RF Exposure Evaluation Report

Product Name : Realtime radio module

Model No. : TM5317-21

FCC ID : NI4-TM5317-21

Applicant : Toyota Motor Corporation

Address : 1, Toyota-Cho Toyota Aichi, 471-8572 Japan

Date of Receipt : Jan. 11, 2021

Date of Declaration : Mar. 09, 2021

Report No. : 2110302R-E3082100013

Report Version : V1.0

Testing Laboratory

3023

Issued Date: Mar. 09, 2021
Report No.: 2110302R-E3082100013

Product Name	Realtime radio module	
Applicant	Toyota Motor Corporation	
Address	1, Toyota-Cho Toyota Aichi, 471-8572 Japan	
Manufacturer	TOYOTA TECHNICAL DEVELOPMENT CORPORATION	
Factory	OYO ELECTRIC CO. ,LTD.	
Model No.	TM5317-21	
FCC ID.	NI4-TM5317-21	
Trade Name	TOYOTA	
Applicable Standard	KDB 447498 D01 v06	☒ Minimum test separation distance ≥ 20 cm ☐ For low power devices
Test Result	Complied	

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Approved By :
(Director / Vincent Lin)

Revision History

Report No.	Version	Description	Issued Date
2110302R-E3082100013	V1.0	Initial issue of report.	Mar. 09, 2021

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Realtime radio module
Trade Name	TOYOTA
Model No.	TM5317-21
FCC ID.	NI4-TM5317-21
Frequency Range	2402 – 2480MHz
Channel Number	79
Type of Modulation	GFSK
Channel Control	Auto
Antenna Type	FlexPIFA Antenna
Antenna Gain	Refer to the table “Antenna List”

1.2. Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	Laird connectivity	001-0016	FlexPIFA Antenna	2.5dBi for 2.4GHz

2. RF Exposure Evaluation

2.1. Standard Applicable

According to KDB 447498 D01 (7.1), A minimum test separation distance ≥ 20 cm is required between the antenna and radiating structures of the device and nearby persons to apply mobile device exposure limits.

2.2. Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (Minutes)
(A) Limits for Occupational/ Control Exposures				
300-1500	--	--	F/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	F/1500	6
1500-100,000	--	--	1	30

F= Frequency in MHz

Friis Formula

Friis transmission formula: $Pd = (Pout*G)/(4*pi*r^2)$

Where

Pd = power density in mW/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

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

2.3. Test Result of RF Exposure Evaluation

Product : Realtime radio module
Test Item : RF Exposure Evaluation

WLAN 2.4G Peak Gain: 2.5dBi

Channel	Frequency	Conducted Peak Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit (mWc/m^2)	Pass/Fail
40	2441	2.51	1.782	0.0006	1	Pass

Note: The conducted output power is refer to report No.: 2110302R-E3032110109 from the DEKRA.