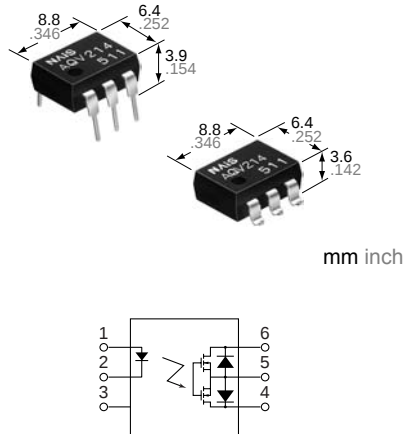


Panasonic
ideas for life

**Controls low-level
input signals.
Controls load voltage
60V to 600V.**

**GU PhotoMOS
(AQV21○,
AQV214H)**

FEATURES



1. Controls low-level analog signals

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

2. Control with low-level input signals

3. Controls various types of loads such as relays, motors, lamps and solenoids.

4. Optical coupling for extremely high isolation

Unlike mechanical relays, the PhotoMOS relay combines LED and optoelectronic device to transfer signals using light for extremely high isolation.

5. Eliminates the need for a counter electromotive force protection diode in the drive circuits on the input side

6. Stable on resistance

7. Low-level off state leakage current

8. Eliminates the need for a power supply to drive the power MOSFET

A power supply used to drive the power MOSFET is unnecessary because of the built-in optoelectronic device. This results in easy circuit design and small PC board area.

9. Low thermal electromotive force (Approx. 1 μ V)

TYPICAL APPLICATIONS

- High-speed inspection machines
- Telephone equipment
- Data communication equipment
- Computer

TYPES

Type	I/O isolation	Output rating*		Part No.				Packing quantity	
				Through hole terminal	Surface-mount terminal				
		Load voltage	Load current	Tube packing style		Tape and reel packing style		Tube	Tape and reel
				Picked from the 1/2/3-pin side	Picked from the 4/5/6-pin side				
AC/DC	Standard 1,500 V AC	60V	550 mA	AQV212	AQV212A	AQV212AX	AQV212AZ	1 tube contains 50 pcs. 1 batch contains 500 pcs.	1,000 pcs.
		100 V	320 mA	AQV215	AQV215A	AQV215AX	AQV215AZ		
		200 V	180 mA	AQV217	AQV217A	AQV217AX	AQV217AZ		
		350 V	130 mA	AQV210	AQV210A	AQV210AX	AQV210AZ		
		400 V	120 mA	AQV214	AQV214A	AQV214AX	AQV214AZ		
		600 V	50 mA	AQV216	AQV216A	AQV216AX	AQV216AZ		
	Reinforced 5,000 V	400 V	120 mA	AQV214H	AQV214HA	AQV214HAX	AQV214HAZ		

*Indicate the peak AC and DC values.

Note: For space reasons, the SMD terminal shape indicator "A" and the package type indicator "X" and "Z" are omitted from the seal.

RATING

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

Item		Sym- bol	Type of connec- tion	AQV212(A)	AQV215(A)	AQV217(A)	AQV210(A)	AQV214(A)	AQV216(A)	AQV214H(A)	Remarks	
Input	LED forward current	I _F		50 mA							f = 100 Hz, Duty factor = 0.1%	
	LED reverse voltage	V _R		5 V								
	Peak forward current	I _{FP}		1 A								
	Power dissipation	P _{in}		75 mW								
Output	Load voltage (peak AC)	V _L		60 V	100 V	200 V	350 V	400 V	600 V	400 V	A connection: Peak AC, DC; B, C connection: DC	
	Continuous load current	A		0.55 A	0.32 A	0.18 A	0.13 A	0.12 A	0.05 A	0.12 A		
		B		0.65 A	0.42 A	0.22 A	0.15 A	0.13 A	0.06 A	0.13 A		
		C		0.80 A	0.60 A	0.30 A	0.17 A	0.15 A	0.08 A	0.15 A		
	Peak load current	I _{peak}		1.2 A	0.96 A	0.54 A	0.4 A	0.3 A	0.15 A	0.3 A		A connection: 100 ms (1 shot), V _L =DC
Power dissipation	P _{out}	500 mW										
Total power dissipation		P _T		550 mW								
I/O isolation voltage		V _{iso}		1,500 V AC							5,000 V AC	
Temperature limits	Operating	T _{opr}		-40°C to +85°C -40°F to +185°F							Non-condensing at low temp.	
	Storage	T _{stg}		-40°C to +100°C -40°F to +212°F								

