



# A Test Lab Techno Corp.

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## MPE Report

Test Report No.	: 1308FS11-03
Applicant	: Telit Communications S.p.A.
Manufacturer	: Telit Communications S.p.A.
Product Type	: Module
Trade Name	: Telit
Model Number	: HE910-NAG V2, HE910-NA V2
Test Period	: Nov. 27, 2013
Dates of Issued	Nov. 28, 2013
Test Specification	: 47 CFR § 2.1091 47 CFR §1.1310 ANSI / IEEE Std.C95.1-1992 H46-2/99-237E CANADA RSS-102 Issue 4 March 2010
Location of Test Lab.	: Chang-an Lab.

1. The test operations have to be performed with cautious behavior, the test results are as attached.
2. The test results are under chamber environment of A Test Lab Techno Corp. A Test Lab Techno Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples.
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Tested By : Sky Chou  
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## 1. Description of Equipment under Test (EUT)

Applicant	Telit Communications S.p.A.
Applicant Address	Viale Stazione di Prosecco 5/b, Trieste, 34010, Italy
Manufacturer	Telit Communications S.p.A.
Manufacturer Address	Via Stazione di Prosecco, 5/B 34010 Sgonico Italy
Product Type	Module
Trade Name	Telit
Model Number	HE910-NAG V2, HE910-NA V2
Different Description	HE910-NA V2 is same HW with HE910-NAG V2, but without GPS function.
FCC	RI7HE910NAV2
Frequency Range	824.2 - 848.8 MHz GSM/GPRS/EGPRS/DTM 850 1850.2 - 1909.8 MHz PCS/GPRS/EGPRS/DTM 1900 1852.4 - 1907.6 MHz WCDMA(RMC 12.2K)/HSDPA/HSUPA/HSPA+ Band II 826.4 - 846.6 MHz WCDMA(RMC 12.2K)/HSDPA/HSUPA/HSPA+ Band V *GPRS / EGPRS Multi Class: 10 *DTM Multi Class: 9
Transmit Power (conducted power)	GSM/GPRS/EGPRS/DTM 850: 1.811 W / 32.58 dBm PCS/GPRS/EGPRS/DTM 1900: 0.885 W / 29.47 dBm WCDMA(RMC 12.2K)/HSDPA/HSUPA/HSPA+ Band II: 0.237 W / 23.75 dBm WCDMA(RMC 12.2K)/HSDPA/HSUPA/HSPA+ Band V: 0.251 W / 23.99 dBm
Antenna Specification	GSM/GPRS/EGPRS/DTM 850: 7.43 dBi GSM/GPRS/EGPRS/DTM E 1900: 3.00 dBi WCDMA(RMC 12.2K)/HSDPA/HSUPA/HSPA+ Band II: 3.00 dBi WCDMA(RMC 12.2K)/HSDPA/HSUPA/HSPA+ Band V: 8.45 dBi *Evaluation of the antenna gain between GSM 850 and WCDMA Band V; in order to compliance with these ERP / EIRP and MPE requirements, used antenna gain 7.43dBi. *Evaluation of the antenna gain between GSM PCS and WCDMA Band II; in order to compliance with these ERP / EIRP and MPE requirements, used antenna gain 3dBi.
Antenna Designation	Dipole Antenna
Temperature Range	-30 ~ +70°C
RF Evaluation	5.49 W/m <sup>2</sup>

The above equipment was tested by A Test Lab Techno Corp. For compliance with the requirements set forth in 47 CFR § 2.1091 & 47 CFR § 1.1310. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties



## 2. Human Exposure Assessment

Due to the design and installation of this product, it is not possible to conduct SAR evaluation. This is because client either manufactures or supplies the antenna(s) that will be used in the installation of this product. Therefore, this product will be evaluated as a mobile device per 47 CFR §1.1310 titled "Radiofrequency radiation exposure limits", generally referred to as MPE limits.

In 47 CFR § 2.1091, paragraph (b) defines a mobile device as "a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 cm is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons." This product is intended to be installed into a vehicle such that the unit is physically secured at one location. In the installation guide supplied with the product,

Client has made the following statement: "IMPORTANT: To meet the FCC's RF Exposure Guidelines, the antenna should be installed so there is at least 20 cm of separation between the body of the user and nearby persons and the antenna". Based on the installation of the transceiver and the antenna, the transmitters radiating structure is more than 20 cm from the user. Thus, this product is a "mobile device" as defined in section § 2.1091 paragraph (b).

