NEC

6 PIN DIP 400 V BREAKDOWN VOLTAGE 1-CH OPTICAL COUPLED MOSFET

PS7142-1A
PS7142L-1A

FEATURES

- **1 CHANNEL TYPE:** 1a output
- **LOW LED OPERATING CURRENT:** I_F = 2 mA
- **DESIGNED FOR AC/DC SWITCHING LINE CHANGER**
- **SMALL PACKAGE:** 6-pin DIP
- **LOW OFFSET VOLTAGE**
- **SURFACE MOUNT AVAILABLE**

DESCRIPTION

The PS7142-1A and PS7142L-1A are solid state relays containing GaAs LEDs on the light emitting side (input side) and MOSFETs on the output side. They are suitable for analog signal control because of their low offset and high linearity.

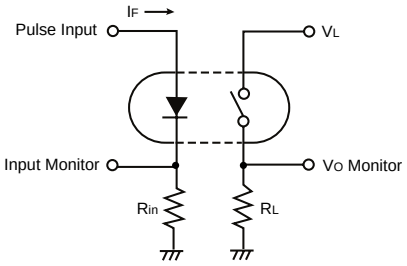
APPLICATIONS

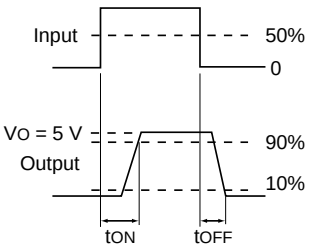
- **EXCHANGE EQUIPMENT**
- **MEASUREMENT EQUIPMENT**
- **FA/OA EQUIPMENT**

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

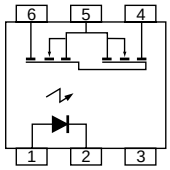
PART NUMBER				PS7142-1A, PS7142L-1A		
	SYMBOLS	PARAMETERS	UNITS	MIN	TYP	MAX
Diode	V_F	Forward Voltage, I_F = 10 mA	V		1.2	1.4
	I_R	Reverse Current, V_R = 5 V	μA			5.0
MOSFET	I_{Loff}	Off-state Leakage Current, VD = 400 V	μA		0.03	1.0
	C_{out}	Output Capacitance, V_D = 0 V, f = 1 MHz	pF		225	
Coupled	IFon	LED On-state Current, I_L = 200 mA	mA			2.0
	R_{ON1}	On-State Resistance; I_F = 10 mA, I_L = 10 mA	Ω		6.0	10
	R_{ON2}	I_F = 10 mA, I_L = 200 mA, t≤10 ms				
	t_{ON}	Turn-on Time[1] I_F = 10 mA, V_O= 5 V, PW ≥ 10 ms	ms		0.8	5.0
	t_{OFF}	Turn-off Time[1] I_F = 10 mA, V_O = 5 V, PW ≥ 10 ms	ms		0.02	0.2
	R_{I-O}	Isolation Resistance, V_{I-O} = 1.0 kV	Ω	10^9		
	C_{I-O}	Isolation Capacitance, V = 0 V, f = 1 MHz	pF		1.1	

Note:
1. Test Circuit for Switching Time:





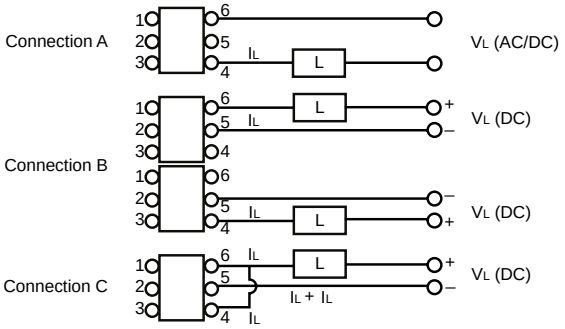
PS7142-1A, PS7142L-1A



ABSOLUTE MAXIMUM RATINGS[1] (T_A = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
Diode			
I_F	Forward Current (DC)	mA	50
V_R	Reverse Voltage	V	5
P_D	Power Dissipation	mW	50
I_{FP}	Peak Foward Current[2]	A	1
MOSFET			
V_L	Break Down Voltage	V	400
I_L	Continuous Load Current[3] Connection A	mA	200
	Connection B		250
	Connection C		400
I_{LP}	Pulse Load Current[4] AC/DC Connection	mA	400
P_D	Power Dissipation	mW	560
Coupled			
BV	Isolation Voltage[5]	V	1500
P_T	Total Power Dissipation	mW	610
T_A	Operating Ambient Temp.	°C	-40 to +80
T_{STG}	Storage Temperature	°C	-40 to +100

