RF Exposure Evaluation Report

FCC 47 CFR § 2.1091

for

Connected Digital Recorder

Model Name.: N702, N702B, CAMPro US, SafetyCam Pro

Prepared for:

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Prepared by

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
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1 Attestation of Test Results

Applicant Name	Mitac Digital Technology Corporation
Model Name	N702, N702B, CAMPro US, SafetyCam Pro
Applicable Standards	FCC 47 CFR § 2.1091 FCC 47 CFR § 1.1307 FCC 47 CFR § 1.1310 Published RF exposure KDB procedures
Receive EUT Date:	May 31, 2024
Compliance Certification Services Inc. , tested the above equipment in accordance with the requirements set forth in the above standards. Determination of compliance is based on the results of the compliance measurement,not taking into account measurement instrumentation uncertainy.All indications of Pass/Fail in this report are opinions expressed by Compliance Certification Services Inc, based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.	
Approved & Released By: 	
Sky Zhou Asst. Section Manager Compliance Certification Services Inc.	

2 Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1091, the following FCC Published RF exposure KDB procedures:

- 447498 D04 Interim General RF Exposure Guidance v01
- 865664 D02 RF Exposure Reporting v01r02

3 Device Under Test (DUT) Information

3.1 DUT Description

Product	Connected Digital Recorder
Trade Name	MiTAC, Mio, MAGELLAN, Navman, SMARTER AI, Webfleet, Azuga
Model No.	N702, N702B, CAMPro US, SafetyCam Pro
Model Discrepancy	Difference of the those model number / trademarks (list on this report) are just for marketing purpose only.
Hardware Version	R03
Software Version	R01
Sample Stage	Identical prototype

3.2 Wireless Technologies

Frequency bands	☒ Bluetooth: 2402MHz ~ 2480MHz ☒ 802.11b/g/n HT20: 2412 MHz ~ 2462 MHz ☒ 802.11n HT40: 2422 MHz ~ 2452MHz ☒ 802.11a/n HT20: 5180MHz ~ 5240MHz / 5745MHz ~ 5825MHz ☒ 802.11n HT40: 5190MHz ~ 5230MHz / 5755MHz ~ 5795MHz ☒ 802.11ac VHT80: 5210MHz / 5775MHz ☒ 13.56MHz ☒ WCDMA Band II: 1852.4MHz ~ 1907.6MHz ☒ WCDMA Band IV: 1712.4MHz ~ 1752.6MHz ☒ WCDMA Band V: 826.4MHz ~ 846.6MHz ☒ LTE Band 2: 1850.0MHz ~ 1910.0MHz ☒ LTE Band 4: 1710.0MHz ~ 1755.0MHz ☒ LTE Band 5: 824.0MHz ~ 849.0MHz ☒ LTE Band 12: 704.0MHz ~ 716.0MHz ☒ LTE Band 13: 777 MHz ~ 787 MHz ☒ LTE Band 14: 788 MHz ~ 798 MHz ☒ LTE Band 66: 1710 MHz ~ 1780 MHz ☒ LTE Band 71: 663 MHz ~ 698 MHz ☐ Others
Exposure classification	☐ Occupational/Controlled exposure ☒ General Population/Uncontrolled exposure

Antenna Specification	Dipole Antenna WIFI 2.4GHz & Bluetooth: Gain: 4.2 dBi WIFI 5GHz: 5150~5250 MHz, Gain: 2.8 dBi 5725~5850 MHz, Gain: 3.3 dBi Bluetooth Gain : 4.20 dBi (Numeric gain: 2.63) Worst WIFI 2.4GHz Gain : 4.20 dBi (Numeric gain: 2.63) Worst WIFI 5GHz Gain : 3.30 dBi (Numeric gain: 2.14) Worst 13.56MHz: Loop Antenna / Gain: N/A dBi WWAN: Dipole Antenna WCDMA Band II: 5.30 dBi WCDMA Band IV: 5.20 dBi WCDMA Band V: 2.50 dBi LTE Band 2: 5.30 dBi LTE Band 4: 5.20 dBi LTE Band 5: 2.50 dBi LTE Band 12: 1.30 dBi LTE Band 13: 2.60 dBi LTE Band 14: 2.60 dBi LTE Band 66: 5.20 dBi LTE Band 71: 1.30 dBi Gain : 5.30 dBi (Numeric gain: 3.39) Worst Gain : 5.20 dBi (Numeric gain: 3.31) Worst Gain : 2.60 dBi (Numeric gain: 1.82) Worst Gain : 2.50 dBi (Numeric gain: 1.78) Worst Gain : 1.30 dBi (Numeric gain: 1.35) Worst

