

Radio Measurement and Test Report

For

Shenzhen Concox Information Techology Co., Ltd

4/F, Building C, Gaoxinqi Industrial Park, Liuxian 1st Road, No.67 Xin'an

Street Bao'an District, Shenzhen, China

Test Standards:	ETSI EN 303 413 V1.1.1 (2017-06)			
Product Description:	GPS VEHICLE TRACKER			
Tested Model:	<u>X3</u>			
Report No.:	<u>STR18038161E-2</u>			
Tested Date:	2018-03-15 to 2018-04-09			
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Tested By:	Mike Shi / Engineer Mike Shi			
Reviewed By:	Silin Chen / EMC Manager Silin chen			
Approved & Authorized By:	Jandy So / PSQ Manager			
Prepared By:	Approved			
Shenzhen SEM.Test Technology Co., Ltd.				
1/F, Build	ling A, Hongwei Industrial Park, Liuxian 2nd Road,			
Bao'an District, Shenzhen, P.R.C (518101)				
Tel.: +86-755-33663308	Fax.: +86-755-33663309 Website: www.semtest.com.cn			

Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen SEM.Test Technology Co., Ltd.



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1 GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Manufacturer:	Shenzhen Concox Information Techology Co., Ltd
Address of manufacturer:	4/F, Building C, Gaoxinqi Industrial Park, Liuxian 1st Road,
	No.67 Xin'an Street Bao'an District, Shenzhen, China

General Description of EUT	
Product Name:	GPS VEHICLE TRACKER
Brand Name:	/
Model No.:	X3
Adding Model(s):	GT810
Rated Voltage:	DC Port: DC12V/24V; Battery: DC 3.7V
Battery Capacity:	450mAh
Adapter Model:	1
Software Version:	NT37_10_A1D_D23_R0_V02_WM_20180322_1004
Hardware Version:	NT37_MB_V1.2

Note: The test data is gathered from a production sample provided by the manufacturer.

Technical Characteristics of EUT		
Frequency Range:	1575.42GHz Receiving	



1.2 Test Standards

The tests were performed according to following standards:

ETSI EN 303 413 V1.1.1 (2017-06) Satellite Earth Stations and Systems (SES);Global Navigation Satellite System (GNSS) receivers; Radio equipment operating in the 1 164 MHz to 1 300 MHz and 1 559 MHz to 1 610 MHz frequency bands; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product maybe which result in lowering the immunity should be checked to ensure compliance has been maintained

1.3 Test Methodology

All measurements contained in this report were conducted with ETSI EN 303 413,

The equipment under test (EUT) was configured to measure its highest possible emission level. For more detail refer to the Operating Instructions.

1.4 Test Facility

FCC – Registration No.: 125990

Shenzhen SEM Test Technology Co., Ltd. Laboratory has been recognized to perform compliance testing on equipment subject to the Commissions Declaration Of Conformity (DOC). The Designation Number is CN5010, and Test Firm Registration Number is 125990.

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Shenzhen SEM. Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.



1.5 EUT Setup and Test Mode

The equipment under test (EUT) was configured to measure its highest possible emission/immunity level. The test modes were adapted according to the operation manual for use, the EUT was operated in the engineering mode to fix the Rx frequency that was for the purpose of the measurements, more detailed description as follows:

Test Mode List	t	
Test Mode	Description	Remark
TM1	GPS Receiving	1.575.42GHz

Test Conditions			
Temperature	25 °C		
Relative humidity	45 %.		
ATM Pressure:	1019 mbar		

EUT Cable List and Details					
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite		
Power Cord; UL1007	2.0	Unshielded	Without Coro		
22# KKSGT810-2000MM	2.0	Unsineraea	without Core		
relay socket: HVF4-1C	0.1	Unshielded	Without Core		
Pasted microphone: SS-17033001	2.8	Unshielded	Without Core		
Audio line:	0.1	Unshielded	Without Core		
2468 24#*2 KKSGT810-29-100mm	0.1	Ulishielded	without Core		
SOS switch extension line: 2468	2.0	Unshielded	Without Core		
24AWG 2000mm	2.0	Unshielded	Without Core		
Input-output extension line:	2.0	Unshielded	Without Core		
KKSGT06E-3P	2.0	Unsineided	without Core		

Auxiliary Cable List and Details				
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite	
AUX Cable	0.5	Unshielded	Without Core	

Auxiliary Equipment List and Details					
Description Manufacturer		Model	Serial Number		
Speaker	AngSi Technology	OontZ Angle 3ULTRA	/		
Relay	Tianbo	TRV3-L-12V-S-ZF	/		



