

# APT-CV4-Vx-SQ Modules



### **Features**

- > APT-CV4 controllers add advanced control features to standard constant voltage (CV) drivers
- > Integrated between the CV driver and LED modules, the DC modules are powered directly from the CV driver
- > APT-CV4 controllers provide up to 4 constant current outputs for powering LED channels of varying forward voltages
- > Operable for independent control over each output channel and/or control over overall intensity and calibrated channel mix
- > APT Programmer enables in-factory and in-field changes to control settings including CCT range, CCT mapping and Intensity mapping
- > Wired versions available with DMX512/RDM (VA)
- > Wireless versions available with Casambi BLE Mesh (VWC)
- > Wireless controller versions available with either embedded antenna (EA) or whip antenna (WA)

### Ordering Information

Product Code	Description
APT-CV4-Vx-SQ-wwww	Vx – Hardware version SQ – Square form factor
	wwww – Firmware code provided by Arkalumen
Hardware Version	Functionality
VA	DMX512/RDM
VWC	Wireless – Casambi BLE Mesh

### System Architecture

	Design Requirements						
1.	Ensure DC V <sub>IN</sub> is greater than V <sub>OUT</sub> of each channel (dictated by the LED forward voltage of the channel).						
2.	If optimized transition is desired, use transition calibration feature in the advanced tab of the APT Programmer						
3.	Minimize $\Delta V$ of each channel for optimal efficiency. $\Delta V_{MAX}$ is determined based on the channel current (I <sub>CH</sub> ).						
	For $I_{CH} < 1.0A$ , $\Delta V_{MAX} = 15V$ For $1.0A < I_{CH} < 2.0A$ , $\Delta V_{MAX} = 9V$						
	For 2.0A < $I_{CH}$ < 2.5A, $\Delta V_{MAX}$ = 5V For 2.5A < $I_{CH}$ < 3.2A, $\Delta V_{MAX}$ = 3.5V						
4.	4. LED channels should be able to handle a minimum of 80mA ripple. 80mA ripple is seen with the following						
	conditions, 1.2A/channel and 1.2V $\Delta$ V. Current ripple is dependent on $\Delta$ V of each channel.						
5.	APT controllers are designed to work with a wide range of drivers, but a fixture manufacturer must test the APT						
	controller for driver compatibility and ensure proper system operation before installation.						

Contact Arkalumen for technical support at support@arkalumen.com

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www.arkalumen.com/patents





### Warnings

- 1. Do not connect/disconnect input or output wiring while powered
- 2. Do not connect APT Programmer while APT controller is powered by DC power source
- 3. Follow ESD protection procedures while handling input or output wiring, and programming port
- 4. Do not attach an AC input to the APT controller; DC input only
- 5. Use only with a driver providing an isolated DC output (ie. the output has no earth or protective ground reference).
- 6. Read and respect all voltage, current and power limits outlined in the electrical specifications section of the hardware version being used
- 7. Carefully follow and check all wiring diagrams in this document for the correct hardware version being used

### Mechanical Specifications

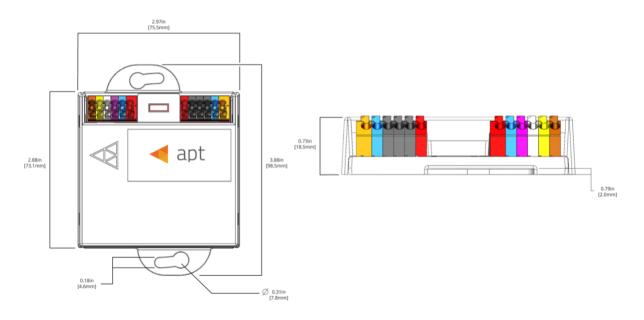


Figure 1 - APT-CV4-Vx-SQ Mechanical Drawing

Dimensions	Inches
Length	2.97
Width	3.88
Height	0.73



# APT-CV4-VA-SQ Module (DMX512/RDM)

### **Electrical Specifications**

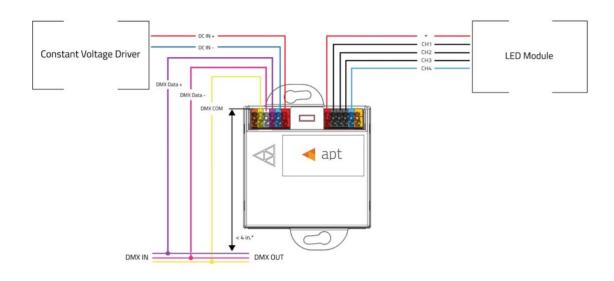
### Input

Port	Voltage		Current			Power			
	Min	Max		Min	Max		Min	Max	
DC IN +/-	10	60	V	87	4,100	mA	-	100	W
DMX Data+	-10	15	V	-0.8	1	mA	-	-	
DMX Data-	-10	15	V	-0.8	1	mA	-	-	

