Photomos relays

Order code	Manufacturer code	Description
60-4318	AQZ202	RELAY SIL 60V 3A (AQZ202)
60-4320	AQZ204	RELAY SIL 400V 0.5A (AQZ204)

Sales: 01206 751166 **Technical: 01206 835555** **Fax: 01206 7551188**
Sales@rapidelec.co.uk **Tech@rapidelec.co.uk** **www.rapidelectronics.co.uk**

NAiS

POWER PhotoMOS RELAYS

PhotoMOS RELAYS

UL File No.: E43149
CSA File No.: LR26550

Matsushita Code	Description	Package
AQZ202	60V 3.0A PhotoMOS Relay	4 Pin SIL
AQZ204	400V 0.5A PhotoMOS Relay	4 Pin SIL

mm inch

FEATURES

1. High capacity PhotoMOS Relay in a compact and slim 4-pin SIL
2. Extremely low ON resistance
3. Control low-level signal
Power PhotoMOS relays feature extremely low closed-circuit offset voltage to enable control of low-level analog signals without distortion.
4. Low-level off state leakage current
5. High I/O isolation voltage 2,500 V
6. Eliminates the need for a counter electromotive protection diode in the drive circuit on the input side
7. Eliminate the need for a power supply to drive the power MOSFET
8. PC board layout is simplified
9. No restriction on mounting direction
10. Varistor incorporated type is also available.

APPLICATION

- High speed inspection machines
- IC checker
- NC machine, Robots
- Office machines
- Telecommunication
- Automotive
- Industrial control

TYPES

	Output rating		Part No.	Packing quantity	
	Load voltage	Load current		Inner carton	Outer carton
AC/DC type	60 V	3.0 A	AQZ202	25 pcs.	500 pcs.
	100 V	2.0 A	AQZ205		
	200 V	1.0 A	AQZ207		
	400 V	0.5 A	AQZ204		
DC type	60 V	4.0 A	AQZ102		
	100 V	2.6 A	AQZ105		
	200 V	1.3 A	AQZ107		
	400 V	0.7 A	AQZ104		

Notes: Load voltage and current of AC/DC type: Peak AC/DC
Load voltage and current of DC type: DC

RATING

1. AC/DC type

1) Absolute maximum ratings (Ambient temperature: 25°C 77°F)

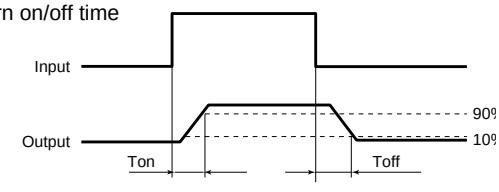
Item		Symbol	AQZ202	AQZ205	AQZ207	AQZ204	Remarks
Input	LED forward current	I_F	50 mA				
	LED reverse voltage	V_R	3 V				
	Peak forward current	I_{FP}	1 A				f = 100 Hz,Duty factor = 0.1 %
	Power dissipation	P_{in}	75 mW				
Output	Load voltage (peak AC)	V_L	60 V	100 V	200 V	400 V	
	Continuous load current	I_L	3.0 A	2.0 A	1.0 A	0.5 A	
	Peak load current	I_{peak}	9.0 A	6.0 A	3.0 A	1.5 A	100 ms (1shot), V_L = DC
	Power dissipation	P_{out}	1.6 W				
Total power dissipation		P_T	1.6 W				
I/O isolation voltage		V_{iso}	2,500 V AC				
Temperature limits	Operating	T_{opr}	–20°C to +85°C –4°F to +185°F				Non-condensing at low temperatures
	Storage	T_{stg}	–40°C to +100°C –40°F to +212°F				

2) Electrical characteristics (Ambient temperature: 25°C 77°F)

Item				Symbol	AQZ202	AQZ205	AQZ207	AQZ204	Condition
Input	LED operate current		Minimum Typical Maximum	I_{Fon}	1.0 mA 3.0 mA				I_L = 100 mA V_L = 10 V
	LED turn off current		Minimum Typical Maximum	I_{Foff}	0.4 mA 0.9 mA				I_L = 100 mA V_L = 10 V
	LED dropout voltage		Minimum Typical Maximum	V_F	1.25 V (1.6 V at I_F = 10 mA) 1.5 V				I_F = 50 mA
Output	On resistance		Minimum Typical Maximum	R_{on}	0.11 Ω 0.18 Ω	0.23 Ω 0.34 Ω	0.7 Ω 1.1 Ω	2.1 Ω 3.2 Ω	I_F = 10 mA I_L = max. Within 1 s on time
	Off state leakage current		Minimum Typical Maximum	—	10 μA				I_F = 0 V_L = max.
Transfer characteristics	Switching speed	Turn on time*	Minimum Typical Maximum	T_{on}	2.46 ms 5.0 ms	2.40 ms 5.0 ms	1.12 ms 5.0 ms	1.65 ms 5.0 ms	I_F = 10 mA I_L = 100 mA V_L = 10 V
			Minimum Typical Maximum		5.64 ms 10.0 ms	5.65 ms 10.0 ms	2.57 ms 10.0 ms	3.88 ms 10.0 ms	I_F = 5 mA I_L = 100 mA V_L = 10 V
		Turn off time*	Minimum Typical Maximum	T_{off}	0.22 ms 3.0 ms	0.21 ms 3.0 ms	0.10 ms 3.0 ms	0.08 ms 3.0 ms	I_F = 5 mA or 10 mA I_L = 100 mA V_L = 10 V
	I/O capacitance		Minimum Typical Maximum	C_{iso}	0.8 pF 1.5 pF				f = 1 MHz V_B = 0
	Initial I/O isolation resistance		Minimum Typical Maximum	R_{iso}	1,000 MΩ				500 V DC
	Maximum operating speed		Minimum Typical Maximum	—	0.5 cps				I_F = 10 mA Duty factor = 50% I_L = Max., V_L = Max.
Vibration resistance			Minimum Typical Maximum	—	10 to 55 Hz at double amplitude of 3 mm				2 hours for 3 axes
Shock resistance			Minimum Typical Maximum	—	4,900 m/s^2 {500 G} 1 ms				3 times for 3 axes

Note: Recommendable LED forward current I_F = 5 to 10 mA.

*Turn on/off time



2. DC type

1) Absolute maximum ratings (Ambient temperature: 25°C 77°F)

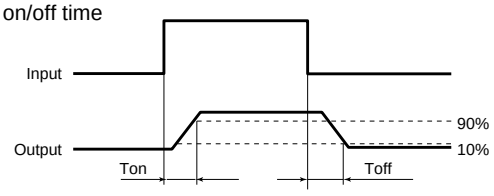
Item		Symbol	AQZ102	AQZ105	AQZ107	AQZ104	Remarks
Input	LED forward current	I_F	50 mA				
	LED reverse voltage	V_R	3 V				
	Peak forward current	I_{FP}	1 A				f = 100 Hz, Duty factor = 0.1 %
	Power dissipation	P_{in}	75 mW				
Output	Load voltage (DC)	V_L	60 V	100 V	200 V	400 V	
	Continuous load current (DC)	I_L	4.0 A	2.6 A	1.3 A	0.7 A	
	Peak load current	I_{peak}	9.0 A	6.0 A	3.0 A	1.5 A	100 ms (1shot), V_L = DC
	Power dissipation	P_{out}	1.35 W				
Total power dissipation		P_T	1.35 W				
I/O isolation voltage		V_{iso}	2,500 V AC				
Temperature limits	Operating	T_{opr}	–20°C to +85°C –4°F to +185°F				Non-condensing at low temperatures
	Storage	T_{stg}	–40°C to +100°C –40°F to +212°F				

2) Electrical characteristics (Ambient temperature: 25°C 77°F)

Item				Symbol	AQZ102	AQZ105	AQZ107	AQZ104	Condition
Input	LED operate current		Minimum Typical Maximum	I_{Fon}	1.0 mA 3.0 mA				I_L = 100 mA V_L = 10 V
	LED turn off current		Minimum Typical Maximum	I_{Foff}	0.4 mA 0.9 mA				I_L = 100 mA V_L = 10 V
	LED dropout voltage		Minimum Typical Maximum	V_F	1.25 V (1.16 V at I_F = 10 mA) 1.5 V				I_F = 50 mA
Output	On resistance		Minimum Typical Maximum	R_{on}	0.05 Ω 0.09 Ω	0.081 Ω 0.17 Ω	0.34 Ω 0.55 Ω	1.06 Ω 1.6 Ω	I_F = 10 mA I_L = max. Within 1 s on time
	Off state leakage current		Minimum Typical Maximum	—	10 μA				I_F = 0 V_L = Max.
Transfer characteristics	Switching speed	Turn on time*	Minimum Typical Maximum	T_{on}	1.66 ms 5.0 ms	1.89 ms 5.0 ms	0.83 ms 5.0 ms	1.01 ms 5.0 ms	I_F = 10 mA I_L = 100 mA V_L = 10 V
			Minimum Typical Maximum		3.79 ms 10.0 ms	4.50 ms 10.0 ms	1.75 ms 10.0 ms	2.34 ms 10.0 ms	I_F = 5 mA I_L = 100 mA V_L = 10 V
		Turn off time*	Minimum Typical Maximum	T_{off}	0.15 ms 3.0 ms	0.19 ms 3.0 ms	0.08 ms 3.0 ms	0.08 ms 3.0 ms	I_F = 5 mA or 10 mA I_L = 100 mA V_L = 10 V
	I/O capacitance		Minimum Typical Maximum	C_{iso}	0.8 pF 1.5 pF				f = 1 MHz V_B = 0
	Initial I/O isolation resistance		Minimum Typical Maximum	R_{iso}	1,000 MΩ				500 V DC
	Maximum operating speed		Minimum Typical Maximum	—	0.5 cps				I_F = 10 mA Duty factor = 50% $I_L \times V_L$ = 200 (VA)
Vibration resistance			Minimum Typical Maximum	—	10 to 55 Hz at double amplitude of 3 mm				2 hours for 3 axes
Shock resistance			Minimum Typical Maximum	—	4,900 m/s^2 {500 G} 1 ms				3 times for 3 axes

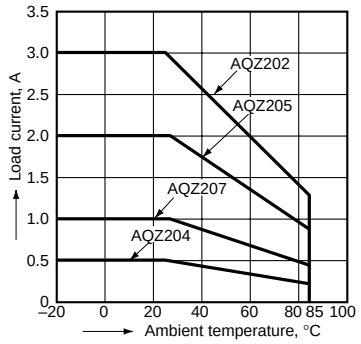
Note: Recommendable LED forward current I_F = 5 to 10 mA.

*Turn on/off time

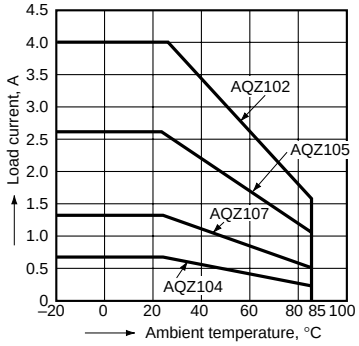


REFERENCE DATA

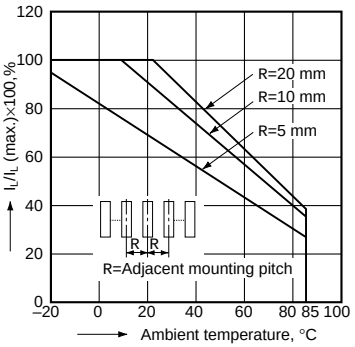
1.-(1) Load current vs. ambient temperature characteristics (AC/DC type)
Allowable ambient temperature: –20°C to +85°C
–4°F to +185°F



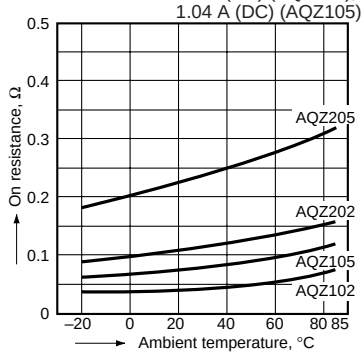
1.-(2) Load current vs. ambient temperature characteristics (DC type)
Allowable ambient temperature: –20°C to +85°C
–4°F to +185°F



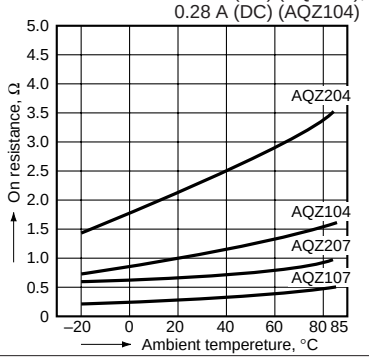
2. Load current vs. ambient temperature characteristics in adjacent mounting
I_L: Load current;
I_L (max.): Maximum continuous load current



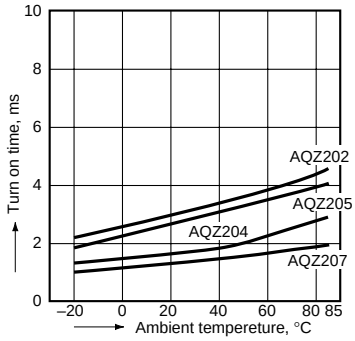
3.-(1) On resistance vs. ambient temperature characteristics
LED current: 10 mA;
Continuous load current: 1.2 A (DC) (AQZ202),
0.8 A (DC) (AQZ205),
1.6 A (DC) (AQZ102),
1.04 A (DC) (AQZ105)