GU PhotoMOS (AQV21○, AQV214H)

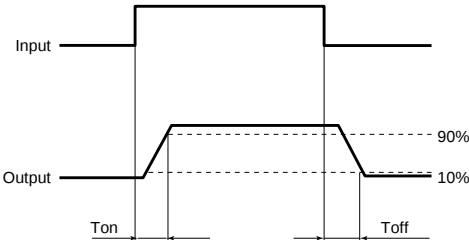
2. Electrical characteristics (Ambient temperature: 25°C 77°F)

Item				Sym- bol	Type of connec- tion**	AQV212(A)	AQV215(A)	AQV217(A)	AQV210(A)	AQV214(A)	AQV216(A)	AQV214H(A)	Condition
Input	LED operate current		Typical	I _{Fon}	—	1 mA	1 mA	1 mA	1 mA	1 mA	1 mA	1.3 mA	I _L = Max.
			Maximum			3 mA	3 mA	3 mA	3 mA	3 mA	3 mA	3 mA	
	LED turn off current		Minimum	I _{Foff}	—	0.4 mA	0.4 mA	0.4 mA	0.4 mA	0.4 mA	0.4 mA	1.2 mA	I _L = Max.
			Typical			0.79 mA	0.79 mA	0.79 mA	0.79 mA	0.79 mA	0.79 mA	0.79 mA	
	LED dropout voltage		Typical	V _F	—	1.25 V (1.14 V at I _F = 5 mA)							I _F = 50 mA
			Maximum			1.5 V							
Output	On resistance		Typical	R _{on}	A	0.83 Ω	2.3 Ω	11.0 Ω	23 Ω	30 Ω	70 Ω	30 Ω	I _F = 5 mA I _L = Max. Within 1 s on time
			Maximum			2.5 Ω	4.0 Ω	15.0 Ω	35 Ω	50 Ω	120 Ω	50 Ω	
			Typical	R _{on}	B	0.44 Ω	1.15 Ω	5.5 Ω	11.5 Ω	22.5 Ω	55 Ω	22.5 Ω	I _F = 5 mA I _L = Max. Within 1 s on time
			Maximum			1.25 Ω	2.0 Ω	7.5 Ω	17.5 Ω	25 Ω	100 Ω	25 Ω	
			Typical	R _{on}	C	0.25 Ω	0.6 Ω	2.8 Ω	6.0 Ω	11.3 Ω	28 Ω	11.3 Ω	I _F = 5 mA I _L = Max. Within 1 s on time
			Maximum			0.63 Ω	1.0 Ω	3.8 Ω	8.8 Ω	12.5 Ω	50 Ω	12.5 Ω	
	Output capacitance		Typical	C _{out}	A	150 pF	110 pF	70 pF	45 pF	45 pF	45 pF	45 pF	I _F = 0 mA V _B = 0 V f = 1 MHz
	Off state leakage current		Maximum	—	—	1 μA							I _F = 0 mA V _L = Max.
Transfer characteristics	Switching speed	Turn on time*	Typical	T _{on}	—	0.65 ms	0.6 ms	0.25 ms	0.25 ms	0.21 ms	0.28 ms	0.6 ms	I _F = 5 mA** I _L =Max.
			Maximum			2 ms	2 ms	1.0 ms	0.5 ms	0.5 ms	0.5 ms	0.8 ms	
		Turn off time*	Typical	T _{off}	—	0.08 ms	0.06 ms	0.05 ms	0.05 ms	0.05 ms	0.04 ms	0.05 ms	I _F = 5 mA I _L = Max.
			Maximum			0.2 ms	0.2 ms	0.2 ms	0.2 ms	0.2 ms	0.2 ms	0.2 ms	
	I/O capacitance		Typical	C _{iso}	—	0.8 pF							f = 1 MHz V _B = 0 V
			Maximum			1.5 pF							
	Initial I/O isolation resistance			Minimum	R _{iso}	—	1,000 MΩ						

Note: Recommendable LED forward current
Standard type: 5 mA
Reinforced type: 5 to 10 mA

For type of connection, catalog.

