

# RF EXPOSURE Test Report

**Product:** Vehicle interconnection decoder

**Trade Mark:** N/A

**Model Number:** SGXU2501-EVO

**FCC ID:** 2BR3YSGXU2501

**Prepared for**

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**Prepared by**

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## TEST RESULT CERTIFICATION

**Applicant's Name** ..... : Shenzhen Yunlu Changxing Trade Co., Ltd.  
**Address** ..... : Room 115, 1st Floor, Liangji Zhihui Building, No. 184, Qingquan Road, Longhua Street, Longhua District, Shenzhen  
**Manufacturer's Name** ..... : Shenzhen Yunlu Changxing Trade Co., Ltd.  
**Address** ..... : Room 115, 1st Floor, Liangji Zhihui Building, No. 184, Qingquan Road, Longhua Street, Longhua District, Shenzhen

### Product description

**Product name** ..... : Vehicle interconnection decoder  
**Model Number** ..... : SGXU2501-EVO

**Standards** ..... : FCC CFR 47 PART 1 , 1.1310

**Test procedure** ..... : KDB 447498 D01 General RF Exposure Guidance v06

This device described above has been tested by Shenzhen HongBiao Certification& Testing Co., Ltd and the test results show that the equipment under test (EUT) is in compliance with the EMC requirements. And it is applicable only to the tested sample identified in the report.

**Date of Test** ..... :

**Date (s) of performance of tests** ..... : Sept. 05, 2025~Sept. 18, 2025

**Test Result**..... : **Pass**

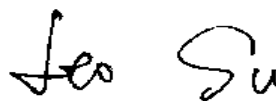
**Testing Engineer** :

  
( Z o e S u )

**Technical Manager** :

  
( G a r y L u )

**Authorized Signatory** :

  
( L e o S u )

[illegible]

# 1 General Description

## 1.1 Description of EUT

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product name:              | Vehicle interconnection decoder                                                                                                                                                                                                                                                                                                                                                                                 |
| Model name:                | SGXU2501-EVO                                                                                                                                                                                                                                                                                                                                                                                                    |
| Series Model:              | SGXU2501-CIC, SGXU2501-NBT, SGXU2501-LRH, SGXU2501-Q5H, SGXU2501-Q5L, SGXU2501-Q7, SGXU2501-LEX, SGXU2501-LEX-V, SGXU2501-MQB, SGXU2501-POS, SGXU2501-LRB, SGXU2501-VOL, SGXU2501-VOL-V, SGXU2501-4X, SGXU2501-5X                                                                                                                                                                                               |
| Different of series model: | All models of circuits and modules are the same, except for the model and accessory wires and plugs.                                                                                                                                                                                                                                                                                                            |
| Operation frequency:       | BLE: 2402-2480MHz<br>BR+EDR: 2402-2480MHz<br>2.4GHz WiFi: 2412-2462 MHz<br>5GHz WiFi: 5745-5825 MHz                                                                                                                                                                                                                                                                                                             |
| Modulation type:           | BLE: GFSK<br>BR+EDR: GFSK, $\pi/4$ -DQPSK, 8DPSK<br>2.4GHz WiFi: 802.11b : DSSS (DBPSK, DQPSK, CCK)<br>802.11g/n (HT20/HT40) : OFDM<br>(64QAM, 16QAM, QPSK, BPSK)<br>5GHz WiFi: 802.11n(HT20/HT40): MCS0-MCS7;<br>802.11ac(VHT20): NSS1, MCS0-MCS8<br>802.11ac(VHT40): NSS1, MCS0-MCS9                                                                                                                          |
| Bit Rate of transmitter:   | BT: 1 Mbps, 2Mbps, 3Mbps<br>2.4GHz WiFi:<br>802.11b:11/5.5/2/1 Mbps<br>802.11g:54/48/36/24/18/12/9/6Mbps<br>802.11n(20MHz) use 800 ns GI:<br>65.0/58.5/52.0/39.0/26.0/19.5/13.0/6.5 Mbps (MCS0~MCS7)<br>802.11n(40MHz) use 800 ns GI:<br>13.5/27/40.5/54/81/108/121.5/135Mbps (MCS0~MCS7)<br>5GHz WiFi:<br>802.11n(HT20/HT40): MCS0-MCS7<br>802.11ac(VHT20): NSS1, MCS0-MCS8<br>802.11ac(VHT40):NSS1, MCS0-MCS9 |
| Antenna type:              | External Antenna                                                                                                                                                                                                                                                                                                                                                                                                |
| Antenna gain:              | BR+EDR: 3.46dBi<br>BLE: 3.46dBi<br>2.4GHz WiFi: 1.48dBi<br>5GHz WiFi: 6.49dBi                                                                                                                                                                                                                                                                                                                                   |
| Max. output power:         | BR+EDR: 2.42dBm<br>BLE: 2.42dBm<br>2.4GHz WiFi: 17.26dBm<br>5GHz WiFi: 18.71dBm                                                                                                                                                                                                                                                                                                                                 |

