



Report No.: FCC 1912104-01 File Reference No.: 2020-01-03

Applicant: SHENZHEN HANSONG ELECTRONICS CO.,LTD

Product: CAR AUDIO VIDEO SYSTEM

Model No.: XVM1000Ui, CMM10, CMM710, JVM100UiS,

AVM1000UiN, AVM1000Ui

Trademark: N/A

Test Standards: FCC Part 15.247

Test Result:

It is herewith confirmed and found to comply with the

requirements set up by ANSI C63.10, FCC Part 15.247 for

the evaluation of electromagnetic compatibility

Approved By

Jack Chung

Jack Chung

Manager

Dated: January 03, 2020

Results appearing herein relate only to the sample tested The technical reports is issued errors and omissions exempt and is subject to withdrawal at

SHENZHEN TIMEWAY TESTING LABORATORIES

Zone C, 1st Floor, Block B, Jun Xiang Da Building, Zhongshan Park Road West, Tong Le Village, Nanshan District, Shenzhen, China

Tel (755) 83448688, Fax (755) 83442996, E-Mail:info@timeway-lab.com

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Special Statement:

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.

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The testing quality system of our laboratory meet with ISO/IEC-17025 requirements, which is approved by CNAS. This approval result is accepted by MRA of APLAC.

Our test facility is recognized, certified, or accredited by the following organizations:

CNAS-LAB Code: L2292

The EMC Laboratory has been assessed and in compliance with CNAS-CL01 accreditation criteria for testing Laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of testing Laboratories.

FCC-Registration No.: 744189

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 744189.

Industry Canada (IC) — Registration No.:5205A

The EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 5205A.

A2LA (Certification Number:5013.01)

The EMC Laboratory has been accredited by the American Association for Laboratory Accreditation (A2LA). Certification Number:5013.01

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Test Report Conclusion

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1.0 General Details

1.1 Test Lab Details

Name: SHENZHEN TIMEWAY TESTING LABORATORIES.

Address: Zone C, 1st Floor, Block B, Jun Xiang Da Building, Zhongshan Park Road West, Tong Le

Village, Nanshan District, Shenzhen, China

Telephone: (755) 83448688 Fax: (755) 83442996

Site Listed with Federal Communications commission (FCC)

Registration Number:744189 For 3m Anechoic Chamber

Site Listed with Industry Canada of Ottawa, Canada

Registration Number: IC: 5205A

For 3m Anechoic Chamber

1.2 Applicant Details

Applicant: SHENZHEN HANSONG ELECTRONICS CO.,LTD

Address: 2F,4th Industrial park, Heshuikou, Gongming, ShenZhen, Guang Dong Province, China

Telephone: -Fax: --

1.3 Description of EUT

Product: CAR AUDIO VIDEO SYSTEM

Manufacturer: SHENZHEN HANSONG ELECTRONICS CO.,LTD

Address: 2F,4th Industrial park, Heshuikou, Gongming, ShenZhen, Guang Dong Province, China

Brand Name: N/A

Model Number: XVM1000Ui

Additional Model Number: CMM10,CMM710,JVM100UiS,AVM1000UiN,AVM1000Ui

Type of Modulation GFSK, JI/4D-QPSK, 8DPSK for Bluetooth

Frequency range 2402-2480MHz for Bluetooth

Channel Spacing 1MHz for Bluetooth

Frequency Selection By software

Channel Number 79 channel for Bluetooth

Antenna: Ant 1: PCB antenna. The gain of the antennas is 0.58dBi

Ant 2: Integral antenna, The gain of the antennas is 2.0dBi

Note: there is only one transmission chain. And the two antennas can transmit at the

same time.

Rating: Input: DC12V

1.4 Submitted Sample: 1 Samples

The report refers only to the sample tested and does not apply to the bulk.

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1.5 Test Duration 2019-12-10 to 2020-01-03

Test Uncertainty

Conducted Emissions Uncertainty =3.6dB Radiated Emissions below 1GHz Uncertainty =4.7dB Radiated Emissions above 1GHz Uncertainty =6.0dB Conducted Power Uncertainty =6.0dB Occupied Channel Bandwidth Uncertainty =5%

1.7 Test Engineer

Terry Tang The sample tested by

Print Name: Terry Tang

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2.0 Test Equipment					
Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	R&S	ESPI 3	100379	2019-06-21	2020-06-20
TWO Line-V-NETW	R&S	EZH3-Z5	100294	2019-06-21	2020-06-20
TWO Line-V-NETW	R&S	EZH3-Z5	100253	2019-06-21	2020-06-20
Impuls-Begrenzer	R&S	ESH3-Z2	100281	2019-06-21	2020-06-20
Loop Antenna	EMCO	6507	00078608	2020-06-20	2020-06-20
Spectrum	R&S	FSIQ26	100292	2019-06-21	2020-06-20
Horn Antenna	A-INFO	LB-180400-KF	J211060660	2019-06-21	2020-06-20
Horn Antenna	R&S	BBHA 9120D	9120D-631	2018-07-09	2021-07-08
Power meter	Anritsu	ML2487A	6K00003613	2019-08-22	2020-08-21
Power sensor	Anritsu	MA2491A	32263	2019-08-22	2020-08-21
Bilog Antenna	Schwarebeck	VULB9163	9163/340	2018-07-04	2021-07-03
9*6*6 Anechoic			N/A	2018-02-07	2021-02-06
EMI Test Receiver	RS	ESVB	826156/011	2019-06-21	2020-06-20
EMI Test Receiver	RS	ESH3	860904/006	2019-06-21	2020-06-20
Spectrum	HP/Agilent	ESA-L1500A	US37451154	2019-06-21	2020-06-20
Spectrum	HP/Agilent	E4407B	MY50441392	2019-06-21	2020-06-20
Spectrum	RS	FSP	1164.4391.38	2019-01-20	2020-01-19
RF Cable	Zhengdi	ZT26-NJ-NJ-8 M/FA		2019-06-21	2020-06-20
RF Cable	Zhengdi	7m		2019-06-21	2020-06-20
RF Switch	EM	EMSW18	060391	2019-06-21	2020-06-20
Pre-Amplifier	Schwarebeck	BBV9743	#218	2019-06-21	2020-06-20
Pre-Amplifier	HP/Agilent	8449B	3008A00160	2019-06-21	2020-06-20
LISN	SCHAFFNER	NNB42	00012	2019-01-08	2020-01-07

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3.0 **Technical Details**

3.1 **Summary of test results**

The EUT has been tested according to the following specifications:

Requirement	CFR 47 Section	Result	Notes
Antenna Requirement	15.203, 15.247(b)(4)	N/A	Complies
Maximum Peak Out Power	15.247 (b)(1), (4)	PASS	Complies
Carrier Frequency Separation	15.247(a)(1)	PASS	Complies
20dB Channel Bandwidth	15.247 (a)(1)	PASS	Complies
Number of Hopping Channels	15.247(a)(iii), 15.247(b)(1)	PASS	Complies
Time of Occupancy (Dwell Time)	15.247(a)(iii)	PASS	Complies
Spurious Emission, Band Edge, and Restricted bands	15.247(d),15.205(a), 15.209 (a),15.109	PASS	Complies
Conducted Emissions	15.207(a), 15.107	PASS	Complies
RF Exposure	15.247(i), 1.1307(b)(1)	PASS	Complies

3.2 **Test Standards**

FCC Part 15 Subpart & Subpart C, Paragraph 15.247

4.0 **EUT Modification**

No modification by SHENZHEN TIMEWAY TESTING LABORATORIES.

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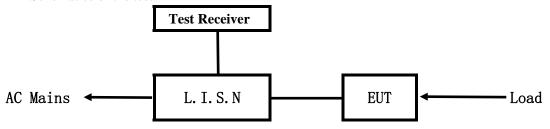
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5. Power Line Conducted Emission Test

5.1 Schematics of the test

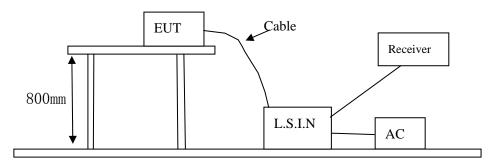


EUT: Equipment Under Test

5.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.10-2013. The Frequency spectrum From 0.15MHz to 30MHz was investigated. The LISN used was 50ohm/50uH as specified by section 5.1 of ANSI C63.10-2013.

Test Voltage: 120V~60Hz Block diagram of Test setup



5.3 Configuration of The EUT

The EUT was configured according to ANSI C63.10-2013. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

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A. EUT

Device	Manufacturer	Model	FCC ID	
CAR AUDIO VIDEO	SHENZHEN HANSONG	VVM1000U:	2 AVA VIICNE 2010000	
SYSTEM	ELECTRONICS CO.,LTD	XVM1000Ui	2AVAXHSNS20190001	

B. Internal Device

Device	Manufacturer	Model	Rating	

C. Peripherals

Device	Manufacturer	Model	Rating

5.4 EUT Operating Condition

Operating condition is according to ANSI C63.10-2013.

- A Setup the EUT and simulators as shown on follow
- B Enable AF signal and confirm EUT active to normal condition

5.5 Power line conducted Emission Limit according to Paragraph 15.107, 15.207

	Frequency	Class A Lim	its (dB µ V)	Class B Limits (dB µ V)		
(MHz)		Quasi-peak Level	Average Level	Quasi-peak Level	Average Level	
	$0.15 \sim 0.50$	79.0	66.0	66.0~56.0*	56.0~46.0*	
	$0.50 \sim 5.00$	73.0	60.0	56.0	46.0	
	5.00 ~ 30.00	73.0	60.0	60.0	50.0	

Notes:

- 1. *Decreasing linearly with logarithm of frequency.
- 2. The tighter limit shall apply at the transition frequencies

5.6 Test Results: N/A

Note: EUT used in a vehicle, this test item not applicable.

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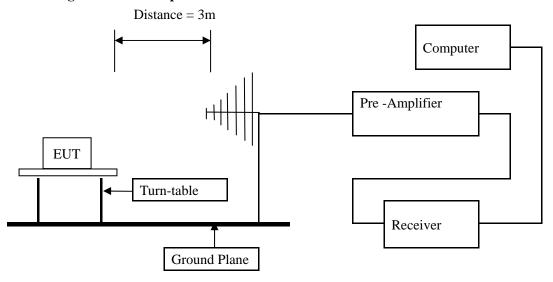
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6 Radiated Emission Test

- 6.1 Test Method and test Procedure:
- (1) The EUT was tested according to ANSI C63.10-2013. The radiated test was performed at Timeway EMC Laboratory. This site is on file with the FCC laboratory division, Registration No. 744189
- (2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.10-2013.
- (3) The frequency spectrum from 30 MHz to 25GHz was investigated. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 kHz. For measurement above 1GHz, peak values with RBW=VBW=1MHz and PK detector. AV value with RBW=1MHz, VBW=10Hz and PK detector. Measurements were made at 3 meters.
- (4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
- (5) Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a "QP" in the data table.
- (6) The antenna polarization: Vertical polarization and Horizontal polarization.

