



Certification Exhibit

Wi-Fi radio Module FCC ID: 2BWPS-JSC4136A4411B
Cellular radio Module FCC ID: XMR2022EM060KGL

FCC Rule Part: 47 CFR Part 2.1093

Project Number: 721022436

Manufacturer: Doosan Bobcat
Host Model Name/Number: 47034136/ ESG986-05RB

RF Exposure

General Information:

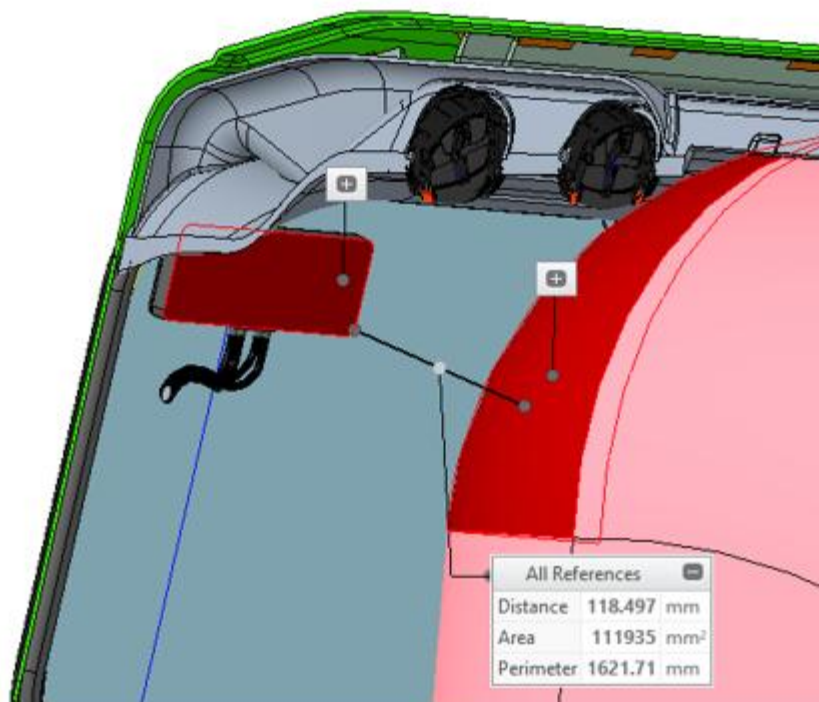
Applicant: Doosan Bobcat

Device Category: Portable

Environment: General Population/Uncontrolled Exposure

Test Specification/Issue/Date: US Code of Federal Regulations (CFR): Title 47, Part 1, Subpart I:
Procedures Implementing the National Environmental Policy Act of
1969, 2025.
US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J:
Equipment Authorization Procedures, 2025.

The photograph below demonstrates that a minimum compliance separation distance of 11.8 cm is maintained between the end user and all antennas, including both LTE and Wi-Fi antennas, under the normal device-use configuration. Both antennas are enclosed within the device housing, as shown in the photograph, and the device and antennas are installed by the grantee, ensuring that the required separation distance is inherently maintained.



**Antenna physical clearance to
operator space claim when
mounted on cab rear window**

Technical Information (Wi-Fi 2.4GHz radio):

Frequency Range (MHz): 2412 - 2462
Antenna Type: MA285 Adhesive Mount 5-in-1 Combination
Antenna Gain: 1.16 dBi
*Maximum Transmitter Conducted Power: 27.98dBm, 628.06mW
Maximum System EIRP: 29.14dBm, 820.35mW
Exposure Conditions: 11.8 centimeters

Technical Information – (Wi-Fi 5GHz radio):

Frequency Range (MHz): 5180 - 5825
Antenna Type: MA285 Adhesive Mount 5-in-1 Combination
Antenna Gain: 2.53 dBi
*Maximum Transmitter Conducted Power: 21.67dBm, 146.89mW
Maximum System EIRP: 24.2dBm, 263.03mW
Exposure Conditions: 11.8 centimeters

