

Test Report No. 7191118777-EEC15/06
dated 12 Nov 2015



PSB Singapore

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FORMAL REPORT ON TESTING IN ACCORDANCE WITH
47 CFR FCC Part 15B (CLASS A)
OF AN
INTELLIGENT VEHICLE GATEWAY
[Model : CV90-JC339]
[FCC ID : 2AE8ZIVG]

TEST FACILITY TÜV SÜD PSB Pte Ltd
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FCC REG. NO. 99142 (3m and 10m Semi-Anechoic Chamber, Science Park)

IND. CANADA REG. NO. 2932I-1 (3m and 10m Semi-Anechoic Chamber, Science Park)

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QUOTATION NUMBER 2191016627

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TEST PERIOD 05 Sep 2015 – 11 Nov 2015

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LA-2007-0380-A
LA-2007-0381-F
LA-2007-0382-B
LA-2007-0383-G

LA-2007-0384-G
LA-2007-0385-E
LA-2007-0386-C
LA-2010-0464-D

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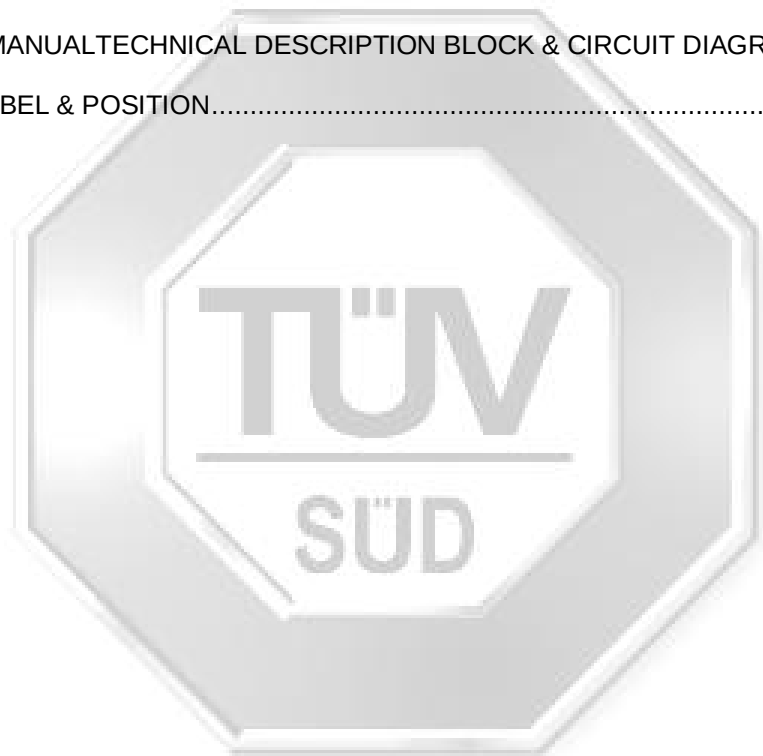
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TEST SUMMARY

The product was tested in accordance with the customer's specifications.

Test Results Summary

Test Standard	Description	Pass / Fail
47 CFR FCC Part 15B		
15.107	Conducted Emissions (Class A)	Not Applicable *See Note 2
15.109	Radiated Emissions (Class A)	Pass

Notes

1. All test measurement procedures are according to ANSI C63.4: 2014.
2. The Equipment Under Test (EUT) is a battery operated device / DC operated device and contains no provision for public utility connections.
3. The EUT was tested using fully charged batteries with DC voltage of 12.3V.
4. The RF module used in this product is a FCC certified module and PCI Limited declares that no modification has been done on the RF module in integrating the RF module to this product.
5. The device contains certified GSM/GPRS/EDGE/CDMA/UMTS/HSPA Module under FCC ID: 2AE8ZIVG01.

Modifications

No modifications were made.

