TEST REPORT

Applicant:	TOUCH DYNAMIC INC.
Address:	121 Corporate Blvd, South Plainfield, NJ 07080, USA
Equipment Type:	Vector
Model Name:	Vector
Brand Name:	TOUCH_DYNAMIC
FCC ID:	2BMQJ-VECTOR
Test Standard:	47 CFR Part 2.1091 KDB 447498 D04 v01
Test Date:	Sep. 27, 2024~Oct. 31, 2024
Date of Issue:	Jan. 9, 2025

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

Tested by: Xiong Lining **Checked by:** Xu Rui **Approved by:** Tolan Tu (Testing Director)

Revision History

Version	Issue Date	Revisions Content
Rev. 01	Jan. 9, 2025	Initial Issue

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1 GENERAL INFORMATION

1.1 Test Laboratory

Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100

1.2 Test Location

Name	Shenzhen BALUN Technology Co., Ltd.
Location	☐ Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
	☑ 1/F, Building B, Ganghongji High-tech Intelligent Industrial Park, No. 1008, Songbai Road, Yangguang Community, Xili Sub-district, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation Certificate	The laboratory is a testing organization accredited by FCC as a accredited testing laboratory. The designation number is CN1196.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	TOUCH DYNAMIC INC.
Address	121 Corporate Blvd, South Plainfield, NJ 07080, USA

2.2 Manufacturer Information

Manufacturer	TOUCH DYNAMIC INC.
Address	121 Corporate Blvd, South Plainfield, NJ 07080, USA

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description for Equipment under Test (EUT)

EUT Name	Vector
Model Name Under Test	Vector
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	V1.0
Software Version	D0773_TOUCH_DYNAMIC_COMBO_20241029
Dimensions (Approx.)	L：367mm；W：200mm；H：290mm
Weight (Approx.)	Main screen: 3986g Secondary screen: 568g

2.5 Technical Information

Network and Wireless connectivity	BR+EDR+BLE WIFI2.4G:11b\11g\11n\11ax WIFI5G:11a\11n\11ac\11ax

The requirement for the following technical information of the EUT was tested in this report:

Operating Mode	Bluetooth, WIFI	
Frequency Range	Bluetooth	2402 ~ 2480 MHz
	2.4G WIFI	2412 ~ 2462 MHz
	5G WIFI	U-NII-1: 5150 ~ 5250MHz U-NII-2A: 5250 ~ 5350MHz U-NII-2C: 5470-5725MHz U-NII-3: 5725 ~ 5850MHz
Antenna Type	PIFA Antenna	
Exposure Category	General Population/Uncontrolled Exposure	
Product Type	Mobile	

3 SUMMARY OF TEST RESULT

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 2.1091	Radiofrequency radiation exposure evaluation: mobile devices
2	KDB 447498 D04 v01	447498 D04 Interim General RF Exposure Guidance v01

4 DEVICE CATEGORY AND LEVELS LIMITS

Mobile Devices:

CFR Title 47 §2.1091(b)

For purposes of this section, a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons.

FCC KDB 447498 D04 General RF Exposure Guidance v01 Limit

Evaluation of compliance with the exposure limits in § 1.1310 is necessary if the ERP of the device is greater than ERP20cm in Formula (B.1) [repeated from § 2.1091(c)(1) and § 1.1307(b)(1)(i)(B)].

$$P_{\text{th}}\ (\text{mW}) = ERP_{20\,\text{cm}}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases} \qquad (\text{B.1})$$

If the ERP is not easily obtained, then the available maximum time-averaged power may be used (i. e., without consideration of ERP 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.

SAR-based exemptions are constant at separation distances between 20 cm and 40 cm to avoid discontinuities in the threshold when transitioning between SAR-based and MPE-based exemption criteria at 40 cm, considering the importance of reflections.

The SAR-based exemption formula of § 1.1307(b)(3)(i)(B), repeated here as Formula (B.2), applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, of less than or equal to the threshold Pth (mW).

