

TEST REPORT

of

FCC Part 22 Subpart H, Part 24 Subpart E
(Class II Permissive Change)
FCC ID : RI7CC864-DUAL

Equipment Under Test : Dual-Band CDMA Module/GPS
Model Name : CC864-DUAL
Serial No. : N/A
Applicant : Telit Communications S.p.A.
Manufacturer : Telit Communications S.p.A.
Date of Test(s) : 2010.02.12 ~ 2010.02.22
Date of Issue : 2010.03.04

In the configuration tested, the EUT complied with the standards specified above.

Tested By:



Date

2010.03.04

Grant Lee

Approved By



Date

2010.03.04

Charles Kim

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Table of contents

1. General information -----	3
2. RF radiated output power & spurious radiated emission -----	10
3. RF Exposure Evaluation -----	13

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1. General information

1.1 Testing laboratory

SGS Testing Korea Co., Ltd.
 Wireless Div. 2FL, 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea 435-040
www.electrolab.kr.sgs.com
 Telephone : +82 +31 428 5700
 FAX : +82 +31 427 2371

1.2 Details of applicant

Applicant : Telit Communications S.p.A.
 Address : Viale Stazione di Prosecco 5/b Trieste, 34010, Italy
 Contact Person : Brian Tucker
 Phone No. : 1-919-439-7977
 Fax No. : 1-919-840-0337

1.3 Details of Host

Host : Leica Geosystems Inc.
 Host model : SLC1 (additional model name: SLC2)
 Address : 5051 Peachtree Corners Circle Suite 250 Norcross GA, USA
 Contact Person : Shannon Hixon
 Phone No. : 970-689-2838
 Fax No. : 970-204-0267
 Host Manufacturer : Leica Geosystems AG

1.4. Description of EUT

Kind of Product	Dual-Band CDMA Module/GPS
Model Name	CC864-DUAL
Module FCC ID CDMA/PCS	RI7CC864-DUAL
Power Supply	DC 4 V
Output Power CDMA:	Cond. : 24.94 dBm AVG // E.R.P : 24.55 dBm
Output Power PCS:	Cond. : 24.36 dBm AVG // E.I.R.P : 24.32 dBm
Frequency Range	CDMA : 824.70 MHz ~ 848.31 MHz
	PCS : 1851.25 MHz ~ 1908.75 MHz
Modulation Technique	GMSK (CDMA, PCS)
Antenna gain	0 dBi

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1.5. Conducted Output power

Band	Channel	SO2	SO2	S055	S055	TDSO
		RC1/1	RC3/3	RC1/1	RC3/3	RC3/3
CDMA850	1013	24.31	24.40	24.38	24.82	24.70
	3863	24.81	24.93	24.76	24.94	24.78
	777	24.70	24.70	24.67	24.71	24.77
PCS1900	25	24.35	24.32	24.33	24.36	24.33
	600	24.00	24.05	24.06	24.07	24.16
	1175	24.35	24.35	24.32	24.36	23.97

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1.6. Test equipment list

Equipment	Manufacturer	Model	Cal Due.
Signal Generator	Agilent	E4438C	Apr. 01, 2010
Spectrum Analyzer	R&S	100769	May. 15, 2010
Directional Coupler	Narda	4226-20	Jan. 07, 2011
Power Meter	Agilent	E4416A	Apr. 01, 2010
Power Sensor	Agilent	E9327A	Apr. 02, 2010
Preamplifier	H.P.	8447F	Jul. 02, 2010
Preamplifier	Agilent	8449B	Apr. 01, 2010
Band Reject Filter	Wainwright	WRCG824/849-814/85960/10SS	Apr. 01, 2010
High Pass Filter	Wainwright	WHK3.0/18G-10SS	Oct. 29, 2010
Bilog Antenna	SCHWARZBECK MESSELEKTRONIK	396	Jul. 22, 2010
Horn Antenna	R&S	HF 906	Oct. 08, 2011
Horn Antenna	SCHWARZBECK	BBHA9120D(0600)	Oct. 09, 2011
Communication Antenna	AR	AT 4002	N.C.R
Dipole Antenna	VHAP/UHAP	975/958	Jan. 15, 2012

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1.7. Summary of test results

The EUT has been tested according to the following specifications:

Applied standard : FCC Part 22 Subpart H and Part 24 Subpart E		
Standard section	Test item	Result
22.913(a) 24.232(c)	RF radiated output power	Complied
22.917(a) 24.238(a)	Spurious radiated emission	Complied
1.1307(b)(1)	Maximum Permissible Exposure (Exposure of Humans to RF Fields)	Complied

