

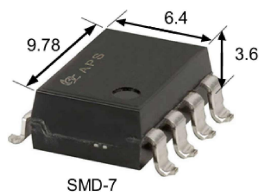


FEATURES

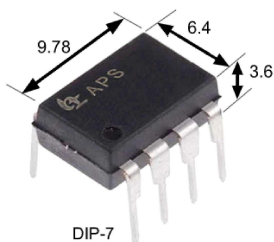
- Supports 0.3 A, 0.6 A, 0.9 A and 1.2 A ON-state RMS currents.
- Handles both 100 and 200 Vrms loads.
- High dielectric strength: 5,000 Vrms

TYPICAL APPLICATIONS

- Home appliances market:
air conditioner, microwave oven, washing machine, personal hygiene system, refrigerator, fan heater, inductive heating cooker, rice cooker and humidifier, etc.
- Industrial equipment market

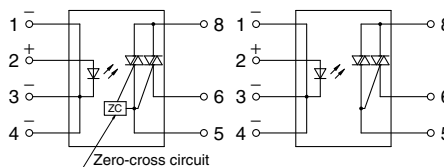


SMD-7

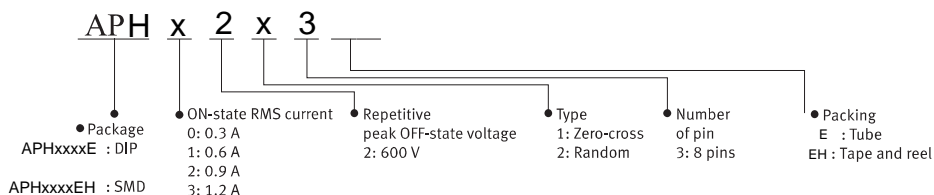


DIP-7

mm



ORDERING INFORMATION (PART NO.)



TYPES

Type	Output rating*		Type	Part No.		Packing quantity	
				Through hole terminal	Surface-mount terminal	Tube	Tape and reel
	Repetitive peak OFF-state voltage	ON-state RMS current		DIP7	SMD7		
AC type	600 V	Zero-cross	0.3A	APH0213E	APH0213EH	1 tube contains 50 pcs. 1 batch contains 500 pcs.	1,000 pcs.
			0.6A	APH1213E	APH1213EH		
			0.9A	APH2213E	APH2213EH		
			1.2A	APH3213E	APH3213EH		
		Random	0.3A	APH0223E	APH0223EH		
			0.6A	APH1223E	APH1223EH		
			0.9A	APH2223E	APH2223EH		
			1.2A	APH3223E	APH3223EH		

* Indicate the repetitive peak OFF-state voltage and ON-state RMS current: peak AC.



RATING

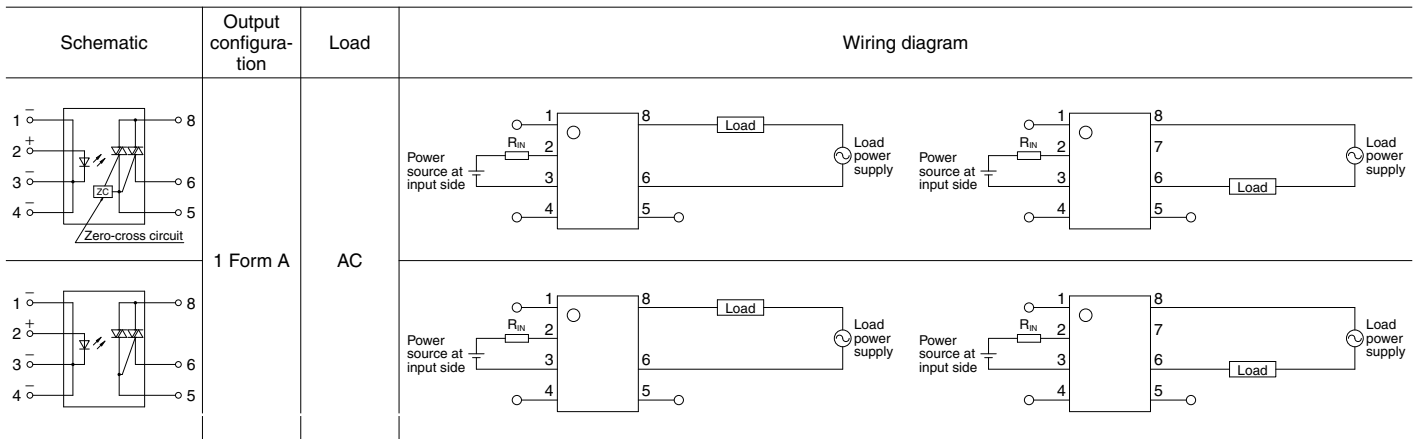
Absolute maximum ratings (Ambient temperature: 25°C)

