

CONTROL CHIEF CORPORATION MPE REPORT

SCOPE OF WORK

MPE CALCULATION – Model vImpulse

REPORT NUMBER

106538840BOX-001MPE Rev1

ISSUE DATE

04/28/2026

REVISION DATE

06/04/2026

DOCUMENT CONTROL NUMBER

Generic EMC Report Shell Rev. October 2022

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MPE REPORT
(FULL COMPLIANCE)

Report Number: 106538840BOX-001MPE Rev1

Project Number: G106538840

Report Issue Date: 04/28/2026

Report Revision Date: 06/04/2026

Model(s) Tested: vImpulse

Standards: FCC Part 1 Subpart I, April 2026

Procedures Implementing the National Environmental Policy Act of 1969

§1.1307 Actions that may have a significant environmental effect, for which Environmental Assessments (EAs) must be prepared.

ISED RSS-102 Issue 6 December 15, 2023

Radio Frequency (RF) Exposure Compliance of
Radiocommunication Apparatus (All Frequency Bands)

Tested by:
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Client:
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USA

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1 Introduction and Conclusion

This evaluation report covers for a mobile device subject to routine environmental evaluation for RF exposure. A mobile device is defined as a transmitting device designed 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.

The evaluation indicated in section 2.0 were performed on the product constructed as described in section 4.0. The remaining sections are the verbatim text from the actual evaluation during the investigation. These sections include the evaluation name, the specified Method, and Results. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product evaluated **complies** with the requirements of the standard(s) indicated. The results obtained in this report pertain only to the item(s) evaluated. Intertek does not make any claims of compliance for samples or variants which were not evaluated.

2 Evaluation Summary

Section	Test full name	Result
3	Client Information	-
4	Description of Equipment Under Evaluation and Variant Models	-
5	System Setup and Method	-
6	Power Density Calculation (FCC §1.1310; ISED RSS-102 Issue 6)	Compliant
7	Revision History	-

3 Client Information

This EUT was evaluated at the request of:

Client: Control Chief Corporation
200 Williams Street
Bradford, PA 16701
USA

Contact: Jake Bryner
Email: jbryner@controlchief.com

4 Description of Equipment Under Test and Variant Models

Manufacturer: Control Chief Corporation
200 Williams Street
Bradford, PA 16701
USA

Description of Equipment Under Test (provided by client)

The EUT is a transmitter module.

Equipment Under Test Power Configuration			
Rated Voltage	Rated Current	Rated Frequency	Number of Phases
DC power	N/A	N/A	N/A

Variant Models:

The following variant models have been identified by the manufacturer as being electrically identical models, depopulated models, or with reasonable similarity to the model(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

None

5 Power Density Calculation

5.1 Requirement(s)

FCC §1.1310 Radiofrequency radiation exposure limits

Table 1 below sets forth limits for Maximum Permissible Exposure (MPE) to radiofrequency electromagnetic field.

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	842/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

F = frequency in MHz

* = Plane-wave equivalent power density

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Table 2 below sets forth limits for the RF field strength.

Table 2 – RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency range (MHz)	Electric field strength (V/m rms)	Magnetic field strength (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-10	83	90	-	Instantaneous*
0.1-10	-	0.73/ f	-	6**
1.1-10	87/ f ^{0.5}	-	-	6**
10-20	27.46	0.0728	-2	6
20-48	58.07/ f ^{0.25}	0.1540/ f ^{0.25}	8.944/ f ^{0.5}	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 f ^{0.3417}	0.008335 f ^{0.3417}	0.02619 f ^{0.6834}	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ f ^{1.2}
150000-300000	0.158 f ^{0.5}	4.21 x 10 ⁻⁴ f ^{0.5}	6.67 x 10 ⁻⁵ f	616000/f ^{1.2}

Note: f is frequency in MHz. *Based on nerve stimulation (NS) **Based on specific absorption rate (SAR)

Table 8: RF field strength and power density limits for controlled-use devices (controlled environment)

