Standalone SAR test exclusion considerations

March 25, 2019

- Device category = ☐ Portable device ☑ Mobile device
- Transmitting mode = ☑ Single Transmitting ☐ Simultaneous Transmitting
- Max. transmitting frequency = 1909.3 MHz
- Min. test separation distance = 200 mm
- Max. Antenna Gain = 3.32 dBi
- Max. power with turn-up tolerance = 24.00 dBm = 251.2 mW (Typical Power = Max. 24.00 dBm)

Note. LTE Cat.M1 Band 2

KDB 447498 D01 clasue 4.3.1 Step 2-2) SAR test exclusion thresholds for 1500MHz to 6GHz at test separationn distances > 50 mm

[Threshold at 50 mm + (test separation distance - 50 mm) X 10] mW

= [1.74 + (200mm - 50mm X 10)] = 1501.7

Note. The calculation result was rounded to one decimal place for comparison.

→ SAR evaluation for general population exposure conditions by measurement or numerical simulation is not required.

Maximum Permissible Exposure(MPE) evaluation for mobile device

$S = P G / (4 R^2 \pi) , mW/cm^2$

$= 0.107337 \ mW/cm^2$

S = Maximum power density
P = Maximum power with turn-up tolerance
G = Numeric power gain of the antenna
R = Distance from transmitting antenna

Conclusion: The exposure condition of this device is compliant with FCC rules.

The limit for maximum permissible exposure = 1.000000 mW/cm^2

Standalone SAR test exclusion considerations

March 25, 2019

- Device category = ☐ Portable device ☑ Mobile device
- Transmitting mode = ☑ Single Transmitting ☐ Simultaneous Transmitting
- Max. transmitting frequency = 1754.3 MHz
- Min. test separation distance = 200 mm
- Max. Antenna Gain = 3.83 dBi
- Max. power with turn-up tolerance = 23.00 dBm = 199.6 mW (Typical Power = Max. 23.00 dBm)

Note. LTE Cat.M1 Band 4

KDB 447498 D01 clasue 4.3.1 Step 2-2) SAR test exclusion thresholds for 1500MHz to 6GHz at test separationn distances > 50 mm

[Threshold at 50 mm + (test separation distance - 50 mm) X 10] mW

= [1.32 + (200mm - 50mm X 10)] = 1501.3

Note. The calculation result was rounded to one decimal place for comparison.

→ SAR evaluation for general population exposure conditions by measurement or numerical simulation is not required.

Maximum Permissible Exposure(MPE) evaluation for mobile device

$S = P G / (4 R^2 \pi) , mW/cm^2$

$= 0.095916 \ mW/cm^2$

S = Maximum power density
P = Maximum power with turn-up tolerance
G = Numeric power gain of the antenna
R = Distance from transmitting antenna

Conclusion: The exposure condition of this device is compliant with FCC rules.

The limit for maximum permissible exposure = 1.000000 mW/cm^2

Standalone SAR test exclusion considerations

March 25, 2019

- Device category = ☐ Portable device ☑ Mobile device
- Transmitting mode = ☑ Single Transmitting ☐ Simultaneous Transmitting
- Max. transmitting frequency = 715.3 MHz
- Min. test separation distance = 200 mm
- Max. Antenna Gain = -1.16 dBi
- Max. power with turn-up tolerance = 24.00 dBm = 251.2 mW (Typical Power = Max. 24.00 dBm)

Note. LTE Cat.M1 Band 12

KDB 447498 D01 clasue 4.3.1 Step 2-1) SAR test exclusion thresholds for 100MHz to 1500MHz at test separationn distances > 50 mm

[Threshold at 50 mm + (test separation distance - 50 mm) X (f(MHz) / 150)] mW

= [1.06 + (200mm - 50mm) X (715.3MHz / 150)] = 716.4

Note. The calculation result was rounded to one decimal place for comparison.

→ SAR evaluation for general population exposure conditions by measurement or numerical simulation is not required.