This method shall only be used at separation distances from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive). Pth is given by Formula (B.2).

$$P_{\text{th}}\,(\text{mW}) = \begin{cases} ERP_{20\,\text{cm}}(d/20\ \text{cm})^{x} & d \le 20\ \text{cm} \\ ERP_{20\,\text{cm}} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases} \qquad \text{(B.2)}$$

where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\,\text{cm}}\sqrt{f}}\right)$$

and f is in GHz, d is the separation distance (cm), and $ERP_{20\text{cm}}$ is per Formula (B.1).
The example values shown in Table B.2 are for illustration only.

Table B.2—Example Power Thresholds (mW)

Frequency (MHz)	Distance (mm)									
	5	10	15	20	25	30	35	40	45	50
300	39	65	88	110	129	148	166	184	201	217
450	22	44	67	89	112	135	158	180	203	226
835	9	25	44	66	90	116	145	175	207	240
1900	3	12	26	44	66	92	122	157	195	236
2450	3	10	22	38	59	83	111	143	179	219
3600	2	8	18	32	49	71	96	125	158	195
5800	1	6	14	25	40	58	80	106	136	169

According with FCC KDB 447498 D04, Appendix A, Per § 1.1307(b)(3)(i)(A), a single RF source is exempt RF device (from the requirement to show data demonstrating compliance to RF exposure limits, as previously mentioned) if the available maximum time-averaged power is no more than 1 mW, regardless of separation distance.

This exemption applies to all operating configurations and exposure conditions, for the frequency range 100 kHz to 100 GHz, regardless of fixed, mobile, or portable device exposure conditions. This is a standalone exemption, and it cannot be applied in conjunction with any other test exemption.

When maximum available power each individual transmitting antenna within the same time averaging period is ≤ 1 mW, and the nearest parts of the antenna structures of the simultaneously operating transmitters are separated by at least 2 cm.

When the aggregate maximum available power of all transmitting antennas is ≤ 1 mW in the same time-averaging period.

5 ASSESSMENT RESULT

5.1 Output Power

Bluetooth				
Mode	GFSK	π/4-DQPSK	8-DPSK	BLE
Conducted Power (dBm)	8.53	8.47	8.51	8.39
Antenna Gain (dBi)	1.30	1.30	1.30	1.30
EIRP (dBm)	9.83	9.77	9.81	9.69
Note: This report listed the worst case conducted power value, please refer to RF test report No. BL-SH2490677-601 and BL-SH2490677-602 for more details.				

2.4G WLAN			
Mode	WLAN 2.4G-Main	WLAN 2.4G-Aux	WLAN 2.4G-MIMO
Conducted Power (dBm)	25.34	25.62	28.49
Antenna Gain (dBi)	5.30	4.80	5.05
EIRP (dBm)	30.64	30.42	33.54
Note: This report listed the worst case conducted power value, please refer to RF test report No. BL-SH2490677-603 for more details.			

5G WLAN			
Mode	U-NII-1-Main	U-NII-1-Aux	U-NII-1-MIMO
Conducted Power (dBm)	15.44	16.26	18.55
Antenna Gain (dBi)	2.40	4.60	3.67
EIRP (dBm)	17.84	20.86	22.22
Note: This report listed the worst case conducted power value, please refer to RF test report No.BL-SH2490677-604 for more details.			

5G WLAN			
Mode	U-NII-2A-Main	U-NII-2A-Aux	U-NII-2A-MIMO
Conducted Power (dBm)	15.53	15.41	18.42
Antenna Gain (dBi)	3.20	4.60	3.93
EIRP (dBm)	18.73	20.01	22.35
Note: This report listed the worst case conducted power value, please refer to RF test report No.BL-SH2490677-604 for more details.			

