



# PS7160-2A,PS7160L-2A

# 8-PIN DIP, 600 V BREAK DOWN VOLTAGE 2-ch Optical Coupled MOS FET

#### **DESCRIPTION**

The PS7160-2A and PS7160L-2A are solid state relays containing GaAs LEDs on the light emitting side (input side) and MOS FETs on the output side.

They are suitable for analog signal control because of their low offset and high linearity.

The PS7160L-2A has a surface mount type lead.

#### **FEATURES**

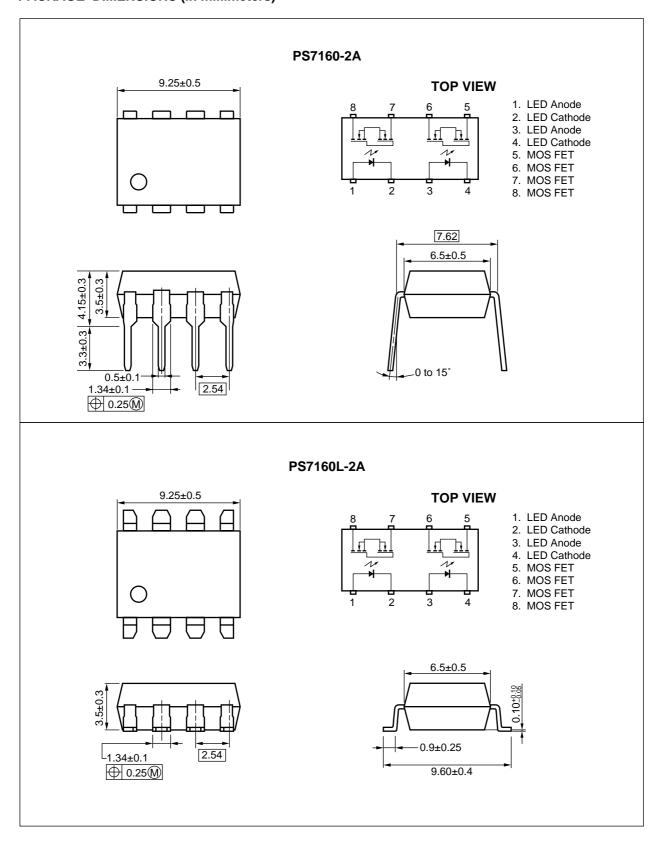
- 2 channel type (1 a + 1 a output)
- Low LED operating current (IF = 2 mA)
- · Designed for AC/DC switching line changer
- Small package (8-pin DIP)
- · Low offset voltage
- PS7160L-2A: Surface mount type
- UL approved: File No. E72422 (S)
- BSI approved: No. 8245/8246
- CSA approved: No. CA 101391

### **APPLICATIONS**

- Exchange equipment
- · Measurement equipment
- FA/OA equipment

The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.

# **PACKAGE DIMENSIONS (in millimeters)**



# **ORDERING INFORMATION (Solder Contains Lead)**

Part Number	Package	Packing Style	Application Part Number*1
PS7160-2A	8-pin DIP	Magazine case 50 pcs	PS7160-2A
PS7160L-2A			PS7160L-2A
PS7160L-2A-E3		Embossed Tape 1 000 pcs/reel	
PS7160L-2A-E4			

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

# **ORDERING INFORMATION (Pb-Free)**

Part Number	Package	Packing Style	Application Part Number *1
PS7160-2A-A	8-pin DIP	Magazine case 50 pcs	PS7160-2A
PS7160L-2A-A			PS7160L-2A
PS7160L-2A-E3-A		Embossed Tape 1 000 pcs/reel	
PS7160L-2A-E4-A			

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

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

Parameter		Symbol	Ratings	Unit	
Diode	Forward Current (DC)	lF	50	mA	
	Reverse Voltage	VR	5.0	V	
	Power Dissipation	Po	50	mW/ch	
	Peak Forward Current *1	<b>I</b> FP	1	Α	
MOS FET	Break Down Voltage	VL	600	V	
	Continuous Load Current *2	lι	90 (120)	mA	
	Pulse Load Current *2, 3 (AC/DC Connection)	ILP	250 (300)	mA	
	Power Dissipation	Po	375	mW/ch	
Isolation Voltage *4		BV	1 500	Vr.m.s.	
Total Power Dissipation		Рт	850	mW	
Operating Ambient Temperature		TA	-40 to +85	°C	
Storage Te	Storage Temperature		-40 to +100	°C	

<sup>\*1</sup> PW = 100  $\mu$ s, Duty Cycle = 1 %

<sup>\*2</sup> Conditions: IF  $\geq$  5 mA. Load current ( ) value is.

