

PS2561B-1, PS2561BL-1, PS2561BL2-1

DIP PHOTOCOUPLER OPERATING AMBIENT TEMPERATURE 110°C

R08DS0212EJ0100 Rev.1.00 Dec 25, 2020

DESCRIPTION

The PS2561B-1 is an optically coupled isolator containing a GaAs light emitting diode and an NPN silicon phototransistor.

The PS2561B-1 is in a plastic DIP (Dual In-line Package) and the PS2561BL-1 is lead bending type (Gullwing) for surface mount.

The PS2561BL1-1 is wide lead bending type.

The PS2561BL2-1 is wide lead bending type for surface mount.

FEATURES

- Operating ambient temperature: 110°C
- High isolation voltage (BV = 5 000 Vr.m.s.)
- High collector to emitter voltage (V_{CEO} = 80 V)
- High current transfer ratio (CTR = 200% TYP.)
- High-speed switching ($t_r = 3 \mu s$ TYP., $t_f = 5 \mu s$ TYP.)
- Ordering number of taping product: PS2561BL-1-F3 : 2 000 pcs/reel
 : PS2561BL2-1-F3 : 2 000 pcs/reel
- Pb-Free product
- Safety standards
 - UL approved: UL1577, Double protection
 - CSA approved: CAN/CSA-C22.2 No. 62368-1, Reinforced insulation
 - BSI approved: BS EN 62368-1, Reinforced insulation
 - SEMKO approved: EN 62368-1, IEC 62368-1, Reinforced insulation
 - NEMKO approved: EN 62368-1, Reinforced insulation
 - FIMKO approved: EN 62368-1, Reinforced insulation
 - DEMKO approved: EN 62368-1, Reinforced insulation
 - VDE approved: DIN EN 60747-5-5 (Option)

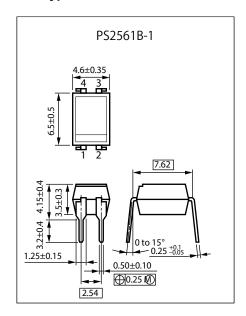
PIN CONNECTION (Top View) 4 3 1. Anode 2. Cathode 3. Emitter 4. Collector

APPLICATIONS

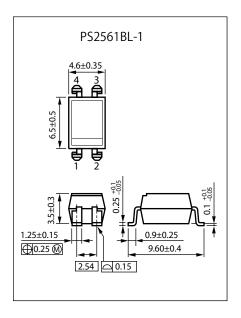
- Power supply
- Telephone/FAX.
- FA/OA equipment
- Programmable logic controllers

PACKAGE DIMENSIONS (UNIT: mm)

DIP Type

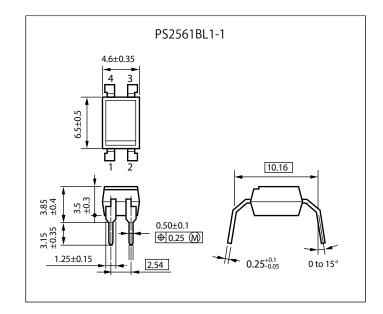


Lead Bending Type For Surface Mount

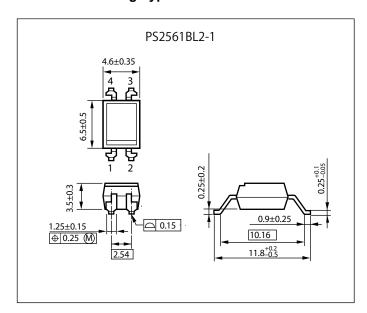


Weight (4-pin DIP): 0.26 g (typ.)

Wide Lead Bending Type



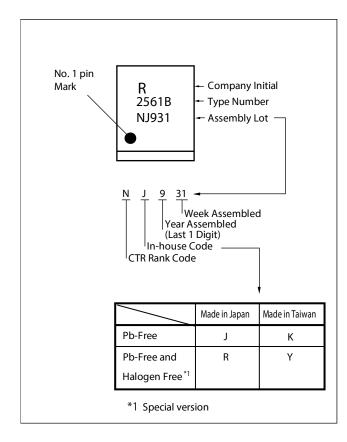
Wide Lead Bending Type For Surface Mount