1.6 Measurement Uncertainty

Measurement uncertainty				
Parameter	Uncertainty	Note		
GUE adjacent frequency band selectivity	0 92 dP	(1)		
test	0.82 dB	(1)		
Radiated Spurious Emissions	30-200MHz ±4.52dB	(1)		
	0.2-1GHz ±5.56dB	(1)		
	1-6GHz ±3.84dB	(1)		
	6-18GHz ±3.92dB	(1)		

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

1.7 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
Power Splitter	Mini-Circuits	Z4PD-642W-S+	N846501416	2017-06-12	2018-06-11
Spectrum Analyzer	R&S	FSP	836079/035	2017-06-12	2018-06-11
Pre-amplifier	Agilent	8447F	3113A06717	2017-06-12	2018-06-11
Pre-amplifier	Compliance Direction	PAP-0118	24002	2017-06-12	2018-06-11
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2017-06-08	2018-06-07
Spectrum Analyzer	Agilent	E4407B	MY41440400	2017-06-12	2018-06-11
Universal Radio Communication Tester	Rohde & Schwarz	CMW500	1201.0002k50-148650-FB	2017-06-12	2018-06-11
Horn Antenna	ETS	3117	00086197	2017-06-08	2018-06-07

2. SUMMARY OF TEST RESULTS

Standards	Reference	Description of Test Item	Result	
ETSI EN 202 412	5.4	GUE adjacent frequency band selectivity test	Pass	
E151 EN 505 415	5.5	Receiver Spurious Radiations	Pass	
Pass: The EUT complies with the essential requirements in the standard Fail: The EUT does not comply with the essential requirements in the standard N/A: not applicable				



3. GUE adjacent frequency band selectivity test

3.1 General

According to the ETSI EN 303 413 section 5.4, It is recognized that alternative test methods may exist. If an alternate test method is chosen to demonstrate conformance, then it shall be ensured and declared in the test report that any alternative test method used yields results identical to those described in the present document.

3.2 Test Procedure

1) Configure the GNSS signal generator to simulate those GNSS and GNSS signals from table 4-1 declared as supported by the GUE, with power levels and other details as specified in clause B.2.

2) With the adjacent frequency signal switched off, the EUT shall be given sufficient time to acquire all simulated satellites from the declared GNSS system(s).

3) Record the baseline C/N0 value(s) reported by the EUT. Sufficient filtering shall be used to obtain a stable value. C/N0 may be averaged across all the satellites in view for each GNSS constellation. However, C/N0 shall not be averaged across satellite signals in different GNSS constellations. For a multi-GNSS EUT, there shall be a separate C/N0 value recorded for each GNSS constellation and each GNSS signal supported.

4) The adjacent frequency signal generator shall be configured to generate the signal defined in table 4-4, at the first test point centre frequency and signal power level as specified in table 4-2.

5) The adjacent frequency signal shall be switched on, and the EUT's C/N0 value(s) recorded as in step 3) to measure the degradation with respect to the baseline value(s) recorded in step 3).

6) Test point Pass/Fail Criteria: If the C/N0 degradation from step 5) does not exceed the value in equation 4-1, then this test point is set to "pass". If the C/N0 degradation exceeds the value in equation 4-1, then this test point is set to "fail." For a multi-GNSS and multi-signal EUT, there shall be a separate pass/fail determination for each GNSS and for each GNSS signal supported. If the C/N0 degradation exceeds the value in equation 4-1 for any supported GNSS or supported GNSS signal, then this test point is set to "fail".

7) Step 1) through step 6) shall be repeated for all test point centre frequencies (and associated signal power level) specified in table 4-2.

If the EUT passes the C/N0 degradation test for all test points for all GNSS constellations and all GNSS signals declared as supported from table 4-1, the EUT shall be deemed to "pass". If the C/N0 degradation test fails for any GNSS constellation or GNSS signal at any of the test points, the EUT shall be deemed to "fail".



GNSS	GNSS Signal Designations	RNSS Frequency Band (MHz)		
BDS	B11	1 559 to 1 610		
	E1	1 559 to 1 610		
Calilao	E5a	1 164 to 1 215		
Gameo	E5b	1 164 to 1 215		
	E6	1 215 to 1 300		
GLONASS -	G1	1 559 to 1 610		
	G2	1 215 to 1 300		
	L1	1 559 to 1 610		
GPS	L2	1 215 to 1 300		
	L5	1 164 to 1 215		
SDAS	L1	1 559 to 1 610		
SDAS	L5	1 164 to 1 215		

Table 4-1: GNSS, GNSS signals and RNSS frequency bands

Table 4-2: Frequency bands, adjacent frequency signal test point centre frequencies and power levels for the 1 559 MHz to 1 610 MHz RNSS band

