

TOSHIBA PHOTO-INTERRUPTER INFRARED LED + PHOTODARLINGTON TRANSISTOR

TLP863

VCRS, COMPACT DISC PLAYERS

COPIERS, FAX MACHINES, PRINTERS

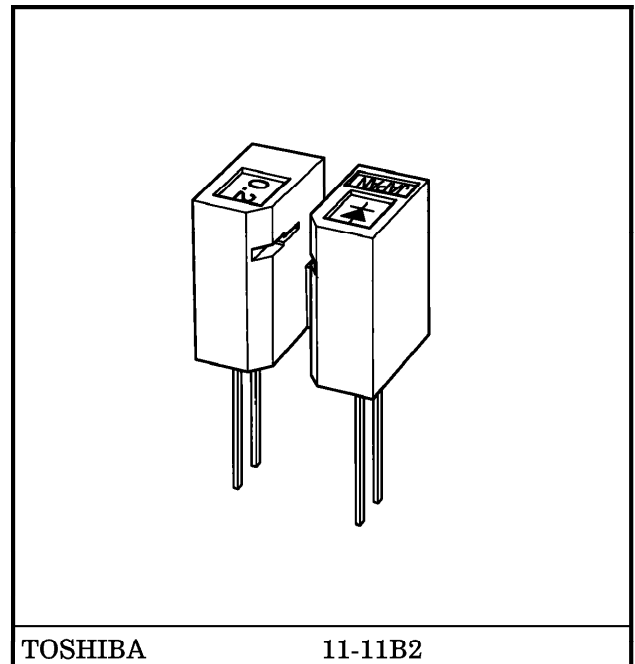
VENDING MACHINES, TICKET MACHINES

VARIOUS POSITION DETECTION SENSORS

The TLP863 photo-interrupters combines a GaAs infrared LED with a high-sensitivity Si photodarlington transistor. The TLP863 exhibits a high current transfer ratio, can be driven using a low input current and are best suited for use in low-power circuits.

Due to its oblong detection slit, this phototransistor is best suited to vertical position detection.

- Small package
- Designed for direct mounting on printed circuit boards (positioning pins included).
- Gap : 2.2 mm
- High resolution : Slit width = 0.2 mm (the oblong slit)
- High current transfer ratio : $I_C / I_F = 25\%$ (min) at $I_F = 1 \text{ mA}$
- Detector impermeable to visible light.
- Package material : Polycarbonate



TOSHIBA

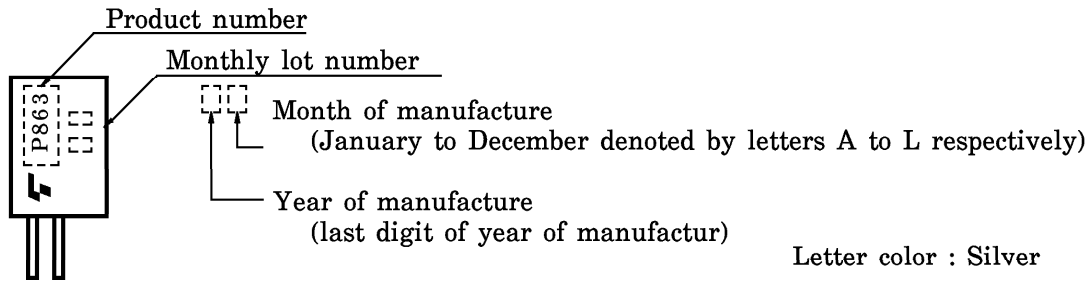
11-11B2

Weight : 0.9 g (typ.)

MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

CHARACTERISTIC		SYMBOL	RATING	UNIT
LED	Forward Current	I_F	50	mA
	Forward Current Derating ($T_a > 25^\circ\text{C}$)	$\Delta I_F / ^\circ\text{C}$	-0.33	mA / $^\circ\text{C}$
	Reverse Voltage	V_R	5	V
DETECTOR	Collector-Emitter Voltage	V_{CEO}	30	V
	Emitter-Collector Voltage	V_{ECO}	5	V
	Collector Power Dissipation	P_C	75	mW
	Collector Power Dissipation Derating ($T_a > 25^\circ\text{C}$)	$\Delta P_C / ^\circ\text{C}$	-1	mW / $^\circ\text{C}$
	Collector Current	I_C	40	mA
Operating Temperature Range		T_{opr}	-25~85	$^\circ\text{C}$
Storage Temperature Range		T_{stg}	-40~100	$^\circ\text{C}$
Soldering Temperature (5 s)		T_{sol}	260	$^\circ\text{C}$

