

# DA-Type Socket Assemblies

## Socket Assemblies with Transimpedance Amplifier (DA Type)

DA type socket assemblies contain an active voltage-divider circuit and an amplifier that converts high impedance current signals from the photomultiplier tube into low impedance voltage signals. These socket assemblies ensure stable photomultiplier operation with excellent output linearity.

### Features

- Active Voltage Divider
- Superior DC Output Linearity
- Photomultiplier Tube Gain Adjustment Function (C7246 series)
- Wide Frequency Bandwidth (C7247 series)
- Input/output Connectors (C7246-22, C7246-23, C7247-22, C7247-23)

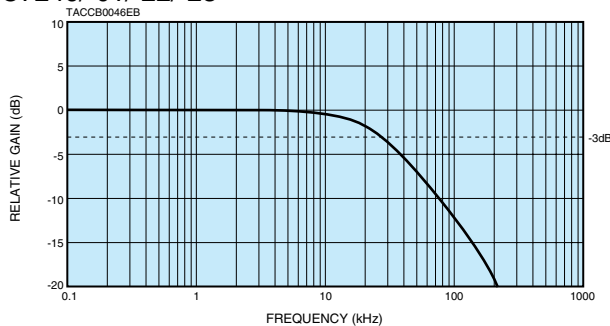
### Specifications

Type No.	Applicable PMTs	Amplifier					
		Input Voltage (V)	Maximum Input Voltage (V)	Maximum Supply Voltage (mA)	Frequency Bandwidth (-3 dB)	Current to Voltage Conversion Factor (V/μA)	Maximum Output Signal Voltage (V)
C7246-01	φ28 mm Side-on type	±12 to ±15	±18	+20/-0.53	DC to 20 kHz	0.3 (load resistance 10 kΩ)	+10 (load resistance 10 kΩ)
C7246-23							
C7247-01							
C7247-23							
C7246	φ28 mm Head-on type R374, R2228, R5929, R6094, R6095, etc.	±12 to ±15	±18	+20/-0.53	DC to 20 kHz	0.3 (load resistance 10 kΩ)	+10 (load resistance 10 kΩ)
C7246-22							
C7247							
C7247-22							

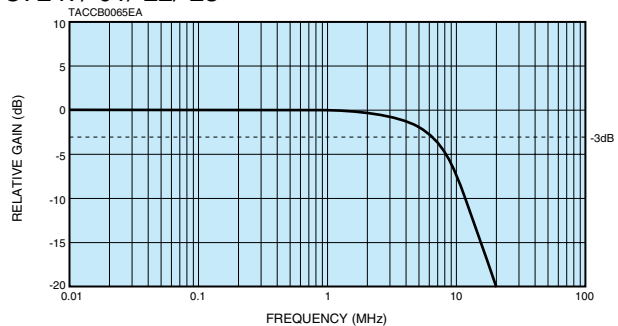
NOTE: Ⓐ If the output signal voltage is 3 V or higher (with 10 kΩ load), the divider circuit input voltage should be -600 V to -1000 V.

### Frequency Response of Built-in Amplifier

C7246/-01/-22/-23

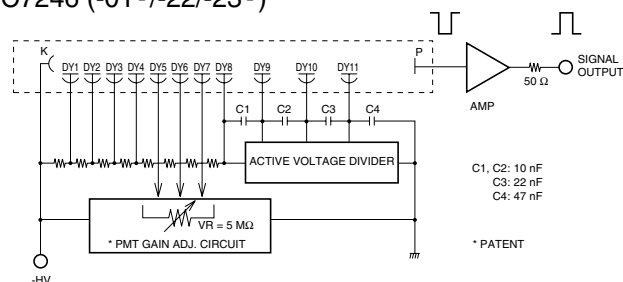


C7247/-01/-22/-23

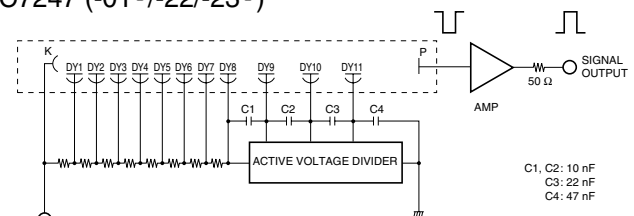


### Circuit Diagrams

C7246 (-01<sup>Ⓐ</sup>/-22/-23<sup>Ⓑ</sup>)