Technical Information – (Cellular radio):

WCDMA Band 2

Frequency Range (MHz): 1850-1910
Antenna Type: MA285 Adhesive Mount 5-in-1 Combination
Antenna Gain: 3.63 dBi
*Maximum Transmitter Conducted Power: 23.23dBm, 210.37mW
Maximum System EIRP: 26.86dBm, 485.28mW
Exposure Conditions: 11.8 centimeters

WCDMA Band 4

Frequency Range (MHz): 1710-1755
Antenna Type: MA285 Adhesive Mount 5-in-1 Combination
Antenna Gain: 3.79 dBi
*Maximum Transmitter Conducted Power: 23.21dBm, 209.41mW
Maximum System EIRP: 27dBm, 501.18mW
Exposure Conditions: 11.8 centimeters

WCDMA Band 5

Frequency Range (MHz): 824-849
Antenna Type: MA285 Adhesive Mount 5-in-1 Combination
Antenna Gain: 2.75 dBi
*Maximum Transmitter Conducted Power: 23.33dBm, 215.27mW
Maximum System EIRP: 26.08dBm, 405.51mW
Exposure Conditions: 11.8 centimeters

LTE Band 2/25

Frequency Range (MHz): 1850-1910 (Band 2) and 1850-1915 (Band 25)
Antenna Type: MA285 Adhesive Mount 5-in-1 Combination
Antenna Gain: 3.63 dBi
*Maximum Transmitter Conducted Power: 22.94dBm, 196.78mW
Maximum System EIRP: 26.57dBm, 453.94mW
Exposure Conditions: 11.8 centimeters

LTE Band 4/66

Frequency Range (MHz): 1710-1755 (Band 4) and 1710-1780 (Band 66)
Antenna Type: MA285 Adhesive Mount 5-in-1 Combination
Antenna Gain: 3.79 dBi
*Maximum Transmitter Conducted Power: 22.97dBm, 198.15mW
Maximum System EIRP: 26.76dBm, 474.24mW
Exposure Conditions: 11.8 centimeters

LTE Band 5/26

Frequency Range (MHz): 824-849 (Band 5) and 814-849 (Band 26)
Antenna Type: MA285 Adhesive Mount 5-in-1 Combination
Antenna Gain: 2.75 dBi
*Maximum Transmitter Conducted Power: 23.09dBm, 203.70mW
Maximum System EIRP: 25.84dBm, 383.71mW
Exposure Conditions: 11.8 centimeters

LTE Band 7

Frequency Range (MHz): 2500-2570
Antenna Type: MA285 Adhesive Mount 5-in-1 Combination
Antenna Gain: 3.22 dBi
*Maximum Transmitter Conducted Power: 22.99dBm, 199.06mW
Maximum System EIRP: 26.21dBm, 417.83mW
Exposure Conditions: 11.8 centimeters

LTE Band 12/17

Frequency Range (MHz): 699-716 (Band 12) and 704-716 (Band 17)
Antenna Type: MA285 Adhesive Mount 5-in-1 Combination
Antenna Gain: 2.38 dBi
*Maximum Transmitter Conducted Power: 23.02dBm, 200.45mW
Maximum System EIRP: 25.4dBm, 346.74mW
Exposure Conditions: 11.8 centimeters

LTE Band 13

Frequency Range (MHz): 777-787
Antenna Type: MA285 Adhesive Mount 5-in-1 Combination
Antenna Gain: 2.38 dBi
*Maximum Transmitter Conducted Power: 22.83dBm, 191.86mW
Maximum System EIRP: 25.21dBm, 331.89mW
Exposure Conditions: 11.8 centimeters

LTE Band 14

Frequency Range (MHz): 788-798
Antenna Type: MA285 Adhesive Mount 5-in-1 Combination
Antenna Gain: 2.38 dBi
*Maximum Transmitter Conducted Power: 22.89dBm, 194.54mW
Maximum System EIRP: 25.27dBm, 336.51mW
Exposure Conditions: 11.8 centimeters

