

HAMAMATSU

PHOTON IS OUR BUSINESS

HIGH VOLTAGE POWER SUPPLY



HAMAMATSU PHOTONICS K.K.















High voltage power supplies listed in this catalog have the following features:

- Low noise
- High efficiency
- High stability
- Protection function included


Our many years of experience and achievements amassed as a leading manufacturer of photomultiplier tubes as well as the high voltage power supplies that drive them ensure highly reliable performance in a diverse range of applications.



High voltage power supply modules





	Type No.		Output voltage (Max.) (V)	Output current (Max.) (mA)	Input voltage (V)	Size W × H × D [Ⓐ] (mm)	Page	Note
	C14210	-14	-1100	0.4	+3 to +5	15 × 7.3 × 15	2	Very compact Light weight SMT type
	C10940	-03	-1200	0.6	+5	15 × 18 × 15	3	Compact R2: Digital Control RS-485 Daisy-chain
		-03-R2						
		-53	+1200					
		-53-R2						
	C13890	-15	-1250	0.6	+11 to +16	46 × 24 × 12	4	Wide input voltage -15: UL recognized (UL60601-1) 
		-55	+1250					
	C11152	—	-1500	1	+15	41 × 10 × 41	5	Low ripple / noise 
		-01						
		-50	+1500					
		-51						
	C9619	—	-2000	2	+15	62 × 15 × 45	6	Compact
		-01						
		-50	+2000					
		-51						
	C12446	-12	-1000	10	+24	62 × 15 × 45	7	Large current output 
		-52	+1000					
	C12766	-12	-1500	30	+24	107 × 25.5 × 72	8	Large current output -12: UL recognized (UL60601-1) 
		-52	+1500					
	C13887	-12	-2500	15	+24	128 × 25.5 × 72	9	Large current output
		-52	+2500					
	C14051	-15	-10000	0.2	+11 to +16	98 × 25 × 45	10	High voltage output Wide input voltage *-15 only 
		-55	+10000					

Multiple output type

	C13145	-01	-1000 /ch	1 /ch	+24	130 × 35 × 130	11	8-channel outputs
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[Ⓐ]Excluding projecting parts

Bench-top type high voltage power supplies

	Type No.		Output voltage (Max.) (V)	Output current (Max.) (mA)	Input voltage (V)	Size W × H × D [Ⓐ] (mm)	Page	Note
	C9525	-02	-2000	1.8	AC 100 to AC 240	246 × 85 × 312	12	USB control Multiple outputs of ±5 V, ±15 V and high voltage 
		-03						
		-52	+2000					
		-53						
	C9727	—	-3500	2	AC 100 to AC 240	246 × 85 × 312	13	USB control Multiple outputs of ±5 V, ±15 V and high voltage 
		-01						
		-50	+3500					
		-51						

[Ⓐ]Excluding projecting parts

High voltage power supply modules

0.4 W output 1100 V / 0.4 mA

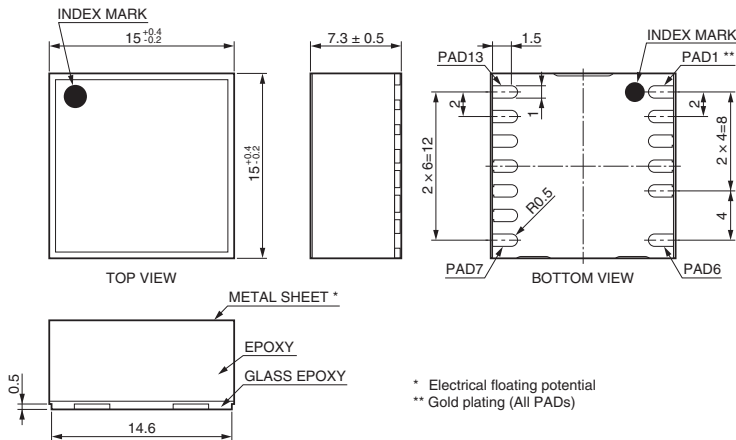
C14210-14



Parameter		Value / Description	Unit
Input voltage		+3.0 to +5.0	V
Input current ^(A)	with no load	Typ. 40	mA
	with full load	Typ. 235	
Variable output voltage range		0 to -1100	V
Specification guaranteed output voltage range		-200 to -1100	V
Output current		Max. 0.4	mA
Line regulation against ± 0.5 V input change		Typ. ± 0.01	%
Load regulation against 0 % to 100 % load change		Typ. ± 0.01	%
Ripple / Noise (p-p) ^(B)		Typ. 50	mV
Output voltage control		by external controlling voltage (Vcont: +0.2 V to +1.1 V) by external potentiometer (10 k Ω or more)	—
Reference voltage output ^(C)		Typ. +1.2	V
Output voltage setting (Absolute value)		Typ. -1000 \times controlling voltage	V
Output voltage rise time (0 % \rightarrow 99 %)		Typ. 150	ms
Temperature coefficient		Typ. ± 0.01	%/ $^{\circ}$ C
Operating ambient temperature		0 to +50	$^{\circ}$ C
Operating ambient humidity ^(D)		Below 80	%
Storage temperature		-20 to +60 (After broad mounting)	$^{\circ}$ C
Storage humidity ^(D)		Below 80 (After broad mounting)	%
Mounting temperature ^(E)		Max. 230	$^{\circ}$ C
Weight		Typ. 4	g
Protective functions		Short circuit in output / continuous overloading / excessive controlling voltage input	—

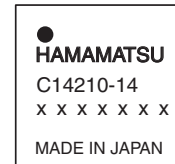
NOTE: (A) $V_{DD}=+3$ V, at maximum output voltage and current (B) 5 kHz or more (C) Load resistance: 10 k Ω or more (D) No condensation (E) Refer to handling precautions (P.16)

Dimensional outline (Unit: mm)



* Electrical floating potential
** Gold plating (All PADS)

Pin configuration



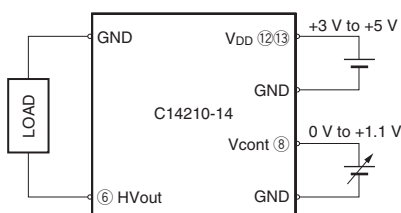
No.	NAME	No.	NAME
13	V _{DD} IN	1	GND
12	V _{DD} IN	2	GND
11	GND	3	(NC)
10	(NC)	4	(NC)
9	V _{ref} OUT	5	(NC)
8	V _{cont} IN		
7	GND	6	HVout

(NC): No connection (Do not use)

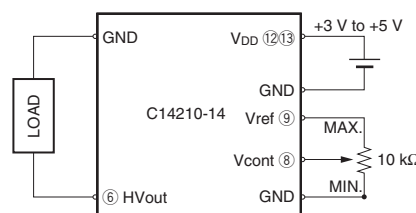
TACCA0372EA

Output voltage control

By external voltage



By external potentiometer



PIN ASSIGNMENT ***

- ① GND
- ② GND
- ③ (NC)
- ④ (NC)
- ⑤ (NC)
- ⑥ HVout
- ⑦ GND
- ⑧ OUTPUT VOLTAGE CONTROL (Vcont)
- ⑨ REFERENCE VOLTAGE OUTPUT (Vref)
- ⑩ (NC)
- ⑪ GND
- ⑫ INPUT VOLTAGE (V_{DD})
- ⑬ INPUT VOLTAGE (V_{DD})

*** Pins ①, ②, ⑦, and ⑪ are connected internally, but it is recommended that ⑪ be connected externally in a separate line for ①, ②, and ⑦.