PHOTOCOUPLER CONSTRUCTION

Parameter	Unit (mm)
Air Distance (MIN.)	7
Creepage Distance (MIN.)	7
Isolation Distance (MIN.)	0.4

MARKING EXAMPLE



ORDERING INFORMATION

Part Number	Order Number*1	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number *2	
PS2561B-1	PS2561B-1-A	Pb-Free	Magazine case 100 pcs	Standard products (UL, CSA, BSI, NEMKO, SEMKO,	PS2561B-1	
PS2561BL-1	PS2561BL-1-A				PS2561BL-1	
PS2561BL1-1	PS2561BL1-1-A			DEMKO, FIMKO	PS2561BL1-1	
PS2561BL2-1	PS2561BL2-1-A			approved)	PS2561BL2-1	
PS2561BL-1-F3	PS2561BL-1-F3-A		Embossed Tape 2 000	· L		
PS2561BL2-1-F3	PS2561BL2-1-F3-A		pcs/reel			PS2561BL
PS2561B-1-V	PS2561B-1-V-A		Magazine case 100 pcs	UL, CSA, BSI, SEMKO, NEMKO, FIMKO, DEMKO,	PS2561B-1	
PS2561BL-1-V	PS2561BL-1-V-A				PS2561BL-1	
PS2561BL1-1-V	PS2561BL1-1-V-A			DIN EN 60747-5-5	PS2561BL1-1	
PS2561BL2-1-V	PS2561BL2-1-V-A			approved	PS2561BL2-1	
PS2561BL-1-V-F3	PS2561BL-1-V-F3-A		Embossed Tape 2 000 pcs/reel		PS2561BL-1	
PS2561BL2-1-V-F3	PS2561BL2-1-V-F3-A	1			PS2561BL2-1	
PS2561B-1	PS2561B-1Y-A	Special version	Magazine case 100 pcs	Standard products	PS2561B-1	
PS2561BL-1	PS2561BL-1Y-A	(Pb-Free and		(UL, CSA, BSI, NEMKO, SEMKO,	PS2561BL-1	
PS2561BL1-1	PS2561BL1-1Y-A	Halogen Free)	DEMKO, FIMKO		PS2561BL1-1	
PS2561BL2-1	PS2561BL2-1Y-A			approved)	PS2561BL2-1	
PS2561BL-1-F3	PS2561BL-1Y-F3-A		Embossed Tape 2 000 pcs/reel		PS2561BL-1	
PS2561BL2-1-F3	PS2561BL2-1Y-F3-A				PS2561BL2-1	
PS2561B-1-V	PS2561B-1Y-V-A		Magazine case 100 pcs	UL, CSA, BSI, SEMKO, NEMKO, FIMKO, DEMKO, DIN EN 60747-5-5 approved	PS2561B-1	
PS2561BL-1-V	PS2561BL-1Y-V-A				PS2561BL-1	
PS2561BL1-1-V	PS2561BL1-1Y-V-A	_			PS2561BL1-1	
PS2561BL2-1-V	PS2561BL2-1Y-V-A				PS2561BL2-1	
PS2561BL-1-V-F3	PS2561BL-1Y-V-F3-A		Embossed Tape 2 000		PS2561BL-1	
PS2561BL2-1-V-F3	PS2561BL2-1Y-V-F3-A		pcs/reel		PS2561BL2-1	

Notes: *1. When specifying CTR rank, please add "/CTR rank" after Order Number.

ex. L rank: PS2561B-1-A/L

Notes: *2. For the application of the Safety Standard, following part number should be used.

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise specified)

Parameter		Symbol	Ratings	Unit
Diode	Reverse Voltage	V _R	6	V
	Forward Current (DC)	l _F	40	mA
	Power Dissipation Derating	⊿P _D /°C	1.5	mW/°C
	Power Dissipation	PD	150	mW
	Peak Forward Current*1	I _{FP}	1	Α
Transistor	Collector to Emitter Voltage	Vceo	80	V
	Emitter to Collector Voltage	V _{ECO}	7	V
	Collector Current	Ic	50	mA
	Power Dissipation Derating	⊿Pc/°C	1.5	mW/°C
	Power Dissipation	Pc	150	mW
Isolation Voltage*2		BV	5 000	Vr.m.s.
Operating Ambient Temperature		TA	-55 to +110	°C
Storage Temperature		T _{stg}	-55 to +150	°C

Note: *1. PW = 100 μ s, Duty Cycle = 1 %

^{*2.} AC voltage for 1 minute at T_A = 25 °C, RH = 60 % between input and output. Pins 1-2 shorted together, 3-4 shorted together.

