

# Maximum Permissible Exposure Report

**Product** : Cable Gateway  
**Model Name** : CBV390SL5-X57  
**Series Model** : Infinity 601  
**FCC ID** : RK9-INFINITY601  
**Test Regulation** : 47 CFR FCC Part 2.1091  
**Received Date** : 2023/2/23  
**Test Date** : 2023/2/23 ~ 2023/4/19  
**Issued Date** : 2023/6/6  
**Applicant** : CastleNet Technology Inc.  
No. 14, Ln. 141, Sec. 3, Beishen Rd., Shengkeng Dist., New Taipei City 22244, Taiwan (R.O.C.)  
**Issued By** : Underwriters Laboratories Taiwan Co., Ltd.  
Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



The results reported herein have been performed in accordance with the laboratory's terms of accreditation. This report shall not be reproduced except in full without the written approval of the Laboratory. The results in this report are responsible of the test sample(s) provided by the client only and are not to be used to indicate applicability to other similar products.

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## 1. Attestation of Test Results

**APPLICANT:** CastleNet Technology Inc.  
No. 14, Ln. 141, Sec. 3, Beishen Rd., Shenkeng Dist., New Taipei  
City 22244, Taiwan (R.O.C.)

**MANUFACTURER:** CastleNet Technology Inc.  
No. 14, Ln. 141, Sec. 3, Beishen Rd., Shenkeng Dist., New Taipei  
City 22244, Taiwan (R.O.C.)

**EUT DESCRIPTION:** Cable Gateway

**MODEL:** CBV390SL5-X57

**SERIES MODEL:** Infinity 601

**SAMPLE STAGE:** Pilot-run Verification Test sample

APPLICABLE STANDARDS	
STANDARD	Test Results
47 CFR FCC Part 2.1091	PASS

Underwriters Laboratories Taiwan Co., Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by Underwriters Laboratories Taiwan Co., Ltd. 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.

**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Underwriters Laboratories Taiwan Co., Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Underwriters Laboratories Taiwan Co., Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Prepared By:



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Project Handler

Date : 2023/6/6

Approved and Authorized By:



Eric Lee  
Senior Laboratory Engineer

Date : 2023/6/6

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## 2. Test Methodology and Reference Procedures

The tests documented in this report were performed in accordance with KDB 447498 D04 Interim General RF Exposure Guidance v01.

## 3. Facilities and Accreditation

<b>Test Location</b>	Underwriters Laboratories Taiwan Co., Ltd.
<b>Address</b>	Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan
<b>Accreditation Certificate</b>	Underwriters Laboratories Taiwan Co., Ltd. is accredited by TAF, Laboratory Code 3398.

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## 4. Equipment Under Test

### 4.1. Description of EUT

<b>Product Name</b>	Cable Gateway	
<b>Model Name</b>	CBV390SL5-X57	
<b>Series Model</b>	Infinity 601	
<b>Operating Frequency</b>	WLAN	<b>2.4GHz:</b> 2412MHz ~ 2462MHz <b>5GHz:</b> 5180MHz ~ 5240MHz 5260MHz ~ 5320MHz 5500MHz ~ 5720MHz 5745MHz ~ 5825MHz
<b>Modulation</b>	WLAN	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDMA
<b>Number of Channel</b>	2.4G WLAN 2412 ~ 2462 MHz	11 for 802.11b, 802.11g, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20)
		7 for 802.11n (HT20), 802.11ac (VHT40), 802.11ax (HE40)
	5G WLAN 5180 ~ 5240 MHz	4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20)
		2 for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40)
		1 for 802.11ac (VHT80), 802.11ax (HE80)
	5G WLAN 5260 ~ 5320 MHz	4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20)
		2 for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40)
1 for 802.11ac (VHT80), 802.11ax (HE80)		
		1 for 802.11ac (VHT160), 802.11ax (HE160)