Maximum Tune up power

BT	11.00 dBm	(12.589 mW)
BLE	1.00 dBm	(1.259 mW)
WIFI 2.4GHz (DTS)		
IEEE 802.11b Mode:	27.00 dBm	(501.187 mW)
IEEE 802.11g Mode:	25.00 dBm	(316.228 mW)
IEEE 802.11n HT 20 Mode:	25.00 dBm	(316.228 mW)
IEEE 802.11n HT 40 Mode:	25.00 dBm	(316.228 mW)
WIFI 5.2GHz (U-NII 1)		
IEEE 802.11a	16.50 dBm	(180.506 mW)
IEEE 802.11n HT 20	16.50 dBm	(173.583 mW)
IEEE 802.11n HT 40	19.00 dBm	(79.433 mW)
IEEE 802.11ac VHT 80	14.50 dBm	(28.184 mW)
WIFI 5.8GHz (U-NII 3)		
IEEE 802.11a	23.50 dBm	(172.264 mW)
IEEE 802.11n HT 20	23.00 dBm	(131.963 mW)
IEEE 802.11n HT 40	22.50 dBm	(278.916 mW)
IEEE 802.11ac VHT 80	22.50 dBm	(282.370 mW)

WWAN

WCDMA II	25.00 dBm	(316.228 mW)
WCDMA IV	25.00 dBm	(316.228 mW)
WCDMA V	25.00 dBm	(316.228 mW)
LTE Band 2	25.00 dBm	(316.228 mW)
LTE Band 4	25.00 dBm	(316.228 mW)
LTE Band 5	25.00 dBm	(316.228 mW)
LTE Band 12	25.00 dBm	(316.228 mW)
LTE Band 13	25.00 dBm	(316.228 mW)
LTE Band 14	25.00 dBm	(316.228 mW)
LTE Band 66	25.00 dBm	(316.228 mW)
LTE Band 71	25.00 dBm	(316.228 mW)

Result Power

13.56MHz 57.98 dBuV/m (3m)

Class II Permissive Change	1. Adding the N702B series model, the only difference from the original model is the replacement of a larger speaker, which also results in a different appearance due to the larger speaker. 2. Adding an additional series, CAMPro US, SafetyCam Pro (market segmentation), and new brand names: SMARTER AI, Webfleet, Azuga. 3. Adding the following accessories and cables. (1) A60 Camera (2) Panic button (3) AE-CM30HB (TVI camera) (4) AE-CH11A (TVI camera) (5) ODB Transfer Cable (6) Open wire power cable (7) 12V TVI cables (8) OBDII power cable for 12V TVI cable (9) Hardwire power cable for 12V TVI cable (10) Clean installation V.2 cable (11) A60 Power cable (12) Mini USB Relay 4. Update HW version to R03.

Notes:

1. For more details, please refer to the User's manual of the EUT.
2. Disclaimer: Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.
3. Disclaimer: The variant model numbers / trademarks are assessed as identical in hardware and software to each other, hence all variants are fully covered by the test results in this test report without further verification test.
4. Disclaimer: The WWAN tune up power referred the Max Conducted power referred the module report for RF Exposure assessment purpose, the module report was provided by applicant.
5. The tune up power referred the AVG power of the test report TMWK2203000754KR, TMWK2203000755KR, TMWK2203000756KR and TMWK2203000757KR for RF Exposure assessment purpose.
6. The NFC power referred the test report TMWK2203000758KR for RF Exposure assessment purpose.

4 Maximum Permissible Exposure

4.1 Limits for Maximum Permissible Exposure (MPE)

Table 1 - Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	* 100	6
3.0-30	1842/f	4.89/f	* $900/f^2$	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	* 100	30
1.34-30	824/f	2.19/f	* $180/f^2$	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
1,500-100,000			1.0	30

4.2 MPE Calculation Method

Calculation

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{377}$

Where E = Field strength in Volts / meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{377 d^2}$$

Changing to units of mW and cm, using:

P (mW) = P (W) / 1000 and

d (cm) = d(m) / 100

Yields

$$S = \frac{30 \times (P/1000) \times G}{377 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2}$$ **Equation 1**

Where d = Distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power density in mW / cm^2

If, Substituting the MPE safe distance using d = 20 cm into Equation 1:

$$S = 0.000199 \times P \times G$$

4.3 MPE EXEMPTION

(A) The available maximum time-averaged power is no more than 1 mW

(B) The available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold *Pth* (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). *Pth* is given by:

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

Where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\ cm}\sqrt{f}}\right) \text{ and } f \text{ is in GHz;}$$

and

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

d = the separation distance (cm);

(C) Using Table 1 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).

Single RF Sources Subject to Routine Environmental Evaluation	
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.
Note: R is in meters, f is in MHz.	

4.4 Multiple RF sources

In the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation),

$$\sum_{i=1}^{a} \frac{P_i}{P_{\mathrm{th},i}} + \sum_{j=1}^{b} \frac{ERP_j}{ERP_{\mathrm{th},j}} + \sum_{k=1}^{c} \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1$$

5 Radio Frequency Radiation Max Exposure Evaluation

Bluetooth

Mode	Frequency (MHz)	Max Tune-up power (dBm)	Max Tune-up power (mW)	G(dBi)	G(num.)	D(cm)	Power Density in mW/cm^2	Limit (mW/cm^2)
BT	2480.00	11.00	12.59	4.20	2.63	20.0	0.007	1.00
BLE	2480.00	1.00	1.26	4.20	2.63	20.0	0.001	1.00

WIFI 2.4GHz (DTS)