PRODUCT DESCRIPTION

Description	: The Equipment Under Test (EUT) is an INTELLIGENT VEHICLE GATEWAY.
Applicant	: Omnitrac, LLC 10182 Telesis Court Suite 100 San Diego, CA. 92121
Manufacturer	: PCI Limited 35 Pioneer Road North Singapore 628475
Factory (ies)	: PT PCI Elektronik Internasional Panbil Industrial Estate Factory C Lot 2-3 Jalan Ahmad Yani Muka Kuning Indonesia 29433
Model Number	: CV90-JC339
FCC ID	: 2AE8ZIVG
Serial Number	: 108000468
Microprocessor	: Refer to Electrical Specification
Operating Frequency	: Refer to Electrical Specification
Clock / Oscillator Frequency	: 792MHz
Port / Connectors	: Refer to manufacturer's user manual / operating manual
Rated Input Power	: 12Vdc
Accessories	: Refer to manufacturer's user manual / operating manual



PRODUCT DESCRIPTION

Antenna Specification					
Description	GSM	WCDMA	CDMA	Bluetooth	WLAN 2.4G
Antenna Brand Name	Customized Antenna	Customized Antenna	Customized Antenna	Yageo	Yageo
Antenna Model Name	GA-OTIS-USDB	GA-OTIS-USDB	GA-OTIS-USDB	ANT3216A063R2400A	ANT3216A063R2400A
Antenna Type	Inverted-F	Inverted-F	Inverted-F	Ceramic Chip	Ceramic Chip
Antenna Gain	Max peak gain 2.55dBi at 859MHz, Max peak gain 1.45dBi at 1910MHz			Max peak gain 2.14dBi	Max peak gain 2.51dBi

Electrical Specifications

Microprocessor Information 1	
Manufacturer 1	Freescall Semiconductor
Part Number 1	MCIMX6Q7CVT08AD
Part Description	IC ARM CORTEX A9 i.MX6 QUAD IND GRADE
Microprocessor Information 2	
Manufacturer 2	NXP Semiconductors
Part Number 2	LPC1833JET256,551
Part Description	IC ARM CORTEX-M3 32-bit TFBGA256
Clock/Oscillator	
Highest frequency generated by Freescale MCIMX6Q7CVT08AD	792MHz
Port / Connectors 1	
Manufacturer	JST
Part Number	S20B-J11DK-GWXR (LF)
Part Description	20 POS 2.5P AWG 20-28 CONNECTOR
Quantity per	1
Port / Connectors 2	
Manufacturer	WIESON
Part Number	G3505B135-DJ-A06
Part Description	USB TYPE A REVERSED CONNECTOR
Quantity per	2
Port / Connectors 3	
Manufacturer	MOLEX
Part Number	502774-0891
Part Description	MICRO SD CARD REV PUSH-PUSH CONNECTOR
Quantity per	1



SUPPORTING EQUIPMENT DESCRIPTION

The EUT was tested as a stand-alone unit without any supporting equipment.





EUT OPERATING CONDITIONS

47 CFR FCC Part 15B

1. Radiated Emissions

The EUT was exercised in its typical operating modes (all possible supported modes) as listed below throughout the test:

- a. Video Playback
- b. Buttons LED & Screen Scrolling



RADIATED EMISSION TEST

47 CFR FCC Part 15.109 Radiated Emission Limits (Class A)

Frequency Range (MHz)	Quasi-Peak Limit Values (dBμV/m) @ 10m
30 - 88	39.0
88 - 216	43.5
216 - 960	46.4
Above 960	49.5*

* Above 1GHz, average detector was used. A peak limit of 20dB above the average limit does apply.

47 CFR FCC Part 15.109 Radiated Emission Test Instrumentation

Instrument	Model	S/No	Cal Due Date
R&S Test Receiver – ESI1	ESI40	100010	14 Jul 2016
Schaffner Bilog Antenna –(30MHz-2GHz) BL3 (Ref)	CBL6112D	2549	29 Jan 2016
ETS Horn Antenna(18GHz-40GHz)(Ref)	3116	0004-2474	02 Oct 2016
EMCO Horn Antenna(1GHz-18GHz)	3115	0003-6088	20 Apr 2016
R&S Preamplifier (1GHz -18GHz)	SCU18	102191	13 Mar 2016
Agilent Preamplifier(1GHz-26.5GHz) (PA18)	8449D	3008A02305	06 Oct 2016
Com-Power Preamplifier (1MHz-1GHz)	PAM-103	441096	13 Oct 2016
Micro-Tronics Bandstop Filter (2.4-2.5 GHz)	BRM50701	017	13 Aug 2016

RADIATED EMISSION TEST

47 CFR FCC Part 15.109 Radiated Emission Test Setup

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard as shown in the setup photos.
2. The filtered power supply for the EUT and supporting equipment were tapped from the appropriate power sockets located on the turntable.
3. The relevant broadband antenna was set at the required test distance away from the EUT and supporting equipment boundary.

