



# Radio Frequency Exposure Evaluation Report

**FOR:**  
Danlaw Inc.

**Model Name:**  
DL980

**Product Description:**  
Cellular, GNSS, BT/WiFi OBDII dongle.

**FCC ID:** 2AD9I-DL980SW  
**IC ID:** 20087- DL980SW

**Per:**

CFR Part Part1 (1.1307 &1.1310), Part 2 (2.1091),  
FCC KDB 447498 D01 General RF Exposure Guidance v06  
ISED RSS-102 Issue 5

**Report number:** EMC\_DANLA\_058\_18001\_FCC\_ISED\_MPE

**DATE:** 04/15/2019



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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 #
Danlaw Inc.	Cellular, GNSS, BT/WiFi OBDII dongle.	DL980SW

### Report reviewed by: TCB Evaluator

04/15/2019	Compliance	Cindy Li (Lab Manager)	
Date	Section	Name	Signature

### Responsible for the Report:

04/15/2019	Compliance	Yuchan Lu (Test Engineer)	
Date	Section	Name	Signature

## 2 Administrative Data

### 2.1 Identification of the Testing Laboratory Issuing the Test Report

<b>Company Name:</b>	CETECOM Inc.
<b>Department:</b>	Compliance
<b>Street Address:</b>	411 Dixon Landing Road
<b>City/Zip Code</b>	Milpitas, CA 95035
<b>Country</b>	USA
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<b>Lab Manager:</b>	Cindy Li
<b>Responsible Project Leader:</b>	Trina Noor

### 2.2 Identification of the Client / Manufacturer

<b>Applicant's Name:</b>	Danlaw Inc.
<b>Street Address:</b>	41131 Vincenti Ct
<b>City/Zip Code</b>	Novi, MI 48375
<b>Country</b>	USA

### Identification of the Manufacturer

<b>Manufacturer's Name:</b>	Same as Client
<b>Manufacturers Address:</b>	
<b>City/Zip Code</b>	
<b>Country</b>	

### 3 Equipment under Assessment

Marketing name:	DL980
HW Version :	v1.0
SW Version :	v1.0
Firmware Version Identification Number (FVIN):	v1.0
Hardware Version Identification Number (HVIN):	DL980SW
Product Marketing Name (PMN):	DL980
Regulatory Band:	<ul style="list-style-type: none"> <li>❖ <b><u>Cellular Module:</u></b> <ul style="list-style-type: none"> <li>▪ WCDMA/UMTS FDD BAND II: 1850 ~ 1910 MHz</li> <li>▪ WCDMA/UMTS FDD BAND IV: 1710 ~ 1755 MHz</li> <li>▪ WCDMA/UMTS FDD BAND V: 824 ~ 849 MHz</li> <li>▪ LTE BAND 2: 1850 ~ 1910 MHz</li> <li>▪ LTE BAND 4: 1710 ~ 1755 MHz</li> <li>▪ LTE BAND 5: 824 ~ 849 MHz</li> <li>▪ LTE BAND 12: 699 ~ 716MHz</li> </ul> </li> <li>❖ <b><u>Bluetooth LE:</u></b> <ul style="list-style-type: none"> <li>▪ 2402 MHz (ch0) – 2480 MHz (ch39), 40 channels</li> </ul> </li> <li>❖ <b><u>WLAN</u></b> <ul style="list-style-type: none"> <li>▪ 2412 MHz (ch1) – 2462 MHz (ch11), 11 channels</li> </ul> </li> </ul>
Integrated Module Info:	<ul style="list-style-type: none"> <li>❖ <b><u>Cellular Module:</u></b> <ul style="list-style-type: none"> <li>▪ Module name: SW WP7603</li> <li>▪ Model number: WP7603</li> <li>▪ FCC/IC ID: N7NWP76C</li> </ul> </li> <li>❖ <b><u>Bluetooth LE, WLAN:</u></b> <ul style="list-style-type: none"> <li>▪ Module name: Qualcomm QCA 9377 Chipset</li> </ul> </li> </ul>
Antenna Type:	<ul style="list-style-type: none"> <li>❖ <b><u>Cellular:</u></b> Primary antenna maximum gains: <ul style="list-style-type: none"> <li>▪ WCDMA II: 1.59 dBi</li> <li>▪ WCDMA IV: 1.27 dBi</li> <li>▪ WCDMA V: 3.91 dBi</li> <li>▪ LTE Band 2: 1.59 dBi</li> <li>▪ LTE Band 4: 1.27 dBi</li> <li>▪ LTE Band 5: 3.91 dBi</li> <li>▪ LTE Band 12: 0.2 dBi</li> </ul> </li> </ul>

