



FCC TEST REPORT

REPORT NO.: DSA-11OC0107MBCY-FCC

MODEL NO.: D500050000

RECEIVED: Oct. 18, 2011

ISSUED: Nov. 25, 2011

APPLICANT: DIAS AUTOMOTIVE ELECTRONIC
SYSTEMS CO., LTD

ADDRESS: 6th Floor, 3 Building, No. 615, Ning Qiao,
Pudong, Shanghai

ISSUED BY: BUREAU VERITAS ADT (Shanghai) Corporation

LAB LOCATION: 2F, Building C, No.1618, Yishan rd., 201103,
Shanghai, China

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1 CERTIFICATION

PRODUCT: TPMS sensor
MODEL NO.: N/A
APPLICANT: D500050000
TESTED: Oct. 26 ~Nov. 20, 2011
TEST ITEM: Engineering Sample
STANDARDS: FCC Part 15:2010,
Subpart C (Section 15.209 and 15.231),
ANSI C63.4-2003

We, BUREAU VERITAS ADT (Shanghai) Corporation, declare that the equipment above has been tested in our facility and found compliance with the requirement limits of applicable standards. The test record, data evaluation and Equipment Under Test (EUT) configurations represented herein are true and accurate under the standards herein specified.

PREPARED BY : fish ye , **DATE:** Nov. 25, 2011
Fish YE
Report Engineer

TECHNICAL ACCEPTANCE : Joy zhu , **DATE:** Nov. 25, 2011
Joy Zhu
Lab Manager

APPROVED BY : Yzhu , **DATE:** Nov. 25, 2011
Zhaoqian YU
Director of Operations



2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C			
Standard Paragraph	Test Type	Result	Remarks
15.207	Conducted Emission Test	N/A	Please refer to 4.1.2.
15.231(e)	De-activation Time	PASS	Meet the requirement of limit
15.209 15.231(e)	Radiated Emission Test	PASS	Minimum passing margin is -22.05dB to 37.27MHz
15.231(c)	20dB Occupied Bandwidth Measurement	PASS	Meet the requirement of limit

2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4:

Measurement		Value
Conducted emissions		2.55 dB
Conducted emissions at telecom port		2.60 dB
Radiated emissions	30 MHz ~ 1GHz	3.22 dB
	Above 1GHz	2.89 dB



3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	TPMS sensor
MODEL NO.	D500050000
POWER SUPPLY	3V DC by battery
MODULATION TYPE	FSK
CARRIER FREQUENCY OF EACH CHANNEL	433.92 MHz
NUMBER OF CHANNEL	1
ANTENNA TYPE	Soldered on PCB
DATA CABLE SUPPLIED	N/A
I/O PORTS	N/A

NOTE: The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

Test Mode	Description
1	Make sure EUT work in the operation mode.

One channel is provided to this EUT:

Channel	Frequency
1	433.92 MHz



3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a remote switching. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

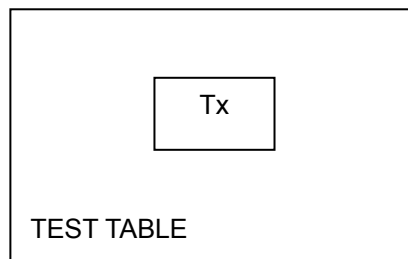
FCC Part 15, Subpart C. (15.231)

ANSI C63.4- 2003

All test items have been performed and recorded as per the above standards.

3.4 DESCRIPTION OF SUPPORT UNITS

For Transmitter





4 EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY (MHz)	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

- NOTES:** 1. The lower limit shall apply at the transition frequencies.
 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

4.1.2 TEST RESULTS

Because the EUT is powered by battery, so the report doesn't require for conduct emission test.



4.2 DEACTIVATION TIME

4.2.1 LIMITS OF DEACTIVATION TIME MEASUREMENT

TEST STANDARD:

FCC Part 15: 2010, Subpart C (Section: 15.231(e))

A transmitter activated automatically shall cease transmission within 1 second after activation.

4.2.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
Spectrum Analyzer ROHDE & SCHWARZ	FSP	E1S1002	May. 15, 2012
BILOG Antenna SCHWARZBECK	VULB9168	E1A1001	Sept. 26, 2012

NOTE: The calibration interval of the above test instruments is 12 months.

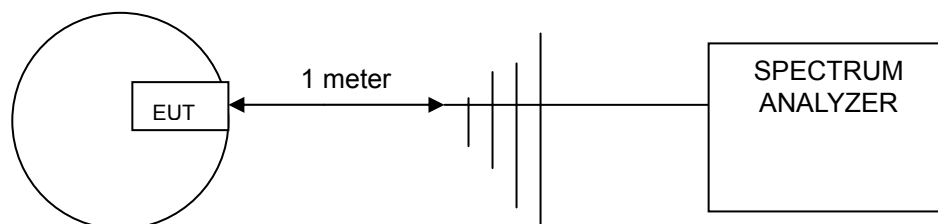
4.2.3 TEST PROCEDURES

- 1 The EUT was placed on the turning table.
- 2 The signal was coupled to the spectrum analyzer through an antenna.
- 3 The transmission duration was measured and recorded.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