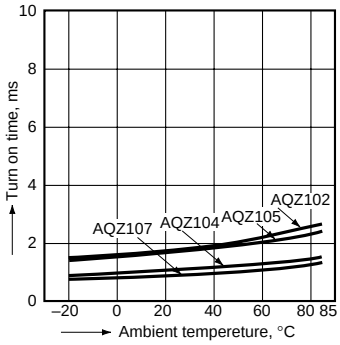
3.-(2) On resistance vs. ambient temperature characteristics
LED current: 10 mA;
Continuous load current: 0.4 A (DC) (AQZ207),
0.2 A (DC) (AQZ204),
0.52 A (DC) (AQZ107),
0.28 A (DC) (AQZ104)



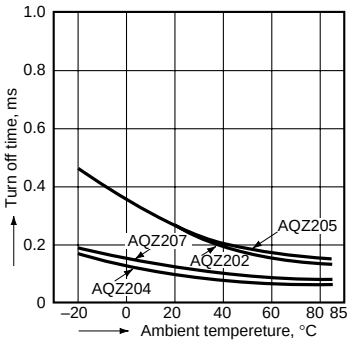
4.-(1) Turn on time vs. ambient temperature characteristics (AC/DC type)
LED current: 10 mA; Load voltage: 10 V (DC);
Continuous load current: 100 mA (DC)



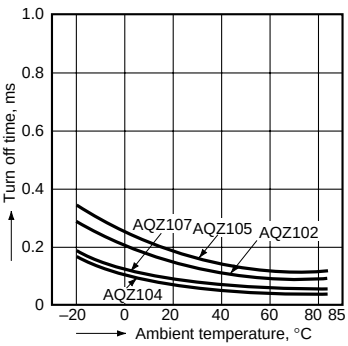
4.-(2) Turn on time vs. ambient temperature characteristics (DC type)
LED current: 10 mA; Load voltage: 10 V (DC);
Continuous load current: 100 mA (DC)



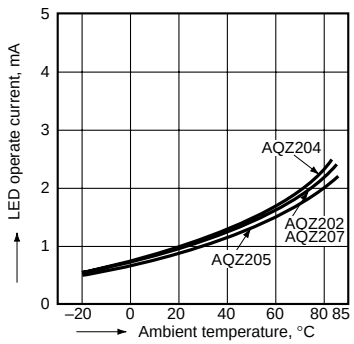
5.-(1) Turn off time vs. ambient temperature characteristics (AC/DC type)
LED current: 10 mA; Load voltage: 10 V (DC);
Continuous load current: 100 mA (DC)



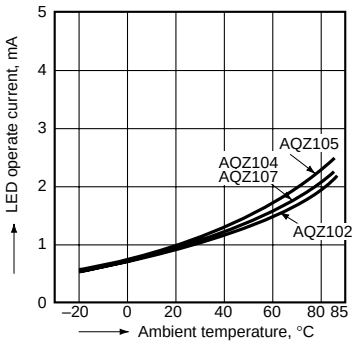
5.-(2) Turn off time vs. ambient temperature characteristics (DC type)
LED current: 10 mA; Load voltage: 10 V (DC);
Continuous load current: 100 mA (DC)



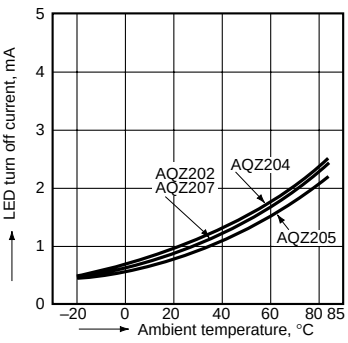
6.-(1) LED operate vs. ambient temperature characteristics (AC/DC type)
Load voltage: 10 V (DC);
Continuous load current: 100 mA (DC)



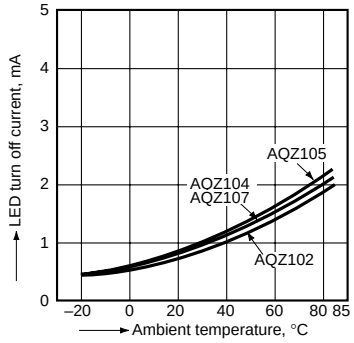
6.-(2) LED operate vs. ambient temperature characteristics (DC type)
Load voltage: 10 V (DC);
Continuous load current: 100 mA (DC)



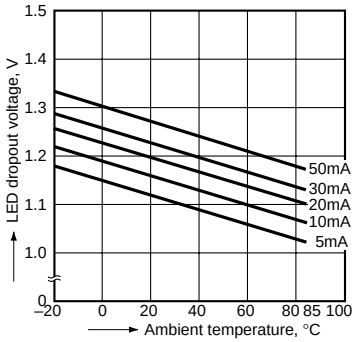
7.-(1) LED turn off current vs. ambient temperature characteristics (AC/DC type)
Load voltage: 10 V (DC);
Continuous load current: 100 mA (DC)



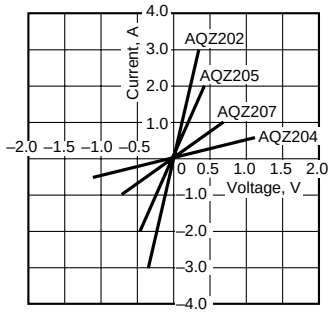
7.-(2) LED turn off current vs. ambient temperature characteristics (DC type)
Load voltage: 10 V (DC);
Continuous load current: 100 mA (DC)



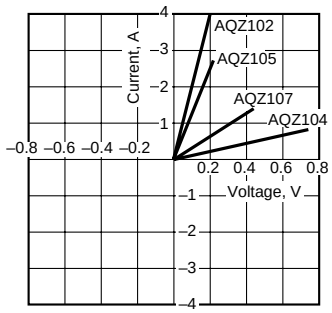
8. LED dropout voltage vs. ambient temperature characteristics
Sample: all types; LED current: 5 to 50 mA



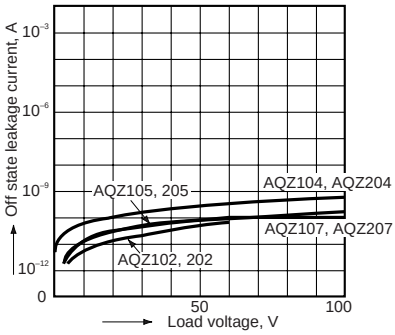
9.-(1) Voltage vs. current characteristics of output at MOS portion (AC/DC type)
Ambient temperature: 25°C 77°F



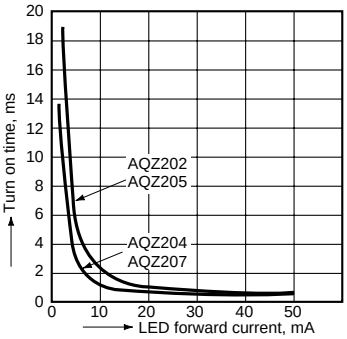
9.-(2) Voltage vs. current characteristics of output at MOS portion (DC type)
Ambient temperature: 25°C 77°F



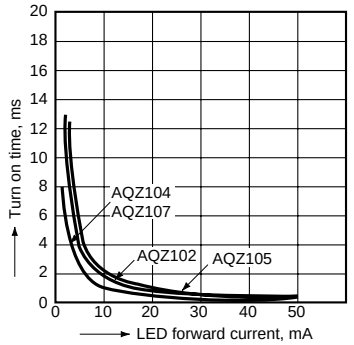
10. Off state leakage current
Ambient temperature: 25°C 77°F



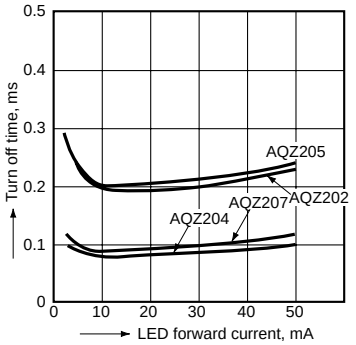
11.-(1) LED forward current vs. turn on time characteristics (AC/DC type)
Load voltage: 10 V (DC); Continuous load current: 100 mA (DC); Ambient temperature: 25°C 77°F



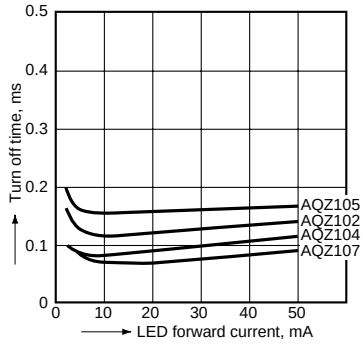
11.-(2) LED forward current vs. turn on time characteristics (DC type)
Load voltage: 10 V (DC); Continuous load current: 100 mA (DC); Ambient temperature: 25°C 77°F



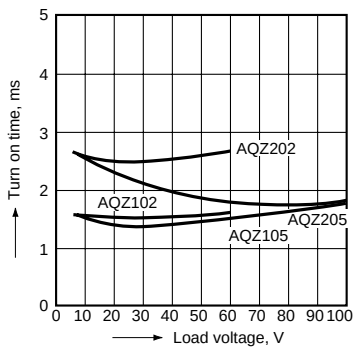
12.-(1) LED forward current vs. turn off time characteristics (AC/DC type)
Load voltage: 10 V (DC); Continuous load current: 100 mA (DC); Ambient temperature: 25°C 77°F



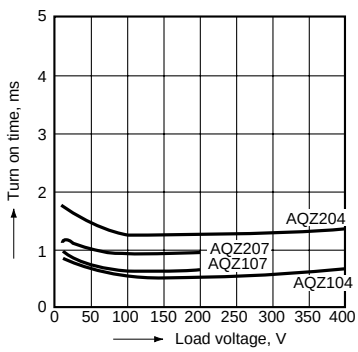
12.-(2) LED forward current vs. turn off time characteristics (DC type)
Measured portion: between terminals 4 and 6;
Load voltage 10 V (DC); Continuous load current: 100 mA (DC); Ambient temperature: 25°C 77°F



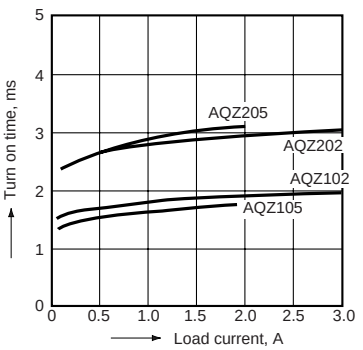
13.-(1) Load voltage vs. turn on time characteristics (Load voltage: 60, 100 V type)
LED current: 10 mA; Continuous load current: 100 mA;
Ambient temperature: 25°C 77°F



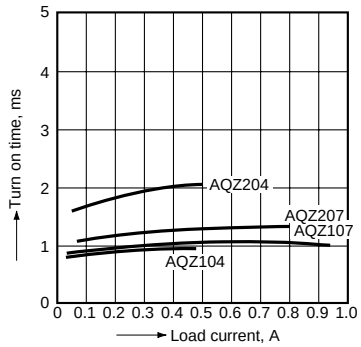
13.-(2) Load voltage vs. turn on time characteristics (Load voltage: 200, 400 V type)
LED current: 10 mA; Continuous load current: 100 mA;
Ambient temperature: 25°C 77°F



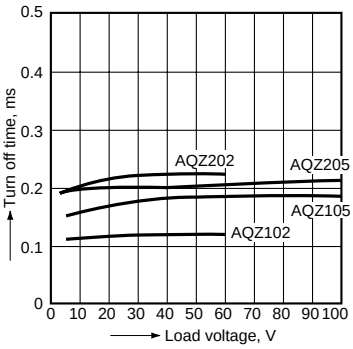
14.-(1) Load current vs. turn on time characteristics (Load voltage: 60, 100 V type)
LED current: 10 mA; Load voltage: 10 V (DC);
Ambient temperature: 25°C 77°F



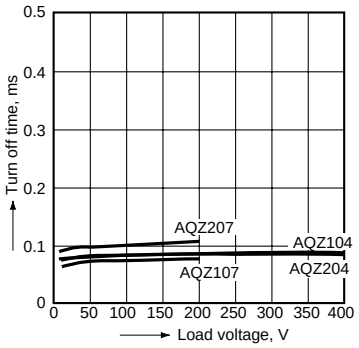
14.-(2) Load current vs. turn on time characteristics (Load voltage: 200, 400 V type)
LED current: 10 mA; Load voltage: 10 V (DC);
Ambient temperature: 25°C 77°F



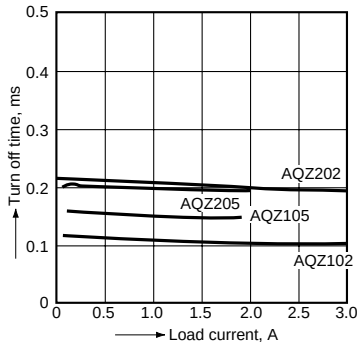
15.-(1) Load voltage vs. turn off time characteristics (Load voltage: 60, 100 V type)
LED current: 10 mA; Continuous load current: 100 mA;
Ambient temperature: 25°C 77°F



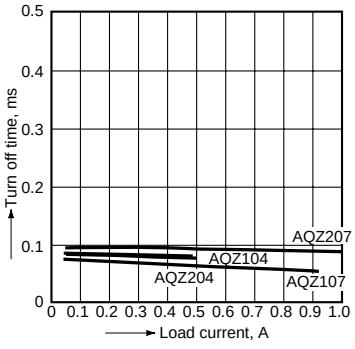
15.-(2) Load voltage vs. turn off time characteristics (Load voltage: 200, 400 V type)
LED current: 10 mA; Continuous load current: 100 mA;
Ambient temperature: 25°C 77°F



