Analysis Report

The Equipment Under Test (EUT), is a portable Composite Device (Spectre Unit) which contains a 2.4GHz Transceiver and a BLE Transceiver. For the 2.4GHz portion, the sample supplied operated on 29 channels, normally at 2440 - 2468MHz. The channels are separated with 1MHz spacing. For the BLE portion, the sample supplied operated on 40 channels, normally at 2402 - 2480MHz. The channels are separated with 2MHz spacing.

The EUT is powered by 1 x 7.4V Lithium-ion battery. After switching on the EUT, the EUT, the spectre can be paired up with a smartphone together with the training drone. The spectre will be further paired up with the beacon using the 2.4GHz module. The training drone and beacon will be used as shooting target to play different shooting game based on the signals received by the paired smartphone from the beacon and the training drone.

Antenna Gain: 0 dBi

2.4GHz Portion
Frequency Range: 2440MHz to 2468MHz, 1MHz channel spacing, 29 channels

Average Radiated range: 60.9dBµV/m to 62.2dBµV/m

Bluetooth BLE Portion
Frequency Range: 2402MHz to 2480MHz, 2MHz channel spacing, 40 channels

Average Radiated range: 62.7dBµV/m to 63.7dBµV/m

According to the KDB447498 D01 v06:

Radiated Power (maximum)
= 63.7 dBµV/m (0.000703 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 2.4GHz 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 2.4GHz operation,

Maximum Time-averaged Conducted Power of this device = 0.000498 **mW (62.2dBμV/m)**

Therefore, the Estimated SAR will be determined as follow,

$$\text{Estimated SAR} = (\sqrt{F(GHz)}/7.5)x(P\max/TD)$$
$$= \mathbf{0.0000209\ W/kg}$$

where *Pmax* = 0.000498 mW, *TD* = 5 mm and *F(GHz)* = 2.468 GHz

For Bluetooth BLE operation,

Maximum Time-averaged Conducted Power of this device = 0.000703 **mW (63.7dBμV/m)**

Therefore, the Estimated SAR will be determined as follow,

$$\text{Estimated SAR} = (\sqrt{F(GHz)}/7.5)x(P\max/TD)$$
$$= \mathbf{0.0000295\ W/kg}$$

where *Pmax* = 0.000703 mW, *TD* = 5 mm and *F(GHz)* = 2.480 GHz

Simultaneous Transmission Analysis

2.4GHz SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)	Simultaneous SAR Required
0.0000209	0.0000295	0.0000504	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.