5G WLAN			
Mode	U-NII-2C-Main	U-NII-2C-Aux	U-NII-2C-MIMO
Conducted Power (dBm)	17.71	18.45	20.35
Antenna Gain (dBi)	3.30	5.10	4.55
EIRP (dBm)	21.01	23.55	24.90

Note: This report listed the worst case conducted power value, please refer to RF test report No.BL-SH2490677-604 for more details.

5G WLAN			
Mode	U-NII-3-Main	U-NII-3-Aux	U-NII-3-MIMO
Conducted Power (dBm)	17.98	18.55	21.29
Antenna Gain (dBi)	4.80	5.10	4.96
EIRP (dBm)	22.78	23.65	26.25
Note: This report listed the worst case conducted power value, please refer to RF test report No.BL-SH2490677-604 for more details.			

5.2 Tune-up power

Mode		Conducted Power Range (dBm)	EIRP Range (dBm)	ERP Range (dBm)
Bluetooth	Bluetooth	【7.50,9.50】	【8.80,10.80】	【6.65,8.65】
2.4G WIFI	2.4G WIFI	【27.00,29.00】	【32.05,34.05】	【29.90,31.90】
5G WIFI	U-NII-1: 5150-5250MHz	【17.50,19.50】	【21.17,23.17】	【19.02,21.02】
	U-NII-2A: 5250-5350MHz	【17.50,19.50】	【21.43,23.43】	【19.28,21.28】
	U-NII-2C: 5470-5725MHz	【19.50,21.50】	【24.05,26.05】	【21.90,23.90】
	U-NII-3: 5725-5850MHz	【20.50,22.50】	【25.46,27.46】	【23.31,25.31】
Note1: ERP= EIRP -2.15dB.				
Note2: According KDB 447498 D04, used the greater of maximum conducted power and ERP to compare with the threshold value Pth.				

5.3 RF Exposure Evaluation Result

Evolution mode		f(MHz)	Distance (cm)	Maximum power (dBm)	Maximum power (mW)	Threshold Power (mW)	P/Plimit	Verdict
Bluetooth	Bluetooth	2402	20	9.50	8.91	3060.00	0.0029	Pass
WLAN	2.4GWIFI	2412	20	31.90	1548.82	3060.00	0.5062	Pass
	U-NII-1: 5150-5250MHz	5150	20	21.02	126.47	3060.00	0.0413	Pass
	U-NII-2A: 5250-5350MHz	5250	20	21.28	134.28	3060.00	0.0439	Pass
	U-NII-2C: 5470-5725MHz	5470	20	23.90	245.47	3060.00	0.0802	Pass
	U-NII-3: 5725-5850MHz	5725	20	25.31	339.63	3060.00	0.1110	Pass

5.4 Collocated Power Calculation

Evolution mode	Frequency (MHz)	Power /Limit	Σ(Power / Limit) of WLAN + Bluetooth	Verdict
Bluetooth	2402MHz ~ 2480MHz	0.0029	0.5091	Pass
2.4G WIFI	2412MHz ~ 2462MHz	0.5062		

Note:

1. Σ(Power / Limit): This is a summation of [(power for each transmitter/ antenna included in the simultaneous transmission)/ (corresponding Power limit)], for Bluetooth+ WLAN.
2. Both of the WLAN and Bluetooth can transmit simultaneously, the formula of calculated the Power is CP1 / LP1 + CP2 / LP2 + ……etc. < 1
   CP = Calculation power
   LP = Limit of power
3. The worst-case situation is 0.5091, which is less than “1”. This confirmed that the device comply with FCC KDB 447498 D04 Power limit.
4. The DUT work frequency range used is 2402MHz ~ 2480 MHz, 5150MHz ~ 5250 MHz, 5250MHz ~ 5350 MHz, 5470MHz ~ 5725 MHz, 5725MHz ~ 5850 MHz the result close to the limit by the above formula, so we select worst case power to calculate the exclusion power threshold.
5. More power list please refer to RF test report.

5.5 Conclusion

This EUT is deemed to comply with the reference level limits, therefore the basic restrictions are compliant with human exposure limits.

Statement

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--END OF REPORT--