

DA-Type Socket Assemblies

DA-TYPE SOCKET ASSEMBLIES C7246 SERIES, C7247 SERIES

The C7246 and C7247 series are DA type socket assemblies designed for 28 mm (1-1/8 inch) diameter side-on and head-on photomultiplier tubes. A voltage-divider circuit and an amplifier are incorporated in the same package.

The C7247 series uses an amplifier with a wide bandwidth of DC to 5 MHz, while the C7246 uses an amplifier with a practical bandwidth of DC to 20 kHz to improve the effective S/N ratio. The photomultiplier tube low-level, high-impedance current can be converted into a low-impedance voltage output.

Both the C7246 and C7247 series use an active voltage-divider circuit that ensures excellent DC linearity at low power consumption. The C7246 series also has a PMT gain adjustment function that does not affect amplifier frequency bandwidth.

Specifications

Parameter	C7246/C7246-22	C7246-01/C7246-23	C7247/C7247-22	C7247-01/C7247-23	Unit
Applicable PMTs	28 mm Dia. Head-on R374, R2228, R5929 R6094, R6095, etc.	28 mm Dia. Side-on	28 mm Dia. Head-on R374, R2228, R5929 R6094, R6095, etc.	28 mm Dia. Side-on	—

MAXIMUM RATINGS

Parameter	C7246/C7246-22	C7246-01/C7246-23	C7247/C7247-22	C7247-01/C7247-23	Unit
Input Voltage for Amplifier	± 18				V
Supply Voltage for Divider	-1500				V
Operating Ambient Temperature	0 to +40				°C
Storage Temperature	-15 to +60				°C

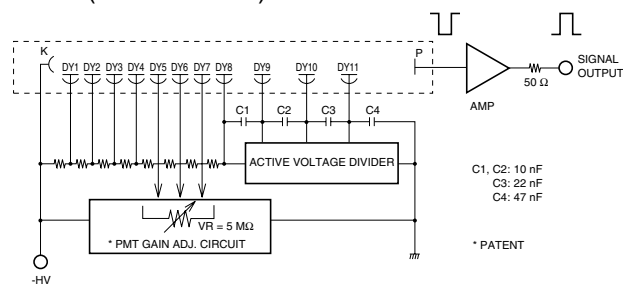
GENERAL

Parameter	C7246/C7246-22	C7246-01/C7246-23	C7247/C7247-22	C7247-01/C7247-23	Unit
Frequency Bandwidth (-3 dB)	DC to 20 kHz		DC to 5 MHz		—
Current to Voltage Conversion Factor	0.3 (at load resistance 10 k Ω)		0.15 (at load resistance 50 Ω)		V/ μ A
Maximum Output Signal Voltage	10 (at load resistance 10 k Ω)		3 (at load resistance 50 Ω)		V
Maximum Output Signal Current	18		60		mA
Output Impedance	50		50		Ω
Offset Voltage	Max.	± 1	± 3		mV
Output Noise Voltage (rms)	Typ.	0.09 (at load resistance 10 k Ω)	4.5 (at load resistance 50 Ω)		mV
PMT Gain Adjustable Range	Min.	10	30	—	dB
Input Voltage for Amplifier	± 12 to ± 15		± 12 to ± 15		V
Input Current for Amplifier (at ± 15 V)	Max.	+20 / -0.53	+140 / -50		mA
Recommended Supply Voltage for Divider	-400 to -1000 [Ⓐ]	-300 to -1000 [Ⓐ]	-400 to -900	-300 to -600	V
Divider Current	Typ.	174 (at HV = -1000 V)	211 (at HV = -1000 V)	166 (at HV = -600 V)	μ A
Weight	Typ.	55 / 170	50 / 170	55 / 170	g

NOTE: [Ⓐ] If the output signal voltage is 3 V or higher (with 10 k Ω load), the divider circuit input voltage should be -600 V or higher. (C7246/-01/-22/-23)