TACCC0192EA

High voltage power supply modules

0.7 W output 1200 V / 0.6 mA

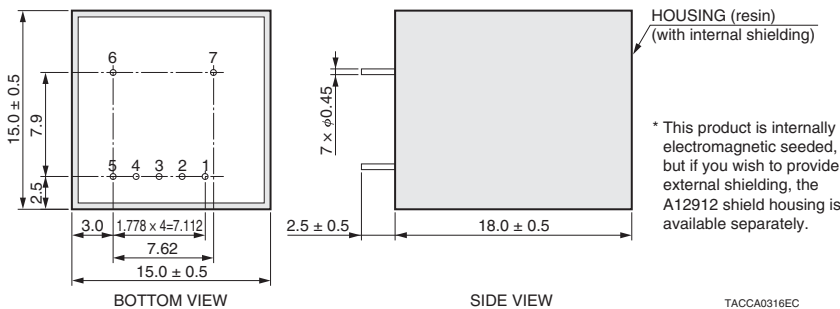
C10940 series



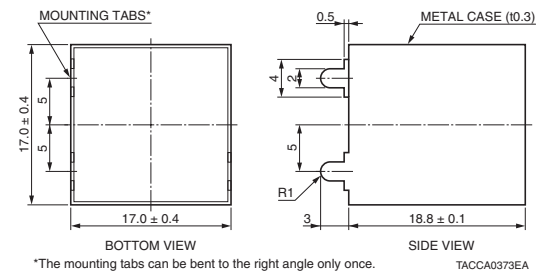
Parameter			C10940-03	C10940-03-R2*	C10940-53	C10940-53-R2*	Unit
Input voltage			+5 ± 0.5				V
Input current (A)	with no load	Typ.	60				mA
	with full load	Typ.	230				mA
Variable output voltage range			-10 to -1200		+10 to +1200		V
Specification guaranteed output voltage range			-200 to -1200		+200 to +1200		V
Output current			Max. 0.6				mA
Line regulation against ±0.5 V input change (A,B)			Typ. ±0.02				%
Load regulation against 0 % to 100 % load change (A)			Typ. ±0.01				%
Ripple / Noise (p-p) (A,B)			Typ. 50				mV
Output voltage control			See output voltage control diagrams below	See remote control diagram below	See output voltage control diagrams below	See remote control diagram below	—
Reference voltage output			Typ. +1.2		—		V
Output voltage setting (Absolute value)			Typ. Controlling voltage x 1000		—		V
Output voltage rise time (0 % → 99 %) (A,B)			Typ. 120		300		ms
Temperature coefficient (A,B)			Typ. ±0.01				%/°C
Operating ambient temperature (A,B)			0 to +50				°C
Operating ambient humidity (C)			Below 80				%
Storage temperature			-20 to +60				°C
Storage humidity (C)			Below 80				%
Weight			Typ. 7.7				g
Protective functions			Protected against reversed power input, reversed/excessive controlling voltage input, continuous overloading/short circuit output				—

NOTE: (A)At maximum output voltage (B)At maximum output current (C)No condensation
* -R2 type: RS-485 control

Dimensional outline (Unit: mm)

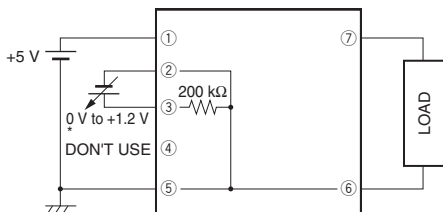


Option (sold separately) Shield case A12912

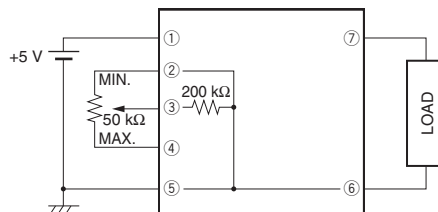


Output voltage control (C10940-03, C10940-53)

By external voltage



By external potentiometer

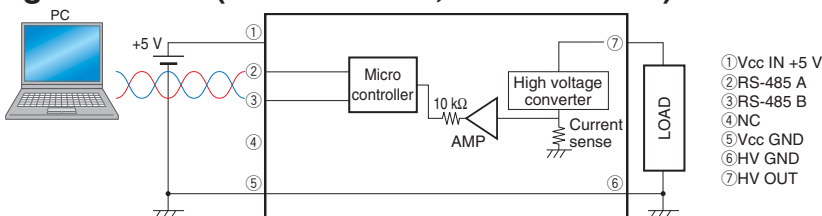


- ① Vcc IN +5 V
- ② Vcont GND
- ③ Vcont
- ④ Vref OUT +1.2 V Typ.
- ⑤ Vcc GND
- ⑥ HV GND
- ⑦ HV OUT

* The instability in the external controlling voltage should be minimized as it directly affects the output voltage quality.

TACCA0156EB

Digital control (C10940-03-R2, C10940-53-R2)



TACCC0157EC

High voltage power supply modules

0.7 W output 1250 V / 0.6 mA

C13890 series



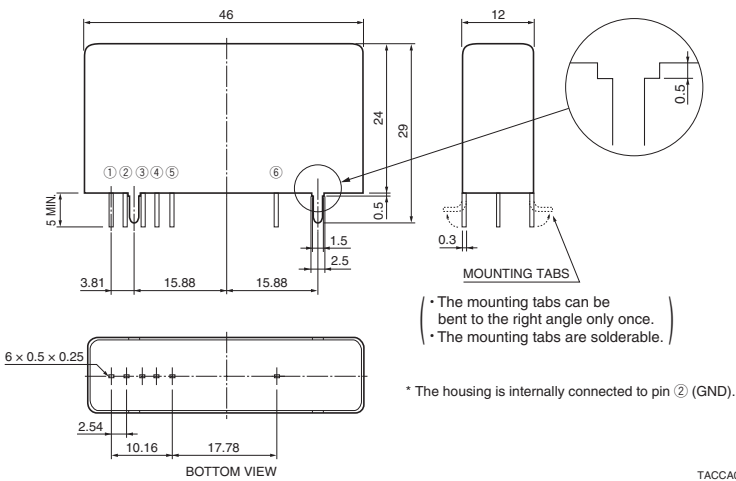
Left: C13890-15, Right: C13890-55

CE C13890-15: UL recognized (UL60601-1, File No. E470768)

Parameter		C13890-15	C13890-55	Unit
Input voltage		+11 to +16		V
Input current ^(A)	with no load	35		mA
	with full load	125		
Variable output range		0 to -1250	0 to +1250	V
Specification guaranteed output voltage range		-200 to -1250	+200 to +1250	V
Output current		0.6		mA
Line regulation against ± 1 V or ± 0.5 V input change ^{(A)(B)}		Typ. ± 0.01		%
Load regulation against 0 % to 100 % load change ^(A)		Typ. ± 0.01		%
Ripple / Noise (p-p) ^{(A)(B)}		Typ. 0.003 % (38 mV)		—
Output voltage control		By external controlling voltage (0 V to +5 V) or external potentiometer (50 k Ω)		—
Controlling voltage input impedance		Typ. 75		k Ω
Reference voltage output		Typ. +5.1		V
Output voltage setting (Absolute value)		Typ. Controlling voltage \times 250		V
Output voltage rise time (0 % \rightarrow 99 %) ^{(A)(B)}		Typ. 100		ms
Temperature coefficient ^{(A)(B)}		Typ. ± 0.01		%/ $^{\circ}$ C
Operating ambient temperature ^{(A)(B)}		-10 to +60		$^{\circ}$ C
Operating ambient humidity ^(C)		Below 80		%
Storage temperature		-20 to +70		$^{\circ}$ C
Storage humidity ^(C)		Below 80		%
Weight		Typ. 29		g
Protective functions		Protected against reversed power input, reversed / excessive controlling voltage input, continuous overloading / short circuit in output		—

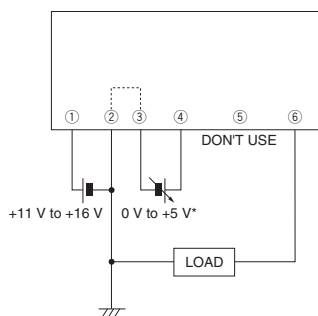
NOTE: (A)At maximum output voltage (B)At maximum output current (C)No condensation

Dimensional outline (Unit: mm)

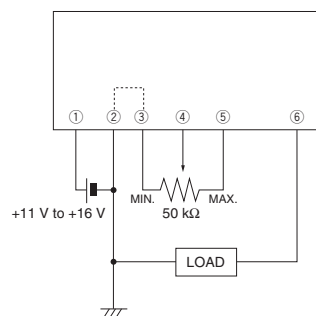


Output voltage control

●By external voltage



●By external potentiometer



PIN ASSIGNMENT

- ① Vcc IN +11 V or +16 V
- ② Vcc GND
- ③ Vcont GND
- ④ Vcont IN
- ⑤ Vref OUT +5.1 V Typ.
- ⑥ HV OUT

- The housing is internally connected to pin ②.
- Pins ② and ③ are internally connected.