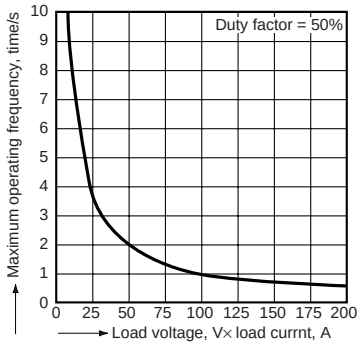
16.-(1) Load current vs. turn off time characteristics (load voltage: 60, 100 V type)
LED current: 10 mA; Load voltage 10 V (DC);
Ambient temperature: 25°C 77°F



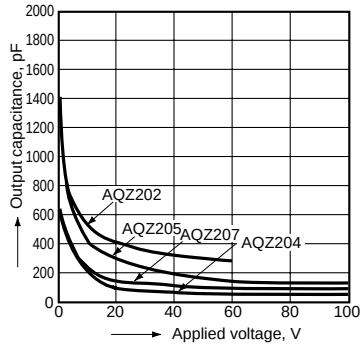
16.-(2) Load current vs. turn off time characteristics (Load voltage: 200, 400 V type)
LED current: 10 mA; Load voltage 10 V (DC);
Ambient temperature: 25°C 77°F



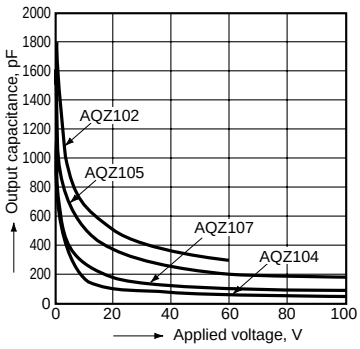
17. Maximum operating frequency vs. load voltage/current characteristics
LED current: 10 mA; Ambient temperature: 25°C 77°F



18.-(1) Applied voltage vs. output capacitance characteristics (AC/DC type)
Frequency: 1 MHz; Ambient temperature: 25°C 77°F



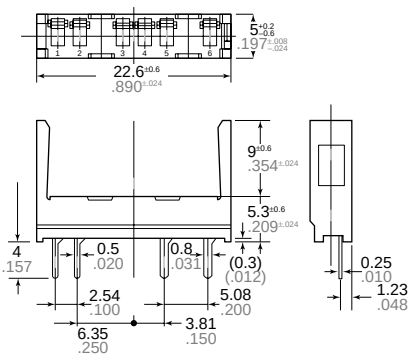
18.-(2) Applied voltage vs. output capacitance characteristics (DC type)
Frequency: 1 MHz; Ambient temperature: 25°C 77°F



ACCESSORY

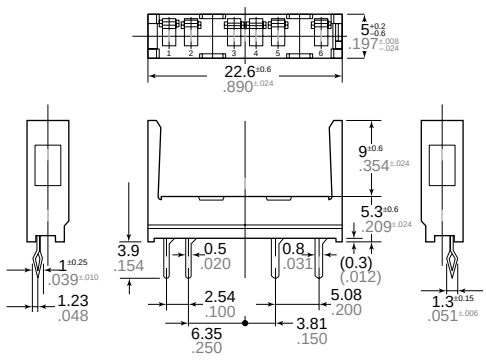
mm inch

Socket Standard type



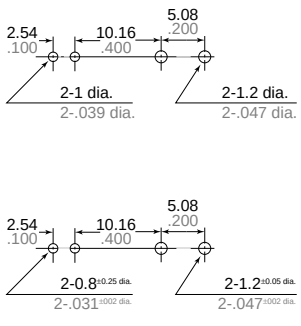
PA1a-PS

Self clinching type



PA1a-PS-H

PC board pattern
(Bottom view)

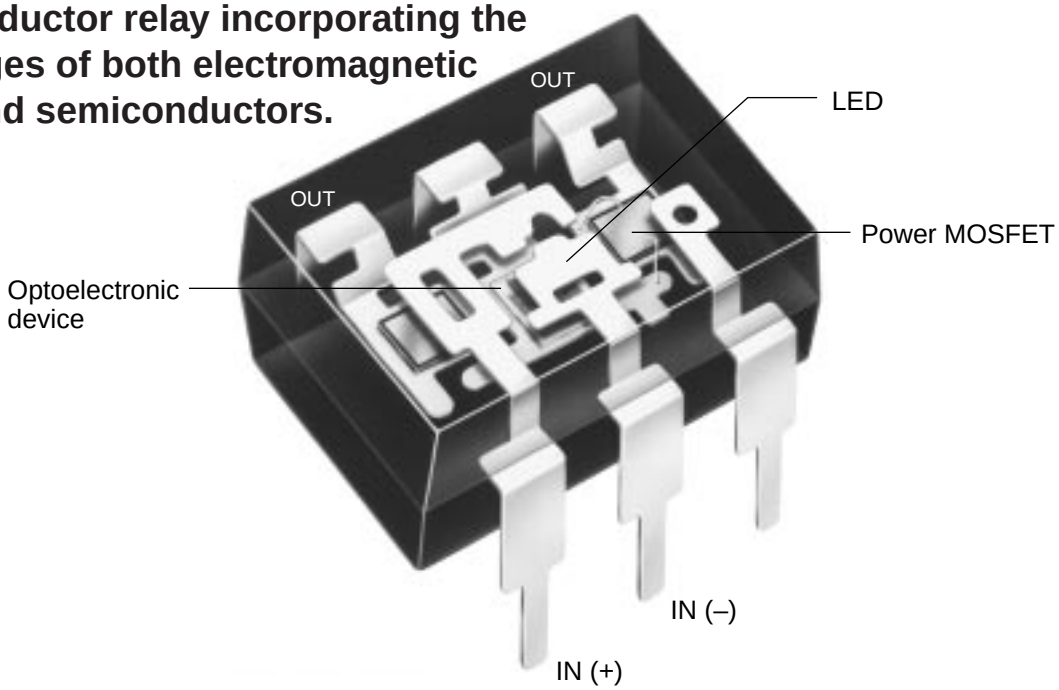


Tolerance: ±0.1 ±.004

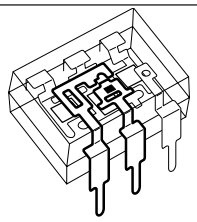
PhotoMOS Relay Technical Information

How PhotoMOS Relays Operate:

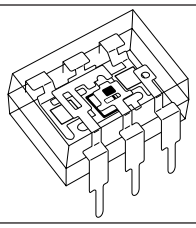
Optoelectronic device directly drives a power MOSFET. Semiconductor relay incorporating the advantages of both electromagnetic relays and semiconductors.



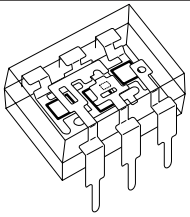
When operated



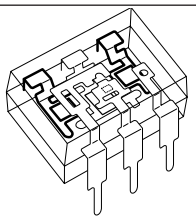
When a signal current flows to the input terminals the LED on the input side emits light.



The emitted light passes through transparent silicon and reaches the photoelectric element (solar cell) which is mounted opposite the LED.

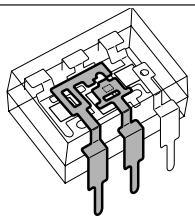


The photoelectric element converts the received light to a voltage corresponding to the quantity of light. This voltage passes through a control circuit and charges the MOSFET gate on the output side.

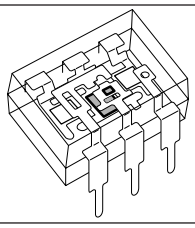


When the MOSFET gate voltage supplied from the photoelectric element reaches a preset voltage value, the MOSFET begins to conduct and turns on the load.

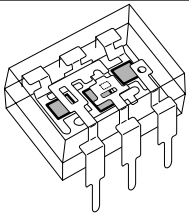
When turned off



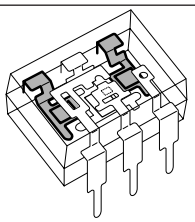
When the signal current at the input terminal is cut off, the LED stops emitting light.



When the emitted light from the LED stops, the voltage of the photoelectric element decreases.



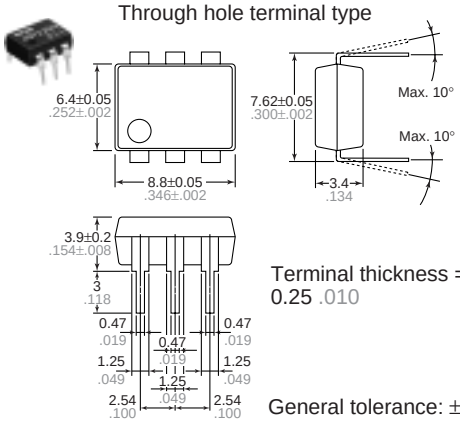
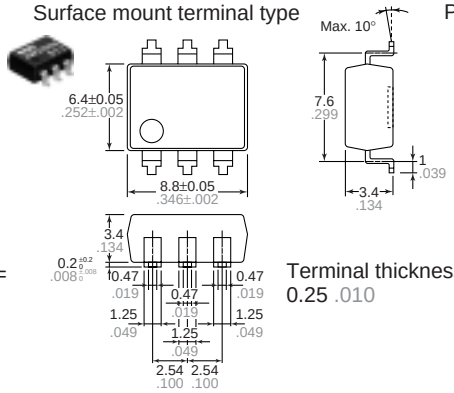
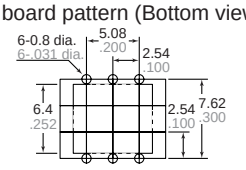
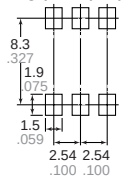
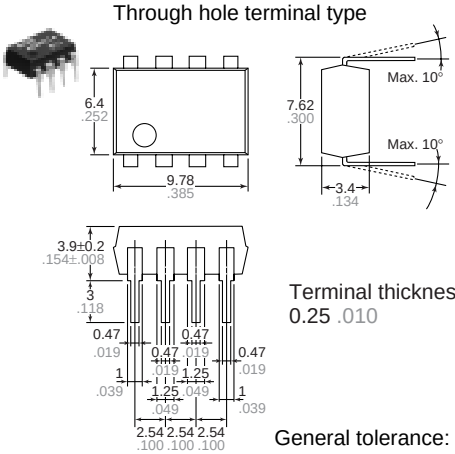
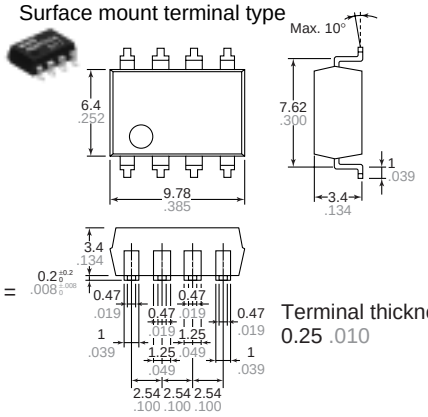
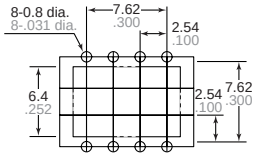
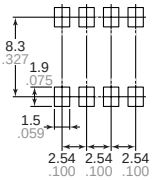
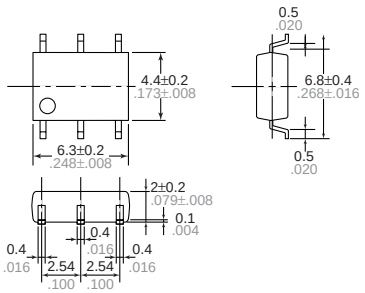
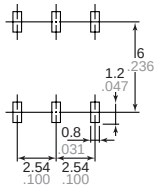
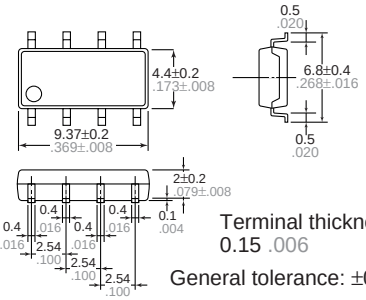
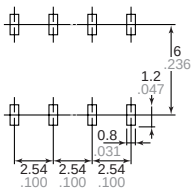
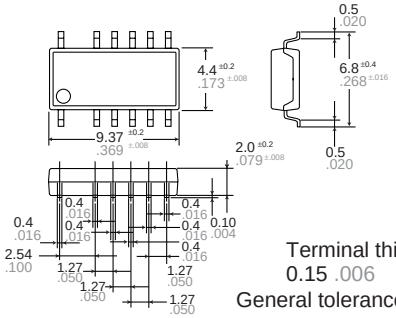
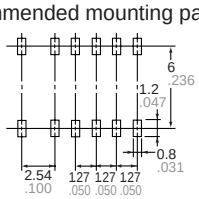
When the voltage supplied from photoelectric element decrease, the control circuit rapidly discharges the gate charge of MOSFET.