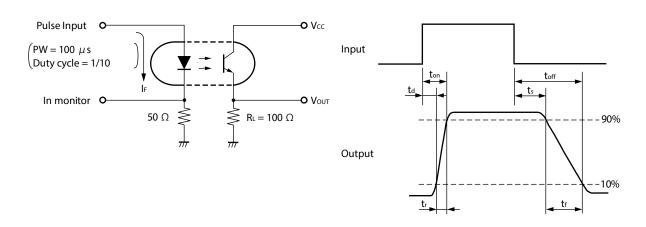
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

	Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	VF	IF = 10 mA		1.17	1.4	V
	Reverse Current	lr	V _R = 5 V			5	μΑ
	Terminal Capacitance	Ct	V = 0 V, f = 1.0 MHz		50		pF
Transistor	Collector to Emitter Dark Current	Iceo	Vce = 48 V, I _F = 0 mA			100	nA
Coupled	Current Transfer Ratio	CTR	IF = 5 mA, VcE = 5 V	100	200	400	%
	(Ic/I _F)*1		IF = 1 mA, VcE = 5 V	50	100		
	Collector Saturation Voltage	VCE (sat)	IF = 10 mA, Ic = 2 mA			0.3	V
	Isolation Resistance	R _{I-O}	V _{I-O} = 1.0 kV _{DC}	10 ¹¹			Ω
	Isolation Capacitance	C _{I-O}	V = 0 V, f = 1.0 MHz		0.5		pF
	Rise Time*2	tr	Vcc = 10 V, Ic = 2 mA, RL = 100 Ω		3		μs
	Fall Time*2	tf			5		

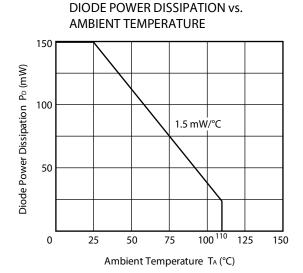
Note: *1. CTR rank

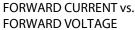
CTR Rank	CTR (%)	Conditions	
Q	100 to 200	I _F = 5 mA, V _{CE} = 5 V	
	50 and larger	I _F = 1 mA, V _{CE} = 5 V	
W	130 to 260	I _F = 5 mA, V _{CE} = 5 V	
	70 and larger	I _F = 1 mA, V _{CE} = 5 V	
D	100 to 300	I _F = 5 mA, V _{CE} = 5 V	
	50 and larger	I _F = 1 mA, V _{CE} = 5 V	
	200 to 400	I _F = 5 mA, V _{CE} = 5 V	
L 	100 and larger	I _F = 1 mA, V _{CE} = 5 V	
N	100 to 400	I _F = 5 mA, V _{CE} = 5 V	
	50 and larger	I _F = 1 mA, V _{CE} = 5 V	

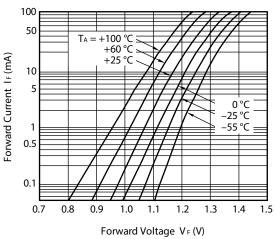
*2. Test Circuit for Switching Time



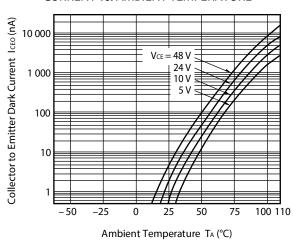
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise specified)



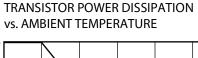


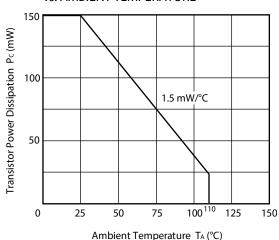


COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE

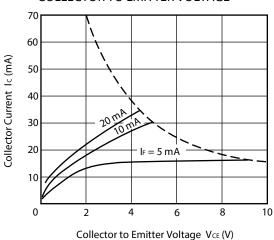


Remark The graphs indicate nominal characteristics.

