

PS2911-1

R08DS0110EJ0402 Rev.4.02 Dec 6, 2021

HIGH CTR, 4-PIN ULTRA SMALL PACKAGE FLAT-LEAD PHOTOCOUPLER

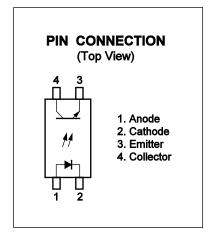
DESCRIPTION

The PS2911-1 is an optically coupled isolator containing a GaAs light emitting diode and an NPN silicon phototransistor in one package for high density mounting applications.

An ultra small flat-lead package has been provided which realizes a reduction in mounting area of about 30% compared with the PS28xx series.

FEATURES

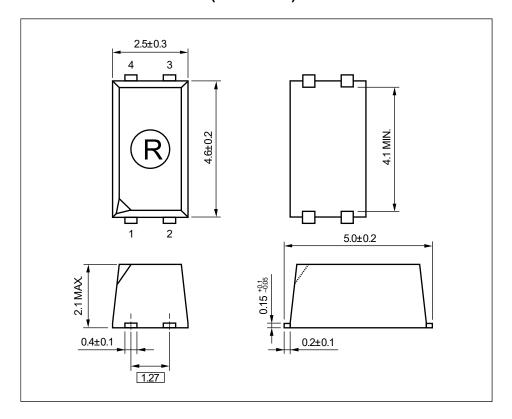
- Ultra small flat-lead package (4.6 (L) × 2.5 (W) × 2.1 (H) mm)
- High current transfer ratio (CTR = 200 % TYP. @ I_F = 1 mA, V_{CE} = 5 V)
- High isolation voltage (BV = 2 500 Vr.m.s.)
- Ordering number of taping product: PS2911-1-F3: 3 500 pcs/reel
- · Safety standards
 - UL approved: UL1577, Single protection
 - BSI approved: BS EN 62368-1, Supplementary insulation
 - VDE approved: DIN EN 60747-5-5 (Option)



APPLICATIONS

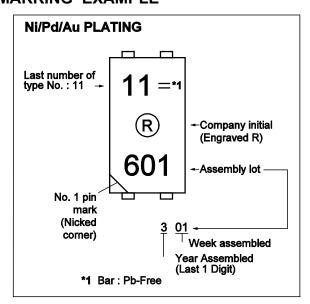
- DC/DC converter
- Modem/PC card

PACKAGE DIMENSIONS (UNIT: mm)



Weight: 0.05g (typ.)

MARKING EXAMPLE



PHOTOCOUPLER CONSTRUCTION

Parameter	MIN.
Air Distance	4 mm
Creepage Distance	4 mm
Isolation Distance	0.4 mm

ORDERING INFORMATION

Part Number	Order Number*1	Solder Plating	Packing Style	Safety Standard	Application
		Specification		Approval	Part Number*2
PS2911-1	PS2911-1-AX	Pb-Free	50 pcs (Tape 50 pcs cut)	Standard products	PS2911-1
PS2911-1-F3	PS2911-1-F3-	(Ni/Pd/Au)	Embossed Tape 3 500	(UL, BSI approved)	
	AX		pcs/reel		
PS2911-1-V	PS2911-1-V-AX		50 pcs (Tape 50 pcs cut)	UL, BSI,	
PS2911-1-V-F3	PS2911-1-V-F3-		Embossed Tape 3 500	DIN EN 60747-5-5	
	AX		pcs/reel	approved	

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

ex. L rank: PS2911-1-AX/L

Note: *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	Forward Current	l _F	50	mA
	Forward Current Derating	⊿IF/°C	0.5	mA/°C
	Peak Forward Current *1	I _{FP}	0.5	Α
	Power Dissipation	P _D	60	mW
	Reverse Voltage	V _R	6	V
Detector	Collector to Emitter Voltage	V _{CEO}	40	V
	Emitter to Collector Voltage	V _{ECO}	5	V
	Collector Current	Ic	40	mA
	Power Dissipation Derating	⊿Pc/°C	1.2	mW/°C
	Power Dissipation	Pc	120	mW
Isolation Voltage *2		BV	2 500	Vr.m.s.
Total Power Dissipation		PT	160	mW
Operating Ambient Temperature		TA	-55 to +100	°C
Storage Temperature		T _{stg}	−55 to +150	°C

Notes: *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.