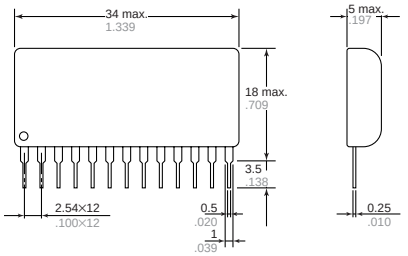
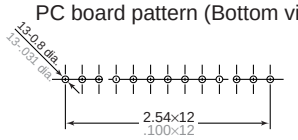
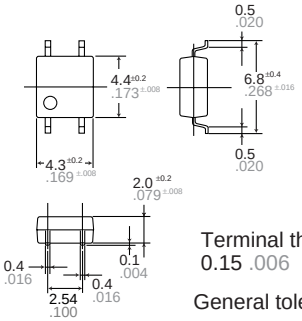
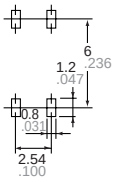
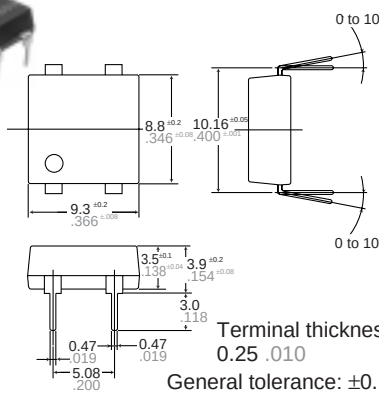
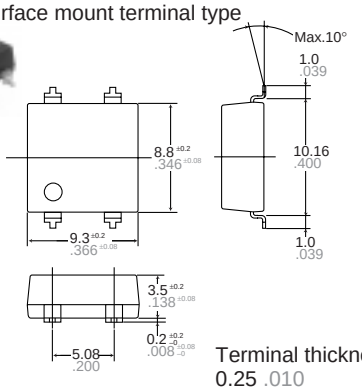
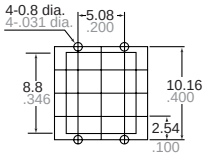
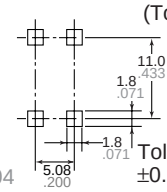
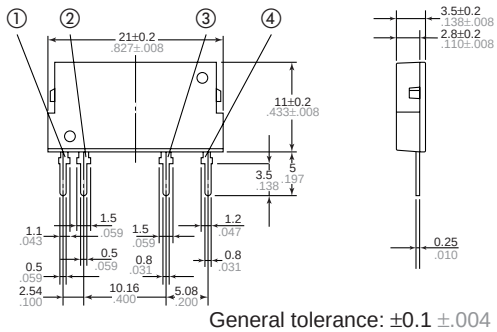
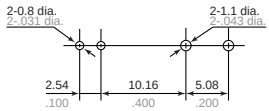
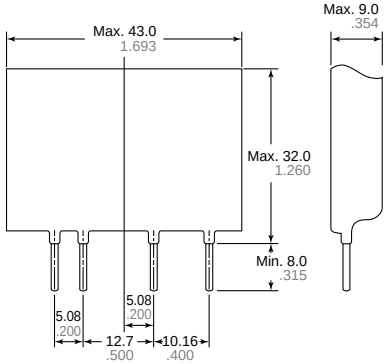
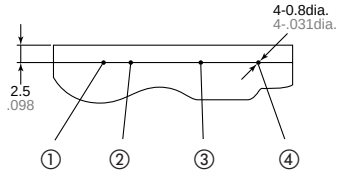
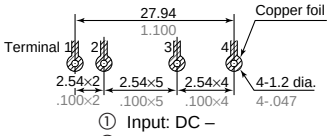
This control circuit makes MOSFET stop conducting and immediately turns off the load.

PhotoMOS Relay Dimensions

mm inch

Type	Dimensions
AQV10 AQV20 AQV21 AQV22 AQV23 AQV25 AQV41 AQV45 Series	Through hole terminal type  Terminal thickness = 0.25 .010 General tolerance: ±0.1 ±.004 Surface mount terminal type  Terminal thickness = 0.25 .010 General tolerance: ±0.1 ±.004 PC board pattern (Bottom view)  Tolerance:±0.1 ±.004 Recommended mounting pad (Top view) 
AQW21 AQW22 AQW25 AQW41 AQW45 AQW61 AQW65 Series	Through hole terminal type  Terminal thickness = 0.25 .010 General tolerance: ±0.1 ±.004 Surface mount terminal type  Terminal thickness = 0.25 .010 General tolerance: ±0.1 ±.004 PC board pattern (Bottom view)  Tolerance:±0.1 ±.004 Recommended mounting pad (Top view) 
AQV21 (SOP) AQV22 (SOP) AQV41 (SOP) Series	  Recommended mounting pad (Top view)  Tolerance: ±0.1 ±.004
AQW21(SOP) AQW21❍TS (SOP) Series	  Terminal thickness = 0.15 .006 General tolerance: ±0.1 ±.004 Recommended mounting pad (Top view)  Tolerance: ±0.1 ±.004
AQW21❍T2S (SOP) Series	  Terminal thickness = 0.15 .006 General tolerance: ±0.1 ±.004 Recommended mounting pad (Top view)  Tolerance: ±0.1 ±.004

mm inch

Type	Dimensions
AQX21•44 Series (Multi-channel type)	  PC board pattern (Bottom view)  Tolerance: ±0.1 ±.004 General tolerance: ±0.5 ±.020
AQY21 (SOP) AQY41 (SOP) Series	  Terminal thickness = 0.15 .006 General tolerance: ±0.1 ±.004 Recommended mounting pad (Top view)  Tolerance: ±0.1 ±.004
AQY27 Series	Through hole terminal type   Terminal thickness = 0.25 .010 General tolerance: ±0.1 ±.004 Surface mount terminal type   Terminal thickness = 0.25 .010 General tolerance: ±0.1 ±.004 PC board pattern (Bottom view)  Tolerance: ±0.1 ±.004 Recommended mounting pad (Top view)  Tolerance: ±0.1 ±.004
AQZ10 AQZ20 Series	  General tolerance: ±0.1 ±.004 PC board pattern (Bottom view)  Tolerance: ±0.1 ±.004 AC/DC type ① Input: DC– ② Input: DC+ ③ Output: DC or AC ④ Output: DC or AC DC type ① Input: DC– ② Input: DC+ ③ Output: DC– ④ Output: DC+
AQZ26 Series	  General tolerance ±0.5 ±.020  Mounting hole location(Bottom view)  ① Input: DC – ② Input: DC + ③ Output : AC or DC ④ Output : AC or DC Pitch tolerance: ±0.1 ±.004

Terminology

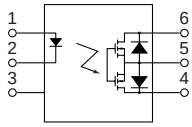
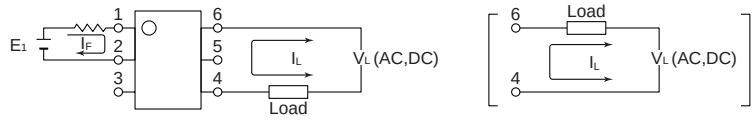
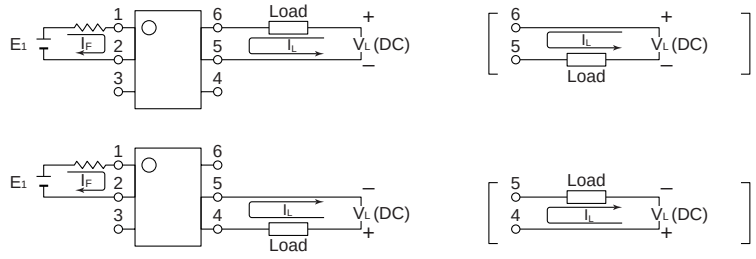
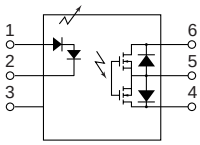
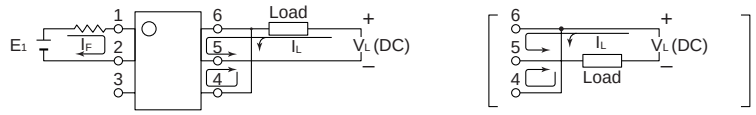
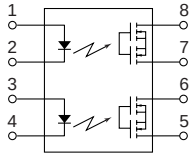
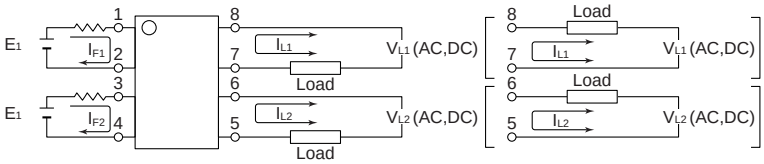
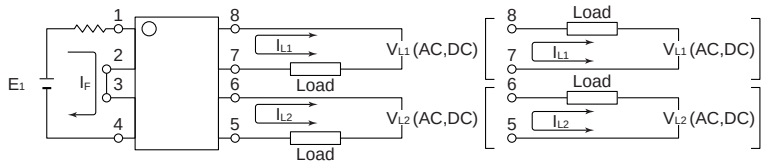
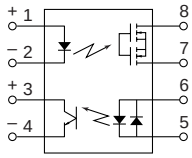
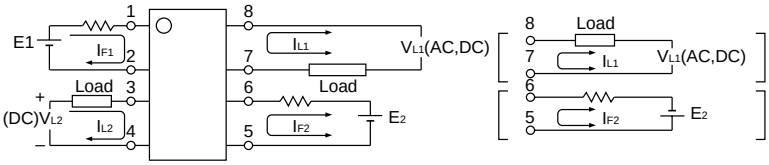
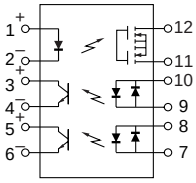
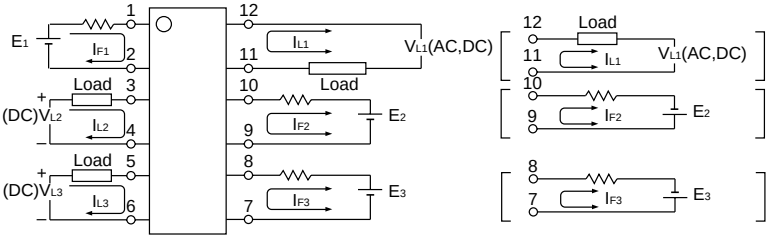
Term		Symbol	Description
Input	LED forward current	I_F	Current that flows between the input terminals when the input diode is forward biased.
	LED reverse voltage	V_R	Reverse breakdown voltage between the input terminals.
	Peak forward current	I_{FP}	Maximum instantaneous value of the forward current.
	LED operate current	I_{FON}	Current when the output switches on (by increasing the LED current) with a designated supply voltage and load connected between the output terminals.
	LED turn off current	I_{Foff}	Current when the output switches off (by decreasing the LED current) after operating the relay with a designated supply voltage and load connected between the output terminals.
	LED dropout voltage	V_F	Dropout voltage between the input terminals due to forward current.
	Power dissipation	P_{in}	Allowable power dissipation between the input terminals.
Output	Load voltage	V_L	Supply voltage range at the output used to normally operate the PhotoMOS relay. Represents the peak value for AC voltages.
	Continuous load current	I_L	Maximum current value that flows continuously between the output terminals of the PhotoMOS relay under designated ambient temperature conditions. Represents the peak value for AC current.
	On resistance	R_{on}	Obtained using the equation below from dropout voltage V_{DS} (on) between the output terminals (when a designated LED current is made to flow through the input terminals and the designated load current through the output terminals.) $R_{on} = V_{DS}$ (on)/I_L
	Off state leakage current	I_{leak}	Current flowing to the output when a designated supply voltage is applied between the output terminals with no LED current flow.
	Power dissipation	P_{out}	Allowable power dissipation between the output terminals.
Electrical characteristics	Turn on time	T_{on}	Delay time until the output switches on after a designated LED current is made to flow through the input terminals.
	Turn off time	T_{off}	Delay time until the output switches off after the designated LED current flowing through the input terminals is cut off.
	I/O capacitance	C_{iso}	Capacitance between the input and output terminals.
	Output capacitance	C_{out}	Capacitance between output terminals when LED current does not flow.
	I/O isolation resistance	R_{iso}	Resistance between terminals (input and output) when a specified voltage is applied between the input and output terminals.
	Total power dissipation	P_T	Allowable power dissipation in the entire circuit between the input and output terminals.
	I/O isolation voltage	V_{iso}	Critical value before dielectric breakdown occurs, when a high voltage is applied for 1 minute between the same terminals where the I/O isolation resistance is measured.
	Operating temperature	T_{opr}	Ambient temperature range in which the PhotoMOS relay can operate normally with a designated load current conditions.
	Storage temperature	T_{stg}	Ambient temperature range in which the PhotoMOS relay can be stored without applying voltage.

