



FCC RF Test Report

APPLICANT,L : Innowi Inc.
EQUIPMENT : ChecOut M
BRAND NAME : Innowi
MODEL NAME : IWCHT-M102
FCC ID : 2AO2Y-IWCHTM102
STANDARD : FCC 47 CFR Part 2, 22(H), 24(E)
CLASSIFICATION : PCS Licensed Transmitter (PCB)

The product was received on Aug. 08, 2018 and completely tested on Aug. 16, 2018. We, Sporton International (Shenzhen) Inc., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.26-2015 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Shenzhen) Inc., the test report shall not be reproduced except in full.



Approved by: Eric Shih / Manager

Sporton International (Shenzhen) Inc.
1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan Shenzhen City
Guangdong Province 518055 China



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG7D0101-01A	Rev. 01	Initial issue of report	Sep. 27, 2018



SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1046	Conducted Output Power	Reporting Only	PASS	-
	§22.913(a)(5)	Effective Radiated Power	< 7 Watts	PASS	-
	§24.232(c)	Equivalent Isotropic Radiated Power	< 2 Watts	PASS	-
4.4	§2.1053 §22.917(a) §24.238(a)	Field Strength of Spurious Radiation	$< 43 + 10 \log_{10}(P[\text{Watts}])$	PASS	Under limit 37.38 dB at 7520.000 MHz



1 General Description

1.1 Applicant

Innowi Inc.
3240 Scott Blvd. Santa Clara CA 95054 USA

1.2 Manufacturer

Innowi Inc.
3240 Scott Blvd. Santa Clara CA 95054 USA

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	ChecOut M
Brand Name	Innowi
Model Name	IWCHT-M102
FCC ID	2AO2Y-IWCHTM102
EUT supports Radios application	WCDMA/HSPA/ HSPA+(16QAM uplink is not supported)/ LTE/NFC WLAN 2.4GHz 802.11b/g/n HT20 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT80 Bluetooth BR / EDR / LE
IMEI Code	Radiation: 358148060041782
HW Version	ChecOut M HW v1.0
SW Version	ChecOut M A-LTE v1.0
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx Frequency	WCDMA: Band V: 826.4 MHz ~ 846.6 MHz Band II: 1852.4 MHz ~ 1907.6 MHz
Rx Frequency	WCDMA: Band V: 871.4 MHz ~ 891.6 MHz Band II: 1932.4 MHz ~ 1987.6 MHz
Maximum Output Power to Antenna	WCDMA: Band V: 23.19 dBm Band II: 22.59 dBm
Antenna Type	Fixed Internal Antenna
Antenna Gain	Cellular Band: -4.56 dBi PCS Band: 2.11 dBi
Type of Modulation	WCDMA: BPSK (Uplink) HSDPA: QPSK (Uplink) HSUPA: QPSK (Uplink) HSPA+: 16QAM (uplink is not supported)

1.5 Modification of EUT

No modifications are made to the EUT during all test items.



1.6 Re-use of Measured Data

1.6.1 Introduction Section

This application re-uses data collected on a similar device. The subject device of this application (Model: IWCHT-M102, FCC ID: 2AO2Y-IWCHTM102) is electrically identical to the reference device (Model: LE910-NA V2, FCC ID: RI7LE910NAV2) for the portions of the circuitry corresponding to the data being re-used, as treated by KDB Publication 996369 D01v02.

1.6.2 Difference Section

For details concerning the similarity with respect to component placement, mechanical/electrical design etc., please refer to the Product Equality Declaration.

The re-used RF data includes the following bands provided in Appendix D (RF Report No. 1506FR22-01 for the reference device Model: LE910-NA V2, FCC ID: RI7LE910NAV2).