LTE Band 26

Frequency Range (MHz): 814-849
Antenna Type: MA285 Adhesive Mount 5-in-1 Combination
Antenna Gain: 2.75 dBi
*Maximum Transmitter Conducted Power: 23.07dBm, 202.77mW
Maximum System EIRP: 25.82dBm, 381.94mW
Exposure Conditions: 11.8 centimeters

LTE Band 30

Frequency Range (MHz): 2305-2315
Antenna Type: MA285 Adhesive Mount 5-in-1 Combination
Antenna Gain: 3.22 dBi
*Maximum Transmitter Conducted Power: 23.10dBm, 204.17mW
Maximum System EIRP: 26.32dBm, 428.55mW
Exposure Conditions: 11.8 centimeters

LTE Band 38/41

Frequency Range (MHz): 2570-2620 (Band 38) and 2496-2690 (Band 41)
Antenna Type: MA285 Adhesive Mount 5-in-1 Combination
Antenna Gain: 3.22 dBi
*Maximum Transmitter Conducted Power: 23.07dBm, 202.77mW
Maximum System EIRP: 26.29dBm, 425.59mW
Exposure Conditions: 11.8 centimeters

*Worst Case from original filing report

Evaluation Details

Specific Requirements

FCC 47 CFR Part 1.1307 Actions that may have a significant environmental effect, for which Environmental Assessments (EAs) must be prepared.

1.1307 (b)(3) Determination of exemption.

(i) For single RF sources (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph (b)(2) of this section): A single RF source is exempt if:

(A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);

(B) Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by:

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

Where

$$x = -\log_{10} \left(\frac{60}{ERP_{20\text{ cm}} \sqrt{f}} \right) \quad \text{and } f \text{ is in GHz;}$$

And

$$ERP_{20\text{ cm}} (\text{mw}) = \begin{cases} 2040f & 0.3\text{ GHz} \leq f < 1.5\text{ GHz} \\ 3060 & 1.5\text{ GHz} \leq f < 6\text{ GHz} \end{cases}$$

$d = \text{the separation distance (cm)}$

(C) Or using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

Table 1 to § 1.1307(b)(3)(i)(C)—Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1,920 R ² .
1.34-30	3,450 R ² /f ² .
30-300	3.83 R ² .
300-1,500	0.0128 R ² f.
1,500-100,000	19.2R ² .

RF Exposure Calculation

Table 1: Cellular WCDMA Bands

Technical Parameters	WCDMA Band 2	WCDMA Band 4	WCDMA Band 5
Frequency (MHz)	1852.4	1732.6	836.4
Separation Distance (cm)	11.80	11.8	11.8
Separation Distance (m)	0.1180	0.118	0.118
Antenna Gain (dBi)	3.63	3.79	2.75
ERP Easily Determined	YES	YES	YES
1-g body or 10-g extremity	Body	Body	Body
Conducted Power (dBm)	23.23	23.21	23.33
Conducted Power (mW)	210.38	209.41	215.28
Duty Factor (Source-Based) %	100.0	100.0	100.0
Maximum (Source-Based) Time-Averaged Conducted Power (mW)	210.38	209.41	215.28
Maximum (Source-Based) Time-Averaged ERP (mW)	295.91	305.60	247.26
Maximum (Source-Based) Time-Averaged EIRP (mW)	485.29	501.19	405.51
Maximum Output (mW)	295.91	305.60	247.26
47 CFR 1.1307(b)(3)(i)(B) SAR-Based Exemption P_{th} (mW)			
x	1.84	1.83	1.42
ERP _{20cm} (mW)	3060.00	3060.00	1706.26
Maximum Output (mW)	295.908	305.602	247.261
P _{th} (mW)	1158.136	1167.042	808.680
Exemption	YES	YES	YES
Contribution Ratio (P / P _{th})	0.256	0.262	0.306
Distance to Limit (cm)	5.624	5.667	5.108