Reliability tests

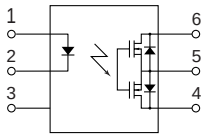
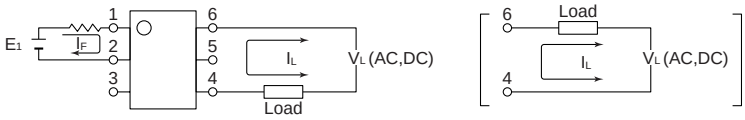
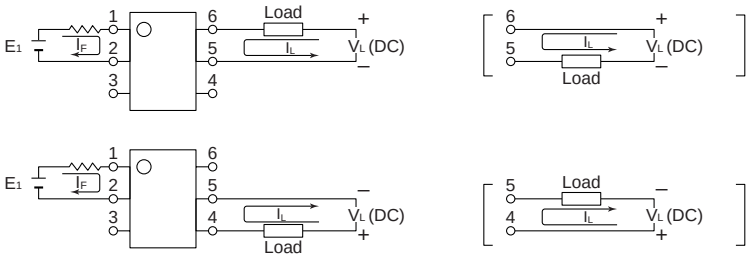
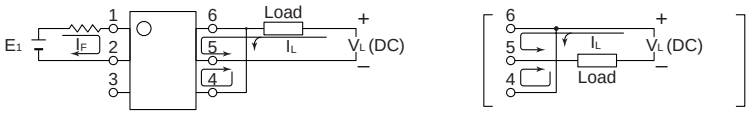
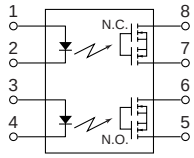
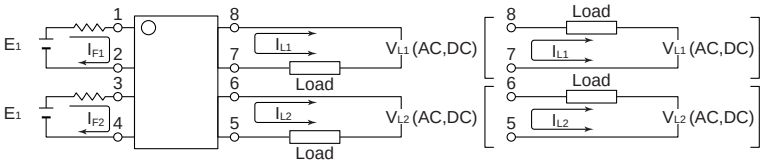
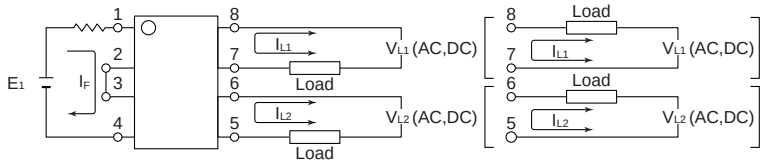
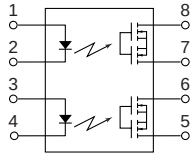
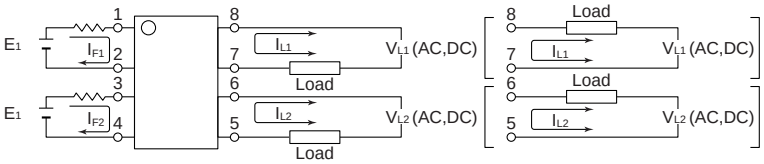
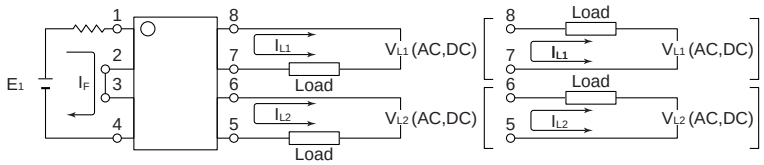
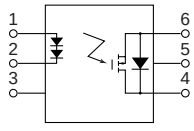
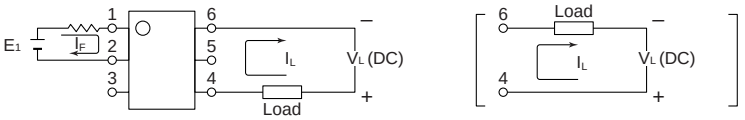
Classification	Item	Condition	Purpose
Life tests	High temperature storage test	T_{stg} (Max.)	Determines resistance to long term storage at high temperature.
	Low temperature storage test	T_{stg} (Min.)	Determines resistance to long term storage at low temperature.
	High temperature and high humidity storage test	85°C 185°F, R.H. 85%	Determines resistance to long term storage at high temperature and high humidity.
	Continuous operation life test	V_L = Max., I_L = Max., I_F = LED operate current (Max.)	Determines resistance to electrical stress (voltage and current).
Thermal environment tests	Temperature cycling test	Low storage temperature (T_{stg} Min.) High storage temperature (T_{stg} Max.)	Determines resistance to exposure to both low temperatures and high temperatures.
	Thermal shock test	Low temperature (0°C) (32°F), High temperature (100°C) (212°F)	Determines resistance to exposure to sudden changes in temperature.
	Solder burning resistance	260±5°C 500±41°F, 10 s	Determines resistance to thermal stress occurring while soldering.
Mechanical environment tests	Vibration test	196 m/s^2 {20 G}, 20 to 2,000 Hz*1	Determines the resistance to vibration sustained during shipment or operation.
	Shock test	9,800 m/s^2 {1,000 G} 0.5 ms*2; 4,900 m/s^2 {500 G} 1 ms	Determines the mechanical and structural resistance to shock.
	Drop test	Dropped at a height of 80 cm on oak board	Determines the mechanical resistance to drops sustained during shipment or operation.
	Terminal strength test	Determined from terminal shape and cross section	Determines the resistance to external force on the terminals of the PhotoMOS relay mounted on the PC board while wiring or operating.
	Solderability	230°C 446°F 5 s (with soldering flux)	Evaluates the solderability of the terminals.

*1 10 to 55 Hz at double amplitude of 3 mm for Power PhotoMOS relays.
*2 4,900 m/s^2, 1 ms for Power PhotoMOS relays.

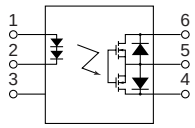
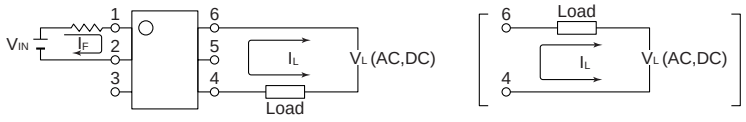
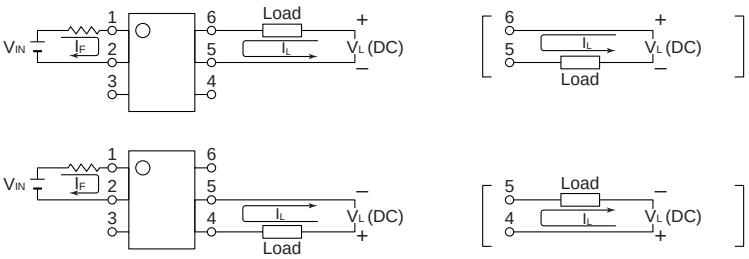
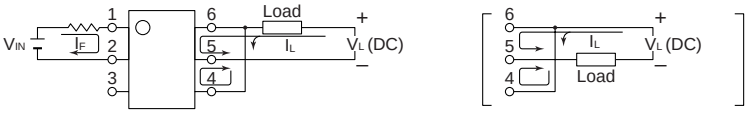
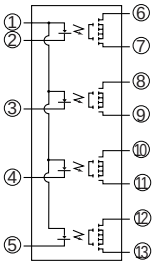
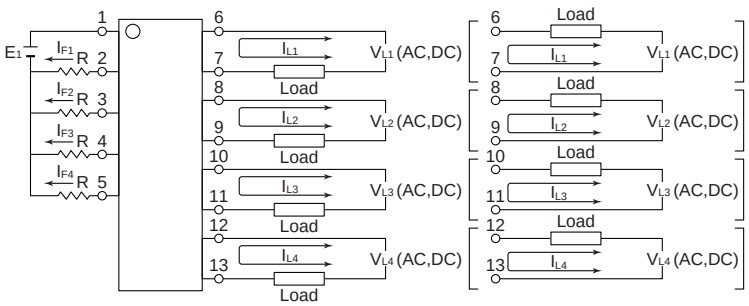
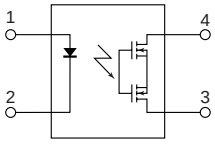
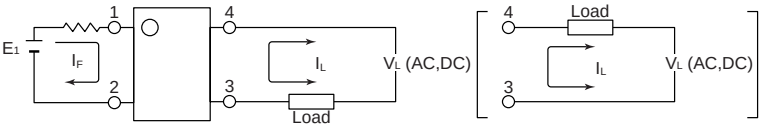
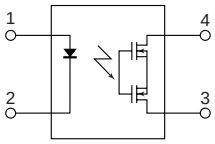
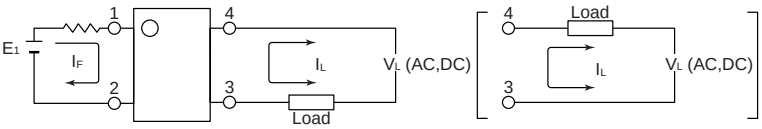
PhotoMOS Relay Schematic and Wiring Diagrams

Type	Schematic	Output configuration	Load	Connection	Wiring diagram
AQV21 AQV21 (SOP) AQV22 AQV22 (SOP) AQV23 AQV25 Series		1a	AC/DC	A	
			DC	B*	
	 (AQV254R only)		DC	C	
AQW21 AQW21 (SOP) AQW22 AQW25 Series		2a	AC/DC	—	(1) Two independent 1 Form A use  (2) 2 Form A use 
AQW21❍TS Series	 Relay portion (1,2,7,8 pins) Detector portion (3,4,5,6 pins)	Relay portion 1a Detecter portion 1a	Relay portion AC/DC Detecter portion DC	—	
AQW21❍T2S Series	 Relay portion (1,2,11,12 pins) Detector portion (3,4,9,10 pins) (5,6,7,8 pins)	Relay portion 1a Detecter portion 2a	Relay portion AC/DC Detecter portion DC	—	

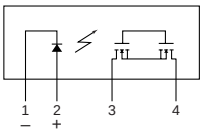
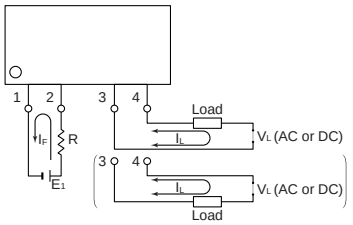
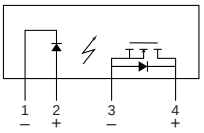
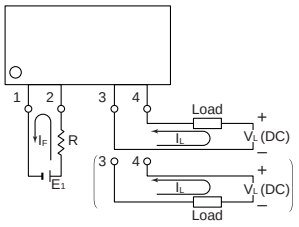
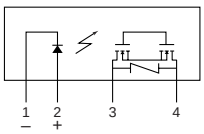
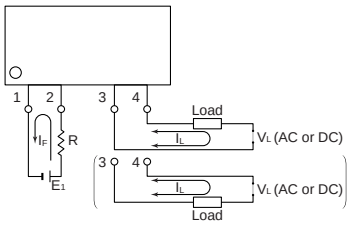
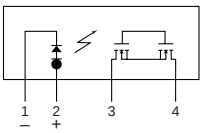
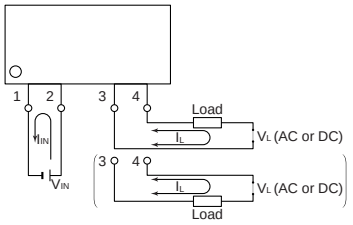
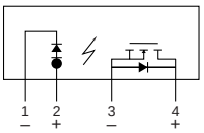
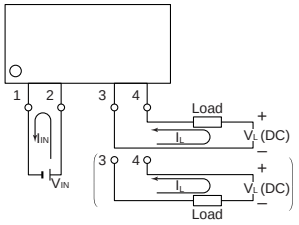
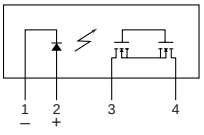
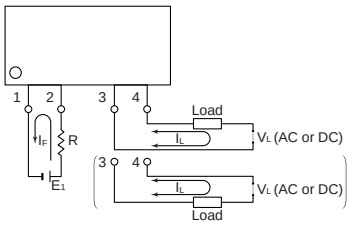
*Can be also connected as 2 Form A type. (However, the sum of the continuous load current should not exceed the absolute maximum rating.)
**Can be also connected as 2 Form B type. (However, the sum of the continuous load current should not exceed the absolute maximum rating.)
Notes: 1. E_1: Power source at input side; V_{IN}: Input voltage; I_F: LED forward current; V_L: Load voltage; I_L: Load current; R: Current limit resistor.
2. Method of connecting the load at the output is devided into 3 types.

Type	Schematic	Output configuration	Load	Connection	Wiring diagram
AQV41 AQV41 (SOP) AQV45 Series		1b	AC/DC	A	
			DC	B**	
			DC	C	
AQW61 AQW65 Series		1a1b	AC/DC	—	(1) Two independent 1 Form A & 1 Form B use  (2) 1 Form A 1 Form B use 
AQW41 AQW45 Series		2b	AC/DC	—	(1) Two independent 1 Form B use  (2) 2 Form B use 
AQV10 Series	 Terminal 3 cannot be used, since it is in the internal circuit of the relay.	1a	DC	A	

*Can be also connected as 2 Form A type. (However, the sum of the continuous load current should not exceed the absolute maximum rating.)
**Can be also connected as 2 Form B type. (However, the sum of the continuous load current should not exceed the absolute maximum rating.)
Notes: 1. E_1: Power source at input side; V_{IN}: Input voltage; I_F: LED forward current; V_L: Load voltage; I_L: Load current; R: Current limit resistor.
2. Method of connecting the load at the output is devided into 3 types.

Type	Schematic	Output configuration	Load	Connection	Wiring diagram
AQV20 Series	 Terminal 3 cannot be used, since it is in the internal circuit of the relay.	1a	AC/DC	A	
			DC	B*	
			DC	C	
AQX21▪44 Series (Multi-channel type)	 ① Input Common: DC+ ② Input 1: DC– ③ Input 2: DC– ④ Input 3: DC– ⑤ Input 4: DC– ⑥ Output 1 (N.O.): DC or AC ⑦ Output 2 (N.O.): DC or AC ⑧ Output 2 (N.O.): DC or AC ⑨ Output 2 (N.O.): DC or AC ⑩ Output 3 (N.O.): DC or AC ⑪ Output 3 (N.O.): DC or AC ⑫ Output 4 (N.O.): DC or AC ⑬ Output 4 (N.O.): DC or AC	4a	AC/DC	–	
AQY21 (SOP) AQY27 Series		1a	AC/DC	–	
AQY41 (SOP) Series		1b	AC/DC	–	

*Can be also connected as 2 Form A type. (However, the sum of the continuous load current should not exceed the absolute maximum rating.)
**Can be also connected as 2 Form B type. (However, the sum of the continuous load current should not exceed the absolute maximum rating.)
Notes: 1. E_1: Power source at input side; V_{IN}: Input voltage; I_F: LED forward current; V_L: Load voltage; I_L: Load current; R: Current limit resistor.
2. Method of connecting the load at the output is devided into 3 types.