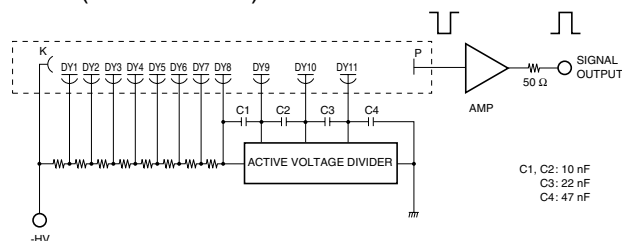
Circuit Diagrams

C7246 (-01[Ⓑ]/-22/-23[Ⓑ])



NOTE: [Ⓑ] C7246-01/-23 are for 28 mm side-on PMT so that the last dynode number is "DY9"

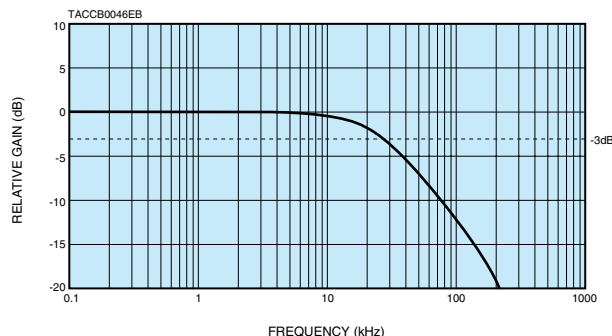
C7247 (-01[Ⓑ]/-22/-23[Ⓑ])



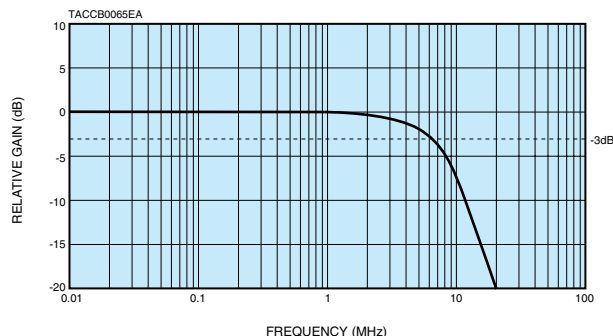
NOTE: [Ⓑ] C7247-01/-23 are for 28 mm side-on PMT so that the last dynode number is "DY9"

Frequency Response of Built-in Amplifier

C7246/-01/-22/-23

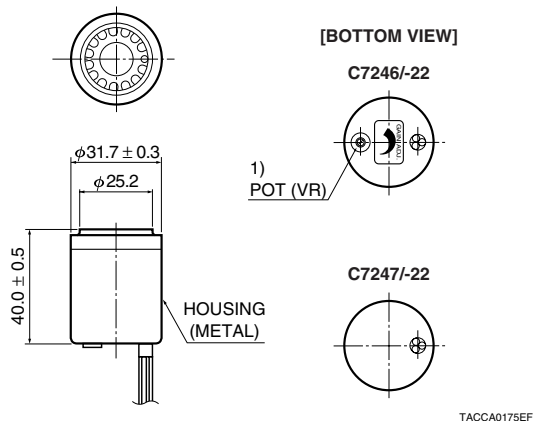


C7247/-01/-22/-23



Dimensional Outlines (Unit : mm)