Block diagram of Test setup



- 6.2 Configuration of The EUT

 Same as section 5.3 of this report
- 6.3 EUT Operating Condition
 Same as section 5.4 of this report.

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6.4 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

Frequencies in restricted band are complied to limit on Paragraph 15.209 and 15.109 and RSS-210

Frequency Range (MHz)	Distance (m)	Field strength (dB μ V/m)
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

Note:

- 1. RF Voltage $(dBuV) = 20 \log RF \text{ Voltage } (uV)$
- 2. In the Above Table, the higher limit applies at the band edges.
- 3. Distance refers to the distance in meters between the measuring instrument antenna and the EUT
- 4. $\Pi/4DQPSK$ was the worse case because it has highest output power

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Test result

General Radiated Emission Data and Harmonics Radiated Emission Data

Radiated Emission In Horizontal/Vertical (30MHz----1000MHz)

EUT set Condition: Keep Bluetooth Transmitting

Results: Pass

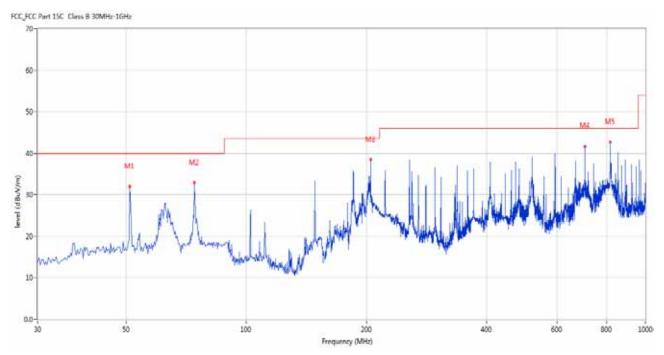
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Test Figure:

H



No.	Frequency	Results	Factor (dB)	Limit	Over Limit	Detector	Table	Height	ANT	Verdict
	(MHz)	(dBuV/m)		(dBuV/m)	(dB)		(o)	(cm)		
1	51.092	31.98	-11.41	40.0	-8.02	Peak	0.00	100	Н	Pass
2	75.094	32.14	-17.33	40.0	-7.86	Peak	0.00	100	Н	Pass
3	205.041	39.47	-13.59	43.5	-4.03	Peak	32.00	100	Н	Pass
4	705.194	41.66	-4.15	46.0	-4.34	Peak	14.00	100	Н	Pass
5	816.716	42.69	-2.92	46.0	-3.31	Peak	20.00	100	Н	Pass

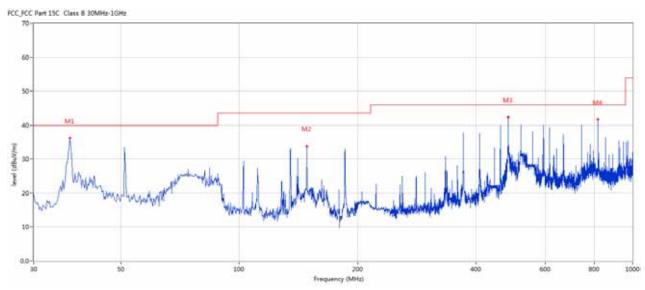
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Test Figure:

V



No.	Frequenc	Results	Factor	Limit	Over	Detector	Table (o)	Height	ANT	Verdict
	y (MHz)	(dBuV/m)	(dB)	(dBuV/m)	Limit (dB)			(cm)		
1	37.031	36.17	-13.17	40.0	-3.83	Peak	354.00	100	V	Pass
2	148.310	34.83	-17.16	43.5	-8.67	Peak	354.00	100	V	Pass
3	482.634	42.42	-7.37	46.0	-3.58	Peak	359.00	100	V	Pass
4	816.716	41.82	-2.92	46.0	-4.18	Peak	354.00	100	V	Pass

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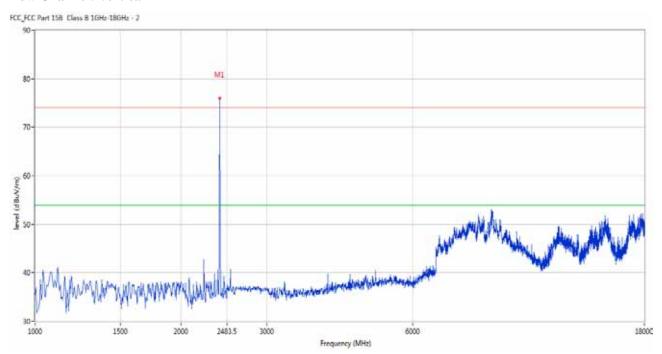
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Test Figures above 1GHz:

Please refer to the following test plots for details:

Low Channel: Vertical

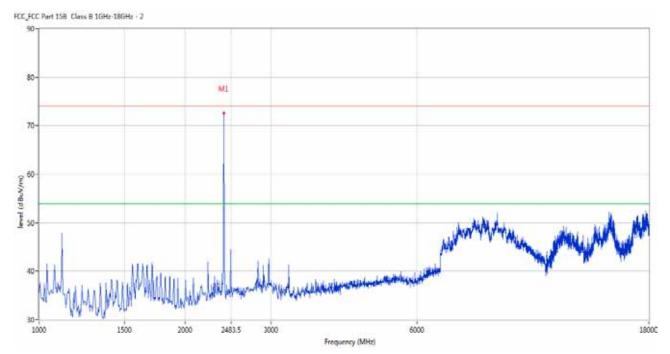


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Low Channel: Horizontal

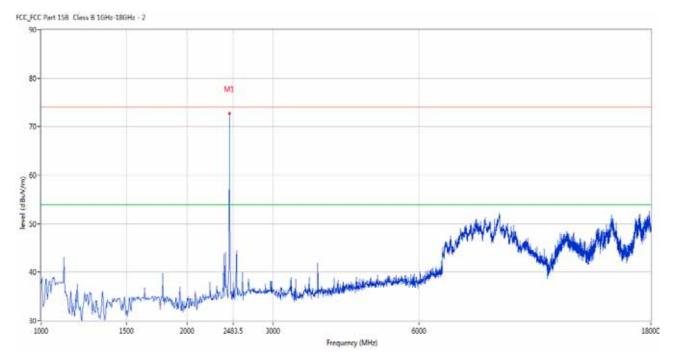


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Middle Channel: Horizontal

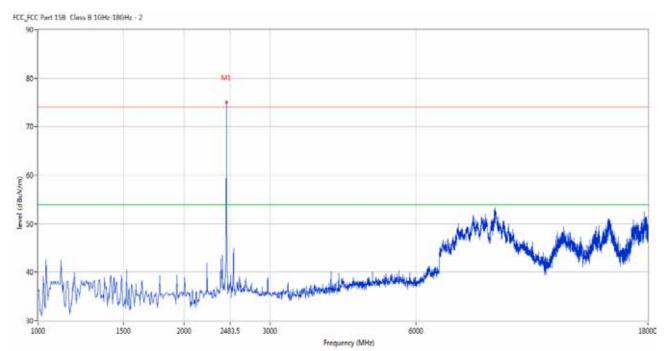


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Middle Channel: Vertical

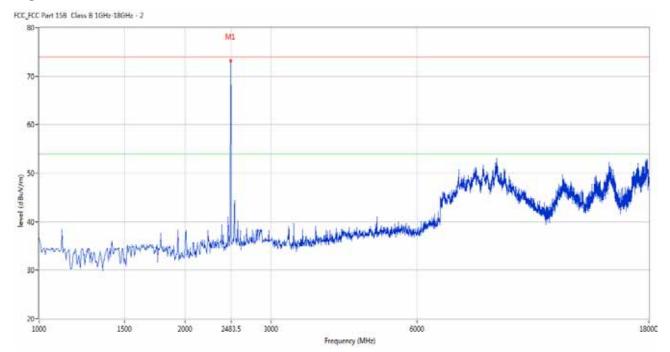


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High Channel: Horizontal

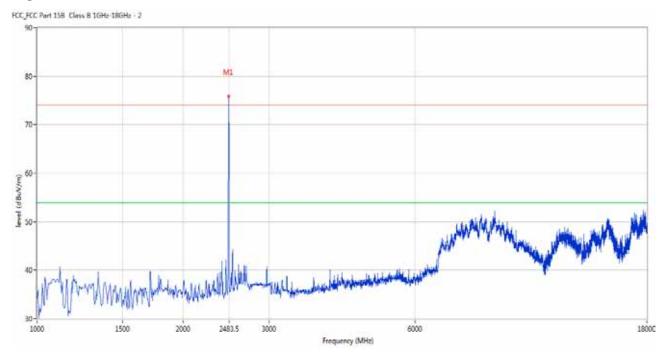


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High Channel: Vertical



Note: 1. Level = Reading + AF + Cable - Preamp

2. For the radiated emissions above 18G and below 30MHz, it is the floor noise.

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7.0 20dB Bandwidth Measurement

7.1 Regulation

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

7.2 Limits of 20dB Bandwidth Measurement

N/A

7.3 Test Procedure.

- 1. Check the calibration of the measuring instrument (spectrum analyzer) using either an internal calibrator or a known signal from an external generator.
- 2. Set the spectrum analyzer as follows: Span =3MHz, RBW =30 kHz, VBW=100 kHz, Sweep = auto Detector function = peak, Trace = max hold
- 3. Measure the highest amplitude appearing on spectral display and record the level to calculate results. 6. Repeat above procedures until all frequencies measured were complete.