Type	Schematic	Output configuration	Load	Wiring diagram
AQZ20 Series		1a	AC/DC	
AQZ10 Series		1a	DC	
AQZ20·V Series		1a	AC/DC	
AQZ20·D Series		1a	AC/DC	
AQZ10·D Series		1a	DC	
AQZ26 Series		1a	AC/DC	

Notes: 1. E_1: Power source at input side; V_{IN}: Input voltage; I_F: LED forward current; V_L: Load voltage; I_L: Load current; R: Current limit resistor.
2. Method of connecting the load at the output is devided into 3 types.

PhotoMOS Relay Cautions for Use

SAFETY WARNINGS

• Do not use the product under conditions that exceed the range of its specifications. It may cause overheating, smoke, or fire.

• Do not touch the recharging unit while the power is on. There is a danger of electrical shock. Be sure to turn off the power when performing mounting, maintenance, or repair operations on the relay (including connecting parts such as the terminal board and socket).

• Check the connection diagrams in the catalog and be sure to connect the terminals correctly. Erroneous connections could lead to unexpected operating errors, overheating, or fire.

NOTES

■ **PhotoMOS Relays excluding Power PhotoMOS Relays**

1. Unused terminals

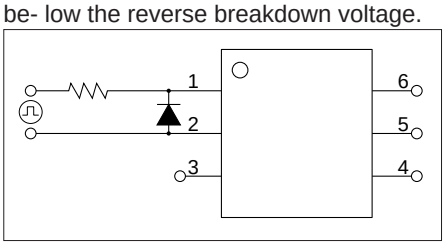
The No. 3 terminal is used with the circuit inside the relay. Therefore, do not connect it to the external circuitry with either connection method A, B or C.

2. Short across terminals

Do not short circuit between terminals when relay is energized, since there is the possibility of breaking the internal IC.

3. Surge voltages at the input

If reverse surge voltages are present at the input terminals, connect a diode in reverse parallel across the input terminals and keep the reverse voltages be- low the reverse breakdown voltage.



4. Recommended LED forward current (I_F)

It is recommended that the LED forward current (I_F) of each PhotoMOS Relay should be set according to the following table.

Type		Product name	Recommended LED forward current (I_F)
DIP SMD type	Standard I/O isolation type (1,500 V AC)	AQV10,20 Series	10 mA
		AQY27 Series*	5 to 10 mA
		AQV21 Series (including SOP) AQV22 Series (including SOP) AQV25 Series AQV45 Series AQW21 Series (including SOP) AQW21❍TS,T2S Series AQW41 Series AQW61 Series AQW22 Series AQW25 Series AQW45 Series AQW65 Series AQY21,41 Series	5 mA
		AQV23 Series	2 mA
	Reinforced I/O isolation (5,000 V AC)	AQV21,41 Series AQV25,45 Series	5 to 10 mA
SIL type	AQX21 Series		5 mA
	AQZ10,20,26 Series		5 to 10 mA

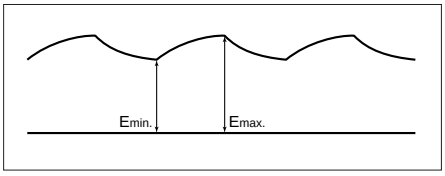
*Standard I/O insolation type (2,500 V AC)

5. Ripple in the input power supply

If ripple is present in the input power supply, observe the following:

1) For LED operate current at E_{min}, maintain the value mentioned in the table of "Note 4. Recommended LED forward current (I_F)."

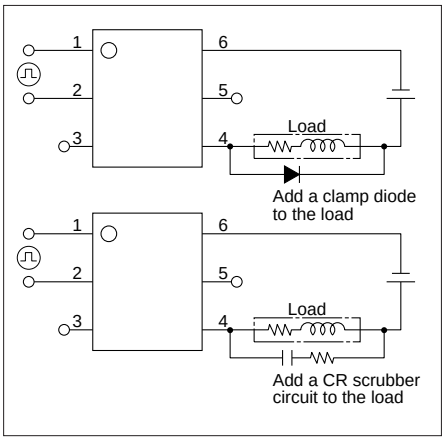
2) Keep the LED operate current at 50 VmA (25 mA for PhotoMOS HE Relay with LED display type) or less at E_{max}.



6. Output spike voltages

1) If an inductive load generates spike voltages which exceed the absolute maximum rating, the spike voltage must be limited.

Typical circuits are shown below.



2) Even if spike voltages generated at the load are limited with a clamp diode if the circuit wires are long, spike voltages will occur by inductance. Keep wires as short as possible to minimize inductance.

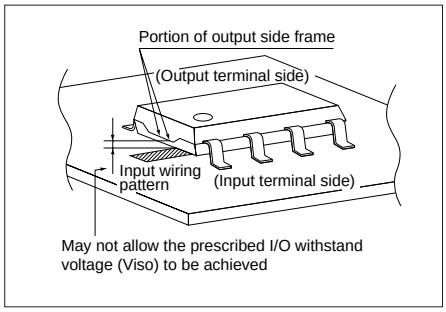
7. Cleaning solvents compatibility

Dip cleaning with an organic solvent is recommended for removal of solder flux, dust, etc. Select a cleaning solvent from the following table. If ultrasonic cleaning must be used, the severity of factors such as frequency, output power and cleaning solvent selected may cause loose wires and other defects. Make sure these conditions are correct before use. For details, please consult us.

Cleaning solvent		Compatibility (❍: Yes ×: No)
Chlorine-base	• I.I.I. Trichloroethlene (Chloroethlene) • Trichloroethlene (Trichlene) • Perchloroethlene • Methlene chloride	❍
Adueous	• Indusco 624, 1000 • Hollis 310 • Lonco Terg	❍
Alcohol-base	• IPA • Ethanol	❍
Others	• Thinner • Gasoline	×

8. INPUT WIRING PATTERN

With AQY or AQW types, avoid installing the input (LED side) wiring pattern to the bottom side of the package if you require the specified I/O isolation voltage (Viso) after mounting the PC board. Since part of the frame on the output side is exposed, it may cause fluctuations in the I/O isolation voltage.

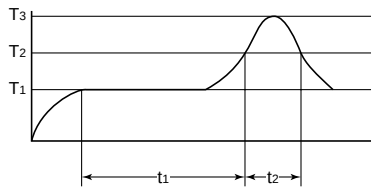


9. Soldering

1) When soldering PC board terminals, keep soldering time to within 10 s at 260°C 500°F.

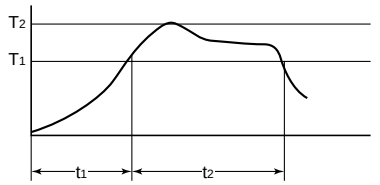
2) When soldering surface-mount terminals, the following conditions are recommended.

(1) IR (Infrared reflow) soldering method



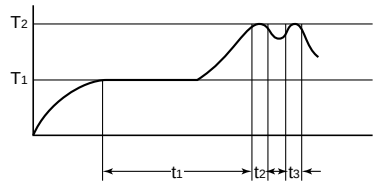
T1 = 155 to 165°C 311 to 329°F
T2 = 180°C 200°C 356 to 392°F
T3 = 245°C 473°F or less
t1 = 120 s or less
t2 = 30 s or less

(2) Vapor phase soldering method



T1 = 180 to 200°C 366 to 392°F
T2 = 215°C 419°F or less
t1 = 40 s
t2 = 90 s or less(40 s or less for SOP type)

(3) Double wave soldering method



T1 = 155 to 165°C 311 to 329°F
T2 = 260°C 500°F or less
t1 = 60 s or less
t2+t3 = 5 s or less

(4) Soldering iron method

Tip temperature: 280 to 300°C 536 to 572°F

Wattage: 30 to 60 W

Soldering time: within 5 s

(5) Others

Check mounting conditions before using other soldering methods (hot-air, hot plate, pulse heater, etc.)

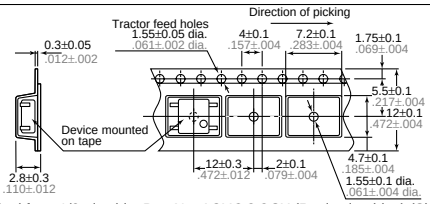
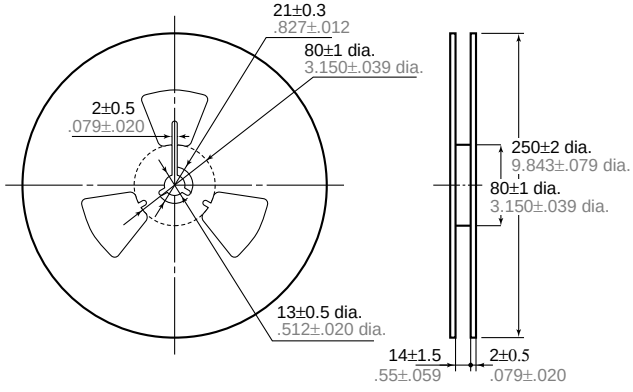
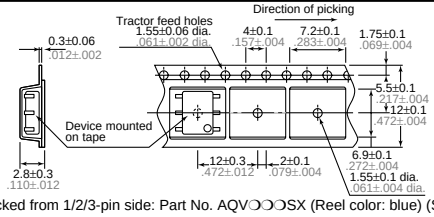
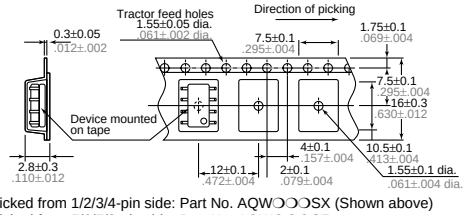
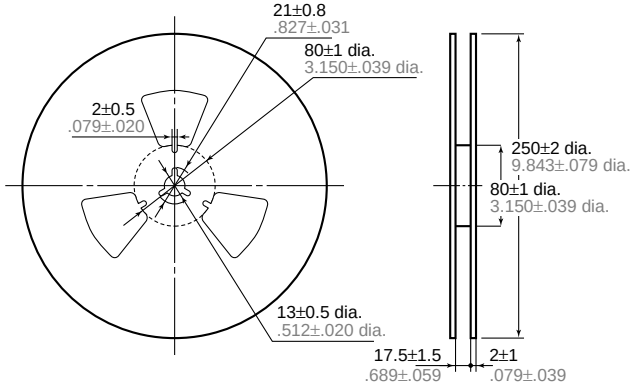
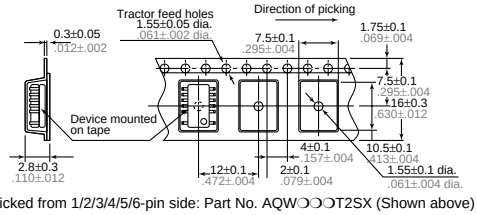
• The temperature profile indicates the temperature of the soldered terminal on the surface of the PC board. The ambient temperature may increase excessively. Check the temperature under mounting conditions.

• The conditions for the infrared reflow soldering apply when preheating using the VPS method.

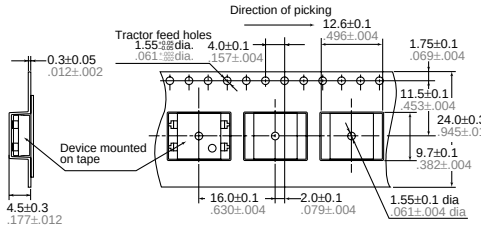
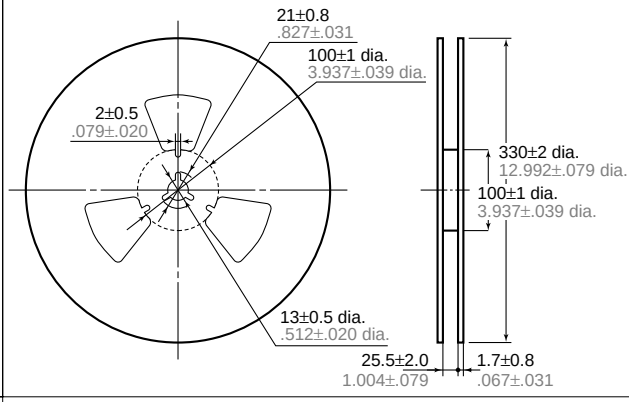
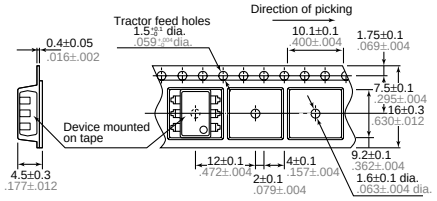
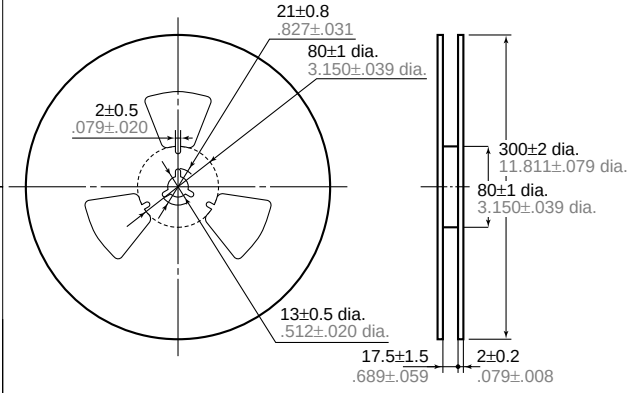
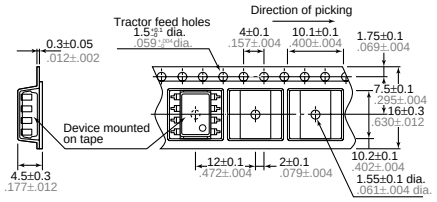
10. The following shows the packaging format

