



Radio Frequency Exposure Evaluation Report

For:
NetraDyne, Inc.

Model:
DRI-128

Product Description:
Intelligent Driving Monitoring System Smart Connected Dash Cam

FCC ID: **2AM8R-DRI128**
IC ID: **23098-DRI128**

Per:

CFR Part Part1 (1.1307 & 1.1310), Part 2 (2.1091),
FCC KDB 447498 D01 General RF Exposure Guidance v06

Report number: EMC_NETRA_002_17001_FCC_ISED_MPE

DATE: 01/25/2018



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1 Assessment

This RF Exposure evaluation report provides evidence for compliance of the below identified device with the RF Exposure limits for mobile devices as defined in FCC CFR Part 1 (1.1307 & 1.1310), Part 2 (2.1091) and IC standard RSS-102 issue 5 under worst case conditions (measured or rated RF output power, antenna gain, distance towards human body, multiple transmitter information as presented by the applicant).

In addition, maximum antenna gain or minimum distance towards the human body is calculated, respectively, where relevant.

The device meets the limits as stipulated by the above given FCC and IC rule parts based on available specifications for worst case conditions at 20cm distance to the body.

Company	Description	Model #
NetraDyne, Inc.	Intelligent Driving Monitoring System Connected Dash Cam	DRI-128

Report reviewed by: TCB Evaluator

01/25/2018 Compliance James Donnellan
(Lab Manager)

Date	Section	Name	Signature
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Responsible for the Report:

01/25/2018 Compliance Issa Ghanma
(EMC Engineer)

Date	Section	Name	Signature
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2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Address:	411 Dixon Landing Road Milpitas, CA 95035 U.S.A.
Telephone:	+1 (408) 586 6200
Fax:	+1 (405) 586-6299
Project Manager:	Josephine Mena
Project Engineer:	Issa Ghanma

2.2 Identification of the Client / Manufacturer

Applicant's Name:	NetraDyne, Inc.
Street Address:	4350 Executive DR., suite 150
City/Zip Code	San Diego, CA 92127
Country	USA
Contact Person:	Sandeep Pandya
Phone No.	8582455169
e-mail:	Sandeep.pandya@netradyne.com

Identification of the Manufacturer

Manufacturer's Name:	Same as Applicant
Manufacturers Address:	-----
City/Zip Code	-----
Country	-----

3 Equipment under Assessment

Model #:	DRI-128
HW Version :	RevD
SW Version :	0.2.1
FCC-ID :	2AM8R-DRI128
IC ID:	23098-DRI128
FWIN:	0.2.1
HVIN:	RevD
PMN:	Driver i
Product Description:	Intelligent Driving Monitoring System Smart Connected Dash Cam
Regulatory Band:	<p>Bluetooth EDR/BDR, Bluetooth LE Nominal band: 2400 – 2483.5 MHz</p> <p>WLAN Wi-Fi 2.4GHz:2412 – 2462MHz Wi-Fi 5.0GHz:5250 – 5350MHz</p> <p>Cellular: WCDMA/UMTS FDD BAND II : 1850MHz – 1910MHz WCDMA/UMTS FDD BAND IV : 1710MHz – 1755MHz LTE BAND 2 : 1850MHz – 1910MHz LTE BAND 4 : 1710MHz – 1755MHz</p>
Integrated Module Info:	<p>Bluetooth EDR/BDR, Bluetooth LE, WLAN (Wi-Fi) Jetson TX-1 FCC ID:VOB-P2180, IC ID:7361A-P2180</p> <p>Cellular: WP7504 FCC ID: N7NWP7, IC ID:2417C-WP7</p>

Antenna Type:	<p>Bluetooth EDR/BDR, Bluetooth LE, WLAN (Wi-Fi) FXP831 Patch Antenna, Internal</p> <ul style="list-style-type: none"> Frequency :2.4 ~ 2.5GHz, Peak Gain: 2.5dBi(free space), 3.0dBi(plastic) Frequency :4.9 ~ 6.0GHz, Peak Gain: 4.5dBi(free space), 5.0dBi(plastic) <p>Cellular: Flex MIMO Antenna Antenna 1(Main):3.5 dB Antenna 2: 3.5 dB</p>
Maximum Conducted Output Power	<p>Bluetooth EDR/BDR: from modular grant 0.012Watts</p> <p>Bluetooth LE: from modular grant 0.006Watts</p> <p>WLAN(Wi-Fi)2.4GHz: from modular grant 0.061Watts</p> <p>WLAN(Wi-Fi)5GHz: from modular grant 0.085Watts</p> <p>Cellular: from report # B16W00042-FCC-RF WCDMA Band II: 23.1dBm WCDMA Band IV: 23.46dBm LTE Band 2: 23.55dBm LTE Band 4: 23.36dBm</p>
Rated Operating Voltage Range:	Low 10.5 VDC, Nominal 12 VDC, High 14.5 VDC
Operating Temperature Range:	-20° to 55° C
Sample Revision:	<input type="checkbox"/> Prototype Unit; <input checked="" type="checkbox"/> Production Unit; <input type="checkbox"/> Pre-Production

