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RF Exposure and Transmitter Power Considerations for the SECO PC-Gateway SYS-C31-DMV

Contains FCC ID: 2ALZB-AW276 and FCC ID: XMR201903EG25G

For mobile product operation the FCC requires that the calculated MPE be equal to or less than a given limit dependent on frequency at a distance of 20 cm from a device to the body of a user.

The transmitter operation for the PC-Gateway SYS-C31-DMV utilises a certified BT / BT LE / 2.4 GHz WLAN / 5GHz WLAN module (FCC ID: 2ALZB-AW276), together with a certified cellular module EG25-G (FCC ID: XMR201903EG25G).

These modules have been certified for the following operating bands:

BT BR ER / BT LE: 2402 to 2480 MHz

2.4 GHz WLAN: 2412 to 2462 MHz

5 GHz WLAN: 5180 to 5240 MHz, 5260 to 5320 MHz, 5500 to 5700 MHz, 5745 to 5825 MHz

GSM850 / WCDMA850 B5 / LTE B5: 824 to 849 MHz

GSM1900 / WCDMA B2 / LTE B2: 1850 to 1910 MHz

WCDMA B4 / LTE B4: 1710 to 1755 MHz

LTE B7: 2500 to 2570 MHz

LTE B12: 699 to 716 MHz

LTE B13: 777 to 787 MHz

LTE B25: 1850 to 1915 MHz

LTE B26: 814 to 849 MHz

LTE B38: 2570 to 2620 MHz

LTE B41: 2496 to 2690 MHz

The following FCC Rule Parts and procedures are applicable:

Part 1.1310 – Radiofrequency radiation exposure limits

KDB447498 D01 v06

Mobile and Portable Devices RF Exposure Procedures and Equipment Authorisation Policies

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MPE CALCULATIONS

The MPE calculation used to calculate the safe operating distance for the user is:

$$S = \text{EIRP} / 4 \pi R^2$$

Where

- S = Power density
- EIRP = Effective Isotropic Radiated Power (EIRP = P x G)
- P = Conducted Transmitter Power
- G = Antenna Gain (relative to an isotropic radiator)
- R = distance to the centre of radiation of the antenna (safe operating distance)

Power Density Requirement

From table 1 (b) - Limits for General Population/ Uncontrolled Exposure of FCC §1.1310 (e) for $f > 1500\text{MHz}$, $S_{\text{req}} = 1.0 \text{ mW/cm}^2$

From table 1 (b) - Limits for General Population/ Uncontrolled Exposure of FCC §1.1310 (e) for $f < 1500\text{MHz}$, $S_{\text{req}} = f/1500 \text{ mW/cm}^2$

(f = operating frequency)

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VALUES

Powers are from the BT BR / EDR, BT LE, 2.4 GHz WLAN and 5 GHz WLAN FCC Grant listings and the cellular module FCC Grant RF Exposure Evaluation report.

Refer to antenna datasheet *Multi Band antenna _ DYNAFLEX - 814_1000RG316_SMMRP* for antenna gain values.

Frequency Range (MHz)	Operating Band	Max. Conducted Average Output Power (dBm)	Antenna Gain (dBi)	EIRP (mW)	Calculated Distance R @ S _{req} (cm)	Power Density S mw/ cm ²		
						Limit S _{req}	Calculated S _n @ 20cm	S _n /S _{req}
2402 - 2480	BT BR/EDR	7.0	2.7	9.3	0.86	1.0	0.0019	0.0019
2402 - 2480	BT LE	4.8	2.7	5.6	0.67	1.0	0.0011	0.0011
2412 - 2462	2.4 GHz WLAN	29.7	¹ 2.1 / ² 2.7	³ 251.4	16.09	1.0	0.6468	0.6468
³ 5180 - 5825	5 GHz WLAN	22.9	⁴ 1.6 / ⁵ 0.7	⁶ 510.9	6.38	1.0	0.1016	0.1016
824 - 849	GSM850	25.8	2.8	724.4	10.24	0.55	0.1441	0.2620
824 - 849	WCDMA B5 LTE B5	25.0	2.8	602.6	9.34	0.55	0.1199	0.2180
1850 - 1910	GSM1900	22.8	2.9	371.5	5.44	1.0	0.0739	0.0739
1850 - 1910	WCDMA B2 LTE B2	25.0	2.9	616.6	7.00	1.0	0.1227	0.1227
1710 - 1755	WCDMA B4 LTE B4	25.0	0.3	338.8	5.19	1.0	0.0674	0.0674
2500 - 2570	LTE B7	25.0	0.3	338.8	5.19	1.0	0.0674	0.0674
699 - 716	LTE B12	25.0	1.3	426.6	8.50	0.47	0.0849	0.1806
777 - 787	LTE B13	25.0	1.3	426.6	8.08	0.52	0.0849	0.1633
1850 - 1915	LTE B25	25.0	2.9	616.6	7.00	1.0	0.1227	0.1227
814 - 849	LTE B26	25.0	2.8	602.6	9.60	0.54	0.1199	0.2220
2570 - 2620	LTE B38	25.0	0.3	338.8	5.19	1.0	0.0674	0.0674
2496 - 2690	LTE B41	25.0	0.3	338.8	5.19	1.0	0.0674	0.0674

¹802.11 Blue channel 2.4 GHz band antenna gain

²802.11 Red channel 2.4 GHz band antenna gain

³Value stated is for the sub-band with the highest recorded output power of all four 5 GHz WLAN sub-bands

⁴802.11 Blue channel 5 GHz band antenna gain

⁵802.11 Red channel 5 GHz band antenna gain

⁶Combined EIRP derived from summation of blue and red channel EIRPs



KDB447498 D01 v06 Section 7.2 SIMULTANEOUS TRANSMISSION CONSIDERATIONS

Worst case summation of calculated MPE ratios S_n/S_{req} .

BT BR/EDR and 2.4 GHz WLAN operation:

$$\text{ie: } \Sigma \text{MPE}_{\text{ratios}} = (S_1 / S_{\text{req1}}) + (S_2 / S_{\text{req2}})$$

$$= 0.0019 + 0.6468$$

$$= \mathbf{0.6487}$$

Bluetooth and Cellular (GSM850) operation:

$$\text{ie: } \Sigma \text{MPE}_{\text{ratios}} = (S_1 / S_{\text{req1}}) + (S_3 / S_{\text{req3}})$$

$$= 0.0019 + 0.2620$$

$$= \mathbf{0.2639}$$

Σ of MPE ratios < 1.0, so in accordance with KDB447498 Section 7.2, simultaneous transmission test exclusion applies.

Conclusion

The required 20 cm RF exposure limits for General Population / Uncontrolled Exposure will not be exceeded for the SECO PC-Gateway SYS-C31-DMV using the listed antenna.

Yours faithfully,

Alessandro Pali / Senior Manager