### Exposure evaluation

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{PG}{4\pi R^2}$$

The formula of antenna gain evaluation is as below:

$$G_{max} = \frac{4\pi R^2}{P_{av}} S_{limit}$$

Where

S: power density

P: power input to the antenna

G: power gain of the antenna in the direction of interest relative to an isotropic radiator.

R: distance to the center of radiation of the antenna.



### 3. RF Output Power

Band	Data Rate	CH	Frequency (MHz)	Avg.-burst Conducted power (dBm)
GSM 850	---	128	824.2	32.44
		190	836.6	<b>32.58</b>
		251	848.8	32.34
GPRS 850	4Down1Up	128	824.2	32.32
		190	836.6	32.46
		251	848.8	32.22
	3Down2Up	128	824.2	32.25
		190	836.6	32.36
		251	848.8	32.15
EGPRS 850	4Down1Up	128	824.2	26.10
		190	836.6	26.19
		251	848.8	26.02
	3Down2Up	128	824.2	26.04
		190	836.6	26.08
		251	848.8	26.03
DTM 850 (GSM+GPRS)	3Down2Up	128	824.2	32.06
		190	836.6	32.15
		251	848.8	32.06
DTM 850 (GSM+EGPRS)	3Down2Up	128	824.2	26.24
		190	836.6	26.35
		251	848.8	26.06



Band	Data Rate	CH	Frequency (MHz)	Avg.-burst Conducted power (dBm)
GSM 1900	---	512	1850.2	29.44
		661	1880.0	<b>29.47</b>
		810	1909.8	29.41
GPRS 1900	4Down1Up	512	1850.2	29.32
		661	1909.8	29.37
		810	1909.8	29.31
	3Down2Up	512	1850.2	29.21
		661	1909.8	29.27
		810	1909.8	29.19
EGPRS 1900	4Down1Up	512	1850.2	25.13
		661	1880.0	25.16
		810	1909.8	25.09
	3Down2Up	512	1850.2	25.02
		661	1909.8	25.06
		810	1909.8	25.07
DTM 1900 (GSM+GPRS)	3Down2Up	512	1850.2	29.06
		661	1909.8	29.12
		810	1909.8	29.01
DTM 1900 (GSM+EGPRS)	3Down2Up	512	1850.2	25.03
		661	1909.8	25.06
		810	1909.8	25.10



Band	Sub-test	CH	Frequency (MHz)	Time-Average Conducted power (dBm)
WCDMA Band II	---	9262	1852.4	<b>23.75</b>
		9400	1880.0	23.69
		9538	1907.6	23.36
HSDPA Band II	1	9262	1852.4	22.74
		9400	1880.0	22.65
		9538	1907.6	22.32
	2	9262	1852.4	22.71
		9400	1880.0	22.61
		9538	1907.6	22.30
	3	9262	1852.4	22.23
		9400	1880.0	22.16
		9538	1907.6	21.80
	4	9262	1852.4	22.21
		9400	1880.0	22.13
		9538	1907.6	21.81
HSUPA/HSPA+ Band II	1	9262	1852.4	22.46
		9400	1880.0	22.37
		9538	1907.6	22.23
	2	9262	1852.4	20.43
		9400	1880.0	20.36
		9538	1907.6	20.23
	3	9262	1852.4	21.45
		9400	1880.0	21.33
		9538	1907.6	21.23
	4	9262	1852.4	20.42
		9400	1880.0	20.30
		9538	1907.6	20.22
	5	9262	1852.4	22.41
		9400	1880.0	22.36
		9538	1907.6	22.21



Band	Sub-test	CH	Frequency (MHz)	Time-Average Conducted power (dBm)
WCDMA Band V	---	4132	826.4	<b>23.99</b>
		4183	836.6	23.97
		4233	846.6	23.92
HSDPA Band V	1	4132	826.4	22.98
		4183	836.6	22.94
		4233	846.6	22.88
	2	4132	826.4	22.96
		4183	836.6	22.91
		4233	846.6	22.86
	3	4132	826.4	22.45
		4183	836.6	22.43
		4233	846.6	22.39
	4	4132	826.4	22.47
		4183	836.6	22.43
		4233	846.6	22.35
HSUPA/HSPA+ Band V	1	4132	826.4	22.47
		4183	836.6	22.34
		4233	846.6	22.26
	2	4132	826.4	20.48
		4183	836.6	20.33
		4233	846.6	20.26
	3	4132	826.4	21.46
		4183	836.6	21.34
		4233	846.6	21.24
	4	4132	826.4	20.44
		4183	836.6	20.31
		4233	846.6	20.24
	5	4132	826.4	22.47
		4183	836.6	22.31
		4233	846.6	22.25