Notes:
1. Operation in excess of any one of these parameters may result in permanent damage.
2. PW = 100 µs, Duty Cycle = 1 %.
3. Conditions: $I_F \geq 2$ mA. The following types of load connections are available:



4. PW = 100 ms, 1 shot.
5. AC voltage for 1 minute at T_A = 25 °C, RH = 60 % between input and output.

RECOMMENDED OPERATING CONDITIONS (T_A = 25°C)

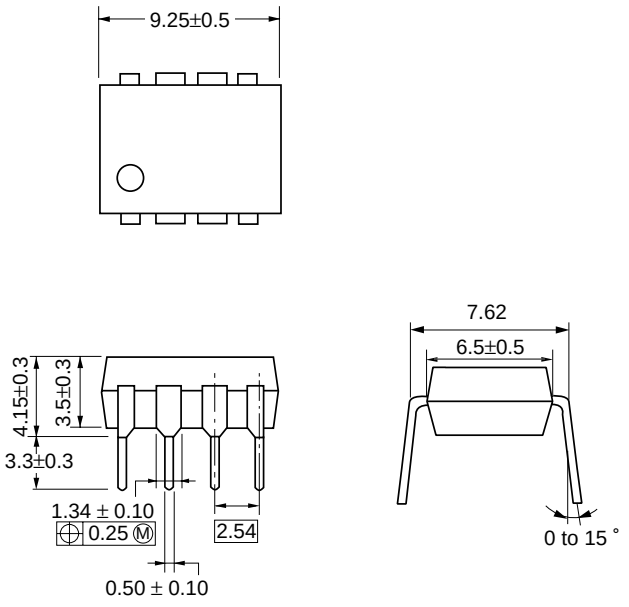
PART NUMBER		PS7142-1A,PS7142L-1A			
SYMBOLS	PARAMETERS	UNITS	MIN	TYP	MAX
I_F	LED Operating Current	mA	2	10	20
V_F	LED Off Voltage	V	0		0.5

ORDERING INFORMATION

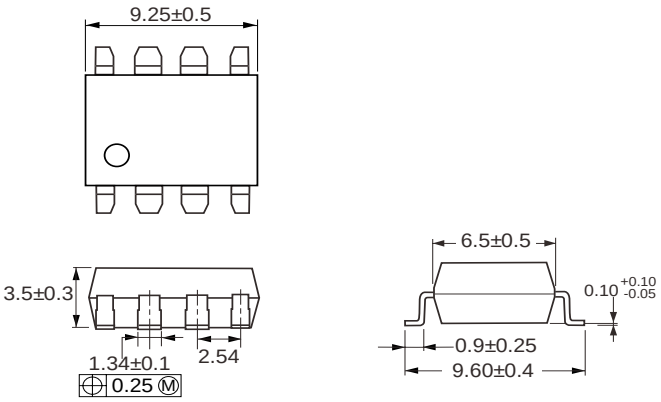
PART NUMBER	PACKAGE	PACKING STYLE
PS7142-1A	6-PIN DIP	Magazine case 50 pcs
PS7142L-1A		
PS7142L-1A-E3		Embossed Tape 1000 pcs/reel
PS7142L-1A-E4		

OUTLINE DIMENSIONS (Units in mm)

PS7142-1A

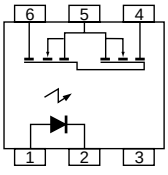


PS7142L-1A



PIN CONNECTION (Top View)

