

TEST REPORT

Report Number: 15090562HKG-002

Application
for
Original Grant
of 47 CFR Part 90 Certification

CDMA Module

(FCC ID: RI7CE910B-DUAL)

Prepared and Checked by:

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Date: October 14, 2015

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GENERAL INFORMATION

Applicant Name:	Telit Communications S.p.A.
Applicant Address:	Via Stazione di Prosecco 5/B Trieste 34010 Italy
FCC Specification Standard:	FCC Part 90:2014
FCC ID:	RI7CE910B-DUAL
FCC Model(s):	CE910B-DUAL
Type of EUT:	CDMA 850/1900 Transceiver
Description of EUT:	CDMA Module
Serial Number:	N/A
Sample Receipt Date:	September 09, 2015
Date of Test:	September 13-30, 2015
Report Date:	October 14, 2015
Environmental Conditions:	Temperature: 25 ± 10°C Humidity: 10 to 90%

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1.0 Summary of Test Results

Test Items	FCC Section	Results	Details see section
RF Output Power	2.1046 90.635	Pass	4.2
Occupied Bandwidth	2.1049	Pass	4.3
Spurious Emissions at Antenna Terminals	2.1051 2.1057 90.691	Pass	4.4
Power of Spurious Emissions	2.1053 2.1057 90.691	Pass	4.5
Bandedge at antenna terminal	90.691	Pass	4.6
Frequency Stability	2.1055 90.213	Pass	4.7
RF Exposure	1.1307 2.1093	Pass	4.8

1.1 Statement of Compliance

The equipment under test is found to be complying with the applicable requirements of following standards:

FCC Part 90: 2014

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2.0 General Description

2.1 Product Description

The CE910B-DUAL is a CDMA modular supports (BC 0, BC 1 & BC 10) 850 and 1900 MHz.

The Cellular radiotelephone service and personal communications services frequency ranges of the EUT are as below:

CDMA BC 0:

Tx: 824.70- 848.31MHz (at intervals of 1.25MHz)

Rx: 869.70 - 893.31MHz (at intervals of 1.25MHz)

CDMA BC 1:

Tx: 1851.25 - 1908.75MHz (at intervals of 1.25MHz)

Rx: 1931.25 - 1988.75MHz (at intervals of 1.25MHz)

CDMA BC10: (FCC only)

Tx: 817.90- 822.75MHz (at intervals of 1.25MHz)

Rx: 862.90 – 867.75MHz (at intervals of 1.25MHz)

The EUT is powered by a DC power supply (3.8VDC).

The antenna used in the EUT is external, and the test sample is a prototype.

The circuit description is attached in the Appendix and saved with filename: descri.pdf.

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2.3 Test Methodology

Preliminary radiated scans and all radiated measurements were performed in semi-anechoic chamber. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application. All measurements were made in accordance with the procedures in 47 CFR Part 2, Part 90 and TIA-603-C.

2.4 Test Facility

The facilities used to collect the radiated data and conducted data are in **Interterk Testing Services Taiwan Ltd** and located at 11, Ln. 275, Ko Nan 1st st. Shiang-Shan District, Hsinchu 300 Taiwan. This test facility and site measurement data have been fully placed on file with the FCC

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3.0 **System Test Configuration**

3.1 Justification

For radiated emissions testing, the equipment under test (EUT) was controlled by communication tester to produce maximum power. Care was taken to ensure proper power supply voltages during testing. During testing, all cables (if any) were manipulated to produce worst case emissions.

The EUT was powered by DC power supply (3.8VDC).

For the measurements, the EUT is attached to a plastic stand if necessary and placed on the wooden turntable. If the EUT attaches to peripherals, they are connected and operational to simulate typical use.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna polarization are varied during the search for maximum signal level. Only the worst-case polarization is reported. For each spurious, raise and lower the test antenna from 1m to 4m to obtain a maximum reading on the spectrum analyzer. Radiated emissions are taken at three meters. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

The power level of EUT is set by the communication tester to achieve the maximum power levels emitted by the EUT.

Emission that are directly caused by digital circuits in the transmit path and transmitter portion are measured, and the limit are according to FCC Part 15 Section 15.109.

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3.1 Justification - Cont'd

Detector function for radiated emissions is in peak mode.

All relevant operation modes have been tested, and the worst case data is included in this report.

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3.2 Details of EUT and Description of Accessories

Details of EUT:

DC power supply (provided with Intertek) was used to power the device. Their description are listed below.

- (1) NA

Description of Accessories:

- (1) 1.2 m antenna with SMA connector.(Provided by client)

3.3 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

Uncertainty and Compliance - Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value.

3.4 Equipment Modification

Any modifications installed previous to testing by Telit Communications S.p.A. will be incorporated in each production model sold/leased in the United States.

No modifications were installed by Intertek Testing Services Taiwan Ltd.