1.8. Test report revision

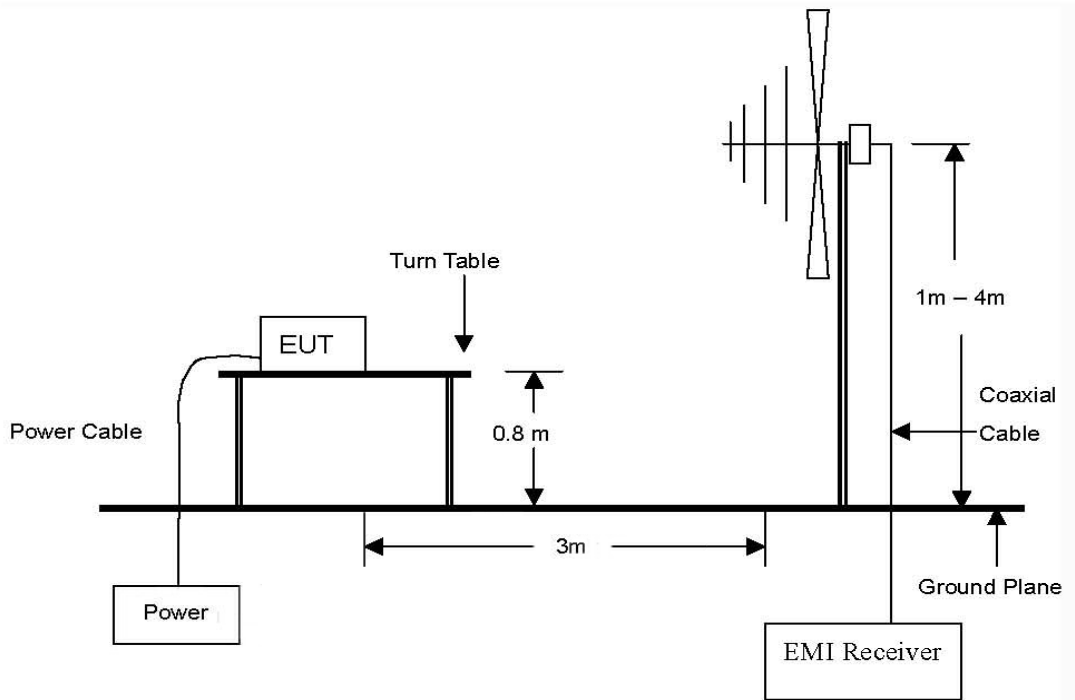
Revision	Report number	Description
0	F690501/RF-RTL003623	Initial

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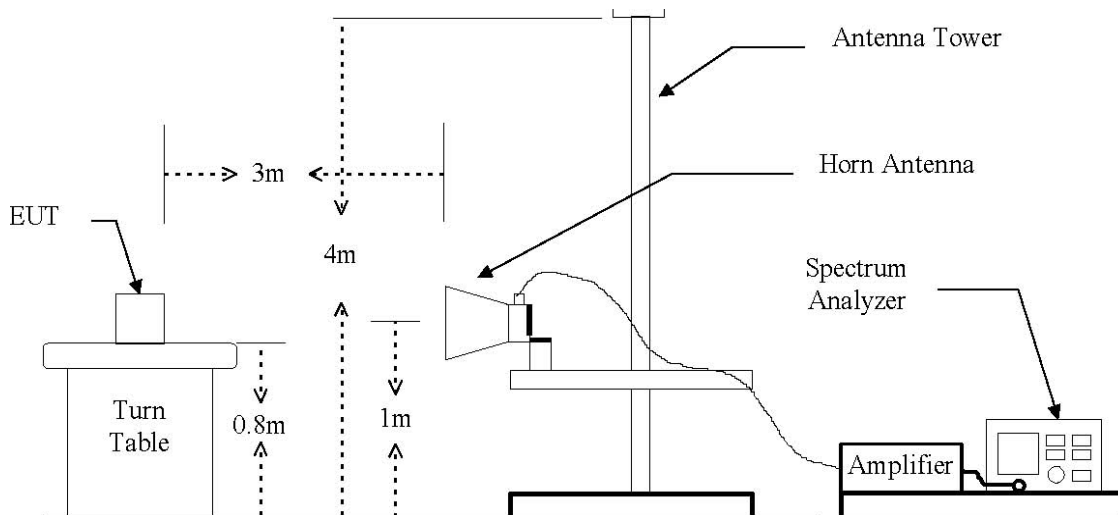
2. RF radiated output power & spurious radiated emission

2.1. Test setup

The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz Emissions.