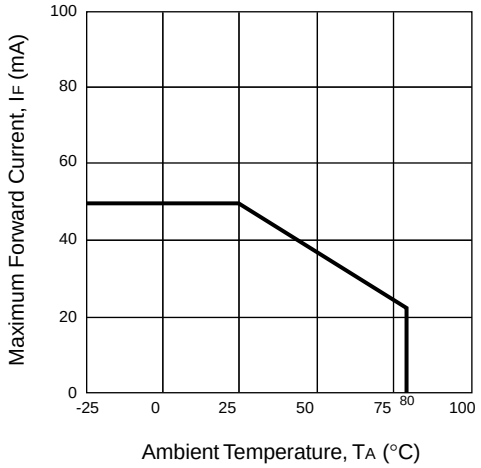
PS7142-1A, PS7142L-1A



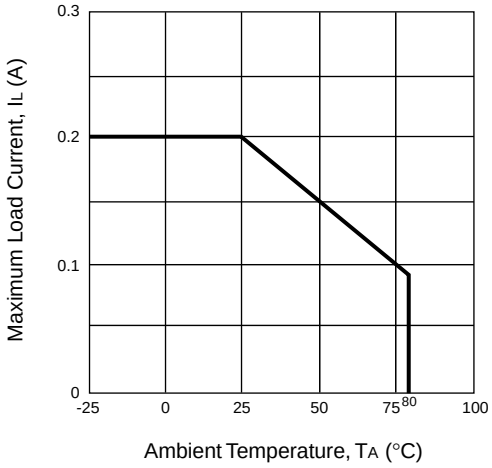
1. LED Anode
2. LED Cathode
3. NC
4. MOSFET Drain
5. MOSFET Source
6. MOSFET Drain

TYPICAL PERFORMANCE CURVES (T_A = 25 °C)

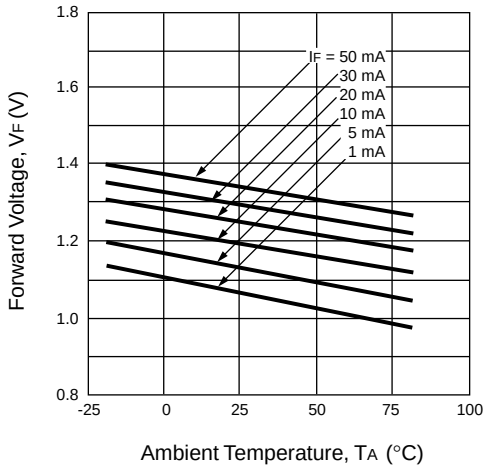
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



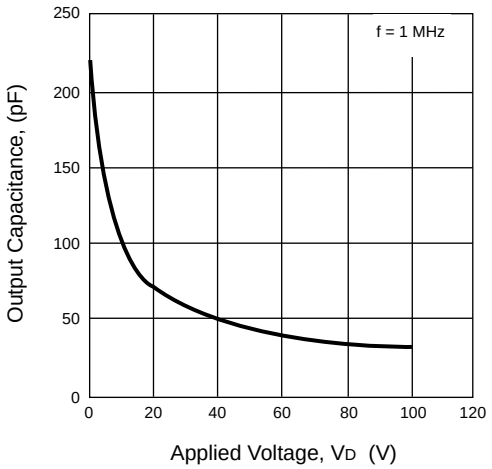
MAXIMUM LOAD CURRENT vs. AMBIENT TEMPERATURE



