Radio Frequency Exposure Evaluation Report

For:
Banner Engineering Corp.

Brand:
Banner Engineering Corp.

Marketing Name:
60 GHz Industrial Radar Presence Detector

Model Name:
Q90R2-12040-6KDQ

Product Description:
Industrial Radar Presence Detector

FCC ID: UE3Q90R2-6

Per:
CFR Part Part1 (1.1307 &1.1310), Part 2 (2.1091),
FCC KDB 447498 D04 Interim General RF Exposure Guidance v01

REPORT #: EMC_BANNE-008-24001_RF_Exposure

DATE: 2024-03-26

A2LA Accredited

IC recognized # 3462B

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1 Assessment

This RF Exposure evaluation report provides evidence for compliance of the below identified device with the RF Exposure limits for mobile devices as defined in FCC CFR Part 1 (1.1307 &1.1310), Part 2 (2.1091) under worst case conditions (measured or rated RF output power, antenna gain, distance towards human body, multiple transmitter information as presented by the applicant).
In addition, maximum antenna gain or minimum distance towards the human body is calculated respectively, where relevant.

The device meets the limits as stipulated by the above given FCC rule parts based on available specifications for worst case conditions at 20 cm distance to the body.

Company	Description	Model #
Banner Engineering Corp.	Industrial Radar Presence Detector	Q90R2-12040-6KDQ

Responsible for the Report:

Date	Section	Name	Signature
2024-03-26	Compliance	Guangcheng Huang (Senior EMC Test Engineer)	

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Street Address:	411 Dixon Landing Road
City/Zip Code	Milpitas, CA 95035
Country	USA
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Lab Manager:	Ghanma, Issa
Responsible Project Leader:	Baskaran, Akanksha

2.2 Identification of the Client

Client's Name:	Banner Engineering Corp.
Street Address:	9714 10th Avenue North
City/Zip Code	Minneapolis, MN 55441
Country	USA

2.3 Identification of the Manufacturer

Manufacturer's Name:	Same as Client
Manufacturers Address:	
City/Zip Code	
Country	

3 Equipment under Assessment

Model No:	Q90R2-12040-6KDQ
Marketing Name:	60 GHz Industrial Radar Presence Detector
HW Version :	Rev A
SW Version :	1.0
FCC ID :	UE3Q90R2-6
FWIN:	N/A
HVIN:	Q90R2-6
PMN:	Q90R
Product Description:	Industrial Radar Presence Detector
Frequency Range / number of channels:	60 – 61.56 GHz
Radio Information:	Radar Chip: IWR6843
Modes of Operation:	FMCW
Antenna Information as declared:	Microstrip patch antenna
Power Supply / Rated operating Voltage Range:	Nominal 24 V DC Range 10 - 30 V DC
Operating Temperature Range	-40 °C to +65 °C
Other Radios included in the device:	None
Sample Revision	■ Production; ☐ Pre-Production
EUT Diameter	90mm X 90mm X 25mm
Note: All information provided by the client.	

4 RF Exposure Limits and FCC Basic Rules

4.1 FCC 2.1091

4.1.1 § 2.1091(c)(1)

Evaluation of compliance with the exposure limits in § 1.1310 of this chapter, and preparation of an EA if the limits are exceeded, is necessary for mobile devices with single RF sources having either more than an available maximum time-averaged power of 1 mW or more than the ERP listed in Table 1 to § 1.1307(b)(3)(i)(C), whichever is greater. For mobile devices not exempt by § 1.1307(b)(3)(i)(C) at distances from 20 centimeters to 40 centimeters and frequencies from 0.3 GHz to 6 GHz, evaluation of compliance with the exposure limits in § 1.1310 of this chapter is necessary if the ERP of the device is greater than ERP20cm in the formula below. If the ERP of a single RF source at distances from 20 centimeters to 40 centimeters and frequencies from 0.3 GHz to 6 GHz is not easily obtained, then the available maximum time-averaged power may be used (i.e., without consideration of ERP) in comparison with the following formula only if the physical dimensions of the radiating structure(s) do not exceed the electrical length of λ/4 or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

$$P_{th}(\text{mW}) = ERP_{20\,cm}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases}$$

4.1.2 § 1.1307(b)(3)(i)(C)

Using following table 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 λ/2π, 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 λ/4 or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

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^2f.
1,500–100,000	19.2R^2.

5 Evaluations

5.1 FCC RF Exposure

Exemption threshold according to FCC 1.1307(b)(3)(i)(C) for a single RF source

Radio	Tech-Band	Freq-Low [GHz]	EIRP [W]	ERP [W]	Exemption ERP Threshold [W]	Percentage of limit
radar	60 GHz band	60	0.028	0.017	0.768	2.21%

Conclusion:

The maximum RF emissions from this equipment is below the SAR exemption ERP threshold for separation distance between the antenna and the human body greater than 20 cm. SAR is not required.

6 Revision History

Date	Report Name	Changes to report	Prepared by
2024-03-26	EMC_BANNE-008-24001_RF_Exposure	Initial version	Guangcheng Huang

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