#### 4. Max. Gain Evaluation

Band	Data Rate	Frequency (MHz)	Limit (mw)/cm <sup>2</sup>	Distance (cm) [R]	Duty Cycle	Calculations to meet ERP limits			Calculations to meet MPE limits		
						ERP limits (W)	Antenna gain to meet ERP limits [G1]		Avg. max tune-up power (upper limit) (dBm) [P]	Antenna gain to meet MPE limits [G2]	
							Numeric	[dBi]		Numerical	[dBi]
GSM 850	1D1U	824.2	0.549	20	0.125	7	5.75	7.60	33	11.06	10.44
		836.6	0.558	20	0.125	7	5.75	7.60	33	11.24	10.51
		848.8	0.566	20	0.125	7	5.75	7.60	33	11.40	10.57
GPRS 850	4D1U	824.2	0.549	20	0.125	7	5.75	7.60	33	11.06	10.44
		836.6	0.558	20	0.125	7	5.75	7.60	33	11.24	10.51
		848.8	0.566	20	0.125	7	5.75	7.60	33	11.40	10.57
	3D2U	824.2	0.549	20	0.250	7	5.75	7.60	33	5.53	7.43
		836.6	0.558	20	0.250	7	5.75	7.60	33	5.62	7.50
		848.8	0.566	20	0.250	7	5.75	7.60	33	5.70	7.56
EGPRS 850	4D1U	824.2	0.549	20	0.125	7	22.91	13.60	27	44.04	16.44
		836.6	0.558	20	0.125	7	22.91	13.60	27	44.77	16.51
		848.8	0.566	20	0.125	7	22.91	13.60	27	45.41	16.57
	3D2U	824.2	0.549	20	0.250	7	22.91	13.60	27	22.02	13.43
		836.6	0.558	20	0.250	7	22.91	13.60	27	22.38	13.50
		848.8	0.566	20	0.250	7	22.91	13.60	27	22.70	13.56
DTM 850 (GSM+GPRS)	3D2U	824.2	0.549	20	0.250	7	5.75	7.60	33	5.53	7.43
		836.6	0.558	20	0.250	7	5.75	7.60	33	5.62	7.50
		848.8	0.566	20	0.250	7	5.75	7.60	33	5.70	7.56
DTM 850 (GSM+EGPRS)	3D2U	824.2	0.549	20	0.250	7	22.91	13.60	27	22.02	13.43
		836.6	0.558	20	0.250	7	22.91	13.60	27	22.38	13.50
		848.8	0.566	20	0.250	7	22.91	13.60	27	22.70	13.56

Min G1: 7.60 dBi

Min G2: 7.43 dBi

Min G(G1,G2) : 7.43 dBi

G1: Antenna gain (dBi) to comply with ERP limits

G2: Antenna gain (dBi) to comply with MPE limits

Note: In order to comply with MPE and ERP limits therefore the max antenna gain should not exceed 7.43 dBi in GSM850MHz.



Band	Data Rate	Frequency (MHz)	Limit (mw)/cm <sup>2</sup>	Distance (cm) [R]	Duty Cycle	Calculations to meet EIRP limits			Calculations to meet MPE limits		
						EIRP limits (W)	Antenna gain to meet EIRP limits [G1]		Avg. max tune-up power (upper limit) (dBm) [P]	Antenna gain to meet MPE limits [G2]	
							Numeric	[dBi]		Numeric	[dBi]
PCS 1900	1D1U	1850.2	1.000	20	0.125	2.00	2.00	3.01	30	40.21	16.04
		1880.0	1.000	20	0.125	2.00	2.00	3.01	30	40.21	16.04
		1909.8	1.000	20	0.125	2.00	2.00	3.01	30	40.21	16.04
GPRS 1900	4D1U	1850.2	1.000	20	0.125	2.00	2.00	3.01	30	40.21	16.04
		1880.0	1.000	20	0.125	2.00	2.00	3.01	30	40.21	16.04
		1909.8	1.000	20	0.125	2.00	2.00	3.01	30	40.21	16.04
	3D2U	1850.2	1.000	20	0.250	2.00	2.00	3.01	30	20.10	13.03
		1880.0	1.000	20	0.250	2.00	2.00	3.01	30	20.10	13.03
		1909.8	1.000	20	0.250	2.00	2.00	3.01	30	20.10	13.03
EGPRS 1900	4D1U	1850.2	1.000	20	0.125	2.00	5.02	7.01	26	101.00	20.04
		1880.0	1.000	20	0.125	2.00	5.02	7.01	26	101.00	20.04
		1909.8	1.000	20	0.125	2.00	5.02	7.01	26	101.00	20.04
	3D2U	1850.2	1.000	20	0.250	2.00	5.02	7.01	26	50.50	17.03
		1880.0	1.000	20	0.250	2.00	5.02	7.01	26	50.50	17.03
		1909.8	1.000	20	0.250	2.00	5.02	7.01	26	50.50	17.03
DTM 1900 (GSM+GPRS)	3D2U	1850.2	1.000	20	0.250	2.00	2.00	3.01	30	20.10	13.03
		1880.0	1.000	20	0.250	2.00	2.00	3.01	30	20.10	13.03
		1909.8	1.000	20	0.250	2.00	2.00	3.01	30	20.10	13.03
DTM 1900 (GSM+EGPRS)	3D2U	1850.2	1.000	20	0.250	2.00	5.02	7.01	26	50.50	17.03
		1880.0	1.000	20	0.250	2.00	5.02	7.01	26	50.50	17.03
		1909.8	1.000	20	0.250	2.00	5.02	7.01	26	50.50	17.03

