1. RF Exposure Evaluation

1.1. Limits

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 (Minutes)
(A) Limits for Occupational/ Control Exposures				
300-1500	--	--	F/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	F/1500	6
1500-100,000	--	--	1	30

F= Frequency in MHz

Friis Formula

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

Where

Pd = power density in mW/cm^2

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 id the limit of MPE, 1 mW/cm^2. 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 r where the MPE limit is reached.

1.2. Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.
The temperature and related humidity: 18℃and 78％ RH.

1.3. Test Result of RF Exposure Evaluation

1.3.1. Conducted Power Analysis

Table 1: Duty Cycle of TDMA Signal

No. of timeslots	1	2	3	4
Duty Cycle	1 : 8	1 : 4	1 : 2.66	1 : 2
Timebased avg. power compared to slotted avg. power	-9 dB	-6 dB	-4.25 dB	-3 dB

The following table shows the conducted power measured and time based average power calculated:

Table 2

Frequency Band	Modulation	Timeslots	Power Measured (dBm)	Time based average power (Calculated)
GSM850	GMSK	1	32.55	**23.55**
GSM850	GMSK	2	29.24	23.24
GSM850	GMSK	3	27.35	23.10
GSM850	GMSK	4	25.84	22.84
GSM850	8PSK	1	26.61	**17.61**
GSM850	8PSK	2	23.43	17.43
GSM850	8PSK	3	21.58	17.33
GSM850	8PSK	4	20.38	17.38
PCS1900	GMSK	1	28.96	**19.96**
PCS1900	GMSK	2	25.86	19.86
PCS1900	GMSK	3	23.92	19.67
PCS1900	GMSK	4	22.84	19.84
PCS1900	8PSK	1	24.73	**15.73**
PCS1900	8PSK	2	21.48	15.48
PCS1900	8PSK	3	19.82	15.57
PCS1900	8PSK	4	18.35	15.35
FDD II	QPSK	---	22.75	**22.75**
FDD V	QPSK	---	23.54	**23.54**

1.3.2. Host Platform Analysis

The MPE calculation was performed for the maximum antenna gain maybe used of stand-alone condition. According to FCC Part2.1091(c) requirement, the maximum ERP (below 1.5GHz) is 1.5W and (above 1.5GHz) is 3W. Conjunction with FCC Part22H&24E requirements, the following table shows the maximum antenna gain allowed for stand-alone situation.

According to FCC rules, maximum ERP allowed is 7W (38.45dBm) for Part22H, maximum EIRP is 2W (33dBm) for Part24E.

Table 3

System	Mode	Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Duty Cycle (%)	PAR (dB)	EIRP (dBm)
GSM850	GPRS	824.2~848.8	32.55	8.05	12.5	9	31.60
GSM850	8PSK	824.2~848.8	26.61	8.05	12.5	9	25.66
PCS1900	GPRS	1850.2~1909.8	28.96	4.04	12.5	9	24.00
PCS1900	8PSK	1850.2~1909.8	24.73	4.04	12.5	9	19.77
FDD II	QPSK	1852.4 - 1907.6	22.75	8.05	---	---	30.80
FDD V	QPSK	826.4 - 846.6	23.54	4.04	---	---	27.58

1.3.3. MPE Evaluation Result

The device used should cover the following conditions:

1) The antenna-to-user distance of all transmitters(for example: WLAN, Bluetooth) above is 20cm or larger;
2) The maximum antenna gain of the device does not exceed the values listed in table 3.

Note: other antennas of different communication systems may be installed in the host platform as long as they are not collocated to the device antenna (distance > 20cm).

Test Mode	Frequency Band (MHz)	EIRP (dBm)	Distance (cm)	Power Density Seq (mW/cm^2)	MPE Limit (mW/cm^2)
GPRS850	824 ~ 849	31.60	20	0.29	0.55
GPRS850	824 ~ 849	25.66	20	0.07	0.55
GPRS1900	1850 ~ 1910	24.00	20	0.05	1.00
GPRS1900	1850 ~ 1910	19.77	20	0.02	1.00
FDD II	1850 ~ 1910	30.80	20	0.24	1.00
FDD V	824 ~ 849	27.58	20	0.11	0.55