Table 2: Cellular LTE Bands

Technical Parameters	LTE Band 2/25	LTE Band 4/66	LTE Band 5/26	LTE Band 7	LTE Band 12/17
Frequency (MHz)	1855	1720	825.5	2535	700.5
Separation Distance (cm)	11.80	11.8	11.8	11.8	11.8
Separation Distance (m)	0.1180	0.118	0.118	0.118	0.118
Antenna Gain (dBi)	3.63	3.79	2.75	3.22	2.38
ERP Easily Determined	YES	YES	YES	YES	YES
1-g body or 10-g extremity	Body	Body	Body	Body	Body
Conducted Power (dBm)	22.94	22.97	23.09	22.99	23.02
Conducted Power (mW)	196.79	198.15	203.70	199.07	200.45
Duty Factor (Source-Based) %	100.0	100.0	100.0	100.0	100.0
Maximum (Source-Based) Time-Averaged Conducted Power (mW)	196.79	198.15	203.70	199.07	200.45
Maximum (Source-Based) Time-Averaged ERP (mW)	276.79	289.17	233.97	254.77	211.42
Maximum (Source-Based) Time-Averaged EIRP (mW)	453.94	474.24	383.71	417.83	346.74
Maximum Output (mW)	276.79	289.17	233.97	254.77	211.42
47 CFR 1.1307(b)(3)(i)(B) SAR-Based Exemption P_{th} (mW)					
x	1.84	1.83	1.41	1.91	1.30
ERP _{20cm} (mW)	3060.00	3060.00	1684.02	3060.00	1429.02
Maximum Output (mW)	276.794	289.172	233.968	254.775	211.425
P_{th} (mW)	1157.950	1168.018	801.748	1117.249	719.846
Exemption	YES	YES	YES	YES	YES
Contribution Ratio (P / P_{th})	0.239	0.248	0.292	0.228	0.294
Distance to Limit (cm)	5.425	5.492	4.916	5.441	4.597

Table 3: Cellular LTE Bands

Technical Parameters	LTE Band 13	LTE Band 14	LTE Band 26	LTE Band 30	LTE Band 38/41
Frequency (MHz)	782	790.5	821.5	2310	2593
Separation Distance (cm)	11.80	11.8	11.8	11.8	11.8
Separation Distance (m)	0.1180	0.118	0.118	0.118	0.118
Antenna Gain (dBi)	2.38	2.38	2.75	3.22	3.22
ERP Easily Determined	YES	YES	YES	YES	YES
1-g body or 10-g extremity	Body	Body	Body	Body	Body
Conducted Power (dBm)	22.83	22.89	23.07	23.10	23.07
Conducted Power (mW)	191.87	194.54	202.77	204.17	202.77
Duty Factor (Source-Based) %	100.0	100.0	100.0	100.0	100.0
Maximum (Source-Based) Time-Averaged Conducted Power (mW)	191.87	194.54	202.77	204.17	202.77
Maximum (Source-Based) Time-Averaged ERP (mW)	202.37	205.19	232.89	261.31	259.51
Maximum (Source-Based) Time-Averaged EIRP (mW)	331.89	336.51	381.94	428.55	425.60
Maximum Output (mW)	202.37	205.19	232.89	261.31	259.51
47 CFR 1.1307(b)(3)(i)(B) SAR-Based Exemption P_{th} (mW)					
x	1.37	1.38	1.40	1.89	1.91
ERP _{20cm} (mW)	1595.28	1612.62	1675.86	3060.00	3060.00
Maximum Output (mW)	202.375	205.190	232.893	261.310	259.511
P_{th} (mW)	773.764	779.274	799.197	1129.210	1114.356
Exemption	YES	YES	YES	YES	YES
Contribution Ratio (P / P_{th})	0.262	0.263	0.291	0.231	0.233
Distance to Limit (cm)	4.437	4.481	4.901	5.438	5.512