Item		Symbol	APH0213, APH0223	APH1213, APH1223	APH2213, APH2223	APH3213, APH3223	Remarks
Input	LED forward current	I_F	50 mA				
	LED reverse voltage	V_R	6 V				
	Peak forward current	I_{FP}	1 A				f = 100 Hz, Duty Ratio = 0.1%
Output	Repetitive peak OFF-state voltage	V_{DRM}	600 V				
	ON-state RMS current	$I_{T(RMS)}$	0.3 A	0.6 A	0.9 A	1.2 A	
	Non-repetitive surge current	I_{TSM}	3 A	6 A	9 A	12 A	60 Hz, 1 cycle
I/O isolation voltage		V_{iso}	5,000 Vrms				
Operating temperature		T_{opr}	-30 to +85°C -22 to +185°F				Non-condensing at low temperatures
Storage temperature		T_{stg}	-40 to +125°C -40 to +257°F				

Characteristics (Ambient temperature: 25°C)

Item		Symbol	APH0213, APH1213, APH2213, APH3213	APH0223, APH1223, APH2223, APH3223	Remarks
Input	LED dropout voltage	Typical	1.21 V		$I_F = 20$ mA
		Maximum	1.3 V		
Input	LED reverse current	Typical	—		$V_R = 6$ V
		Maximum	10 μ A		
Output	Peak OFF-state current	Typical	—		$I_F = 0$ mA $V_{DRM} = 600$ V
		Maximum	100 μ A		
	Peak ON-state voltage	Typical	—		$I_F = 10$ mA $I_{TM} = \text{Max.}$
		Maximum	2.5 V		
Output	Holding current	Typical	—		
		Maximum	25 mA		
Output	Critical rate of rise of OFF-state voltage	Minimum	200 V/ μ s		$V_{DRM} = 600$ V $\times 1/\sqrt{2}$
Transfer characteristics	Trigger LED current	Maximum	$I_{FT} = 10$ mA		$V_D = 6$ V $R_L = 100$ Ω
	Zero-cross voltage	Maximum	50 V		$I_F = 10$ mA
	Turn on time*1	Maximum	100 μ s		$I_F = 20$ mA $V_D = 6$ V $R_L = 100$ Ω
	I/O isolation resistance	Minimum	$R_{iso} = 50$ G Ω		500 V DC

SCHEMATIC AND WIRING DIAGRAMS



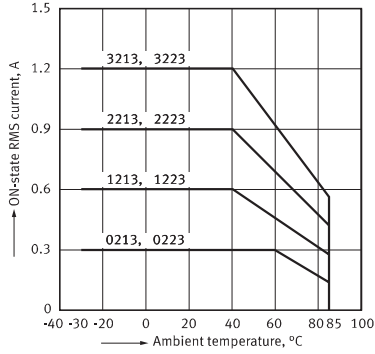
Please obey the following conditions to ensure proper device operation and resetting. Input LED current (Recommended value): $I_F \geq 15$ mA and ≤ 25 mA



REFERENCE DATA

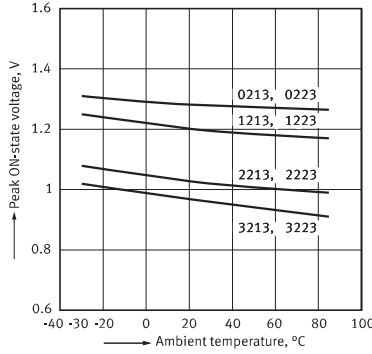
1.ON-state RMS current vs. ambient temperature characteristics