MARKINGS



RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	Min	Typ.	Max	UNIT
Supply Voltage	V_{CC}	—	5	16	V
Forward Current	I_F	—	—	20	mA
Operating Temperature	T_{opr}	-10	—	70	°C

OPTICAL AND ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	Min	Typ.	Max	UNIT
LED	Forward Voltage	V_F	$I_F = 10 \text{ mA}$	1.00	1.15	1.30	V
	Reverse Current	I_R	$V_R = 5 \text{ V}$	—	—	10	μA
	Peak Emission Wavelength	λ_P	$I_F = 10 \text{ mA}$	—	940	—	nm
DETECTOR	Dark Current	$I_D (I_{CEO})$	$V_{CE} = 16 \text{ V}, I_F = 0$	—	—	0.25	μA
	Peak Sensitivity Wavelength	λ_P	—	—	870	—	nm
COUPLED	Current Transfer Ratio	I_C / I_F	$V_{CE} = 2 \text{ V}, I_F = 1 \text{ mA}$	25	—	1000	%
	Collector-Emitter Saturation Voltage	$V_{CE} (\text{sat})$	$I_F = 2 \text{ mA}, I_C = 0.5 \text{ mA}$	—	0.75	1	V
	Rise Time	t_r	$V_{CC} = 5 \text{ V}, I_C = 1 \text{ mA}, R_L = 1 \text{ k}\Omega$	—	600	—	μs
	Fall Time	t_f		—	500	—	

PRECAUTIONS

The following points must be borne in mind.

1. Clean only the soldered part of the leads. Do not immerse the entire package in the cleaning solvent.
2. The package is made of polycarbonate. Polycarbonate is usually stable with acid, alcohol and aliphatic hydrocarbons, however, with petrochemicals (such as benzene, toluene and acetone), alkalis, aromatic hydrocarbons, or chloric hydrocarbons, polycarbonate may crack, swell or melt. Please take this into account when choosing a packaging material by referring to the table below.

<Chemicals which should not be used with polycarbonate>

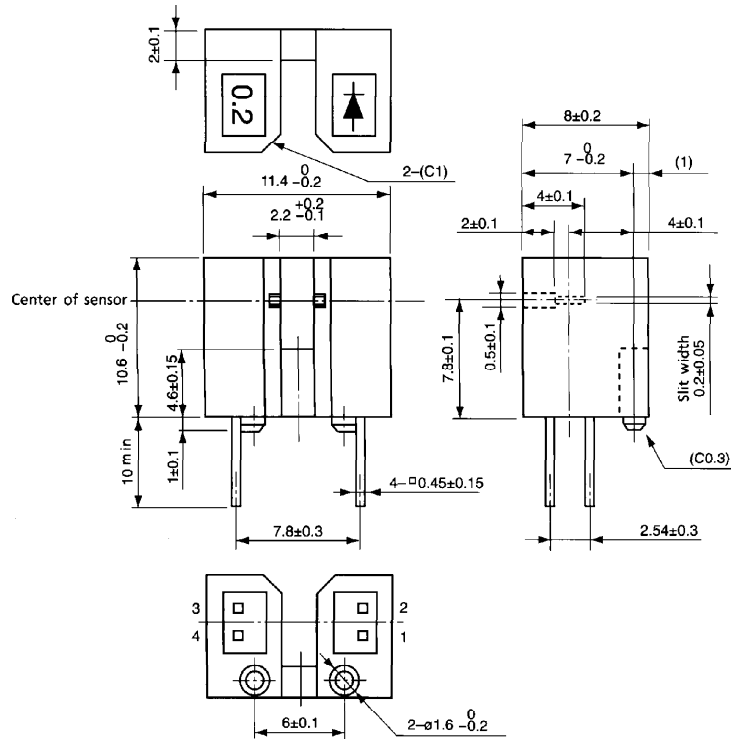
	PHENOMENON	CHEMICALS
A	Staining and slight deterioration	<ul style="list-style-type: none"> • Nitric acid (diluted), hydrogen peroxide, chlorine
B	Cracking, crazed or swelling	<ul style="list-style-type: none"> • Acetic acid (70% or more) • Gasoline • Methyl ethyl ketone, ethyl acetate, butyl acetate • Ethyl methacrylate, ethyl ether, MEK • Acetone, m-amino alcohol, carbon tetrachloride • Carbon disulfide, trichloroethylene, cresol • Thinners, oil of turpentine • Triethanolamine, TCP, TBP
C	Melting { } : Used as solvent	<ul style="list-style-type: none"> • Concentrated sulfuric acid • Benzene • Styrene, acrylonitrile, vinyl acetate • Ethylenediamine, diethylenediamine • {Chloroform, methyl chloride, tetrachloromethane, dioxane, 1, 2-dichloroethane}
D	Decomposition	<ul style="list-style-type: none"> • Ammonia water • Other alkalis