7.4 Test Result

Type of Modulation: GFSK

JF	oddiadioni G1511			
EUT	CAR AUI	DIO VIDEO SYSTEM	Model	XVM1000Ui
Mode	Kee	ep Transmitting	Input Voltage	DC12V
Temperat	ure	24 deg. C,	Humidity	56% RH
Channel	Channel Frequency (MHz)	20 dB Bandwidth (kHz)		
Low	2402	2402 798		Pass
Middle	2441	2441 798		Pass
High	2480 798			Pass

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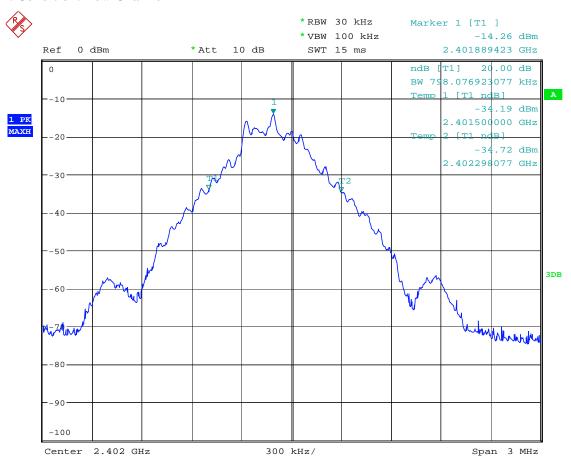
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Test Figure:

1. Condition: Low Channel



Date: 2.JAN.2020 15:44:21

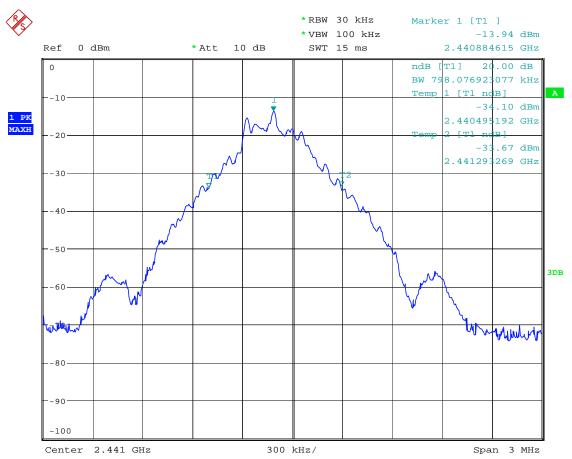
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2. Condition: Middle Channel



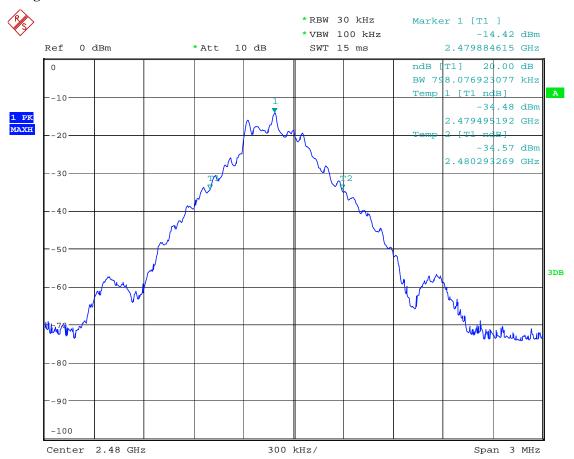
Date: 2.JAN.2020 15:43:44

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3. High Channel



Date: 2.JAN.2020 15:42:49

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Test Result

Type of Modulation: JI/4D-QPSK

EUT	CAR AU	DIO VIDEO SYSTEM	Model	XVM1000Ui
Mode	Ko	eep Transmitting	Input Voltage	DC12V
Temperat	ure	24 deg. C,	Humidity	56% RH
Channel	Channel Frequency (MHz)			Pass/ Fail
Low	2402	1212	1212	
Middle	2441	2441 1212		Pass
High	2480 1212			Pass

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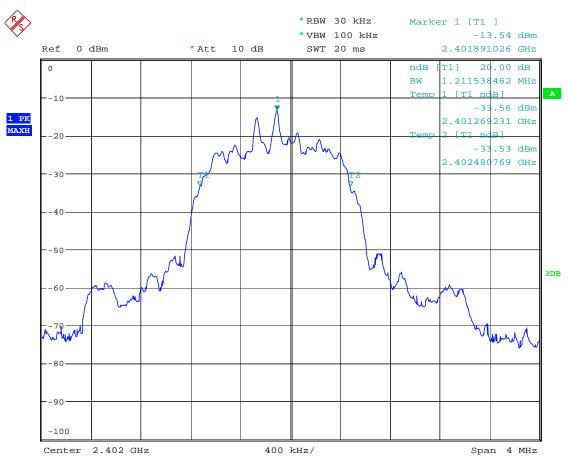
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Test Figure:

1. Condition: Low Channel



Date: 3.JAN.2020 10:07:50

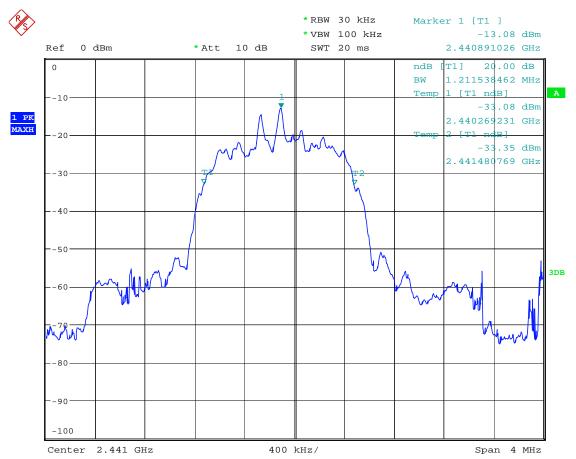
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2. Condition: Middle Channel



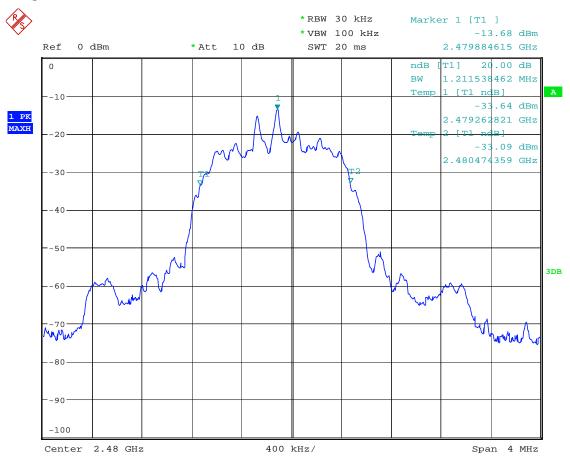
Date: 3.JAN.2020 10:08:41

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3. High Channel



Date: 3.JAN.2020 10:09:32

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Test Result

Type of Modulation: 8DPSK

EUT CAR AU		DIO VIDEO SYSTEM	Model	XVM1000Ui
Mode	K	Keep Transmitting		DC12V
Temperature		24 deg. C,	Humidity	56% RH
Channel	Channel Frequency (MHz)	20 dB Bandwidth (kHz)	Maximum Limit (kHz)	Pass/ Fail
Low	2402	1224		Pass
Middle	2441	1231		Pass
High	2480	2480 1224 -		Pass

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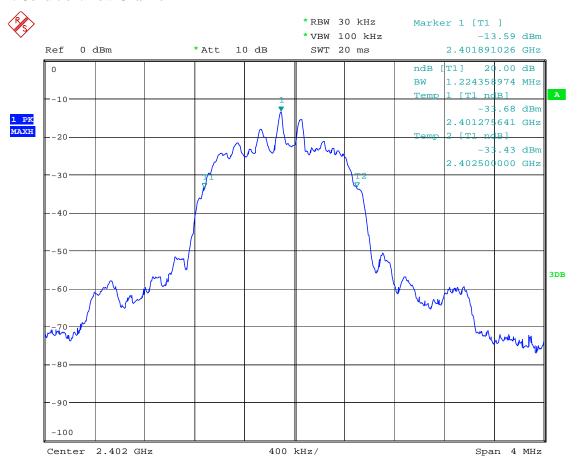
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Test Figure:

1. Condition: Low Channel



Date: 3.JAN.2020 10:16:21

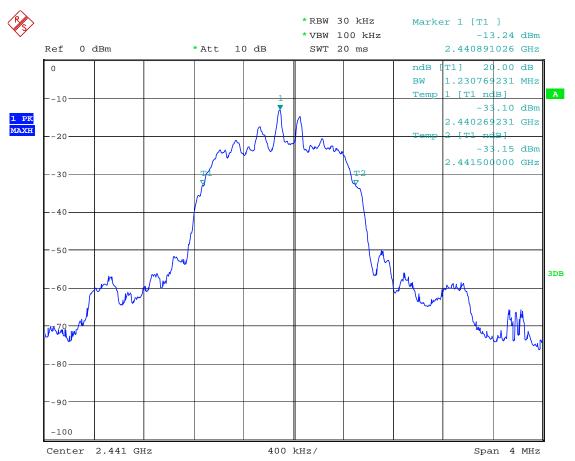
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2. Condition: Middle Channel



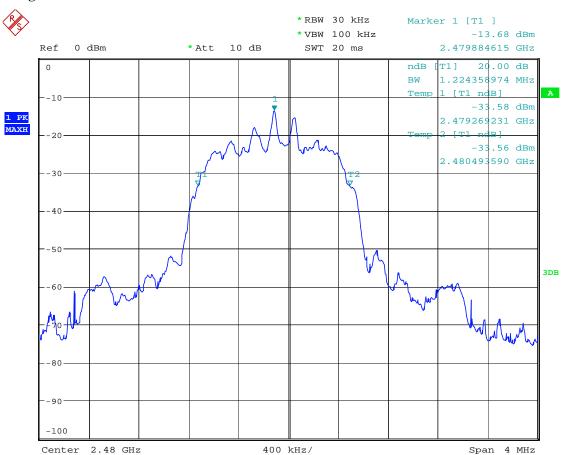
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3. High Channel



Date: 3.JAN.2020 10:14:43

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8. Maximum Output Power

8.1 Regulation

According to §15.247(b)(1), for frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5MHz band:0.125 watts. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

8.2 Limits of Maximum Output Power

The Maximum Output Power Measurement is 30dBm.

8.3 Test Procedure

- 1. Check the calibration of the measuring instrument (spectrum analyzer) using either an internal calibrator or a known signal from an external generator.
- 2. Set the spectrum analyzer as follows: Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel; RBW > the 20 dB bandwidth of the emission being measured; VBW = RBW=3MHz; Sweep = 60s; Detector function = RMS; Trace = max hold
- 3. Measure the highest amplitude appearing on spectral display and record the level to calculate results.
- 4. Repeat above procedures until all frequencies measured were complete.

