

# PS2806-1,PS2806-4

Data Sheet

R08DS0176EJ0101 Rev.1.01 Aug 26, 2022

HIGH ISOLATION VOLTAGE AC INPUT, DARLINGTON TRANSISTOR TYPE SSOP PHOTOCOUPLER

### DESCRIPTION

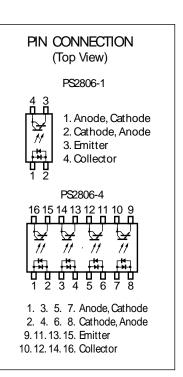
The PS2806-1 and PS2806-4 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon Darlington-connected phototransistor in a plastic SSOP for high density applications. This package has shield effect to cut off ambient light.

### FEATURES

- High isolation voltage (BV = 2 500 Vr.m.s.)
- Small and thin package (4, 16-pin SSOP, Pin pitch 1.27 mm)
- AC input response
- High current transfer ratio (CTR = 2 000 % TYP. @ IF = ±1 mA, V<sub>CE</sub> = 2 V)
- Ordering number of tape product: PS2806-1-F3, PS2806-4-F3
- Pb-free product
- Safety standards
  - UL approved: UL1577, Single protection
  - CSA approved: CAN/CSA-C22.2 No. 62368-1, Basic insulation
  - BSI approved: BS EN 62368-1, Basic/Supplementary insulation
  - VDE approved: DIN EN 60747-5-5 (Option)

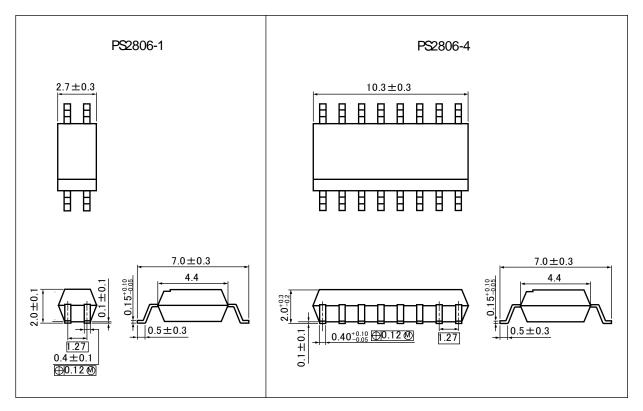


- Programmable logic controllers
- Measuring instruments
- Power supply
- Hybrid IC





### PACKAGE DIMENSIONS (UNIT: mm)



Weight (4-pin SSOP) : 0.05 g (TYP.) Weight (16-pin SSOP) : 0.2 g (TYP.)

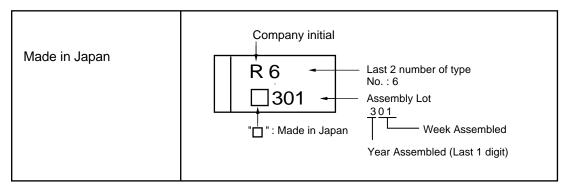
### PHOTOCOUPLER CONSTRUCTION

Parameter	MIN.
Air Distance	4.5 mm
Creepage Distance	4.5 mm
Isolation Thickness	0.1 mm