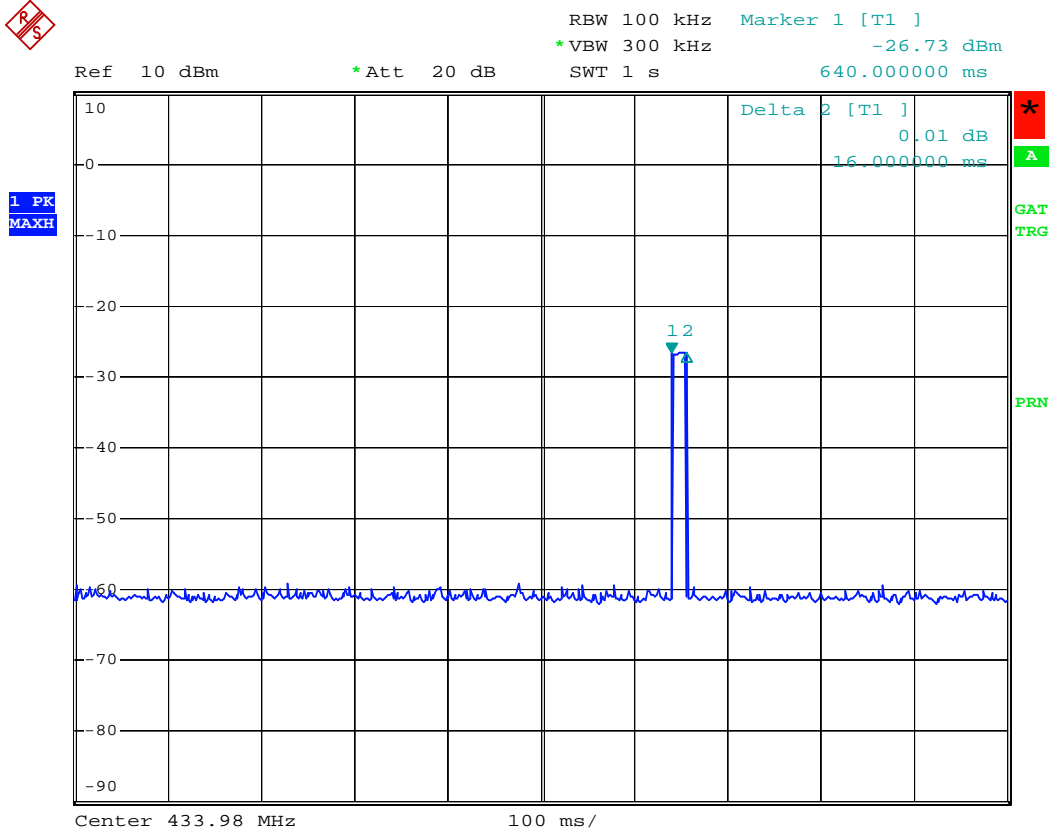
4.2.5 TEST SETUP





4.2.6 TEST RESULTS

Frequency (MHz)	Transmission duration (sec)	Maximum limit (sec)	Pass / Fail
433.98	0.016	1	Pass



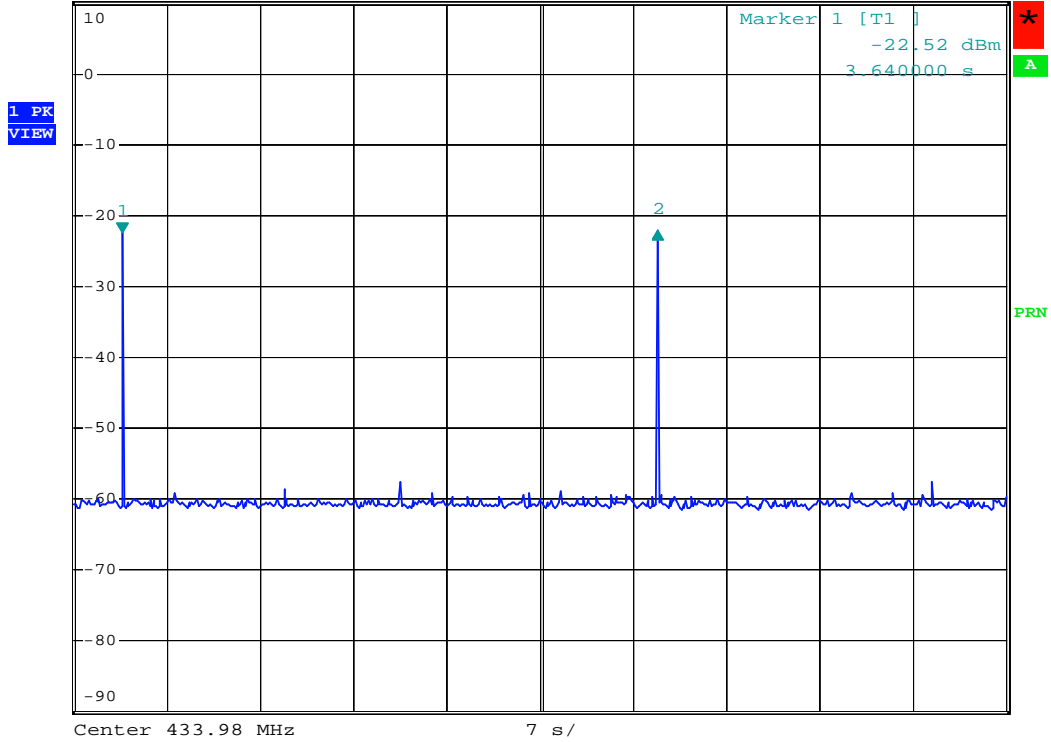
Date: 12.DEC.2011 14:23:09



Silent period



Ref 10 dBm *Att 20 dB RBW 100 kHz Delta 2 [T1] 0.27 dB
*VBW 300 kHz SWT 70 s 40.180000 s



