1   RF Exposure

1.1   RF Exposure Compliance Requirement

1.1.1   Standard Requirement

According to KDB447498D01 General RF Exposure Guidance v06 4.3.1. Standalone SAR test exclusion considerations

Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by Measurement or numerical simulation, is not required when the corresponding SAR Exclusion threshold condition, listed below, is satisfied.

1.1.2   Limits:

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] ·[$\sqrt{f(GHz)}$] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

f(GHz) is the RF channel transmit frequency in GHz

Power and distance are rounded to the nearest mW and mm before calculation The result is rounded to one decimal place for comparison the test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

1.1.3   EUT RF Exposure

$eirp = p_t \times g_t = ((E \times d)^2)/30$

where:

pt = transmitter output power in watts,

gt = numeric gain of the transmitting antenna (unitless),

E = electric field strength in V/m, ---$10^{((dB\mu V/m)/20)}/10^6$,

d = measurement distance in meters (m)---3m,

So $p_t = ((E \times d)^2/30)$

Frequency(MHz)	Level(dBµV/m)	Polarization
315	41.20	Vertical
	40.10	Horizontal

Client declared minimum separation distance between radiator to the body: 5.84mm

For 315MHz wireless:

Field strength = 41.20dBμV/m @3m

So pt={[10$^{(41.20/20)}$ /(10^6) X3]2/30}x1000mW = 0.00000395

So (0.00000395mW/5.84mm)x √0.315GHz = 0.000000379

0.000000379<3.0 for 1-g SAR

Then SAR Evaluation Not Required

1.1.4 For IC

As per RSS102 Section 2.5.1

SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1.

Table 1: SAR evaluation — Exemption limits for routine evaluation based on frequency and separation distance[4,5]					
Frequency (MHz)	**Exemption Limits (mW)**				
	At separation distance of ≤5 mm	**At separation distance of 10 mm**	**At separation distance of 15 mm**	**At separation distance of 20 mm**	**At separation distance of 25 mm**
≤300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW

Frequency (MHz)	**Exemption Limits (mW)**				
	At separation distance of 30 mm	**At separation distance of 35 mm**	**At separation distance of 40 mm**	**At separation distance of 45 mm**	**At separation distance of ≥50 mm**
≤300	223 mW	254 mW	284 mW	315 mW	345 mW
450	141 mW	159 mW	177 mW	195 mW	213 mW
835	80 mW	92 mW	105 mW	117 mW	130 mW
1900	99 mW	153 mW	225 mW	316 mW	431 mW
2450	83 mW	123 mW	173 mW	235 mW	309 mW
3500	86 mW	124 mW	170 mW	225 mW	290 mW
5800	56 mW	71 mW	85 mW	97 mW	106 mW

Channel Frequency (MHz)	Measured Field strength (dBµV/m)	e.i.r.p (dBm)	Max power (mW)	IC Limit (mW)
315	41.20	-56.18	< 1.0	70

Note:

1. SAR Evaluation calculated from 5.84mm

1.2 Conclusion

The Power density of the EUT is less than defined limit as shown above, hence EUT is exempted from routine SAR.