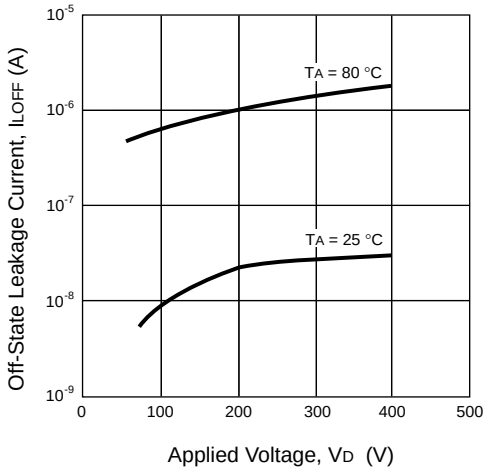
FORWARD VOLTAGE vs. AMBIENT TEMPERATURE



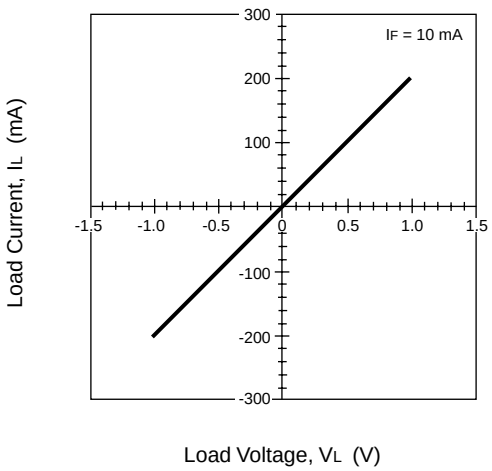
OUTPUT CAPACITANCE vs. APPLIED VOLTAGE



OFF-STATE LEAKAGE CURRENT vs. APPLIED VOLTAGE

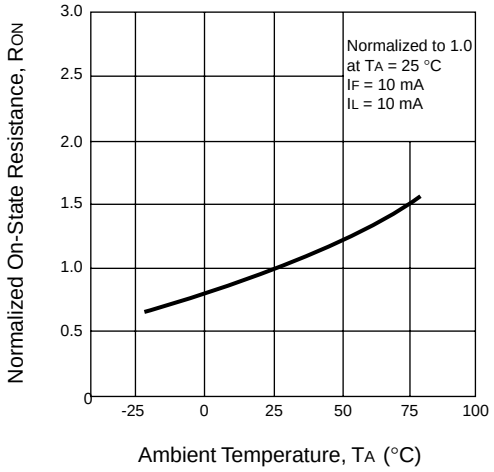


LOAD CURRENT vs. LOAD VOLTAGE

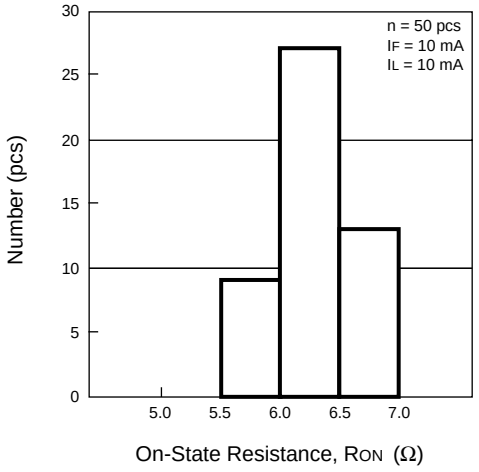


TYPICAL PERFORMANCE CURVES (T_A = 25 °C)

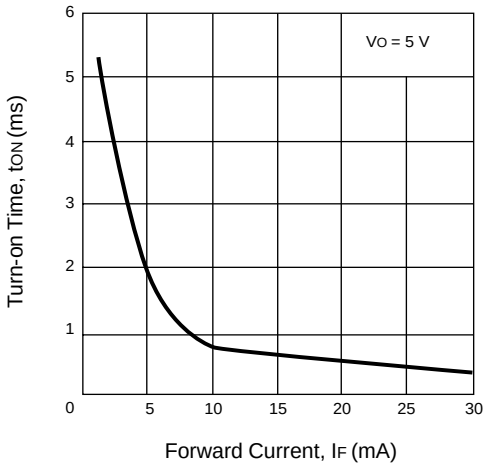
NORMALIZED ON-STATE RESISTANCE vs. AMBIENT TEMPERATURE