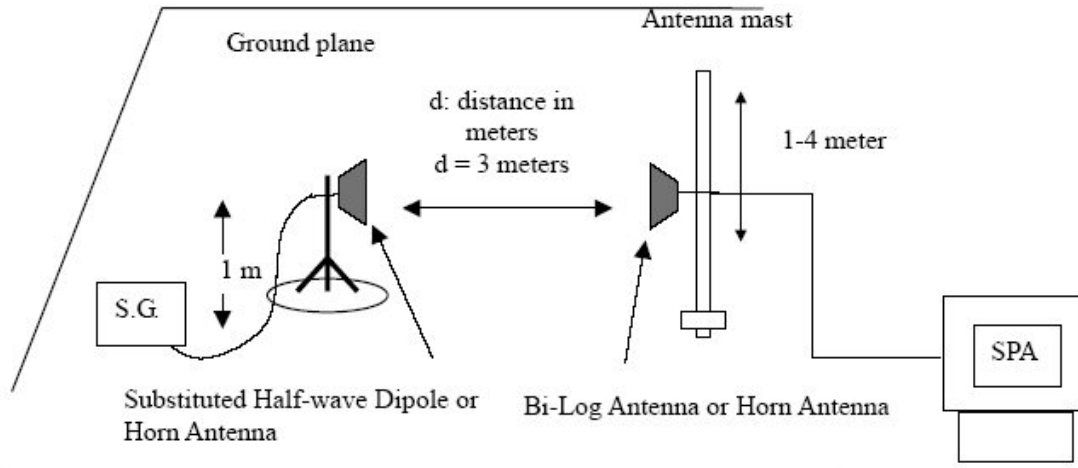


The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 18 GHz Emissions.



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The diagram below shows the test setup for substituted method



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2.2. Limit

FCC §22.913(a), the ERP of mobile transmitters must not exceed 7 watts. FCC §24.232(b) Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

2.3. Test procedure : Based on ANSI/TIA 603C: 2004

1. On a test site, the EUT shall be placed at 80cm height on a turn table, and in the position closest to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3m from EUT to correspond to the fundamental frequency of the transmitter.
3. The output of the test antenna shall be connected to the measuring receiver and the peak detector is used for the measurement.
4. During the measurement of the EUT, the resolution bandwidth was to 1 MHz and the average bandwidth was set to 1 MHz.
5. The transmitter shall be switched on, the measuring receiver shall be tuned to the frequency of the transmitter under test.
6. The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
7. The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
8. The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
9. The maximum signal level detected by the measuring receiver shall be noted.
10. The EUT was replaced by half-wave dipole (824~849 MHz) or horn antenna (1850 ~1910 MHz) connected to a signal generator.
11. In necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
12. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
13. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, which is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
14. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
15. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

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2.4. Test result for RF output power

Ambient temperature : 24 °C
 Relative humidity : 47 % R.H.

Test mode: CDMA 850

Frequency (MHz)	Ant. Pol. (H/V)	Cable loss (dB)	S.G level + Amp. (dBm)	Ant. gain (dBd)	E.R.P.	
					(dBm)	(mW)
824.700	V	3.42	37.96	-10.44	24.10	257.04
824.700	H	3.42	35.04	-10.44	21.18	131.22
836.520	V	3.38	36.78	-10.48	22.92	195.88
836.520	H	3.38	32.23	-10.48	18.37	68.71
848.310	V	3.34	38.41	-10.53	24.55	260.02
848.310	H	3.34	34.98	-10.53	21.12	130.32

Test mode: PCS 1900

Frequency (MHz)	Ant. Pol. (H/V)	Cable loss (dB)	S.G level + Amp. (dBm)	Ant. gain (dBi)	E.I.R.P.	
					(dBm)	(mW)
1851.25	V	4.92	23.53	5.71	24.32	270.40
1851.25	H	4.92	13.44	5.71	14.23	26.49
1880.00	V	4.97	22.03	5.78	22.84	192.31
1880.00	H	4.97	10.20	5.78	11.01	12.62
1908.75	V	5.01	22.11	5.85	22.95	197.24
1908.75	H	5.01	10.87	5.85	11.71	14.83

Remark:

$E.R.P. \ \& \ E.I.R.P = [S.G \ level + Amp.](dBm) - Cable \ loss(dB) + Ant. \ gain \ (dBd/dBi)$

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2.5. Test result for spurious radiated emission

Ambient temperature : 24 °C
 Relative humidity : 47 % R.H.