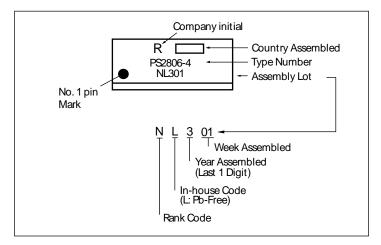


### MARKING EXAMPLE

#### PS2806-1



#### PS2806-4





### **ORDERING INFORMATION**

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number <sup>*1</sup>
PS2806-1	PS2806-1-A	Pb-Free	Embossed Tape 50 pcs	Standard Products	PS2806-1
PS2806-1-F3	PS2806-1-F3-A		Embossed Tape 3 500 pcs/reel	(UL, BSI, CSA Approved)	
PS2806-4	PS2806-4-A		Embossed Tape 10 pcs	Approved)	PS2806-4
PS2806-4-F3	PS2806-4-F3-A		Embossed Tape 2 500 pcs/reel		
PS2806-1-V	PS2806-1-V-A		Embossed Tape 50 pcs	UL, BSI, CSA,	PS2806-1
PS2806-1-V-F3	PS2806-1-V-F3-A		Embossed Tape 3 500 pcs/reel	DIN EN 60747-5-5 Approved	
PS2806-4-V	PS2806-4-V-A		Embossed Tape 10 pcs	Approved	PS2806-4
PS2806-4-V-F3	PS2806-4-V-F3-A		Embossed Tape 2 500 pcs/reel		

Notes: <sup>\*</sup>1. For the application of the safety standard, the following part number should be used.

### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25 °C, unless otherwise specified)

Parameter		Symbol	Ratings		Unit
			PS2806-1	PS2806-4	
Diode	Forward Current (DC)	lf	±50		mA/ch
	Power Dissipation Derating	∆Pd/°C	0.6	0.8	mW/°C
	Power Dissipation	PD	60	80	mW/ch
	Peak Forward Current *1	IFP	±	1	A/ch
Transistor	Collector to Emitter Voltage	Vceo	40		V
	Emitter to Collector Voltage	Veco	6		V
	Collector Current	lc	90	100	mA/ch
	Power Dissipation Derating	∆Pc/°C	1	2	mW/°C
	Power Dissipation	Pc	12	20	mW/ch
Isolation Voltage *2		BV	2 500		Vr.m.s.
Operating Ambient Temperature		TA	-55 to +100		°C
Storage Te	Storage Temperature		–55 to +150		°C

Notes:  $^{*}1$ . PW = 100 µs, Duty Cycle = 1 %

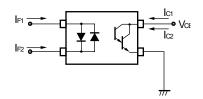
<sup>\*</sup>2. AC voltage for 1 minute at  $T_A = 25$  °C, RH = 60 % between input and output. Pins 1-2 shorted together, 3-4 shorted together (PS2806-1). Pins 1-8 shorted together, 9-16 shorted together (PS2806-4).



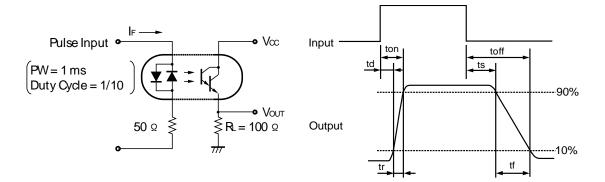
	Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	VF	IF = ±5 mA		1.1	1.4	V
	Terminal Capacitance	Ct	V = 0 V, f = 1.0 MHz		30		pF
Transistor	Collector to Emitter Dark Current	ICEO	Vce = 40 V, IF = 0 mA			400	nA
Coupled	Current Transfer Ratio (Ic/IF)	CTR	$I_F = \pm 1 \text{ mA}, \text{ V}_{CE} = 2 \text{ V}$	200	2 000		%
	CTR Ratio <sup>*1</sup>	CTR1/ CTR2	IF = 1 mA, VCE = 2 V	0.3	1.0	3.0	
	Collector Saturation Voltage	Vce(sat)	IF = ±1 mA, Ic = 2 mA			1.0	V
	Isolation Resistance	Ri-o	VI-O = 1.0 kVDC	10 <sup>11</sup>			Ω
	Isolation Capacitance	CI-O	V = 0 V, f = 1.0 MHz		0.4		pF
	Rise Time *2	tr	$V_{CC} = 5 \text{ V}, \text{ Ic} = 2 \text{ mA}, \text{ R}_{L} = 100 \Omega$		200		μs
	Fall Time *2	tr			200		

# ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)

Notes: \*1. CTR1 = Ic1/IF1, CTR2 = Ic2/IF2

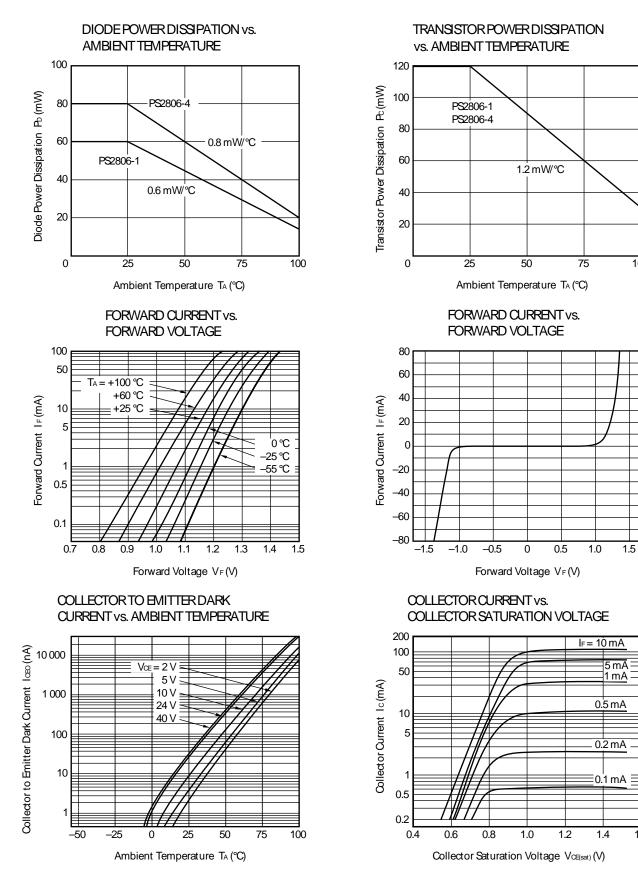


\*2. Test circuit for switching time





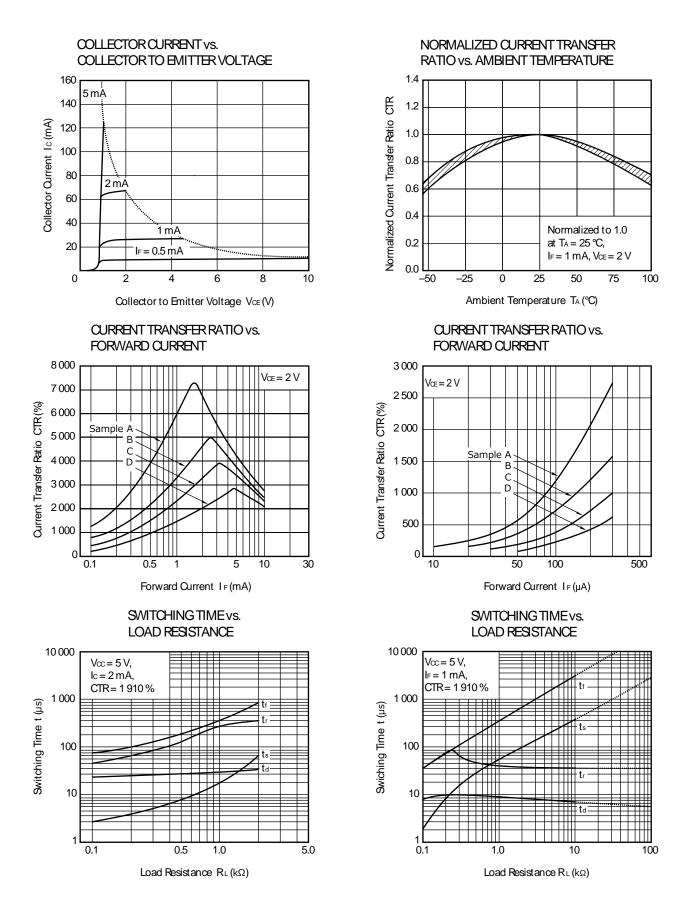
### **TYPICAL CHARACTERISTICS (TA = 25 °C, unless otherwise specified)**



Remark The graphs indicate nominal characteristics.

