REPORT No. : SZ15070092S01

RF EXPOSURE EVALUATION REPORT

APPLICANT	:	CONVERGENCE SYSTEMS LIMITED
PRODUCT NAME	:	Intelligent Integrated RFID Reader with 3G/GSM and GPS
MODEL NAME	:	CS208-3G-2
TRADE NAME	:	CSL
BRAND NAME	:	CSL
FCC ID	:	UB4CS2083G
STANDARD(S)	:	47CFR 2.1091 KDB 447498 D01 General RF Exposure Guidance v05r02
ISSUE DATE		2015-11-17

SHENZHEN MORLAB COMMUNICATIONS TECHNOLOGY Co., Ltd.

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DIRECTORY

TEST REPORT DECLARATION 3

1. TECHNICAL INFORMATION 4

1.1. IDENTIFICATION OF APPLICANT 4
1.2. IDENTIFICATION OF MANUFACTURER 4
1.3. EQUIPMENT UNDER TEST (EUT) 4
1.3.1. PHOTOGRAPHS OF THE EUT 5
1.3.2. IDENTIFICATION OF ALL USED EUT 6
1.4. APPLIED REFERENCE DOCUMENTS 6

2. DEVICE CATEGORY AND RF EXPOSURE LIMIT 7

3. MEASUREMENT OF CONDUCTED PEAK OUTPUT POWER 8

4. RF EXPOSURE EVALUATION 12

ANNEX C GENERAL INFORMATION 14

Change History		
Issue	Date	Reason for change
1.0	2015-11-17	First edition

TEST REPORT DECLARATION

Applicant	CONVERGENCE SYSTEMS LIMITED
Applicant Address	20/F, Chung Nam Building, No.1 Lockhart Road, Wanchai, Hong Kong
Manufacturer	DongGuan DongHongXingYe Electronics Science and Technology Limited
Manufacturer Address	1 Jianxiang Street, Hanxishui, Chashan Town, Dongguan, Guangdong, China
Product Name	Intelligent Integrated RFID Reader with 3G/GSM and GPS
Model Name	CSL
Brand Name	CSL
HW Version	Main board (V1.9); GSM board (V4.0); RFID board (V9.0)
SW Version	12.00.006(HE910); 1.5.28(RFID); WinCE6.0(OS)
Test Standards	47CFR 2.1091; KDB 447498 D01 General RF Exposure Guidance v05r02
Issue Date	2015-11-17
SAR Evaluation	Not Required

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Zhu Zhan

Approved by : Zeng Dexin

Zeng Dexin

1. TECHNICAL INFORMATION

Note: the following data is based on the information by the applicant.

1.1. Identification of Applicant

Company Name:	CONVERGENCE SYSTEMS LIMITED
Address:	20/F, Chung Nam Building, No.1 Lockhart Road, Wanchai, Hong Kong

1.2. Identification of Manufacturer

Company Name:	DongGuan DongHongXingYe Electronics Science and Technology Limited
Address:	1 Jianxiang Street, Hanxishui, Chashan Town, Dongguan, Guangdong, China

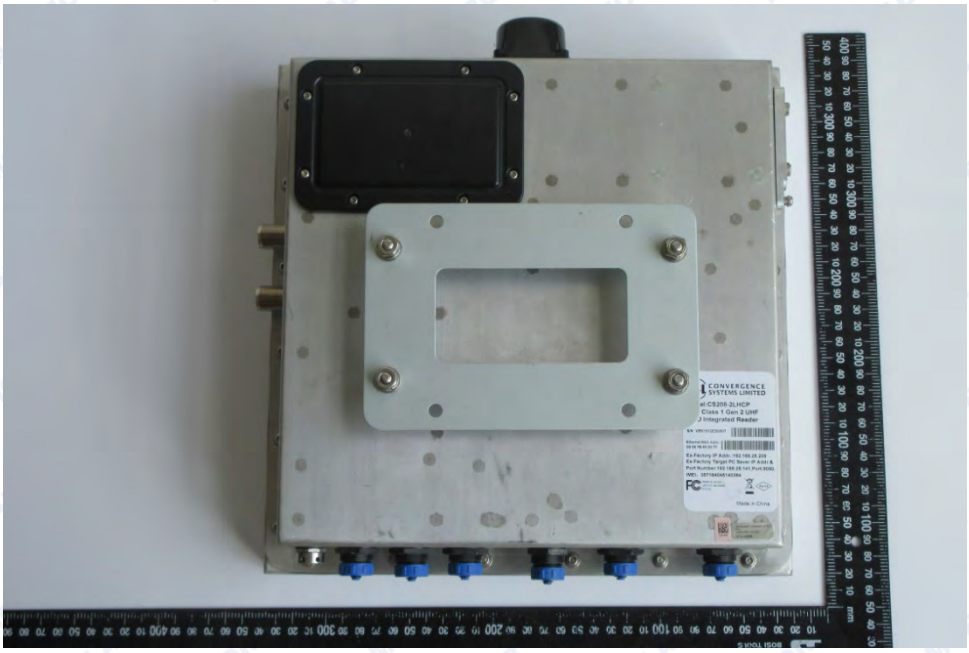
1.3. Equipment Under Test (EUT)