Date: 12.DEC.2011 16:44:36



4.3 RADIATED EMISSION MEASUREMENT

4.3.1 LIMITS OF RADIATED EMISSION MEASUREMENT

TEST STANDARD:

FCC Part 15: 2010, Subpart C (Section: 15.205)

FCC Part 15: 2010, Subpart C (Section: 15.209)

FCC Part 15: 2010, Subpart C (Section: 15.231(e))

According to 15.231 the field strength of emissions from intentional radiators operated under these frequencies bands shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental		Field Strength of Spurious	
	uV/meter	dBuV/meter	uV/meter	dBuV/meter
40.66 – 40.70	1000	60	100	40
70 – 130	500	53.98	50	33.98
130 – 174	500 to 1500	53.98 to 63.52	50 to 150	33.98 to 43.52
174 – 260	1500	63.52	150	43.52
260 – 470	1500 to 5000	63.52 to 73.98	150 to 500	43.52 to 53.98
Above 470	5000	73.98	500	53.98

NOTE:

- (1) Where F is the frequency in MHz, the formula for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, uV/m at 3 meters = $22.7272(F)-2454.5454$; for the band 260-470 MHz, uV/m at 3 meters = $16.6667(F)- 2833.3333$. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.
- (2) The above field strength limits are specified at a distance of 3meters. The tighter limits apply at the band edges.



Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

FREQUENCY RANGE OF RADIATED MEASUREMENT

(For intentional radiators)

If the intentional radiator operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.



4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS30	E1R1001	Apr. 19, 2012
BILOG Antenna SCHWARZBECK	VULB9168	E1A1001	Sept. 26, 2012
Preamplifier Agilent	8447D	E1A2001	Jan. 27, 2012
Preamplifier Agilent	8449B	E1A2002	Jan. 27, 2012
Double Ridged Broadband Horn Antenna Schwarzbeck	BBHA 9120D	E1A1002	Feb. 15, 2012
*Spectrum Analyzer Agilent	E4403B	E1S1001	Jan. 13, 2012
*Spectrum Analyzer ROHDE & SCHWARZ	FSP	E1S1002	May. 15, 2012
RF signal cable Woken	RG-402	E1CBH01	May. 30, 2012
RF signal cable Woken	RG-402	E1CBH16	May. 30, 2012
RF signal cable Woken	RG-402	E1CBH20	May. 30, 2012
RF signal cable Woken	RG-412	E1CBL02	May. 30, 2012
RF signal cable Woken	RG-412	E1CBL03	May. 30, 2012
RF signal cable Woken	RG-412	E1CBL04	May. 30, 2012
Software ADT	ADT_Radiated_V7.5	N/A	N/A

- NOTE:**
1. The calibration interval of the above test instruments is 12 months.
 2. "*" = These equipment are used for the final measurement.
 3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
 4. The Spectrum Analyzer (model: FSP) and RF signal cable (SERIAL: E1CBH05&E1CBH07) are used only for the measurement of emission frequency above 1GHz if tested.



4.3.3 TEST PROCEDURE

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

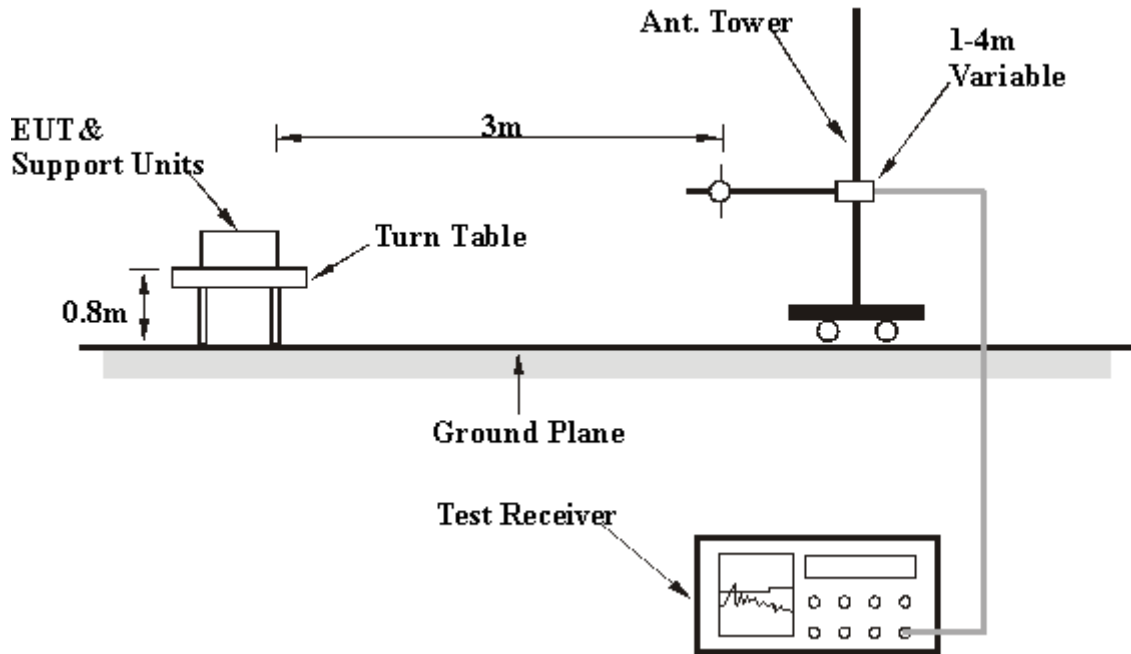
1. The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection (PK) at frequency above 1GHz.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation.