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<b>Number of Channel</b>	5G WLAN 5500 ~ 5720 MHz	4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20)
		2 for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40)
		1 for 802.11ac (VHT80), 802.11ax (HE80)
		1 for 802.11ac (VHT160), 802.11ax (HE160)
	5G WLAN 5745 ~ 5825 MHz	4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20)
		2 for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40)
		1 for 802.11ac (VHT80), 802.11ax (HE80)
<b>Normal Voltage</b>	120Vac/ 60Hz From AC adapter	
<b>Sample ID</b>	Conducted Test: 5666280 Radiated Test: 5666280	

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Note:

1. The models difference table as below:

Model	Wi-Fi	2.5G port	1G port	USB port	ON/OFF switch	Power adapter	Housing
CBV390SL5-X57	V	V	V	V	V	12Vdc/3.5A	black F61 housing
Infinity 601	V	V	V	X	X	12Vdc/3A	white/black F65 housing

2. he EUT provides transmitters and receivers as below:

**2.4GHz:**

Modulation Mode	Tx,Rx Function
802.11b	1Tx Fixed Chain 0,3RX
802.11g	3TX,3RX
802.11n (HT20)	3TX,3RX
802.11n (HT40)	3TX,3RX
802.11ac (VHT20)	3TX,3RX
802.11ac (VHT40)	3TX,3RX
802.11ax (HE20)	3TX,3RX
802.11ax (HE40)	3TX,3RX

**5GHz:**

Modulation Mode	Tx,Rx Function
802.11a	1Tx Fixed Chain 0,4RX
802.11n (HT20)	4TX,4RX
802.11n (HT40)	4TX,4RX
802.11ac (VHT20)	4TX,4RX
802.11ac (VHT40)	4TX,4RX
802.11ac (VHT80)	4TX,4RX
802.11ax (HE20)	4TX,4RX
802.11ax (HE40)	4TX,4RX
802.11ax (HE80)	4TX,4RX
802.11ax (HE160)	4TX,4RX

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## 3. The EUT contains following accessory devices:

Product	Brand	Model	Description
Lan Cable	EEK SONG ELEC	PF01-C112	YELLOW / 1M
AC Adapter	MOSO	MSS- V3500WR120- 042A0-US	12Vdc/3.5A
AC Adapter	MOSO	MS-V3000R120- 036I1-US	12Vdc/3A
AC Adapter	SUNNY	SYS1666-3612- W2	12Vdc/3A

4. The above EUT information is declared by manufacturer and for more detailed features description, please refer the manufacturer's or user's manual, the laboratory shall not be held responsible.

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## 4.2. Description of Available Antennas

Ant. No.	Transmitter Circuit	Brand Name	Model Name	Ant. Type	Maximum Gain (dBi)
1	Chain (0)	LYNWAVE TECH	2AN-C901WE00RFR	PCB	2.4GHz: 3.5 5GHz: 3.9
2	Chain (1)	LYNWAVE TECH	2AN-C901BK00RFR	PCB	2.4GHz: 3.5 5GHz: 4.6
3	Chain (2)	LYNWAVE TECH	2AN-C901BE00RFR	PCB	2.4GHz: 3.6 5GHz: 5.1
4	Chain (3)	LYNWAVE TECH	2AN-C901GY00RFR	PCB	5GHz: 3.2

Note: The above antenna information was provided from customer and for more detailed features description, please refer the manufacturer's specification or user's manual, the laboratory shall not be held responsible.

