

Test Report

Prepared for: FRTek

Model: FRM-DU39DL, FRM-mRU39DL

Description: 39 GHz_ L 5G Wireless Optical DAS

FCC ID: 2AFEG-FRM-39L

To

FCC Part 1.1310

Date of Issue: September June 19, 2021

On the behalf of the applicant:

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Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	July 9, 2020	Greg Corbin	Original Document
2.0	June 30, 2021	Greg Corbin	Removed DU from description, added model number for mRU, changed 256 QAM to 64 QAM, and updated channel capacity per manufacturer input

ANAB

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Non-accredited tests contained in this report:

N/A

EUT Description

Model: FRM-DU39DL, FRM-mRU39DL

Description: 39 GHz_ L 5G Wireless Optical DAS

Additional Information:

The EUT is a 5G 38 GHz Optical DAS (Distributed Amplifier System).

The frequency range for both the uplink and downlink is 37.6 – 38.6 GHz.

The EUT has separate SISO and MIMO input / outputs.

Modulation used is according to the 5G NR (New Radio Standard) 3GPP 38 (Downlink: CP-OFDM, Uplink: CP-OFDM or DFT-S-OFDM – up to 64QAM).

Channel Capacity is:

100MHz X 10FA (Continuous & Non-Continuous) or 200MHz X 5FA (Continuous & Non-Continuous) or 400MHz X 2FA (Continuous & Non-Continuous)

EUT Operation during Tests

EUT was set up for normal operating conditions.

The EUT was controlled by a manufacturer provided GUI.

Control: *i-storm*,
version:40.01

5G test signals with either 100 MHz or 400 MHz bandwidths were used as required.

The DU and mHU antennas were removed to provide access to the antenna ports.

Test signals were injected into the antenna ports.

The manufacturer provided an antenna adapter plate with 2.92 mm connectors for connections to the antenna ports.

The 5G 39 GHz Optical DAS contains the following individual units.

Product Name	Model Name
mRU	FRM-mRU39DL
DU	FRM-DU39DL
DRU	FRM-DRU39
MDU	FRM-MDU39L
MHU	FRM-MHU39
MPSU	FRM-MPSU

The EUT Antenna ports are listed below.

DU	mRU
SISO Downlink Input	SISO Downlink Output
SISO Uplink Output	SISO Uplink Input
MIMO Downlink Input	MIMO Downlink Output
MIMO Uplink Output	MIMO Uplink Input

Antenna Gain

Antenna	Frequency (GHz)	Bandwidth (GHz)	Gain (dBi)
DU	37.6 – 38.6	1.0	10 ±1 dB
mRU	37.6 – 38.6	1.0	8 ±1 dB

MPE Evaluation

This is a mobile device used in Uncontrolled Exposure environment.

Limits Uncontrolled Exposure
47 CFR 1.1310
Table 1, (B)

0.3-1.234 MHz:	Limit [mW/cm ²] = 100
1.34-30 MHz:	Limit [mW/cm ²] = (180/f ²)
30-300 MHz:	Limit [mW/cm ²] = 0.2
300-1500 MHz:	Limit [mW/cm ²] = f/1500
1500-100,000 MHz	Limit [mW/cm ²] = 1.0

Test Data

Output Power

	Manufacturer rated power	Tune up procedure	Output Power for RF Exposure calculation	
	(dBm)	(dB)	(dBm)	(mw)
Downlink	20	None Specified	20	100
Uplink	20	None Specified	20	100

SISO / MIMO Downlink

Test Frequency, MHz	27650
Power, Conducted, mW (P)	100
Antenna Gain Isotropic (dBi)	9
Antenna Gain Numeric (G)	7.94
Antenna Type	Linear
Distance (R)	20 cm

$S = \frac{P * G}{4\pi r^2}$
Power Density (S) mw/cm ²

Power Density (S) = 0.158 mw/cm ²
Limit = (from above table) = 1.0 mw/cm ²

SISO Uplink

Test Frequency, MHz	27650
Power, Conducted, mW (P)	100
Antenna Gain Isotropic	11 dBi
Antenna Gain Numeric (G)	12.59
Antenna Type	Linear
Distance (R)	20 cm

$S = \frac{P * G}{4\pi r^2}$
Power Density (S) mw/cm ²

Power Density (S) = 0.250 mw/cm ²
Limit = (from above table) = 1.0 mw/cm ²

The EUT complies with the MPE limit at 20 cm.

END OF TEST REPORT