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4.0 Test Results

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). Configuration photographs and data tables of the emissions are included.

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4.1 RF Power Output (FCC Part 2.1046, 90.635)

The RF power output is measured at the RF output terminal. The limit is as follows:

Part 90.635 (for BC10 band):

[] ≤ 500W ERP (57dBm) for base stations and cellular repeaters

[√] ≤ 100W ERP (50.0dBm) for mobile and auxiliary test transmitters

Test results:

ERP/EIRP = Conducted Power + Antenna Gain - Cable Loss

CDMA : BC10

As refer to KDB 971168 D01, 5.6

ERP = Conducted Power + Antenna Gain - Cable Loss -

2.15dB CDMA : BC10

Conduct Peak Power

Channel Number	Frequency (MHz)	Measured Conduct Peak Power (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	Conversion Factor (dB)	Calculated ERP (dBm)	Limit (dBm)	Verdict
476	817.9	28.09	5.12	0	2.15	31.06	50	Pass
526	819.15	28.18	5.12	0	2.15	31.15	50	Pass
670	822.75	28.24	5.12	0	2.15	31.21	50	Pass

Conduct Average power

Channel Number	Frequency (MHz)	*Measured Conduct Average Power (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	Conversion Factor (dB)	Calculated ERP (dBm)	Limit (dBm)	Verdict
476	817.9	24.90	5.12	0	2.15	27.87	50	Pass
526	819.15	24.84	5.12	0	2.15	27.81	50	Pass
670	822.75	24.84	5.12	0	2.15	27.81	50	Pass

* Data is obtained by the communication tester.

*ERP (dBm) = Conducted Power (dBm) + Antenna Gain (dBi) - 2.15dB

#EIRP (dBm) = Conducted Power (dBm) + Antenna Gain (dBi)

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4.2 Occupied Bandwidth (FCC Part 2.1049)

From 2.1049, occupied bandwidth is defined as the measured spectral width of an emission. The measurement determines occupied bandwidth as the difference between upper and lower frequencies where 0.5% of the emission power is above the upper frequency and 0.5% of the emission power is below the lower frequency.

Test results:

BC10:

Channel	Frequency(MHz)	99% Occupied BW(MHz)	26dB Emission BW (MHz)	Verdict
476	817.9	1.28	1.432	PASS
526	819.15	1.28	1.440	PASS
670	822.75	1.28	1.432	PASS

The plots of 99% bandwidth are saved in the file 99% bw.pdf.

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4.3 Spurious Emissions at Antenna Terminals (FCC Part 2.1051, 90.691)

The conducted spurious emissions is measured from 9kHz up to the 10th harmonic of fundamental emission.

For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $116 \log_{10}(f/6.1)$ decibels or $50 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

The plots are saved in the file cspurious.pdf.

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4.4 Power of Spurious Emissions (FCC Part 2.1053, 90.635, 90.691)

The radiated spurious emissions are measured from 30MHz up to the 10th harmonic of fundamental emission.

According to Part 90.691, for any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10\log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value are not reported.

Test results:

ERP/EIRP = Conducted Power + Antenna Gain - Cable Loss

Radiated Scan Pursuant to FCC Part 90.691: Emissions Requirement

CDMA : BC10

Frequency(MHz)	E.R.P at 3m(dBm)	Limit	Margin(dB)
1638.30	-47.92	-13.00	-34.92
2457.45	-46.41	-13.00	-33.41
3276.60	-51.44	-13.00	-38.44
4095.75	-51.29	-13.00	-38.29
4914.90	-50.33	-13.00	-37.33
5734.05	-49.95	-13.00	-36.95
6553.20	-51.05	-13.00	-38.05
7372.35	-51.15	-13.00	-38.15
8191.50	-50.15	-13.00	-37.15
9010.65	-49.25	-13.00	-36.25
9829.80	-50.45	-13.00	-37.45

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4.5 Bandedge at Antenna Terminals (FCC Part 2.1051, 90.691)

Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $116 \log_{10}(f/6.1)$ decibels or $50 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

Test results:

The plots are saved in the file be.pdf.

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4.6 Frequency Stability (FCC Part 2.1053, 90.213)

The frequency stability is measured with the temperature variation range of -30°C to +50°C (10°C increment), and voltage supply variation range of 90% to 110% of nominal DC supply voltage, and/or nominal to battery end points for hand-carried battery-powered supplies.

[] AC nominal supply voltage: 120VAC

[√] DC nominal voltage: 3.8 VDC; End point: 3.42

20°C is taken as temperature in normal condition.

For Part 90.213, the frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ (± 2.5 ppm) of the center frequency.