4.3.5 TEST SETUP



For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

4.3.6 EUT OPERATING CONDITIONS

Set the transmitter part of EUT under transmission condition continuously at specific channel frequency.

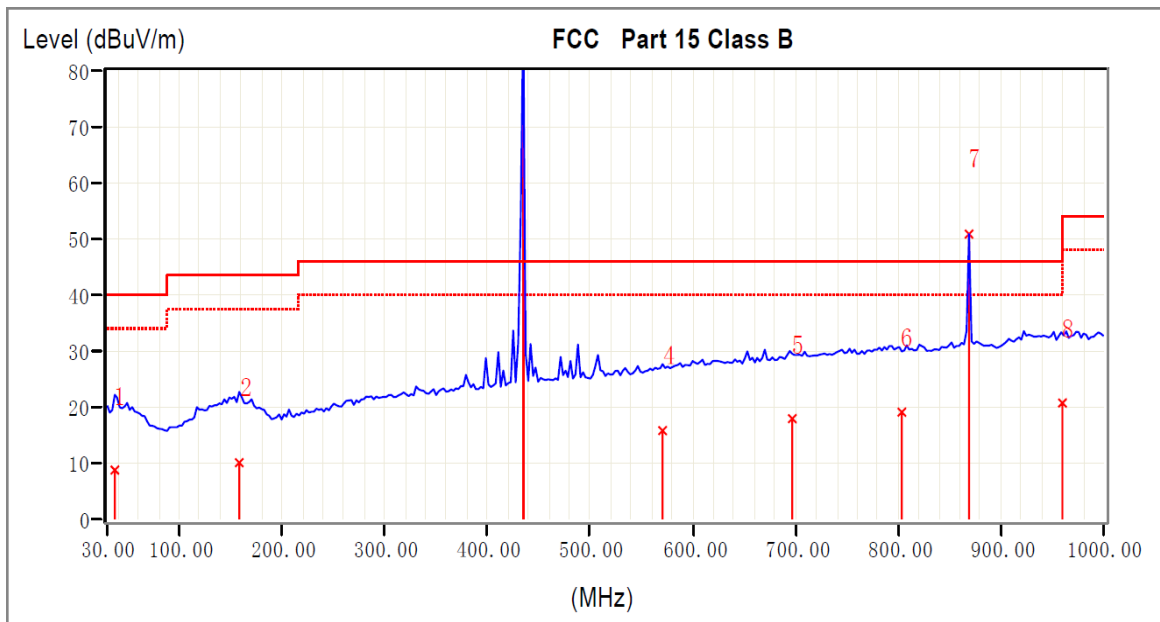


4.3.7 TEST RESULTS

Below 1GHz Worst-Case Data

EUT	TPMS sensor	MODEL NO.	D500050000
CHANNEL	Channel 1	FREQUENCY RANGE	30 ~ 1000 MHz
MODULATION TYPE	FSK	INPUT POWER (SYSTEM)	3V DC by battery
ENVIRONMENTAL CONDITIONS	20 deg. C, 50% RH, 1000 hPa	DETECTOR FUNCTION	Quasi-Peak
TESTED BY	Roy CHENG		