Table 4: Wi-Fi 2.4 & Wi-Fi 5GHz

Technical Parameters	Wi-Fi 2.4GHz	Wi-Fi 5GHz
Frequency (MHz)	2437	5580
Separation Distance (cm)	11.80	11.8
Separation Distance (m)	0.1180	0.118
Antenna Gain (dBi)	1.16	2.53
ERP Easily Determined	YES	YES
1-g body or 10-g extremity	Body	Body
Conducted Power (dBm)	27.98	21.67
Conducted Power (mW)	628.06	146.89
Duty Factor (Source-Based) %	100.0	100.0
Maximum (Source-Based) Time-Averaged Conducted Power (mW)	628.06	146.89
Maximum (Source-Based) Time-Averaged ERP (mW)	500.21	160.38
Maximum (Source-Based) Time-Averaged EIRP (mW)	820.35	263.03
Maximum Output (mW)	628.06	160.38
47 CFR 1.1307(b)(3)(i)(B) SAR-Based Exemption P_{th} (mW)		
x	1.90	2.08
ERP _{20cm} (mW)	3060.00	3060.00
Maximum Output (mW)	628.058	160.382
P_{th} (mW)	1122.307	1020.682
Exemption	YES	YES
Contribution Ratio (P / P_{th})	0.560	0.157
Distance to Limit (cm)	8.695	4.849

Simultaneous Transmission

For the simultaneous transmission evaluation, the radio conditions leading to the highest SAR based exemption ratio was used.

Configuration 1: Wi-Fi 2.4GHz + LTE Band 12/17
Configuration 2: Wi-Fi 2.4GHz + WCDMA Band 5
Configuration 3: Wi-Fi 5GHz + LTE Band 12/17
Configuration 4: Wi-Fi 5GHz + WCDMA Band 5

Table 1: Configuration 1

Technical Parameters	Wifi 2.4GHz	LTE Band 12/17
Frequency (MHz)	2437	700.5
Separation Distance (cm)	11.80	11.8
Separation Distance (m)	0.1180	0.118
Antenna Gain (dBi)	1.16	2.38
ERP Easily Determined	YES	YES
1-g body or 10-g extremity	Body	Body
Conducted Power (dBm)	27.98	23.02
Conducted Power (mW)	628.06	200.45
Duty Factor (Source-Based) %	100.0	100.0
Maximum (Source-Based) Time-Averaged Conducted Power (mW)	628.06	200.45
Maximum (Source-Based) Time-Averaged ERP (mW)	500.21	211.42
Maximum (Source-Based) Time-Averaged EIRP (mW)	820.35	346.74
Maximum Output (mW)	628.06	211.42
47 CFR 1.1307(b)(3)(i)(B) SAR-Based Exemption Pth (mW)		
x	1.90	1.30
ERP _{20cm} (mW)	3060.00	1429.02
Maximum Output (mW)	628.058	211.425
P _{th} (mW)	1122.307	719.846
Exemption	YES	YES
Contribution Ratio (P / P _{th})	0.560	0.294
Distance to Limit (cm)	8.695	4.597
Summation of Contribution From SAR-Based Exemption		
Contribution Ratio (P / P _{th})	0.560	0.294
Summation of Contribution Ratios (P / P _{th})	0.854	

