## RF Exposure

The equipment under test (EUT) is a BMW M6GT3 Battery Operated Car operating at 2.4G Band. It has 2.4G transmitter function and Bluetooth function. The EUT can be powered by DC 12.0V (1 x 12.0V rechargeable battery) and it can't operation during charging. For more detail information pls. refer to the user manual.

Standalone SAR of 2.4G transmitter function:
Antenna Type: Integral antenna.
Antenna Gain: 0dBi.
The normal radiated output power (e.i.r.p) is: -6.0dBm (tolerance: +/- 3dB).
The normal conducted output power is -6.0dBm (tolerance: +/- 3dB).
Modulation Type: GFSK.

According to the KDB 447498:

The Maximum peak radiated emission for the EUT is 88.6dBμV/m at 3m in the frequency 2462MHz
The EIRP = [(FS*D) ^2 / 30] mW = -6.63dBm
which is within the production variation.

The Minimum peak radiated emission for the EUT is 88.1dBμV/m at 3m in the frequency 2440MHz
The EIRP = [(FS*D) ^2 / 30] mW = -7.13dBm
which is within the production variation.

The maximum conducted output power specified is -3dBm= 0.501mW
The source- based time-averaging conducted output power
=0.501* Duty cycle mW <0.501 mW(Duty cycle <100%)

The SAR Exclusion Threshold Level:
= 3.0 * (min. test separation distance, mm) / sqrt(freq. in GHz)
= 3.0 * 5 / sqrt (2.462) mW
= 9.56 mW

Since the source-based time-averaging conducted output power is well below the SAR low threshold level, so the EUT is considered to comply with SAR requirement without testing.

Standalone SAR of Bluetooth function:
Antenna Type: Integral antenna
Modulation Type: GFSK, π/4-DQPSK and 8-DPSK
Antenna Gain: 0dBi Max
Bluetooth Version: 5.0 (Single Mode EDR)
The normal radiated output power (e.i.r.p) is: -10.0dBm (tolerance: +/- 3dB).
The normal conducted output power is -10.0dBm (tolerance: +/- 3dB).

According to the KDB 447498:

The Maximum peak radiated emission for the EUT is 86.0 dBμV/m at 3m in the frequency 2402MHz
The EIRP = [(FS*D) ^2 / 30] mW = -9.23dBm
which is within the production variation.

The Minimum peak radiated emission for the EUT is 83.7 dBμV/m at 3m in the frequency 2480MHz
The EIRP = [(FS*D) ^2 / 30] mW = -11.53dBm
which is within the production variation.

The maximum conducted output power specified is -7.0dBm=0.200mW
The source- based time-averaging conducted output power
=0.200* Duty cycle mW <0.200 mW(Duty cycle <100%)

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 source-based time-averaging conducted output power is well below the SAR low threshold level, so the EUT is considered to comply with SAR requirement without testing.

Simultaneous transmission SAR test exclusion considerations:

When an antenna qualifies for the standalone SAR test exclusion of 4.3.1 and also transmits simultaneously with other antennas, the standalone SAR value must be estimated according to the following to determine the simultaneous transmission SAR test exclusion criteria:

[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)]·[√f(GHz)/x] W/kg, for test separation distances ≤ 50 mm; where x = 7.5 for 1-g SAR and x = 18.75 for 10-g SAR.

The maximun conducted output power specified of 2.4G transmitter
=0.501mW

The estimated 1-g SAR value of the 2.4G transmitter function
=[0.501mW/5mm]* [2.462^0.5/7.5] W/kg
=0.021W/kg

The maximun conducted output power specified of Bluetooth transmitter
=0.200mW

The estimated 1-g SAR value of the Bluetooth transmitter function
=[0.200mW/5mm]* [2.48^0.5/7.5] W/kg
=0.008W/kg

The sum of 1-g SAR = 0.021W/kg + 0.008W/kg =0.029W/kg ≤ 1.6W/kg

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, SAR test exclusion applies to the simultaneous transmission configuration.