Frequency band (MHz)	Test point centre Adjacent frequency		Comments	
1 518 to 1 525	1 524	1 524 -65		
1 525 to 1 549	1 548	-95	MSS (space-to-Earth) band	
1 549 to 1 559	1 554	-105	MSS (space-to-Earth) band	
1 559 to 1 610		GUE RNSS band under te	est	
1 610 to 1 626	1 615	1 615 -105 MSS (Earth-to-spa		
1 626 to 1 640	1 627	-85	MSS (Earth-to-space) band	

Table 4-3: Frequency bands, adjacent frequency signal test point centre frequencies and power levels for the 1 164 MHz to 1 300 MHz RNSS band

Frequency band (MHz)	Test point centre Adjacent frequency signal		Comments			
960 to 1 164	1 154	1 154 -75				
1 164 to 1 215	GUE RNSS band under test					
1 215 to 1 260	GUE RNSS band under test					
1 260 to 1 300	GUE RNSS band under test					
1 300 to 1 350	1 310	-85	Radiolocation, ARNS, RNSS			

 Table 4-4: Adjacent frequency signal

Parameter	Value	Comments
Frequency	See table 4-2 and table 4-3	
Power level	See table 4-2 and table 4-3	
Bandwidth	1 MHz	See clause B.1 for details
Format	AWGN	



3.3 Summary of Test Results/Plots

GPS : L1(1 559 to 1 610MHz)

Frequency (MHz)		Adjacent frequency signal power level (dBm)	Measured C/N0 (dB-Hz)				
band (MHz)	From table 2	From table 2	No interfering signal	With interfering signal	Decrease of C/N0	Decrease $\leq 1 dB?$	
1 518 to 1 525	1 524	-65	22	22	0	GPS Pass	
1 525 to 1 549	1 548	-95	19	19	0	GPS Pass	
1 549 to 1 559	1 554	-105	16	16	0	GPS Pass	
1 610 to 1 626	1 615	-105	17	17	0	GPS Pass	
1 626 to 1 640	1 627	-85	21	21	0	GPS Pass	
Final test results for 1 559 MHz to 1 610 MHz RNSS band: Pass							



4. Receiver Spurious Emissions

4.1 Limit of Spurious Emissions

Frequency range	Maximum power	Bandwidth	
30 MHz to 1 GHz	-57 dBm	100 kHz	
1 GHz to 8,3 GHz	-47 dBm	1 MHz	

4.2 Test Procedure

1. The test conditions.

Normal condition Extreme conditions

2. Please refer to ETSI EN 303 413 Sub-clause 5.5.2.2 for the measurement method.

4.3 Summary of Test Results/Plots

According to the data sheet, the EUT complied with the EN 303 413 standards, and had the worst margin of:



Receiver spurious emission from 30MHz to 1GHz



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dB)	
1	59.8588	-72.76	-4.71	-77.47	-57.00	-20.47	ERP
2	108.2667	-76.18	-4.81	-80.99	-57.00	-23.99	ERP
3	244.2321	-67.20	-0.57	-67.77	-57.00	-10.77	ERP
4	289.0021	-68.62	1.80	-66.82	-57.00	-9.82	ERP
5	463.9696	-73.89	5.08	-68.81	-57.00	-11.81	ERP
6	801.7863	-75.55	9.55	-66.00	-57.00	-9.00	ERP





No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dB)	
1	67.6751	-69.69	-6.41	-76.10	-57.00	-19.10	ERP
2	140.8351	-70.76	-6.56	-77.32	-57.00	-20.32	ERP
3	210.7860	-66.13	-4.05	-70.18	-57.00	-13.18	ERP
4	245.9509	-66.12	-0.50	-66.62	-57.00	-9.62	ERP
5	350.4768	-69.95	2.54	-67.41	-57.00	-10.41	ERP
6	696.8567	-77.71	10.21	-67.50	-57.00	-10.50	ERP

Receiver spurious emission from above 1GHz

Frequency	Result	Limit	Margin	Polar
(MHz)	(dBm)	(dBm)	(dB)	H/V
5569.95	-57.83	-47	-10.83	Н
12285.76	-53.98	-47	-6.98	Н
2642.49	-59.55	-47	-12.55	V
10177.91	-53.28	-47	-6.28	V

Note: Testing is carried out with frequency rang 30MHz to 8.3GHz

EXHIBIT 1 - PRODUCT LABELING

Please refer to "ANNEX_EUT Label & Photos".

EXHIBIT 2 - EUT PHOTOGRAPHS

Please refer to "ANNEX_EUT Label & Photos".



EXHIBIT 3 - TEST SETUP PHOTOGRAPHS

Receiving Spurious Emission Test Setup (Below 1GHz)

Spurious Emission Test Setup (Above 1GHz)



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