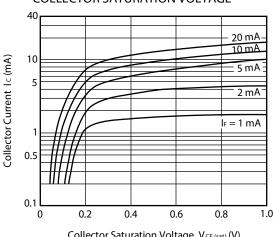




COLLECTOR CURRENT vs. **COLLECTOR TO EMITTER VOLTAGE**

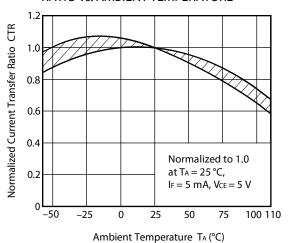


COLLECTOR CURRENT vs. **COLLECTOR SATURATION VOLTAGE**

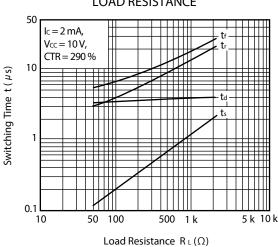


Collector Saturation Voltage VCE (sat) (V)

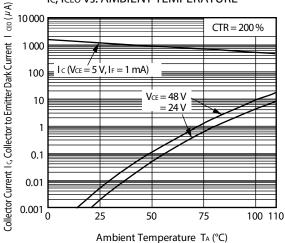
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



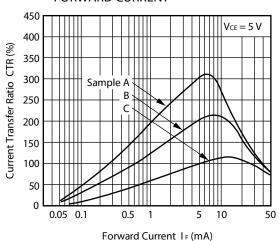
SWITCHING TIME vs. LOAD RESISTANCE



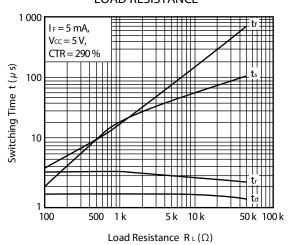
IC, ICEO VS. AMBIENT TEMPERATURE



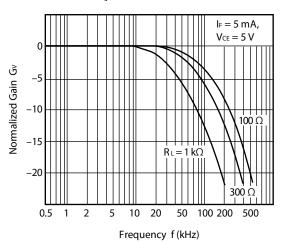
CURRENT TRANSFER RATIO vs. **FORWARD CURRENT**



SWITCHING TIME vs. LOAD RESISTANCE



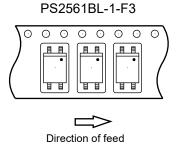
FREQUENCY RESPONSE



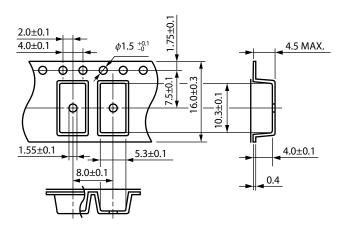
Remark The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (UNIT: mm)

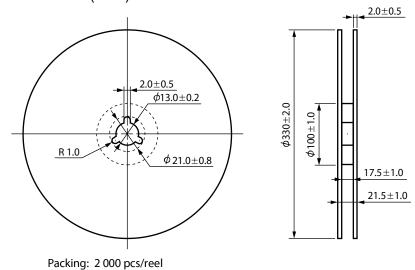
Taping Direction



Outline and Dimensions (Tape)



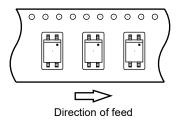
Outline and Dimensions (Reel)



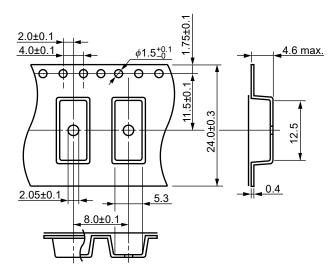
TAPING SPECIFICATIONS (UNIT: mm)