Mode	Frequency (MHz)	Max Tune-up power (dBm)	Max Tune-up power (mW)	G(dBi)	G(num.)	D(cm)	Power Density in mW/cm^2	Limit (mW/cm^2)
IEEE 802.11b	2437.00	27.00	501.19	4.20	2.63	20.0	0.262	1.00
IEEE 802.11g	2437.00	25.00	316.23	4.20	2.63	20.0	0.165	1.00
IEEE 802.11n HT 20	2437.00	25.00	316.23	4.20	2.63	20.0	0.165	1.00
IEEE 802.11n HT 40	2437.00	25.00	316.23	4.20	2.63	20.0	0.165	1.00

WIFI 5.2GHz (U-NII 1)

Mode	Frequency (MHz)	Max Tune-up power (dBm)	Max Tune-up power (mW)	G(dBi)	G(num.)	D(cm)	Power Density in mW/cm^2	Limit (mW/cm^2)
IEEE 802.11a	5240.00	16.50	44.67	2.80	1.91	20.0	0.017	1.00
IEEE 802.11n HT 20	5240.00	16.50	44.67	2.80	1.91	20.0	0.017	1.00
IEEE 802.11n HT 40	5230.00	19.00	79.43	2.80	1.91	20.0	0.030	1.00
IEEE 802.11ac VHT 80	5210.00	14.50	28.18	2.80	1.91	20.0	0.011	1.00

WIFI 5.8GHz (U-NII 3)

Mode	Frequency (MHz)	Max Tune-up power (dBm)	Max Tune-up power (mW)	G(dBi)	G(num.)	D(cm)	Power Density in mW/cm^2	Limit (mW/cm^2)
IEEE 802.11a	5825.00	23.50	223.87	3.30	2.14	20.0	0.095	1.00
IEEE 802.11n HT20	5825.00	23.00	199.53	3.30	2.14	20.0	0.085	1.00
IEEE 802.11n HT40	5795.00	22.50	177.83	3.30	2.14	20.0	0.076	1.00
IEEE 802.11ac VHT80	5775.00	22.50	177.83	3.30	2.14	20.0	0.076	1.00

WWAN

Mode	Frequency (MHz)	Max Tune-up power (dBm)	Max Tune-up power (mW)	G(dBi)	G(num.)	D(cm)	Power Density in mW/cm^2	Limit (mW/cm^2)
WCDMA Band II	1910.00	25.00	316.23	5.30	3.39	20.0	0.213	1.00
WCDMA Band IV	1755.00	25.00	316.23	5.20	3.31	20.0	0.208	1.00
WCDMA Band V	849.00	25.00	316.23	2.50	1.78	20.0	0.112	0.57
LTE Band 2	1910.00	25.00	316.23	5.30	3.39	20.0	0.213	1.00
LTE Band 4	1755.00	25.00	316.23	5.20	3.31	20.0	0.208	1.00
LTE Band 5	849.00	25.00	316.23	2.50	1.78	20.0	0.112	0.57
LTE Band 12	716.00	25.00	316.23	1.30	1.35	20.0	0.085	0.48
LTE Band 13	787.00	25.00	316.23	2.60	1.82	20.0	0.114	0.52
LTE Band 14	798.00	25.00	316.23	2.60	1.82	20.0	0.114	0.53
LTE Band 66	1780.00	25.00	316.23	5.20	3.31	20.0	0.208	1.00
LTE Band 71	698.00	25.00	316.23	1.30	1.35	20.0	0.085	0.47

NFC

Mode	Frequency (MHz)	Result power (dBuV/m)	Max EIRP power (dBm)	Max EIRP power (mW)	D(cm)	Power Density in mW/cm^2	Limit (mW/cm^2)
NFC	13.56	57.98	-37.25	0.00	20.0	0.00000004	0.98

6 Simultaneous Transmission Analysis

In the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation),

$$\sum_{i=1}^{a}\frac{P_i}{P_{\mathrm{th},i}}+\sum_{j=1}^{b}\frac{ERP_j}{ERP_{\mathrm{th},j}}+\sum_{k=1}^{c}\frac{Evaluated_k}{Exposure\ Limit_k}\leq 1$$

Simultaneous Transmission Condition

RF Exposure Condition	Item	Capable Transmit Configurations						
	1	WWAN	+	DTS	+	BT	+	NFC
	2	WWAN	+	U-NII	+	BT	+	NFC
Notes: 1. DTS cannot transmit simultaneously with U-NII.								

6.1 Sum of the WWAN & Wi-Fi 2.4GHz & BT & NFC

Therefore, the worst-case situation is 0.114 / 0.52 + 0.262 / 1 + 0.007 / 1 + 0.00000004 / 0.98 = 0.488, which is less than “1”.

6.2 Sum of the WWAN & Wi-Fi 5GHz & BT & NFC

Therefore, the worst-case situation is 0.114 / 0.52 + 0.095 / 1 + 0.007 / 1 + 0.00000004 / 0.98 = 0.321, which is less than “1”.

7 Facilities

All measurement facilities used to collect the measurement data are located at

☒ No.11, Wugong 6th Rd., Wugu Dist., New Taipei City, Taiwan.

END OF REPORT