*Turn on/Turn off time



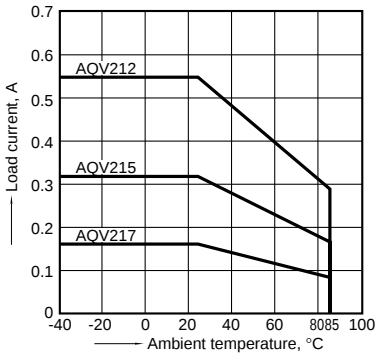
- For Dimensions, seecatalog.
- For Schematic and Wiring Diagrams, seecatalog.
- For Cautions for Use, seecatalog.

REFERENCE DATA

1-(1). Load current vs. ambient temperature characteristics

Allowable ambient temperature: -40°C to +85°C
-40°F to +185°F

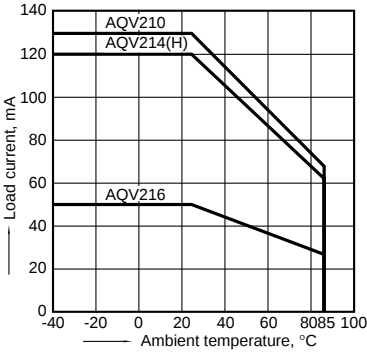
Type of connection: A



1-(2). Load current vs. ambient temperature characteristics

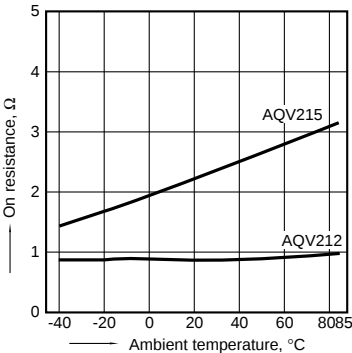
Allowable ambient temperature: -40°C to +85°C
-40°F to +185°F

Type of connection: A



2-(1). On resistance vs. ambient temperature characteristics

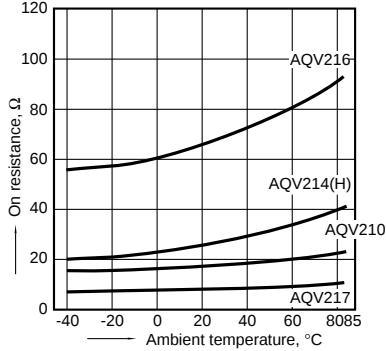
Measured portion: between terminals 4 and 6;
LED current: 5 mA; Load voltage: Max. (DC)
Continuous load current: Max. (DC)



GU PhotoMOS (AQV21○, AQV214H)

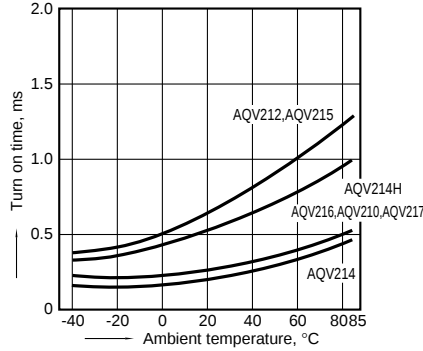
2-(2). On resistance vs. ambient temperature characteristics

Measured portion: between terminals 4 and 6;
LED current: 5 mA; Load voltage: Max. (DC)
Continuous load current: Max. (DC)



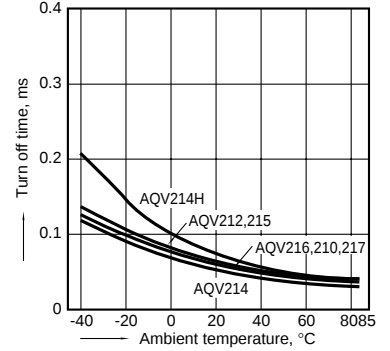
3. Turn on time vs. ambient temperature characteristics