Test results: BC10

Channel : 476 (817.9MHz)

Voltage (VDC)	Temperature (°C)	Channel Number	Designed Frequency (MHz)	Measured Frequency Drift (Hz)	Frequency Error (ppm)	Limit (ppm)	Verdict
3.8	25	476	817.9	60	0.007	± 2.5	Pass
3.42	25	476	817.9	65	0.008	± 2.5	Pass
4.18	25	476	817.9	68	0.008	± 2.5	Pass

Channel : 670 (822.75MHz)

Voltage (VDC)	Temperature (°C)	Channel Number	Designed Frequency (MHz)	Measured Frequency Drift (Hz)	Frequency Error (ppm)	Limit (ppm)	Verdict
3.8	25	670	822.75	-65	-0.008	± 2.5	Pass
3.42	25	670	822.75	-63	-0.008	± 2.5	Pass
4.18	25	670	822.75	-62	-0.008	± 2.5	Pass

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Channel : 476 (817.9MHz)

Voltage (VDC)	Temperature (°C)	Channel Number	Designed Frequency (MHz)	Measured Frequency Drift (Hz)	Frequency Error (ppm)	Limit (ppm)	Verdict
3.8	50	476	817.9	8	0.001	±2.5	Pass
	40		817.9	56	0.007	±2.5	Pass
	30		817.9	57	0.007	±2.5	Pass
	20		817.9	60	0.007	±2.5	Pass
	10		817.9	-67	-0.008	±2.5	Pass
	0		817.9	-10	-0.001	±2.5	Pass
	-10		817.9	48	0.006	±2.5	Pass
	-20		817.9	-12	-0.001	±2.5	Pass
	-30		817.9	13	0.002	±2.5	Pass

Channel : 670 (822.75MHz)

Voltage (VDC)	Temperature (°C)	Channel Number	Designed Frequency (MHz)	Measured Frequency Drift (Hz)	Frequency Error (ppm)	Limit (ppm)	Verdict
3.8	50	670	822.75	-8	-0.001	±2.5	Pass
	40		822.75	-56	-0.007	±2.5	Pass
	30		822.75	-65	-0.008	±2.5	Pass
	20		822.75	-66	-0.008	±2.5	Pass
	10		822.75	-73	-0.009	±2.5	Pass
	0		822.75	-70	-0.009	±2.5	Pass
	-10		822.75	45	0.005	±2.5	Pass
	-20		822.75	29	0.004	±2.5	Pass
	-30		822.75	33	0.004	±2.5	Pass

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4.7 Radio Frequency Exposure Compliance

EUT is subject to the radio frequency exposure requirements specified in FCC Rule §§ 1.1307(b), 2.1093 . It shall be considered to operate in a “general population /uncontrolled” environment.

- [] Portable unit: EUT was evaluated for Specific Absorption Rate (SAR) evaluation compliance according to OET Bulletin 65, Supplement C (Edition 01-01). It is in compliance with the SAR evaluation requirements. The caution statement is saved as filename: RF exposure info.pdf. A SAR test report was submitted at same time and saved as SAR Report.pdf.
- [x] Mobile unit: EUT was evaluated for Maximum Permissible Exposure (MPE) evaluation compliance according to OET Bulletin 65(Edition 97-01). The evaluation calculation results are saved as filename: RF exposure info.pdf.

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5.0 Equipment List

Equipment	EMI Test Receiver	Spectrum Analyzer	Signal Generator
Equipment No.	EC1468	EC1353	EC1354
Brand	Rohde & Schwarz	Rohde & Schwarz	Rohde & Schwarz
Model No	ESR-7	FSP30	SMR27
Calibration Date	01/12/2014	18/08/2015	03/11/2014
Calibration Due Date	30/11/2015	16/08/2016	02/11/2015

Equipment	Horn Antenna (1-18G)	Broadband Antenna	Active Loop Antenna
Equipment No.	EC1332	EC1347	EC1471
Brand	EMCO	SCHWARZBECK	SCHWARZBECK
Model No	3115	VULB 9168	FMZB1519
Calibration Date	05/06/2017	08/08/2013	30/04/2015
Calibration Due Date	03/06/2017	06/08/2016	28/04/2016

Equipment	Pre-Amplifier(1-26.5G)	966-2_3m Semi-Anechoic Chamber	966-2(A) Cable
Equipment No.	EC1373	EC1350	EC1447
Brand	EMCO	966_2	SUHNER
Model No	EMC12635SE	CEM-966_2	SMA/EX100
Calibration Date	07/10/2015	24/02/2015	06/05/2015
Calibration Due Date	05/10/2016	23/02/2016	04/05/2016

Equipment	966-2(B) Cable	Universal Radio Communication Tester
Equipment No.	EC1448	EC1501
Brand	JUNFLON	Rohde & Schwarz
Model No	SMA/ J12J100880-00	CMU200
Calibration Date	09/05/2015	28/04/2015
Calibration Due Date	07/05/2016	27/04/2016

END OF TEST REPORT

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APPENDIX EXHIBITS OF APPLICATION FOR CERTIFICATION