

SAR Test exemption documentation according to CFR 47 §1.1307

Report identification number: 1-2437/21-01-11 Exemption / MPE (FCC)

contains the module with the following certification numbers

FCC ID	2ALP8IA01
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This test report is electronically signed and valid without handwritten signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

Document authorised:



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EUT technologies:

SAR based exempted technologies:

Technologies:	Max. power [dBm]		Max. declared EIRP [dBm]	Max. declared ERP [dBm]	#
	conducted	EIRP ²⁾			
BT LE 2450 MHz	8.45 ¹⁾ (=7.0mW)	11.6	12.0 (=15.85mW)	9.95 (=9.89mW)	A
WLAN 2450 MHz	22.4 ¹⁾ (=174.0mW)	25.55	26.0	23.95 (=248.3mW)	--
E GPRS 850 MHz	35.0 * 26.0 **	36.2 * 27.2 **	28.0	25.95 (=393.55mW)	B
E GPRS 1900 MHz	32.0 * 23.0 **	35.0 * 26.0 **	27.0	24.95 (=312.6mW)	B
LTE FDD 2 Cat M1/ 1900 MHz	22.0 (=158.5mW)	25.0	26.0	23.95 (=248.3mW)	B
LTE FDD 4 Cat M1/Cat NB1 1750 MHz	22.0 (=158.5mW)	23.2	24.0	21.95 (=156.67mW)	B
LTE FDD 5 Cat M1 850 MHz	22.0 (=158.5mW)	23.2	24.0	21.95 (=156.67mW)	B
LTE FDD 12 Cat M1 700 MHz	22.0 (=158.5mW)	24.0	25.0	22.95 (=197.24mW)	B
LTE FDD 13 Cat M1 700 MHz	22.0 (=158.5mW)	24.0	25.0	22.95 (=197.24mW)	B
LTE FDD 25 Cat M1 1900 MHz	22.0 (=158.5mW)	25.0	26.0	23.95 (=248.3mW)	B
LTE FDD 26 Cat M1 850 MHz	22.0 (=158.5mW)	23.2	24.0	21.95 (=156.67mW)	B
LTE FDD 66 Cat M1 1750 MHz	22.0 (=158.5mW)	23.2	24.0	21.95 (=156.67mW)	B
LTE FDD 85 Cat M1 700 MHz	22.0 (=158.5mW)	24.0	25.0	22.95 (=197.24mW)	B

¹⁾ Conducted value taken from FCC Module Grant XMR201910BG95M3

²⁾ Calculated with antenna gains from manufacturer:

700 MHz (2.0dB)

1750 MHz (1.2dB)

2450MHz (3.15dB)

850 MHz (1.2dB)

1900 MHz (3.0dB)

* - 1 slot slotted avg. power

** - 1 slot time based avg. power

Details and origins of the measurements shown in the table above:

#	Results from:	Additional information
A	1-2437/21-01-07 CTC Advanced GmbH	Max meas. EIRP page 18
B	Module data sheet (Quectel BG95-M3)	Max. declared conducted values

Collocation overview:

Active scenario:	1	2	3	4
Technology				
BT LE / WLAN	x		x	
E GPRS / LTE CAT M1	x	x		

Declared minimum safety distance: 20cm

According the manual a safety distance of 20cm shall be applied between the user (and/or bystanders) to the EUT antenna whilst active transmitting.

SAR-Based Exemption following 47 CFR 1.1307 amendment:

The SAR-based exemption formula of § 1.1307(b)(3)(i)(B), repeated here as Formula (B.2), applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, of less than or equal to the threshold P_{th} (mW). This method shall only be used at separation distances from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by Formula (B.2).

$$P_{th}(\text{mW}) = \begin{cases} ERP_{20\text{cm}} \left(\frac{d}{20\text{cm}}\right)^x & d \leq 20\text{cm} \\ ERP_{20\text{cm}} & 20\text{cm} \leq d \leq 40\text{cm} \end{cases} \quad (\text{B.2})$$

where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\text{cm}} \sqrt{f}}\right)$$

and f is in GHz, d is the separation distance (cm), and $ERP_{20\text{cm}}$ is per Formula (B.1).

$$P_{th}(\text{mW}) = ERP_{20\text{cm}}(\text{mW}) = \begin{cases} ERP_{20\text{cm}} \left(\frac{d}{20\text{cm}}\right)^x & d \leq 20\text{cm} \\ ERP_{20\text{cm}} & 20\text{cm} \leq d \leq 40\text{cm} \end{cases} \quad (\text{B.1})$$

Technology	Transmitter frequency (MHz)	Max. decl. ERP (mW)	Threshold ERP		Minimal Safety (mm)	Verdict
			(mW)	(dBm)		
LTE 12/13/85	700	197.24	3060.00	34.8	20	EXCEMPTED
E GPRS / LTE 5/25	850	393.6	3060.00	34.8	20	EXCEMPTED
LTE 4/66	1750	156.67	3060.00	34.8	20	EXCEMPTED
E GPRS / LTE 2/25	1900	312.60	3060.00	34.8	20	EXCEMPTED
BT LE / WLAN	2450	248.30	3060.00	34.8	20	EXCEMPTED

Collocation:

Technology , [MHz]	E GPRS, 850	WLAN, 2450
Exemption based on	SAR , 20mm distance	
Limit ERP [mW]:	3060	3060
Result ERP [mW]:	393.55	248.3
Limit-Exhaustion [%]	12.9	8.1
Collocated percentage [%]	21.0	
Verdict:	pass	

This prediction demonstrates the following:

The power density levels for FCC that are larger than the minimum safety-distances stated above, are below the maximum levels allowed by regulations.