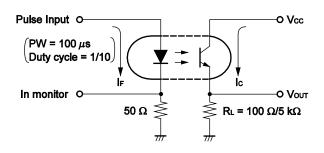
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

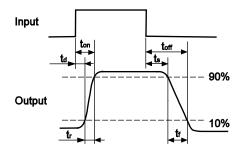
	Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V _F	I _F = 1 mA	0.9	1.1	1.3	V
	Reverse Current	I _R	V _R = 5 V			5	μΑ
	Terminal Capacitance	Ct	V = 0 V, f = 1 MHz		15		pF
Transistor	Collector to Emitter Dark Current	Iceo	I _F = 0 mA, V _{CE} = 40 V			100	nA
Coupled	Current Transfer Ratio	CTR	I _F = 1 mA, V _{CE} = 5 V	100	200	400	%
	Collector Saturation Voltage	V _{CE(SAT)}	I _F = 1 mA, I _C = 0.2 mA		0.13	0.3	V
	Isolation Resistance	R _{I-O}	$V_{I-O} = 1 \text{ kV}_{DC}$	10 ¹¹			Ω
	Isolation Capacitance	C _{I-O}	V = 0 V, f = 1 MHz		0.4		pF
	Rise Time *2	tr	$V_{CC} = 5 \text{ V}, I_{C} = 2 \text{ mA}, R_{L} = 100 \Omega$		5		μS
	Fall Time *2	t _f			10		
	Turn-on Time *2	t _{on}	V_{CC} = 5 V, I_F = 1 mA, R_L = 5 $k\Omega$		40		μS
	Storage Time *2	ts			10		
	Turn-off Time *2	t _{off}			120		

Notes: *1. CTR rank

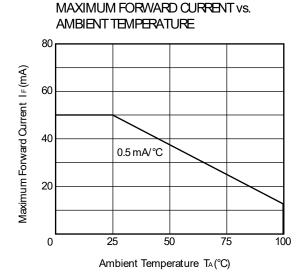
N : 100 to 400 (%) K : 200 to 400 (%) L : 150 to 300 (%) M : 100 to 200 (%)

*2. Test circuit for switching time

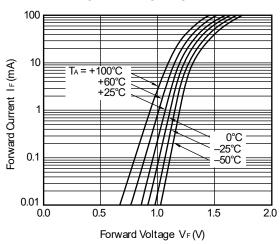




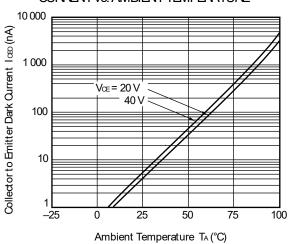
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise specified)



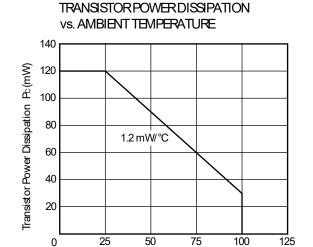
FORWARD CURRENT vs. FORWARD VOLTAGE



COLLECTOR TO EMITTER DARK CURRENT VS. AMBIENT TEMPERATURE

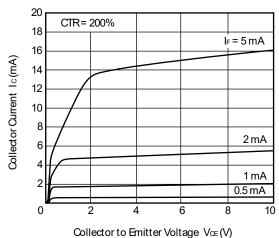


Remark The graphs indicate nominal characteristics.