C7247 (-01<sup>Ⓐ</sup>/-22/-23<sup>Ⓑ</sup>)



NOTE: Ⓑ C7247-01/-23 are for 28 mm side-on PMT so that the last dynode number is "DY9"

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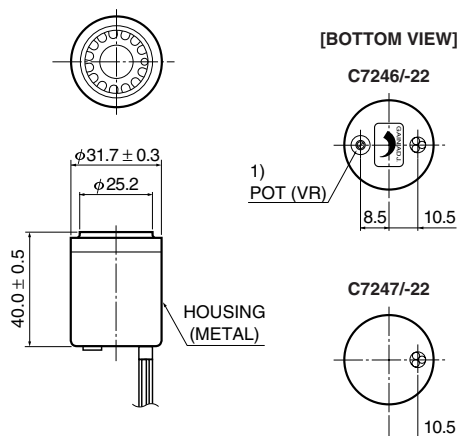
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Amplifier		Voltage-divider Circuit				Operating Ambient Temperature (°C)	Storage Temperature (°C)	Weight (g)
Offset Voltage Max. (mV)	Output Noise Voltage Typ. (mV rms)	Recommended Supply Voltage (V)	Maximum Supply Voltage (V)	Divider Current (μA)	PMT Gain Adjustable Range (dB)			
±1	0.09 (load resistance 10 kΩ)	-300 to -1000 <sup>A</sup>	-1500	211 (HV = -1000 V)	30	0 to +40	-15 to +60	50
±3	4.5 (load resistance 50 Ω)	-300 to -600		166 (HV = -600 V)	—			170 (With connectors)
±1	0.09 (load resistance 10 kΩ)	-400 to -1000 <sup>A</sup>		174 (HV = -1000 V)	10			55
±3	4.5 (load resistance 50 Ω)	-400 to -900		219 (HV = -900 V)	—			170 (With connectors)
								55
								170 (With connectors)

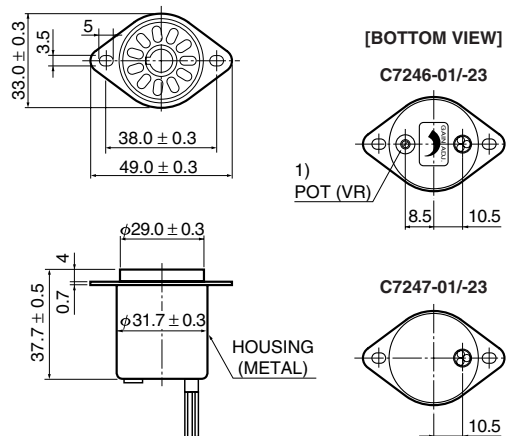
## Dimensional Outlines (Unit : mm)

C7246/-22, C7247/-22



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C7246-01/-23, C7247-01/-23



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Type No.	Input/output	Cable Type	Cable Length	Connector
C7246/-01	-HV	SHIELD CABLE <sup>2)</sup> (GRAY)	450 ± 10	—
C7247/-01	Signal Output	COAXIAL CABLE: RG-174/U (BLACK)		—
	±15 V	TWISTED PAIR CABLE WITH SHIELD <sup>3)</sup> (GRAY)	—	—
C7246-22/-23	-HV	SHIELD CABLE (GRAY)	1500 ± 25	SHV-P
C7247-22/-23	Signal Output	COAXIAL CABLE: RG-174/U (BLACK)		BNC-P
	±15 V	TWISTED PAIR CABLE WITH SHIELD (GRAY)	DIN (6 PIN)-P	

- NOTES: 1) Turning this pot clockwise decreases the PMT gain. (25 turns max.)  
 2) At the end of HV cable, it's possible to attach SHV connector fitting RG-174/U.  
 3) Connect as follow.  
 WHITE..... -15 V  
 ORANGE..... +15 V  
 SHIELD..... GND

\* See page 121 for details on flanges and housing contains a magnetic shield case.