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8.4Test Results

Type of Modulation: GFSK

EUT	CAR AU	CAR AUDIO VIDEO SYSTEM		XVM1000Ui
Mode	K	Keep Transmitting		DC12V
Temperature	е	24 deg. C,		56% RH
Channel	Channel Frequency (MHz)	Max. Power Output (dBm)	Peak Power Limit (dBm)	Pass/ Fail
	(14112)	Peak	(GDIII)	
Low	2402	-13.22	30	Pass
Middle	2441	-12.66	30	Pass
High	2480	-13.39	30	Pass

Note: 1. the result basic equation calculation as follow:

Max. Power Output = Power Reading + Cable loss + Attenuator

- 2. The worse case was recorded
- 3. The Peak power was measured

Type of Modulation: JI/4D-QPSK

EUT		CAR AUDIO VIDEO SYSTEM		Model	XVM1000Ui
Mode		Keep Transmitting		Input Voltage	DC12V
Temperature		24 deg. C,		Humidity	56% RH
Channel	Channel Frequency (MHz)		Max. Power Output (dBm)	Peak Power Limit (dBm)	Pass/ Fail
			Peak		
Low		2402	-11.43	21	Pass
Middle		2441	-11.01	21	Pass
High		2480	-11.50	21	Pass

Note: 1. the result basic equation calculation as follow:

Max. Power Output = Power Reading + Cable loss + Attenuator

- 2. The worse case was recorded
- 3. The Peak power was measured

The report refers only to the sample tested and does not apply to the bulk.

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Type of Modulation: 8DPSK

EUT	CAR AU	CAR AUDIO VIDEO SYSTEM		XVM1000Ui
Mode	Ke	Keep Transmitting		DC12V
Temperature	2	24 deg. C,		56% RH
Channel	Channel Frequency (MHz)	Max. Power Output (dBm)	Peak Power Limit (dBm)	Pass/ Fail
		Peak		
Low	2402	-11.52	21	Pass
Middle	2441	-11.52	21	Pass
High	2480	-11.67	21	Pass

Note: 1. the result basic equation calculation as follow:

Max. Power Output = Power Reading + Cable loss + Attenuator

- 2. The worse case was recorded
- 3. The Peak power was measured

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9. Carrier Frequency Separation

9.1 Regulation

According to §15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

9.2 Limits of Carrier Frequency Separation

The Maximum Power Spectral Density Measurement is 25kHz or two-thirds of the 20dB bandwidth of the hopping Channel which is great.

9.3 Test Procedure

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Set the spectrum analyzer as follows: Span = wide enough to capture the peaks of two adjacent channels: Resolution (or IF) Bandwidth (RBW) \geq 1% of the span; Video (or Average) Bandwidth (VBW) \geq RBW; Sweep = auto; Detector function = peak; Trace = max hold
- 3. Measure the separation between the peaks of the adjacent channels using the marker-delta function.
- 4. Repeat above procedures until all frequencies measured were complete.

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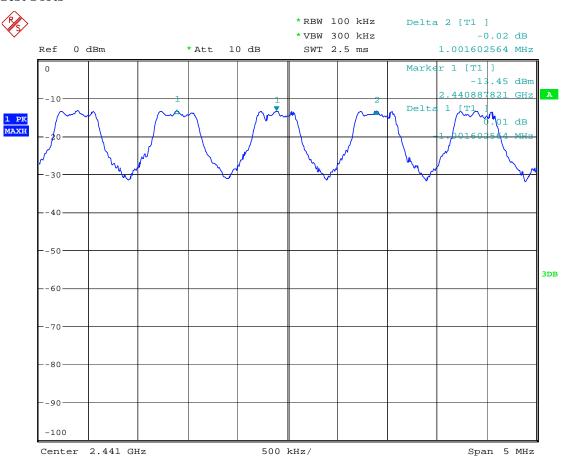


9.4Test Result

Type of Modulation: GFSK

EUT	CAR AUDIO VIDEO SYSTEM		Model	XVM1000Ui	
Mode	Hopping On I		Input Voltage	DC12V	
Temperature	24 deg. C,	Humidity			56% RH
Carrier Frequency Separation		Limit		Pass/ Fail	
1.002MHz		≥ 25 kHz or 2/3 of the 20 dB bandwidth		Pass	

Test Plots



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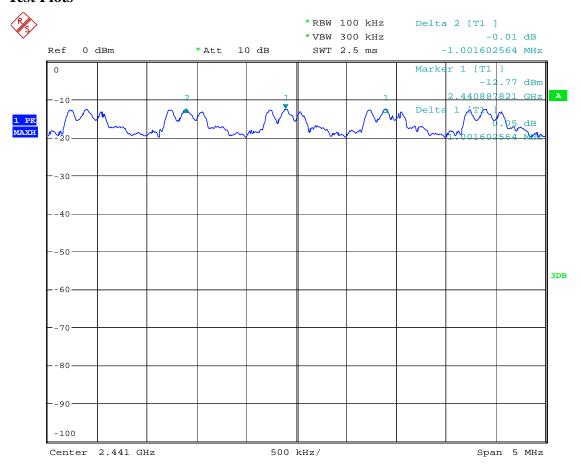
Date: 2020-01-03



Type of Modulation: $\pi/4D$ -QPSK

EUT	CAR AUDIO VIDEO SYSTEM		Model	X	VM1000Ui
Mode	Hopping On I		Input Voltage	DC12V	
Temperature	24 deg. C,	24 deg. C,		56% RH	
Carrier Frequency Separation		Limit		Pass/ Fail	
1.002MHz		≥ 25 kHz or 2/3 of 20 dB bandwidth		Pass	

Test Plots



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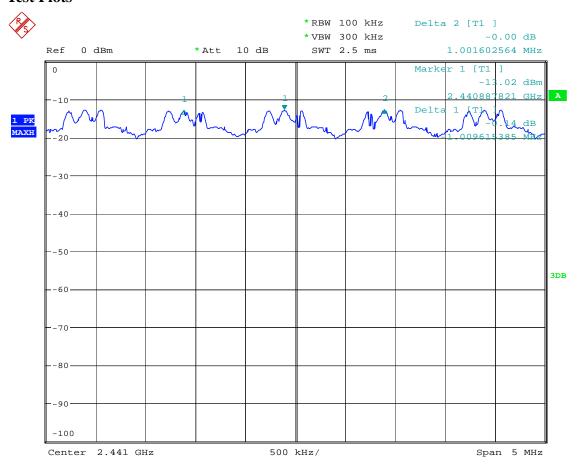
Date: 2020-01-03



Type of Modulation: 8DPSK

EUT	CAR AUDIO VIDEO SYSTEM		Model	X	VM1000Ui
Mode	Hopping On I		Input Voltage	DC12V	
Temperature	24 deg. C,		Humidity	56% RH	
Carrier Frequency Separation		Limit		Pass/ Fail	
1.002MHz		≥ 25 kHz or 2/3 of 20 dB bandwidth		Pass	

Test Plots



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10. Number of Hopping Channels

10.1 Regulation

According to §15.247(a)(1)(iii), frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used. According to §15.247(b)(1), for frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

10.2 Limits of Number of Hopping Channels

The frequency hopping systems in the 2400-2483.5MHz band shall use at least 15 channels.

10.3 Test Procedure

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Set the spectrum analyzer as follows: Span = the frequency band of operation; RBW=100 kHz, VBW=300 kHz; Sweep = auto; Detector function = peak; Trace = max hold
- 3. Record the number of hopping channels.

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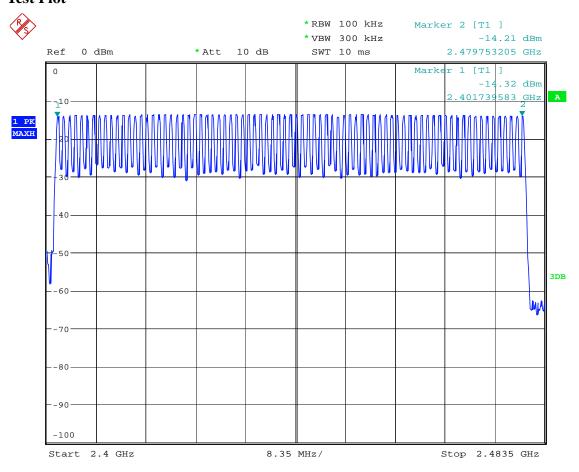


10.4Test Result

Type of Modulation: GFSK

EUT	CAR AUDIO VIDEO		Model	X	VM1000Ui
	SYSTEM				
Mode	Hopping On		Input Voltage	DC12V	
Temperature	24 deg. C,		Humidity	56% RH	
Operating Free	g Frequency Number of hopping cl		oing channels	Limit	Pass/ Fail
2402-2480MHz		79		≥ 15	Pass

Test Plot



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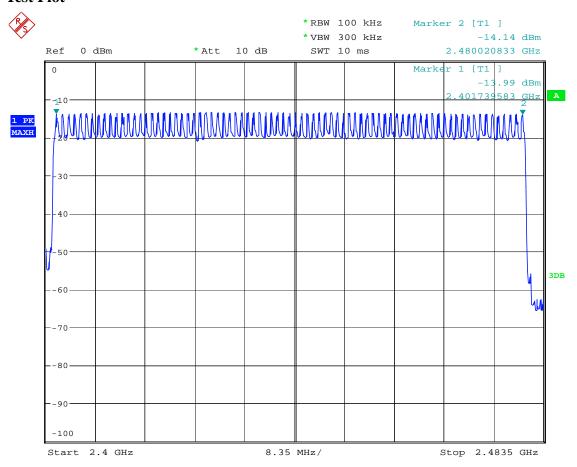
Date: 2020-01-03



Type of Modulation: $\sqrt{1/4}$ D-QPSK

EUT	CAR AUDIO VIDEO SYSTEM		Model	XVM1000Ui
Mode	Hopping On		Input Voltage	DC12V
Temperature	24 deg. C,		Humidity	56% RH
Operating Frequency		Number of hopping channels	Limit	Pass/ Fail
2402-2480MHz		79	≥ 15	Pass

Test Plot



Date: 2.JAN.2020 17:44:58

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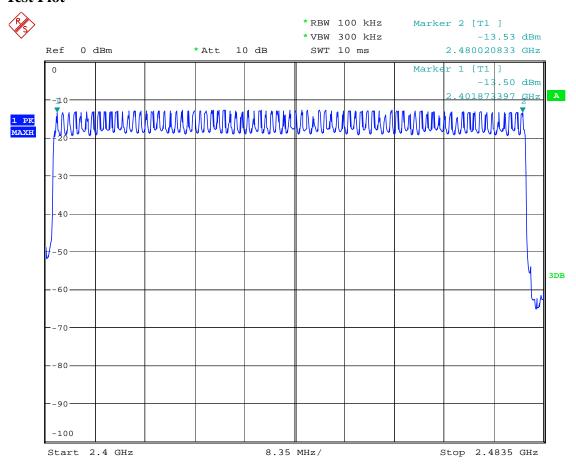
Date: 2020-01-03



Type of Modulation: 8DPSK

EUT	CAR AUDIO VIDEO SYSTEM		M	odel		XVM1000Ui
Mode	Hopping On		Input	Voltage		DC12V
Temperature		24 deg. C,		dity	56% RH	
Operating Frequency		Number of hopping channels		Liı	mit	Pass/ Fail
2402-2480MHz		79		≥ 15		Pass

Test Plot



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11. Time of Occupancy (Dwell Time)

11.1 Regulation

According to §15.247(a)(1)(iii), frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

11.2 Limits of Carrier Frequency Separation

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed

11.3 Test Procedure

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Set the spectrum analyzer as follows: Span = zero span, centered on a hopping channel; RBW = 1 MHz; VBW \geq RBW; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold
- 3. Measure the dwell time using the marker-delta function.
- 4. Repeat above procedures until all frequencies measured were complete.
- 5. Repeat this test for different modes of operation (e.g., data rate, modulation format, etc.), if applicable.