<sup>\*3</sup> PW = 100 ms, 1 shot

<sup>\*4</sup> AC voltage for 1 minute at  $T_A = 25$  °C, RH = 60 % between input and output

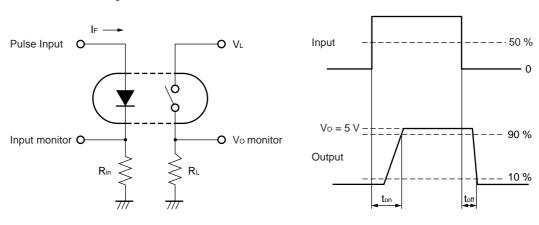
# RECOMMENDED OPERATING CONDITIONS (TA = 25 °C)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
LED Operating Current	lF	2	10	20	mA
LED Off Voltage	VF	0		0.5	V

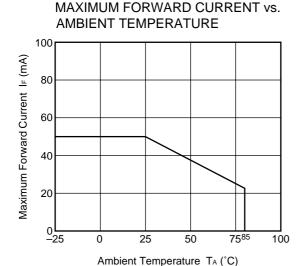
# **ELECTRICAL CHARACTERISTICS (TA = 25 °C)**

	Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	VF	IF = 10 mA		1.2	1.4	V
	Reverse Current	lr	V <sub>R</sub> = 5 V			5.0	μA
MOS FET	Off-state Leakage Current	Loff	V <sub>D</sub> = 600 V		0.03	1.0	μА
	Output Capacitance	Cout	V <sub>D</sub> = 0 V, f = 1 MHz		110		pF/ch
Coupled	LED On-state Current	<b>I</b> Fon	IL = 90 mA			2.0	mA
	On-state Resistance	Ron1	IF = 10 mA, IL = 10 mA		42	50	Ω
		Ron2	$I_F = 10 \text{ mA}, I_L = 90 \text{ mA}, t \le 10 \text{ ms}$		33	50	
	Turn-on Time *1	ton	If = 10 mA, Vo = 5 V, RL = 500 $\Omega$ ,		0.8	1.5	ms
	Turn-off Time *1	toff	PW ≥ 10 ms		0.06	0.2	
	Isolation Resistance	R <sub>I-O</sub>	Vi-o = 1.0 kVpc	10 <sup>9</sup>			Ω
	Isolation Capacitance	C <sub>I-O</sub>	V = 0 V, f = 1 MHz		1.1		pF/ch

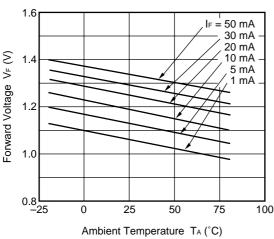
# \*1 Test Circuit for Switching Time



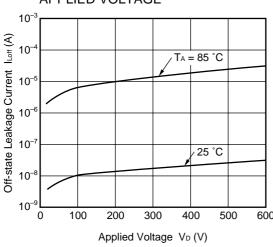
# **★** TYPICAL CHARACTERISTICS (TA = 25 °C, unless otherwise specified)



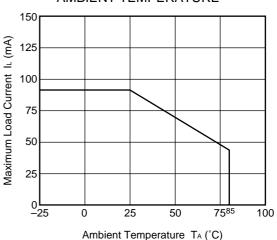




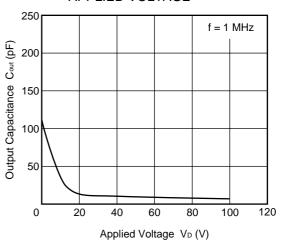
OFF-STATE LEAKAGE CURRENT vs. APPLIED VOLTAGE



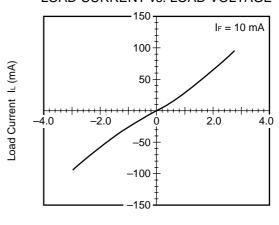
# MAXIMUM LOAD CURRENT vs. AMBIENT TEMPERATURE



# OUTPUT CAPACITANCE vs. APPLIED VOLTAGE

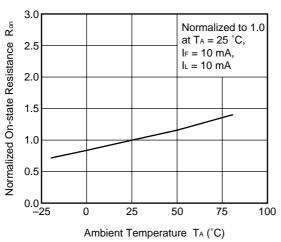


### LOAD CURRENT vs. LOAD VOLTAGE

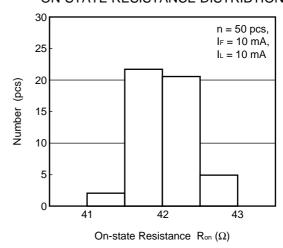


Load Voltage V<sub>L</sub> (V)

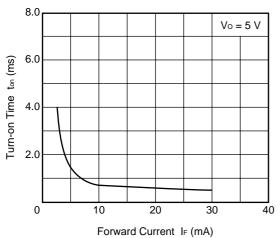
# NORMALIZED ON-STATE RESISTANCE vs. AMBIENT TEMPERATURE



