

# PHOTOCOUPLER PS2845-4A

# WORLD'S SMALLEST CLASS, FOUR CHANNELS 12-PIN ULTRA SMALL SOP PHOTOCOUPLER -NEPOC Series-

## DESCRIPTION

The PS2845-4A is an optically coupled isolator containing GaAs light emitting diodes and NPN silicon phototransistors.

This product includes four channels in a single package for high-density mounting applications.

The PS2845-4A is the world's smallest class of photocouplers and realizes about 50% reduction in mounting area compared with the PS280x and PS281x Series.

## FEATURES

• Ultra small and thin package

(12-pin ultra small SOP, Pin pitch 0.8 mm, 4.4 (L)  $\times$  5.6 (W)  $\times$  2.5 (H))

- Common lead anode, cathode, collector common
- High current transfer ratio (CTR = 200% TYP. @ I<sub>F</sub> = ±1mA)
- High isolation voltage (BV = 1 500 Vr.m.s.)
- Pb-Free product
- Ordering number of tape product: PS2845-4A-F3, F4: 2 500 pcs/reel
- Safety standards
  - UL approved: File No. E72422

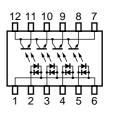
#### **APPLICATIONS**

- Programmable logic controllers (PLCs)
- Input and output for function automation
- Hybrid IC

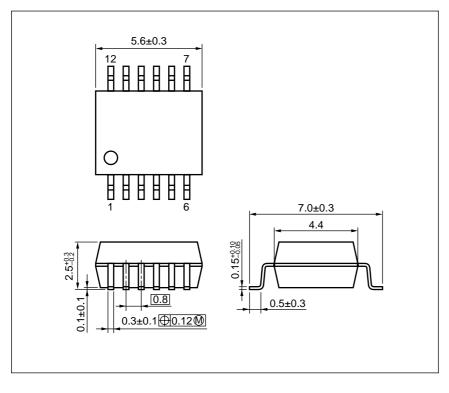
1 ch 1, 6 common 2 11 7, 12 cd	ode, Cathode Cathode, Anode Emitte	r Collector
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		7, 12 common

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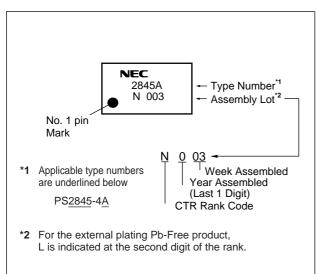
PIN CONNECTIONS (Top View)



# PACKAGE DIMENSIONS (UNIT: mm)



# MARKING EXAMPLE



# ORDERING INFORMATION

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number *1
PS2845-4A-F3	PS2845-4A-F3	Solder	Embossed Tape 2 500 pcs/reel	Standard products	PS2845-4A
PS2845-4A-F4	PS2845-4A-F4	contains lead		(UL Approved)	
PS2845-4A-F3	PS2845-4A-F3-A	Pb-Free			
PS2845-4A-F4	PS2845-4A-F4-A				

\*1 For the application of the Safety Standard, following part number should be used.

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

Parameter		Symbol	Ratings	Unit
Diode	Forward Current (DC)	lF	±20	mA/ch
	Power Dissipation Derating	⊿I⊧/°C	0.2	mA/°C
	Peak Forward Current *1	IFP	±0.5	А
Transistor	Collector to Emitter Voltage	Vceo	70	V
	Emitter to Collector Voltage	Veco	5	V
	Collector Current	lc	20	mA/ch
	Power Dissipation Derating	⊿Pc/°C	0.4	mW/°C
	Power Dissipation	Pc	40	mW/ch
Isolation Voltage *2		BV	1 500	Vr.m.s.
Operating Ambient Temperature		TA	-40 to +100	°C
Storage Temperature		Tstg	-55 to +125	°C

\***1** PW = 100 μs, Duty Cycle = 1%

\*2 AC voltage for 1 minute at  $T_A = 25^{\circ}$ C, RH = 60% between input and output. Pins 1-6 shorted together, 7-12 shorted together.

	Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	VF	IF = ±1 mA	0.9	1.1	1.2	V
	Terminal Capacitance	Ct	V = 0 V, f = 1 MHz		30		pF
Transistor	Collector to Emitter Current	ICEO	IF = 0 mA, VCE = 24 V			100	nA
Coupled	Current Transfer Ratio (Ic/IF)	CTR	IF = ±1 mA, Vce = 0.4 V	100	200	400	%
	Optical Leakage Current <sup>*1</sup> (1 to 2-ch, 2 to 3-ch, 3 to 4-ch)	١L	IF = 5 mA, VCE = 24 V			100	nA
	Collector Saturation Voltage	Vce (sat)	IF = ±1 mA, Ic = 0.2 mA		0.13	0.3	V
	Isolation Resistance	Ri-o	VI-O = 1 kVDC	10 <sup>11</sup>			Ω
	Isolation Capacitance	CI-O	V = 0 V, f = 1 MHz		0.4		pF
	Turn-on Time *2	ton	$V_{CC} = 5 \text{ V}, \text{ I}_F = \pm 1 \text{ mA}, \text{ R}_L = 5 \text{ k}\Omega$		20		μS
	Turn-off Time *2	toff			110		

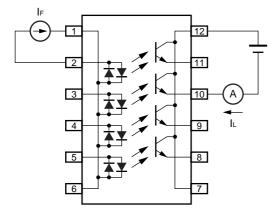
# ELECTRICAL CHARACTERISTICS (TA = 25°C)

\*1 The optically induced leakage current is current which can be measured at transistor if LED = "ON" and LED = "OFF".