|                      |                                                    |
|----------------------|----------------------------------------------------|
| Hardware version:    | V1.0                                               |
| Software version:    | V1.0                                               |
| Battery:             | N/A                                                |
| Power supply:        | Input: 10-14V, Rated power 12V<br>Output: DC 5V/1A |
| Adapter information: | N/A                                                |

## 1.2 Test Mode

| Pretest Test Mode | Description of Mode |
|-------------------|---------------------|
| 1                 | TX                  |
| 2                 | /                   |
| 3                 | /                   |

## 1.3 Test Setup

See photographs of the test setup in the report for the actual setup and connections between EUT and support equipment.

## 1.4 Ancillary Equipment

| Equipment | Model | S/N | Manufacturer |
|-----------|-------|-----|--------------|
| /         | /     | /   | /            |
|           |       |     |              |
|           |       |     |              |

## 2 Test Facilities and Accreditations

### 2.1 Test Laboratory

|                       |                                                                                                                                                   |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Site             | Shenzhen HongBiao Certification& Testing Co., Ltd                                                                                                 |
| Test Site Location    | Room 102, 201, Building 2, Yuanwanggu RFID Industrial Park, Tongguan Road, Tianliao Community, Yutang Street, Guangming District, Shenzhen, China |
| Telephone:            | (86-755) 2998 9321                                                                                                                                |
| Fax:                  | (86-755) 2998 5110                                                                                                                                |
| FCC Registration No.: | CN1341                                                                                                                                            |
| A2LA Certificate No.: | 6765.01                                                                                                                                           |

### 2.2 Environmental Conditions

During the measurement the environmental conditions were within the listed ranges:

|                    |              |
|--------------------|--------------|
| Temperature:       | 15°C~35°C    |
| Relative Humidity: | 20%~75%      |
| Air Pressure:      | 98kPa~101kPa |

### 2.3 Measurement Uncertainty

The reported uncertainty of measurement  $y \pm U$ , where expended uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95 %.

The data and results quoted in this document are true and accurate values, and uncertainties are not involved in the calculations.

In addition, components and mass production processes that are similar to testing equipment may introduce additional deviations, and the manufacturer is solely responsible for the continued compliance of the equipment.

| Measurement Frequency Range | U, (dB)            | Note |
|-----------------------------|--------------------|------|
| RF frequency                | $2 \times 10^{-5}$ |      |
| RF power, conducted         | $\pm 0.57$ dB      |      |
| Temperature                 | $\pm 1$ degree     |      |
| Humidity                    | $\pm 5$ %          |      |

### 2.4 Test Software

| Software name  | Manufacturer | Model    | Version  |
|----------------|--------------|----------|----------|
| RF Test System | MWRF         | MTS 8310 | V2.0.0.0 |

### 3 List of Test Equipment

| RF   |               |                                              |              |                |            |                  |            |
|------|---------------|----------------------------------------------|--------------|----------------|------------|------------------|------------|
| Item | Equipment No. | Equipment name                               | Manufacturer | Model          | Serial No. | Calibration date | Due date   |
| 1    | HB-E041       | MXG Anaio<br>Signal Generator                | Agilent      | N5181A         | MY47070421 | 2025-05-07       | 2026-05-06 |
| 2    | HB-E042       | WIDEBAND<br>RADIO<br>COMMUNICATION<br>TESTER | R&S          | CMW500         | 132108     | 2025-05-08       | 2026-05-07 |
| 3    | HB-E043       | MXG Anaio<br>Signal Generator                | Agilent      | N5182A         | US46240335 | 2025-05-08       | 2026-05-07 |
| 4    | HB-E044       | Signal &<br>spectrum<br>Analyzer             | R&S          | FSV3044        | 101264     | 2025-05-07       | 2026-05-06 |
| 5    | HB-E045       | RF Control<br>Box                            | Noyetec      | NY100-R<br>FCB | N/A        | 2025-05-08       | 2026-05-07 |
| 6    | HB-E058       | Thermometer<br>Clock<br>Humidity<br>Monitor  | N/A          | HTC-1S         | N/A        | 2025-05-09       | 2026-05-08 |

Note: the calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

## 4 RF Exposure

### 4.1 Standalone SAR test exclusion considerations

#### 4.1.1. Limit

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) Radiation as specified in §1.1307(b).