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11.4 Test Result

Type of Modulation: GFSK

1,100 01 1100 01 01 01 01						
EUT	CAR AUDIO V	O VIDEO SYSTEM Model		XVM1000Ui		
Mode	Keep Tr	ansmitting	Input Voltage]	DC12V	
Temperatur	re 24 d	leg. C,	Humidity	5	56% RH	
Channel	Reading	Hoping Rate		Actual	Limit	
	DH5					
Middle	2.997ms	266.66	266.667 hop/s		0.4s	

Actual = Reading \times (Hopping rate / Number of channels) \times Test period, Test period = 0.4 [seconds / channel] \times 79 [channel] = 31.6 [seconds] NOTE: The EUT makes worst case 1600 hops per second or 1 time slot has a length of 625 μ s with 79 channels.

A DH5 Packet needs 5 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 266.667 hops per second with 79 channels.

A DH3 Packet needs 3 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 400 hops per second with 79 channels.

A DH1 Packet needs 1 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 800 hops per second with 79 channels.

Note: DH5 was the worst case.

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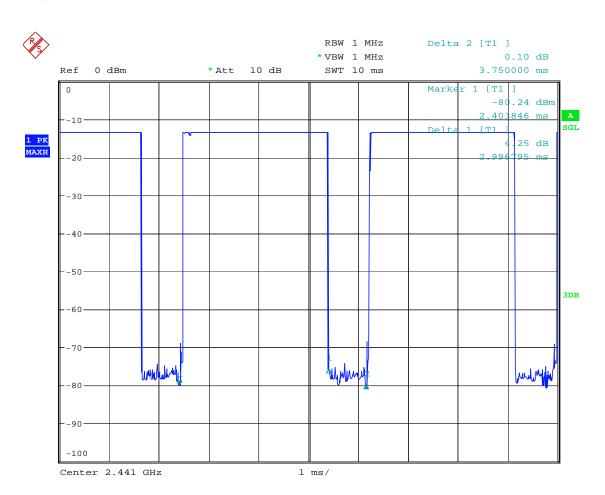
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Test Plots:

DH5



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Test Result

Type of Modulation: $\pi/4D$ -QPSK

EUT	CAR AUDIO V	CAR AUDIO VIDEO SYSTEM		XVM1000Ui		
Mode	Keep Tr	ransmitting Input Voltage]	DC12V	
Temperature	e 24 d	leg. C,	eg. C, Humidity		66% RH	
Channel	Reading	Hoping Rate		Actual	Limit	
DH5						
Middle	3.013ms	266.667 hop/s		0.321s	0.4s	

Actual = Reading \times (Hopping rate / Number of channels) \times Test period, Test period = 0.4 [seconds / channel] \times 79 [channel] = 31.6 [seconds] NOTE: The EUT makes worst case 1600 hops per second or 1 time slot has a length of 625 μ s with 79 channels.

A DH5 Packet needs 5 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 266.667 hops per second with 79 channels.

A DH3 Packet needs 3 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 400 hops per second with 79 channels.

A DH1 Packet needs 1 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 800 hops per second with 79 channels.

Note: 2DH5 was the worst case.

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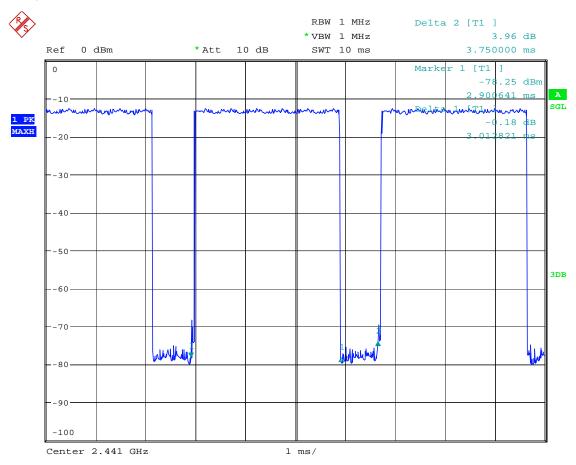
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Test Plots:

2DH5



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Type of Modulation: 8DPSK

EUT	CAR AUDIO V	CAR AUDIO VIDEO SYSTEM		XVM1000Ui		
Mode	Keep Tr	ansmitting	Input Voltage]	DC12V	
Temperature	e 24 d	leg. C,	Humidity 56% RH		56% RH	
Channel	Reading	Hoping Rate		Actual	Limit	
DH5						
Middle	3.013ms	266.667 hop/s		0.321s	0.4s	

Actual = Reading \times (Hopping rate / Number of channels) \times Test period, Test period = 0.4 [seconds / channel] \times 79 [channel] = 31.6 [seconds] NOTE: The EUT makes worst case 1600 hops per second or 1 time slot has a length of 625 μ s with 79 channels.

A DH5 Packet needs 5 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 266.667 hops per second with 79 channels.

A DH3 Packet needs 3 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 400 hops per second with 79 channels.

A DH1 Packet needs 1 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 800 hops per second with 79 channels.

Note: 3DH5 was the worst case.

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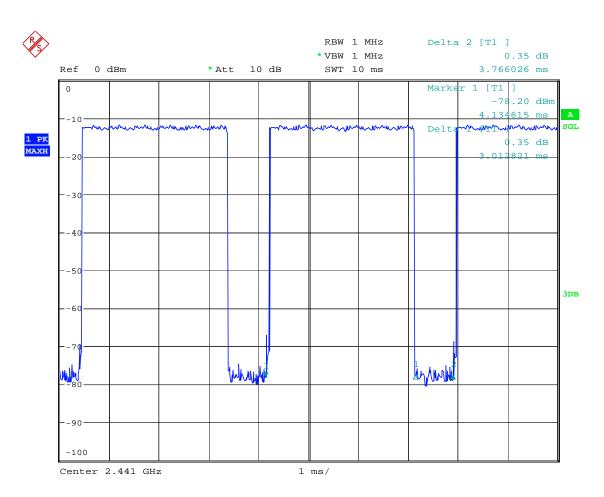
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Test Plots:

3DH5



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12 Out of Band Measurement

12.1 Test Setup



The restricted band requirement based on radiated emission test; please see the clause 6 for the test setup

12.2 Limits of Out of Band Emissions Measurement

- 1. Below –20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).
- 2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

12.3 Test Procedure

For signals in the restricted bands above and below the 2.4-2.483GHz allocated band a measurement was made of radiated emission test. Peak values with RBW=VBW=1MHz and PK detector.

For bandage test, the spectrum set as follows: RBW=100 kHz, VBW=300 kHz. A conducted measurement used

Note: 1. For band-edge measurement, the frequency from 30MHz-25GHz was tested. And It met the FCC rule.

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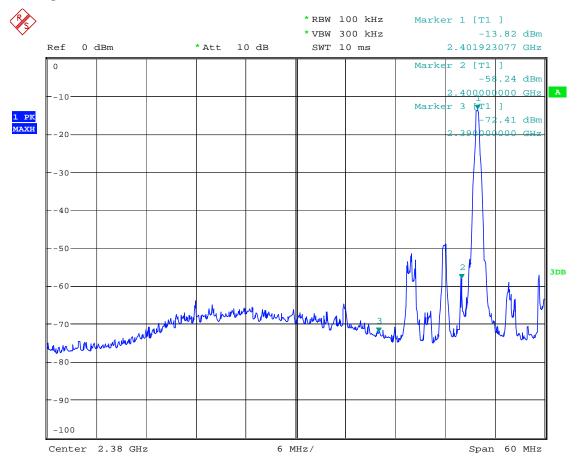


Type of Modulation: GFSK

Band Edge Test Result 12.4

Product:	CAR AUDIO VIDEO SYSTEM	Test Mode:	Low Channel
Mode	Keeping Transmitting	Input Voltage	DC12V
Temperature	24 deg. C	Humidity	56% RH
Test Result:	Pass	Detector	PK

Test Figure:



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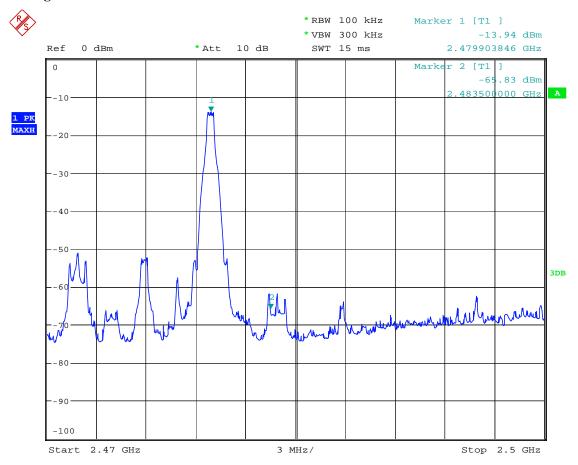


Type of Modulation: GFSK

Band Edge Test Result 12.4

Product:	CAR AUDIO VIDEO SYSTEM	Test Mode:	High Channel
Mode	Keeping Transmitting	Input Voltage	DC12V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

Test Figure:



Date: 2.JAN.2020 17:23:40

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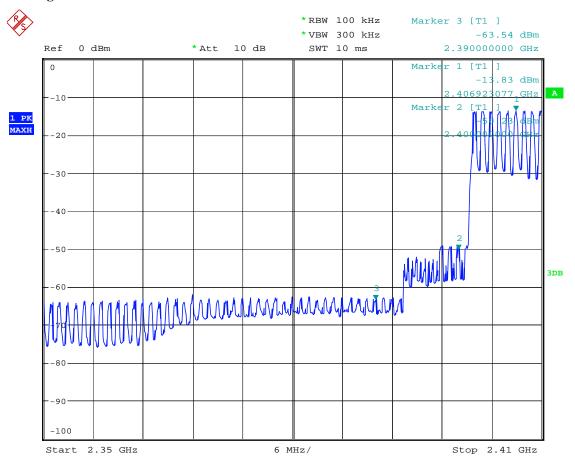