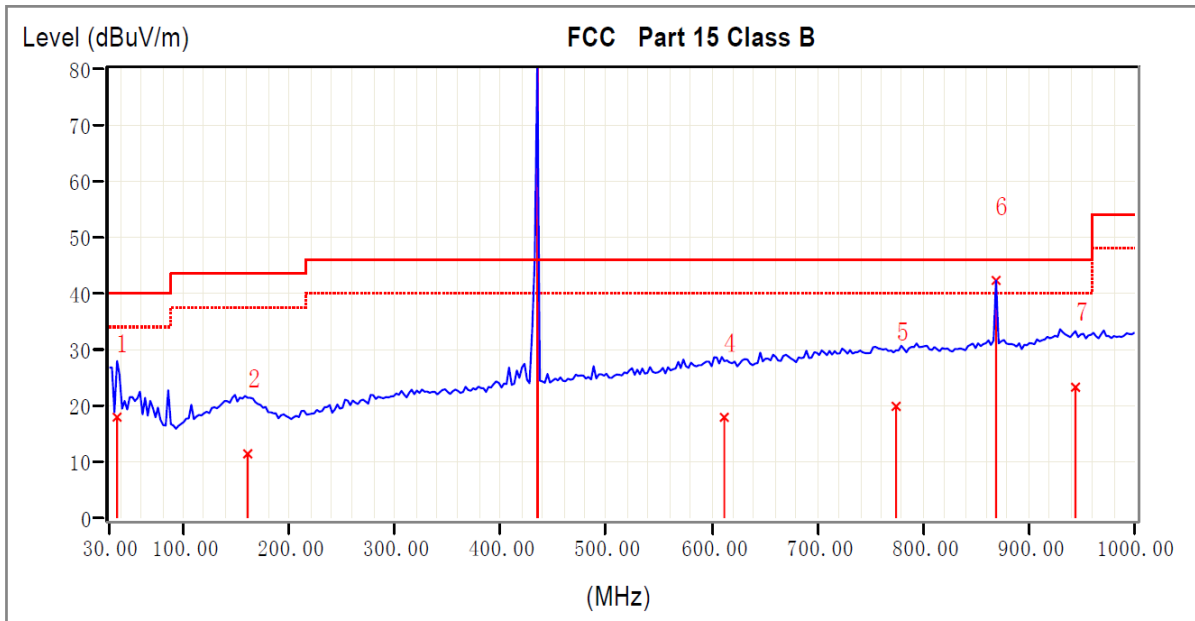
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Factor (dB/M)	Reading (dBuV/M)	Emission (dBuV/M)	Limit (dBuV/M)	Margin (dB)	Ant. Height (cm)	Table Angle (Deg.)
1	37.27	15.43	-6.67	8.76	40.00	-31.24	100	196
2	158.53	16.78	-6.69	10.09	43.50	-33.41	100	169
4	570.77	22.15	-6.38	15.78	46.00	-30.22	100	147
5	696.87	24.23	-6.30	17.93	46.00	-28.07	100	125
6	803.58	25.66	-6.58	19.09	46.00	-26.91	100	107
8	960.00	27.39	-6.64	20.74	46.00	-25.26	100	107





ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Factor (dB/M)	Reading (dBuV/M)	Emission (dBuV/M)	Limit (dBuV/M)	Margin (dB)	Ant. Height (cm)	Table Angle (Deg.)
1	37.27	15.43	2.52	17.95	40.00	-22.05	100	32
2	160.95	16.69	-5.29	11.40	43.50	-32.10	100	65
4	612.00	23.08	-5.16	17.92	46.00	-28.08	100	92
5	774.48	25.29	-5.42	19.87	46.00	-26.13	100	117
7	944.23	27.39	-4.13	23.26	46.00	-22.74	100	145

- NOTE:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB)
 2. Correction Factor (dB) = Antenna Factor (dB) + Cable Factor (dB)
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. "*" = Fundamental frequency
 6. The average value of fundamental frequency and spurious emission is: Average = Peak value + 20log(Duty cycle)
 Where the duty factor is calculated from following formula:
 $20\log(\text{Duty cycle}) = 20\log[(69 \times 0.066\text{ms} + 5 \times 0.133) / 10\text{ms}] = -5.65\text{dB}$
 Average = PK value + 20log(Duty cycle) = PK value - 5.65dB
 please see page 21 and 22 for plotted duty





EUT	TPMS sensor	MODEL NO.	D500050000
CHANNEL	Channel 1	FREQUENCY RANGE	Below 1GHz
MODULATION TYPE	FSK	INPUT POWER (SYSTEM)	3V DC by battery
ENVIRONMENTAL CONDITIONS	20 deg. C, 50% RH, 1000 hPa	DETECTOR FUNCTION	Peak/ Average
TESTED BY	Roy CHENG		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Factor (dB/M)	Reading (dBuV/M)	Emission (dBuV/M)	Limit (dBuV/M)	Margin (dB)	Ant. Height (cm)	Table Angle (Deg.)
1	433.98PK	19.47	57.72	77.19	92.87	-15.68	--	--
2	433.98AV	19.47	52.07	71.54	72.87	-1.33	--	--
3	869.05PK	26.16	24.7	50.86	72.87	-22.01	--	--
4	869.05AV	26.16	19.05	45.21	52.87	-7.66	--	--

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Factor (dB/M)	Reading (dBuV/M)	Emission (dBuV/M)	Limit (dBuV/M)	Margin (dB)	Ant. Height (cm)	Table Angle (Deg.)
1	433.98PK	19.47	57.04	76.51	92.87	-16.36	--	--
2	433.98AV	19.47	51.39	70.86	72.87	-2.01	--	--
3	869.05PK	26.16	16.15	42.31	72.87	-30.56	--	--
4	869.05AV	26.16	10.5	36.66	52.87	-16.21	--	--



Above 1GHz Worst-Case Data

EUT	TPMS sensor	MODEL NO.	D500050000
CHANNEL	Channel 1	FREQUENCY RANGE	Above 1GHz
MODULATION TYPE	FSK	INPUT POWER (SYSTEM)	3V DC by battery
ENVIRONMENTAL CONDITIONS	20 deg. C, 50% RH, 1000 hPa	DETECTOR FUNCTION	Peak/ Average
TESTED BY	Roy CHENG		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Factor (dB/M)	Reading (dBuV/M)	Emission (dBuV/M)	Limit (dBuV/M)	Margin (dB)	Ant. Height (cm)	Table Angle (Deg.)
1	1296PK	29.97	24.18	54.14	72.87	-18.73	--	--
2	1296AV	29.97	18.52	48.49	52.87	-4.38	--	--
3	1736PK	29.94	26.83	56.77	72.87	-16.1	--	--
4	1736AV	29.94	15.15	51.12	52.87	-1.75	--	--
5	2170PK	33.06	11.99	45.05	72.87	-27.82	--	--
6	2170AV	33.06	6.34	39.4	52.87	-13.47	--	--
7	2604PK	33.83	12.68	46.51	72.87	-26.36	--	--
8	2604AV	33.83	7.03	40.86	52.87	-12.01	--	--
9	3038PK	36.04	12.41	48.45	72.87	-24.42	--	--
10	3038AV	36.04	6.76	42.8	52.87	-10.07	--	--
11	4340PK	36.85	11.65	48.50	72.87	-24.37	--	--
12	4340AV	36.85	6.00	42.85	52.87	-10.02	--	--