1.6.3 Reference detail Section:

Equipment Class	Reference FCC ID	Folder Test	Report Title/Section
PCE (2G/3G)	RI7LE910NAV2	Part22H.24E.27L(1506FR22-01)	All conducted sections applicable
PCE (LTE)	RI7LE910NAV2	Part22H.24E.27L.27M.27F.27H (1506FR21-01)	All conducted(except LTE Band 17) sections applicable



1.6.4 Spot Check Verification Data Section

In order to confirm hardware similarity of the subject device with the reference device, spot check measurements were performed on the subject device for the following test items, the test result were consistent with FCC ID: RI7LE910NAV2.

Assertions concerning the similarity of these devices are based on representations by the applicant. The applicant accepts full responsibility for the validity of the similarity claim, and for the determination that verification test data are sufficient to support it.

Test Item	Mode	RI7LE910NAV2 Worst Result	2AO2Y-IWCHTM102 Worst Result	Difference (dB)
Average Conducted Power (dBm)	WCDMA Band II	23.66	22.59	1.07
	WCDMA Band V	23.59	23.19	0.4
	LTE Band 2	23.43	22.53	0.90
	LTE Band 4	23.12	22.38	0.74
	LTE Band 5	22.90	22.71	0.19
	LTE Band 12	22.86	22.62	0.24
	LTE Band 13	22.88	22.45	0.43

1.7 Maximum ERP/EIRP Power

FCC Rule	System	Type of Modulation	Maximum ERP/EIRP (W)
Part 22H	WCDMA Band V RMC 12.2Kbps	BPSK	0.0445
Part 24E	WCDMA Band II RMC 12.2Kbps	BPSK	0.2951



1.8 Testing Location

Sporton Lab is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600156-0).

Test Site	Sporton International (Shenzhen) Inc.		
Test Site Location	No. 3 Bldg the third floor of south, Shahe River west, Fengzeyuan Warehouse, Nanshan District, Shenzhen City, Guangdong Province 518055, China TEL: +86-755- 3320-2398		
Test Site No.	Sporton Site No.	FCC designation No.	FCC Test Firm Registration No.
	03CH02-SZ	CN5019	577730

1.9 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ 47 CFR Part 2, 22(H), 24(E)
- ♦ ANSI C63.26-2015
- ♦ FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- ♦ FCC KDB 412172 D01 Determining ERP and EIRP v01r01
- ♦

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.



2 Test Configuration of Equipment Under Test

2.1 Test Mode

Antenna port conducted and radiated test items were performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

Radiated measurements were performed with rotating EUT in different three orthogonal test planes to find the maximum emission.

Radiated emissions were investigated as following frequency range:

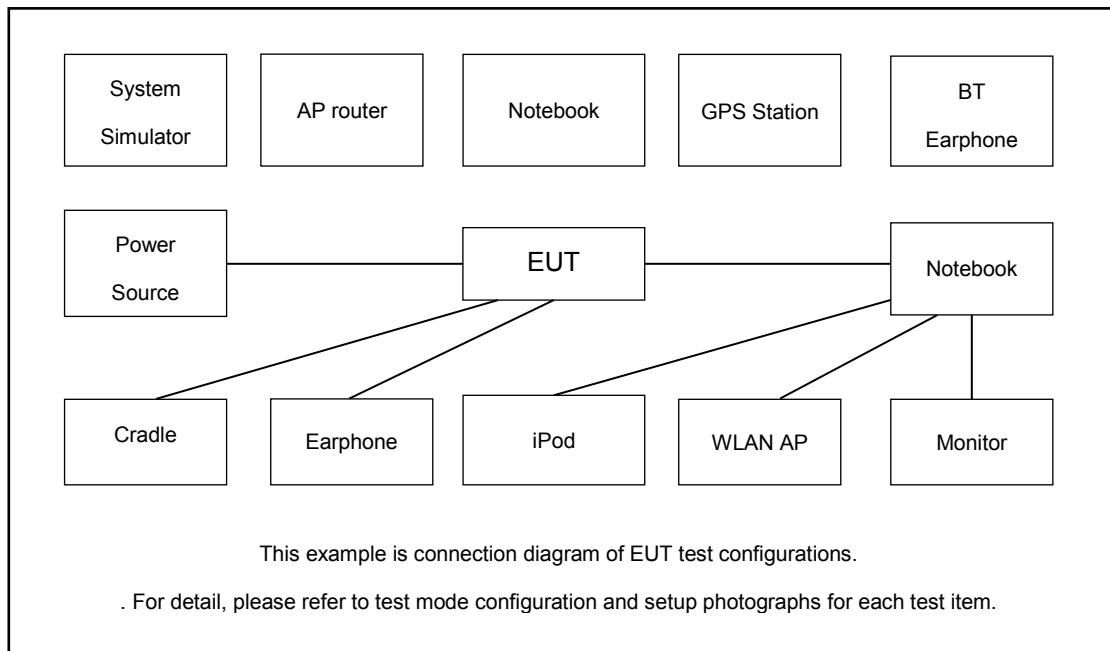
1. 30 MHz to 10th harmonic for WCDMA Band
2. 30 MHz to 10th harmonic for WCDMA Band II.