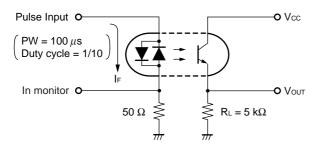
LED of channel 1 is switched to "ON".

At Tr-output of channel 2 a voltage is applied and one can measure a current between emitter and collector.

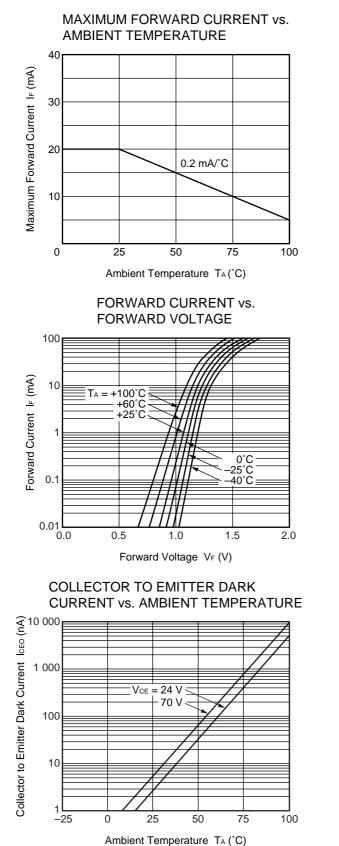
This is leakage current (at IF = 5 mA, VCEO = 24 V). Measurement circuits for optical leakage current E.g. : In the case of 1 to 2-ch



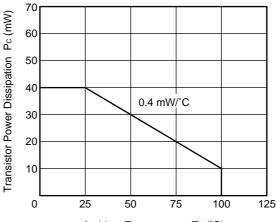
\*2 Test circuit for switching time



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

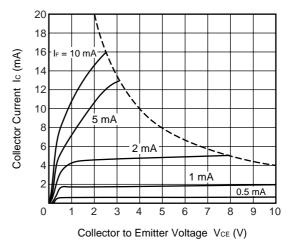


TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE

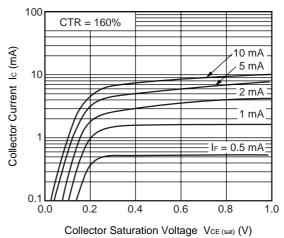


Ambient Temperature T<sub>A</sub> (°C)

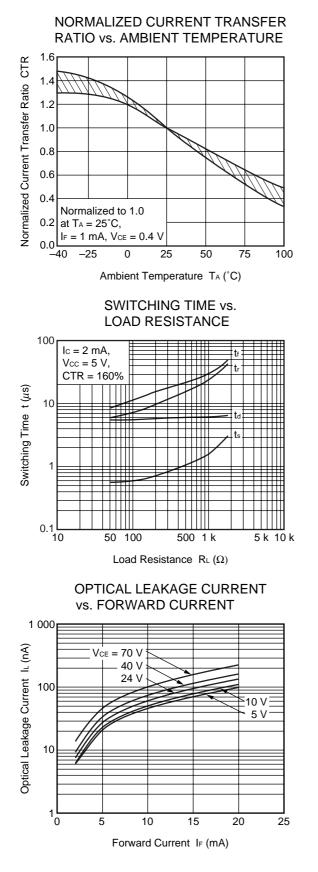
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE

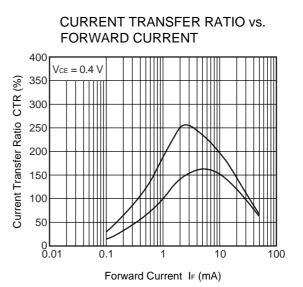


COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE

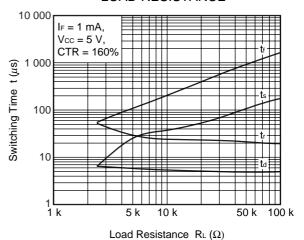




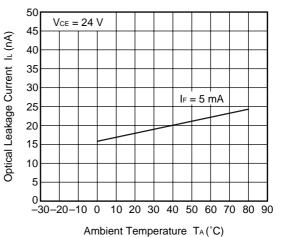




SWITCHING TIME vs. LOAD RESISTANCE

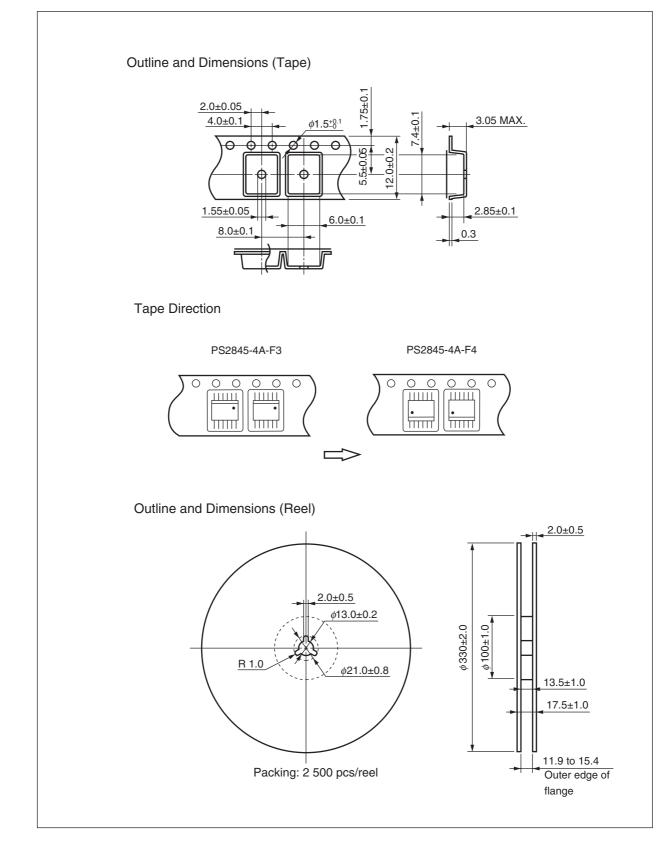


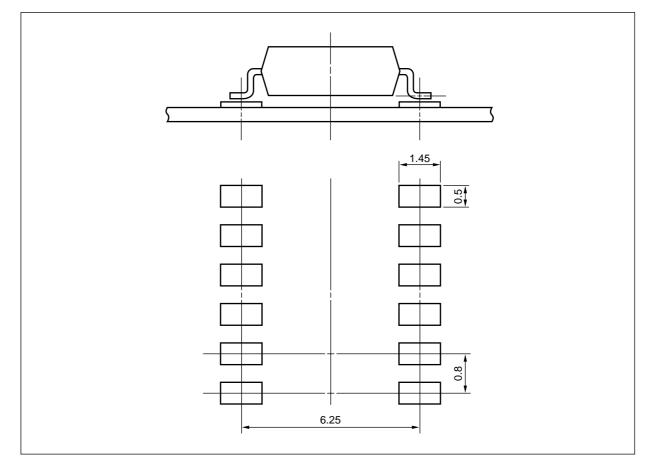
OPTICAL LEAKAGE CURRENT vs. AMBIENT TEMPERATURE



Remark The graphs indicate nominal characteristics.

# \* TAPING SPECIFICATIONS (UNIT: mm)





# RECOMMENDED MOUNT PAD DIMENSIONS (UNIT: mm)

# NOTES ON HANDLING

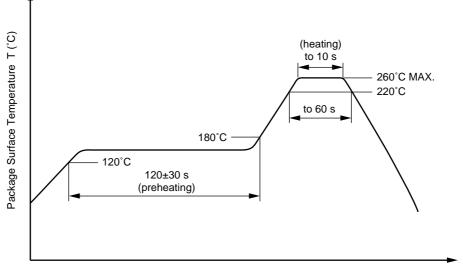
## 1. Recommended soldering conditions

## (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

- 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.)
- Flux 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

<ul> <li>Peak temperature (lead part temperature)</li> </ul>	350°C or below
<ul> <li>Time (each pins)</li> </ul>	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

# • 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 collector-emitters at startup, the output transistor may enter the on state, even if the voltage is within the absolute maximum ratings.

# USAGE CAUTIONS

- 1. Protect against static electricity when handling.
- 2. Avoid storage at a high temperature and high humidity.



Subject: Compliance with EU Directives

CEL certifies, to its knowledge, that semiconductor and laser products detailed below are compliant with the requirements of European Union (EU) Directive 2002/95/EC Restriction on Use of Hazardous Substances in electrical and electronic equipment (RoHS) and the requirements of EU Directive 2003/11/EC Restriction on Penta and Octa BDE.

CEL Pb-free products have the same base part number with a suffix added. The suffix –A indicates that the device is Pb-free. The –AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (\*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL's understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

Restricted Substance per RoHS	Concentration Limit per RoHS (values are not yet fixed)	Concentration contained in CEL devices	
Lead (Pb)	< 1000 PPM	-A Not Detected	-AZ (*)
Mercury	< 1000 PPM	Not Detected	
Cadmium	< 100 PPM	Not Detected	
Hexavalent Chromium	< 1000 PPM	Not Detected	
РВВ	< 1000 PPM	Not Detected	
PBDE	< 1000 PPM	Not Detected	

If you should have any additional questions regarding our devices and compliance to environmental standards, please do not hesitate to contact your local representative.

In no event shall CEL's liability arising out of such information exceed the total purchase price of the CEL part(s) at issue sold by CEL to customer on an annual basis.

See CEL Terms and Conditions for additional clarification of warranties and liability.

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