Type of Modulation: GFSK

Band Edge Test Result

Product:	CAR AUDIO VIDEO SYSTEM	Test Mode:	Hopping mode
Mode	Hopping On	Input Voltage	DC12V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

Test Figure:



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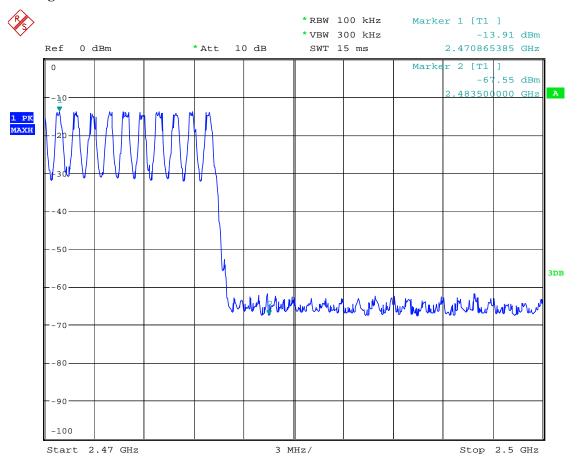


Type of Modulation: GFSK

Band Edge Test Result

Product:	CAR AUDIO VIDEO SYSTEM	Test Mode:	Hopping mode
Mode	Hopping On	Input Voltage	DC12V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

Test Figure:



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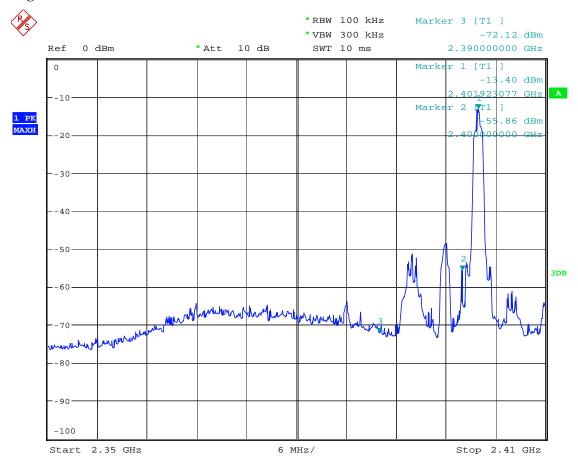


Type of Modulation: $\pi/4D$ -QPSK

12.4 Out of Band Test Result

Product:	CAR AUDIO VIDEO SYSTEM	Test Mode:	Low Channel
Mode	Keeping Transmitting	Input Voltage	DC12V
Temperature	24 deg. C	Humidity	56% RH
Test Result:	Pass	Detector	PK

Test Figure:



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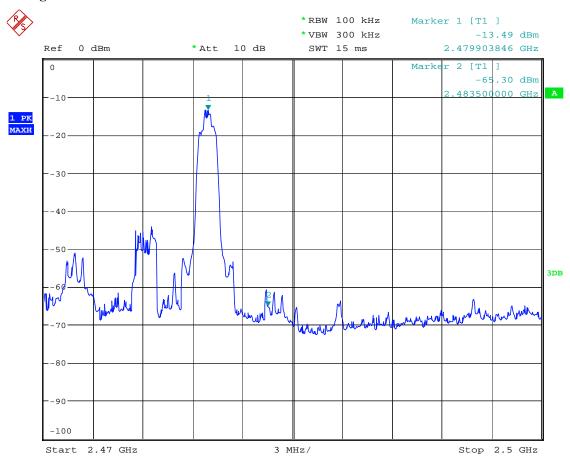


Type of Modulation: $\pi/4D$ -QPSK

12.4 Band Edge Test Result

Product:	CAR AUDIO VIDEO SYSTEM	Test Mode:	High Channel
Mode	Keeping Transmitting	Input Voltage	DC12V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

Test Figure:



Date: 3.JAN.2020 09:59:55

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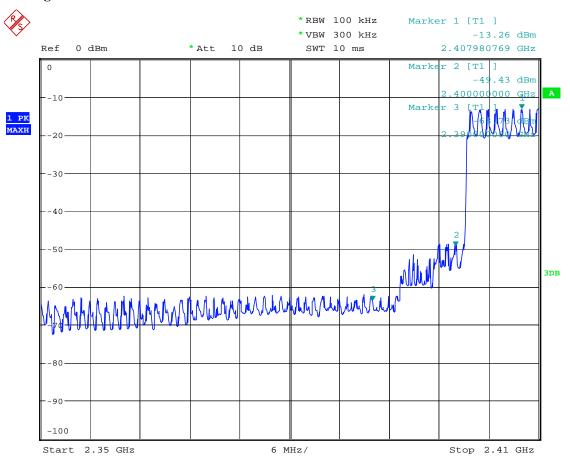


Type of Modulation: $\pi/4D$ -QPSK

Out of Band Test Result

Product:	CAR AUDIO VIDEO SYSTEM	Test Mode:	Hopping mode
Mode	Hopping On	Input Voltage	DC12V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

Test Figure:



Date: 3.JAN.2020 10:04:31

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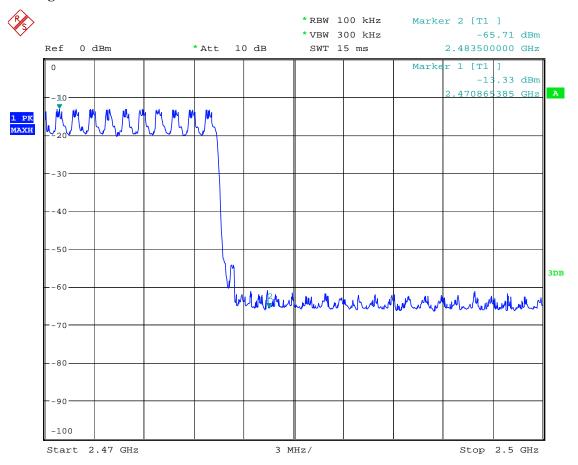


Type of Modulation: $\pi/4D$ -QPSK

Out of Band Test Result

Product:	CAR AUDIO VIDEO SYSTEM	Test Mode:	Hopping mode
Mode	Hopping On	Input Voltage	DC12V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

Test Figure:



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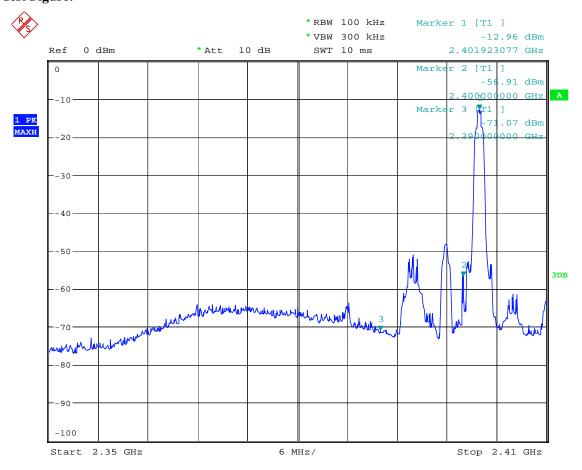


Type of Modulation: 8DPSK

12.4 Band Edge Test Result

Product:	CAR AUDIO VIDEO SYSTEM	Test Mode:	Low Channel
Mode	Keeping Transmitting	Input Voltage	DC12V
Temperature	24 deg. C	Humidity	56% RH
Test Result:	Pass	Detector	PK

Test Figure:



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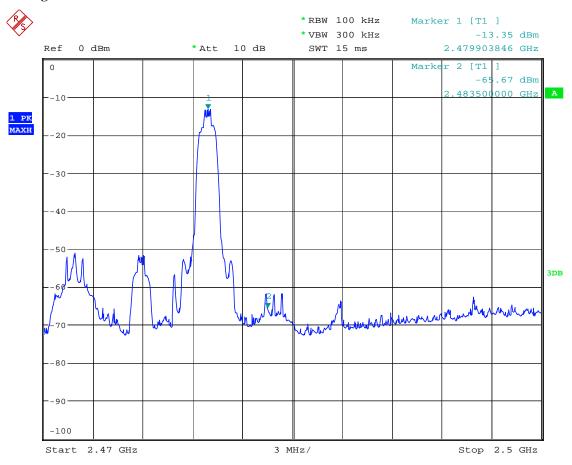


Type of Modulation: 8DPSK

12.4 Band Edge Test Result

Product:	CAR AUDIO VIDEO SYSTEM	Test Mode:	High Channel
Mode	Keeping Transmitting	Input Voltage	DC12V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

Test Figure:



Date: 3.JAN.2020 11:08:44

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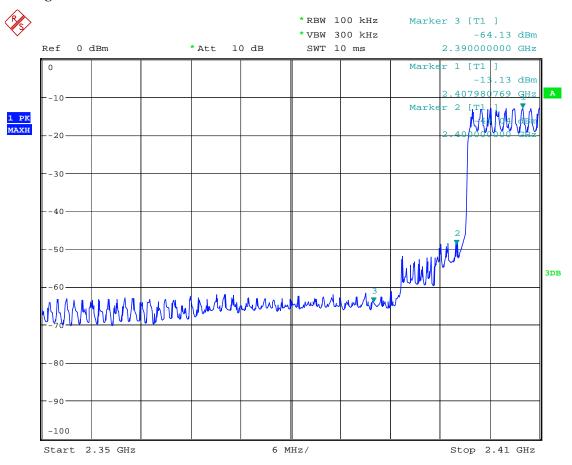


Type of Modulation: 8DPSK

Band Edge Test Result

Product:	CAR AUDIO VIDEO SYSTEM	Test Mode:	Hopping mode
Mode	Hopping On	Input Voltage	DC12V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

Test Figure:



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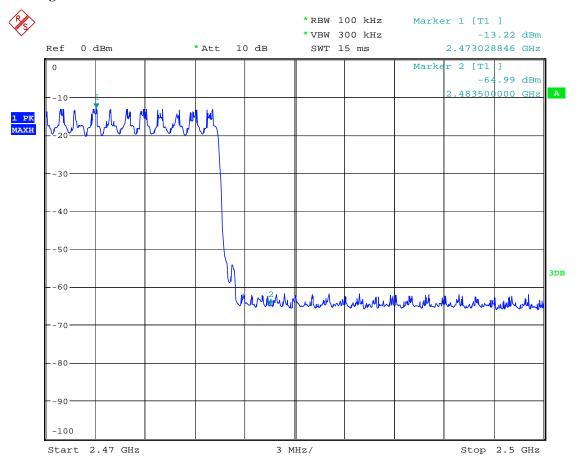