Table 2: Configuration 2

Technical Parameters	Wifi 2.4GHz	WCDMA Band 5
Frequency (MHz)	2437	836.4
Separation Distance (cm)	11.80	11.8
Separation Distance (m)	0.1180	0.118
Antenna Gain (dBi)	1.16	2.75
ERP Easily Determined	YES	YES
1-g body or 10-g extremity	Body	Body
Conducted Power (dBm)	27.98	23.33
Conducted Power (mW)	628.06	215.28
Duty Factor (Source-Based) %	100.0	100.0
Maximum (Source-Based) Time-Averaged Conducted Power (mW)	628.06	215.28
Maximum (Source-Based) Time-Averaged ERP (mW)	500.21	247.26
Maximum (Source-Based) Time-Averaged EIRP (mW)	820.35	405.51
Maximum Output (mW)	628.06	247.26
47 CFR 1.1307(b)(3)(i)(B) SAR-Based Exemption Pth (mW)		
x	1.90	1.42
ERP _{20cm} (mW)	3060.00	1706.26
Maximum Output (mW)	628.058	247.261
P _{th} (mW)	1122.307	808.680
Exemption	YES	YES
Contribution Ratio (P / P _{th})	0.560	0.306
Distance to Limit (cm)	8.695	5.108
Summation of Contribution From SAR-Based Exemption		
Contribution Ratio (P / P _{th})	0.560	0.306
Summation of Contribution Ratios (P / P _{th})	0.866	

Table 3: Configuration 3

Technical Parameters	Wifi 5GHz	LTE Band 12/17
Frequency (MHz)	5580	700.5
Separation Distance (cm)	11.8	11.8
Separation Distance (m)	0.118	0.118
Antenna Gain (dBi)	2.53	2.38
ERP Easily Determined	YES	YES
1-g body or 10-g extremity	Body	Body
Conducted Power (dBm)	21.67	23.02
Conducted Power (mW)	146.89	200.45
Duty Factor (Source-Based) %	100.0	100.0
Maximum (Source-Based) Time-Averaged Conducted Power (mW)	146.89	200.45
Maximum (Source-Based) Time-Averaged ERP (mW)	160.38	211.42
Maximum (Source-Based) Time-Averaged EIRP (mW)	263.03	346.74
Maximum Output (mW)	160.38	211.42
47 CFR 1.1307(b)(3)(i)(B) SAR-Based Exemption Pth (mW)		
x	2.08	1.30
ERP _{20cm} (mW)	3060.00	1429.02
Maximum Output (mW)	160.382	211.425
P _{th} (mW)	1020.682	719.846
Exemption	YES	YES
Contribution Ratio (P / P _{th})	0.157	0.294
Distance to Limit (cm)	4.849	4.597
Summation of Contribution From SAR-Based Exemption		
Contribution Ratio (P / P _{th})	0.157	0.294
Summation of Contribution Ratios (P / P _{th})	0.451	

Table 4: Configuration 4

Technical Parameters	Wifi 5GHz Radio 1	WCDMA Band 5
Frequency (MHz)	5580	836.4
Separation Distance (cm)	11.8	11.8
Separation Distance (m)	0.118	0.118
Antenna Gain (dBi)	2.53	2.75
ERP Easily Determined	YES	YES
1-g body or 10-g extremity	Body	Body
Conducted Power (dBm)	21.67	23.33
Conducted Power (mW)	146.89	215.28
Duty Factor (Source-Based) %	100.0	100.0
Maximum (Source-Based) Time-Averaged Conducted Power (mW)	146.89	215.28
Maximum (Source-Based) Time-Averaged ERP (mW)	160.38	247.26
Maximum (Source-Based) Time-Averaged EIRP (mW)	263.03	405.51
Maximum Output (mW)	160.38	247.26
47 CFR 1.1307(b)(3)(i)(B) SAR-Based Exemption Pth (mW)		
X	2.08	1.42
ERP _{20cm} (mW)	3060.00	1706.26
Maximum Output (mW)	160.382	247.261
P _{th} (mW)	1020.682	808.680
Exemption	YES	YES
Contribution Ratio (P / P _{th})	0.157	0.306
Distance to Limit (cm)	4.849	5.108
Summation of Contribution From SAR-Based Exemption		
Contribution Ratio (P / P _{th})	0.157	0.306
Summation of Contribution Ratios (P / P _{th})	0.463	

The summation ratios are <1 which meet the exemption from routine environmental evaluation for RF exposure for multiple sources operating at the same time.

Exemption from Routine Environmental Evaluation applies. The EUT meets the RF exposure requirements of the standards listed above.