



RF Exposure Evaluation Declaration

Report No.: S20230316528501E08

Issue Date: 05-16-2023

Applicant: Xi'an NovaStar Tech Co., Ltd.
Address: 101 Block D-F, 01 Square, Xi'an Software Park, No.72,
2nd Keji Road, Xi'an, Shaanxi, China
FCC ID: 2AG8JTU20P
Product: LED Playback Control Processor
Model No.: TU20 Pro, TU15 Pro
Trade Mark: 
FCC Rule Part(s): CFR 47, FCC Part 2.1091 Radio frequency radiation
exposure evaluation: mobile devices.
Item Receipt date: Mar 16, 2023
Test Date: Mar 17 ~ May 15, 2023

Compiled By Amos Xia
(Amos Xia)
Senior Test Engineer
Approved By Line Chen
(Line Chen)
Engineer Manager



The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in KDB 558074 D01. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of Fangguang Inspection & Testing Co., Ltd. Wuxi Branch

The test report must not be used by the client to claim product certifications, approval, or endorsement by NVLAP, NIST or any agency of U.S. Government.

Revision History

Report No.	Version	Description	Issue Date
S20230316528501E08	Rev. 01	/	05-16-2023

1. PRODUCT INFORMATION

1.1. Equipment Description

Product Name:	LED Playback Control Processor								
Model Name:	TU20 Pro								
Additional Model:	TU15 Pro								
Model Description:	TU20 Pro and TU15 Pro are the same on the board, Schematic, Hardware version, Software version and internal photos are same, only port structure and the model name are different. <table><tr><td>Model</td><td>TU15 Pro</td><td>TU20 Pro</td></tr><tr><td>Number of RJ45 ports equipped</td><td>4</td><td>6</td></tr></table>			Model	TU15 Pro	TU20 Pro	Number of RJ45 ports equipped	4	6
Model	TU15 Pro	TU20 Pro							
Number of RJ45 ports equipped	4	6							
Trade Mark:									
Input Voltage Range:	DC 12V, 3A								
Bluetooth Version:	5.0								
Wi-Fi Specification:	WLAN: 802.11b/g/n20/ax20/n40(The sample has two WiFi Modules, one for WIFI-STA function(model:RTL8811CU) and that supports b/g/n20/n40, and the other for WiFi -AP function(model: AP6275S) that support b/g/n20/ax20) RLAN: 802.11a/n-HT20/n-HT40/ac-VHT20/ac-VHT40/ac-VHT80/ax-HE20/ax-HE40/ax-HE80(The sample has two WiFi Modules, one for WIFI-STA function(model:RTL8811CU) and that supports a/n20/n40/ac20/ac40/ac80, and the other for WiFi -AP function(model: AP6275S) that support a/n20/n40/ac20/ac40/ac80/ax20/ax40/ax80)								

1.2. Product Specification Subjective to this Report

Frequency Range:	BT/BLE:2402~2480MHz 802.11b/g/n-HT20/ax-HE20: 2412 ~ 2462MHz 802.11 n-HT40: 2422 ~ 2452MHz For 802.11a/n-HT20/ac-VHT20/ax-HE20: 5180~5240MHz, 5745~5825MHz For 802.11n-HT40/ac-VHT40/ax-HE40: 5190~5230MHz, 5755~5795MHz For 802.11ac-VHT80/ax-HE80: 5210MHz, 5775MHz
Type of Modulation:	BLE:GFSK BT: GFSK, $\pi/4$ DQPSK, 8DPSK 802.11b: DSSS 802.11g/n: OFDM 802.11a/n/ac/ax:CCK/OFDM/BPSK/QPSK/DBPSK/DQPSK/16QAM/64QAM/256QAM/1024QAM
Data Rate:	BLE:1Mbps&2Mbps BT:1Mbps(GFSK), 2Mbps($\pi/4$ DQPSK), 3Mbps (8DPSK) 802.11b: 1/2/5.5/11Mbps 802.11g: 6/9/12/18/24/36/48/54Mbps 802.11n: MCS0~MCS7 802.11a: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 150Mbps 802.11ac: up to 433.3Mbps 802.11ax: up to 600Mbps
Antenna Type:	Dipole Antenna
Antenna Gain:	BT/BLE:2.27dBi 2.4G WiFi: Ant0:2.27dBi Ant1:2.27dBi Ant2:2.27dBi 5G RLAN: Ant0:2.83dBi Ant1:2.83dBi Ant2:2.83dBi
CDD Directional Gain:	2.4G WiFi: 5.28dBi 5G RLAN:5.84dBi

2. RF Exposure Evaluation

2.1. 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

Calculation Formula: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

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

P_d is the limit of MPE, 1mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

2.2. Test Result of RF Exposure Evaluation

Product	LED Playback Control Processor
Test Item	RF Exposure Evaluation

Mode	Frequency (MHz)	Maximum Conducted OutputPower (dBm)	Antenna Gain (dBi)	PG		MPE (mW/cm ²)	MPE Limits (mW/cm ²)
				(dBm)	(mW)		
WLAN	2412 - 2462	17.37	Directional Gain: 5.28	22.65	184.077	0.036	1.00
U-NII	5150 - 5250 5745 - 5825	16.02	Directional Gain: 5.84	21.86	153.462	0.031	1.00
BT	2402 - 2480	8.83	2.27	11.10	12.882	0.003	1.00
BLE	2402 - 2480	7.20	2.27	9.47	8.851	0.002	1.00

Remark: 1. MPE use distance is 20cm from manufacturer declaration of user manual.

Remark: 2. Use the maximum gain of all bands when evaluating

Remark: 3. BT, 2.4G and 5G wifi can't transmit simultaneously.

CONCLUSION:

The Max Power Density at R (20 cm) = $0.036\text{mW/cm}^2 < 1\text{mW/cm}^2$.

So the EUT complies with the requirement.

_____ The End _____