Type of Modulation: 8DPSK

Band Edge Test Result

Product:	CAR AUDIO VIDEO SYSTEM	Test Mode:	Hopping mode
Mode	Hopping On	Input Voltage	DC12V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

Test Figure:



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12.4 **Restrict Band Measurement**

	EUT	CAR AU	JDIO VI	DEO SYSTE	EM	Model			XVM100	0Ui
	Mode	K	eep Tran	smitting		Input Volta	ige		DC12	V
Te	mperature	rature 24 deg. C, Humidity		У			56% RH			
Te	est Result:		Pas	SS	M	odulation '	Гуре		8DPSI	Κ
CC Part 1	58 Class 8 1GHz-18GHz	-2								
7.5%										
80-										
									\wedge	-
70-								1	1	
⊋ 60-									1	
60° 60° 50° 50° 50° 50° 50° 50° 50° 50° 50° 5										
\$ 50-							100 1 1	1./	1	
				ndo:	· Committee	Jali		11/1/	V.	
			(1 , 1)	The state of the state of	in the	L. L. ANGELL	I DE LA STREET		V	DIL. L. LI
40-	وويرافها براوارية وارته	الغام الساما	Madda	Mark Market Land	الملاوسان فنالونها	LI LINOHA	THE ATTEM	7.	1	Mill will be said to
30-	زوروا الأوليها ليداروها والأو	the state of the s	indicate of the second	Market Market Market	haviolately benefit.	A PROPERTY OF	the Article			MAINMAN
è		international philips	indicated and and	"Antalahilaniah	Frequency (MH	AND THE PARK	ten attach		- 8	2410
30-	Frequency	Results	Factor	Limit	Frequency (MH	Detector	Table (o)	Height	ANT	Verdict
30- 236	25	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)		0.000	Table (o)	Height (cm)	ANT	930

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12.4 **Restrict Band Measurement**

	EUT	CAR AU	JDIO VI	DEO SYSTE	M	Model		X	VM1000U	Ji
	Mode	K	eep Tran	smitting	In	put Voltage	;		DC12V	
Te	mperature		24 deg	g. C,]	Humidity			56% RH	
Te	est Result:		Pas	SS	Mod	dulation Ty	ре		8DPSK	
CC Part 1	58 Class 8 1GHz-18GHz	- 2			•		•			÷1
70 - (w/\ngp) see 50 -	ki Mhahasidi shiki ai kiki	J. N. Strick and Street	والمنابئة	Managalida	insideraphilipeaphilip	And Married		A STANSON OF THE STAN		**************************************
×		_			720 83	10				3410
30 2360	,				Frequency (M)	42)				
30- 2360 No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table (o)	Height	ANT	Verdict
2360	25	Results (dBuV/m)	Factor (dB)		a second contract	300	Table (o)	Height (cm)	ANT	Verdict

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12.4 **Restrict Band Measurement**

EUT	CAR	RAUDIO VID	EO SYSTEM		Model			XVM10	00Ui
Mode		Keep Trans	mitting		Input Volt	age		DC12	2V
Temperatur	·e	24 deg.	C,		Humidit	ty		56% F	RH
Test Result	:	Pass		M	odulation	Type		8DPS	K
CC Part 158 Class B 1GH	r-18GHz - 2								#3
90-									
80-									
-		0	n.						
70-		, in the second	1						
		1							
			1						
g 60-									
60-									
gu/Angpi java so-									
60- 60- 50-									
50-	4		1	ma sa Chi	dalainette, e a 11	o control	ale at	6 - 10 - 10 -	de i de
40-40-40-40-40-40-40-40-40-40-40-40-40-4	Marineral backware		1	V oroniejski je	لمالمان المتعادم	idasi da karanti da ka	Lidding on the party	المعطامة المتعادلة ا	Makahlanu
40- 30- 2470	de Antonio de la como		2453.	Montalishidd	A STATE OF THE PARTY OF THE PAR	المناوية المعربة	Likhish Makeley	المتعطية المتعادية ا	Market Maries
40-	day anima di darak darak		2483.	Malhalishida S Frequency (MHz	Marine Maria de La	idenia khingidhidi	Lista Madeinia	haydyda i dda	2500
30- 2470	uency Resi	ults Factor	7927		Detector	Table (o)	Height	ANT	2500.
30- 2470		ults Factor (dB)	Limit	Frequency (MHz)		Table (o)	Height (cm)	ANT	11.1

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12.4 Restrict Band Measurement

Mode Keep Transmitting Input Voltage DC12V Temperature 24 deg. C, Humidity 56% RH Test Result: Pass Modulation Type 8DPSK C Part 158 Class 8 1GHz-18GHz - 2 90 100 100 100 100 100 100 100	EU'	T	CAR AUD	OIO VID	EO SYSTEM	1	Model			XVM100	00Ui
Test Result: Pass Modulation Type 8DPSK C Part 158 Class 8 2GHz-18GHz - 2 90 70-	Mod	de	Kee	p Transı	nitting	Iı	nput Volta	ge		DC12	V
Part 158 Class 8 2GHz-18GHz - 2 90- 90- 70-	Temper	rature		24 deg.	C,		Humidity			56% R	Н
70-	Test Re	esult:		Pass		Mo	dulation T	уре		8DPS1	K
70-		8 1GHz-18GHz - 2	i								#3
					4						
	40-40-40-40-40-40-40-40-40-40-40-40-40-4	The same of the sa	hildrenny		248		Lein belande Lander Land	illichid deith	hereby his	, light de propinsion de la constant	Adjorda da seco
) HOME (HEM/1999)	40- 30- 3470	Frequency	Results	Factor	777	Frequency (MHz)		Table	Height	ANT	11.1
) HOME (1982/2000)	30-2470 No. F				Limit	Over Limit			_	ANT	11.1

Note: 1. For Restricted band test, only the worst case was reported.

2. The measured PK value less than the AV limit, no necessary to take down the AV measurement result.

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13.0 Antenna Requirement

13.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitter antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the mount in dB that the directional gain of the antenna exceeds 6 dBi.

13.2 Antenna Connected constructions

Ant 1: PCB antenna. The gain of the antennas is 0.58dBi

Ant 2: Integral antenna, The gain of the antennas is 2.0dBi

Note: there is only one transmission chain. And the two antennas can transmit at the same time.

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14.0 FCC ID Label

FCC ID: 2AVAXHSNS20190001

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The label must not be a stick-on paper label. The label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

Mark Location:



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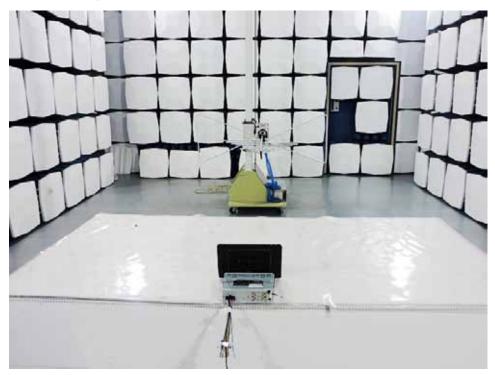
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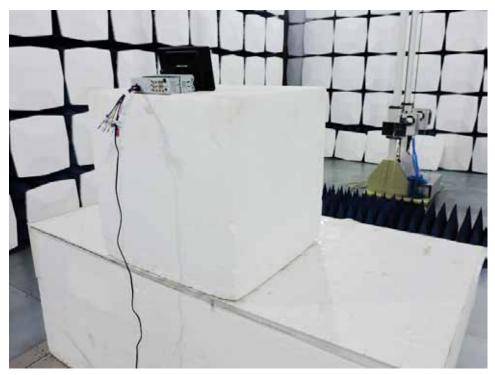
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15.0 Photo of testing

Radiated Emission Test Setup:





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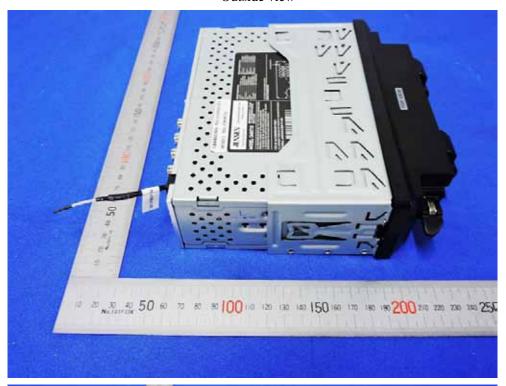
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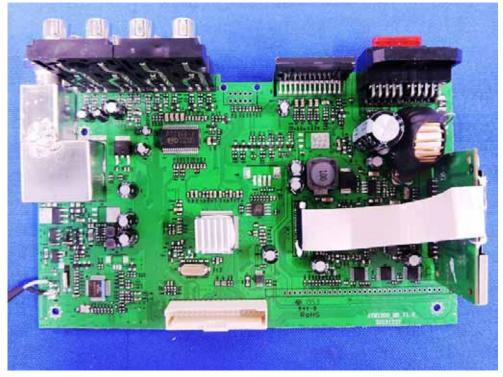
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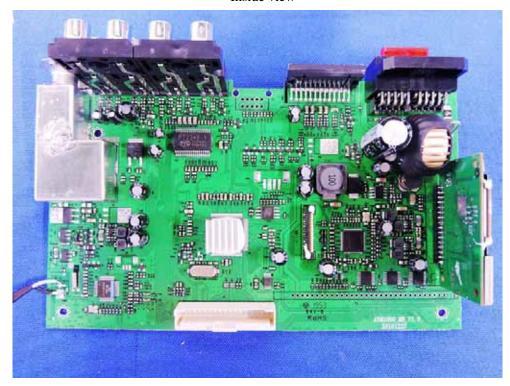
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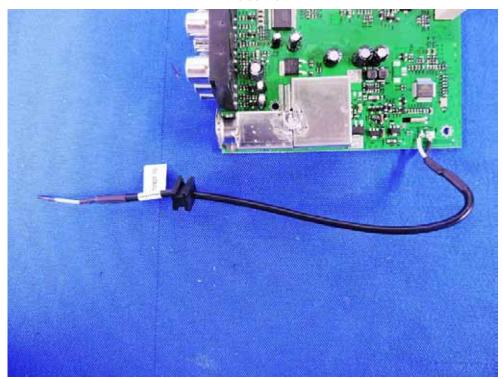
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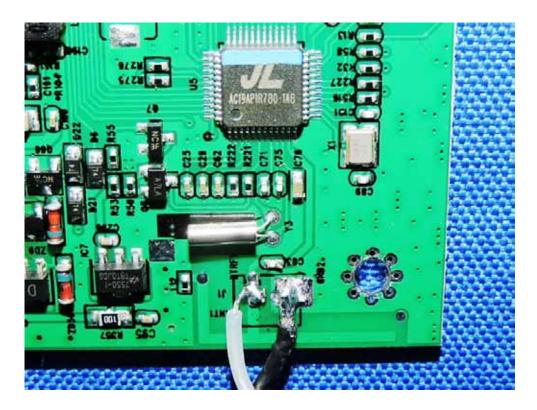
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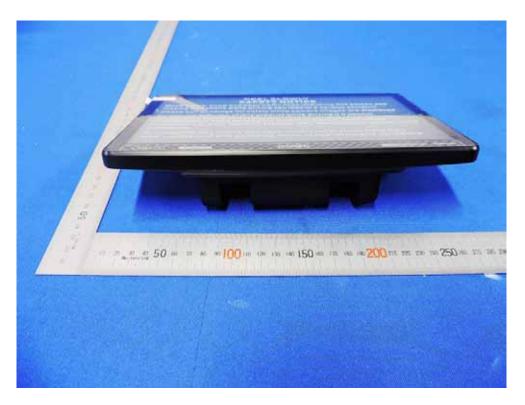
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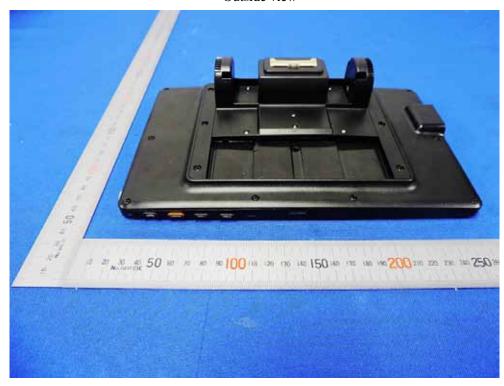
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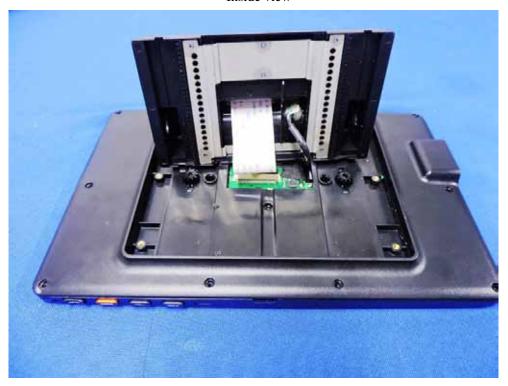
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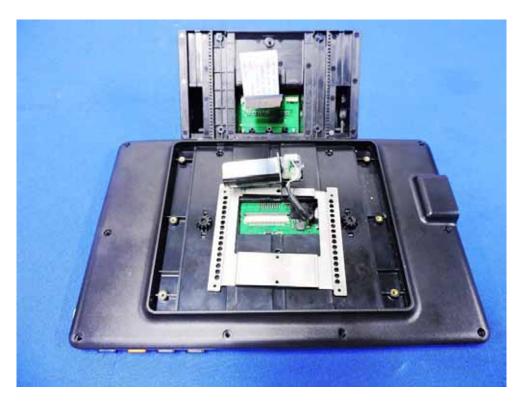
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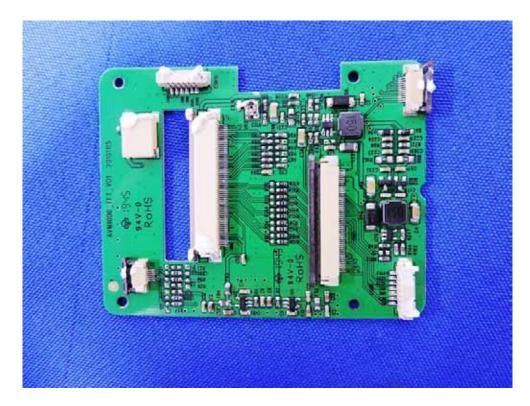
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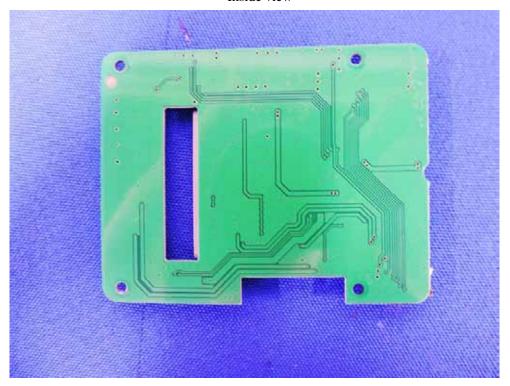
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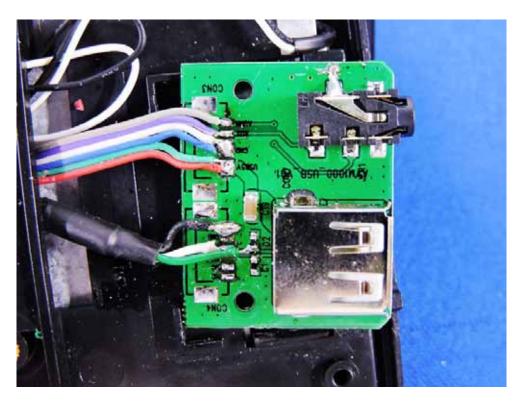
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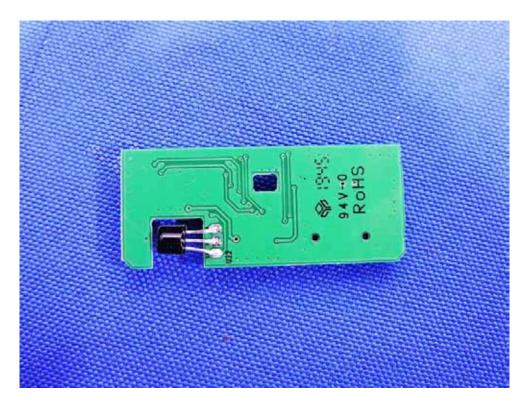
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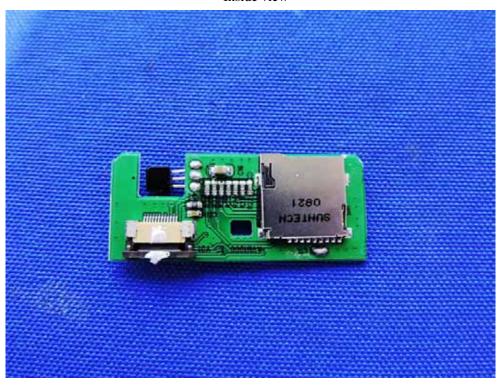
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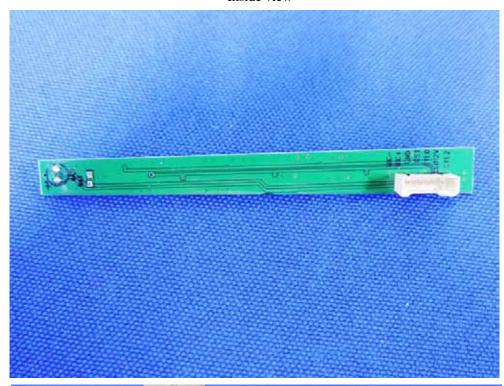
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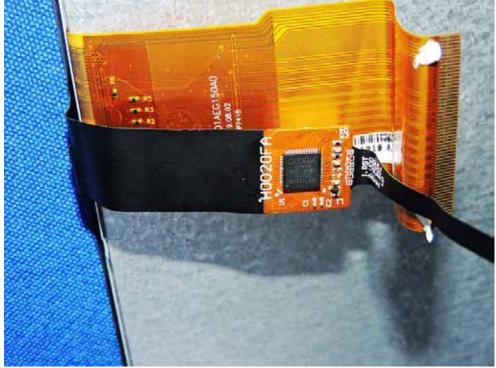
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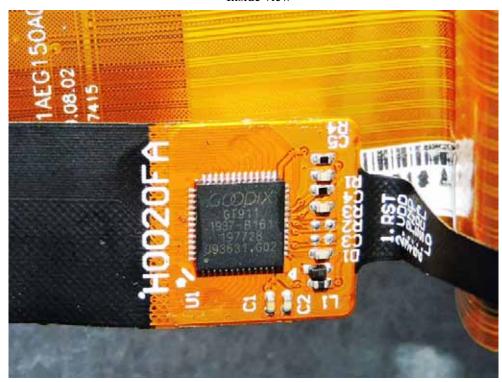
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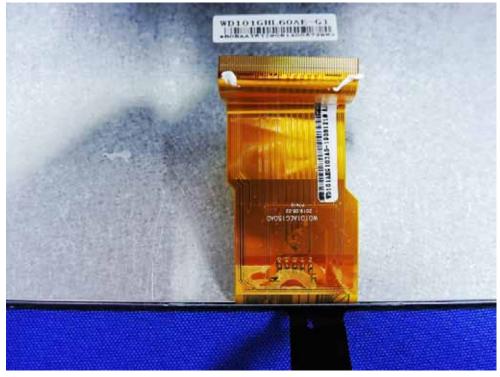
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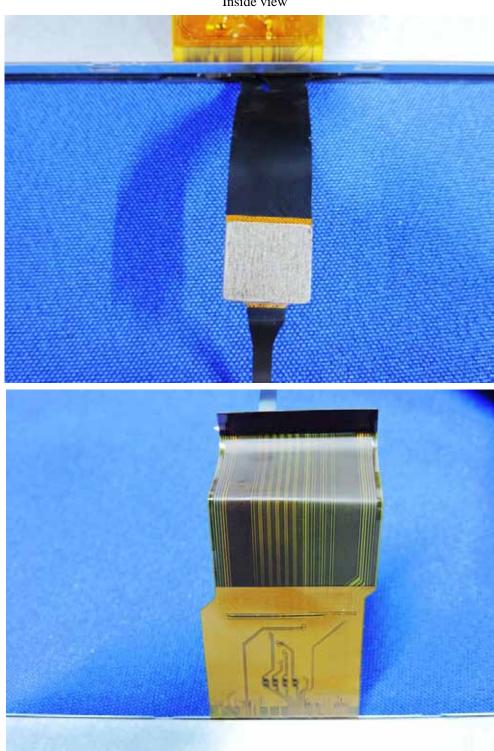
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