Min G1: 3.01 dBi

Min G2: 13.03 dBi

Min G(G1,G2) : 3.01 dBi

G1: Antenna gain (dBi) to comply with EIRP limits.

G2: Antenna gain (dBi) to comply with MPE limits.

Note: In order to comply with MPE and EIRP limits therefore the max antenna gain should not exceed 3.01 dBi in PCS.



Band	Data Rate	Frequency (MHz)	Limit (mw)/cm <sup>2</sup>	Distance (cm) [R]	Duty Cycle	Calculations to meet EIRP limits			Calculations to meet MPE limits		
						EIRP limits (W)	Antenna gain to meet EIRP limits [G1]		Avg. max tune-up power (upper limit) (dBm) [P]	Antenna gain to meet MPE limits [G2]	
							Numeric	[dBi]		Numeric	[dBi]
WCDMA Band II	RMC 12.4K	1852.4	1.000	20	1	2	7.96	9.01	24	20.01	13.01
		1880.0	1.000	20	1	2	7.96	9.01	24	20.01	13.01
		1907.6	1.000	20	1	2	7.96	9.01	24	20.01	13.01

Min G1: 9.01 dBi

Min G2: 13.01 dBi

Min G(G1,G2) : 9.01 dBi

G1: Antenna gain (dBi) to comply with EIRP limits.

G2: Antenna gain (dBi) to comply with MPE limits.

Note: In order to comply with MPE and EIRP limits therefore the max antenna gain should not exceed 9.01 dBi in WCDMA Band II.

Band	Data Rate	Frequency (MHz)	Limit (mw)/cm <sup>2</sup>	Distance (cm) [R]	Duty Cycle	Calculations to meet ERP limits			Calculations to meet MPE limits		
						ERP limits (W)	Antenna gain to meet ERP limits [G1]		Avg. max tune-up power (upper limit) (dBm) [P]	Antenna gain to meet MPE limits [G2]	
							Numeric	[dBi]		Numeric	[dBi]
WCDMA Band V	RMC 12.4K	826.4	0.551	20	1	7	45.71	16.60	24	11.02	10.42
		836.6	0.558	20	1	7	45.71	16.60	24	11.16	10.48
		846.6	0.564	20	1	7	45.71	16.60	24	11.28	10.52

Min G1: 16.60 dBi

Min G2: 10.42 dBi

Min G(G1,G2) : 10.42 dBi

G1: Antenna gain (dBi) to comply with ERP limits

G2: Antenna gain (dBi) to comply with MPE limits

Note: In order to comply with MPE and ERP limits therefore the max antenna gain should not exceed 10.42 dBi in WCDMA Band V.



