

PS2913-1 Data Sheet

SINGLE Tr. OUTPUT, HIGH COLLECTOR TO EMITTER VOLTAGE 4-PIN ULTRA SMALL FLAT-LEAD PHOTOCOUPLER

R08DS0113EJ0100 Rev.1.00 Nov 29, 2013

DESCRIPTION

The PS2913-1 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

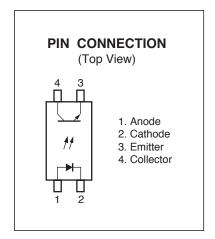
- Ultra small flat-lead package $(4.6 \text{ (L)} \times 2.5 \text{ (W)} \times 2.1 \text{ (H)} \text{ mm})$
- High collector to emitter voltage (VCEO = 120 V)
- High isolation voltage (BV = 2 500 Vr.m.s.)
- Ordering number of taping product: PS2913-1-F3: 3 500 pcs/reel

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- Safety standards
 - UL approved: No. E72422
 - BSI approved (BS EN 60065, BS EN 60950)
 - DIN EN 60747-5-5 (VDE 0884-5) approved (Option)

APPLICATIONS

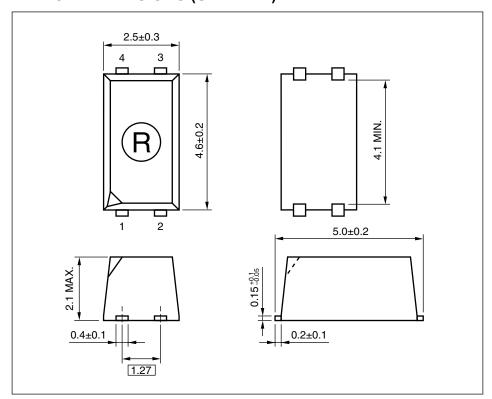
- DC/DC converter
- Modem/PC card



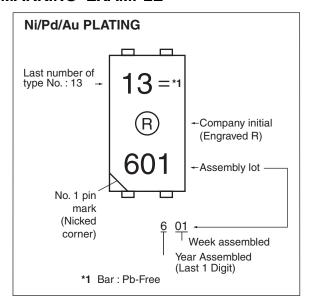
The mark <R> shows major revised points.

The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.

<R> PACKAGE DIMENSIONS (UNIT: mm)



<R> MARKING EXAMPLE



PHOTOCOUPLER CONSTRUCTION

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

<R> ORDERING INFORMATION

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number ^{*1}
PS2913-1	PS2913-1-AX	Pb-Free	50 pcs (Tape 50 pcs cut)	Standard products	PS2913-1
PS2913-1-F3	PS2913-1-F3- AX	(Ni/Pd/Au)	Embossed Tape 3 500 pcs/reel	(UL, BSI approved)	
PS2913-1-V	PS2913-1-V-AX		50 pcs (Tape 50 pcs cut)	UL, BSI, DIN EN 60747-5-5	
PS2913-1-V-F3	PS2913-1-V-F3- AX		Embossed Tape 3 500 pcs/reel	(VDE 0884-5) Approved (Option)	

Note: *1. 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	I _F	50	mA	
	Forward Current Derating	⊿IF/°C	0.5	mA/°C	
	Peak Forward Current *1		0.5	А	
	Power Dissipation	P_D	60	mW	
	Reverse Voltage	V_R	6	V	
Detector	Collector to Emitter Voltage	V_{CEO}	120	V	
	Emitter to Collector Voltage	V _{ECO}	6	V	
	Collector Current	I _C	30	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		P _T	160	mW	
Operating Ambient Temperature		T _A	-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.

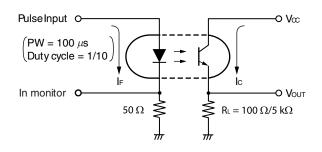
ELECTRICAL CHARACTERISTICS ($T_A = 25$ °C)

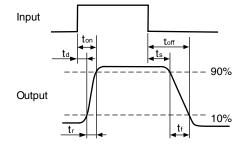
	Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V _F	I _F = 1 mA	0.9	1.1	1.3	V
	Reverse Current	I _R	V _R = 5 V			5	μΑ
	Terminal Capacitance	Ct	V = 0 V, f = 1 MHz		15		pF
Transistor	Collector to Emitter Dark Current	I _{CEO}	I _F = 0 mA, V _{CE} = 120V			100	nA
Coupled	Current Transfer Ratio	CTR	I _F = 1 mA, V _{CE} = 5 V	50	100	200	%
	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		$V_{CC} = 5 \text{ V}, I_{C} = 2 \text{ mA}, R_{L} = 100 \Omega$		10		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 Ω		80		μS
	Storage Time *2	ts			5		
	Turn-off Time *2	t _{off}			50		