3. Mount the device on a level surface.
4. Conversion efficiency falls over time due to the current which flows in the infrared LED. When designing a circuit, take into account this change in conversion efficiency over time. The ratio of fluctuation in conversion efficiency to fluctuation in infrared LED optical output is 1:1.

$$\frac{I_C / I_F(t)}{I_C / I_F(0)} = \frac{P_O(t)}{P_O(0)}$$

PACKAGE DIMENSIONS
11-11B2

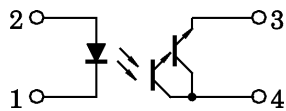
Unit : mm



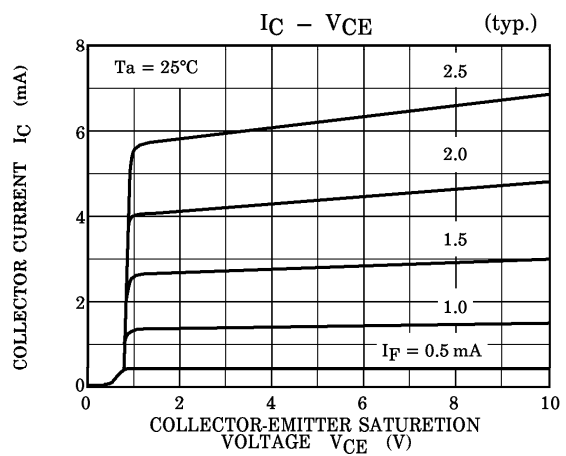
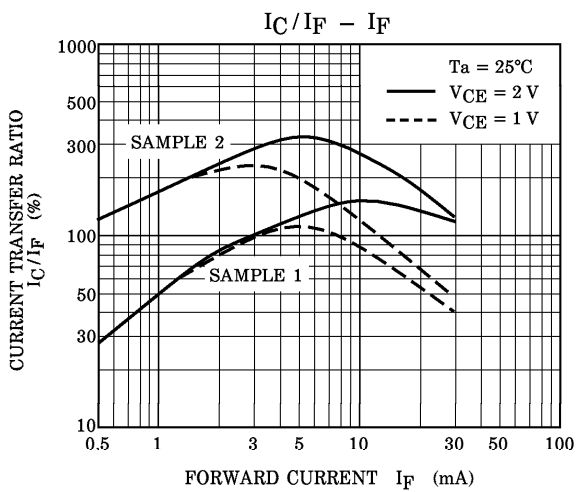
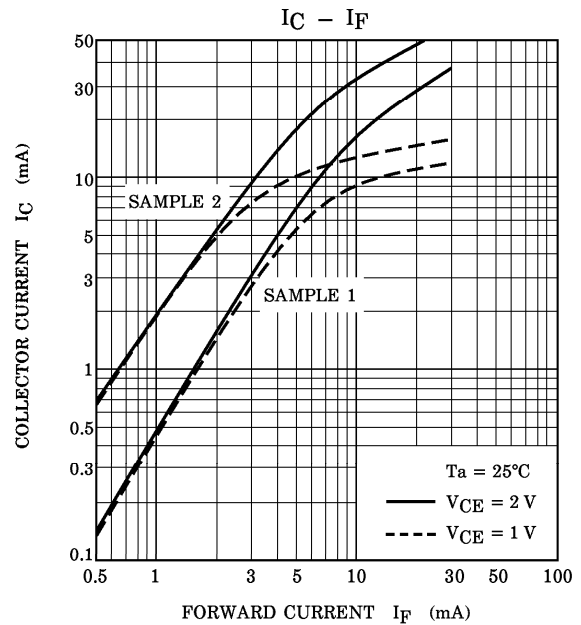
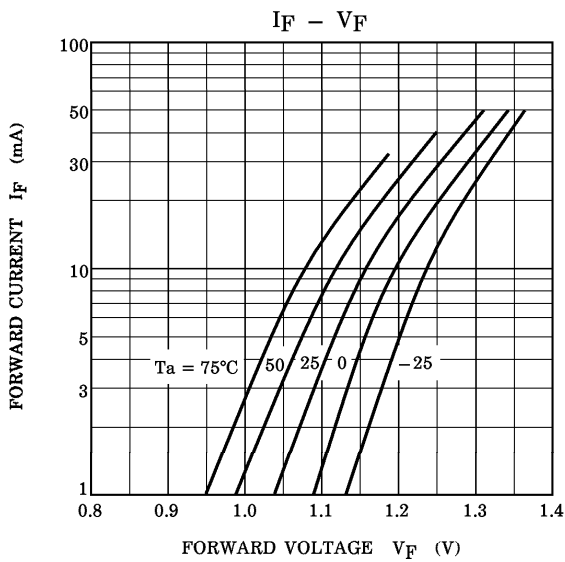
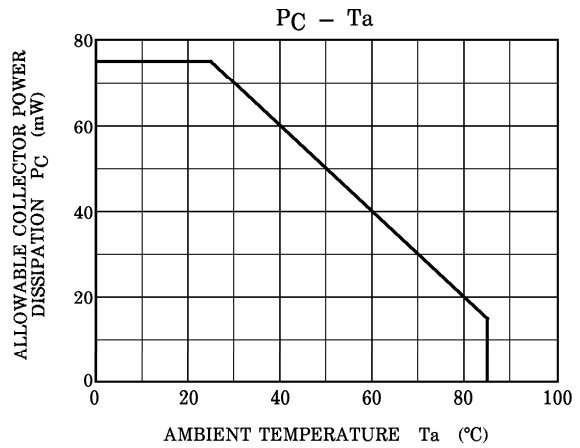
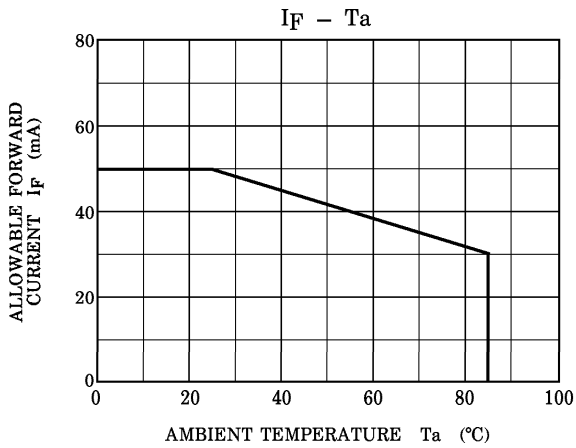
() : Reference value
Lead dimensions are indicated with each lead roots.