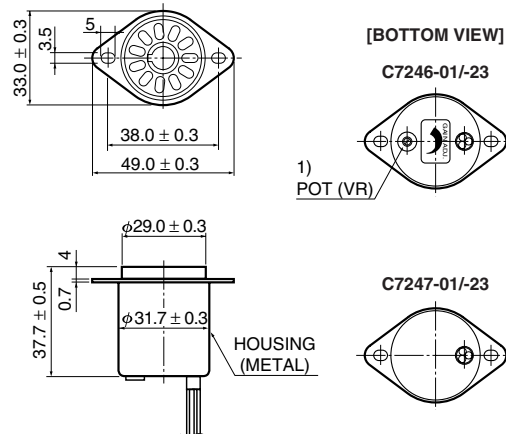
C7246/-22, C7247/-22



Type No.	Input/output	Cable Type	Cable Length	Connector
C7246/-01	-HV	COAXIAL CABLE ²⁾ (RED)	450 ± 10	—
C7247/-01	Signal Output	COAXIAL CABLE: RG-174/U (BLACK)	—	—
	±15 V	TWISTED PAIR CABLE WITH SHIELD ³⁾ (GRAY)	—	—
C7246/-22/-23	-HV	COAXIAL CABLE (RED)	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

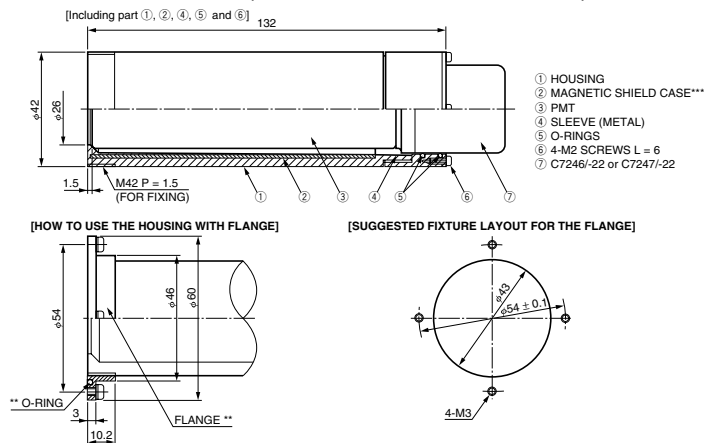
C7246-01/-23, C7247-01/-23



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Sold Separately

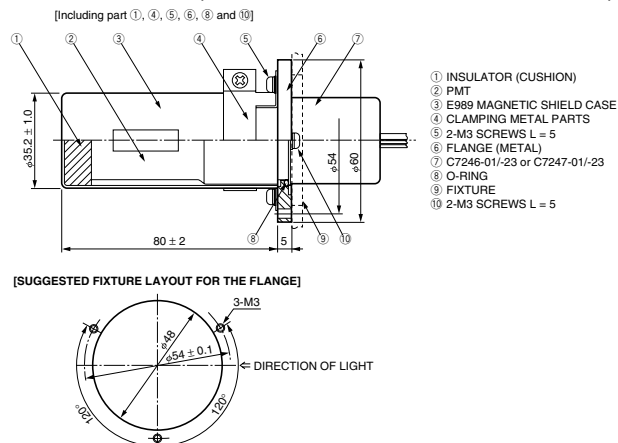
HOUSING E7718* (for C7246/-22 or C7247/-22)



* Can also be attached to C9028-01, C7950-01 and C10344-03.
 ** Flange and O-ring are sold separately. (Type No.: A7719)
 *** Magnetic shield case is electrically floating.

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FLANGE A7709* (for C7246-01/-23 or C7247-01/-23)



* Can also be attached to E717-63/500, C8991 and C7950.
 A7708 dedicated flange is provided for C6270 and C6271.

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DP-Type Socket Assemblies

HIGH VOLTAGE POWER SUPPLY SOCKET ASSEMBLY C6270, C9028-01, C9773, C8991, C10344-03 (DP Type)

C6270, C9028 and C9773 are high voltage power supply socket assemblies, incorporating a regulated high voltage power supply and an active voltage divider. It enables simple yet stable photomultiplier tube operations with extended DC output linearity by only supplying +15 V and connecting to a potentiometer or a 0 V to +5 V for high voltage adjustments.

The C8991 and C10344-03 use a Cockcroft-Walton type high voltage power supply that ensures high output linearity of photomultiplier tube while maintaining low power consumption.