Notes: *1. CTR rank

N : 50 to 200 (%) K : 100 to 200 (%) L : 75 to 150 (%) M : 50 to 100 (%)

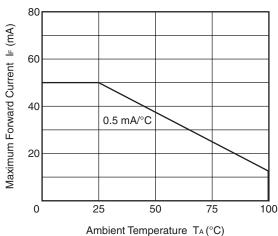
<R> *2. Test circuit for switching time



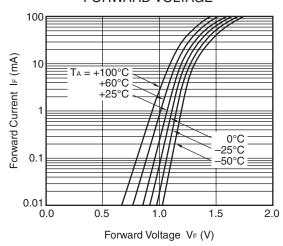


TYPICAL CHARACTERISTICS (T_A = 25°C, unless otherwise specified)

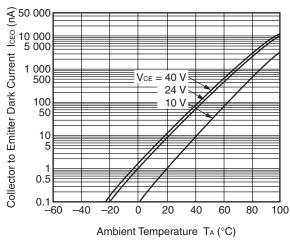




FORWARD CURRENT vs. FORWARD VOLTAGE

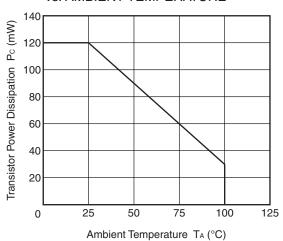


COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE

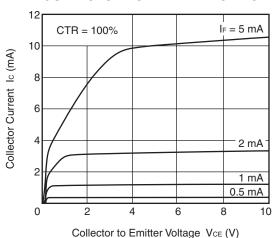


Remark The graphs indicate nominal characteristics.

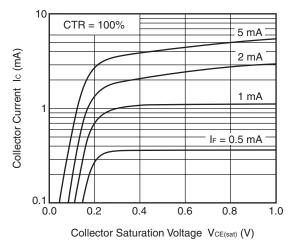
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



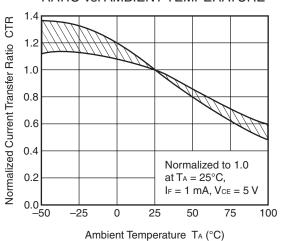
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



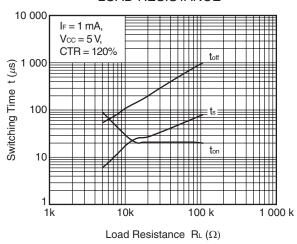
COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE





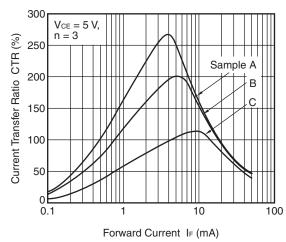


SWITCHING TIME vs. LOAD RESISTANCE

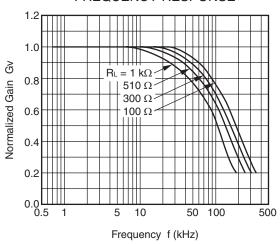


Remark The graphs indicate nominal characteristics.

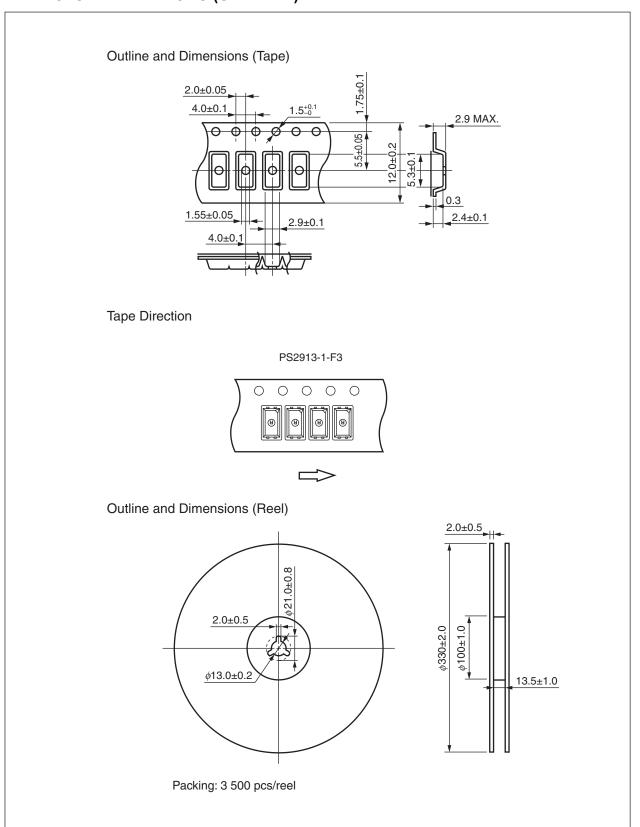
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