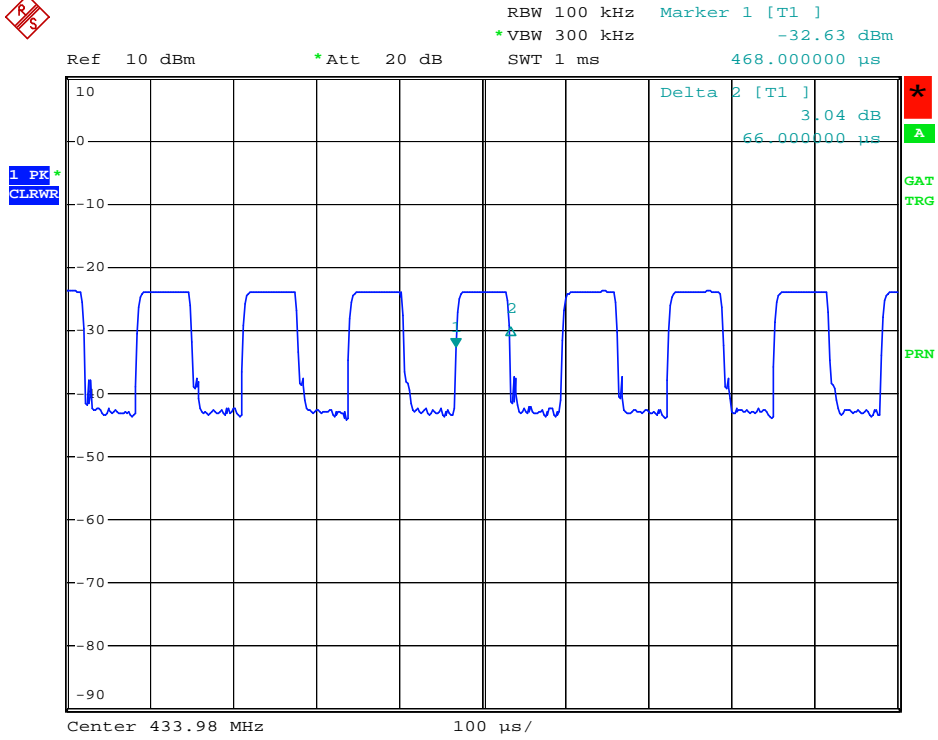


ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Factor (dB/M)	Reading (dBuV/M)	Emission (dBuV/M)	Limit (dBuV/M)	Margin (dB)	Ant. Height (cm)	Table Angle (Deg.)
1	1296PK	29.97	20.50	50.47	72.87	-22.4	--	--
2	1296AV	29.97	14.85	44.82	52.87	-8.05	--	--
3	1736PK	29.94	24.10	54.04	72.87	-18.83	--	--
4	1736AV	29.94	18.45	48.39	52.87	-4.48	--	--
5	2170PK	33.06	12.31	45.54	72.87	-27.33	--	--
6	2170AV	33.06	6.83	39.89	52.87	-12.98	--	--
7	2604PK	33.83	12.63	46.63	72.87	-26.24	--	--
8	2604AV	33.83	7.15	40.98	52.87	-11.89	--	--
9	3038PK	36.04	12.86	47.62	72.87	-25.25	--	--
10	3038AV	36.04	5.93	41.97	52.87	-10.9	--	--
11	4340PK	36.85	11.60	48.10	72.87	-24.77	--	--
12	4340AV	36.85	5.6	42.45	52.87	-10.42	--	--