High voltage power supply modules

1.5 W output 1500 V / 1 mA

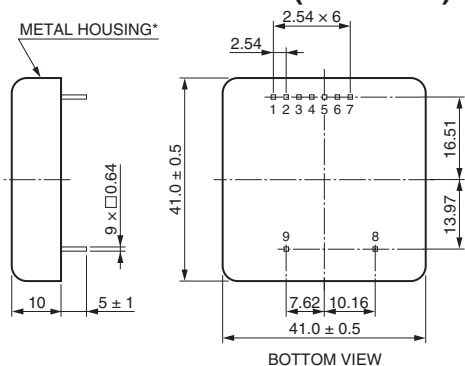
C11152 series



Parameter			C11152	C11152-01	C11152-50	C11152-51	Unit
Input voltage			+15 ± 1	+12 ± 0.5	+15 ± 1	+12 ± 0.5	V
Input current ^(A)	with no load	Typ.	45	50	45	50	mA
	with full load	Typ.	180	220	180	220	
Variable output voltage range			0 to -1500		0 to +1500		V
Specification guaranteed output voltage range			-240 to -1500		+240 to +1500		V
Output current			Max.			1	mA
Line regulation against ±1 V or ±0.5 V input change ^{(A)(B)}			Typ.			±0.01	%
Load regulation against 0 % to 100 % load change ^(A)			Typ.			±0.01	%
Ripple / Noise (p-p) ^{(A)(B)}			Typ.			5 (>5 kHz), 8 (≤5 kHz)	mV
Output voltage control			By external controlling voltage (0 V to +5 V) or external potentiometer (50 kΩ)				—
Controlling voltage input impedance			Typ.			130	kΩ
Reference voltage output			Typ.			+5.2	V
Output voltage setting (Absolute value)			Typ.			Controlling voltage × 300	V
Output voltage rise time (0 % → 99 %) ^{(A)(B)}			Typ.			120	ms
Temperature coefficient ^{(A)(B)}			Typ.			±0.005	%/°C
High voltage monitor output			0 to +5 (Output impedance 10 kΩ)				V
ON / OFF input			TTL positive logic				—
ON / OFF input impedance			30				kΩ
Operating ambient temperature ^{(A)(B)}			0 to +50				°C
Operating ambient humidity ^(C)			Below 80				%
Storage temperature			-20 to +60				°C
Storage humidity ^(C)			Below 80				%
Weight			Typ.			38	g
Protective functions			Protected against reversed power input, reversed / excessive controlling voltage input, continuous overloading / short circuit in output				—

NOTE: (A)At maximum output voltage (B)At maximum output current (C)No condensation

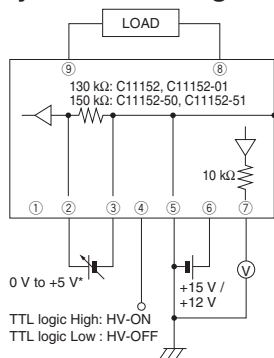
Dimensional outline (Unit: mm)



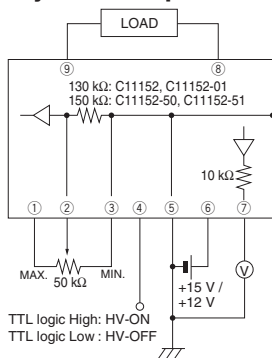
TACCA0306EC

Output voltage control

● By external voltage



● By external potentiometer



PIN ASSIGNMENT**

- ① Vref OUT +5.2 V Typ.
- ② Vcont IN
- ③ Vcont GND
- ④ ON / OFF IN
- ⑤ Vcc GND
- ⑥ Vcc IN +15 V or +12 V
- ⑦ HV MONITOR OUT
- ⑧ HV OUT
- ⑨ HV GND

** Never connect the pin number ③ and ⑤ directly and externally.

TACCC0148ED

High voltage power supply modules

4 W output 2000 V / 2 mA

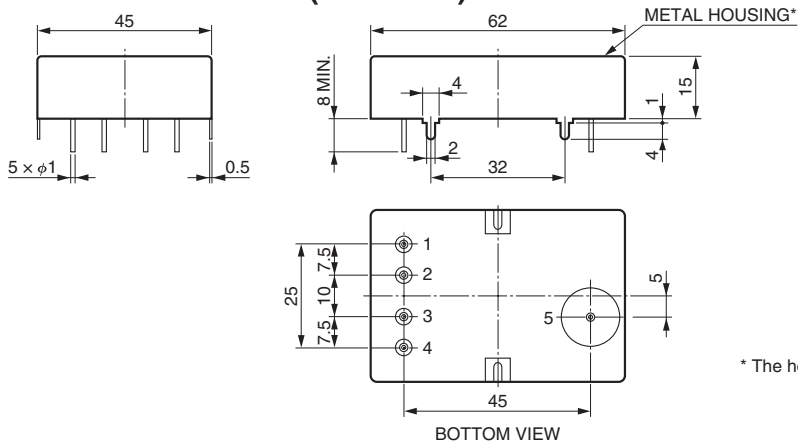
C9619 series



Parameter		C9619	C9619-01	C9619-50	C9619-51	Unit
Input voltage		+15 ± 1	+12 ± 1	+15 ± 1	+12 ± 1	V
Input current ^(A)	with no load	Typ. 120	100	120	100	mA
	with full load	Typ. 380	460	380	460	
Variable output voltage range		0 to -2000		0 to +2000		V
Specification guaranteed output voltage range		-320 to -2000		+320 to +2000		V
Output current		Max. 2				mA
Line regulation against ±1 V input change ^{(A)(B)}		Typ. ±0.01				%
Load regulation against 0 % to 100 % load change ^(A)		Typ. ±0.01				%
Ripple / Noise (p-p) ^{(A)(B)}		Typ. 0.003 % (60 mV)				—
Output voltage control		By external controlling voltage (0 V to +5 V) or external potentiometer (50 kΩ)				—
Controlling voltage input impedance		Typ. 110		97		kΩ
Reference voltage output		Typ. +5.2				V
Output voltage setting (Absolute value)		Typ. Controlling voltage × 400				V
Output voltage rise time (0 % → 99 %) ^{(A)(B)}		Typ. 150				ms
Temperature coefficient ^{(A)(B)}		Typ. ±0.01				%/°C
Operating ambient temperature ^{(A)(B)}		0 to +40				°C
Operating ambient humidity ^(C)		Below 85				%
Storage temperature		-20 to +60				°C
Storage humidity ^(C)		Below 90				%
Weight		Typ. 100				g
Protective functions		Protected against reversed power input, reversed / excessive controlling voltage input, continuous overloading / short circuit in output				—

NOTE: (A)At maximum output voltage (B)At maximum output current (C)No condensation

Dimensional outline (Unit: mm)

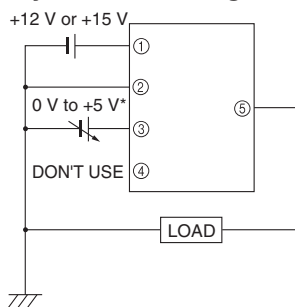


* The housing is internally connected to pin ② (GND).