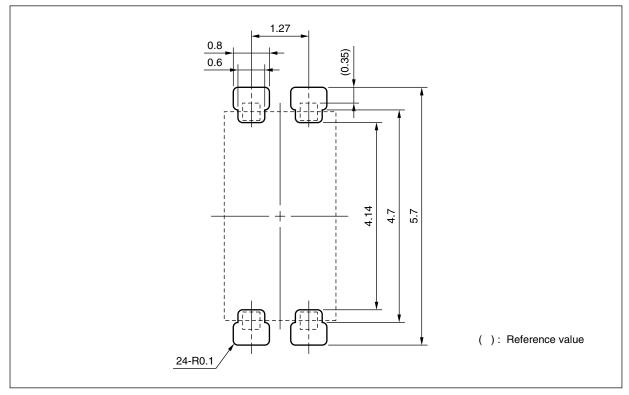
FREQUENCY RESPONSE



<R> 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 <R>

- 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

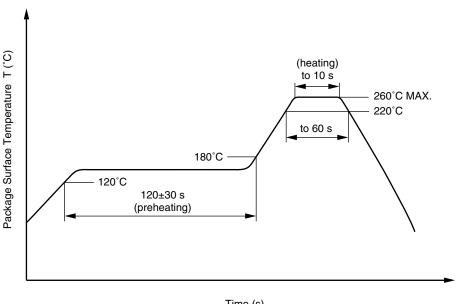
120±30 s

Three or less

Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% or less is

recommended.)

Recommended Temperature Profile of Infrared Reflow



Time (s)

(2) Wave soldering

260°C or below (molten solder temperature) 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% or less is recommended.)

(3) Soldering by Soldering Iron

Peak Temperature (lead part temperature) 350°C or below

Time (each pin) 3 seconds or less

Rosin flux containing small amount of chlorine (The flux with a Flux maximum chlorine content of 0.2 Wt% or less 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

Fluxes

Avoid removing the residual flux with freon-based and chlorine-based cleaning solvent.

- 2. Cautions Regarding Noise
 - Be aware that when voltage is applied suddenly between the photocoupler's input and output or between collectoremitters 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.

<R> SPECIFICATION OF VDE MARKS LICENSE DOCUMENT

Parameter	Symbol	Spec.	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}
$U_{pr} = 1.875 \times U_{IORM}, P_d < 5 pC$			
Highest permissible overvoltage	U _{TR}	4 000	V_{peak}
Degree of pollution (DIN EN 60664-1 VDE0110 Part 1)		2	
Comparative tracking index (IEC 60112/DIN EN 60112 (VDE 0303	CTI	175	
Part 11))			
Material group (DIN EN 60664-1 VDE0110 Part 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			
$V_{IO} = 500 \text{ V dc at } T_A = 25^{\circ}\text{C}$	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)	Isi	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

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 in any way allow it to enter the mouth.

Revision History

PS2913-1 Data Sheet

		Description		
Rev.	Date	Page	Summary	
3.00	May , 2006	_	First edition issued	
1.00	Nov 29, 2013	Throughout	Renesas format is applied to this data sheet.	
		p.1	Modification of FEATURES	
		p.2	Modification of PACKAGE DIMENSIONS	
			Modification of MARKING EXAMPLE	
		p.3	Modification of ORDERING INFORMATION	
		p.4	Modification of ELECTRICAL CHARACTERISTICS	
		p.6	Modification of TYPICAL CHARACTERISTICS	
		p.7	Modification of TAPING SPECIFICATIONS	
		p.9	Modification of NOTES ON HANDLING	
		p.11	Addition of SPECIFICATION OF VDE MARKS LICENSE DOCUMENT	

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