All modes and data rates and positions were investigated.

Test modes are chosen to be reported as the worst case configuration below:

Test Modes		
Band	Radiated TCs	Conducted TCs
WCDMA Band V	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link
WCDMA Band II	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m

2.4 Frequency List of Low/Middle/High Channels

Frequency List				
Band	Channel/Frequency(MHz)	Lowest	Middle	Highest
WCDMA Band V	Channel	4132	4182	4233
	Frequency	826.4	836.4	846.6
WCDMA Band II	Channel	9262	9400	9538
	Frequency	1852.4	1880.0	1907.6

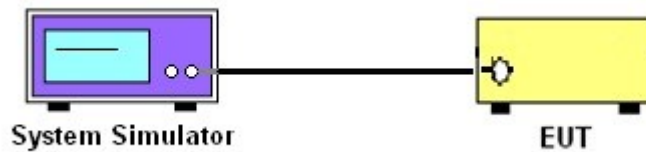
3 Conducted Test Result

3.1 Measuring Instruments

See list of measuring instruments of this test report.

3.2 Test Setup

3.2.1 Conducted Output Power



3.3 Test Result of Conducted Test

Please refer to Appendix A.



3.4 Conducted Output Power and ERP/EIRP

3.4.1 Description of the Conducted Output Power and ERP/EIRP

A system simulator was used to establish communication with the EUT. Its parameters were set to enforce EUT transmitting at the maximum power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

The ERP of mobile transmitters must not exceed 7 Watts for WCDMA Band V.

The EIRP of mobile transmitters must not exceed 2 Watts for WCDMA Band II

According to KDB 412172 D01 Power Approach,

$EIRP = P_T + G_T - L_C$, $ERP = EIRP - 2.15$, where

P_T = transmitter output power in dBm

G_T = gain of the transmitting antenna in dBi

L_C = signal attenuation in the connecting cable between the transmitter and antenna in dB

3.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.2
2. The transmitter output port was connected to the system simulator.
3. Set EUT at maximum power through the system simulator.
4. Select lowest, middle, and highest channels for each band and different modulation.
5. Measure and record the power level from the system simulator.