Features (C6270, C9028-01, C9773)

- Active Voltage Divider
- Superior DC Output Linearity
- Fast High Voltage Programming Response
- Wide High Voltage Output Range
- Low Ripple / Noise

Features (C8991, C10344-03)

- Cockcroft-Walton Circuit
- Low Power Consumption
- Superior DC Output Linearity

Common Specifications

GENERAL

Parameter		C6270	C9028-01	C9773	C8991	C10344-03	Unit
Applicable PMTs		ϕ 28 mm side-on type	ϕ 28 mm head-on type R374, R2228 R5929, R6094 R6095, etc.	ϕ 25 mm head-on type R1924A, R1925A R3550A, R5070A	ϕ 28 mm side-on type	ϕ 28 mm head-on type R374, R2228 R5929, R6094 R6095, etc.	—
Input Voltage		$+15 \pm 1$			$+11.5$ to $+15.5$		V
Input Current		45	60	50	8		mA
Linear DC Output Current of PMT ^(A)	at -1000 V	Typ. 100 ^(A)			Typ. 100 ^(B)		μ A
	at -500 V	Typ. 50 ^(A)			Typ. 50 ^(B)		μ A
Operating Ambient Temperature		0 to +40			0 to +50		°C
Storage Temperature		-15 to +60			-15 to +60		°C
Weight		Typ. 50	60		57		g

NOTE: (A) Within: ± 2 % linearity (B) Within: ± 0.5 % linearity

HIGH VOLTAGE POWER SUPPLY

Parameter		C6270	C9028-01	C9773	C8991	C10344-03	Unit
Output Voltage Range		0 to -1250			-200 to -1200 ^(F)	-200 to -1500	V
Line Regulation Against ± 1 V Input Change		Typ. ± 0.01					%
Ripple / Noise (p-p) in High Voltage Output		0.008			—		%
Anode Ripple Noise ^(C) (p-p)		1					mV
Output Voltage Control		0 V to +5 V or external 50 k Ω potentiometer			0 V to +1.2 V or external 10 k Ω potentiometer	0 V to +1.5 V or external 10 k Ω potentiometer	—
Output Voltage Programming Response ^(D)		Typ. 80			—		ms
Settling Time ^(E)		—			10		s
Temperature Coefficient		Typ. ± 0.01			± 0.005		%/°C

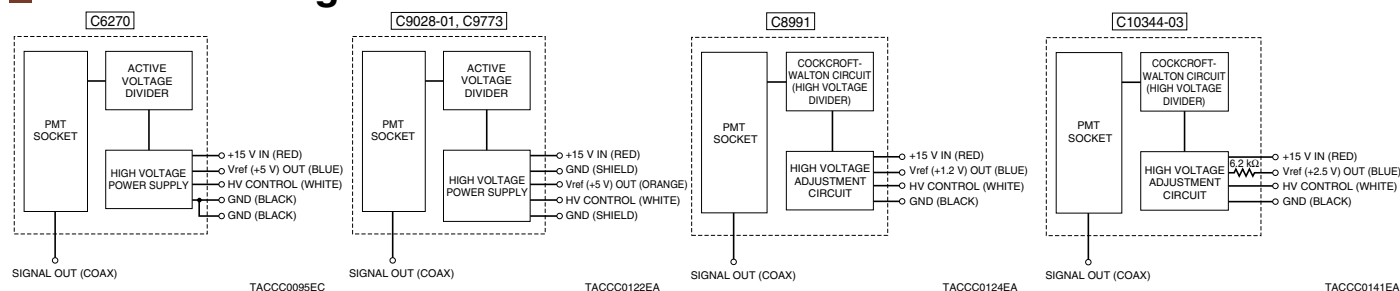
NOTE: (C) Load resistance = 1 M Ω , Load capacitance = 22 pF