47 CFR FCC Part 15.109 Radiated Emission Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. A prescan was carried out to pick the worst emission frequencies from the EUT. For EUT which is a portable device, the prescan was carried out by rotating the EUT through three orthogonal axes to determine which altitude and equipment arrangement produces such emissions.
3. The test was carried out at the selected frequency points obtained from the prescan in step 2. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
 - a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
 - b. The EUT was then rotated to the direction that gave the maximum emission.
 - c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
4. A Quasi-peak measurement was made for that frequency point if it was less than or equal to 1GHz. For frequency point that above 1GHz, both Peak and Average measurements were carried out.
5. Steps 3 and 4 were repeated for the next frequency point, until all selected frequency points were measured.
6. The frequency range covered was from 30MHz to 5th harmonic of the highest frequency used or generated by the EUT or 40GHz, whichever is lower, using the Bi-log antenna for frequencies from 30MHz up to 1GHz, and the Horn antenna above 1GHz.

Sample Calculation Example

At 300 MHz

Q-P limit (Class B) = 46.0 dB μ V/m

Log-periodic antenna factor & cable loss at 300 MHz = 18.5 dB

Q-P reading obtained directly from EMI Receiver = 31.0 dB μ V/m
(Calibrated level including antenna factors & cable losses)

Therefore, Q-P margin = 46.0 - 31.0 = 15.0

i.e. 15.0 dB below Q-P limit



RADIATED EMISSION TEST

47 CFR FCC Part 15.109 Radiated Emission Results

Operating Mode	Video Playback + Buttons LED & Screen Scrolling	Temperature	24°C
Test Input Power	12Vdc	Relative Humidity	60%
Test Distance	10m (≥30MHz – 25GHz)	Atmospheric Pressure	1030mbar
Class	A	Tested By	Lim Poh Huat

Emissions ranging from 30MHz – 1GHz

Frequency (MHz)	Q-P Value (dBμV/m)	Q-P Limit (dBμV/m)	Q-P Margin (dB)	Height (cm)	Azimuth (Degrees)	Polarisation (H/V)
30.0820	30.1	39.0	8.9	100	67	V
98.5790	31.1	43.5	12.4	100	196	V
144.2980	38.3	43.5	5.2	100	280	V
144.8510	31.1	43.5	12.4	100	242	V
192.2560	31.5	43.5	12.0	100	204	V
194.3720	37.8	43.5	5.8	100	148	V

Emissions above 1GHz – 5GHz

Freq (GHz)	Peak Value (dBμV/m)	Peak Limit (dBμV/m)	Peak Margin (dB)	AV Value (dBμV/m)	AV Limit (dBμV/m)	AV Margin (dB)	Height (cm)	Azimuth (Degrees)	Pol (H/V)
2.2364	38.7	69.5	30.8	31.7	49.5	17.8	100	334	V
3.0929	39.9	69.5	29.6	31.3	49.5	18.2	200	296	V
3.4296	42.2	69.5	27.3	33.2	49.5	16.3	300	122	H
3.6372	43.1	69.5	26.4	31.9	49.5	17.6	200	359	V
4.5462	43.2	69.5	26.3	34.2	49.5	15.3	400	241	V
4.9839	48.6	69.5	20.9	37.3	49.5	12.2	200	101	V

Notes

- All possible modes of operation were investigated. Only the worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
- A "positive" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency. Conversely, a "negative" margin indicates a FAIL.
- EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings:
30MHz - 1GHz
RBW: 120kHz VBW: 1MHz
>1GHz
RBW: 1MHz VBW: 1MHz
- The highest frequency of internal sources of the EUT is between 500MHz and 1GHz, as such, the measurement was made up to 5GHz.
- Radiated Emissions Measurement Uncertainty
All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2, in the range 30MHz – 25.0GHz is ±4.0dB.



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