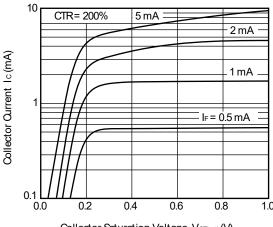


Ambient Temperature TA (°C)

COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE

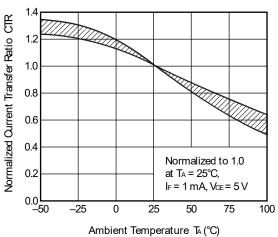


COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE

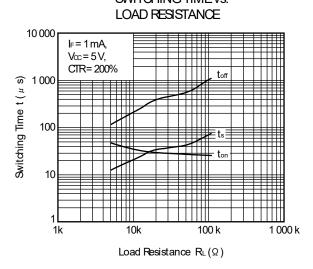


Collector Saturation Voltage VCE(sat) (V)

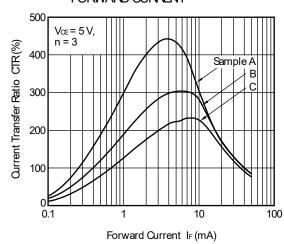
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



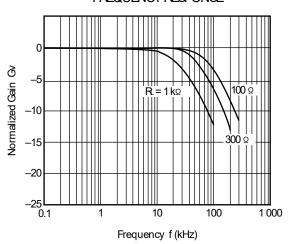
SWITCHING TIME vs.



CURRENT TRANSFER RATIO vs. FORWARD CURRENT

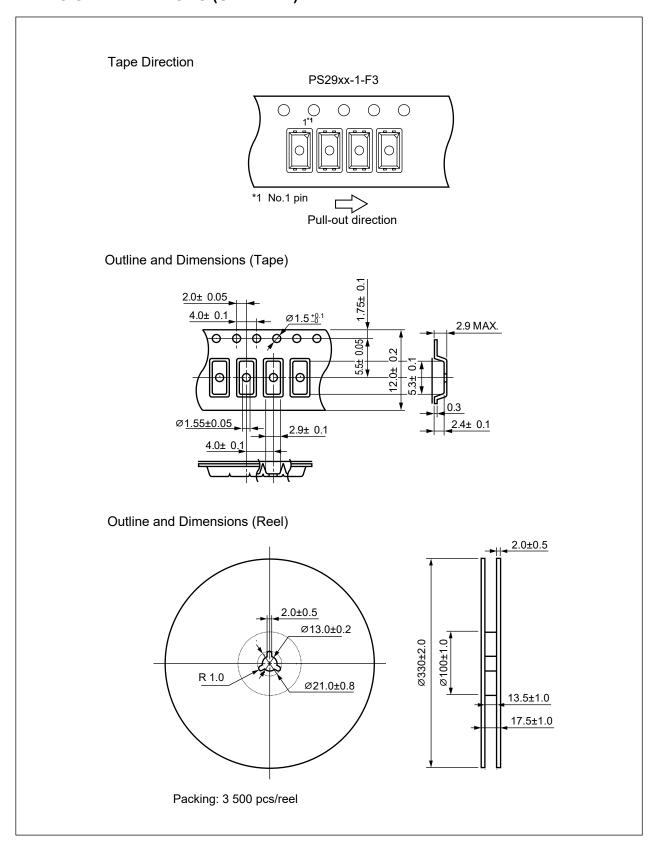


FREQUENCY RESPONSE

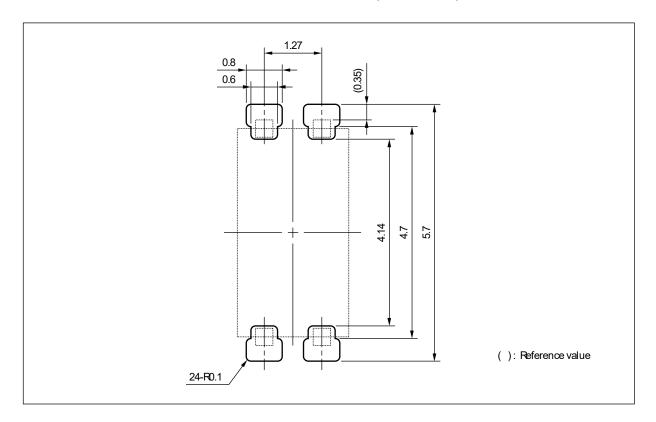


Remark The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (UNIT: mm)



RECOMMENDED MOUNT PAD DIMENSIONS (UNIT: mm)



Remark This drawing is considered to meet air and outer creepage distance 4.0 mm minimum. All dimensions in this figure must be evaluated before use.