	❖ <b><u>Bluetooth LE, WLAN:</u></b> <ul style="list-style-type: none"> <li>▪ Internal antenna</li> <li>▪ Antenna gain: PIFA, -2.05 dBi</li> </ul>
<b>Maximum Conducted Output Power:</b>	❖ <b><u>Cellular:</u></b> From modular grant [Watts]: <ul style="list-style-type: none"> <li>▪ WCDMA Band II: 0.218</li> <li>▪ WCDMA Band IV: 0.238</li> <li>▪ WCDMA Band V: 0.232</li> <li>▪ LTE Band 2: 0.209</li> <li>▪ LTE Band 4: 0.216</li> <li>▪ LTE Band 5: 0.234</li> <li>▪ LTE Band 12: 0.230</li> </ul> ❖ <b><u>Bluetooth LE:</u></b> Measured [Watts]: 0.0006 ❖ <b><u>WLAN:</u></b> Measured [Watts]: 0.04487
<b>Power Supply/ Rated Operating Voltage Range:</b>	Low 9VDC, Nominal 12VDC, High 24VDC
<b>Operating Temperature Range:</b>	Low 0° C, Nominal 25° C, High 50° C
<b>Sample Revision:</b>	<input type="checkbox"/> Prototype Unit; <input type="checkbox"/> Production Unit; <input checked="" 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 <sup>2</sup> )	Averaging time (minutes)
300 – 1500	$f \text{ (MHz)} / 1500$	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/cm<sup>2</sup> or W/m<sup>2</sup>)

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 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 ERP/EIRP measured or calculated from known gain and conducted output power.
- Cellular can transmit simultaneously with WLAN.

Radio	freq [MHz]	Max Conducted power [W]	Gain [dBi]	Gain [lin]	EIRP [W]	IC Limit [W/m2]	FCC Limit [W/m2]	Actual [W/m2]	How much of limit is used up
WCDMA II	1850	0.218	1.59	1.44	0.315	4.476	10.000	0.626	13.99%
WCDMA IV	1710	0.238	1.27	1.34	0.318	4.242	10.000	0.633	14.93%
WCDMA V	824	0.232	3.91	2.46	0.570	2.576	5.493	1.134	44.04%
LTE 2	1850	0.209	1.59	1.44	0.302	4.476	10.000	0.601	13.42%
LTE 4	1710	0.216	1.27	1.34	0.289	4.242	10.000	0.575	13.56%
LTE 5	824	0.234	3.91	2.46	0.575	2.576	5.493	1.145	44.45%
LTE 12	699	0.230	0.2	1.05	0.241	2.302	4.660	0.479	20.83%
BT-LE	2402	0.00060	-2.05	0.62	0.000	5.351	10.000	0.001	0.01%
WLAN	2405	0.04487	-2.05	0.62	0.028	5.355	10.000	0.056	1.04%

### 5.2 Conclusion:

- The worst-case simultaneous transmission is LTE Band 5 simultaneous with WLAN which is using 45.49 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
04/15/2019	EMC_DANLA_058_18001_FCC_ISED_MPE	Initial Release	Yuchan Lu