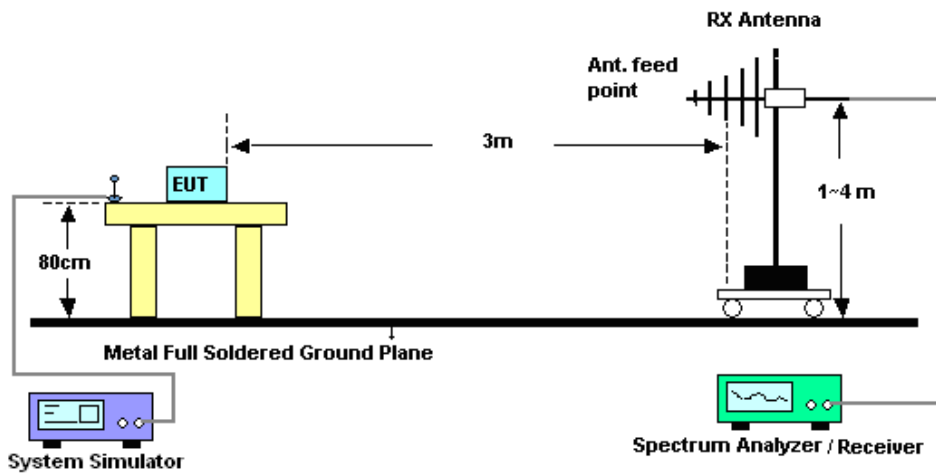
4 Radiated Test Items

4.1 Measuring Instruments

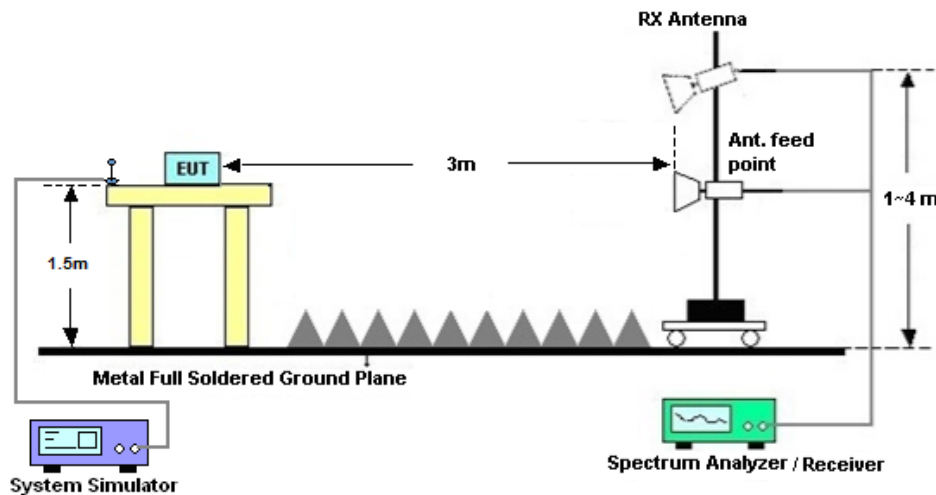
See list of measuring instruments of this test report.

4.2 Test Setup

4.2.1 For radiated test from 30MHz to 1GHz



4.2.2 For radiated test above 1GHz



4.3 Test Result of Radiated Test

Please refer to Appendix B.



4.4 Field Strength of Spurious Radiation Measurement

4.4.1 Description of Field Strength of Spurious Radiated Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

4.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.5
2. The EUT was placed on a rotatable wooden table 0.8 meters for frequency below 1GHz and 1.5 meter for frequency above 1GHz above the ground.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission.
7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
9. Taking the record of output power at antenna port.
10. Repeat step 7 to step 8 for another polarization.
11. $EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$
12. $ERP \text{ (dBm)} = EIRP - 2.15$
13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
14. The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)



5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101041	10kHz~40GHz;Max 30dBm	Oct. 19, 2017	Aug. 16, 2018	Oct. 18, 2018	Radiation (03CH02-SZ)
Bilog Antenna	TeseQ	CBL6112D	35407	30MHz-2GHz	May 10, 2018	Aug. 16, 2018	May 09, 2019	Radiation (03CH02-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1285	1GHz~18GHz	Dec. 13, 2017	Aug. 16, 2018	Dec. 12, 2018	Radiation (03CH02-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 30, 2018	Aug. 16, 2018	Jul. 29, 2019	Radiation (03CH02-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Mar. 30, 2018	Aug. 16, 2018	Mar. 29, 2019	Radiation (03CH02-SZ)
LF Amplifier	Burgeon	BPA-530	102211	0.01~3000Mhz	Oct. 19, 2017	Aug. 16, 2018	Oct. 18, 2018	Radiation (03CH02-SZ)
HF Amplifier	Agilent	8449B	3008A01023	1GHz~26.5GHz	Oct. 19, 2017	Aug. 16, 2018	Oct. 18, 2018	Radiation (03CH02-SZ)
AC Power Source	Chroma	61601	616010002470	N/A	NCR	Aug. 16, 2018	NCR	Radiation (03CH02-SZ)
Turn Table	Chaintek	T-200	N/A	0~360 degree	NCR	Aug. 16, 2018	NCR	Radiation (03CH02-SZ)
Antenna Mast	Chaintek	MBS-400	N/A	1 m~4 m	NCR	Aug. 16, 2018	NCR	Radiation (03CH02-SZ)

