

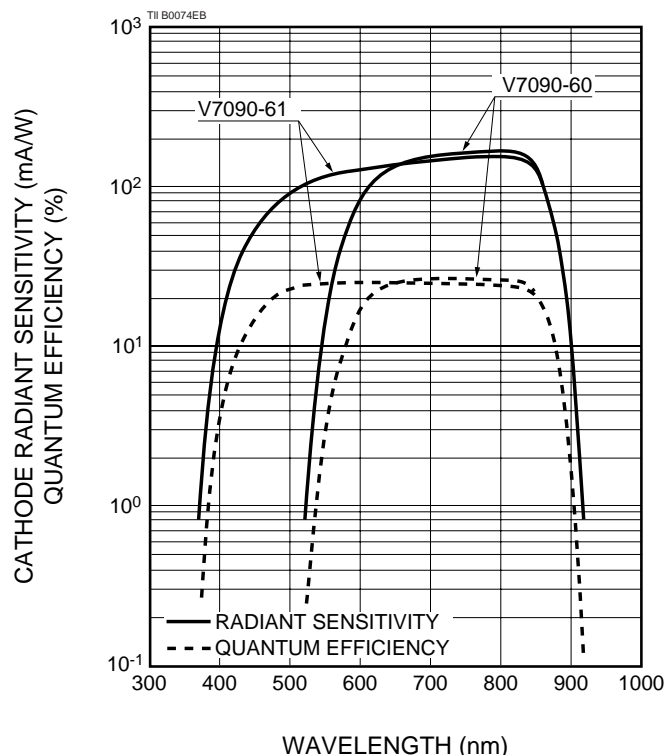
FEATURES

- **High Photocathode Sensitivity**
V7090-60 GaAs (Cs) Photocathode
V7090-61 Blue-enhanced GaAs (Cs) Photocathode
- **Gating Operation** 5 ns (Gate Width)
- **High Image Quality**
(Multi-boundary deviation and Multi-to-multi deviation free)
- **No Image Distortion**
- **Compact and Lightweight**

APPLICATIONS

- **Shutter Camera**
- **Low-light-level Imaging**
(with image sensors such as CCD, vidicon, etc.)
Microscope, Low-light-level TV, etc.
- **Low-light-level Multichannel Detector**
(with linear photodiode array, etc.)
Emission spectroscopy, etc.

Figure 1: Typical Spectral Response



SPECIFICATION

GENERAL

Parameter		V7090U-60-G130	V7090U-61-G130	Unit
Spectral Response		520 to 920	370 to 920	nm
Wavelength of Maximum Response		830	830	nm
Photocathode	Material	GaAs (Cs)	Blue-enhanced GaAs (Cs)	—
	Minimum Effective Area	φ 18		mm
Input Window	Material	Borosilicate Glass		—
	Thickness	5.5		mm
	Index of Refraction at 589.3nm	1.487		—
MCP		1 stage		—
Phosphor Screen	Material	P-43		—
	Minimum Effective Area	φ 18		mm
Output Window Material		Fiber optic plate		—
Case Material		Poly Oxy Methylene (POM)		—
Lead Wire Cover Material		Teflon		—
Weight		80		g

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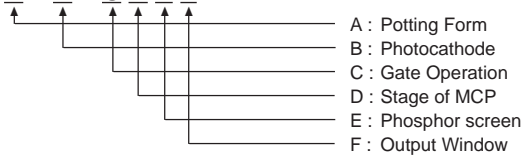
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PROXIMITY FOCUSED IMAGE INTENSIFIER V7090 SERIES

SELECTION GUIDE BY SUFFIX NUMBER

V7090 A - B - C D E F



A	Suffix No.	Potting Form
U		See Figure 7
D		

B	Suffix No.	Photocathode
- 60		GaAs (Cs)
- 61		Blue-enhanced GaAs (Cs)

C	Suffix No.	Gate Type
N		Non-Gate
G		Gateable (5ns)

D	Suffix No.	Stage of MCP
1		1
2		2
3		3

E	Suffix No.	Phosphor Screen
0		P-20
1		P-11
3		P-43
4		P-24
6		P-46
7		P-47

F	Suffix No.	Output Window
0		Fiber Optic Plate
1		Fiber Optic Plate W/NESA *
2		Borosilicate Glass

* With Transparent Conductive Coating

RATINGS

Parameter		Value	Maximum Rating	Unit	
Supply Voltage	Photocathode and MCP-In	750 to 800	830	Vdc	
	MCP-In and MCP-Out	1 stage MCP	910	Vdc	
		2 stage MCP	1000 to 1800	1820	Vdc
		3 stage MCP	1500 to 2700	2730	Vdc
MCP-Out and Phosphor Screen		6000	6100	Vdc	
Temperature	Storage	-	-55 to +65	°C	
	Operating	-	-20 to +40	°C	
	Shock	-	12	°C/min	