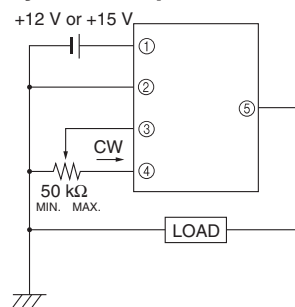
TACCA0291EB

Output voltage control

●By external voltage



●By external potentiometer



PIN ASSIGNMENT

- ① Vcc IN +12 V or +15 V
- ② GND (common)
- ③ Vcont IN
- ④ Vref OUT +5.2 V Typ.
- ⑤ HV OUT

TACCO0199EC

High voltage power supply modules

10 W output 1000 V / 10 mA

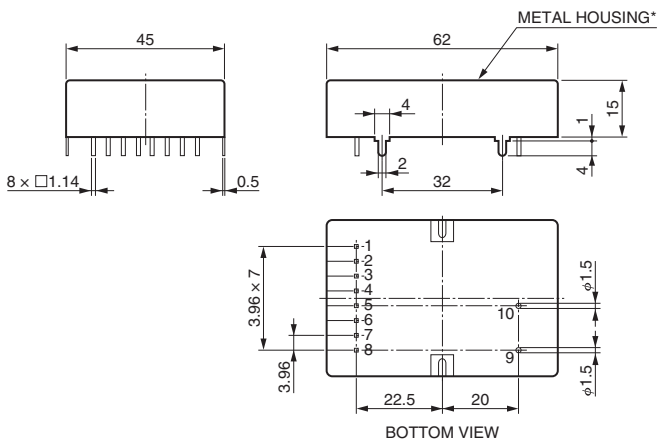
C12446 series



Parameter		C12446-12	C12446-52	Unit	
Input voltage		+24 ± 1.2		V	
Input current ^(A)	with no load	Typ.	55	mA	
	with full load	Typ.	550	mA	
Variable output voltage range		0 to -1000	0 to +1000	V	
Specification guaranteed output voltage range		-200 to -1000	+200 to +1000	V	
Output current	Max.	10		mA	
Line regulation against ±1.2 V input change ^{(A)(B)}		Typ.		±0.01	%
Load regulation against 0 % to 100 % load change ^(A)		Typ.		±0.01	%
Ripple / Noise (p-p) ^{(A)(B)}		Typ.		50	mV
Output voltage control		By external controlling voltage (0 V to +5 V) or external potentiometer (50 kΩ)		—	
Controlling voltage input impedance	Typ.	640		kΩ	
Reference voltage output	Typ.	+5.3		V	
Output voltage setting (Absolute value)	Typ.	Controlling voltage × 200		V	
Output voltage rise time (0 % → 99 %) ^{(A)(B)}	Typ.	150		ms	
Temperature coefficient ^{(A)(B)}	Typ.	±0.005		%/°C	
High voltage monitor output		0 to +5 (Output impedance 10 kΩ)		V	
Current monitor output		0 to +5 (Output impedance 10 kΩ)		V	
ON / OFF input		TTL positive logic		—	
ON / OFF input impedance		30		kΩ	
Operating ambient temperature ^{(A)(B)}		0 to +50		°C	
Operating ambient humidity ^(C)		Below 85		%	
Storage temperature		-20 to +60		°C	
Storage humidity ^(C)		Below 85		%	
Weight	Typ.	100		g	
Protective functions		Protected against reversed power input, reversed / excessive controlling voltage input, continuous overloading / short circuit in output		—	

NOTE: (A)At maximum output voltage (B)At maximum output current (C)No condensation

Dimensional outline (Unit: mm)

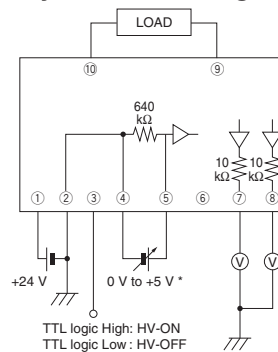


* The housing is internally connected to pin ② (GND).

TACCA0315EB

Output voltage control

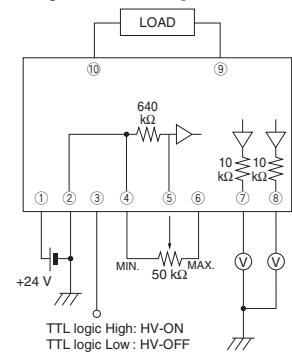
●By external voltage



PIN ASSIGNMENT

- ① Vcc IN +24 V
- ② Vcc GND **
- ③ ON / OFF IN
- ④ Vcont GND **
- ⑤ Vcont IN
- ⑥ Vref OUT +5.3 V Typ.
- ⑦ CURRENT MONITOR OUT
- ⑧ HV MONITOR OUT
- ⑨ HV GND
- ⑩ HV OUT

●By external potentiometer



* The instability in the external controlling voltage should be minimized as it directly affects the output voltage quality.

** Never connect the pin number ② and ④ directly and externally.

TACCC0158EC

High voltage power supply modules

45 W output 1500 V / 30 mA

C12766 series

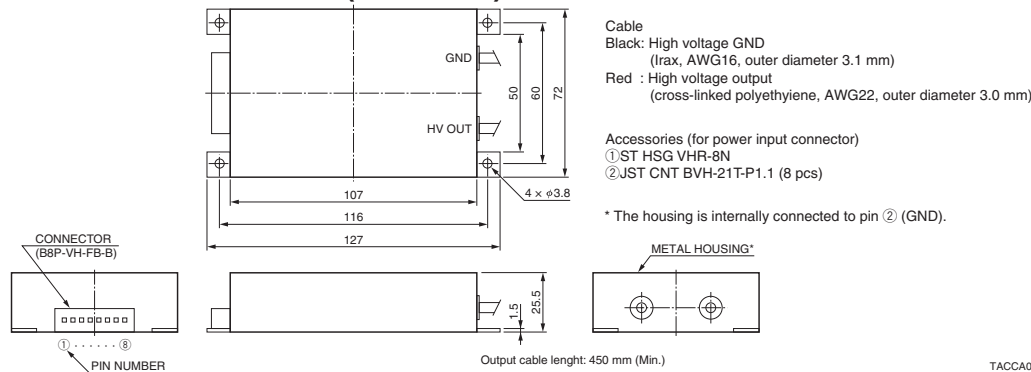


CE C12766-12: UL recognized (UL60601-1, File No. 470768)

Parameter		C12766-12	C12766-52	Unit
Input voltage		+24 ± 1.2		V
Input current ^(A)	with no load	Typ.	65	mA
	with full load	Typ.	2.1	A
Variable output voltage range		0 to -1500	0 to +1500	V
Specification guaranteed output voltage range		-240 to -1500	+240 to +1500	V
Output current		Max.	30	mA
Line regulation against ±1.2 V input change ^{(A)(B)}		Typ.	±0.01	%
Load regulation against 0 % to 100 % load change ^(A)		Typ.	±0.01	%
Ripple / Noise (p-p) ^{(A)(B)}		Typ.	75	mV
Output voltage control		By external controlling voltage (0 V to +5 V) or external potentiometer (50 kΩ)		
Controlling voltage input impedance		Typ.	640	kΩ
Reference voltage output		Typ.	+5.3	V
Output voltage setting (Absolute value)		Typ.	Controlling voltage × 300	V
Output voltage rise time (0 % → 99 %) ^{(A)(B)}		Typ.	1500	ms
Temperature coefficient ^{(A)(B)}		Typ.	±0.01	%/°C
High voltage monitor output		0 to +5 (Output impedance 10 kΩ)		V
Current monitor output		0 to +5 (Output impedance 10 kΩ)		V
ON / OFF input		TTL positive logic		
ON / OFF input impedance		30		
Operating ambient temperature ^{(A)(B)}		0 to +50		
Operating ambient humidity ^(C)		Below 85		
Storage temperature		-20 to +60		
Storage humidity ^(C)		Below 85		
Weight		Typ.	290	g
Protective functions		Protected against reversed power input, reversed / excessive controlling voltage input, continuous overloading / short circuit in output		