# DP-Type Socket Assemblies

## High Voltage Power Supply Socket Assemblies (DP Type)

DP type socket assemblies include a high voltage power supply and so allow easily operating a photomultiplier tube just by supplying a low voltage (+15 V or +5 V). These socket assemblies ensure highly stable photomultiplier tube operation with excellent output linearity.

### Features

- Superior DC Output Linearity
- Active Voltage Divider (C12597-01, C13003-01, C13004-01)
- Fast High Voltage Programming Response (C12597-01, C13003-01, C13004-01)
- Cockcroft-Walton Circuit (C8991, C8991-01, C10344-03, C12842-01, C12842-02)
- Low Power Consumption (C8991, C8991-01, C10344-03, C12842-01, C12842-02)

### Specifications

Type No.	Applicable PMTs	Input Voltage (V)	Maximum Input Voltage (V)	Maximum Input Current (mA)	PMT	
					Linear DC Output Current Min. (μA)	Anode Ripple Noise Typ. (mVp-p)
C12597-01	φ28 mm side-on type	+15 ± 1	+18	60	100 <sup>Ⓒ</sup>	0.5
C8991		+11.5 to +15.5		8	100 <sup>Ⓓ</sup>	1
C8991-01		+13.5 to +15.5		10		1.5
C13003-01	φ25 mm head-on type R1924A, R1925A, R3550A, R5070A, etc.	+15 ± 1	+18	60	100 <sup>Ⓒ</sup>	0.5
C13004-01	φ28 mm head-on type R374, R2228, R5929, R6094, R6095, etc.			65		
C10344-03		+11.5 to +15.5		8	100 <sup>Ⓓ</sup>	1
C12842-01 <sup>Ⓐ</sup>	8 stage dynode, head-on type R6231, R6232, R6233, R6234, R6235, R6236, R6237, etc.	+5 ± 0.5	+6	3	100 <sup>Ⓓ</sup>	0.6 (Max.)
C12842-02 <sup>Ⓐ</sup>	10 stage dynode, head-on type R878, R550, R594, R877, R1512, R1513, etc.					

NOTE: <sup>Ⓐ</sup> C12842-01S/-02S which is with shutter(10ms to DC) function are also available. Please refer the individual datasheet for details.

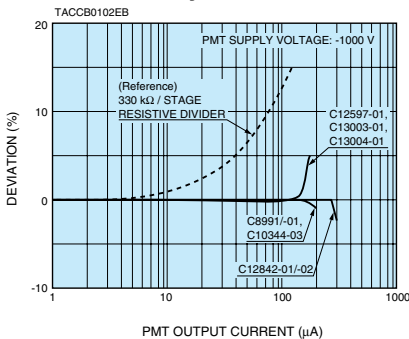
<sup>Ⓒ</sup> PMT Supply Voltage: -1000 V, Within: ±2 % linearity

<sup>Ⓓ</sup> PMT Supply Voltage: -1000 V, Within: ±0.5 % linearity

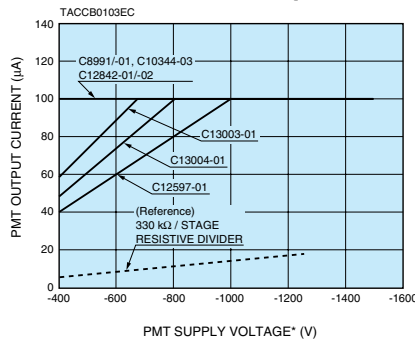
<sup>Ⓑ</sup> When photomultiplier tube is not attached.