Allowable ambient temperature: -30 to +85°C



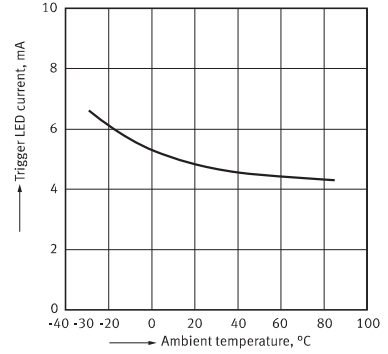
2.Peak ON-state voltage vs. ambient temperature characteristics

LED current: 10 mA; ON current: Max.
Measured portion: between terminals 6 and 8



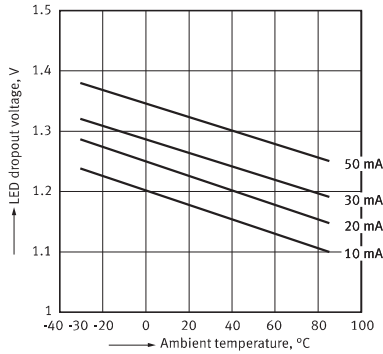
3.Trigger LED current vs. ambient temperature characteristics

Load voltage: 6 V DC;
Load resistance: 100 Ω



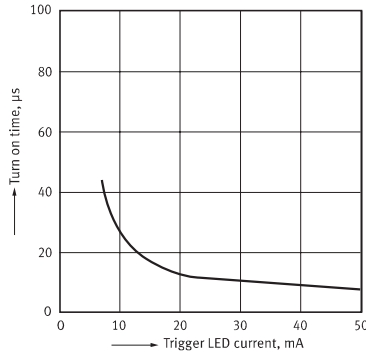
4.LED dropout voltage vs. ambient temperature characteristics

LED current: 10 to 50 mA



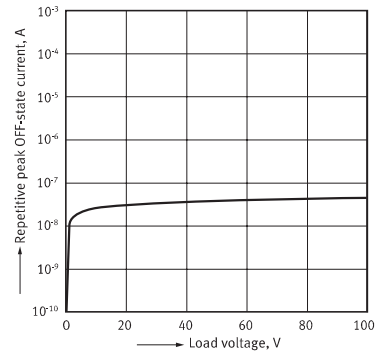
5.Turn on time vs. LED current characteristics

Load voltage: 6 V DC; Load resistance: 100 Ω
Measured portion: between terminals 6 and 8

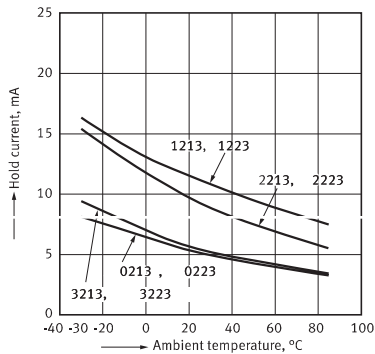


6.Repetitive peak OFF-state current vs. load voltage characteristics

Ambient temperature: 25°C
Measured portion: between terminals 6 and 8; LED current: 0 mA

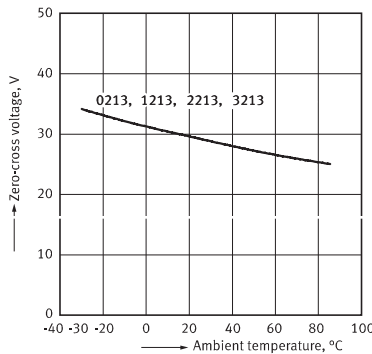


7.Holding current vs. ambient temperature characteristics



8.Zero-cross voltage vs. ambient temperature characteristics

LED current: 10 mA

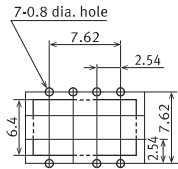


DIMENSIONS

Through hole terminal type

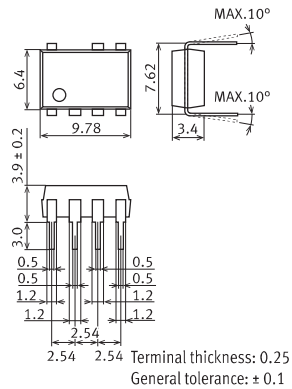


PC board pattern
(BOTTOM VIEW)



Tolerance: ± 0.1

External dimensions



Unit: mm

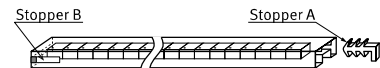
Tube

Phototriac coupler and AP-X SSR are packaged in a tube as pin No. 1 is on the stopper B side. Observe correct orientation when mounting them on PC boards.