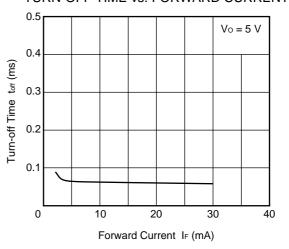
### **ON-STATE RESISTANCE DISTRIBTION**



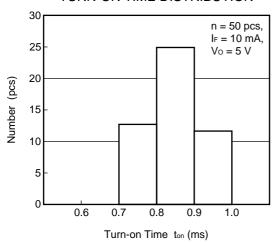
### TURN-ON TIME vs. FORWARD CURRENT



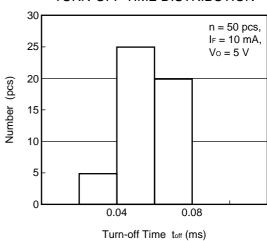
#### TURN-OFF TIME vs. FORWARD CURRENT



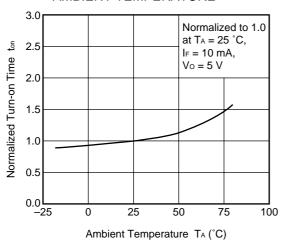
### TURN-ON TIME DISTRIBUTION



# TURN-OFF TIME DISTRIBUTION

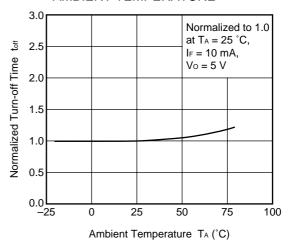


# NORMALIZED TURN-ON TIME vs. AMBIENT TEMPERATURE

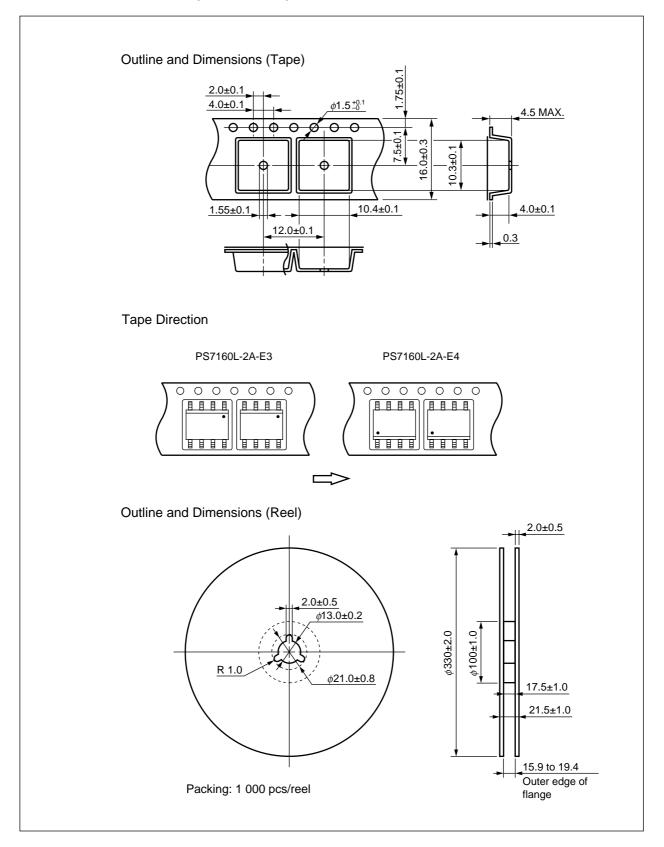


**Remark** The graphs indicate nominal characteristics.

# NORMALIZED TURN-OFF TIME vs. AMBIENT TEMPERATURE



### **★ TAPING SPECIFICATIONS (in millimeters)**



#### RECOMMENDED SOLDERING CONDITIONS

### (1) Infrared reflow soldering

• Peak reflow temperature 260°C or below (package surface temperature)

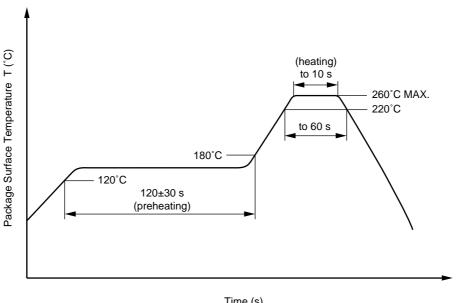
• Time of peak reflow temperature 10 seconds or less • Time of temperature higher than 220°C 60 seconds or less

• Time to preheat temperature from 120 to 180°C 120±30 s Number of reflows Three

• Flux 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

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

content of 0.2 Wt% is recommended.)

### (3) Cautions

Fluxes

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



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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)		on contained 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		
PBB	< 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.

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