1) Tape and reel

mm inch

Type	Tape dimensions	Dimensions of paper tape reel
SO package 4-pin type	 (1) When picked from 1/2-pin side: Part No. AQY○○○SX (Reel color: blue) (Shown above) (2) When picked from 3/4-pin side: Part No. AQY○○○SZ (Reel color: orange)	
SO package 6-pin type	 (1) When picked from 1/2/3-pin side: Part No. AQV○○○SX (Reel color: blue) (Shown above) (2) When picked from 4/5/6-pin side: Part No. AQV○○○SZ (Reel color: orange)	
SO package 8-pin type	 (1) When picked from 1/2/3/4-pin side: Part No. AQW○○○SX (Shown above) (2) When picked from 5/6/7/8-pin side: Part No. AQW○○○SZ	
SO package 12-pin type	 (1) When picked from 1/2/3/4/5/6-pin side: Part No. AQW○○○T2SX (Shown above) (2) When picked from 7/8/9/10/11/12-pin side: Part No. AQW○○○T2SZ	

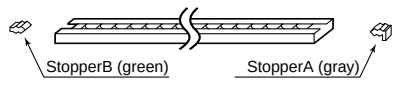
mm inch

Type	Tape dimensions	Dimensions of paper tape reel
PD 4-pin SMD type	 (1) When picked from 1/2-pin side: Part No. AQY○○○AX (Shown above) (2) When picked from 3/4-pin side: Part No. AQY○○○AZ	
6-pin SMD type	 (1) When picked from 1/2/3-pin side: Part No. AQV○○○AX (Shown above) (2) When picked from 4/5/6-pin side: Part No. AQV○○○AZ	
8-pin SMD type	 (1) When picked from 1/2/3/4-pin side: Part No. AQW○○○AX (Shown above) (2) When picked from 5/6/7/8-pin side: Part No. AQW○○○AZ	

2) Tube

(1) Devices are packaged in a tube so pin No. 1 is on the stopper B side. Observe correct orientation when mounting them on PC boards.

(SO package type, PD type)



(DIP, SMD type)

(2) Storage

PhotoMOS relays implemented in SO packages are sensitive to moisture and come in sealed moisture-proof packages. Observe the following cautions on storage.

• After the moisture-proof package is unsealed, take the devices out of storage as soon as possible (within 1 month at the most).

• If the devices are to be left in storage for a considerable period after the moisture-proof package has been unsealed, it is recommended to keep them in another moisture-proof bag containing silica gel (within 3 months at the most).

11. Transportation and storage

1) Extreme vibration during transport will warp the lead or damage the relay. Handle the outer and inner boxes with care.

2) Storage under extreme conditions will cause soldering degradation, external appearance defects, and deterioration of the characteristics. The following storage conditions are recommended:

• Temperature: 5 to 30°C 41 to 86°F

• Humidity: Less than 60% R.H.

• Atomosphere: No harmful gasses such as sulfurous acid gas, minimal dust.

■ Power PhotoMOS Relays

1.-1) Input LED current (Standard type and Internal varistor type)

For rising and dropping ratio of input LED current (di/dt), maintain min. 100 μA/s.

1.-2) Input voltage (Voltage sensitive type)

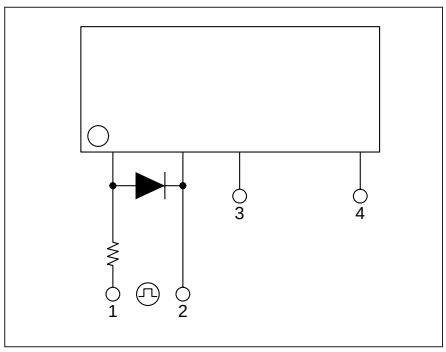
For rising and dropping ratio of input voltage (dv/dt), maintain min. 100 mV/s.

2. Short across terminals

Do not short circuit between terminals when relay is energized, since there is possibility of breaking of the internal IC.

3. Surge voltages at the input

If reverse surge voltages are present at the input terminals, connect a diode in reverse parallel across the input terminals and keep the reverse voltages be low the reverse breakdown voltage.



4. Recommended load voltage

As a guide in selecting PhotoMOS Relays, please refer to the following table.

1) Power photoMOS relays

Type		Absolute maximum rating		Recommended load voltage
		Load voltage	Load current	
AC/DC type	AQZ202	Peak AC 60 V	Peak AC 3.0 A	12 V AC; 5, 12,24 V DC
	AQZ205	Peak AC 100 V	Peak AC 2.0 A	24 V AC 48 V DC
	AQZ207	Peak AC 200 V	Peak AC 1.0 A	48 V AC 100 V DC
	AQZ204	Peak AC 400 V	Peak AC 0.5 A	100 V AC 200 V DC
DC type	AQZ102	60 V DC	4.0 A DC	5,12,24 V DC
	AQZ105	100 V DC	2.6 A DC	48 V DC
	AQZ107	200 V DC	1.3 A DC	100 V DC
	AQZ104	400 V DC	0.7 A DC	200 V DC

2) Power PhotoMOS relay high capacity type

Type		Absolute maximum rating		Recommended load voltage
		Load voltage	Load current	
AC/DC type	AQZ262	Peak AC, DC 60V	Peak AC, DC 6A	12V AC 5,12,24V DC
	AQZ264	Peak AC, DC 400V	Peak AC, DC 1A	AC100V DC200V

3) Power photoMOS relays (Voltage sensitive type)

Type		Absolute maximum rating		Recommended load voltage
		Load voltage	Load current	
AC/DC type	AQZ202D	Peak AC 60 V	Peak AC 2.7 A	12 V AC; 5, 12,24 V DC
	AQZ205D	Peak AC 100 V	Peak AC 1.8 A	24 V AC 48 V DC
	AQZ207D	Peak AC 200 V	Peak AC 0.9 A	48 V AC 100 V DC
	AQZ204D	Peak AC 400 V	Peak AC 0.45 A	100 V AC 200 V DC
DC type	AQZ102D	60 V DC	3.6 A DC	5,12,24 V DC
	AQZ105D	100 V DC	2.3 A DC	48 V DC
	AQZ107D	200 V DC	1.1 A DC	100 V DC
	AQZ104D	400 V DC	0.6 A DC	200 V DC

4) Power photoMOS relays with internal varistor type

Type		Absolute maximum rating		Recommended load voltage
		Load voltage	Load current	
AC/DC type	AQZ202V	17 V AC 22 V DC	Peak AC 3.0 A	12 V AC; 5,12 V DC
	AQZ205V	30 V AC 38 V DC	Peak AC 2.0 A	24 V AC 48 V DC
	AQZ207V	60 V AC 85 V DC	Peak AC 1.0 A	48 V AC 100 V DC
	AQZ204V	140 V AC 180 V DC	Peak AC 0.5 A	100 V AC 200 V DC

5.-1) Ripple in the input power supply (Standard type and high capacity type and internal varistor type)

If ripple is present in the input power supply, observe the following:

1) For LED operate current at E_{min}, maintain min. 5 mA

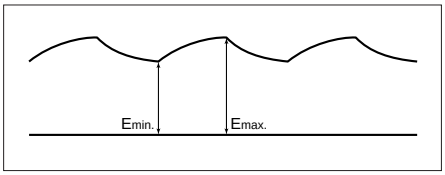
2) Keep the LED operate current at 50 mA or less at E_{max}.

5.-2) Ripple in the input power supply (Voltage sensitive type)

If ripple is present in the input power supply, observe the following:

1) For input voltage at Emin, maintain min. 4 V

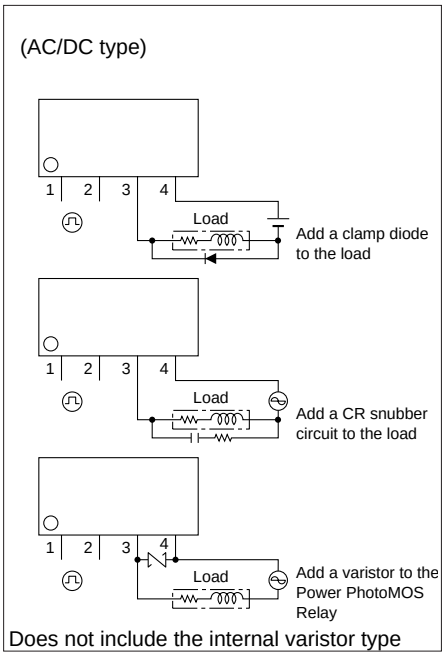
2) Keep input voltage at 30 V or less at Emax.



6. Output spike voltages

1) If an inductive load generates spike voltages which exceed the absolute maximum rating, the spike voltage must be limited.

Typical circuits are shown below.



2) Even if spike voltages generated at the load are limited with a clamp diode if the circuit wires are long, spike voltages will occur by inductance. Keep wires as short as possible to minimize inductance.

7. Adjacent mounting

1) When relays are mounted close together with the heat-generated devices, ambient temperature may rise abnormally. Mounting layout and ventilation should be considered.

2) When many relays are mounted close together, load current should be reduced. (Refer to the date of “Load current vs. ambient temperature characteristics in adjacent mounting.”)

8. Cleaning solvents compatibility

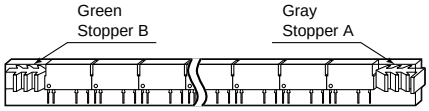
Dip cleaning with an organic solvent is recommended for removal of solder flux, dust, etc. Select a cleaning solvent from the following table. If ultrasonic cleaning must be used, the severity of factors such as frequency, output power and cleaning solvent selected may cause loose wires and other defects. Make sure these conditions are correct before use. For details, please consult us.

Cleaning solvent		Compatibility (❍: Yes ×: No)
Chlorine-base	• I.I.I. Trichloroethlene (Chloroethlene) • Trichloroethlene (Trichlene) • Perchloroethlene • Methlene chloride	❍
Adueous	• Indusco 624, 1000 • Hollis 310 • Lonco Terg	❍
Alcohol-base	• IPA • Ethanol	❍
Others	• Thinner • Gasoline	×

9. Soldering

When soldering PC board terminals, keep soldering time to within 10 s at 260°C 500°F.

10. Packing style



The power photoMOS relays are stick packed so that the number 1 terminal is in the direction of stopper B.
One stick contains 25 power photoMOS relays.

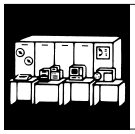
11. Transport and storage

1) If the product is subject to extreme vibration during transport, the lead may warp or the main unit may become damaged. Handle the outer and inner boxes with care.

2) If the storage environment is extremely bad, it may give rise to deterioration of the soldering, external appearance defects, and degradation the characteristics of the product. The following conditions are recommended for the storage location:

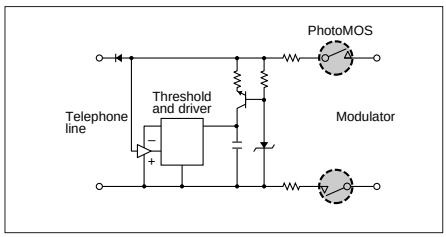
- Temperature: 5 to 30°C 41 to 86°F
- Humidity: Less than 60% RH
- Environment: No hazardous substances such as sulfurous acid gases, and little dust.

PhotoMOS Relays for Various Applications



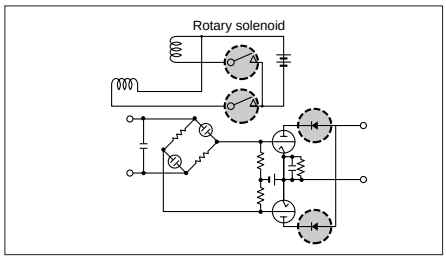
Automatic meter reading

The needs of centralized remote meter reading systems for water, gas and electricity in medium and high rise apartments and new subdivisions are now increasing. PhotoMOS relays are capable of controlling from low level signals up to power signals and feature low leakage current and noise from the optoelectronic device and power MOSFET combination.



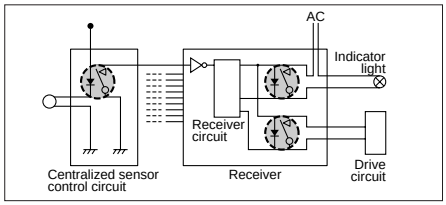
Medical equipment

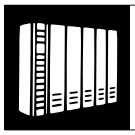
Medical equipment which processes low level signals includes electrocardiographs, electroencephalographs, and X-ray CT scanners. PhotoMOS relays accurately transfer low level signals (less than several hundred millivolts). Furthermore, they are also convenient in driving rotary solenoids such as those used to automatically switch voltage ranges.