Taping Direction

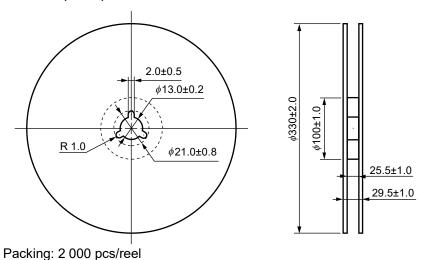
PS2561BL2-1-F3



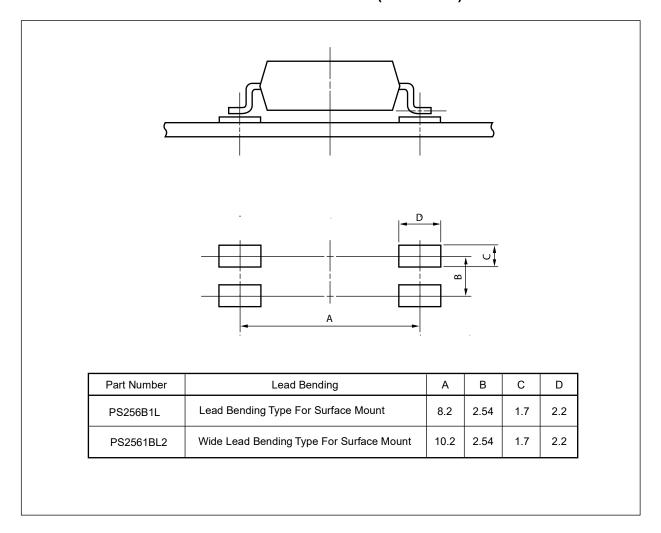
Outline and Dimensions (Tape)



Outline and Dimensions (Reel)



RECOMMENDED MOUNT PAD DIMENSIONS (UNIT: mm)



Remark All dimensions in this figure must be evaluated before use.

NOTES ON HANDLING

- 1. Recommended soldering conditions
 - (1) Infrared reflow soldering
 - Peak reflow temperature 260°C or below (package surface temperature)
 - · Time of peak reflow temperature 10 seconds or less Time of temperature higher than 220°C
 - Time to preheat temperature from 120 to 180°C
 - Number of reflows
 - Flux

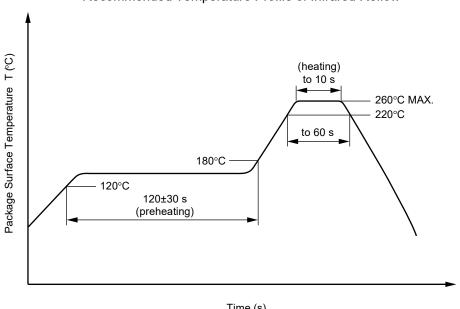
60 seconds or less

120±30 s Three

Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of

0.2 Wt% is recommended.)

Recommended Temperature Profile of Infrared Reflow



Time (s)

(2) Wave soldering

 Temperature 260°C or below (molten solder temperature)

 Time 10 seconds or less

 Preheating conditions 120°C or below (package surface temperature)

 Number of times One (Allowed to be dipped in solder including plastic mold portion.) Rosin flux containing small amount of chlorine (The flux with a maximum Flux

chlorine content of 0.2 Wt% is recommended.)

(3) Soldering by Soldering Iron

 Peak Temperature (lead part temperature) 350°C or below Time (each pins) 3 seconds or less

• Flux Rosin flux containing small amount of chlorine

(The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

- (a) Soldering of leads should be made at the point 1.5 to 2.0 mm from the root of the lead
- (b) Please be sure that the temperature of the package would not be heated over 100°C
- (4) Cautions
 - Flux Cleaning

Avoid cleaning with Freon based or halogen-based (chlorinated etc.) solvents.

• Do not use fixing agents or coatings containing halogen-based substances.

- 2. Cautions regarding noise
 - Be aware that when voltage is applied suddenly between the photocoupler's input and output or between collector-emitters at startup, the output transistor may enter the on state, even if the voltage is within the absolute maximum ratings.
- 3. Measurement conditions of current transfer ratios (CTR), which differ according to photocoupler Check the setting values before use, since the forward current conditions at CTR measurement differ according to product.

When using products other than at the specified forward current, the characteristics curves may differ from the standard curves due to CTR value variations or the like. Therefore, check the characteristics under the actual operating conditions and thoroughly take variations or the like into consideration before use.

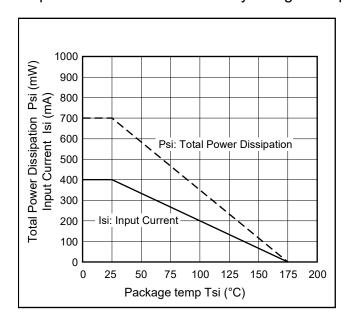
USAGE CAUTIONS

- 1. Protect against static electricity when handling.
- 2. Avoid storage at a high temperature and high humidity.
- 3. Avoid cleaning with Freon based or halogen-based (chlorinated etc.) solvents.
- 4. Do not use fixing agents or coatings containing halogen-based substances.