<sup>Ⓔ</sup> Load resistance=1 MΩ, Load capacitance=20 pF to 25 pF

### DC Linearity Characteristics

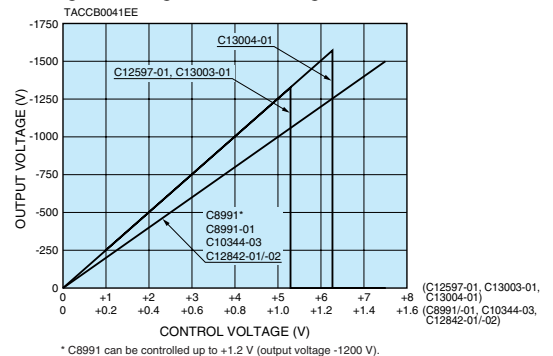


### Practical PMT DC Output Limits

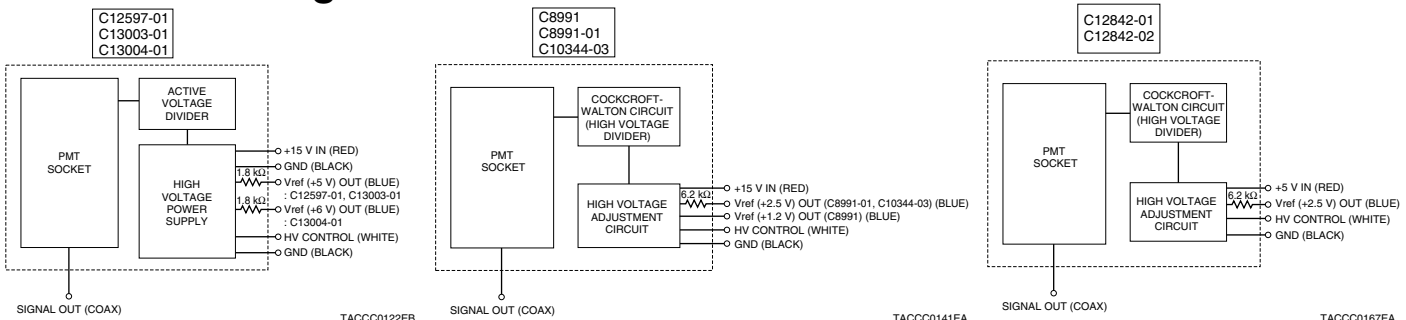


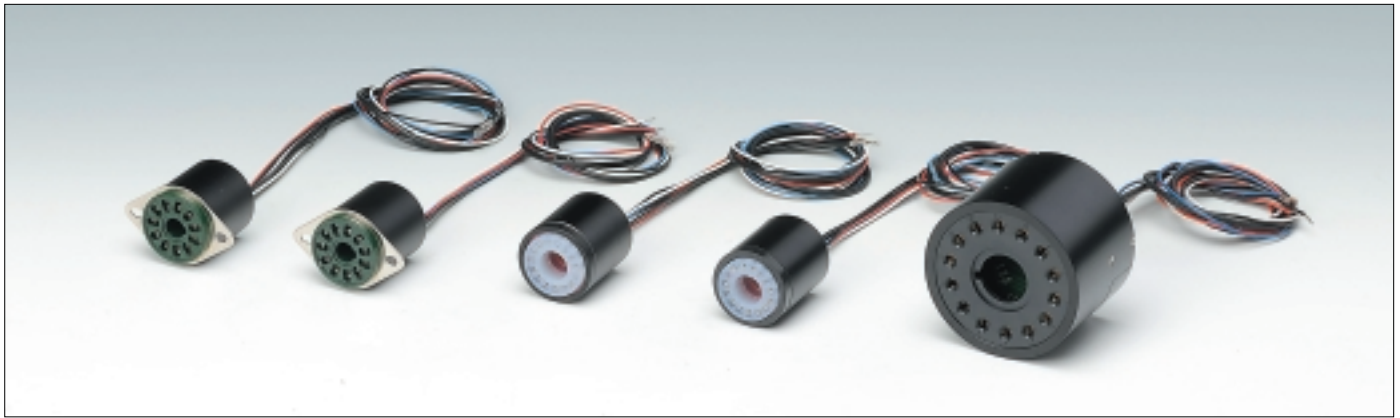
\* Photomultiplier tube must be used with a supply voltage within the rated range.

