

Prüfbericht-Nr.: <i>Test report no.:</i>	IN23RA4Z 001 & IN23VZM3 001	Auftrags-Nr.: <i>Order no.:</i>	146800530 0010	Seite 1 von 4 Page 1 of 4
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	2142863	Auftragsdatum: <i>Order date:</i>	2023-06-01	
Auftraggeber: <i>Client:</i>	Landis + Gyr Technology, Inc. 30000 Mill Creek Ave., Suite 100 Alpharetta, GA 30022			
Prüfgegenstand: <i>Test item:</i>	Sub-GHz Wireless Mesh Module			
Bezeichnung <i>Identification</i>	Series-6 Gen-2 MCM0	Serien -Nr.: <i>Serial no.:</i>	D016E7A9 & D016E7BC	
Auftrags-Inhalt: <i>Order content:</i>	Maximum Permissible Expoure			
Prüfgrundlage: <i>Test specification:</i>	FCC 1.1310, and RSS 102 Issue 5 KDB 447498 D01			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2023-06-19			
Prüfmuster-Nr.: <i>Test sample no:</i>	A003499438-001 & A003499438-003			
Prüfzeitraum: <i>Testing period:</i>	2023-06-19 - 2023-07-29			
Ort der Prüfung: <i>Place of testing:</i>	Wireless laboratory, Bangalore			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (India) Pvt. Ltd. 27/B, 2nd cross road, Electronic city Phase1, Bangalore-560100, India FCC Test Site Registration No: 496599 IC Test Site Registration No: 27711 HVIN: Series-6 Gen-2 MCM0			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von: <i>tested by:</i>	genehmigt von: <i>authorized by:</i>			
Datum: <i>Date:</i>	2023-07-31	Ausstellatum: <i>Issue date:</i>	2023-10-16	
Stellung / Position:	M.V.Naveen Kumar Senior Engineer	Stellung / Position:	Madhu K.N Assistant Manager	
Sonstiges / Other:	FCC ID: R7PMGBM2B1 IC : 5294A-MGBM2B1			
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>	Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>			
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	4 = ausreichend N/A = nicht anwendbar
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory F(ail) = failed a.m. test specification(s)	4 = sufficient N/A = not applicable
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

1 Maximum Permissible Exposure

1.1 RF Exposure Compliance Requirement

The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 is followed. The gain of the antennas used in the product is extracted from the Antenna data sheets provided and also the maximum total power input to the antenna is measured. Through the Friis transmission formula and the maximum gain of the antenna, we can calculate the distance, away from the product, where the limit of MPE is reached.

Although the Friis Transmission formula is far field assumption, the calculated result of that is an over-prediction for near field power density. It is taken as worst case to specify the safety range.

1.2 RF Exposure Limits:

1.2.1 For FCC

1. According to FCC Part 1 Subpart I 1.1310: The criteria listed in the following table shall be used to evaluate the environmental impact of the human exposure to radio-frequency (RF) radiation as specified in 1.1307 (b) showed in Table 1.

Table 1: Limits for Maximum Permissible Exposure (MPE) as per FCC			
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)
Limits for Occupational / controlled Exposures			
300 - 1500	--	--	F/300
1500 - 100000	--	--	5.0
Limits for General population / Uncontrolled Exposure			
300 - 1500	--	--	F/1500
1500 - 100000	--	--	1.0

F or f = Frequency in MHz

Friss Formula

Friss Transmission Formula: $P_d = (P_{out} * G) / (4 * \pi * r^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = Distance between observation point and the center of radiator in cm

If we know the maximum gain of the antenna and the total output power to the antenna, through calculation, we will know MPE value at distance 20cm.

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Test Results:

Manufacturer has declared the tune-up value as 0 dB is considered in MPE calculation.

Antenna: printed Inverted-F Antenna

Antenna Gain: 1.0dBi

Classification	Mode of Operation	Frequency (MHz)	Maximum measured RF output power at antenna terminal (dBm)	Max power Including tune-up tolerance * (mW)	Antenna Gain in linear	Min Separation distance (CM)	Power Density (Pd)(mW/cm²)	FCC Limit (mW/cm²)
DSSS	1	927.60	29.05	803.5261222	1.26	20	0.2011	0.6184
	2	927.80	29.04	801.6780634	1.26	20	0.2006	0.6185
	4	927.80	28.85	767.361489	1.26	20	0.1921	0.6185
	5	927.50	28.83	763.835783	1.26	20	0.1912	0.6183
	6	927.80	28.96	787.045789	1.26	20	0.1970	0.6185
	7	915.20	24.85	305.4921113	1.26	20	0.0764	0.6101
	8	915.20	24.84	304.789499	1.26	20	0.0763	0.6101
DTS	1	914.80	23.82	240.9905429	1.26	20	0.0603	0.6099
	2	915.20	23.85	242.6610095	1.26	20	0.0607	0.6101
	3	914.80	24.79	301.3006024	1.26	20	0.0755	0.6099

Note: Maximum conducted output power taken from test Reports: **IN23RA4Z 001 & IN23VZM3 001**

1.2.2 For IC

According to IC RSS 102 Issue 5: The criteria listed in the following table shall be used to evaluate the environmental impact of the human exposure to radiofrequency (RF) radiation as specified in section 4 showed in Table 4.

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m²)	Reference Period (minutes)
0.003-10 ²¹	83	90	-	Instantaneous*
0.1-10	-	0.73/ f	-	6**
1.1-10	87/ f ^{0.5}	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/ f ^{0.25}	0.1540/ f ^{0.25}	8.944/ f ^{0.5}	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 f ^{0.3417}	0.008335 f ^{0.3417}	0.02619 f ^{0.6834}	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ f ^{1.2}
150000-300000	0.158 f ^{0.5}	4.21 x 10 ⁻⁴ f ^{0.5}	6.67 x 10 ⁻⁵ f	616000/ f ^{1.2}
Note: f is frequency in MHz. *Based on nerve stimulation (NS). ** Based on specific absorption rate (SAR).				

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Classification	Mode of Operation	Frequency (MHz)	Maximum measured RF output power at antenna terminal (dBm)	Max power Including tune-up tolerance * (mW)	Antenna Gain in linear	Min Separation distance (CM)	Power Density (Pd) (mW/cm ²)	RSS Limit (mW/cm ²)
DSSS	1	927.6	29.05	803.5261222	1.26	20	0.2013	0.2793
	2	927.8	29.04	801.6780634	1.26	20	0.2009	0.2793
	4	927.80	28.85	767.361489	1.26	20	0.1921	0.2793
	5	927.50	28.83	763.835783	1.26	20	0.1912	0.2792
	6	927.80	28.96	787.045789	1.26	20	0.1970	0.2793
	7	915.2	24.85	305.4921113	1.26	20	0.0766	0.2767
	8	915.2	24.84	304.789499	1.26	20	0.0764	0.2767
	1	914.8	23.82	240.9905429	1.26	20	0.0604	0.2766
DTS	2	915.2	23.85	242.6610095	1.26	20	0.0608	0.2767
	3	914.8	24.79	301.3006024	1.26	20	0.0755	0.2766

1.3 Conclusion

The Power density of the EUT is less than defined limit as shown above, hence EUT is exempted from routine SAR.