(D) for 0 % $\rightarrow$ 99 % HV change

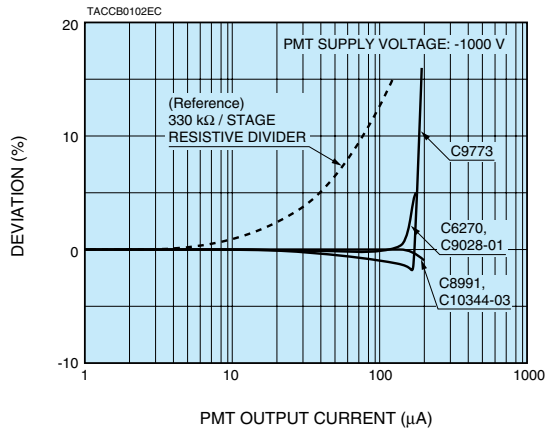
(E) The time required for the output to reach a stable level following a change in the control voltage from +1.0 V to +0.5 V.

(F) C8991-01 with an output voltage range of -200 V to -1500 V is also provided.

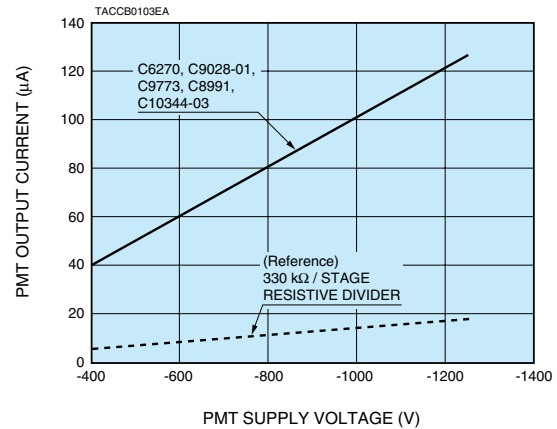
Schematic Diagrams



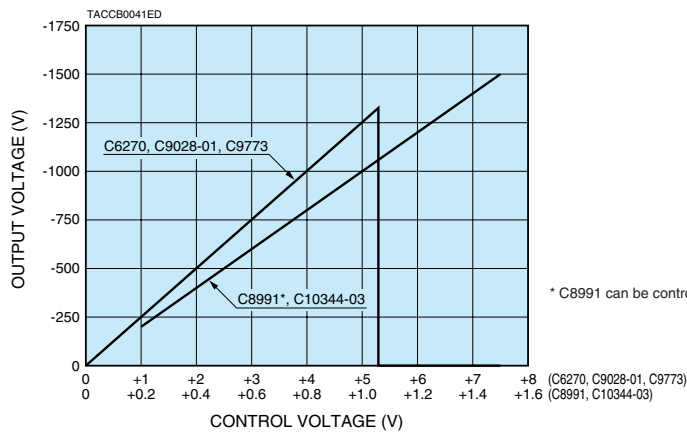
DC Linearity Characteristics



Practical PMT DC Output Limits

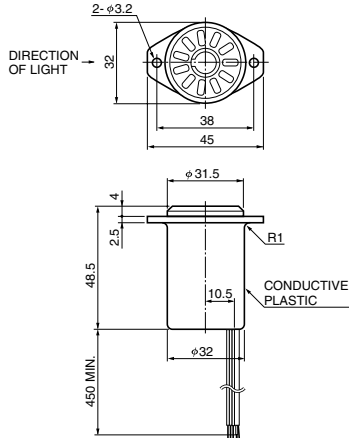


High Voltage Controlling Characteristics



Dimensional Outlines (Unit: mm)