NOTE: (A)At maximum output voltage (B)At maximum output current (C)No condensation

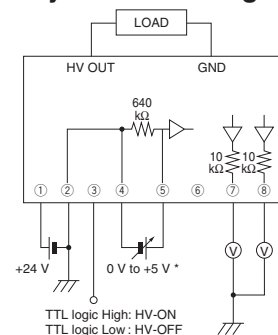
Dimensional outline (Unit: mm)



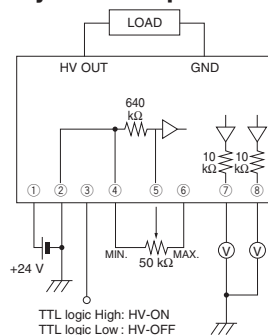
TACCA0331EC

Output voltage control

By external voltage



By external potentiometer



PIN ASSIGNMENT

- ① Vcc IN +24 V
- ② Vcc GND **
- ③ ON / OFF IN
- ④ Vcont GND **
- ⑤ Vcont IN
- ⑥ Vref OUT +5.3 V Typ.
- ⑦ CURRENT MONITOR OUT
- ⑧ HV MONITOR OUT

* The instability in the external controlling voltage should be minimized as it directly affects the output voltage quality.

** Never connect the pin number ② and ④ directly and externally.

TACCC0158EC

High voltage power supply module

37.5 W output 2.5 kV / 15 mA

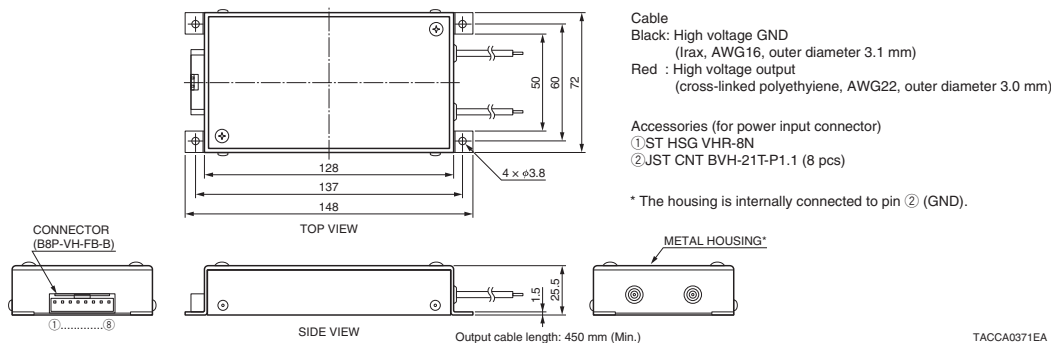
C13887 series



Parameter		C13887-12	C13887-52	Unit
Input voltage range		+24 ± 1.2		V
Input current ^(A)	with no load	Typ.	77	mA
	with full load	Typ.	1.75	A
Variable output voltage range		0 to -2500	0 to +2500	V
Specification guaranteed output voltage range		-400 to -2500	+400 to +2500	V
Output current		Max.	15	mA
Line regulation against ±1.2 V input change ^{(A)(B)}		Typ.	±0.01	%
Load regulation against 0 % to 100 % load change ^(A)		Typ.	±0.01	%
Ripple / Noise (p-p) ^{(A)(B)}		Typ.	125	mV
Output voltage control		External controlling voltage (0 V to +5 V) or external potentiometer (50 kΩ)		—
Controlling voltage input impedance		Typ.	640	kΩ
Reference voltage output		Typ.	+5.34	V
Output voltage setting (Absolute value)		Typ.	Controlling voltage × 500	V
Output voltage rise time (0 % → 99 %) ^{(A)(B)}		Typ.	3000	ms
Temperature coefficient ^{(A)(B)}		Typ.	±0.01	% / °C
High voltage monitor output	Range	0 to +5		V
	Precision	2		%
Current monitor output	Range	0 to +5		V
	Precision	2		%
ON / OFF input		TTL positive logic		—
ON / OFF input impedance		32		kΩ
Operating ambient temperature ^{(A)(B)}		0 to +50		°C
Operating ambient humidity ^(C)		Below 85		%
Storage temperature		-20 to +60		°C
Storage humidity ^(C)		Below 85		%
Weight		315		g
Protective functions		Installed input FUSE / reversed power input protection overvoltage protection for controlling voltage / output overload protection / output overvoltage protection (latch stop)		—

NOTE: (A)At maximum output voltage (B)At maximum output current (C)No condensation

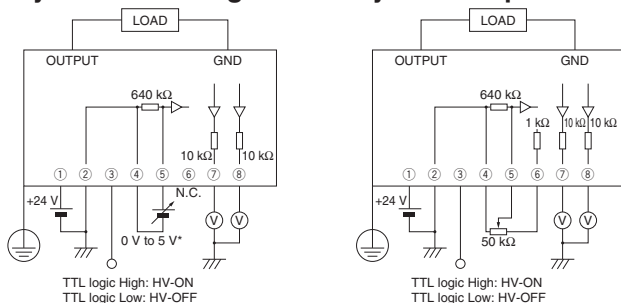
Dimensional outline (Unit: mm)



Output voltage control

●By external voltage

●By external potentiometer



- PIN ASSIGNMENT
- Input voltage (+24 V)
 - Input voltage GND **
 - ON / OFF input signal
 - Control voltage GND **
 - Control voltage *
 - Reference voltage output
 - Current monitor output
 - High voltage monitor output

* Variations in the external control voltage directly affect variations in the output voltage, so the variations must be minimized.
** Do not connect Pins ② and ④ together externally.

High voltage power supply modules

2 W output 10 kV / 0.2 mA

C14051 series

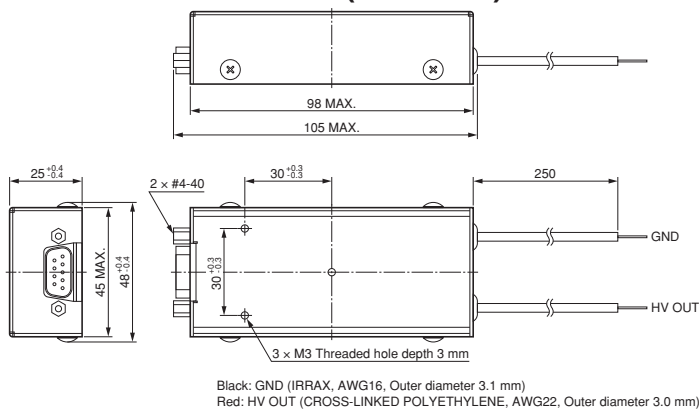
C14051-15:



Parameter		C14051-15	C14051-55	Unit
Input voltage (V _{CC})		+11 to +16		V
Input current ^{(A)(B)}	with no load	Typ. 90		mA
	with full load	Typ. 260		mA
Variable output voltage range		0 to -10 000	0 to +10 000	V
Specification guaranteed output voltage range		-2000 to -10 000	+2000 to +10 000	V
Output current		Max. 0.2		mA
Line regulation against +11 V to +16 V input change ^{(A)(C)}		Typ. ±0.1		%
Load regulation against 0 % to 100 % load change		Typ. ±0.1		%
Ripple / Noise (p-p) ^{(A)(C)}		Typ. 0.1		V
Output voltage control		By external controlling voltage (0 V to +5 V) or external potentiometer (50 kΩ)		—
Controlling voltage input impedance		Typ. 80		kΩ
Reference voltage output		Typ. +5.1		V
Output voltage setting (Absolute value)		Controlling voltage × 2000		V
Output voltage rise time (0 % / 99 %) ^{(A)(C)}		Typ. 200		ms
Temperature coefficient ^{(A)(C)}		Typ. ±0.01		%/°C
High voltage monitor output	Range	0 to +2.5		V
	Accuracy	2		%
Current monitor output	Range	0 to +4.0		V
	Accuracy	2		%
ON / OFF input		TTL positive logic		—
ON /OFF input impedance		10		kΩ
Operating ambient temperature ^{(A)(C)}		-10 to +60		°C
Operating ambient humidity ^(D)		Below 80		%
Storage temperature		-20 to +70		°C
Storage humidity ^(D)		Below 80		%
Weight	Typ.	160		g
Protective functions		Installed input FUSE for over current / reversed power input protection over-temperature protection / overvoltage protection for controlling voltage output overload protection / output overvoltage protection		—