### Output

Port	Vo	Voltage		urrent	Power		
	Min	Max	Min	Max	Min	Max	
+	-	58 V	0	4,013 mA	-	100 W	
CH1	-	58 V	0	3,200 mA	-	-	
CH2	-	58 V	0	3,200 mA	-	-	
CH3	-	58 V	0	3,200 mA	-	-	
CH4	-	58 V	0	3,200 mA	-	-	

# Wiring Diagram



\*If no DMX splitter or amplifier is used, splitting between DMX IN/OUT should be done within 4 inches of the APT controller input connector to prevent line reflectance.

Figure 2 - APT-CV4-VA-SQ DMX512/RDM Configuration



- 1. Please follow all best practices for DMX wiring to ensure correct operation of the system such as using shielded wires and proper termination resistance for DMX daisy chain.
- 2. APT controller acts as a floating device as per ANSI E1.11 2008. Use only with a driver with an output not referenced to earth or protective ground (ie. isolated output).
- 3. It is recommended that each fixture should have DMX IN and DMX OUT wires to allow for installation in a DMX daisy chain\*.

  \*Exception for installations where a splitter or amplifier will be used for each DMX branch
- 4. If no DMX splitter or amplifier is used, splitting between DMX IN/OUT should be done within 4 inches of the APT controller input connector to prevent line reflectance.

Wiring	AWG
Input, Output	16-22

INPUT, OUTPUT

7.5-8.5mm wire preparation



### DMX Address Assignment

Enabled Features	Required DMX Channels
Independent Channel Control	One DMX address is required per available output channel
Calibrated CCT Control	Two additional DMX addresses are required if calibrated CCT mapping is enabled, one for controlling the CCT and one for controlling the overall light intensity

### Schemes

Schemes for DMX [y]	# of DMX Channels	DMX Address Assignment							
		Base	+1	+2	+3	+4	+5		
1	2	ССТ	INT	-	-		•		
2	3	R	G	В	•	. <del>≡</del> i	•		
3	4	R	G	В	w	•	•		
4	6	R	G	В	w	ССТ	INT		
			LEGEND						
Red	R	White		White W CCT Control		CCT Control			
Green	G				Intensity Control		INT		
Blue	В								

- 1. The assigned DMX addresses are customizable. The above table is a list of the default schemes available.
- 2. Changing the DMX Address Assignment does not change the physical wiring of the controller to the LED module. Please refer to Figure 3 for RGBW wiring application.

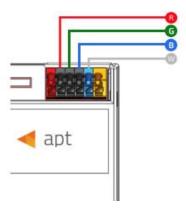


Figure 3 - Wiring APT-CV4-VA-SQ to RGBW LED Module



# Operating Conditions

Temperature Limits							
Max Temperature, Tc 75°C							
Min Ambient Temperature, Ta -40°C							
*Temperature Limits valid when electrical limits are respected and mounting surface is kept at 75°C or below							

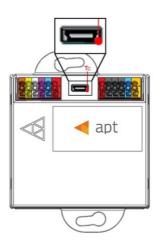


Fig. 4-Tc is measured on metal sleeve of micro-USB programming port in location specified above

# Ordering Information

Product Code	Description
APT-CV4-VA-SQ-wwww	VA – DMX512/RDM hardware version SQ – Square form factor wwww – Firmware code provided by Arkalumen
Configuration Code	Description
DMXn-Ammm-tttt-1Cxxx-2Cxxx-3Cxxx-4Cxxx	DMXn – DMX Address Assignment Scheme Ammm – Base DMX address tttt – Output control feature yCxxx – Channel-specific max current



# Configuration Code Details

Code	Description	Option	Configuration Trait		
DMXn	<b>DMX</b> <i>n</i> denotes DMX wired communication using DMX Address Assignment Scheme <i>n</i> .	DMXn	DMX Address Assignment Scheme <i>n</i> . See Schemes under DMX Address Assignment on page 9.		
	<i>mmm</i> denotes the base address of the	A001	Lowest base address option		
Ammm	controller on a DMX bus.	A###	Base address specified between 1 and 512		
	CONTROLLER ON a DIVIX bus.	A512	Highest base address option		
tttt	tttt denotes the output control features enabled on the controller.	0000	Calibrated CCT mapping disabled		
		CALC	Calibrated CCT enabled. Calibrated CCT can be customized to output specific desired light metrics.		
		1C###			
уСххх	yCxxx denotes the maximum current for channel y as configured in the controller's firmware in 20mA increments.	2C###	Maximum current specified up to 3,200mA. e.g1C200-2C030-3C030-4C030 would specify		
		3C###	2000mA max current for channels 1, and 300mA		
		4C###	for channels 2, 3 and 4.		