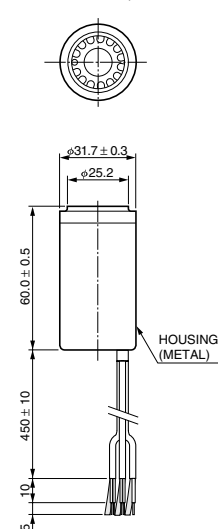
C6270



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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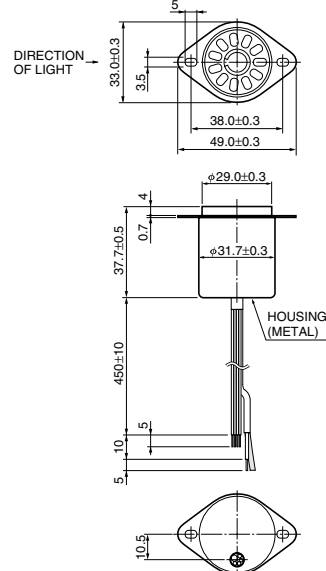
C9028-01, C9773



COAXIAL CABLE RG-174/U	BLACK	SIGNAL OUTPUT	—
HV CONTROL INPUT	WHITE	—	—
Vref OUTPUT	ORANGE	—	—
GND	SHIELD	—	—
+15 V INPUT	RED	—	—
—	BLUE	—	—
GND	SHIELD	—	—

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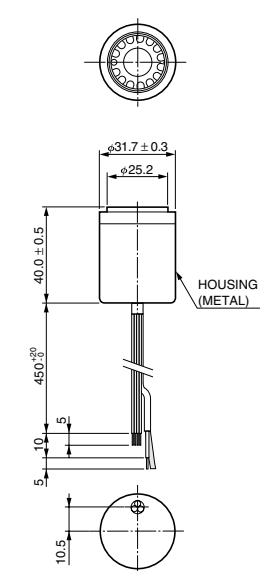
C8991



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

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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

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* See page 101 for details on flanges and housings.
(C9773 has no suitable flange and housing.)

DAP-Type Socket Assemblies

HIGH VOLTAGE POWER SUPPLY SOCKET ASSEMBLY WITH TRANSIMPEDANCE AMPLIFIER C6271, C7950, C7950-01 (DAP Type)

These DAP type socket assemblies incorporate a regulated high voltage power supply and transimpedance amplifier that converts high-impedance current signals of a photomultiplier tube into low-impedance voltage signals.

The C7950 series are compatible with a wide band from DC to 5 MHz. The C6271 has lower noise than that of the C7950 series, although the frequency range is from DC to 10 kHz.

Features

- Superior DC Output Linearity
- Fast High Voltage Programming Response
- Wide High Voltage Output Range
- Low Ripple / Noise
- Wide Frequency Bandwidth

Common Specifications

GENERAL

Parameter			C6271	C7950	C7950-01	Unit
Applicable PMTs			ϕ 28 mm (1-1/8") side-on type		ϕ 28 mm (1-1/8") head-on type	—
					R374, R2228, R5929	
					R6094, R6095, etc.	
Input Voltage			+15 $\pm$ 1	$\pm$ 15 $\pm$ 1		V
Input Current	+15 V	Typ.	+55	+60	+65	mA
	-15 V	Typ.	—	-20		mA
Linear DC Output Current of PMT [Ⓐ]	at -1000 V	Typ.	43			μ A
	at -500 V	Typ.	43			μ A
Operating Ambient Temperature			0 to +40			°C
Storage Temperature			-15 to +60			°C
Weight	Typ.		55	65	70	g