### High Voltage Controlling Characteristics



### Schematic Diagrams





High Voltage Power Supply								Weight (g)
Output Voltage Range (V)	Linear Regulation Typ. (%) <sup>Ⓒ</sup>	Output Voltage Control	Output Voltage Programming Response Typ. (ms) <sup>Ⓓ</sup>	Settling Time (s) <sup>Ⓘ</sup>	Temperature Coefficient Typ. (%/°C)	Operating Ambient Temperature (°C)	Storage Temperature (°C)	
-100 to -1250 <sup>Ⓕ</sup>	±0.01	0 V to +5 V or external 50 kΩ potentiometer	80	—	±0.01	0 to +50	-15 to +60	45
-200 to -1200 <sup>Ⓕ</sup>		0 V to +1.2 V or external 10 kΩ potentiometer	—	10	±0.005	0 to +50		57
-200 to -1500 <sup>Ⓕ</sup>		0 V to +1.5 V or external 10 kΩ potentiometer	—	10	±0.005	0 to +50		59
-200 to -1250 <sup>Ⓕ</sup>		0 V to +5 V or external 50 kΩ potentiometer	80	—	±0.01	0 to +40		40
-200 to -1500 <sup>Ⓕ</sup>		0 V to +6 V or external 50 kΩ potentiometer	—	10	±0.005	0 to +50		57
-200 to -1500 <sup>Ⓕ</sup>		0 V to +1.5 V or external 10 kΩ potentiometer	—	10	±0.01	0 to +50		176
0 to -1500		0 V to +1.5 V or external 10 kΩ potentiometer	—	10	±0.01	0 to +50		

Ⓕ Output voltage that guarantees the characteristics.

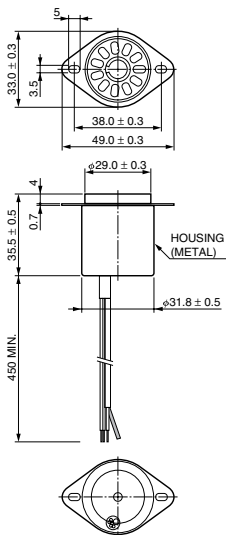
Ⓒ Against ±1 V input change

Ⓓ for 0%→99% HV change

Ⓘ The time required for the output to reach a stable level following a change in the control voltage from +1.0 V to +0.5 V.

## Dimensional Outlines (Unit: mm)

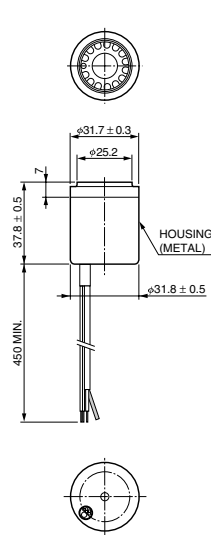
**C12597-01**



SIGNAL OUTPUT	COAXIAL CABLE RG-174/U
+15 V INPUT	AWG 24, RED
Vref OUTPUT	AWG 24, BLUE
HV CONTROL INPUT	AWG 24, WHITE
GND	AWG 24, BLACK
GND	AWG 24, BLACK

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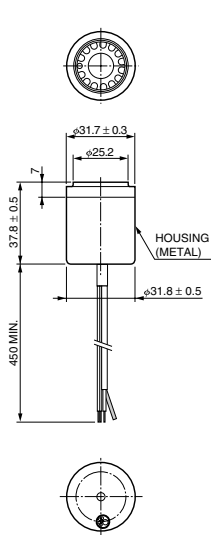
**C13003-01**



SIGNAL OUTPUT	COAXIAL CABLE RG-174/U
+15 V INPUT	AWG 24, RED
Vref OUTPUT	AWG 24, BLUE
HV CONTROL INPUT	AWG 24, WHITE
GND	AWG 24, BLACK
GND	AWG 24, BLACK

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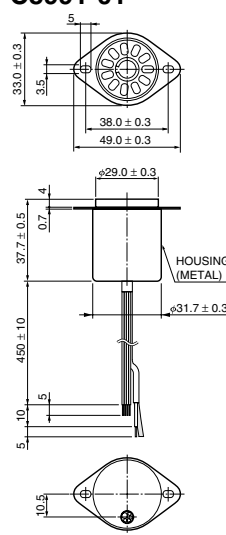
**C13004-01**



SIGNAL OUTPUT	COAXIAL CABLE RG-174/U
+15 V INPUT	AWG 24, RED
Vref OUTPUT	AWG 24, BLUE
HV CONTROL INPUT	AWG 24, WHITE
GND	AWG 24, BLACK
GND	AWG 24, BLACK