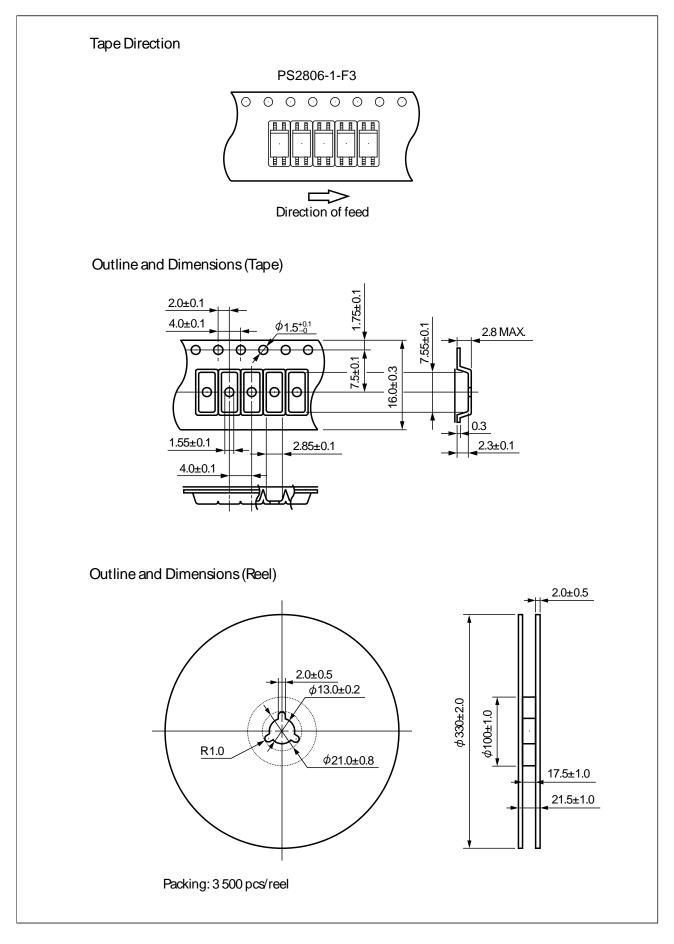
1.6

100

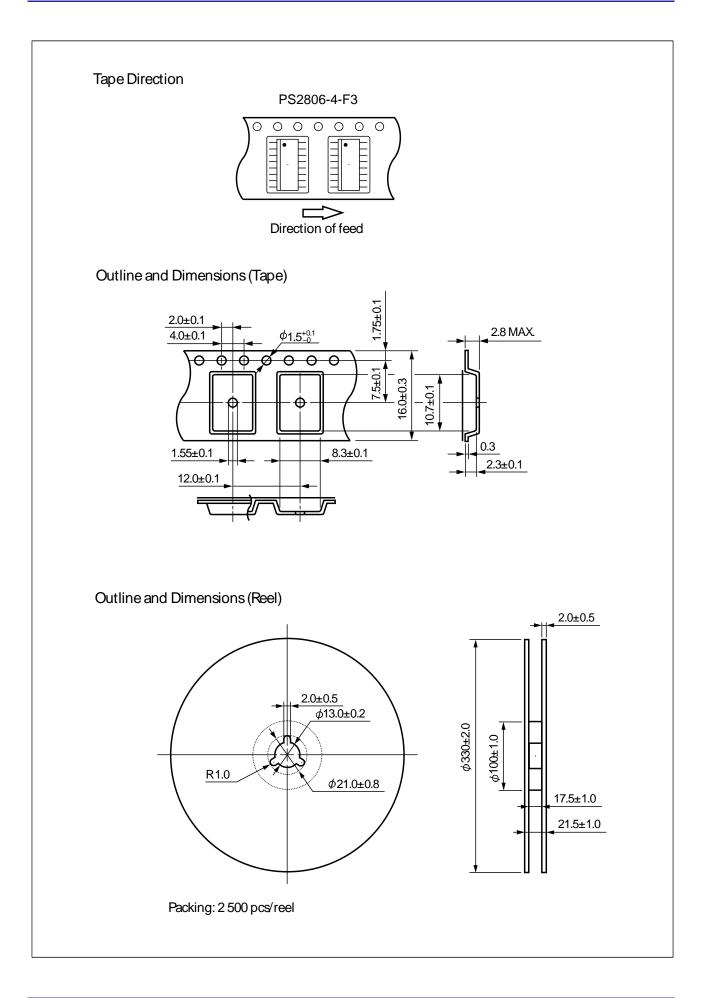


**Remark** The graphs indicate nominal characteristics.

### **TAPING SPECIFICATIONS (UNIT: mm)**

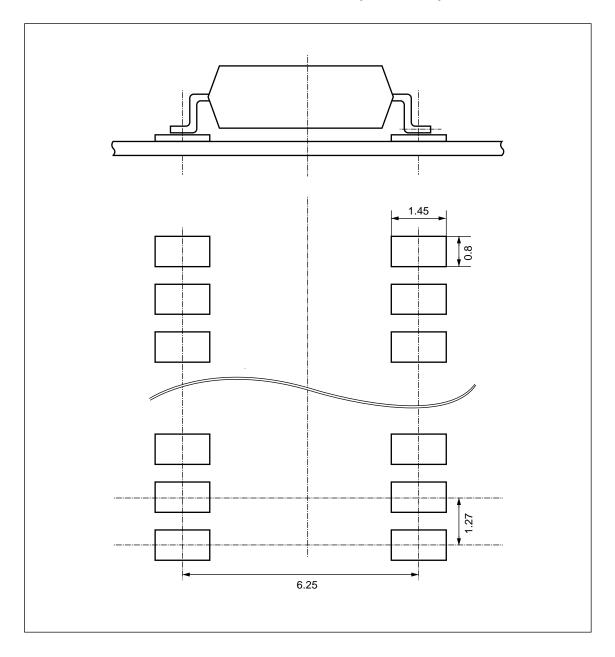








## **RECOMMENDED MOUNT PAD DIMENSIONS (UNIT: mm)**



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



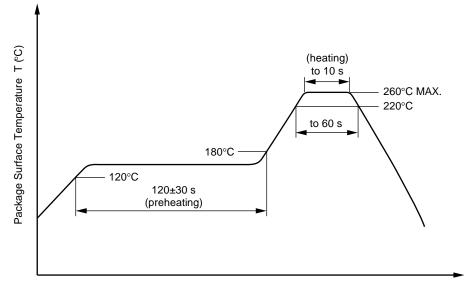
### **NOTES ON HANDLING**

- 1. Recommended soldering conditions
  - (1) Infrared reflow soldering
    - Peak reflow temperature
    - Time of peak reflow temperature
    - Time of temperature higher than 220°C
    - Time to preheat temperature from 120 to 180°C
    - Number of reflows
    - Flux

260°C or below (package surface temperature) 10 seconds or less 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

• Flux

- 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 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
- (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.

 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. This tendency may sometimes be obvious, especially below  $I_F = 1$  mA.

Therefore, check the characteristics under the actual operating conditions and thoroughly take variations or the like into consideration before use.