Maximum Permissible Exposure (MPE)

| Frequency range (MHz)                                          | Electric field strength (V/m) | Magnetic field strength (A/m) | Power density (mW/cm <sup>2</sup> ) | Averaging time (minutes) |
|----------------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| <b>(A) Limits for Occupational/Controlled Exposure</b>         |                               |                               |                                     |                          |
| 0.3-3.0                                                        | 614                           | 1.63                          | *100                                | 6                        |
| 3.0-30                                                         | 1842/f                        | 4.89/f                        | *900/f <sup>2</sup>                 | 6                        |
| 30-300                                                         | 61.4                          | 0.163                         | 1.0                                 | 6                        |
| 300-1,500                                                      |                               |                               | f/300                               | 6                        |
| 1,500-100,000                                                  |                               |                               | 5                                   | 6                        |
| <b>(B) Limits for General Population/Uncontrolled Exposure</b> |                               |                               |                                     |                          |
| 0.3-1.34                                                       | 614                           | 1.63                          | *100                                | 30                       |
| 1.34-30                                                        | 824/f                         | 2.19/f                        | *180/f <sup>2</sup>                 | 30                       |
| 30-300                                                         | 27.5                          | 0.073                         | 0.2                                 | 30                       |
| 300-1,500                                                      |                               |                               | f/1500                              | 30                       |
| 1,500-100,000                                                  |                               |                               | 1.0                                 | 30                       |

f = frequency in MHz \* = Plane-wave equivalent power density

#### MPE Calculation Method

Friis transmission formula:  $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2)$

Where

$P_d$  = Power density in mW/cm<sup>2</sup>

$P_{out}$  = output power to antenna in mW

$G$  = Numeric gain of the antenna relative to isotropic antenna

$\pi$  = 3.1415926

$R$  = distance between observation point and center of the radiator in cm(20cm)

$P_d$  the limit of MPE, 1mW/cm<sup>2</sup>.

If we know the maximum gain of the antenna and total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

#### 4.1.2. Test Result

##### BR+EDR/BLE:

Operation Frequency: 2402-2480MHz,

Antenna Type: External Antenna;

Power density limited: 1mW/ cm<sup>2</sup>

##### 2.4GHz WiFi:

Operation Frequency: WIFI 802.11b/g/n HT20: 2412-2462MHz,

802.11n HT40: 2422-2452MHz,

Antenna Type: External Antenna;

Power density limited: 1mW/ cm<sup>2</sup>

##### 5GHz WiFi:

Operation Frequency: 802.11n-HT20/ac-VHT20: 20MHz

802.11n-HT40/ac-VHT40: 40MHz

Antenna Type: External Antenna;

R=20cm

mW=10^(dBm/10)

BT: Antenna gain Numeric=10^(dBi/10)= 10^(3.46/10)=2.22

2.4GHz WiFi: Antenna gain Numeric=10^(dBi/10)= 10^(1.48/10)=1.41

5GHz WiFi: Antenna gain Numeric=10^(dBi/10)= 10^(6.49/10)=4.46

BR+EDR(Worst):

| Channel Freq. (MHz) | modulation | conducted power | Tune-up power (dBm) | Max           |       | Antenna |          | Evaluation result     | Power density Limits  |
|---------------------|------------|-----------------|---------------------|---------------|-------|---------|----------|-----------------------|-----------------------|
|                     |            | (dBm)           |                     | tune-up power |       | Gain    |          | (mW/cm <sup>2</sup> ) | (mW/cm <sup>2</sup> ) |
|                     |            |                 |                     | (dBm)         | (mW)  | (dBi)   | Numeri c |                       |                       |
| 2402                | GFSK       | 2.42            | 2±1                 | 3             | 1.995 | 3.46    | 2.22     | 0.0009                | 1                     |

BLE(Worst):

| Chann<br>el Freq.<br>(MHz) | modulation   | conducte<br>d power | Tune-u<br>p<br>power<br>(dBm) | Max           |       | Antenna |             | Evaluation<br>result  | Power<br>density<br>Limits |
|----------------------------|--------------|---------------------|-------------------------------|---------------|-------|---------|-------------|-----------------------|----------------------------|
|                            |              | (dBm)               |                               | tune-up power |       | Gain    |             | (mW/cm <sup>2</sup> ) | (mW/cm <sup>2</sup> )      |
|                            |              |                     |                               | (dBm)         | (mW)  | (dBi)   | Nu<br>meric |                       |                            |
| 2402                       | GFSK<br>(1M) | 2.42                | 2±1                           | 3             | 1.995 | 3.46    | 2.22        | 0.0009                | 1                          |