NOTES ON HANDLING

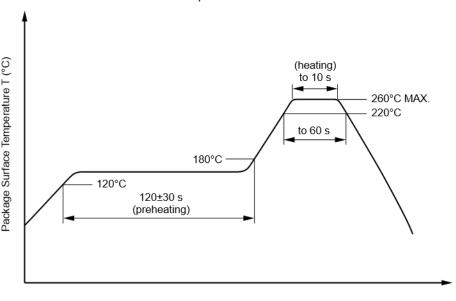
- 1. Recommended soldering conditions
 - (1) Infrared reflow soldering
 - Peak reflow temperature
 260 °C or below (package surface temperature)
 - Time of peak reflow temperature
 Time of temperature higher than 220 °C
 10 seconds or less
 60 seconds or less
 - Time to preheat temperature from 120 to 180 °C $\,$ 120 \pm 30 s
 - Number of reflows
 - Flux

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
 Flux
 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
- (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.

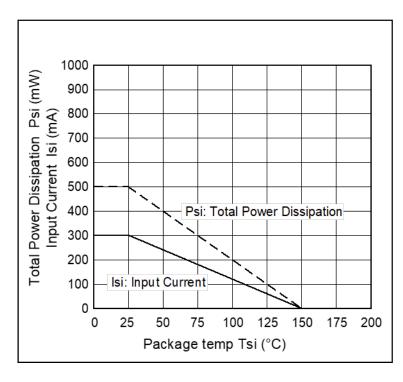
USAGE CAUTIONS

- 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.

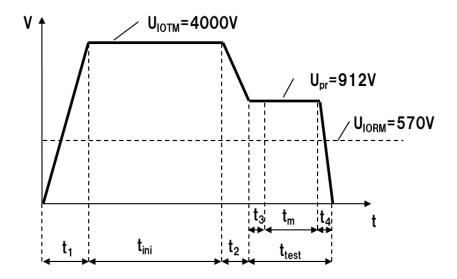
SPECIFICATION OF VDE MARKS LICENSE DOCUMENT

Parameter	Symbol	Rating	Unit
Climatic test class (IEC 60068-1/DIN EN 60068-1)		55/100/21	
Dielectric strength			
maximum operating isolation voltage	U _{IORM}	570	V_{peak}
Test voltage (partial discharge test, procedure a for type test and	U_pr	912	V_{peak}
random test)			
$U_{pr} = 1.6 \times U_{IORM}, P_d < 5 pC$			
Test voltage (partial discharge test, procedure b for all devices)	U_pr	1 068	V_{peak}
U_{pr} = 1.875 × U_{IORM} , P_d < 5 pC			
Highest permissible overvoltage	U _{TR}	4 000	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	T _A	-55 to +100	°C
Isolation resistance, minimum value			
V _{IO} = 500 V dc at T _A = 25 °C	Ris MIN.	10 ¹²	Ω
V _{IO} = 500 V dc at T _A MAX. at least 100 °C	Ris MIN.	10 ¹¹	Ω
Safety maximum ratings (maximum permissible in case of fault, see			
thermal derating curve)			
Package temperature	Tsi	150	°C
Current (input current I _F , Psi = 0)	lsi	300	mA
Power (output or total power dissipation)	Psi	500	mW
Isolation resistance			
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

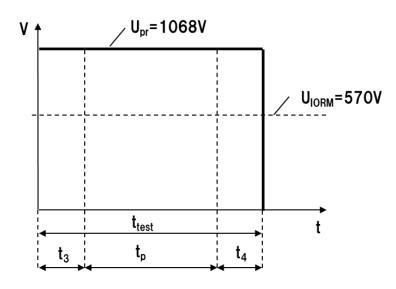
 t_3 , t_4 =1 sec

 $t_{m (PARTIAL DISCHARGE)} = 10 sec$

 t_{test} =12 sec

t_{ini}=60 sec

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



 $t_3, t_4 = 0.1 \text{ sec}$

 $t_{p \, (PARTIAL \, \, DISCHARGE)} = 1.0 \, sec$

 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.
 - 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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