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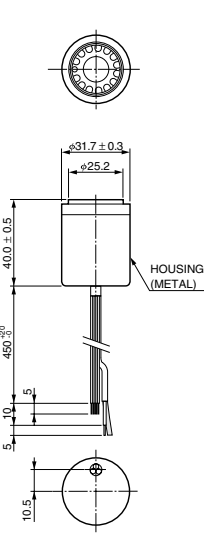
**C8991  
C8991-01**



SIGNAL OUTPUT	COAXIAL CABLE RG-174/U
+15 V INPUT	AWG 24, RED
Vref OUTPUT	AWG 24, BLUE
HV CONTROL INPUT	AWG 24, WHITE
GND	AWG 24, BLACK
GND	AWG 24, BLACK

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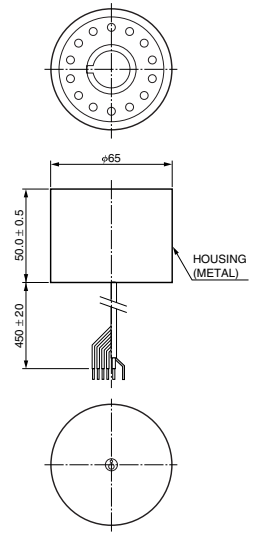
**C10344-03**



SIGNAL OUTPUT	COAXIAL CABLE RG-174/U
+15 V INPUT	AWG 24, RED
Vref OUTPUT	AWG 24, BLUE
HV CONTROL INPUT	AWG 24, WHITE
GND	AWG 24, BLACK
GND	AWG 24, BLACK

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**C12842-01/-02**



SIGNAL OUTPUT	COAXIAL CABLE RG-174/U
+5 V INPUT	AWG 26, RED
Vref OUTPUT	AWG 26, BLUE
HV CONTROL INPUT	AWG 26, WHITE
GND	AWG 26, BLACK
GND	AWG 26, BLACK

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\* See page 121 for details on flanges and housing contains a magnetic shield case.

# DAP-Type Socket Assemblies

## High Voltage Power Supply Socket Assemblies with Transimpedance Amplifier (DAP Type)

DAP type socket assemblies contain an high voltage power supply and an amplifier that converts high impedance current signals from the photomultiplier tube into low impedance voltage signals. These socket assemblies ensure stable photomultiplier operation with excellent output linearity.

### Features

- Superior DC Output Linearity
- Active Voltage Divider (C6271, C7950, C7950-01)
- Fast High Voltage Programming Response (C6271, C7950, C7950-01)
- Cockcroft-Walton Circuit (C12843-01, C12843-02)
- Low Power Consumption (C12843-01, C12843-02)
- Wide Frequency Bandwidth (C7950, C7950-01)
- Single Power Supply Operation (C6271)

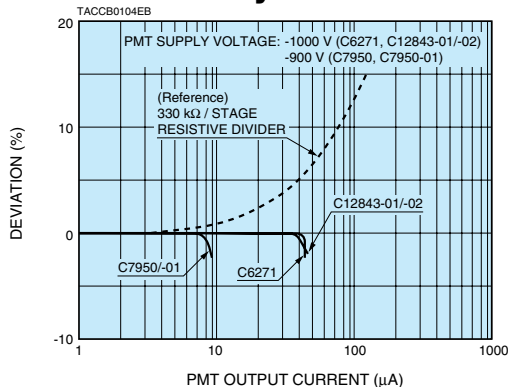
### Specifications

Type No.	Applicable PMTs	Input Voltage (V)	Maximum Input Voltage (V)	Maximum Input Current (mA) <sup>(B)</sup>	PMT		Amplifier	
					Linear DC Output Current Min. (μA)	Frequency Bandwidth (-3 dB)	Current to Voltage Conversion Factor (V/μA)	Maximum Output Signal Voltage (V)
C6271	φ28 mm side-on type	+15 ± 1	+18	+60/—	43 (load resistance 10 kΩ) <sup>(C)</sup>	DC to 10 kHz	0.3 (load resistance 10 kΩ)	+13 (load resistance 10 kΩ)
C7950					8 (load resistance 50 Ω) <sup>(D)</sup>	DC to 5 MHz	0.15 (load resistance 50 Ω)	+1.2 (load resistance 50 Ω)
C7950-01	φ28 mm head-on type R374, R2228, R5929, R6094, R6095, etc.	±15 ± 1	±18	+65/-20				
C12843-01 <sup>(A)</sup>	8 stage dynode, head-on type R6231, R6232, R6233, R6234, R6235, R6236, etc.	±5 ± 0.5	±6	+6.5/-3.5	40 (load resistance 10 kΩ) <sup>(E)</sup>	DC to 200 kHz	0.1 (load resistance 10 kΩ)	+4 (load resistance 10 kΩ)
C12843-02 <sup>(A)</sup>	10 stage dynode, head-on type R878, R550, R594, R877, R1512, R1513, etc.							