NOTE: (A)At maximum output voltage (B)V_{CC}=+12 V (C)At maximum output current (D)No condensation

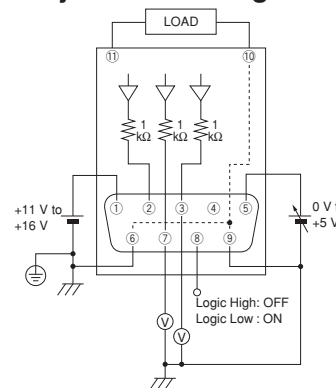
Dimensional outline (Unit: mm)



TACCA0363EA

Output voltage control

●By external voltage

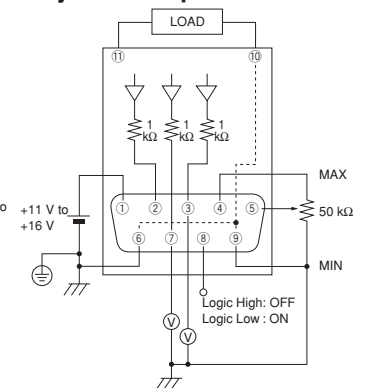


Connector: D-sub 9 pin

PIN ASSIGNMENT

- ① Vcc +11 V to +16 V
- ② ERROR OUT (0 V or +5 V)
- ③ CURRENT MONITOR OUT
- ④ Vref +5.1 V
- ⑤ Vcont 0 V to +5 V
- ⑥ Vcc GND
- ⑦ HV MONITOR OUT
- ⑧ ON / OFF IN
- ⑨ Vcont GND
- ⑩ HV GND
- ⑪ HV OUT

●By external potentiometer



- * The instability in the external controlling voltage should be minimized as it directly affects the output voltage quality
- * The housing is internally connected to pin ⑤.
- * Pin ⑥ and Pin ⑨ and ⑩ are internally connected.

TACCC0183EA

8 ch High voltage power supply module

1 W output (1000 V / 1 mA) × 8 ch

C13145-01

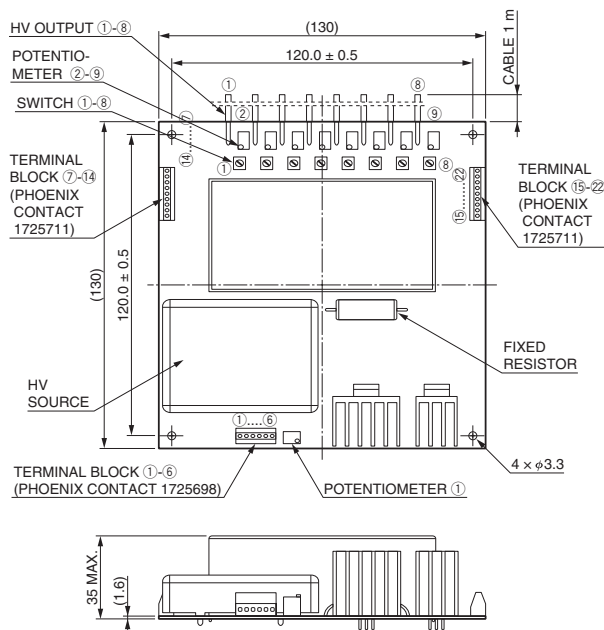


8-channel outputs / each output controlled individually

Parameter		Value / Description	Unit
Input voltage		+24 ± 1.2	V
Input current ^(A)	with no load Typ.	170	mA
	with full load Typ.	580	mA
No. of channel		8	—
Variable output voltage range		0 to -1000	V
Specification guaranteed output voltage range		-300 to -900	V
Output current		1 (per channel)	mA
Line regulation against ±1.2 V input change ^{(A)(B)}		Typ. ±0.01	%
Load regulation against 0 % to 100 % load change ^(A)		Typ. ±0.01	%
Ripple / Noise (p-p) ^{(A)(B)}		Typ. 20 (Potentiometer control)	mV
Output voltage control		By external controlling voltage (0 V to +5 V) or potentiometer (10 kΩ)	—
Controlling voltage input impedance		Typ. 10	kΩ
Output voltage setting (Absolute value)		Typ. Controlling voltage × 200	V
Output voltage rise time (0 % → 99 %) ^{(A)(B)}		Typ. 5 (Controlling voltage control)	ms
Temperature coefficient ^{(A)(B)}		Typ. ±0.03	%/°C
Operating ambient temperature ^{(A)(B)}		0 to +50	°C
Operating ambient humidity ^(C)		Below 80	%
Storage temperature		-20 to +60	°C
Storage humidity ^(C)		Below 80	%
Weight		Typ. 516	g
Protective functions		Protected against excessive controlling voltage input / over current	—

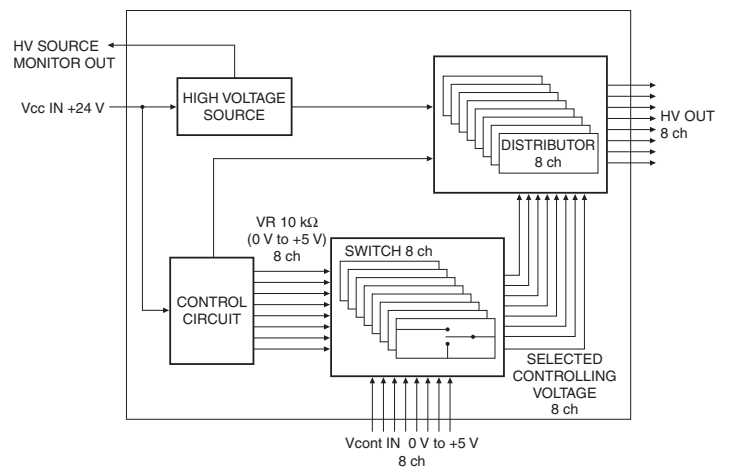
NOTE: ^(A)At maximum output voltage ^(B)At maximum output current ^(C)No condensation

Dimensional outline (Unit: mm)



TACCA0354EA

Block diagram



TACCC0180EA

Bench-top type high voltage power supplies

4 W output 2000 V / 1.8 mA

C9525 series



Multiple outputs of 5 V, 15 V and high voltage
USB control

Parameter		C9525-02 / C9525-03	C9525-52 / C9525-53	Unit
High voltage output	Output voltage *	0 to -2000	0 to +2000	V
	Specification guaranteed output voltage	-320 to -2000	+320 to +2000	V
	Output current	Max. 1.8		mA
	Line regulation (For 10 % change in line voltage) ^{(A)(B)}	Max. ±0.005		%
	Load regulation (For 0 % to 100 % change in load) ^(A)	Max. ±0.03		%
	Ripple / Noise (p-p) ^{(A)(B)}	Typ. 0.003		%
	Drift (After 30 minute warm-up) ^{(A)(B)}	Typ. ±0.05		%/h
	Temperature coefficient ^{(A)(B)}	Typ. ±0.01		%/°C
High voltage output monitoring accuracy ^(A)	Typ. ±(0.1 % +2 V)		—	
Output connector	SHV-R		—	
Low voltage output	Output voltage	+5 ± 0.25, -5 ± 0.25, +15 ± 0.75, -15 ± 0.75		V
	Output current	+5 V, -5 V	Max. 500 (Total value of two connector outputs)	mA
		+15 V, -15 V	Max. 200 (Total value of two connector outputs)	mA
Output connector	DIN-R (6 pin) × 2		—	
AC input voltage	AC100 to AC240		V	
Power consumption ^{(A)(B)}	Max. 60		V·A	
Operating ambient temperature ^{(A)(B)}	0 to +40		°C	
Operating ambient humidity ^(C)	Below 85		%	
Storage temperature	-20 to +50		°C	
Storage humidity ^(C)	Below 90		%	
Weight	Approx. 3.0		kg	