<Phototriac coupler SOP type>



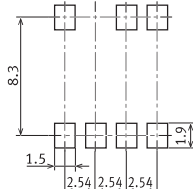
<Phototriac coupler DIP type and AP-H SSR>



Surface-mount terminal type

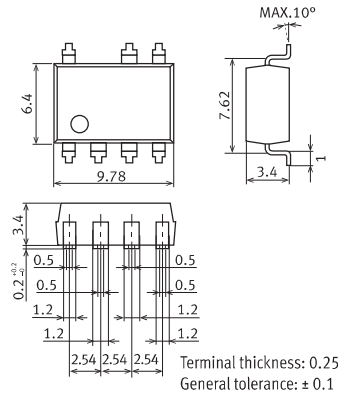


Recommended mounting pad
(TOP VIEW)

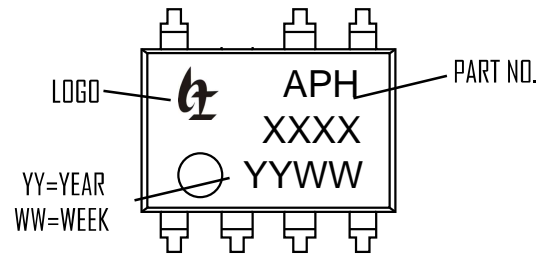


Tolerance: ± 0.1

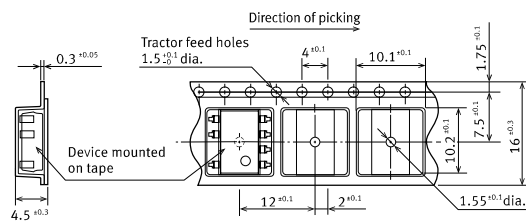
External dimensions



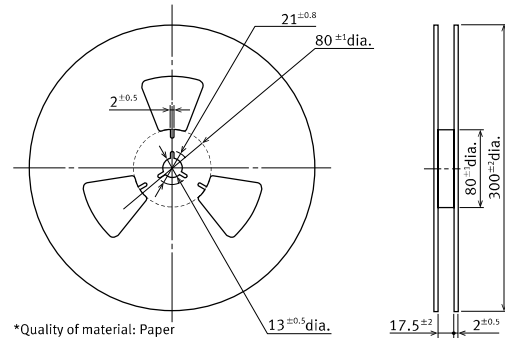
Terminal thickness: 0.25
General tolerance: ± 0.1

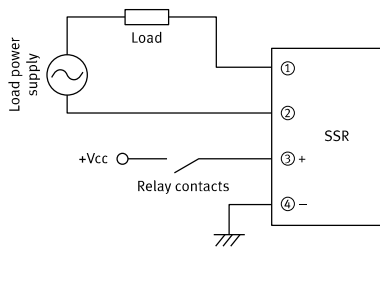
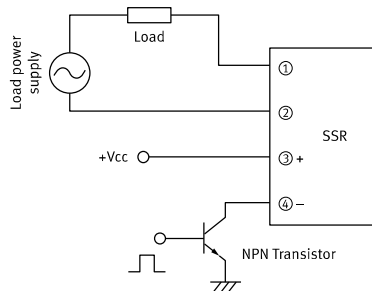
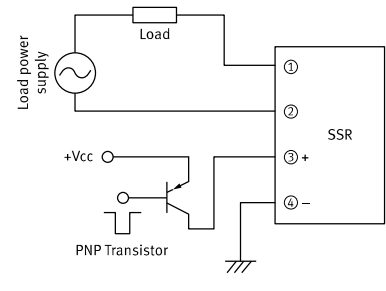
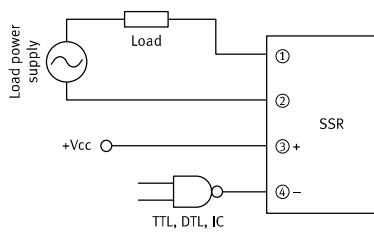


Tape dimensions (Unit: mm)

