

SAR evaluation considerations for handsets with multiple transmitters and antennas

Procedure:

FCC KDB 648474 v01r05 SAR evaluation considerations for handsets with multiple transmitters and antennas.

Table 1 – Output Power Thresholds for Unlicensed Transmitters

| | 2.45 | 5.15 - 5.35 | 5.47 - 5.85 | GHz |
|---|------|-------------|-------------|-----|
| P_{Ref} | 12 | 6 | 5 | mW |
| Device output power should be rounded to the nearest mW to compare with values specified in this table. | | | | |

Table 2 – Summary of SAR Evaluation Requirements for a Cell Phone with Multiple Transmitters

| | Individual Transmitter | Simultaneous Transmission |
|-------------------------|--|---|
| Licensed Transmitters | <u>Routine evaluation required</u> | <u>SAR not required:</u> <u>Unlicensed only</u> <ul style="list-style-type: none"> when stand-alone 1-g SAR is not required and antenna is ≥ 5 cm from other antennas <u>Licensed & Unlicensed</u> <ul style="list-style-type: none"> when the sum of the 1-g SAR is < 1.6 W/kg for all simultaneous transmitting antennas when SAR to peak location separation ratio of simultaneous transmitting antenna pair is < 0.3 <u>SAR required:</u> <u>Licensed & Unlicensed</u> antenna pairs with SAR to peak location separation ratio ≥ 0.3 ; test is only required for the configuration that results in the highest SAR in stand-alone configuration for each wireless mode and exposure condition <u>Note: simultaneous transmission exposure conditions for head and body can be different for different style phones; therefore, different test requirements may apply</u> |
| Unlicensed Transmitters | <u>When there is no simultaneous transmission –</u> <ul style="list-style-type: none"> output ≤ 60 f: SAR not required output > 60 f: stand-alone SAR required <u>When there is simultaneous transmission –</u> <u>Stand-alone SAR not required when</u> <ul style="list-style-type: none"> output $\leq 2 \cdot P_{Ref}$ and antenna is ≥ 5.0 cm from other antennas output $\leq P_{Ref}$ and antenna is ≥ 2.5 cm from other antennas output $\leq P_{Ref}$ and antenna is < 2.5 cm from other antennas, each with either output power $\leq P_{Ref}$ or 1-g SAR < 1.2 W/kg <u>Otherwise stand-alone SAR is required</u> <u>When stand-alone SAR is required</u> <ul style="list-style-type: none"> test SAR on highest output channel for each wireless mode and exposure condition if SAR for highest output channel is $> 50\%$ of SAR limit, evaluate all channels according to normal procedures | |
| Jaw, Mouth and Nose | <u>Flat phantom SAR required</u> <ul style="list-style-type: none"> when measurement is required in tight regions of SAM and it is not feasible or the results can be questionable due to probe tilt, calibration, positioning and orientation issues position rectangular and clam-shell phones according to flat phantom procedures and conduct SAR measurements for these specific locations | When simultaneous transmission SAR testing is required, contact the FCC Laboratory for interim guidance. |

Equipment:

A mobile phone contains GSM850/1900 transmitter and Bluetooth transmitter with FCC ID YROG333.

Measurement data:

The closest distance between the GSM850/1900 antenna and Bluetooth antenna is **38 mm**.

The maximum output power of Bluetooth transmitter is **0.865 mW**.

The maximum SAR value for GSM850/1900 transmitter is **0.523 W/kg** (1-g).

Conclusion:

Based on the output power of Bluetooth transmitter, antenna separation and the SAR value of GSM850/1900 transmitter, stand-alone Bluetooth SAR evaluation is not required.

The sum of 1-g SAR is $0.523 \text{ W/kg} + 0 \text{ W/kg} = 0.523 \text{ W/kg}$, which is less than 1.6 W/kg . Therefore, simultaneous transmission SAR evaluation is not required.