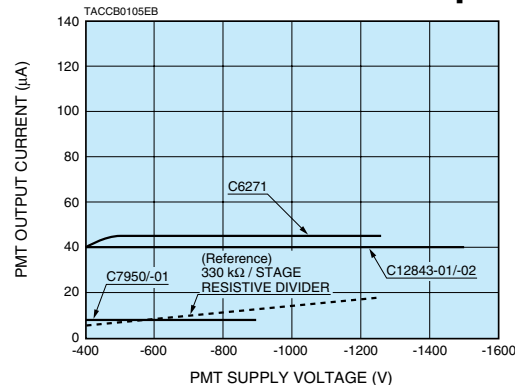
**NOTE:** (A) C12843-01S/-02S which is with shutter(10ms to DC) function are also available. Please refer the individual datasheet for details.  
(B) When photomultiplier tube is not attached.

(C) PMT Supply Voltage: -1000 V, Within: ±2 % linearity  
(D) PMT Supply Voltage: -900 V, Within: ±2 % linearity  
(E) PMT Supply Voltage: -1000 V, Within: ±0.5 % linearity

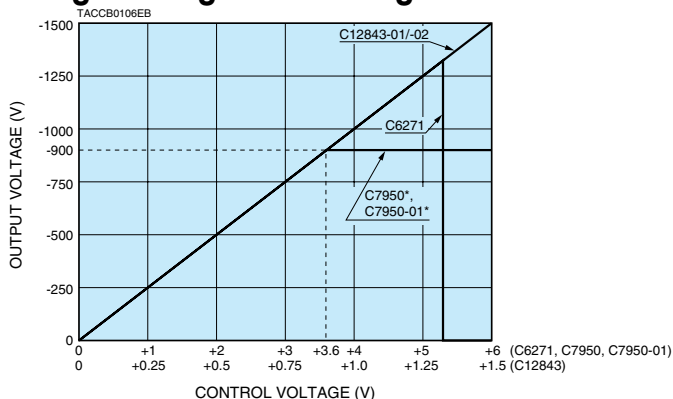
### DC Linearity Characteristics



### Practical PMT DC Output Limits

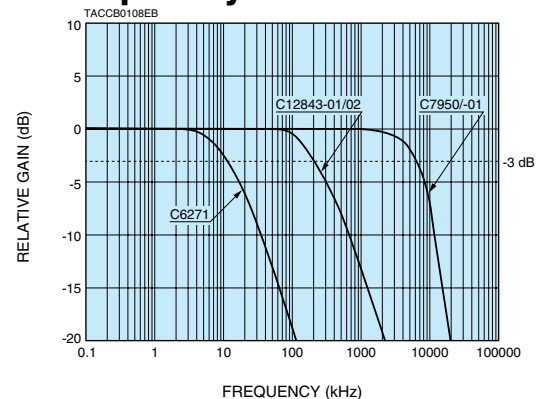


### High Voltage Controlling Characteristics



\* The output is -900 V even if the control voltage is set higher than +3.6 V.