CHARACTERISTICS

Parameter		V7090-60			V7090-61			Unit	
		Min.	Typ.	Max.	Min.	Typ.	Max.		
Photocathode Sensitivity	Luminous [Ⓐ]	1000	1300	-	800	1000	-	μA/lm	
	Radiant Sensitivity (Quantum Efficiency)	at 450nm	-	-	-	-	54 (14.9)	-	mA/W (%)
		at 550nm	-	14 (3.2)	-	-	110 (24.8)	-	
		at 600nm	-	79 (16.3)	-	-	123 (25.4)	-	
		at 700nm	-	150 (26.6)	-	-	143 (25.3)	-	
		at 830nm	-	161 (24.0)	-	-	152 (22.7)	-	
at 900nm	-	11 (1.5)	-	-	11 (1.5)	-			
Light Gain	Luminous Gain [Ⓑ]	1 stage MCP	2.0 × 10 ⁴	4.0 × 10 ⁴	-	1.0 × 10 ⁴	3.0 × 10 ⁴	-	lm/m ² /lx [Ⓒ]
		2 stage MCP	4.0 × 10 ⁶	1.0 × 10 ⁷	-	3.5 × 10 ⁶	8.0 × 10 ⁶	-	
		3 stage MCP	4.0 × 10 ⁷	1.0 × 10 ⁸	-	3.5 × 10 ⁷	8.0 × 10 ⁷	-	
	Radiant Emittance Gain [Ⓓ]	1 stage MCP	-	1.0 × 10 ⁴	-	-	9.4 × 10 ³	-	W/m ² /W/m ²
		2 stage MCP	-	2.5 × 10 ⁶	-	-	2.3 × 10 ⁶	-	
		3 stage MCP	-	2.5 × 10 ⁷	-	-	2.3 × 10 ⁷	-	
EBI [Ⓔ]	Luminous	-	2.0 × 10 ⁻¹¹	5.0 × 10 ⁻¹¹	-	2.0 × 10 ⁻¹¹	5.0 × 10 ⁻¹¹	lm/cm ²	
	Radiant [Ⓕ]	-	4.0 × 10 ⁻¹⁴	1.0 × 10 ⁻¹³	-	4.0 × 10 ⁻¹⁴	1.0 × 10 ⁻¹³	W/cm ²	
Limiting Resolution [Ⓖ]	1 stage MCP	36	40	-	36	40	-	Lp/mm	
	2 stage MCP	28	32	-	28	32	-		
	3 stage MCP	25	28	-	25	28	-		
Gate Time (Gate Width)		5	-	-	5	-	-	ns	

NOTE: Ⓐ The light source is a tungsten filament lamp operated at a distribution temperature of 2856K. Supply voltage is 800 volts between the photocathode and all other electrodes (MCP-In, MCP-Out, Phosphor Screen) connected together as anode.

Ⓑ The luminous gain has relation to the screen luminance Lo (cd/m²) and the illuminance Ei (lx) incident on the photocathode, and expressed by:

$$\text{Luminous Gain} = \pi \cdot \frac{L_o}{E_i}$$

The supply voltages are as follows.

Photocathode and MCP-In 800 Vdc
 MCP-In and MCP-Out
 (1 stage MCP) 900 Vdc
 (2 stage MCP) 1800 Vdc
 (3 stage MCP) 2700 Vdc
 MCP-Out and Phosphor Screen 6000 Vdc

Ⓒ The ratio of the phosphor screen radiant emittance in watts per square meter (W/m²) to the irradiance (W/cm²) on the photocathode. The supply voltages are the same as Ⓐ.

Ⓓ The value at the wavelength of peak response.

Ⓔ The inherent background noise of an image intensifier is normally specified as the input illuminance (or irradiance) required to produce a luminous emittance from the phosphor screen, equal to that obtained when the input illuminance is zero. This indicates the lower limit of detectable illuminance of an image intensifier.

Ⓕ The measure of the ability to detect while and black stripes in an image formed at the photocathode, in terms of line pairs (Lp) (one black and one white stripe) per millimeter. This is the value at an MTF (Modulation Transfer Function) of 5%.