# APT-CV4-VWC-SQ Module (Wireless)

### **Electrical Specifications**

#### Input

Port	Voltage			Current			Power		
	Min	Max		Min	Max		Min	Max	
DC IN +/-	12	60	V	45	4,100	mA	-	100	W

### Output

Port	Voltage		Current		Power	
	Min	Max	Min	Max	Min	Max
+	=	58 V	0	4,055 mA	-	100 W
CH1	-	58 V	0	3,200 mA	-	-
CH2	=	58 V	0	3,200 mA	-	-
CH3	-	58 V	0	3,200 mA	-	-
CH4	-	58 V	0	3,200 mA	-	-

Wireless Operating Conditions <sup>1</sup>			
Maximum Transmitter Power	+4dBm		
Operating Frequencies	2.4GHz		
Maximum Open-Air Range	270m		

Contains modular transmitter with FCC ID: X8WBM832, IC (Industrial Canada) ID: 4100A-BM832

Wireless signal range of the controller will decrease if placed in a metal enclosure or placed near other wireless devices operating at similar frequencies, keep the VWx controller at least 20cm away from other VWx controllers or wireless devices. The end product with this module may subject to perform FCC part 15 unintentional emission test requirement and be properly authorized.

This device is intended for OEM integrator only.

If used with ANTO20 antenna or integrated PCB trace antenna, device does not require routine evaluation or SAR testing.

### Wiring Diagram

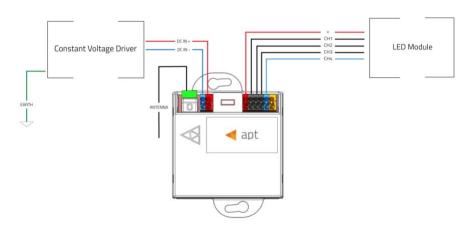


Figure 5 - APT-CV4-VWC-SQ Wireless Communication Configuration



Wiring	AWG
Input	20-26
Output	16-22
Antenna	ANT020*

<sup>\*</sup>Integrated embedded PCB trace antenna option available on request, ANTO20 antenna does not come with device by default, please include request for antenna if necessary



7.5-8.5mm wire preparation

# **Operating Conditions**

Temperature Limits			
Max Temperature, Tc	75°C		
Min Ambient Temperature, Ta	-40°C		
*Temperature Limits valid when electrical limits are respected and mounting surface is kept at 75°C or below			

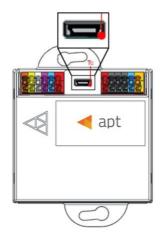


Fig. 6 - Tc is measured on metal sleeve of micro-USB programming port in location specified above



# Ordering Information

Product Code	Description
APT-CV4-VWC-SQ-yA-wwww	VWC – Wireless – Casambi BLE Mesh hardware version SQ – Square form factor yA – Antenna version (EA – embedded antenna, WA -whip antenna) wwww – Firmware code provided by Arkalumen

Configuration Code	Description
CBMn-0000-tttt-1Cxxx-2Cxxx-3Cxxx-4Cxxx	CBMn – Casambi BLE Mesh wireless control protocol 0000 – No base address to be specified tttt – Output control feature yCxxx – Channel-specific max current

# Configuration Code Details

Code	Description	Option	Configuration Trait		
СВМп	<b>CBM</b> <i>n</i> denotes wireless communication using Scheme Address Assignment <i>n</i> .	СВМп	Address Assignment Scheme <b>n</b> . See Schemes under Scheme Address Assignment on page 9.		
tttt	tttt denotes the output control features	0000	Calibrated CCT mapping disabled.		
	enabled on the controller.	CALC	Calibrated CCT enabled. Calibrated CCT can be customized to output specific desired light metrics.		
уСххх		1C###			
	yCxxx denotes the maximum current for channel y as configured in the controller's firmware in 20mA increments.	2C###	Maximum current specified up to 3,200mA. e.g1C200-2C030-3C030-4C030-5C030 would		
		3C###	specify 2000mA max current for channels 1, and 300mA for channels 2. 3 and 4.		
		4C###	300mA for chamicis 2, 3 and 4.		