Analysis Report

Report No.: 23010135HKG-002

The Equipment Under Test (EUT) is a wifi Gateway with Bluetooth BLE feature.

The EUT is powered by USB port (5VDC) from an AC/DC adaptor.

Antenna Gain: 2.7 dBi

<u>Bluetooth BLE Portion</u>
Modulation Type: GFSK
Frequency Range: 2402MHz to 2480MHz, 2MHz channel spacing, 40 channels
Peak Conducted range: -18dBm to -3dBm

<u>wifi Portion</u>
Modulation Type: 802.11 b/g/n(HT20)
Frequency Range: 2412MHz to 2462MHz, 5MHz channel spacing, 11 channels

Modulation Type: 802.11 n(HT40)
Frequency Range: 2422MHz to 2452MHz, 5MHz channel spacing, 7 channels

Peak Conducted range: 1dBm to 7dBm

According to the KDB447498 D01 v06:

Conducted Power (maximum)
= 7 dBm (5 mW)

The SAR Exclusion Threshold Level:
= 3.0 * (min. test separation distance, mm) / sqrt(freq. in GHz)
= 3.0 * 5 / sqrt (2.480) mW
= 9.53 mW

Since the above conducted output power is well below the SAR Exclusion threshold level, so the EUT is considered to comply with SAR requirement without testing.

Simultaneous Transmission SAR exclusion considerations

Since the wifi and Bluetooth transmitters of this device may operate simultaneously, simultaneous transmission analysis is required. Per KDB447498 D01 v06, simultaneous transmission SAR test exclusion can be applied when the sum of 1-g SAR of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit (≤ 1.6W/kg). When the standalone SAR test exclusion is applied, the standalone 1-g SAR must be estimated according to the following equation,

$$\text{Estimated SAR} = (\sqrt{F(GHz)}/7.5)x(P\max/TD)$$

where
F(GHz) is the RF channel transmit frequency in GHz
Pmax is the max. power of channel, including tune-up tolerance, mW
TD is the min. test separation distance, mm

For Bluetooth BLE operation,

Maximum Time-averaged Conducted Power of this device = 0.50 **mW (-3dBm)**

Therefore, the Estimated SAR will be determined as follow,

$$\text{Estimated SAR} = (\sqrt{F(GHz)}/7.5)x(P\max/TD)$$
$$= \mathbf{0.021\ W/kg}$$

where *Pmax* = 0.50 mW, *TD* = 5 mm and *F(GHz)* = 2.480 GHz

For wifi operation,

Maximum Time-averaged Conducted Power of this device = 5 **mW (7dBm)**

Therefore, the Estimated SAR will be determined as follow,

$$\text{Estimated SAR} = (\sqrt{F(GHz)}/7.5)x(P\max/TD)$$
$$= \mathbf{0.21\ W/kg}$$

where *Pmax* = 5 mW, *TD* = 5 mm and *F(GHz)* = 2.462 GHz

Simultaneous Transmission Analysis

wifi SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)	Simultaneous SAR Required
0.21	0.021	0.231	No

Conclusion
Since the above summed SAR result for all simultaneous transmission conditions were below the SAR limit (1.6 W/kg), SAR evaluation for simultaneous transmission configuration is not required.