Test mode: CDMA 850

Frequency (MHz)	Ant. Pol. (H/V)	Cable loss (dB)	S.G level (dBm)	Ant. gain (dBd)	E.R.P (dBm)	Limit (dBm)	Margin (dB)
Low Channel(824.70 MHz)							
1949.40	V	5.08	-39.35	5.95	-38.48	-13.00	25.48
1949.40	H	5.08	-38.70	5.95	-37.84	-13.00	24.84
2474.10	V	5.83	-30.98	7.05	-29.77	-13.00	16.77
2474.10	H	5.83	-36.01	7.05	-34.79	-13.00	21.79
3298.80	V	7.17	-38.00	8.46	-36.71	-13.00	23.71
3298.80	H	7.17	-41.70	8.46	-40.41	-13.00	27.41
Middle Channel(836.52 MHz)							
1673.04	V	4.62	-47.17	5.28	-46.51	-13.00	33.51
1673.04	H	4.62	-45.39	5.28	-44.73	-13.00	31.73
2509.56	V	5.83	-32.69	7.12	-31.39	-13.00	18.39
2509.56	H	5.83	-36.31	7.12	-35.02	-13.00	22.02
3346.08	V	7.17	-37.61	8.48	-36.30	-13.00	23.30
3346.08	H	7.17	-39.91	8.48	-38.60	-13.00	25.60
High Channel(848.31 MHz)							
1696.62	V	4.66	-51.10	5.34	-50.43	-13.00	37.43
1696.62	H	4.66	-47.29	5.34	-46.61	-13.00	33.61
2544.93	V	5.83	-36.42	7.21	-35.04	-13.00	22.04
2544.93	H	5.83	-39.37	7.21	-37.99	-13.00	24.99
3393.24	V	7.16	-37.70	8.49	-36.37	-13.00	23.37
3393.24	H	7.16	-36.97	8.49	-35.64	-13.00	22.64

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Test mode: CDMA1900

Frequency (MHz)	Ant. Pol. (H/V)	Cable loss (dB)	S.G level (dBm)	Ant. gain (dBi)	E.I.R.P (dBm)	Limit (dBm)	Margin (dB)
Low Channel(1851.25 MHz)							
3702.50	V	7.34	-38.06	8.46	-36.94	-13	23.94
3702.50	H	7.34	-39.06	8.46	-37.94	-13	24.94
Middle Channel(1880.00 MHz)							
3760.00	V	7.53	-37.07	8.45	-36.15	-13	23.15
3760.00	H	7.53	-41.81	8.45	-40.89	-13	27.89
High Channel(1908.75 MHz)							
3817.50	V	7.69	-34.91	8.43	-34.17	-13	21.17
3817.50	H	7.69	-40.15	8.43	-39.40	-13	26.40

Remark:

1. $E.R.P. \ \& \ E.I.R.P = [S.G \ level + Amp.](dBm) - Cable \ loss(dB) + Ant. \ gain \ (dBd/dBi)$
2. No more harmonic above 3rd harmonic for all channel.

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3. RF exposure evaluation

According to FCC 1.1310 : The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in § 1.1307(b)

Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength(V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Average time
(A) Limits for Occupational /Control Exposures				
300 – 1500	--	--	F/300	6
1500 - 100000	--	--	5	6
(B) Limits for General Population/Uncontrol Exposures				
300 – 1500	--	--	F/1500	6
<u>1500 - 100000</u>	--	--	<u>1</u>	<u>30</u>

3.1 Friis transmission formula : $Pd = (Pout * G) / (4 * pi * R^2)$

Where

Pd = power density in mW/cm²

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

Pd the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

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3.2 Test result of RF exposure evaluation

Test Item : RF Exposure evaluation data

Test Mode : Normal operation

3.2.1 Output power into antenna & RF exposure evaluation distance

Operating mode	Channel	Frequency (MHz)	Output Power (dBm)	Antenna gain (dBi)	Power density at 20cm (mW/cm ²)	Limit (mW/cm ²)
CDMA850	Low	824.70	24.82	0	0.06036	1
	Middle	836.32	24.94	0	0.06205	
	High	848.31	24.71	0	0.05885	
PCS1900	Low	1851.35	24.36	0	0.05429	1
	Middle	1880.00	24.07	0	0.05078	
	High	1908.75	24.36	0	0.05429	

■ Note

The power density Pd (4th column) at a distance of 20cm calculated from the friis transmission formula is far below the limit of 1 mW/ cm².