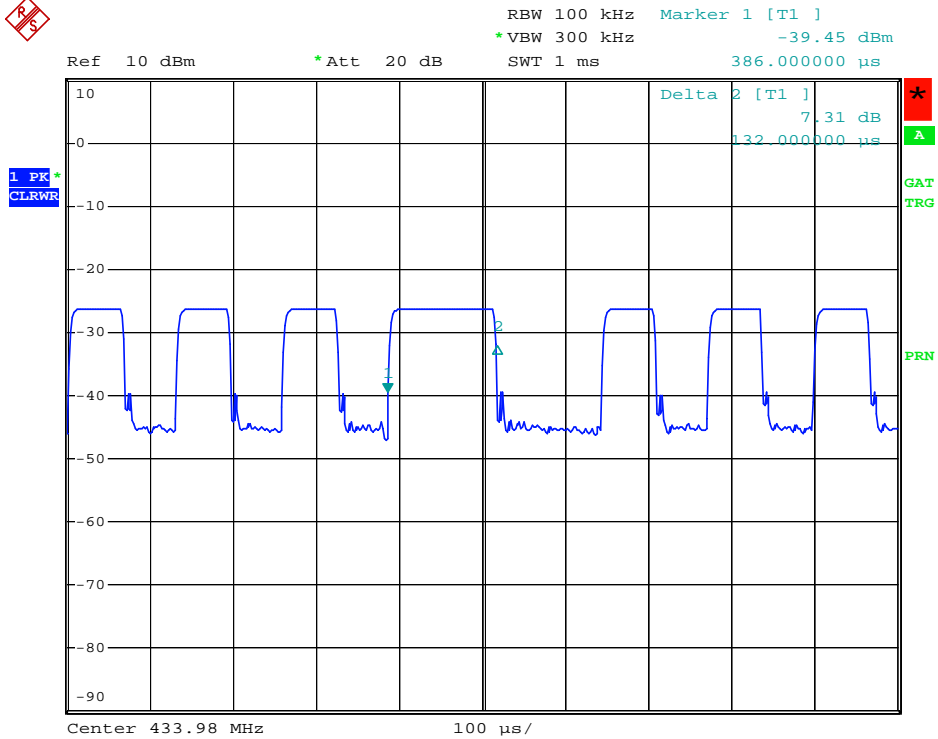
- REMARKS:**
1. Emission level (dBuV/m) =Raw Value (dBuV) + Correction Factor (dB/m)
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. The average value of fundamental frequency and spurious emission is: Average = Peak value + 20log(Duty cycle)
 Where the duty factor is calculated from following formula:
 $20\log(\text{Duty cycle})=20\log[(69*0.066\text{ms}+5*0.133)/10\text{ms}]=-5.65\text{dB}$
 Average=PK value+20log(Duty cycle)= PK value-5.65dB
 please see page 21 and 22 for plotted duty



1ms



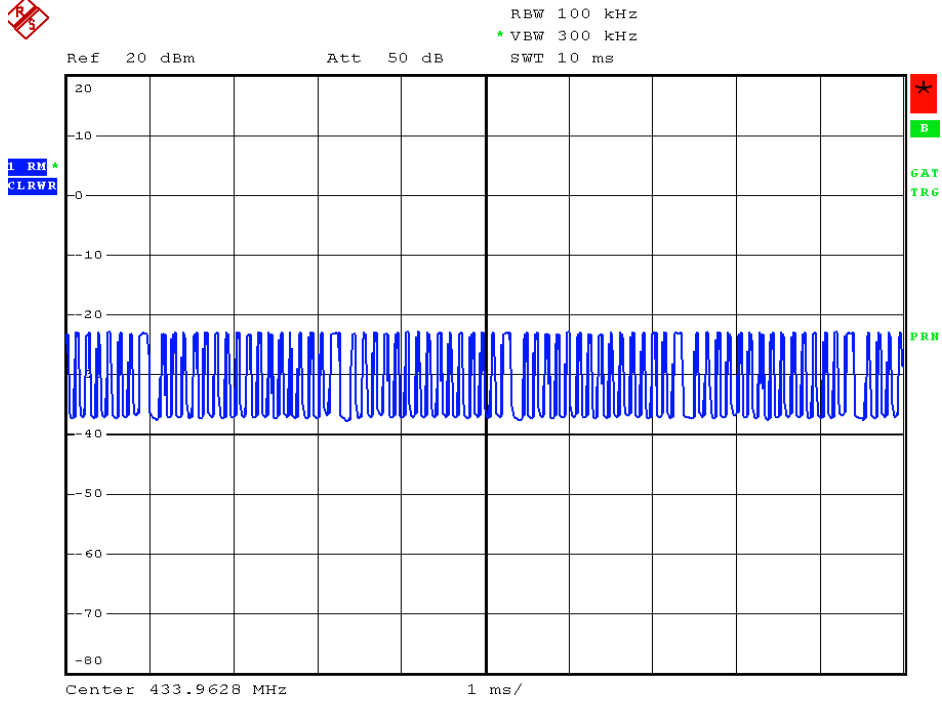
Date: 12.DEC.2011 13:05:45



Date: 12.DEC.2011 12:53:27



10ms



Date: 24.NOV.2011 13:11:20



4.4 20DB OCCUPIED BANDWIDTH MEASUREMENT

4.4.1 LIMITS OF BAND EDGES MEASUREMENT

TEST STANDARD:

FCC Part 15: 2010, Subpart C (Section: 15.231(C))

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for device operating above 70 MHz and below 900 MHz.

Fundamental Frequency (MHz)	Limit of 20 dB Bandwidth(kHz)
433	1082.5

4.4.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SIGNAL ANALYZER Rohde & Schwarz	FSP	E1S1002	Mar. 16, 2012
BILOG Antenna SCHWARZBECK	VULB9168	E1A1001	Sept. 26, 2012

NOTE: The calibration interval of the above test instruments is 12 months.



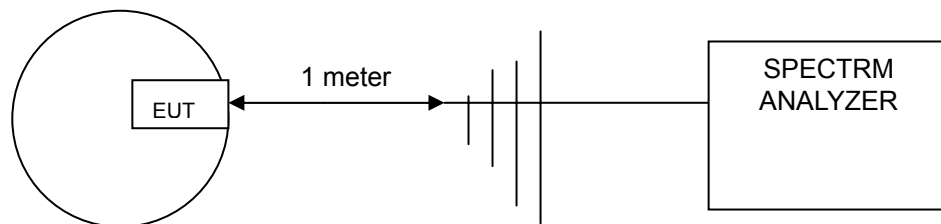
4.4.3 TEST PROCEDURES

1. The EUT was placed on the turning table.
2. The signal was coupled to the spectrum analyzer through an antenna.
3. Set the resolution bandwidth to 100 kHz and video bandwidth to 300 kHz then select Peak function to scan the channel frequency.
4. The 20dB bandwidth was measured and recorded.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation.

