

mm inch

FEATURES

1. 1 channel (Form B) in super miniature design

The device comes in a super-miniature SO package measuring (W) 4.4 × (L) 6.3 × (H) 2.1 mm (W) .173 × (L) .248 × (H) .083 inch —approx. 25% of the volume and 50% of the footprint size of DIP type PhotoMOS Relays.

2. Low on resistance (Max. 50 Ω) at 400 V for normally-closed type

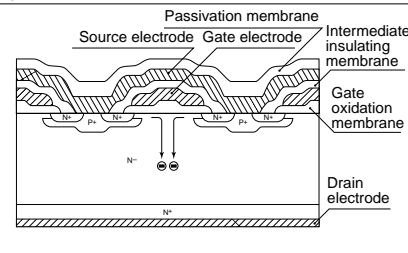
has been achieved thanks to the built-in MOSFET processed by our proprietary method, DSD (Double-Diffused and Selective Doping) method.

5. Low-level off state leakage current

In contrast to the SSR with an off state leakage current of several milliamps, the PhotoMOS relay features a very small off state leakage current of only 100 pA even at the rated load voltage of 400 V.

6. Low thermal electromotive force (Approx. 1 μV)

Cross section of the normally-closed type of power MOS



3. Tape and reel

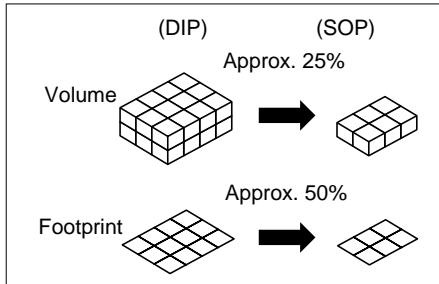
The device comes standard in a tape and reel (1,000 pcs./reel) to facilitate automatic insertion machines.

4. Controls low-level analog signals

PhotoMOS relays feature extremely low closed-circuit offset voltage to enable control of low-level analog signals without distortion.

TYPICAL APPLICATIONS

- Telephones
- Measuring instruments
- Computer
- Industrial robots
- High-speed inspection machines



TYPES

Type	Output ratings*		Part No.		Packing quantity in tape and reel
	Load voltage	Load current	Picked from the 1/2/3-pin side	Picked from the 4/5/6-pin side	
AC/DC	400 V	100 mA	AQV414SX	AQV414SZ	1,000 pcs.

*Indicate the peak AC and DC values.

Notes: (1) Tape package is the standard packing style. Also available in tube. (Part No. suffix "X" or "Z" is not needed when ordering; Tube: 75 pcs.; Case: 1,500 pcs.)

(2) For space reasons, the top two letters of the product number "AQ" are omitted on the product seal. The package type indicator "X" and "Z" are also omitted from the seal. (Ex. the label for product number AQV414S is V414S).

RATING

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

Item		Symbol	Type of connection	AQV414S	Remarks	
Input	LED forward current	I_F		50 mA		
	LED reverse voltage	V_R		3 V		
	Peak forward current	I_{FP}		1 A	$f = 100 \text{ Hz}$, Duty factor = 0.1%	
	Power dissipation	P_{in}		75 mW		
Output	Load voltage (peak AC)	V_L		400 V		
	Continuous load current	I_L		A	0.10 A	A connection: Peak AC, DC B,C connection: DC
				B	0.11 A	
				C	0.12 A	
	Peak load current	I_{peak}		0.3 A	A connection: 100 ms (1 shot) $V_L = DC$	
Power dissipation	P_{out}	450 mW				
Total power dissipation		P_T		500 mW		
I/O isolation voltage		V_{iso}		1,500 V AC		
Temperature limits	Operating	T_{opr}		-40°C to +85°C -40°F to +185°F	Non-condensing at low temperatures	
	Storage	T_{stg}		-40°C to +100°C -40°F to +212°F		

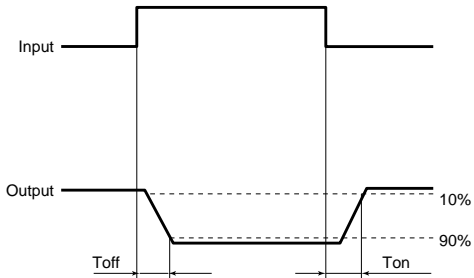
2. Electrical characteristics (Ambient temperature: 25°C 77°F)