Model Name:	Intelligent Integrated RFID Reader with 3G/GSM and GPS
Trade Name:	CSL
Brand Name:	CSL
Hardware Version:	Main board (V1.9); GSM board (V4.0); RFID board (V9.0)
Software Version:	12.00.006(HE910); 1.5.28(RFID); WinCE6.0(OS)
Frequency Bands:	GSM 850: 824-849 MHz; GSM 1900: 1850-1910 MHz; WCDMA Band II : 1850-1910MHz; WCDMA Band IV: 1710-1755MHz; WCDMA Band V: 824-849 MHz; RFID Tx:902.25-915.25MHz;
Modulation Mode:	GSM/GPRS: GMSK; WCDMA/HSDPA/HSUPA/HSPA+;QPSK RFID:FHSS
Antenna type:	Fixed Internal Antenna
Development Stage:	Identical prototype

1.3.1. Photographs of the EUT

1. EUT front view

2. EUT rear view



1.3.2. Identification of all used EUT

The EUT identity consists of numerical and letter characters, the letter character indicates the test sample, and the following two numerical characters indicate the software version of the test sample.

EUT Identity	Hardware Version	Software Version
1#	Mainboard(V1.9);GSMboard(V4.0); RFIDboard(V9.0)	12.00.006(HE910);1.5.28(RFID); WinCE6.0(OS)

1.4. Applied Reference Documents

Leading reference documents for testing:

No.	Identity	Document Title
1	**47 CFR§2.1091**	Radiofrequency Radiation Exposure Evaluation: mobile devices
2	**KDB 447498 D01v05r02**	General RF Exposure Guidance

2. DEVICE CATEGORY AND RF EXPOSURE LIMIT

Per user manual, this device is Intelligent Integrated RFID Reader with 3G/GSM and GPS. Based on 47CFR 2.1091, this device belongs to mobile device category with General Population/Uncontrolled exposure.

Mobile Devices:

47CFR 2.1091(b)

For purposes of this section, a mobile device is defined 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 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. In this context, the term “fixed location” means that the device is physically secured at one location and is not able to be easily moved to another location. Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal computer, are considered to be mobile devices if they meet the 20 centimeter separation requirement.

GENERAL POPULATION / UNCONTROLLED EXPOSURE

The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity. Warning labels placed on low-power consumer devices such as cellular telephones are not considered sufficient to allow the device to be considered under the occupational/controlled category, and the general population/uncontrolled exposure limits apply to these devices.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f^2)	30
30-300	27.5	0.073	0.2	30
300-1500	-	-	f/1500	30
1500-100,000	-	-	1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

3. MEASUREMENT OF CONDUCTED PEAK OUTPUT POWER

1. WCDMA Conducted peak output power

Item	band	WCDMA 850			WCDMA 1900		
	ARFCN	4132	4182	4233	9262	9400	9538
	subtest	DBm			DBm		
5.2(WCDMA)	non	24.95	24.84	24.82	23.53	23.50	23.56
HSDPA	1	25.61	25.63	25.83	23.67	23.91	23.72
	2	25.55	25.60	25.81	23.66	23.90	23.71
	3	25.19	25.19	25.37	23.15	23.47	23.28
	4	25.18	25.13	25.26	23.14	23.39	23.25
HSUPA	1	26.09	26.07	26.28	23.62	23.92	23.83
	2	24.08	24.09	24.18	21.69	21.97	21.90
	3	25.11	25.18	25.18	22.67	22.99	22.89
	4	24.08	24.10	24.19	21.66	21.89	21.79
	5	26.07	26.09	26.11	23.60	23.89	23.84
HSPA+	1	25.42	25.43	25.77	23.43	23.88	23.94
Note: The Conducted RF Output Power test of WCDMA /HSDPA /HSUPA was tested by power meter.							

Item	band	WCDMA 1700		
	ARFCN	1312	1412	1513
	subtest	DBm		
5.2(WCDMA)	non	23.66	23.29	23.11
HSDPA	1	23.27	22.83	22.65
	2	23.29	22.87	22.69
	3	23.78	22.29	22.18
	4	22.69	22.30	22.15
HSUPA	1	23.28	22.89	22.73
	2	21.20	20.88	20.77
	3	22.29	21.99	21.93
	4	21.20	21.69	21.85
	5	23.19	22.87	22.71
HSPA+	1	23.18	22.90	22.78
Note: The Conducted RF Output Power test of WCDMA/HSDPA /HSUPA was tested by power meter.				