4.4.5 TEST SETUP

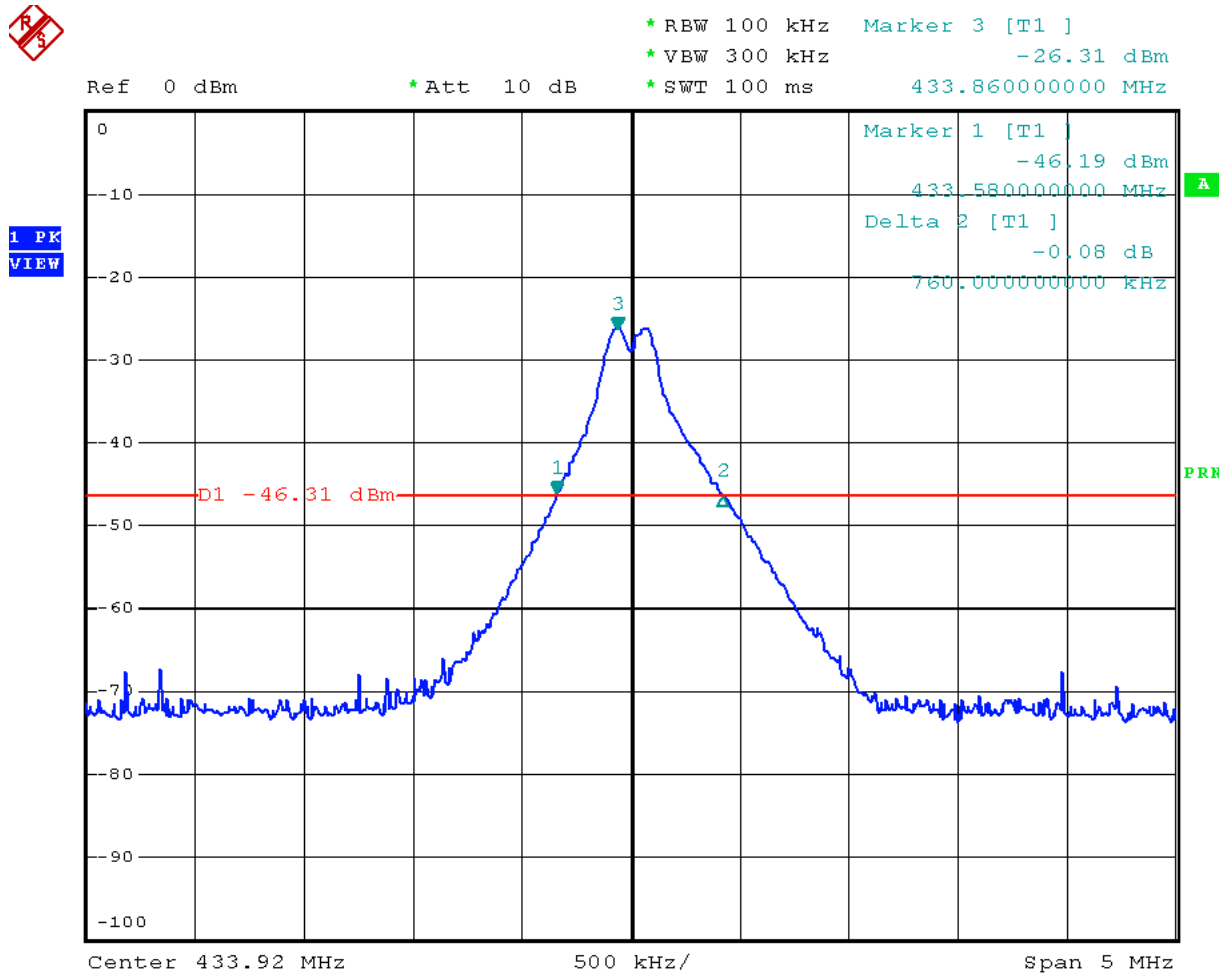




4.4.6 TEST RESULTS

Frequency (MHz)	20 dB bandwidth (kHz)	Maximum limit (kHz)	Pass / Fail
433.86	760	1084.6	Pass

The plot of test result is attached as below.



Date: 24.NOV.2011 12:28:06



5 APPENDIX - INFORMATION ON THE TESTING LABORATORIES

We, BUREAU VERITAS ADT (Shanghai) Corporation, were founded in 2004 to provide our best service in EMC, Radio and Vehicle consultation. Our laboratories are accredited by the following accreditation bodies according to ISO/IEC 17025 (2005) .

USA	A2LA Certificate No.: 2343.01
China	CNAS Certificate No.: L2810

Copies of accreditation certificates could be inquired from our office. If you have any comments, please feel free to contact us at the following:

EMC / RF / Vehicle Lab:

Tel: +86 21 6465 9091

Fax: +86 21 6465 9092

Email: bvadtshmail@cn.bureauveritas.com

--- END ---