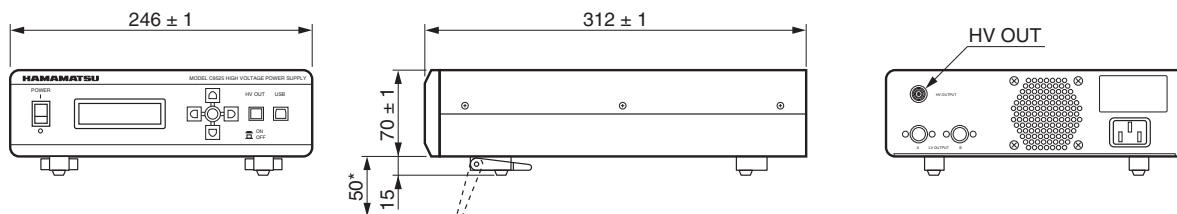
NOTE: (A) At maximum output voltage
(B) At maximum output current
(C) No condensation

* All specifications cannot be guaranteed at output voltage below 320 V.

Accessories

- ① AC line cable (2 m long) 1
C9525-02/C9525-52: AC cable with a rating of 125 V
C9525-03/C9525-53: AC cable with a rating of 250 V
- ② High voltage output cable (1.5 m long) terminated with SHV-P E1168-17 1
- ③ 3P/2P connector AC adapter (C9525-02 / C9525-52 only) 1
- ④ USB cable (1.5 m long) with filter 1
- ⑤ Low voltage power supply section DIN connector plugs 2
- ⑥ CD-ROM (Containing instruction manual, sample software) 1
- ⑦ Clamp filter 2

Dimensional outline (Unit: mm)



* The height of the C9525 is 120 mm with front legs extended.

TACCA0290EA

Bench-top type high voltage power supplies

7 W output 3500 V / 2 mA

C9727 series



CE Multiple outputs of 5 V, 15 V and high voltage
USB control

Parameter		C9727 / C9727-01	C9727-50 / C9727-51	Unit
High voltage output	Output voltage *	0 to -3500	0 to +3500	V
	Specification guaranteed output voltage	-320 to -3500	+320 to +3500	V
	Output current	Max. 2		mA
	Line regulation (For 10 % change in line voltage) ^{(A)(B)}	Max. ±0.005		%
	Load regulation (For 0 % to 100 % change in load) ^(A)	Max. ±0.03		%
	Ripple / Noise (p-p) ^{(A)(B)}	Typ. 0.003		%
	Drift (After 30 minute warm-up) ^{(A)(B)}	Typ. ±0.05		%/h
	Temperature coefficient ^{(A)(B)}	Typ. ±0.01		%/°C
	High voltage output monitoring accuracy ^(A)	Typ. ±(0.1 % +2 V)		—
Output connector		SHV-R		—
Low voltage output	Output voltage		+5 ± 0.25, -5 ± 0.25, +15 ± 0.75, -15 ± 0.75	V
	Output current	+5 V, -5 V	Max. 500 (Total value of two connector outputs)	mA
		+15 V, -15 V	Max. 200 (Total value of two connector outputs)	mA
Output connector		DIN-R (6 pin) × 2		—
AC input voltage		AC100 to AC240		V
Power consumption ^{(A)(B)}		Max. 60		V·A
Operating ambient temperature ^{(A)(B)}		0 to +40		°C
Operating ambient humidity ^(C)		Below 85		%
Storage temperature		-20 to +50		°C
Storage humidity ^(C)		Below 90		%
Weight		Approx. 3.0		kg

NOTE: (A)At maximum output voltage

(B)At maximum output current

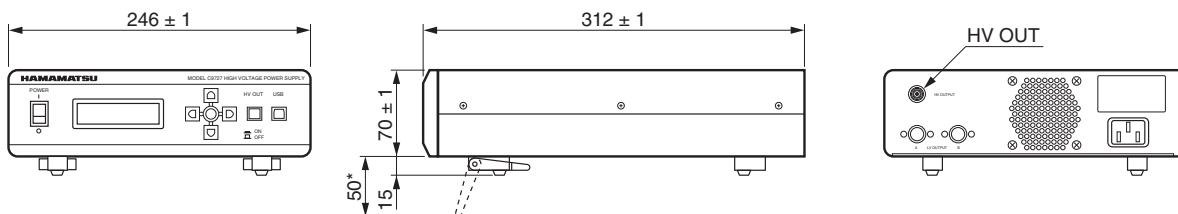
(C)No condensation

* All specifications cannot be guaranteed at output voltage below 320 V.

Accessories

- ① AC line cable 1
C9727/C9727-50: AC cable with a rating of 125 V
C9727-01/C9727-51: AC cable with a rating of 250 V
- ② High voltage output cable (1.5 m long) terminated with SHV-P E1168-19 1
- ③ 3P/2P connector AC adapter (C9727 / C9727-50 only) 1
- ④ USB cable (1.5 m long) with filter 1
- ⑤ Low voltage power supply section DIN connector plugs 2
- ⑥ CD-ROM (Containing instruction manual, sample software) 1

Dimensional outline (Unit: mm)



* The height of the C9727 is 120 mm with front legs extended.

TACCA0290JA

■ Terms related to protection circuits

Protection circuits are designed to protect a product or the system connected to the product from various errors or faults that may occur during operation. Our high voltage power supplies incorporate the following protection components and circuits:

Input fuse

When a short-circuit occurs for some reason in a product, this fuse blows and opens the circuit to prevent harm to the system to which the product is connected. Once a fuse blows it must be

Protection circuit against reverse input connection

When power (V_{CC} or V_{DD}) and ground connections are accidentally reversed, this circuit functions to protect the product from damage.

Overtemperature protection circuit

When an error or fault occurs due to changes in the surrounding environment or for other reasons, this circuit detects a temperature rise in the product and stops its operation to prevent overheating and possible fire.

Overvoltage protection circuit

When an error or fault occurs for some reason in a product or when controlling the system connected to the product, this overvoltage protection circuit functions to protect the product. The protection voltage values of this circuit are determined according to each product, so please note that this circuit does not necessarily protect the load.

Overcurrent protection circuit (overload protection circuit)

This protection circuit minimizes effects on the primary side of the power supply when an error occurs on the secondary side. If an error or fault occurs in a load, this circuit functions to protect the product connected to the load. If the product itself is damaged for some reason, this circuit protects the system connected to the product.

Protection circuit against excessive external control voltage input

When an excessive control voltage is input due to an error or fault in the system connected to the product, this circuit functions to stop the output.

*** Note**

There are two types of protection circuits. One type automatically resets after the cause of the error is eliminated. The other type continues protecting the product until released by the specified method even after the cause of the error is removed. See the instruction manual of each product for detailed information.

■ UL

UL LLC (Underwriters Laboratories Limited Liability Company; UL for short) is a safety testing and certification company headquartered in the United States. UL sets the function and safety standards for a vast range of materials, components, devices, tools and final products. At the same time, UL formulates evaluation methods, performs actual evaluation testing, and permits use of the "UL certification mark" for materials, components or products that have passed the safety testing.

Some of our high-voltage power supplies are listed in the UL 60601-1 (Medical Electrical Equipment Safety Standard). Those power supplies are designed assuming that they will be installed in equipment and so are listed as components rather than final products.

■ Safety standards

Safety standards are standards designed to minimize the risk of harm to humans, property and the environment to an acceptable level by means of safety functions or devices. Safety standards are roughly divided into mechanical and electrical standards each of which includes basic safety standards and group safety standards. Product safety standards specify appropriate values for the basic safety standards and group safety standards according to the application field for each product. There are well-known international standards issued by ISO (International Organization for Standardization) and IEC (International Electrotechnical Commission). In Japan, JIS (Japanese Industrial Standards) basically adopts IEC standards unless there is a specific reason. UL standards are partially based on IEC standards or ISO standards and contain information corresponding to the IEC documents.