### **USAGE CAUTIONS**

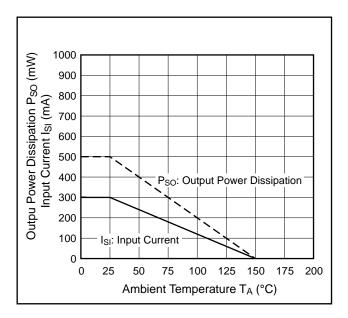
- 1. Protect against static electricity when handling.
- 2. Avoid storage at a high temperature and high humidity.
- 3. Avoid cleaning with Freon based or halogen-based (chlorinated etc.) solvents.
- 4. Do not use fixing agents or coatings containing halogen-based substances.



### SPECIFICATION OF VDE MARKS LICENSE DOCUMENT

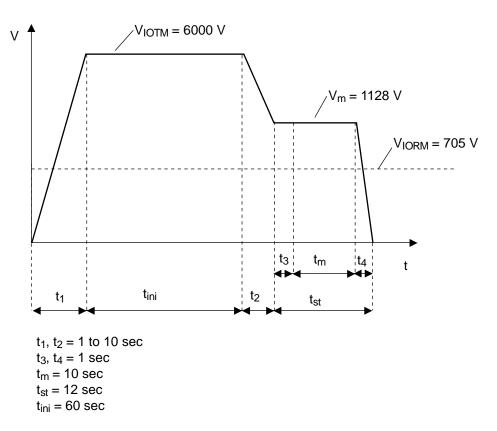
Parameter	Symbol	Rating	Unit
Climatic test class (IEC 60068-1/DIN EN 60068-1)		55/100/21	
Dielectric strength			
maximum operating isolation voltage	VIORM	705	V <sub>peak</sub>
Test voltage (partial discharge test, procedure a for type test and random	Vm	1 128	$V_{peak}$
test)			
$V_m = 1.6 \times V_{IORM.}, q_{pd} < 5 \text{ pC}$			
Test voltage (partial discharge test, procedure b for all devices)	Vm	1 322	V <sub>peak</sub>
$V_m = 1.875 \times V_{IORM.}, q_{pd} < 5 \ pC$	۷m	1 322	<b>v</b> peak
Highest permissible overvoltage	VIOTM	6 000	V <sub>peak</sub>
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))	СТІ	175	
Material group (IEC 60664-1/DIN EN 60664-1 (VDE 0110-1))		III a	
Storage temperature range	T <sub>stg</sub>	$-55 \sim +150$	°C
Operating temperature range	T <sub>A</sub>	$-55 \sim +100$	°C
Isolation resistance, minimum value			
V <sub>I-O</sub> = 500 V dc, T <sub>A</sub> = 25 °C	R⊦o MIN.	10 <sup>12</sup>	Ω
$V_{I-O} = 500 \text{ V dc}, T_A = \text{maximum temperature of rating, at least 100 °C}$	R⊦₀ MIN.	10 <sup>11</sup>	Ω
Safety maximum ratings (maximum permissible in case of fault, see thermal			
derating curve)			
Maximum ambient temperature	Ts	150	°C
Maximum input current	Isi	300	mA
Maximum output power dissipation	Pso	500	mW
Isolation resistance, minimum value at $V_{I-O}$ = 500 V dc, $T_A = T_S$	R⊦o MIN.	10 <sup>9</sup>	Ω

### Dependence of maximum safety ratings with package temperature

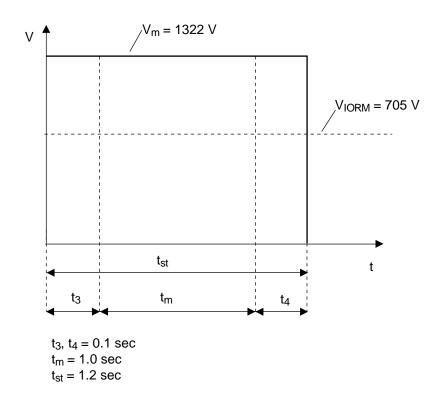




### Method a) Destructive Test, Type and Sample Test



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



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.
	1. 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 in any way allow it to enter the mouth.

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