

To whom it may concern,

Considering that:

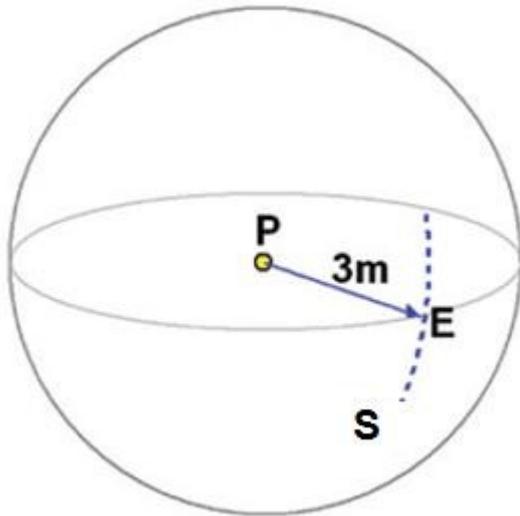
1. According to Section 15.31 (h) of Title 47, Part 15 – Radio Frequency Devices: *“For a composite system that incorporates devices contained either in a single enclosure or in separate enclosures connected by wire or cable, testing for compliance with the standards in this part shall be performed with all of the devices in the system functioning. If an intentional radiator incorporates more than one antenna or other radiating source and these radiating sources are designed to emit at the same time, measurements of conducted and radiated emissions shall be performed with all radiating sources that are to be employed emitting”* and,
2. Under Section IX of KDB 996369 D01 Module Equip Auth Guide v02¹⁰, it is stated that: *“A module or modules can only be used without additional authorizations if they have been tested and granted under the same intended end-use operational conditions, including simultaneous transmission operations. When they have not been tested and granted in this manner, additional testing and/or FCC application filing may be required”* and,
3. In note 10 in the same document, the following statement is contemplated: *“¹⁰ This clause is adapted from a portion of the FCC-TCB conference presentation entitled “Modular Transmitters,” April 2013, available at: (<https://www.fcc.gov/oet/ea/presentations>).”*
4. In this presentation, under EMC considerations, slide 9, it is included that:
§§ 15.31, 2.1041, 2.1091, 2.1093 requirements must be satisfied:
 - *Demonstrate that the final host product is compliant with all transmitters operating simultaneously, if applicable.*
 - *Host Manufacture can use reasonable engineering judgment & testing following the requirements of §15.31 and procedures outlined for verification (§§ 2.953 and 2.948)*

Therefore, based on these statements above, and considering similar guidance than the ones included in KDB 662911 D01 Multiple Transmitter Output, section E 3) a) i):

“Measure and sum the spectra across the outputs as described in section E)2)a). Note that the summation must be performed in linear power units, or the equivalent. For example, if measurement units are microvolts or microvolts/meter, the values shall be squared before summing, and then a square root shall be applied to the sum in order to achieve the equivalent of summing in power units.”

Then, we can conclude that, based on our engineering judgment through the calculations above, the compliance criteria is fulfilled (see table).

Using the following equation to convert dB μ V/m to EIRP (dBm):



$$S = \frac{P}{4 \cdot \pi \cdot r^2}$$

where: S = power density (in appropriate units, e.g. mW/cm²)
P = radiated power (in appropriate units, e.g., mW)
r = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

$$S = \frac{P}{4 \cdot \pi \cdot r^2} = \frac{E^2}{Z_0}$$

where: E = electric field strength (in appropriate units, e.g. V/m)
 Z_0 = free-space impedance, $Z_0 = 120 \pi$

For r=3m:

$$P(\text{dBm}) = E(\text{dB}\mu\text{V/m}) - 95.2$$

Declaration

Mode	Frequency	Average field strength (dBμV/m) at 3m	Spurious Emission Power (dBm)	Spurious Emission Power (mW)	Antenna Gain (dBi)	Radiated Power (dBm)	Measurement Uncertainty (dB)	radiated Power + Measurement Uncertainty (mW)
GSM/EDGE WCDMA LTE	LTE: 2, 4, 13, 17, 5, 25 UMTS: 1, 2, 5, 8, 4 GSM/EDGE:850, 900, 1800, 1900	-	-20,32	0,009289664	2	-18,32	0	0,014723125
LoRA	902-928	51,32	-43,88	4,09261E-05	-	-43,88	4,87	0,000125603

The sum of radiated emission when both transmitters work simultaneously is:

$$P(\text{mW}) = 0,014723125 + 0,000125603 = 0,014848728$$

$$P(\text{dBm}) = 10 \log(0,014848728) = -18,28310748 \leq -13 \text{ dBm}$$

Signed by **Ericsson AB** on 02/03/2017:



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