NOTE: (A) Within: ± 2 % linearity

HIGH VOLTAGE POWER SUPPLY

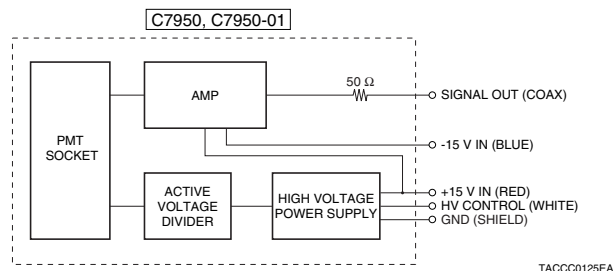
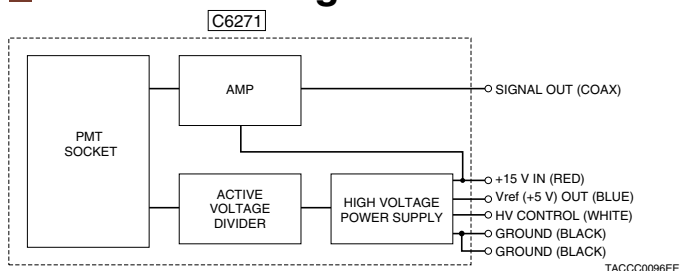
Parameter		C6271	C7950	C7950-01	Unit
Output Voltage Range		0 to -1250	0 to -900		V
Line Regulation Against ± 1 V Input Change	Typ.	± 0.01	± 0.03		%
Ripple / Noise (p-p) in High Voltage Output	Typ.	0.008	0.03		%
Output Voltage Control		0 V to +5 V or external 50 k Ω potentiometer	0 V to +3.6 V		—
Output Voltage Programming Response [®]	Typ.	80			ms
Temperature Coefficient	Typ.	± 0.01	± 0.03		%/ $^{\circ}$ C

NOTE: (B) for 0 % $\rightarrow$ 99 % HV change

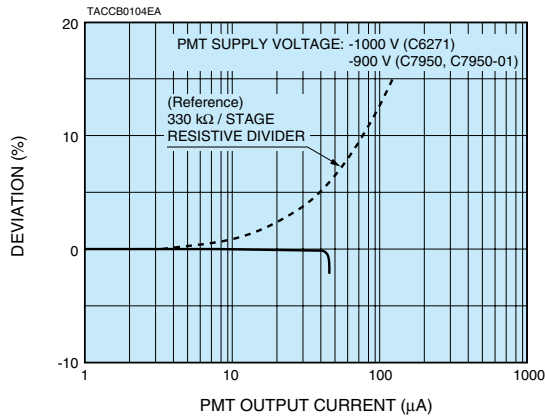
TRANSIMPEDANCE AMPLIFIER SECTION

Parameter			C6271	C7950	C7950-01	Unit
Frequency Bandwidth (-3 dB)			DC to 10 kHz	DC to 5 MHz		—
Current to Voltage Conversion Factor			0.3 (at load resistance 10 k Ω)	0.15 (at load resistance 50 Ω)		V/ μ A
Maximum Output Voltage			13 (at load resistance 10 k Ω)	2 (at load resistance 50 Ω)		V
Signal Output Offset Voltage	Typ.		-0.3 to +0.3	± 10		mV
Induced Ripple (p-p) on Signal Output	Typ.		2	10		mV