Maximum Permissible Exposure(MPE) evaluation for mobile device

$S = P G / (4 R^2 \pi) , mW/cm^2$

$= 0.038260 \ mW/cm^2$

S = Maximum power density
P = Maximum power with turn-up tolerance
G = Numeric power gain of the antenna
R = Distance from transmitting antenna

Conclusion: The exposure condition of this device is compliant with FCC rules.

The limit for maximum permissible exposure = 0.476866 mW/cm^2 (f/1500)

Standalone SAR test exclusion considerations

March 25, 2019

- Device category = ☐ Portable device ☑ Mobile device
- Transmitting mode = ☑ Single Transmitting ☐ Simultaneous Transmitting
- Max. transmitting frequency = 784.5 MHz
- Min. test separation distance = 200 mm
- Max. Antenna Gain = 0.84 dBi
- Max. power with turn-up tolerance = 24.00 dBm = 251.2 mW (Typical Power = Max. 24.00 dBm)

Note. LTE Cat.M1 Band 13

KDB 447498 D01 clasue 4.3.1 Step b-1) SAR test exclusion thresholds for 100MHz to 1500MHz at test separationn distances > 50 mm

[Threshold at 50 mm + (test separation distance - 50 mm) X (f(MHz) / 150)] mW

= [1.11 + (200mm - 50mm) X (784.5MHz / 150)] = 785.6

Note. The calculation result was rounded to one decimal place for comparison.

→ SAR evaluation for general population exposure conditions by measurement or numerical simulation is not required.

Maximum Permissible Exposure(MPE) evaluation for mobile device

$S = P G / (4 R^2 \pi) , mW/cm^2$

$= 0.060639 \ mW/cm^2$

S = Maximum power density
P = Maximum power with turn-up tolerance
G = Numeric power gain of the antenna
R = Distance from transmitting antenna

Conclusion: The exposure condition of this device is compliant with FCC rules.

The limit for maximum permissible exposure = 0.523000 mW/cm^2 (f/1500)

Standalone SAR test exclusion considerations

March 25, 2019

- Device category = ☐ Portable device ☑ Mobile device
- Transmitting mode = ☑ Single Transmitting ☐ Simultaneous Transmitting
- Max. transmitting frequency = 2480 MHz
- Min. test separation distance = 200 mm
- Max. Antenna Gain = 1.99 dBi
- Max. power with turn-up tolerance = 6.00 dBm = 4.0 mW (Typical Power = Max. 6.00 dBm)

Note. BLE

KDB 447498 D01 clasue 4.3.1 Step 2-2) SAR test exclusion thresholds for 1500MHz to 6GHz at test separationn distances > 50 mm

[Threshold at 50 mm + (test separation distance - 50 mm) X 10] mW

= [0.03 + (200mm - 50mm X 10)] = 1500

Note. The calculation result was rounded to one decimal place for comparison.

→ SAR evaluation for general population exposure conditions by measurement or numerical simulation is not required.

Maximum Permissible Exposure(MPE) evaluation for mobile device

$S = P G / (4 R^2 \pi)$, mW/cm^2

= 0.001258 mW/cm^2

S = Maximum power density
P = Maximum power with turn-up tolerance
G = Numeric power gain of the antenna
R = Distance from transmitting antenna

Conclusion: The exposure condition of this device is compliant with FCC rules.

The limit for maximum permissible exposure = 1.000000 mW/cm^2

Standalone SAR test exclusion considerations

March 25, 2019

Modules	Maximum power density, S (mW/cm^2)	MPE Limit (mW/cm^2)	MPE Ratio
WWAN Module / LTE Cat.M1 Band 2	0.107337	0.564400	**0.1902**
WWAN Module / LTE Cat.M1 Band 4	0.095916	1.000000	0.0959
WWAN Module / LTE Cat.M1 Band 12	0.038260	0.565866	0.0676
WWAN Module / LTE Cat.M1 Band 13	0.060639	1.000000	0.0606
BLE (2.4G)	0.001258	1.000000	**0.0013**
		Maximum MPE ratio: (0.1902 + 0.0013)	**0.1915 < 1**