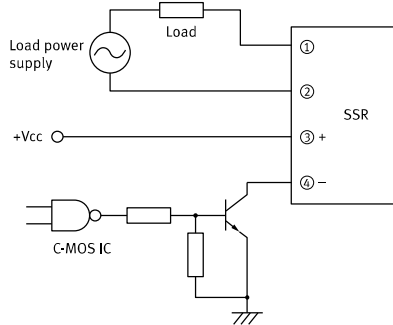


Dimensions of paper tape reel (Unit: mm)

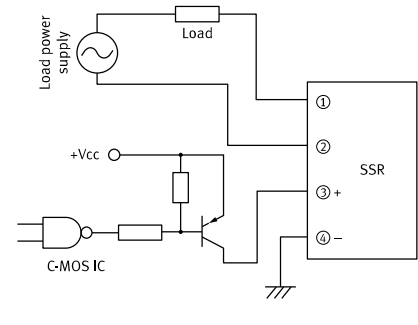
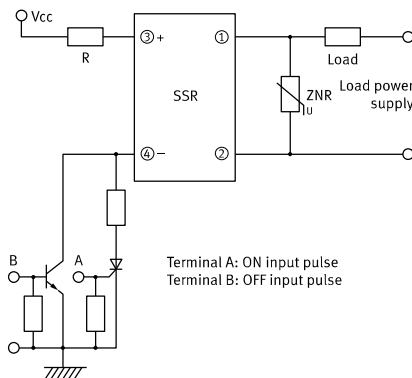
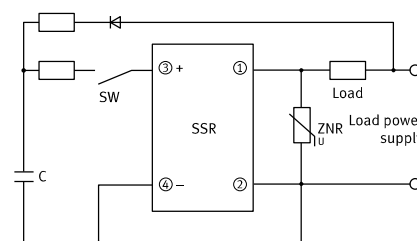


SSR Driving Circuits
Relay Driver

NPN Transistor Driver

PNP Transistor Driver

TTL/DTL/IC Driver

C-MOS/IC Driver

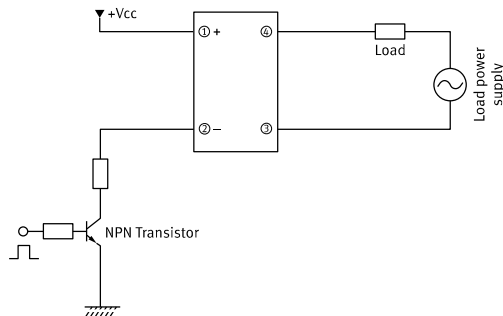
(1) SSR fires when IC output is HIGH:



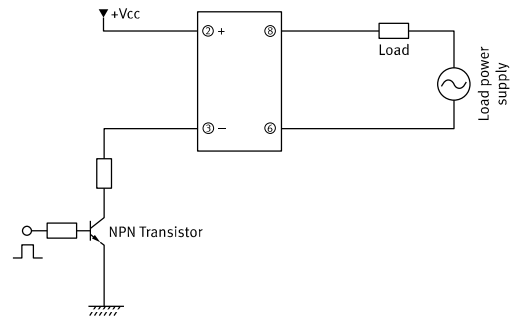
(2) SSR fires when IC output is LOW:


Relay Driver

NPN Transistor Driver

Phototriac Coupler, AP-H Solid State Relay Driving Circuits
NPN Transistor Driver

(1) Phototriac Coupler



(2) AP-H Solid State Relay



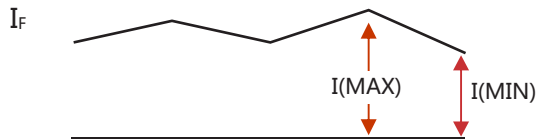


Using Methods

Examples of resistance value to control LED forward current ($I_F=15\text{mA}$)

E1	R1 (Approx)
3.3V	120 Ω
5.0V	240 Ω
12V	700 Ω
24V	1.5K Ω

LED forward current must be more than 15mA , at $I(\text{MIN})$,and less than 25mA , at $I(\text{MIN})$.



Recommended Operating Conditions

Please obey the following conditions to ensure proper device operation and resetting. Input LED current (Recommended value):

Characteristic	Symbol	Min	Typ.	Max	Unit
Forward current	I_F	15	20	25	mA



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