4 RF Exposure Limits and FCC and IC Basic Rules

For the specific described radio apparatus the following basic limits and rules apply for both, FCC and IC where not indicated differently.

4.1 Power Density Limits acc. to FCC 1.1310(e) / RSS-102 i5, cl. 4:

FCC

Frequency Range (MHz)	Power density (mW/cm ²)	Averaging time (minutes)
300 – 1500	f (MHz) / 1500	30
1500 – 100.000	1.0	30

IC

300 – 6000	$0.02619 \times f \text{ (MHz)}^{0.6834}$	6
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4.2 Routine Environmental Evaluation Categorical Exclusion Limits acc. to FCC 2.109(c) / RSS-102, cl. 2.5 (rounded to 1 decimal point):

FCC

operating frequency < 1.5GHz: excluded if ERP < 1.5W / 31.8dBm (EIRP: 33.9);
operating frequency > 1.5GHz: excluded if ERP < 3.0W / 34.8dBm (EIRP: 36.9);

IC

300MHz <= operating frequency < 6 GHz: excluded if EIRP < $0.0131 \times f \text{ (MHz)}^{0.6834} \text{ W}$

4.3 RF Exposure Estimation (MPE Estimation)

Having available the source based average output power and peak antenna gain or the ERP/EIRP of the specified device and for a known minimum distance of its radiating structures from the body of persons according to its use cases (at least 20cm) the power density at that distance can be estimated by the following formula for plane-wave equivalent conditions (far-field conditions), when ground reflection is neglected.

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density (mW/cm² or W/m²)

P = power input to the antenna (mW or W)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (cm or m)

5 Evaluations

5.1 Analysis to Exclude Routine RF Exposure evaluation for Stand Alone Operation

band	lowest frequency [MHz]	FCC EIRP limit	IC EIRP limit in W	IC EIRP limit in dBm	EIRP in dBm	Verdict
UMTS II	1850.00	36.900	2.24	33.50	26.60	Exempt
UMTS IV	1710.00	36.900	2.12	33.27	26.96	Exempt
LTE 2	1850.00	36.900	2.24	33.50	27.05	Exempt
LTE 4	1710.00	36.900	2.12	33.27	26.86	Exempt
BT EDR/BDR	2402	36.900	2.68	34.28	13.79	Exempt
BT-LE	2402	36.900	2.68	34.28	10.78	Exempt
Wi-Fi 2.4GHz	2412	36.900	2.68	34.29	20.85	Exempt
Wi-Fi 5GHz	5260	36.900	4.57	36.60	24.29	Exempt

The single radios are exempt from routine environmental evaluation.

5.2 Analysis of RF Exposure for simultaneous transmission

- Evaluations are based on worst case power density limits for Canada.
- Calculations are made for 20cm.
- Evaluations are based on EIRP measured or calculated from known gain and conducted output power.
- Cellular and Wi-Fi or BT can transmit simultaneously

Radio	freq MHz	EIRP in W	Canada W/m2	Actual W/m2	How much of limit is used up
Band II	1850	0.46	4.476	0.909	20.31%
Band IV	1710	0.50	4.242	0.988	23.29%
Band 2	1850	0.51	4.476	1.009	22.53%
Band 4	1710	0.49	4.242	0.965	22.76%
BT EDR/BDR	2402	0.024	5.351	0.048	0.89%
BT-LE	2402	0.012	5.351	0.024	0.44%
Wi-Fi 2.4GHz	2412	0.122	5.366	0.242	4.51%
Wi-Fi 5GHz	5260	0.269	9.142	0.534	5.84%

Conclusion:

- The worst case simultaneous transmission is UMTS Band IV simultaneous with Wi-Fi 5GHz which is using 29.13% of a limit of 100%. The equipment is passing RF exposure requirements for 20cm distance.

6 Revision History

Date	Report Name	Changes to report	Report prepared by
01/25/2018	EMC_NETRA_002_17001_FCC_ISSED_MPE	Initial Release	Issa Ghanma