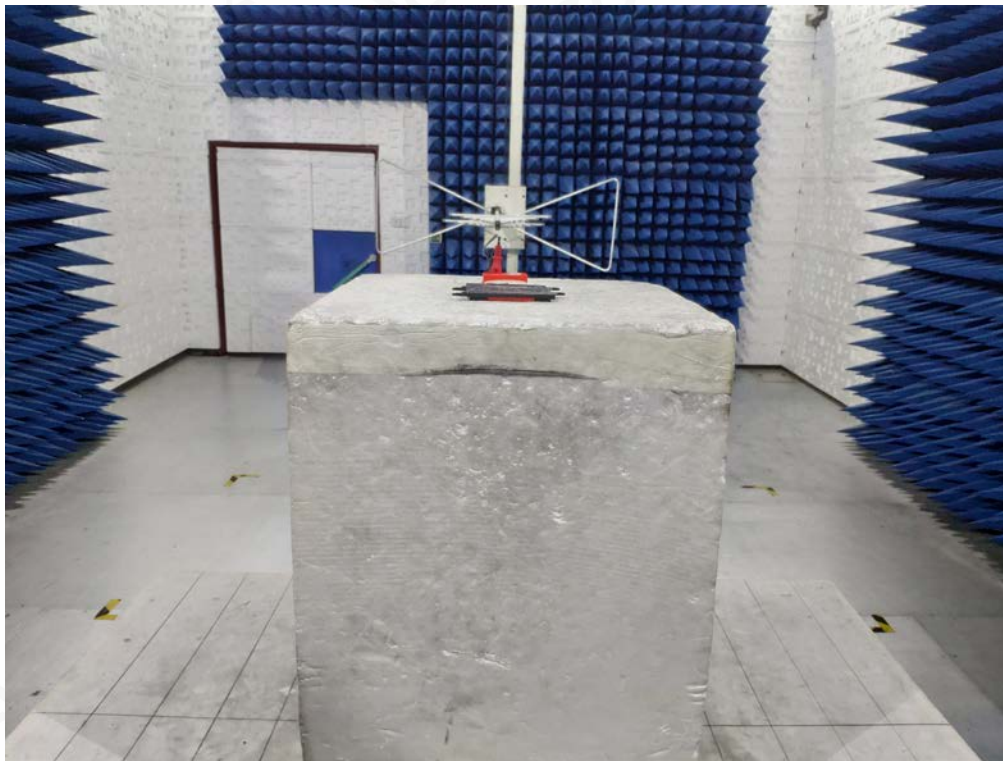
E-mail: agc@agc-cert.com

Service Hotline: 400 089 2118

APPENDIX A: PHOTOGRAPHS OF TEST SETUP
RADIATED SPURIOUS EMISSION TEST SETUP- TRANSMITTER



RADIATED SPURIOUS EMISSION TEST SETUP- RECEIVER



----END OF REPORT----