2.4GHz WiFi(Worst):

| Channel Freq. (MHz) | modulation  | conducted power | Tune-up power | Max           |           | Antenna |         | Evaluation result at 20cm | Power density Limits |
|---------------------|-------------|-----------------|---------------|---------------|-----------|---------|---------|---------------------------|----------------------|
|                     |             | (dBm)           | (dBm)         | tune-up power |           | Gain    |         | Power density(mW/cm2 )    | (mW/cm2)             |
|                     |             |                 |               | (dBm)         | (mW)      | (dBi)   | Numeric |                           |                      |
|                     |             |                 |               |               |           |         |         |                           |                      |
| Ant A               | Ant A       | Ant A           | Ant A         | Ant A         |           | Ant A   |         |                           |                      |
| 2452                | 802.11n H40 | 17.26           | 17±1          | 18            | 63.095734 | 1.48    | 1.41    | 0.01765                   | 1                    |

5GHz WiFi(Worst): UNII-3

| Frequency<br>(MHz) | Modulation<br>mode | conducted power | Tune-up<br>power | Max           |        | Antenna |             | Evaluation<br>result at<br>20cm           | Power<br>density<br>Limits |
|--------------------|--------------------|-----------------|------------------|---------------|--------|---------|-------------|-------------------------------------------|----------------------------|
|                    |                    | (dBm)           | (dBm)            | tune-up power |        | Gain    |             | Power<br>density(mW<br>/cm <sup>2</sup> ) | (mW/cm <sup>2</sup> )      |
|                    |                    |                 |                  | (dBm)         | (mW)   | (dBi)   | Nu<br>meric |                                           |                            |
|                    |                    |                 |                  | Ant A         | Ant A  | Ant A   |             |                                           |                            |
| 5795               | 11ac<br>(HT40)     | 18.71           | 18±1             | 19            | 79.433 | 6.49    | 4.46        | 0.07043                                   | 1                          |

**Conclusion:**

Simultaneous transmit:

| NO | Configurations                      | Maximum MPE Value            |                                 |                                       |                                  |                                                     | Limits<br>(mW/cm <sup>2</sup> ) |
|----|-------------------------------------|------------------------------|---------------------------------|---------------------------------------|----------------------------------|-----------------------------------------------------|---------------------------------|
|    |                                     | BLE<br>(mW/cm <sup>2</sup> ) | BR+EDR<br>(mW/cm <sup>2</sup> ) | 2.4G<br>WiFi<br>(mW/cm <sup>2</sup> ) | 5G WiFi<br>(mW/cm <sup>2</sup> ) | Transmit<br>simultaneously<br>(mW/cm <sup>2</sup> ) |                                 |
| 1  | BLE+BR+EDR<br>+2.4G<br>WiFi+5G WiFi | 0.0009                       | 0.0009                          | 0.01765                               | 0.07043                          | 0.08988                                             | 1                               |

Simultaneous transmit:

| NO | Configurations | Maximum MPE Value           |                                    |                            | Limits |
|----|----------------|-----------------------------|------------------------------------|----------------------------|--------|
|    |                | BT<br>(mW/cm <sup>2</sup> ) | 2.4G WiFi<br>(mW/cm <sup>2</sup> ) | Transmit<br>simultaneously |        |
| 1  | BT+2.4GWiFi    | 0.0009                      | 0.01765                            | 0.01855                    | 1      |

| NO | Configurations | Maximum MPE Value |                                  |                            | Limits |
|----|----------------|-------------------|----------------------------------|----------------------------|--------|
|    |                | BR+EDR            | 5G WiFi<br>(mW/cm <sup>2</sup> ) | Transmit<br>simultaneously |        |
| 1  | BT+5GWiFi      | 0.0009            | 0.07043                          | 0.07133                    | 1      |

According to KDB 447498 D01 General RF Exposure Guidance v06, At the transmit simultaneously calculation method is as follows:

Transmit simultaneously MPE =  $\Sigma$  of MPE ratios

MPE ratios = Field strengths or power density / MPE limit at the test frequency

For the max result:  $0.08988 \leq 1g$  SAR, No SAR is required.

\*\*\*\*\* END OF REPORT \*\*\*\*\*