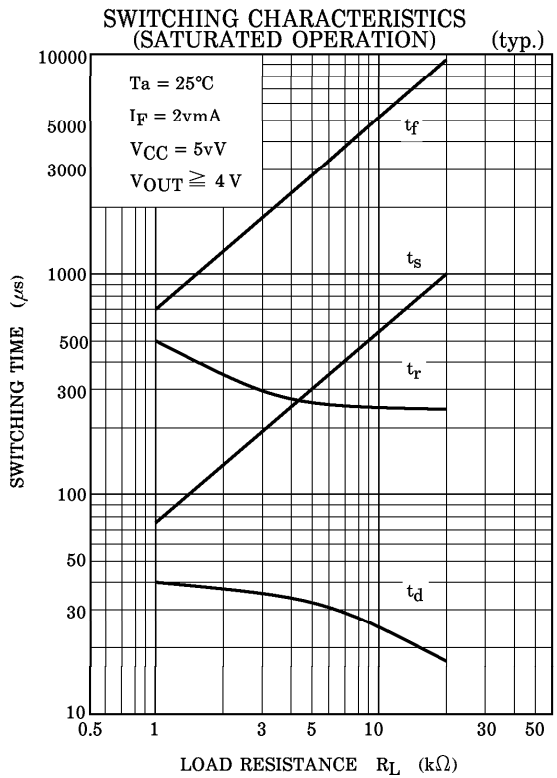
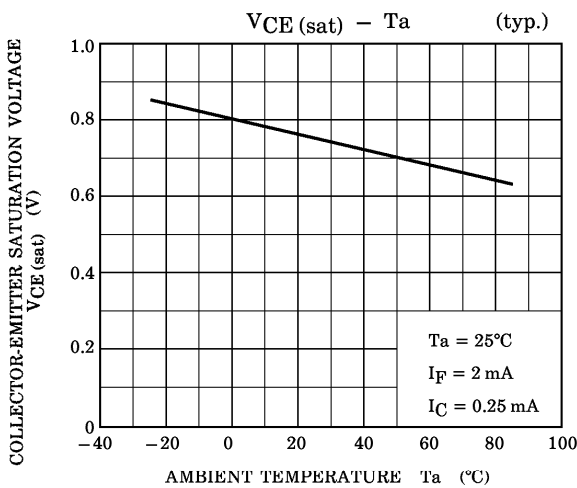
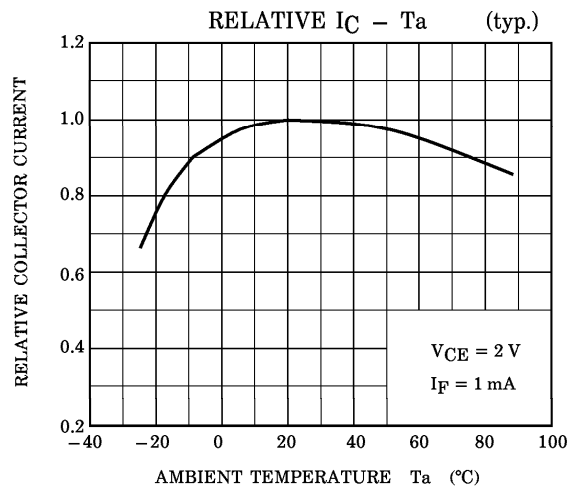
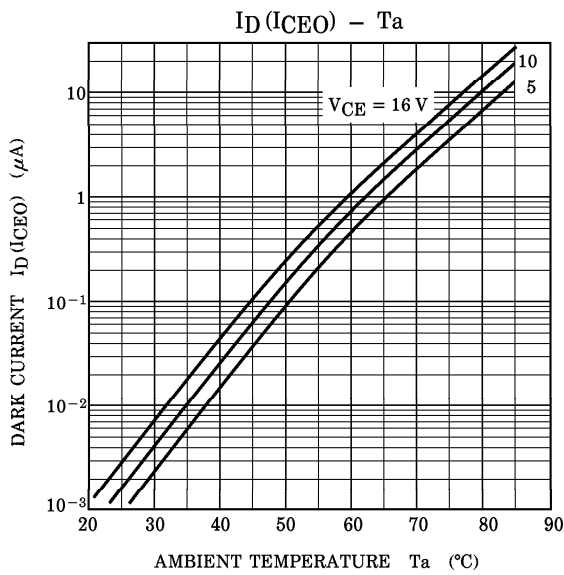
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PIN CONNECTION