Example: UL 60601-1 ← IEC 60601-1

Contains information on Medical electrical equipment - Part 1: General requirements for basic safety and essential performance, mechanical safety, electrical safety, and electromagnetic compatibility.

■ Declaration of Conformity (CE Marking)

The Declaration of Conformity is a document which states that the product fulfills the requirements of the relevant standards of the EU (European Union) regulations and directives (laws). This Declaration of Conformity is an essential document that takes precedence over all other documents. The manufacturer declares (by self-declaration) the conformity of the product by providing key information on product conformance. To make a self-declaration, the manufacturer must prepare a broad range of data evidence and technical documents. The contents should be checked by a third party to ensure that they are correct and easy to understand.

We conduct conformity tests based on the RoHS directives, EN61010-1 and EN61326-1, and prepare a Declaration of Conformity.

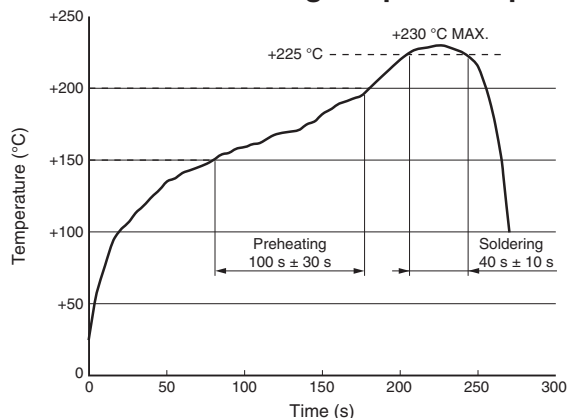
Common to all products

- Products listed in this catalog generate high voltage. Even when power is off, high voltage may remain inside, so be careful not to directly touch the power supply terminals. Touching them may cause electrical shock, injury, or even death.
- Do not try to disassemble, modify or repair the product. Doing so may lead to electrical shock, injury or even death because some internal parts generate high voltage.
- Use or store the product within the ambient temperature and humidity range specified in this catalog.
- Use caution when moving the product to a room with large differences in humidity or temperature since condensation may occur. Do not touch the product with wet or moist hands. Doing so may impair the protective functions of the product, causing damage to the product or connected device, or leading to electrical shock or fire.
- Do not operate the product in locations subject to splashing from conductive liquids, vibration or fire. Doing so may impair the protective functions of the product, causing damage to the product or connected device, or leading to electrical shock or fire.
- Do not operate the product in locations where excessive dust, flammable or explosive gasses or vapors are present. Operating it in such environments is extremely dangerous since it may cause explosion or fire.
- If the product malfunctions or any abnormal conditions occur during use, immediately cut off the power.
- When a protective function trips, cut off the power and remove the cause before restarting. If you continue to use the product without removing the cause of the problem, the protective function will not only trip frequently but may fail resulting in damage to the product or connected device.
- When a power supply listed in this catalog is used with another power supply having a different polarity output and both are connected to the same load, only allow output from one power supply after the output from the other power supply has dropped to 0 V. Allowing simultaneous outputs from both power supplies at the same time may cause abnormal transient current to flow in the power supply that damages the internal circuits. Caution is especially needed in applications with differing polarity outputs when using electrostatic chucks or deflection electrodes, so take the following measures in advance.
 - Allow a time difference (period when one power supply is at 0 V)(period when one power supply is at 0 V) between the ON and OFF of each power supply.
 - Provide a protection circuit that prevents the output current of one power supply from flowing into the other power supply. (Always make sure in advance that the protection circuit functions to protect the power supplies. Depending on the added circuit, an error might occur in the high voltage output and monitor output of the power supply. So please contact us for more details and advice.)

SMT (surface mount type) (C14210-14)

- The C14210-14 is an SMT (surface mount technology) high voltage power supply that can be reflow-soldered onto a printed circuit board. When reflow-soldering, refer to the recommended temperature profile shown in the individual catalog and instruction manual. The C14210-14 might be damaged if not soldered under the specified conditions. Regulating the maximum temperature is essential.

Recommended soldering temperature profile



- This is a typical soldering temperature profile. Be sure to test out the soldering process under your own conditions before actual reflow soldering.
- The C14210-14 does not support flow soldering. Use reflow soldering at a maximum temperature of +230 °C (within 50 seconds). Perform reflow soldering only once. (The C14210-14 is not guaranteed to resist two or more reflow soldering processes.)

There are some other conditions to be considered for handling the C14210-14. Check the individual catalog and instruction manual in advance.

High voltage power supply modules

- High voltage power supply modules include pin-output types designed for on-board mounting. Use these modules by mounting them onto a printed circuit board. When mounting, do not bend the pins. Do not connect cables directly to the pins, and to avoid damaging or breaking the pins, do not apply force to the pins by bending or twisting. The claws on the module case are for clamping the module onto the board. Solder these claws to clamp the module in place so that no mechanical stress is applied to the pins.

- When connecting the high voltage output to a printed circuit board, provide sufficient insulation and creep and space distances on the printed circuit board.
- Be aware of the voltage drop due to the resistance in the wiring and connections. In particular, when using a module requiring large input current, it may not exhibit full performance if there is a drop in the input voltage.
- “Output voltage” in the specifications indicates only the output range. On the other hand, “Characteristics guaranteed output voltage” is the range where other specifications can be guaranteed. Be aware that some characteristics may degrade at a low voltage output.
- We recommend separately connecting the GND line of the power supply voltage and the GND line of the control voltage. This will reduce the effect from variations in the power supply current causing output voltage fluctuations.
- When using an external control voltage to adjust the high voltage output, its fluctuations will directly affect that output voltage, so be aware of the degree of stability needed.
- Even when the control voltage is 0 V, be aware that an offset voltage of several volts to several dozen volts is generated in the actual output.
- The reference voltage output is a voltage for control purposes. When using it, make sure that the load is equal to or lower than the recommended load shown in the data specifications for each product.
- The recommended soldering method is manual soldering. Avoid flow soldering because it will heat the entire module and might possibly cause damage.

■ Benchtop high voltage power supplies (C9525, C9727)

- When connecting to AC power, always plug the power cable into a grounded 3-prong AC outlet. Using an ungrounded AC outlet or extension cable with no protective ground terminal will disable the protective function, possibly causing electrical shock or fire. If a grounded 3-prong AC outlet is not available, then use the supplied 3-pin to 2-pin converter plug and securely ground the product using the grounding lead coming out of the 3-pin to 2-pin converter plug.
- Avoid installing in any way that blocks the air vents or ventilation or installing in locations where the ambient temperature is too high. Operating in such locations may result in fire.
- When connecting to a load, use the supplied high-voltage output cable as much as possible. If not using the supplied high-voltage output cable, use a cable that can withstand more than the required high voltage. Using a cable that cannot withstand the high voltage will impair the protective function of the power supply, causing damage to the power supply and connected device and possible electrical shock.
- When connecting or disconnecting the high-voltage output cable with an SHV plug, always first make sure the high voltage output is OFF. Doing so while the high voltage output is ON may impair the protective function of the power supply, causing damage to the power supply and connected device and possible electrical shock.

■ Safety and warning display

<Safety alert symbols and signal words>



DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.



WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.



CAUTION indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

<Pictorial signs>



Electrical Shock Hazard
Indicates high voltage is present.
ISO 7071



Alternating current (AC)
Indicates voltage or current is alternating current.
IEC 60417 No.5032



Do not disassemble
Indicates disassembly is prohibited.
JIS S 0101



Power ON
Power is ON.
IEC 60417 No.5007



Direct current (DC)
Indicates voltage or current is direct current.
IEC 60417 No.5031



Power OFF
Power is OFF.
IEC 60417 No.5008

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