## 5. Test Result

Band	Data Rate	Frequency (MHz)	Limit (mw/cm <sup>2</sup> )	Distance (cm) [R]	Max Tune-up Power (upper limit) (dBm) [P]	ANT Gain (dBi)	Numeric Gain [G]	Duty Cycle	[P] x [G] with Duty cycle (mW) [TP]	Power Density (mw/cm <sup>2</sup> ) [S]
GSM 850	1D1U	824.2	0.549	20	33	7.43	5.53	0.125	1379.23	0.274
		836.6	0.558	20	33	7.43	5.53	0.125	1379.23	0.274
		848.8	0.566	20	33	7.43	5.53	0.125	1379.23	0.274
GPRS 850	4D1U	824.2	0.549	20	33	7.43	5.53	0.125	1379.23	0.274
		836.6	0.558	20	33	7.43	5.53	0.125	1379.23	0.274
		848.8	0.566	20	33	7.43	5.53	0.125	1379.23	0.274
	3D2U	824.2	0.549	20	33	7.43	5.53	0.250	2758.45	0.549
		836.6	0.558	20	33	7.43	5.53	0.250	2758.45	0.549
		848.8	0.566	20	33	7.43	5.53	0.250	2758.45	0.549
EGPRS 850	4D1U	824.2	0.549	20	27	7.43	5.53	0.125	346.45	0.069
		836.6	0.558	20	27	7.43	5.53	0.125	346.45	0.069
		848.8	0.566	20	27	7.43	5.53	0.125	346.45	0.069
	3D2U	824.2	0.549	20	27	7.43	5.53	0.250	692.89	0.138
		836.6	0.558	20	27	7.43	5.53	0.250	692.89	0.138
		848.8	0.566	20	27	7.43	5.53	0.250	692.89	0.138
DTM 850 (GSM+GPRS)	3D2U	824.2	0.549	20	33	7.43	5.53	0.250	2758.45	0.549
		836.6	0.558	20	33	7.43	5.53	0.250	2758.45	0.549
		848.8	0.566	20	33	7.43	5.53	0.250	2758.45	0.549
DTM 850 (GSM+EGPRS)	3D2U	824.2	0.549	20	27	7.43	5.53	0.250	692.89	0.138
		836.6	0.558	20	27	7.43	5.53	0.250	692.89	0.138
		848.8	0.566	20	27	7.43	5.53	0.250	692.89	0.138

Note: The Numeric Gain calculated by  $10^{(\text{ant. Gain(dBi)} / 10)}$ .



Band	Data Rate	Frequency (MHz)	Limit (mw/cm <sup>2</sup> )	Distance (cm) [R]	Max Tune-up Power (upper limit) (dBm) [P]	ANT Gain (dBi)	Numeric Gain [G]	Duty Cycle	[P] x [G] with Duty cycle (mW) [TP]	Power Density (mw/cm <sup>2</sup> ) [S]
GSM 1900	1D1U	1850.2	1.000	20	30	3.00	2.00	0.125	250.00	0.050
		1880.0	1.000	20	30	3.00	2.00	0.125	250.00	0.050
		1909.8	1.000	20	30	3.00	2.00	0.125	250.00	0.050
GPRS 1900	4D1U	1850.2	1.000	20	30	3.00	2.00	0.125	250.00	0.050
		1909.8	1.000	20	30	3.00	2.00	0.125	250.00	0.050
		1909.8	1.000	20	30	3.00	2.00	0.125	250.00	0.050
	3D2U	1850.2	1.000	20	30	3.00	2.00	0.250	500.00	0.099
		1909.8	1.000	20	30	3.00	2.00	0.250	500.00	0.099
		1909.8	1.000	20	30	3.00	2.00	0.250	500.00	0.099
EGPRS 1900	4D1U	1850.2	1.000	20	26	3.00	2.00	0.125	99.53	0.020
		1909.8	1.000	20	26	3.00	2.00	0.125	99.53	0.020
		1909.8	1.000	20	26	3.00	2.00	0.125	99.53	0.020
	3D2U	1850.2	1.000	20	26	3.00	2.00	0.250	199.05	0.040
		1909.8	1.000	20	26	3.00	2.00	0.250	199.05	0.040
		1909.8	1.000	20	26	3.00	2.00	0.250	199.05	0.040
DTM 1900 (GSM+GPRS)	3D2U	1850.2	1.000	20	30	3.00	2.00	0.250	500.00	0.099
		1880.0	1.000	20	30	3.00	2.00	0.250	500.00	0.099
		1909.8	1.000	20	30	3.00	2.00	0.250	500.00	0.099
DTM 1900 (GSM+EGPRS)	3D2U	1850.2	1.000	20	26	3.00	2.00	0.250	199.05	0.040
		1880.0	1.000	20	26	3.00	2.00	0.250	199.05	0.040
		1909.8	1.000	20	26	3.00	2.00	0.250	199.05	0.040
WCDMA Band II	RMC 12.4K	1852.4	1.000	20	24	3.00	2.00	1.000	502.38	0.100
		1880.0	1.000	20	24	3.00	2.00	1.000	502.38	0.100
		1907.6	1.000	20	24	3.00	2.00	1.000	502.38	0.100
WCDMA Band V	RMC 12.4K	826.4	0.551	20	24	7.43	5.53	1.000	1389.07	0.276
		836.6	0.558	20	24	7.43	5.53	1.000	1389.07	0.276
		846.6	0.564	20	24	7.43	5.53	1.000	1389.07	0.276

Note: The Numeric Gain calculated by  $10^{(\text{ant. Gain(dBi)} / 10)}$ .