2. GPRS Mode Conducted peak output power

Band	Channel	Frequency (MHz)	Output Power(dBm)	
			Slot 1	Slot 2
GSM 850	128	824.2	32.65	32.29
	190	836.6	32.49	31.84
	251	848.8	32.42	31.81
PCS 1900	512	1850.2	28.27	28.26
	661	1880.0	28.40	28.39
	810	1909.8	28.66	28.64

GPRS Mode Time-based Average output power

Band	Channel	Frequency (MHz)	Output Power(dBm)	
			Slot 1	Slot 2
GSM 850	128	824.2	23.62	26.27
	190	836.6	23.46	25.82
	251	848.8	23.39	25.79
PCS 1900	512	1850.2	19.24	22.24
	661	1880.0	19.37	22.37
	810	1909.8	19.63	22.62

Timeslot consignations:

No. Of Slots	Slot 1	Slot 2	Slot 3	Slot 4
Slot Consignation	1Up4Down	2Up3Down	3Up2Down	4Up1Down
Duty Cycle	1:8	1:4	1:2.67	1:2
Correct Factor	-9.03dB	-6.02dB	-4.26dB	-3.01dB

3. EGPRS Mode Conducted peak output power

Band	Channel	Frequency (MHz)	Output Power(dBm)	
			Slot 1	Slot 2
GSM 850	128	824.2	29.91	29.88
	190	836.6	29.77	29.71
	251	848.8	29.68	29.71
PCS 1900	512	1850.2	27.19	27.38
	661	1880.0	27.43	27.51
	810	1909.8	27.79	27.78

EGPRS Mode Time-based Average output power

Band	Channel	Frequency (MHz)	Output Power(dBm)	
			Slot 1	Slot 2
GSM 850	128	824.2	20.88	23.86
	190	836.6	20.74	23.69
	251	848.8	20.65	23.69
PCS 1900	512	1850.2	18.16	21.36
	661	1880.0	18.40	21.49
	810	1909.8	18.76	21.76

4. RFID output power

Band	Channel	Frequency (MHz)	Output Power(dBm)
RFID Profile 0	1	902.75	29.59
	26	915.25	29.62
	50	927.25	29.75
RFID Profile 2	1	902.75	29.57
	26	915.25	29.66
	50	927.25	29.80
RFID Profile 4	1	902.75	29.69
	26	915.25	29.66
	50	927.25	29.82

4. RF EXPOSURE EVALUATION

Standalone transmission MPE evaluation

Bands	Frequency (MHz)	Antenna Gain (dBi)	Conducted Power (dBm)	Time-averaging EIRP (mW)	Power density (mW/cm²)	Limit for MPE (mW/cm²)
WCDMA850	846.6	2.0	26.28	672.98	0.005	0.56
WCDMA1700	1712.4	2.0	23.78	378.44	0.003	1.00
WCDMA1900	1880.0	2.0	23.92	390.84	0.003	1.00
GPRS850	824.2	2.0	26.27	671.43	0.005	0.55
GPRS1900	1909.8	2.0	22.62	289.73	0.002	1.00
EDGE850	824.2	2.0	23.86	385.48	0.003	0.55
EDGE1900	1909.8	2.0	21.76	237.68	0.002	1.00
RFID	927.25	5.0	29.82	3061.96	0.024	0.61

Note:

1. MPE calculation method

$$\text{Power Density} = EIRP/4\pi R^2$$

Where: EIRP = P·G

P = Peak out power

G = Antenna gain

R = Separation distance (100cm)

2. The RFID Reader is used to track vehicles or pallets or human workers passing by a road. It is always p laced high up and on the side and looking down. The separation distance between the user or bystande r and the device is greater than 1m.

Simultaneous transmission MPE evaluation

Bands	Power density (mW/cm²)	Limit for MPE (mW/cm²)	MPE ratio	Estimated SAR(W/Kg), 1g
WCDMA850	0.005	0.56	0.009	0.4
WCDMA1700	0.003	1.00	0.003	0.4
WCDMA1900	0.003	1.00	0.003	0.4
GPRS850	0.005	0.55	0.009	0.4
GPRS1900	0.002	1.00	0.002	0.4
EDGE850	0.003	0.55	0.005	0.4
EDGE1900	0.002	1.00	0.002	0.4
RFID	0.024	0.61	0.039	0.4

Note:

1. The [Σ of (the highest measured or estimated SAR for each standalone antenna configuration, adjusted for maximum tune-up tolerance) / 1.6 W/kg] + [Σ of MPE ratios] is ≤ 1.0
2. When the standalone SAR test exclusion is applied to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to the following to determine simultaneous transmission SAR test exclusion:

   1) (max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] • [√f(GHz)/x] W/kg for test separation distances ≤ 50 mm;

   where x = 7.5 for 1-g SAR, and x = 18.75 for 10-g SAR.

   2) 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distances is > 50 mm
3. RFID and WCDMA/GRPS can transmit simultaneously.

Bands	Σ of MPE ratios	Σ of estimated SAR/1.6		limit
RFID+WCDMA850	0.048	0.5	0.548	1
RFID+WCDMA1700	0.042	0.5	0.542	
RFID+WCDMA1900	0.042	0.5	0.542	
RFID+GPRS850	0.048	0.5	0.548	
RFID+GPRS1900	0.041	0.5	0.541	
RFID+EDGE850	0.044	0.5	0.544	
RFID+EDGE1900	0.041	0.5	0.541	

ANNEX C GENERAL INFORMATION

1. Identification of the Responsible Testing Laboratory

Company Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Department:	Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
Responsible Test Lab Manager:	Mr. Su Feng
Telephone:	+86 755 36698555
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2. Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China

***** END OF REPORT *****