Security Equipment

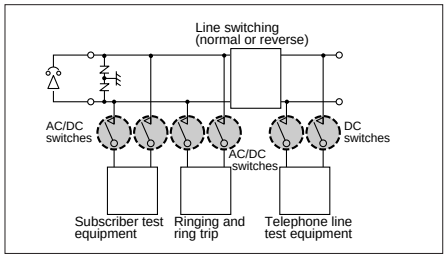
There are many types of security systems from home and office security to building security. PhotoMOS relays are ideal for use as input interfaces for system sensors and output interfaces for alarms.
Input interface: Low leakage current makes use possible for low level voltage and current input.
Output interface: Outputs either AC or DC up to a load voltage of 400 V.





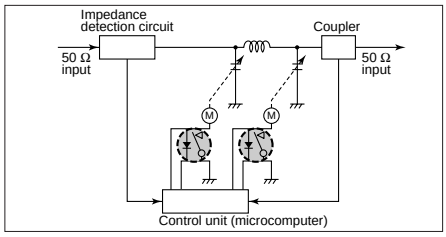
Telecommunications

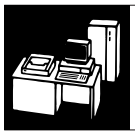
A variety of signals, with levels from millivolts (at microamperes) to tens of volts (at several hundred milliamperes), AC or DC, and even high bit-rate signals, can be superimposed on telephone lines, the heart of telecommunication networks. The switches in telecommunication circuits, which normally carry DC signals, also carry AC signals on top of the DC level when an intermittent signal (e.g. ringer signal) is being sent. PhotoMOS relays are capable of controlling small level (millivolts at microamperes) AC or DC signals.



Communications equipment

The future of communications is in satellite communications. Satellite-communications feature many advantages such as indifference to terrestrial disasters, wide service areas, simple circuit modification and simultaneous conversations. An important control operation in communications equipment is fast automatic tuning.
PhotoMOS relays can easily be connected in parallel, difficult with conventional transistor type. As a result, a variety of circuit connection are possible and power circuits can also be designed.

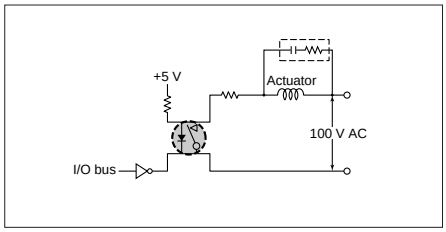




OA equipment

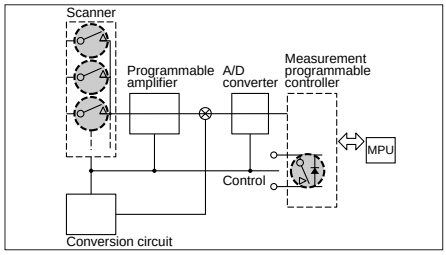
OA equipment usually contains a sensor control unit (for temperature, speed, torque, etc.), drive unit, power supply unit, and a processing unit which controls the overall system. It is organized similarly to compact factory automation machinery. PhotoMOS relays have wide application in the interfaces for signals which connect the functions of these units.

- Operates on a 24 mW input to enable direct control of C-MOS devices.
- Signal transfer through optical coupling achieves high resistance to noise and transients, eliminating the need for adding a snubber circuit to the output to control the load voltage.
- Advantages in the total cost and reliability in the control system result from the absence of AC leakage current related to the snubber circuit.



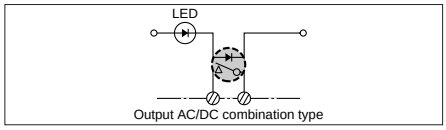
Instrumentation

With the spread of microcomputer chips, the latest instruments are required to measure a variety of signals at high speeds under various conditions. PhotoMOS relays are recommended for measurement scanning functions, automatic zero-point compensation to eliminate zero-point error, and measurement sequence interfaces (e.g. alarm interface.)



Programmable controller

The output circuit of a programmable controller requires various interfaces to match the load type. Recently, as the computing speed and data processing speed increase, problems may arise from noise at the input interface as well as at the output interface. PhotoMOS relays are resistant to inrush current (due to phase shift) and eliminate the need for snubber circuits as long as they are operated within the ratings. Furthermore, use of PhotoMOS relays decreases the mounting area requirements, resulting in more compact programmable controllers.

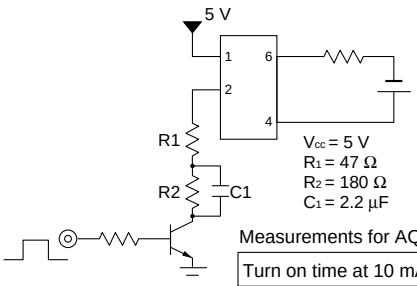


If you are a user experiencing difficulty with solid-state relays and triacs:

If you would like to control small analog signals with a photocoupler and solid-state relays.	➤	PhotoMOS relays feature low offset voltages and on resistances of 0.25 Ω or less. (AQV251 Connection)
If you require a device with a small leakage current (as opposed to bipolar devices having large internal leakage currents).	➤	PhotoMOS relays have leakage currents in the order of microamperes and can control up to 1500 V (peak). (AQV258)
If you would like to directly control analog signals and you would like a device integrating a photocoupler, driver and analog IC to simplify the circuit as much as possible.	➤	PhotoMOS relays contain all of these functions in a single package. Furthermore, circuit design is simplified as a power supply is unnecessary since the internal optoelectronic device directly drives the power MOSFET.
If you require a snubber circuit with a triac or solid-state relay, but are concerned about the snubber circuit's AC leakage current.	➤	PhotoMOS relays are resistant to transients and as long as they are operated within the maximum ratings, eliminate the need for adding a snubber circuit to the output to control the rise in load voltage. Leakage current ceases to be a problem, with cost and reliability being other advantages.
If you require a device for AC control that is resistant to ambient temperature changes and input signal noise.	➤	PhotoMOS relays do not employ the self-trigger mechanism used in SCRs and triacs. Therefore, they do not switch on accidentally. Furthermore, the noise suppression characteristics of optoelectronic devices make them highly resistant to ambient noise for operation at temperatures up to 80°C 176°F.

PhotoMOS Relay Application Examples

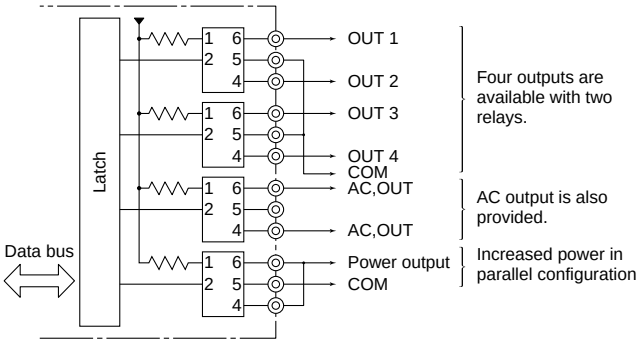
High Response Speed



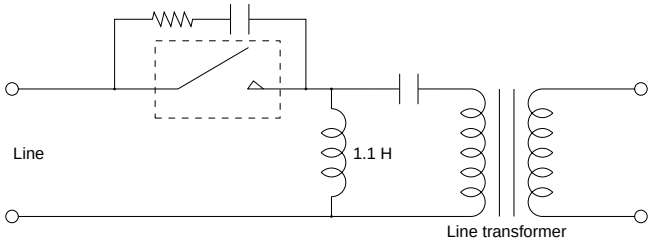
Measurements for AQV204(400V) AC/DC type

Turn on time at 10 mA LED current	0.18 ms
Turn on time with speed-indrease capacitor (LED current 45 mA)	0.03 ms

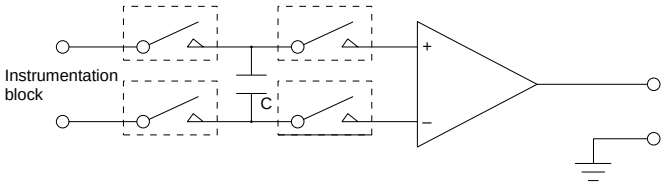
Microprocessor system I/O board



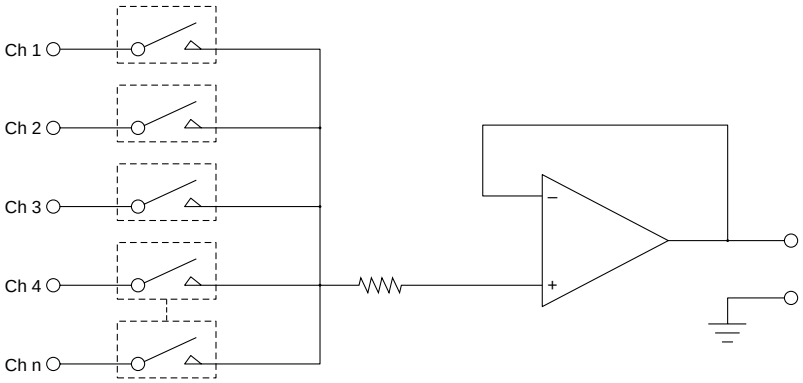
Dial Pulse Generator



Capacitor Switch Circuit



Scanner



Part No. vs. Load Voltage Quick Reference

PhotoMOS Relays

Form A Type

Group name	Part No.	Package style	Number of channels	Load voltage / Third digit	40 V / 1	60 V / 2	100 V (RF:80 V) / 5	200 V / 7	250 V / 3	350 V / 0	400 V / 4	600 V / 6	1000 V / 9	1500 V / 8
HE	AQV25❍	DIP	1-channel	Standard Viso	AQV251	AQV252	AQV255	AQV257	AQV253		AQV254 AQV254R		AQV259	AQV258
				High Viso					AQV253H		AQV254H			
	AQW25❍		2-channels	Standard Viso							AQW254			
HE Soft ON/OFF type	AQV25❍M	DIP	1-channel	Standard Viso				AQV257M						
GU	AQV21❍	DIP	1-channel	Standard Viso		AQV212	AQV215	AQV217		AQV210	AQV214	AQV216		
				High Viso							AQV214H			
	AQW21❍		2-channels	Standard Viso		AQW212	AQW215	AQW217		AQW210	AQW214	AQW216		
	AQX2144❍	SIL	4-channels	Standard Viso							AQX21444			
	AQY21❍S	SOP	1-channel (4 pin)	Standard Viso						AQY210S	AQY214S			
	AQV21❍S		1-channel (6 pin)	Standard Viso		AQV212S	AQV215S	AQV217S		AQV210S	AQV214S	AQV216S		
	AQW21❍S		2-channels	Standard Viso						AQW210S	AQW214S			
	AQW21❍TS		2-channels (MOSFET+ optocoupler)	Standard Viso						AQW210TS				
	AQW21❍ T2S		3-channels (MOSFET+ 2optocouplers)	Standard Viso						AQW210T2S				
GU-E	AQV21❍E	DIP	1-channel	Standard Viso						AQV210E	AQV214E			
				High Viso						AQV210EH	AQV214EH			
RF	AQV22❍	DIP	1-channel	Standard Viso	AQV221		AQV225							
RF Low-ON type	AQV22❍N	DIP	1-channel	Standard Viso			AQV225N	AQV227N			AQV224N			
	AQW22❍N		2-channels	Standard Viso			AQW225N	AQW227N			AQW224N			
	AQV22❍NS	SOP	1-channel	Standard Viso			AQV225NS	AQV227NS			AQV224NS			
HS	AQV23❍	DIP	1-channel	Standard Viso							AQV234			
HF	AQV10❍	DIP	1-channel	Standard Viso	AQV101	AQV102			AQV103		AQV104			
	AQV20❍		1-channel	Standard Viso	AQV201	AQV202			AQV203		AQV204			
PD	AQY27❍	DIP	1-channel	Standard Viso		AQY272	AQY275	AQY277			AQY274			

Form B Type

Group name	Part No.	Package style	Number of channels	Load voltage / Third digit	300 V / 3	400 V / 4
HE	AQV45❍	DIP	1-channel	Standard Viso	AQV453	AQV454
				High Viso		AQV454H
	AQW45❍		2-channels	Standard Viso		AQW454
GU	AQV41❍	DIP	1-channel	Standard Viso		AQV414
	AQW41❍		2-channels	Standard Viso		AQW414
	AQY41❍S	SOP	1-channel (4-pin)	Standard Viso		AQY414S
	AQV41❍S		1-channel (6-pin)	Standard Viso		AQV414S
GU-E	AQV41❍E	DIP	1-channel	Standard Viso		AQV414E
				High Viso		AQV414EH

Form A Form B Type

Group name	Part No.	Package style	Number of channel	Load voltage / Third digit	400 V / 4
HE	AQW65❍	DIP	2-channel	Standard Viso	AQW654
GU	AQW61❍	DIP	2-channel	Standard Viso	AQW614

Power PhotoMOS Relays

Form A Type

Group name	Part No.	Package style	Number of channels	Load voltage / Third digit	40 V / 1	60 V / 2	100 V / 5	200 V / 7	250 V / 3	350 V / 0	400 V / 4
Standard type	AQZ10❍	SIL	1-channel	Standard Viso		AQZ102	AQZ105	AQZ107			AQZ104
	AQZ20❍					AQZ202	AQZ205	AQZ207			AQZ204
Varistor incorporated type	AQZ20❍V					AQZ202V	AQZ205V	AQZ207V			AQZ204V
Voltage sensitive type	AQZ10❍D					AQZ102D	AQZ105D	AQZ107D			AQZ104D
	AQZ20❍D					AQZ202D	AQZ205D	AQZ207D			AQZ204D
High capacity type	AQZ26❍					AQZ262					AQZ264

❍ stands for third digit.
Notes: 1. Standard Viso: 1,500 V between I/O. 2.High Viso: 5,000 V between I/O.