Test No.13						
Name of Test:	Radio Frequency Exposure	Test Standard:	FCC OET Bulletin 65 &RSS-GEN& RSS-102			
Tested By:	WEI LI	Test Date:	08/27/2019-10/01/2019			

Minimum For FCC, per Public Exposure to Radio Frequency Energy Levels **Standard:** (1.1307 (b)(1)) Limits:

From 1.1310 Table 1 (B), for Public S = 1.0 mW/cm²; for Professional, S = 5.0 mW/cm².

For IC: per RSS-102, Sec. 2.5.2, Exemption Limits for Routine Evaluation, with formula of $1.31 \times 10^{-2} f^{0.6834}$ W, more restricted EIRP limit value are 1.37W at 902MHz, 2.67W at 2400MHz,4.52W at 5180MHz.

Method of	$d = 0.282 * 10 \land ((P + G) / 20) / \sqrt{S}$	Equation (1)
Measurement:	$S = 0.0795 * 10 ^ ((P + G)/10) / d^2$	Equation (2)
	where	
	d = MPE distance in cm	
	P = Power in dBm	
	G = Antenna Gain in dBi	
	$S = Power Density Limit in mW/cm^2$	
	Equation (1) and the measured peak power is used to calculat distance.	e the MPE

Equation (2) and the measured peak power is used to calculate the Power density.

Test Result:

Complied with MPE limit

Test Data:

NA

Calculation:

A. For FCC MPE compliance:

1) For GPR alone, max emission level is under the limit set in Section 15.209. No RF hazard need to be concerned.

2) With co-location of GPR and pre-certified RF module, the following calculation shows total RF exposure is still under the MPE limit:

For GPR Tx, max. level measured at 3m distance: 44.9 dB μ V/m, i.e. P+G= -50.3dBm

Plug all three items into equation (2), yielding,

Power Density Limit (mW/cm ²)	Output Power (dBm)	Antenna] Gain (dBi)	Power Density at 20cm (mW/ cm ²⁾	Max. EIRP (W)
1.0			1.6E-9	9E-9

For RF module, made by Texas Instruments Inc., WiFi and BT Module, Model # WL18MODGI. (FCC ID: Z64-WL18DBMOD, IC: 451I-WL18DBMOD). Worst case MPE per report #FA4O0971:

Power Density Limit (mW/cm ²)	Output Power (dBm)	Antenna] Gain (dBi)	Power Density at 20cm (mW/ cm ²⁾	Max. EIRP (W)
1.0	19.5	4.5	0.050	0.251

Thus, co-location calculations:

 Σ MPE = 1.6E-9 *mW/cm*²+ 0.251 *mW/cm*² = 0.251 *mW/cm*² which is less than the limit 1.0 *mW/cm*²

Additionally, $\Sigma \text{ seqnSlimn} = \text{Seq1Slim1} + \text{ Seq2Slim2} \le 1$ Herein $\Sigma \text{SeqnSlimn} = 1.6\text{E}-9/1.0 + 0.251/1.0 = 0.251 \le 1$

B. For IC ISED MPE compliance:

GPR max. EIRP =9E-9W and RF module EIRP= 0.251W. Thus co-location max. EIRP=0.251W < limit 1.37W / 2.67W / 4.52W.