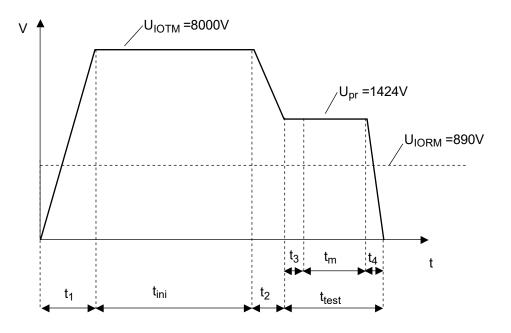
SPECIFICATION OF VDE MARKS LICENSE DOCUMENT

Parameter	Symbol	Rating	Unit
Climatic test class (IEC 60068-1/DIN EN 60068-1)		55/110/21	
Dielectric strength maximum operating isolation voltage Test voltage (partial discharge test, procedure a for type test and random test) $U_{pr} = 1.6 \times U_{\text{IORM}}, P_{\text{d}} < 5 \text{pC}$	UIORM Upr	890 1 424	V _{peak} V _{peak}
Test voltage (partial discharge test, procedure b for all devices) $U_{pr} = 1.875 \times U_{IORM}$, $P_d < 5 \ pC$	U _{pr}	1 669	V_{peak}
Highest permissible overvoltage	U _{ІОТМ}	8 000	V_{peak}
Degree of pollution (IEC 60664-1/DIN EN 60664-1 (VDE 0110-1)		2	
Comparative tracking index (IEC 60112/DIN EN 60112 (VDE 0303-11))	CTI	175	
Material group (IEC 60664-1/DIN EN 60664-1 (VDE 0110-1))		III a	
Storage temperature range	T _{stg}	-55 to +150	°C
Operating temperature range	TA	-55 to +110	°C
Isolation resistance, minimum value V_{IO} = 500 V dc at T_A = 25°C V_{IO} = 500 V dc at T_A MAX. at least 100°C	Ris MIN. Ris MIN.	10 ¹² 10 ¹¹	Ω
Safety maximum ratings (maximum permissible in case of fault, see thermal derating curve) Package temperature Current (input current I _F , Psi = 0) Power (output or total power dissipation) Isolation resistance	Tsi Isi Psi	175 400 700	°C mA mW
V _{IO} = 500 V dc at T _A = Tsi	Ris MIN.	10 ⁹	Ω

Dependence of maximum safety ratings with package temperature

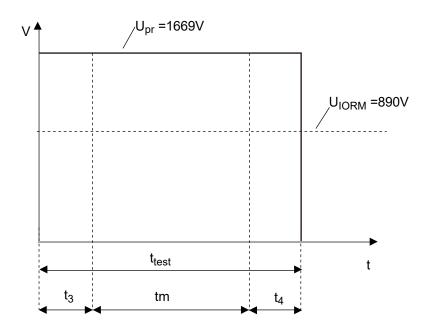


Method a) Destructive Test, Type and Sample Test



 t_1,t_2 = 1 to 10 sec t_3,t_4 = 1 sec $t_{m(PARTIAL\ DISCHARGE)}$ = 10 sec t_{test} = 12 sec t_{ini} = 60 sec

Method b) Non-destructive Test, 100% Production Test



 t_3, t_4 = 0.1 sec $t_{m(PARTIAL\ DISCHARGE)}$ = 1.0 sec t_{test} = 1.2 sec

Caution

GaAs Products

This product uses gallium arsenide (GaAs).

GaAs vapor and powder are hazardous to human health if inhaled or ingested, so please observe the following points.

- Follow related laws and ordinances when disposing of the product. If there are no applicable laws and/or ordinances, dispose of the product as recommended below.
 - Commission a disposal company able to (with a license to) collect, transport and dispose of materials that contain arsenic and other such industrial waste materials.
- 2. Exclude the product from general industrial waste and household garbage, and ensure that the product is controlled (as industrial waste subject to special control) up until final disposal.
- Do not burn, destroy, cut, crush, or chemically dissolve the product.
- Do not lick the product or i any way allow it to enter the mouth.

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