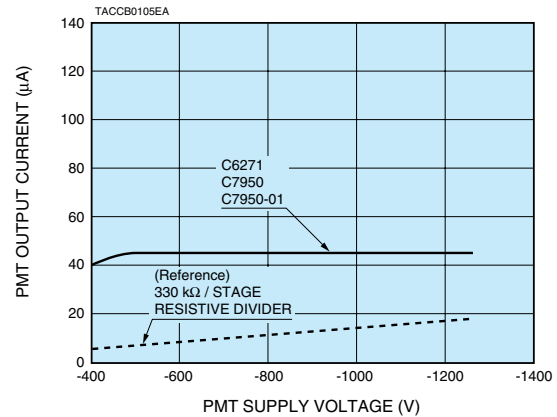
Schematic Diagrams



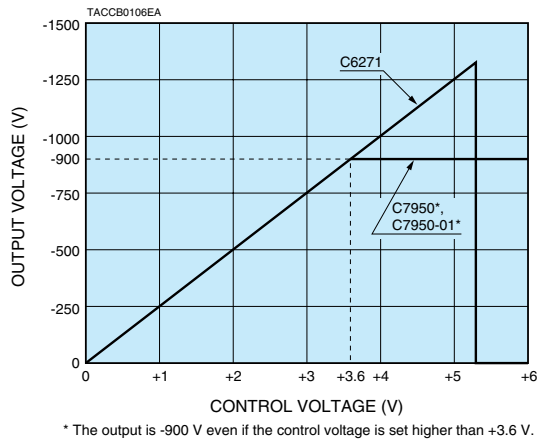
DC Linearity Characteristics



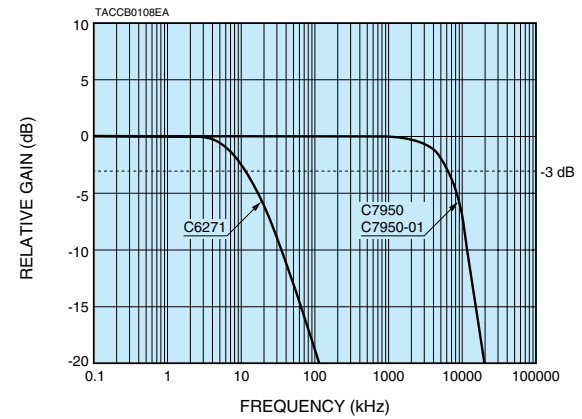
Practical PMT DC Output Limits



High Voltage Controlling Characteristics

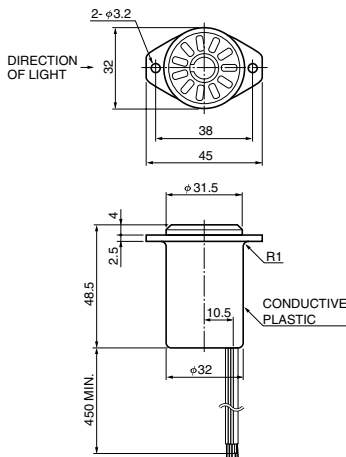


Frequency Bandwidth



Dimensional Outlines (Unit: mm)

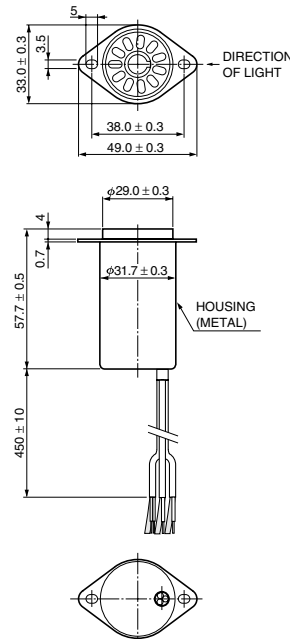
C6271



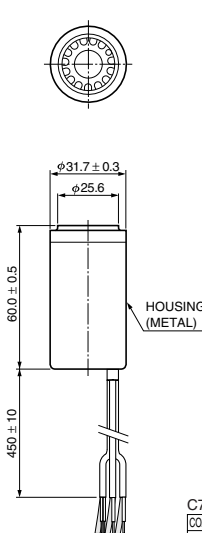
SIGNAL OUTPUT	COAXIAL CABLE RG-174/U
+15 V INPUT	AWG 24, RED
V _{ref} OUTPUT	AWG 24, BLUE
HV CONTROL INPUT	AWG 24, WHITE
GND	AWG 24, BLACK
GND	AWG 24, BLACK

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C7950



C7950-01



C7950, C7950-01	
COAXIAL CABLE RG-174/U	BLACK
SHIELDED CABLE (TWISTED PAIR CABLE)	GRAY
SIGNAL OUTPUT	—
HV CONTROL INPUT	WHITE
GND	ORANGE
+15 V INPUT	RED
-15 V INPUT	BLUE
GND	SHIELD

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* See page 101 for details on flanges and housings.