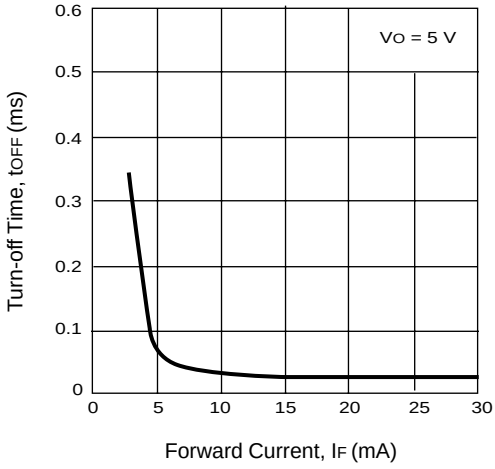
ON-STATE RESISTANCE DISTRIBUTION



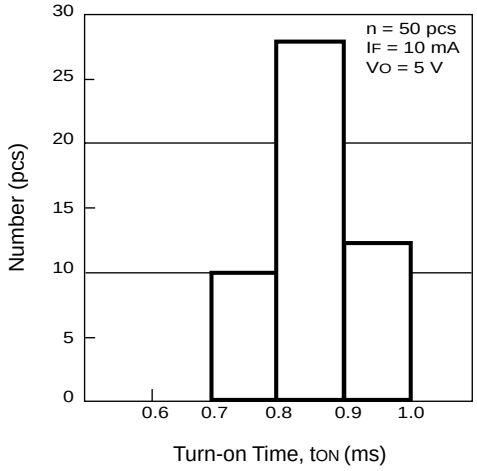
TURN-ON TIME vs. FORWARD CURRENT



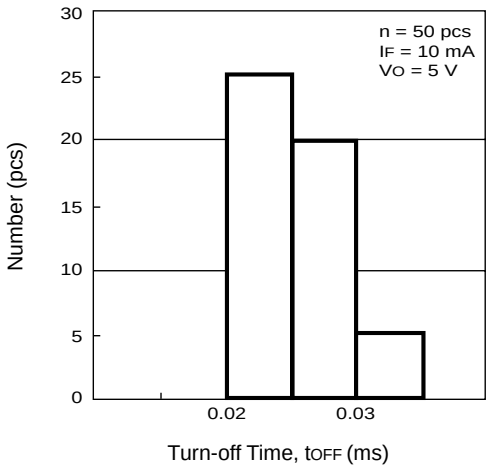
TURN-OFF TIME vs. FORWARD CURRENT



TURN-ON TIME DISTRIBUTION

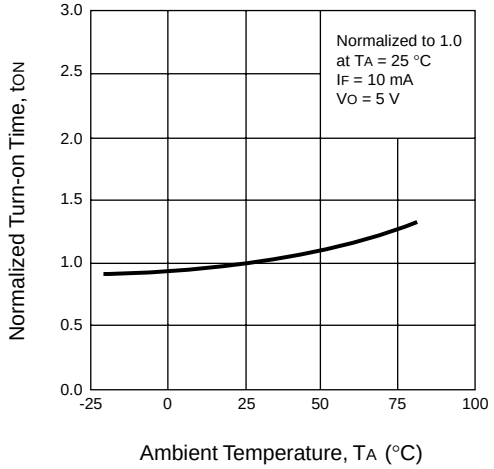


TURN-OFF TIME DISTRIBUTION

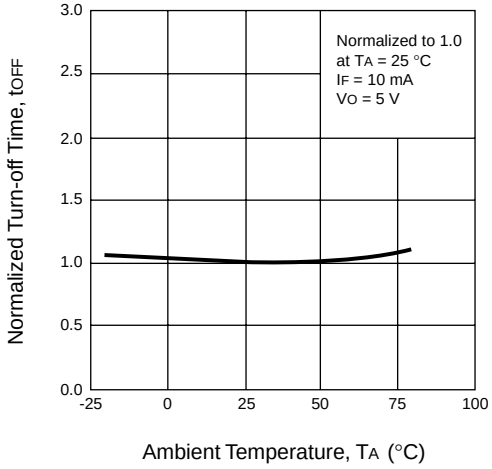


TYPICAL PERFORMANCE CURVES (T_A = 25 °C)

