SAR Exclusion Justification

Test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm

Guidance document reference: 447498 D01 General RF Exposure Guidance v05r01, page 11, paragraph 4.3.1(1).

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)] *

[$\sqrt{f(GHz)}$] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

- f(GHz) is the RF channel transmit frequency in GHz

- Power and distance are rounded to the nearest mW and mm before calculation

- The result is rounded to one decimal place for comparison

- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 5) in section 4.1 is applied to determine SAR test exclusion.

SAR test exclusion analysis:

Assumptions: Since the exact separation distance may vary, the minimum separation distance of 5 mm is assumed per the guidance document.
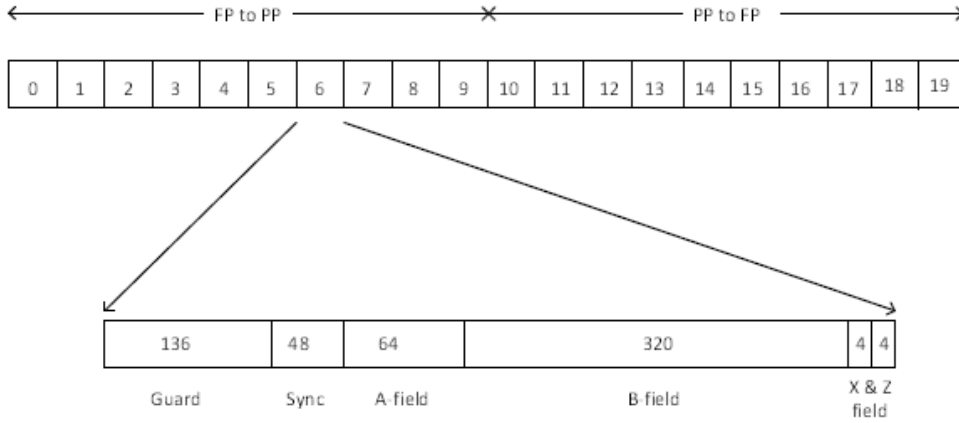
Scaling of rf power output:
Maximum peak rf output power from page 15 of test report 2014_272452_FCC_15247 is 87.1 mW
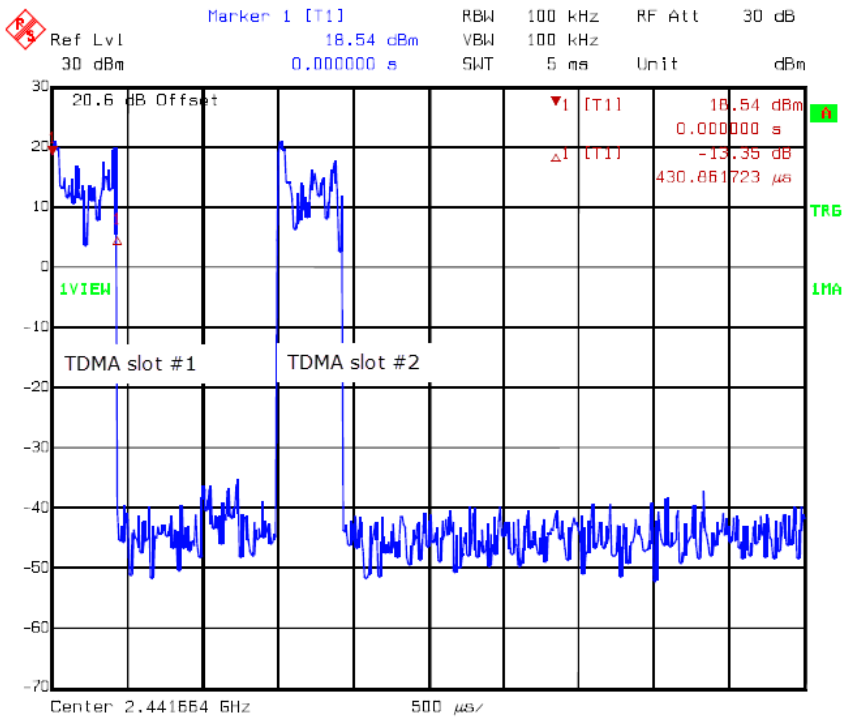
The system uses a source –based duty cycle. The system is TDMA based using 2 of 20 evenly spaced time slots (see page 12 of test report). This makes the source-based duty cycle a ratio of 1:10. The power is therefore scaled by a factor of 10 for the purpose of this analysis making the peak power of 87 mW a value of 8.7 mW average.

Frame and slot structure for the MARS 47 system – 2.4GHz band

	FP to PP										✕					PP to FP			
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

136	48	64	320	4	4
Guard	Sync	A·field	B·field		X & Z field

1 frame = 20 slot

1 slot = 576 bit

1 frame = 11520 bit

Frame period = 10 ms/frame

Crystal freq = 10.368 Mhz

Bitrate = 1.152 Mbit/s

Bit-period= 869 ns

RF Channels = 47

Measured peak power: 87 mW

Source-based average power = 87 mW/10 = 8.7 mW

Max. power of channel:	8.7 mW
Min. separation distance:	5 mm
Max. frequency:	2.48 GHz

$[(Pwr/Dist)*\sqrt{Freq.}] =$ 2.7

The result of the above SAR threshold calculation demonstrates that the result is less than the 1-g numeric threshold of 3 and the 10-g numeric threshold of 7.5.

Conclusion: The above analysis shows that the evaluated device qualifies for exemption from SAR testing for both 1-g and 10-g SAR.

Signed: David Light   3/2/2015
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