### Frequency Bandwidth





Amplifier		High Voltage Power Supply						Operating Ambient Temperature (°C)	Storage Temperature (°C)	Weight (g)
Signal Output Offset Voltage Typ. (mV)	Induced Ripple on Signal Output	Output Voltage Range (V)	Line Regulation Typ. (%)	Output Voltage Control	Output Voltage Programming Response Typ. (ms)	Settling Time (s)	Temperature Coefficient Typ. (%/°C)			
±0.3	2 mVp-p (Typ.)	0 to -1250	±0.01	0 V to +5 V or external 50 kΩ potentiometer	80	—	±0.01	0 to +40	-15 to +60	55
±10	10 mVrms (Typ.)	0 to -900	±0.03	0 V to +3.6 V	80	—	±0.03	0 to +40		60
										60
±1	1 mVp-p (Max.)	0 to -1500	±0.01	0 V to +1.5 V or external 10 kΩ potentiometer	—	10	±0.01	0 to +50	180	

Ⓕ Load resistance=1 MΩ, Load capacitance=20 pF to 25 pF

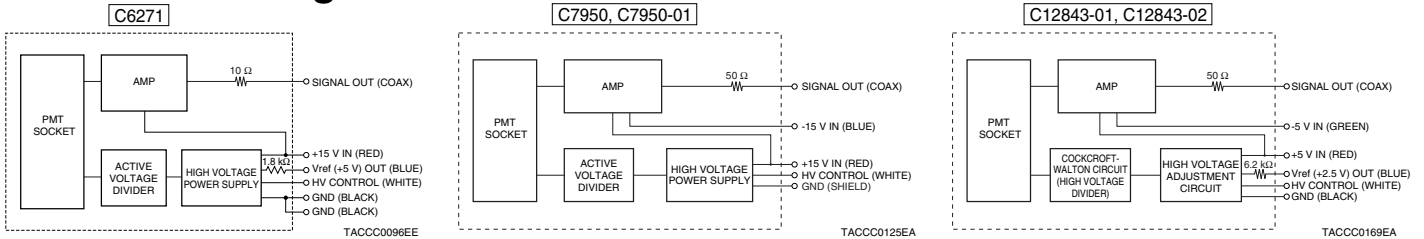
Ⓖ Load resistance=50 Ω, Load capacitance=25 pF

Ⓗ Against ±1 V input change

Ⓘ for 0%→99% HV change

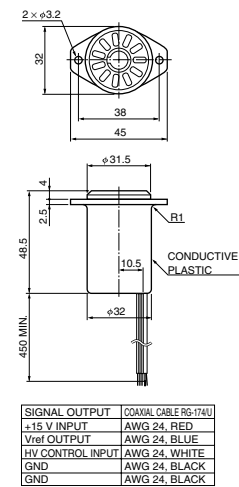
Ⓙ The time required for the output to reach a stable level following a change in the control voltage from +1.0 V to +0.5 V.

## Schematic Diagrams

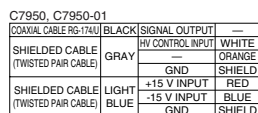
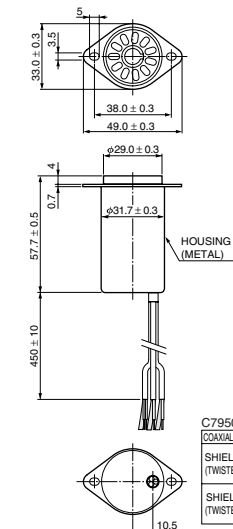


## Dimensional Outlines (Unit: mm)

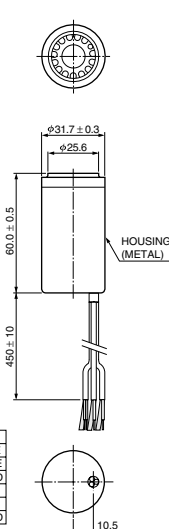
C6271



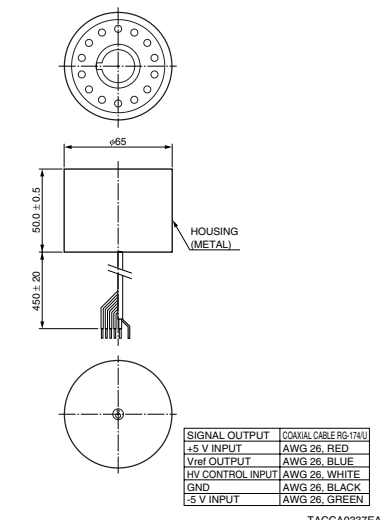
C7950



C7950-01



C12843-01/-02



\* See page 121 for details on flanges and housing contains a magnetic shield case.

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