NORMALIZED TURN-ON TIME vs. AMBIENT TEMPERATURE

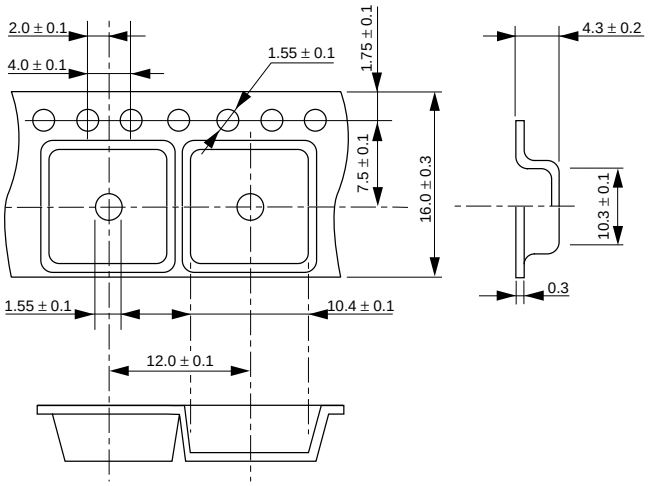


NORMALIZED TURN-OFF TIME vs. AMBIENT TEMPERATURE

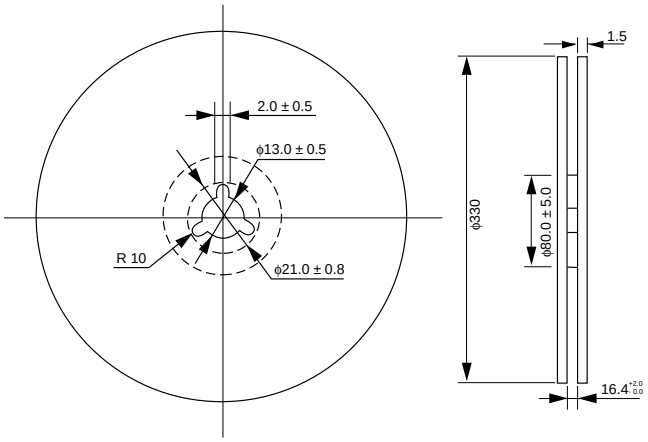


TAPING SPECIFICATIONS (Units in mm)

OUTLINE AND DIMENSIONS (TAPE)



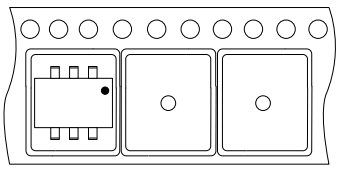
OUTLINE AND DIMENSIONS (REEL)



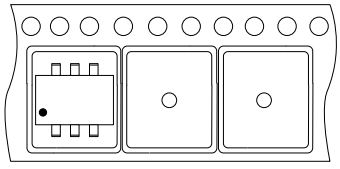
Notes:
1. Packaging : 1000 pcs/reel

TAPING DIRECTION

PS7142L-1A-E3



PS7142L-1A-E4

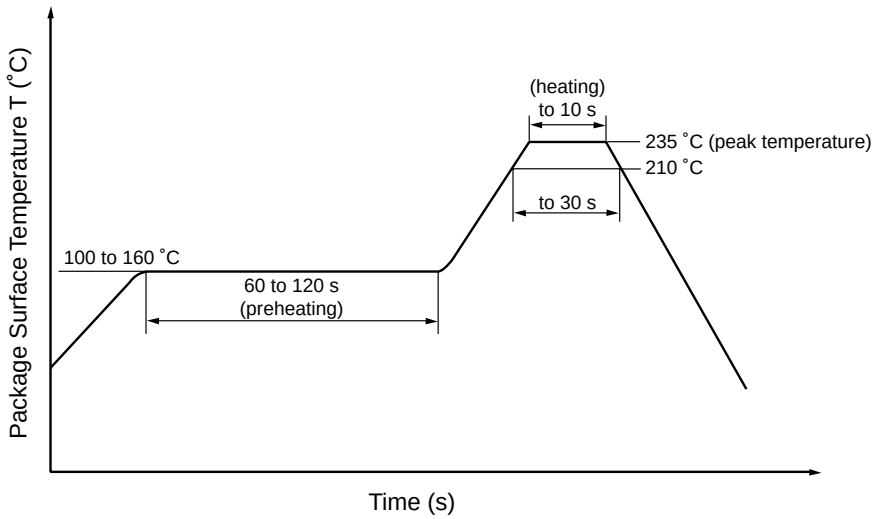


RECOMMENDED SOLDERING CONDITIONS

(1) Infrared reflow soldering

• Peak reflow temperature	235 °C or below (package surface temperature)
• Time of temperature higher than 210 °C	30 seconds or less
• Number of reflows	Two
• 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



(2) Dip soldering

• Temperature	260 °C or below (molten solder temperature)
• Time	10 seconds or less
• 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 cleaning solvent.