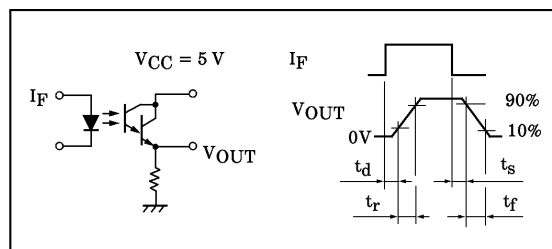


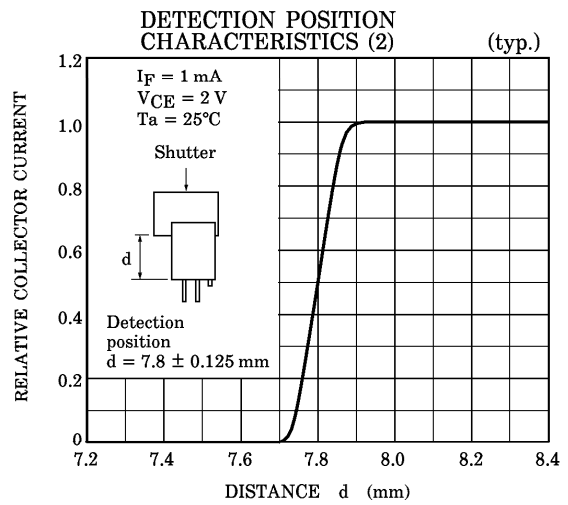
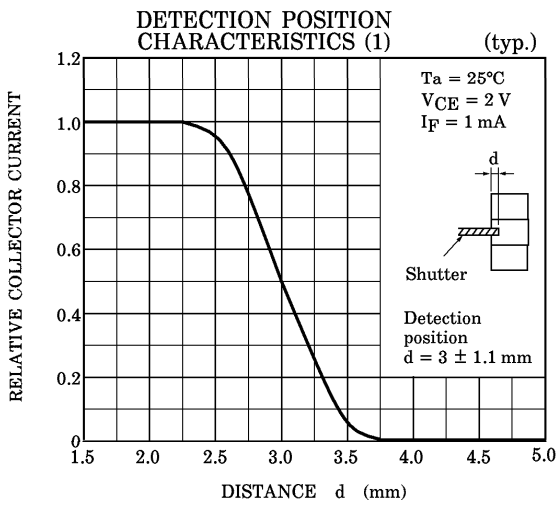
- 1. Cathode
- 2. Anode
- 3. Emitter
- 4. Collector





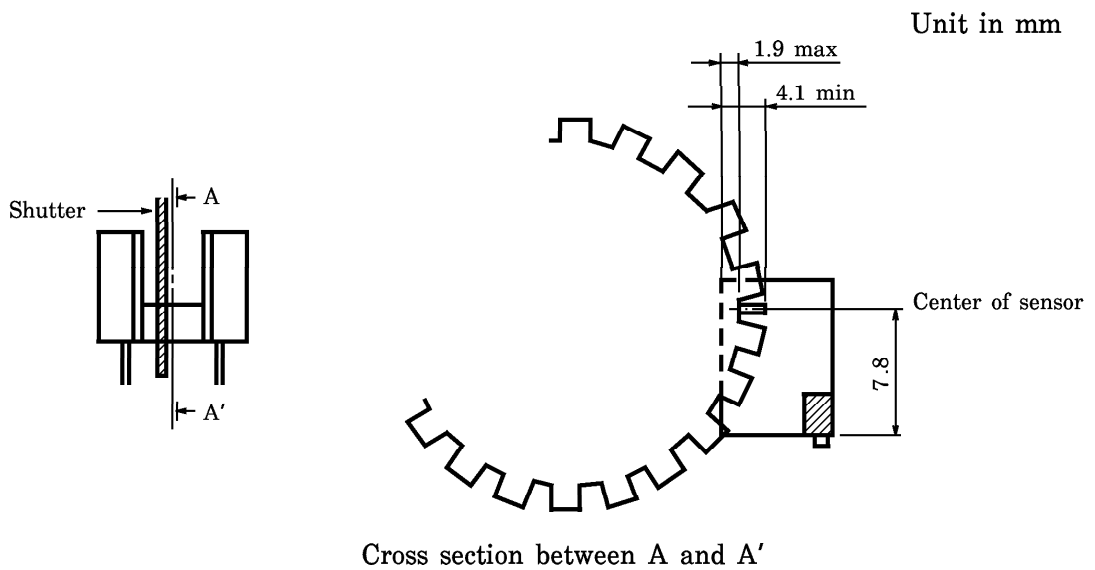
SWITCHING TIME TEST CIRCUIT





RELATIVE POSITIONING OF SHUTTER AND DEVICE

For normal operation position the shutter and the device as shown in the figure below. By considering the device's detection direction characteristic and switching time, determine the shutter slit width and pitch.



RESTRICTIONS ON PRODUCT USE

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