Frequency range (MHz)	Electric field (V_{RMS}/m)	Magnetic field (A_{RMS}/m)	Power density (W/m^2)	Reference period (minutes)
10-20	61.4	0.163	10	6
20-48	$129.8 / f^{0.25}$	$0.3444 / f^{0.25}$	$44.72 / f^{0.5}$	6
48-100	49.33	0.1309	6.455	6
100-6000	$15.60 f^{0.25}$	$0.04138 f^{0.25}$	$0.6455 f^{0.5}$	6
6000-15000	137	0.364	50	6
15000-150000	137	0.364	50	$616000 / f^{1.2}$
150000-300000	$0.354 f^{0.5}$	$9.40 \times 10^{-4} f^{0.5}$	$3.33 \times 10^{-4} f$	$616000 / f^{1.2}$

Note: f is frequency in MHz.

5.2 Method

An MPE evaluation was performed in order to show that the device was compliant with FCC §2.1091 and ISSED RSS-102. The maximum power density was calculated for each transmitter at a separation distance of 20 cm. The calculation was performed using the maximum gain from the internal and external antennas declared by the manufacturer.

The maximum permissible exposure (MPE) is predicted by using the following equation:

$$S = PG/4\pi R^2$$

where: S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW)

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 (appropriate units, e.g., cm)

5.3 Calculation:

The maximum measured output power of the DUT was 27.67 dBm.

(Report Number 106538840BOX-001 Rev1, pg. 13)

The antenna peak gain is 5.4dBi.

(Linx ANT-916-MHW-xxx-x antenna data sheet)

Therefore, there is a maximum EIRP of 27.67dBm + 5.4dB = **33.07dBm**

Measuring the duty cycle of the transmitter on / off characteristic, shows a pulse of 4.3ms every 100ms.

(Report Number 106538840BOX-001 Rev1, pg. 17)

This is a duty cycle of 0.043 which is a Duty Cycle Correction Factor of $10 \cdot \log(0.043) = 13.67\text{dB}$ for one hopping channel. However, the radio transmitter 50% of the time. The duty cycle of the entire frequency range would be $10 \cdot \log(0.5) = 3\text{ dB}$

Therefore, the MPE level will be 33.07dBm – 3dB = **30.07 dBm**

EIRP = 33.07 – 3.0 = 30.07 dBm or 1016.25 mW and R = 20 cm

Power Density = S = PG/4πR²

EIRP Power	Distance	Power Density	Power Density
(dBm)	(cm)	(mW/cm ²)	(W/m ²)
30.07	20	0.202279	2.02279

Limits for MPE: $f/1500 \text{ mW/cm}^2$ ($300 \text{ MHz} \leq f < 1,500 \text{ MHz}$) or 0.60 mW/cm^2 with $f = 902.3 \text{ MHz}$

MPE calculation: 0.202279 mW/cm^2

Notes: The EIRP power for power density calculation was taken from report # 106538840BOX-001 Rev1.

5.4 Results:

The sample tested was found to Comply. The calculated maximum power density at 20 cm distance is less than the limits for uncontrolled exposure of 0.60 mW/cm^2

6 ISED RSS-102 Issue 5 §2.5.2 Exemption

6.1 Requirement(s)

Exemption Limits: $0.02619f^{0.6834} \text{ W/m}^2$ ($300 \text{ MHz} \leq f < 6 \text{ GHz}$) or 2.74 W/m^2

MPE calculation: 2.02279 W/m^2

6.2 Results:

The sample tested was found to Comply. The calculated maximum power density at 20 cm distance is less than the limits for uncontrolled exposure of 2.74 W/m^2

7 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	04/28/2026	106538840BOX-001MPE	VFV <i>VFV</i>	KPS <i>KPS</i>	Original Issue
1	06/04/2026	106538840BOX-001MPE Rev1	VFV <i>VFV</i>	KPS <i>KPS</i>	Recalculated MPE using duty cycle factor