Ⓖ 1 lm/m² = 0.0929 ft-L
 1 lx = 0.0929 ft-c
 1 lm/m²/lx = 1 ft-L/ft-c

Figure 2: Typical Luminous Gain vs. MCP Voltage

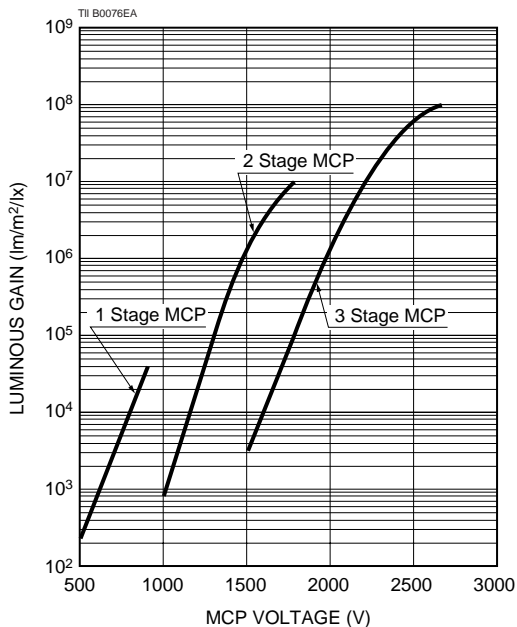


Figure 3: Typical Photocathode Input Illuminance vs. Phosphor Luminous Emittance

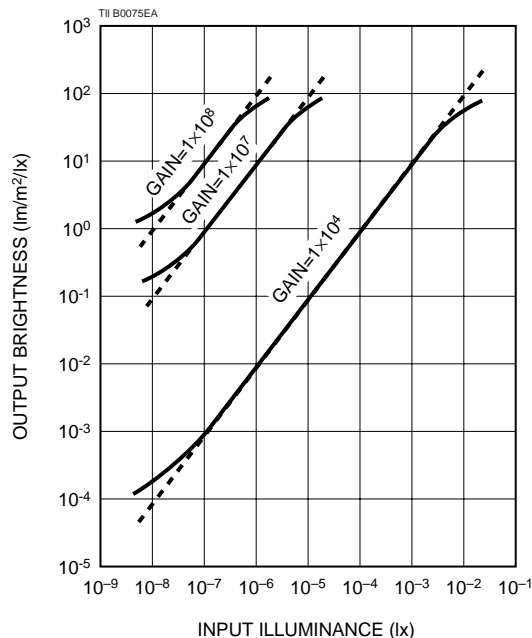


Figure 4: Various Phosphor Screen Spectral Emission

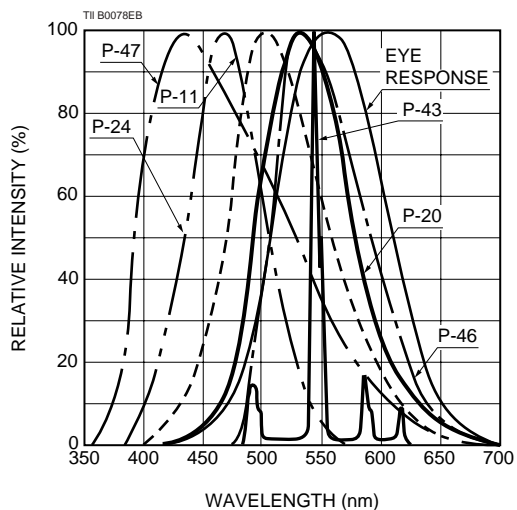
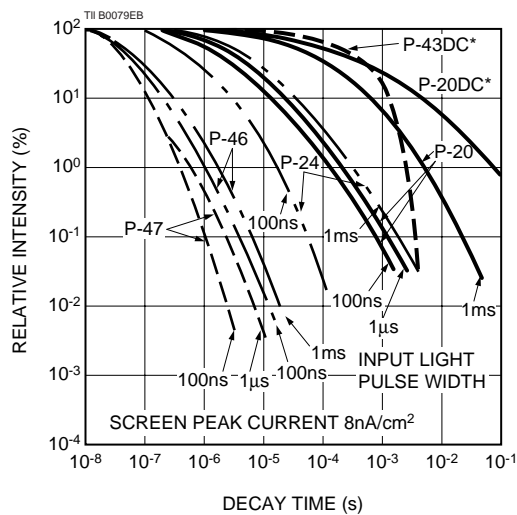


Figure 5: Phosphor Screen Decay Characteristics



★ Decay time obtained following to the continuous input light removal.

Decay Time, Emission Color and Efficiency of Phosphor Screen

Phosphor Screen	P-11	P-20	P-24	P-43	P-46	P-47
Decay Time (to 10%)	30 to 100 µs [Ⓐ]	0.01 to 4 ms [Ⓐ]	3 to 40 µs	1 ms	0.2 to 100 µs	0.1 µs
Emission Color	Blue	Yellowish Green	Green	Yellowish Green	Yellowish Green	Purplish Blue
Relative Power Efficiency [Ⓑ]	1	1	0.4	1	0.3	0.3

NOTE: Ⓐ Varies with input pulse width.