NCR: No Calibration Required



6 Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.5 dB
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Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.3 dB
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Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.7 dB
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Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power)

Conducted Power (*Unit: dBm)						
Band	WCDMA Band V			WCDMA Band II		
Channel	4132	4182	4233	9262	9400	9538
Frequency	826.4	836.4	846.6	1852.4	1880	1907.6
RMC 12.2K	23.06	23.19	23.17	22.35	22.59	22.48
HSDPA Subtest-1	23.10	23.11	23.17	22.37	22.53	22.46
HSDPA Subtest-2	22.65	22.70	22.68	21.91	22.18	22.07
HSDPA Subtest-3	22.12	22.24	22.15	21.42	21.69	21.57
HSDPA Subtest-4	21.90	21.93	21.91	21.20	21.45	21.36
HSUPA Subtest-1	21.69	21.75	21.72	21.42	21.25	21.18
HSUPA Subtest-2	20.25	20.43	20.37	19.66	20.04	19.90
HSUPA Subtest-3	21.30	21.36	21.37	20.70	21.02	20.96
HSUPA Subtest-4	20.63	20.57	20.62	19.98	20.21	20.04
HSUPA Subtest-5	22.60	22.70	22.70	22.00	22.20	22.10



ERP/EIRP

WCDMA Band V ($G_T - L_C = -4.56$ dBi)			
Channel	4132	4182	4233
	(Low)	(Mid)	(High)
Frequency	826.4	836.4	846.6
(MHz)			
Conducted Power (dBm)	23.06	23.19	23.17
Conducted Power (Watts)	0.2023	0.2084	0.2075
ERP(dBm)	16.35	16.48	16.46
ERP(Watts)	0.0432	0.0445	0.0443

WCDMA Band II ($G_T - L_C = 2.11$ dBi)			
Channel	9262	9400	9538
	(Low)	(Mid)	(High)
Frequency	1852.4	1880	1907.6
(MHz)			
Conducted Power (dBm)	22.35	22.59	22.48
Conducted Power (Watts)	0.1718	0.1816	0.1770
EIRP(dBm)	24.46	24.70	24.59
EIRP(Watts)	0.2793	0.2951	0.2877



Appendix B. Test Results of Conducted Test

Radiated Spurious Emission

WCDMA Band V(RMC 12.2Kbps)									
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	1672.8	-56.01	-13	-43.01	-66.38	-59.26	4.00	9.40	H
	2509.2	-60.93	-13	-47.93	-75.91	-64.50	4.88	10.60	H
	3345.6	-61.27	-13	-48.27	-78.24	-66.20	5.52	12.60	H
	1672.8	-51.29	-13	-38.29	-61.45	-54.54	4.00	9.40	V
	2509.2	-61.34	-13	-48.34	-76.17	-64.91	4.88	10.60	V
	3345.6	-62.38	-13	-49.38	-79.35	-67.31	5.52	12.60	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

WCDMA Band II(RMC 12.2Kbps)									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	3760	-55.61	-13	-42.61	-74.11	-62.36	5.85	12.60	H
	5640	-59.10	-13	-46.10	-81.27	-64.90	7.30	13.10	H
	7520	-50.39	-13	-37.39	-78.16	-53.54	8.35	11.50	H
	3760	-55.86	-13	-42.86	-74.4	-62.61	5.85	12.60	V
	5640	-58.45	-13	-45.45	-81.02	-64.25	7.30	13.10	V
	7520	-50.38	-13	-37.38	-77.96	-53.53	8.35	11.50	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.



Appendix D. Reference Report

Please refer to report number 1506FR22-01 which is issued separately.