## 5. Requirement

### Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	*180/f <sup>2</sup>	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

Note 1: f = frequency in MHz, \* means Plane-wave equivalent power density

Note 2: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Power Density (S) is calculated by the following formula:

$$S = (P * G) / 4\pi R^2$$

where: S = power density (in appropriate units, e.g. mW/ cm<sup>2</sup>)

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)

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## 6. General RF Exposure Test Exemption

The corresponding Exclusion Threshold condition, listed below:

- 1) Blanket Exempt: Following 47 CFR 1.1307(b)(3)(i)(A), the available maximum time-averaged power is no more than 1 mW.
- 2) SAR Exempt: Following 47 CFR 1.1307(b)(3)(i)(B), the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold  $P_{th}$  (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).  $P_{th}$  is given by:

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

Where

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

and

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

$d$  = the separation distance (cm);

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- 3) MPE Exempt: Following 47 CFR 1.1307(b)(3)(i)(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  $\lambda/2\pi$ , where  $\lambda$  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  $\lambda/4$  or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

Table 1 to § 1.1307(b)(3)(i)(C) - 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	$19.2R^2$ .

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## 7. Radio Frequency Radiation Exposure Evaluation

### (1) General RF Exposure Test Exemption

Option	Evaluation Method	Clause
<input type="checkbox"/>	Blanket Exempt	47 CFR 1.1307(b)(3)(i)(A)
<input type="checkbox"/>	SAR Exempt	47 CFR 1.1307(b)(3)(i)(B)
<input checked="" type="checkbox"/>	MPE Exempt	47 CFR 1.1307(b)(3)(i)(C)

Note: Max. ERP (dBm) = Max. Average power (dBm) + Antenna Gain (dBi) - 2.15 (dB)

#### Non-Beamforming mode

##### WLAN 2.4GHz

Evaluation Frequency (MHz)	$\lambda/2\pi$ (m)	R (m)	Max. ERP (dBm)	Max. ERP (W)	Threshold ERP (W)
2412 ~ 2462	0.0198	0.5	32.15	1.641	4.8

##### WLAN 5GHz

Evaluation Frequency (MHz)	$\lambda/2\pi$ (m)	R (m)	Max. ERP (dBm)	Max. ERP (W)	Threshold ERP (W)
5180 ~ 5240	0.0092	0.5	34.69	2.944	4.8
5260 ~ 5320	0.0091	0.5	31.58	1.439	4.8
5500 ~ 5720	0.0086	0.5	30.73	1.183	4.8
5745 ~ 5825	0.0084	0.5	29.88	0.973	4.8

#### Beamforming mode

##### WLAN 2.4GHz

Evaluation Frequency (MHz)	$\lambda/2\pi$ (m)	R (m)	Max. ERP (dBm)	Max. ERP (W)	Threshold ERP (W)
2412 ~ 2462	0.0198	0.5	31.54	1.426	4.8

##### WLAN 5GHz

Evaluation Frequency (MHz)	$\lambda/2\pi$ (m)	R (m)	Max. ERP (dBm)	Max. ERP (W)	Threshold ERP (W)
5180 ~ 5240	0.0092	0.5	33.82	2.41	4.8
5260 ~ 5320	0.0091	0.5	27.58	0.573	4.8
5500 ~ 5720	0.0087	0.5	27.62	0.578	4.8
5745 ~ 5825	0.0083	0.5	33.82	2.41	4.8

Note:

1. Max. EIRP (dBm) = Max. Average power (dBm) + Antenna Gain (dBi)
2. Max. EIRP (mW) =  $10^{(\text{Max. EIRP (dBm)} / 10)}$
3. Power density ( $\text{mW}/\text{cm}^2$ ) = Max. EIRP (mW) /  $[4 \times \pi \times (\text{calculated distance})^2]$ , the calculated distance is 50 cm.

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**(2) Simultaneously transmission condition:**

Condition	Technology	
1	WLAN (2.4GHz)	WLAN (5GHz)

Condition	R	Max. ERP	Threshold ERP	Transmit Simultaneously	Transmit Simultaneously Limit
	(m)	(W)	(W)		
WLAN (2.4GHz)	0.5	1.641	4.8	0.955	≤ 1
WLAN (5GHz)	0.5	2.944	4.8		

**Conclusion:**

Therefore the maximum calculations of above situations are less than the “1” limit.

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.

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**END OF REPORT**

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