Ⓑ Relative value when P-43 is made as 1. The unit for the power efficiency is expressed W/m².

PROXIMITY FOCUSED IMAGE INTENSIFIER V7090 SERIES

Figure 6: Typical MTF

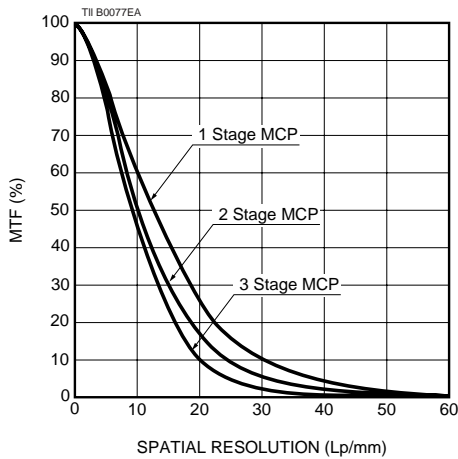
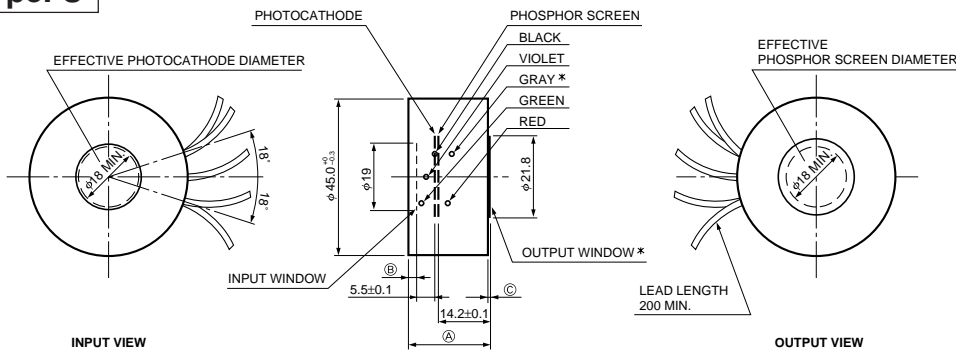


Figure 7: Dimensional Outline (Unit: mm)

The input window of the type U is depressed from the front surface of its housing. The input window of the type D is projected from the front surface of its housing. The input window thickness of both U and D types is 5.5 ± 0.1 mm.

Type. U

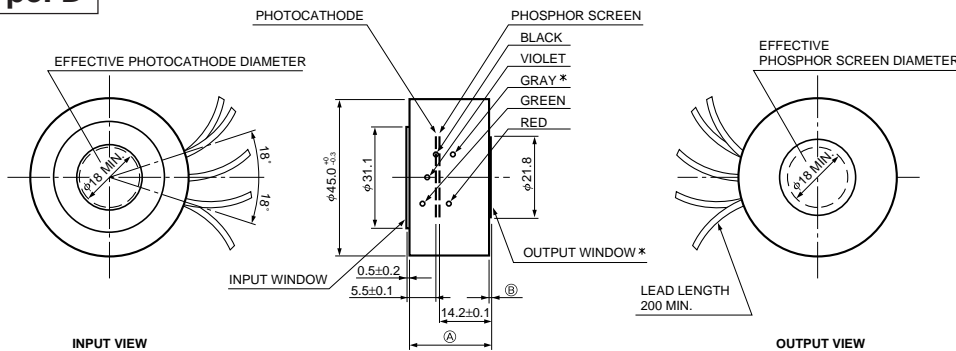


MCP	Ⓐ	Ⓑ	Ⓒ
1 stage	23.0±0.3	2.0±0.3	0.5±0.2
2 stage	23.0±0.3	1.5±0.3	0.5±0.2
3 stage	24.0±0.4	2.0±0.4	1.5±0.2

LEAD (Teflon Cover)
 GREEN (PHOTOCATHODE)
 VIOLET (MCP-IN)
 BLACK (MCP-OUT)
 RED (PHOSPHOR SCREEN)
 GRAY* (NESA/GND)

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Type. D



MCP	Ⓐ	Ⓑ
1 stage	21.0±0.4	0.5±0.3
2 stage	21.5±0.4	0.5±0.3
3 stage	22.0±0.5	0.5±0.4

LEAD (Teflon Cover)
 GREEN (PHOTOCATHODE)
 VIOLET (MCP-IN)
 BLACK (MCP-OUT)
 RED (PHOSPHOR SCREEN)
 GRAY* (NESA/GND)

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* Gray cable will be connected when the tube has a fiber optic output window with NESA coating, which is expressed as "1" in the suffix-F.

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