Item			Symbol	Type of connection	AQV414S	Remarks
Input	LED operate current	Typical	I_{Fon}	—	0.6 mA	$I_L = \text{Max.}$
		Maximum			3 mA	
	LED turn off current	Minimum	I_{Foff}	—	0.4 mA	$I_L = \text{Max.}$
		Typical			0.55 mA	
	LED dropout voltage	Typical	V_F	—	1.14 V (1.25 V at $I_F = 50 \text{ mA}$)	
Maximum		1.5 V				
Output	On resistance	Typical	R_{on}	A	26 Ω	$I_F = 5 \text{ mA}$ $I_L = \text{Max.}$ Within 1 s on time
		Maximum			50 Ω	
		Typical	R_{on}	B	20 Ω	
		Maximum			25 Ω	
	Typical	R_{on}	C	10 Ω	$I_F = 5 \text{ mA}$ $I_L = \text{Max.}$ Within 1 s on time	
	Maximum			12.5 Ω		
Off state leakage current	Maximum	I_{Leak}	—	1 μA	$I_F = 0$ $V_L = \text{Max.}$	
Transfer characteristics	Turn on time*	Typical	T_{on}	—	0.47 ms	$I_F = 5 \text{ mA}$ $V_L = \text{Max.}$
		Maximum			1.0 ms	
	Turn off time	Typical	T_{off}	—	0.28 ms	$I_F = 5 \text{ mA}$ $V_L = \text{Max.}$
		Maximum			1.0 ms	
	I/O capacitance	Typical	C_{iso}	—	0.8 pF	$f = 1 \text{ MHz}$ $V_B = 0$
Maximum		1.5 pF				
Initial I/C isolation resistance	Minimum	R_{iso}	—	1,000 M Ω	500 V DC	

Note: Recommendable LED forward current $I_F = 5 \text{ mA}$.

Type of connection.

*Turn on/Turn off time



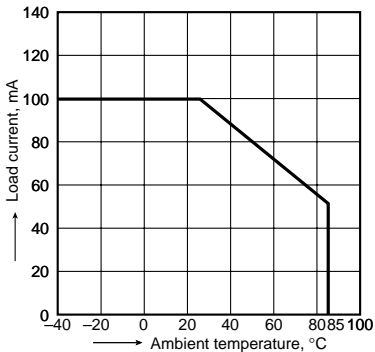
- For Dimensions, see Page 441.
- For Schematic and Wiring Diagrams, see Page 445.
- For Cautions for Use, see Page 449.

REFERENCE DATA

1. Load current vs. ambient temperature characteristics

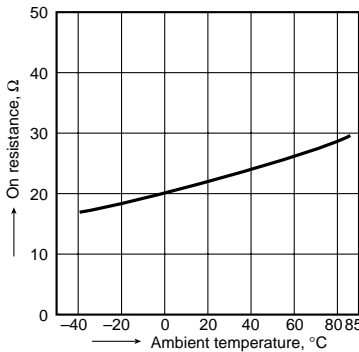
Allowable ambient temperature: -40°C to $+85^\circ\text{C}$
 -40°F to $+185^\circ\text{F}$

Type of connection: A



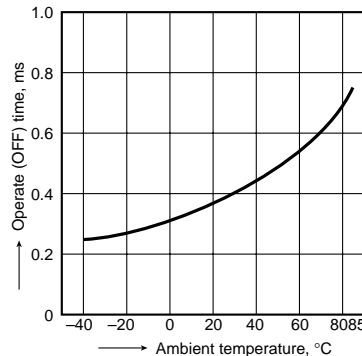
2. On resistance vs. ambient temperature characteristics

Measured portion: between terminals 4 and 6;
LED current: 0 mA;
Continuous load current: 100 mA (DC)



3. Operate (OFF) time vs. ambient temperature characteristics

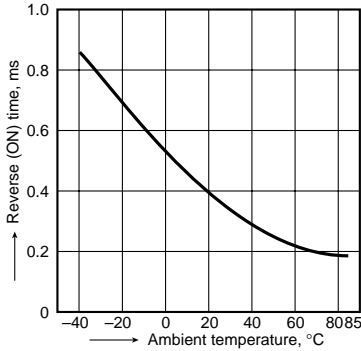
LED current: 5 mA;
Load voltage: 400 V (DC);
Continuous load current: 100 mA (DC)



AQV414S

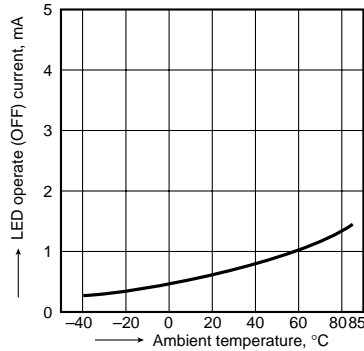
4. Reverse (ON) time vs. ambient temperature characteristics

LED current: 50 mA;
Load voltage: 400 V (DC);
Continuous load current: 100 mA (DC)



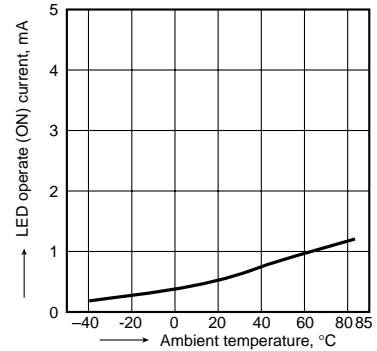
5. LED operate (OFF) current vs. ambient temperature characteristics

Load voltage: 400 V (DC);
Continuous load current: 100 mA (DC)



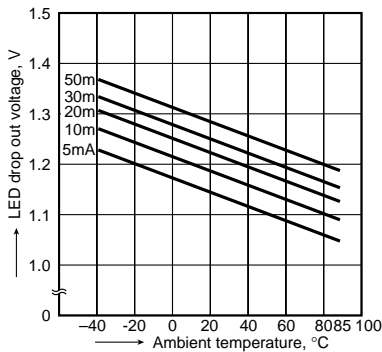
6. LED reverse (ON) current vs. ambient temperature characteristics

Load voltage: 400 V (DC);
Continuous load current: 100 mA (DC)



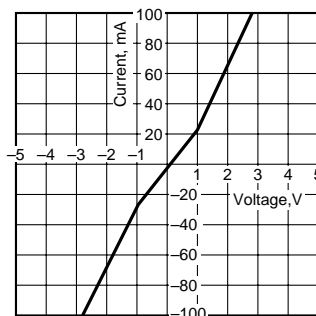
7. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



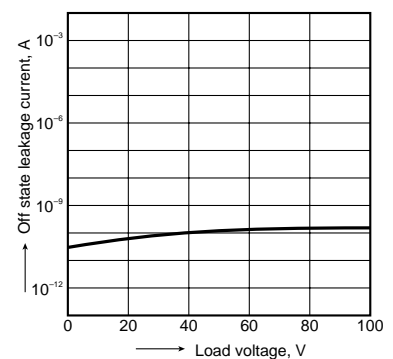
8. Voltage vs. current characteristics of output at MOS portion

Measured portion: between terminals 4 and 6;
Ambient temperature: 25°C 77°F



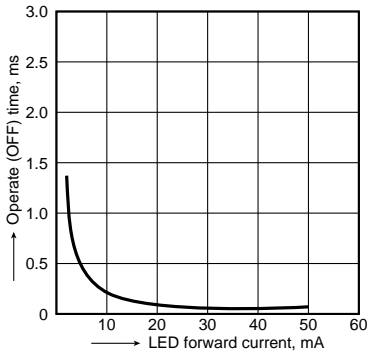
9. Off state leakage current

Measured portion: between terminals 4 and 6;
LED current: 5 mA;
Ambient temperature: 25°C 77°F



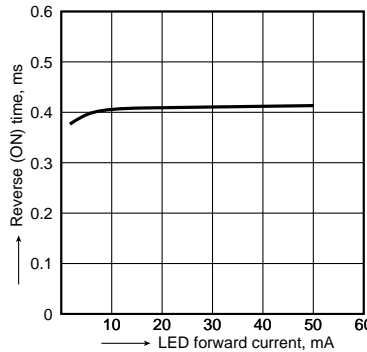
10. LED forward current vs. operate (OFF) time characteristics

Measured portion: between terminals 4 and 6;
Load voltage: 400 V (DC); Continuous load current: 100 mA (DC); Ambient temperature: 25°C 77°F



11. LED forward current vs. reverse (ON) time characteristics

Measured portion: between terminals 4 and 6;
Load voltage: 400 V (DC); Continuous load current: 100 mA (DC); Ambient temperature: 25°C 77°F



12. Applied voltage vs. output capacitance characteristics

Measured portion: between terminals 4 and 6;
Frequency: 1 MHz;
Ambient temperature: 25°C 77°F