LED current: 5 mA;
Load voltage: Max. (DC);
Continuous load current: Max. (DC)



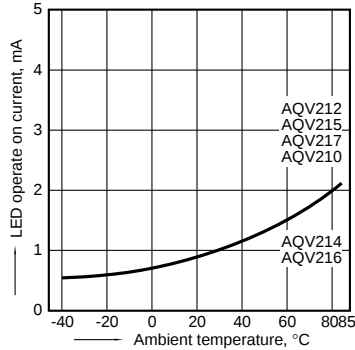
4. Turn off time vs. ambient temperature characteristics

LED current: 5 mA;
Load voltage: Max. (DC);
Continuous load current: Max. (DC)



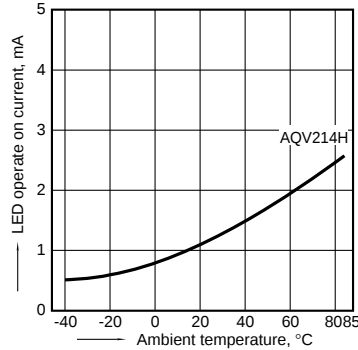
5-(1). LED operate on current vs. ambient temperature characteristics

Load voltage: Max. (DC);
Continuous load current: Max. (DC)



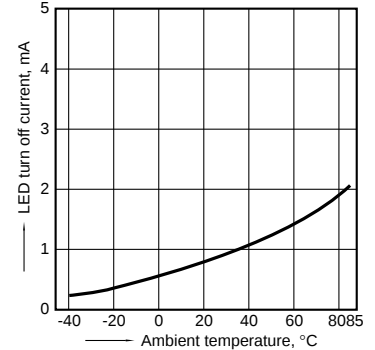
5-(2). LED operate on current vs. ambient temperature characteristics

Load voltage: Max. (DC);
Continuous load current: Max. (DC)



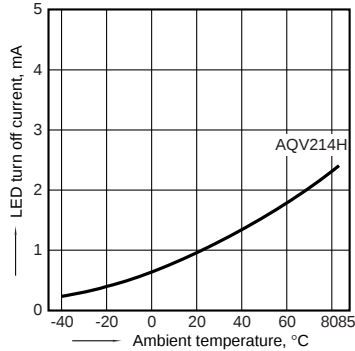
6-(1). LED turn off current vs. ambient temperature characteristics

Load voltage: Max. (DC);
Continuous load current: Max. (DC)



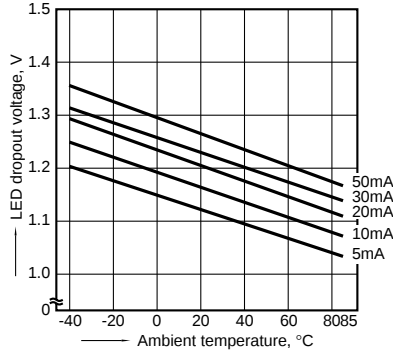
6-(2). LED turn off current vs. ambient temperature characteristics

Load voltage: Max. (DC);
Continuous load current: Max. (DC)



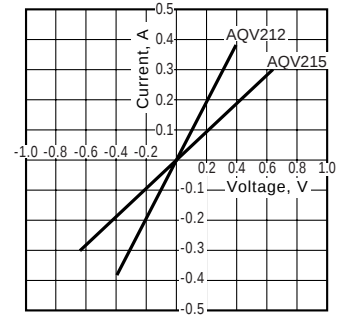
7. LED dropout voltage vs. ambient temperature characteristics

Sample: All types
LED current: 5 to 50 mA



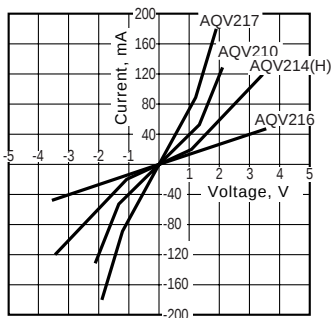
8-(1). Current vs. voltage characteristics of output at MOS portion

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



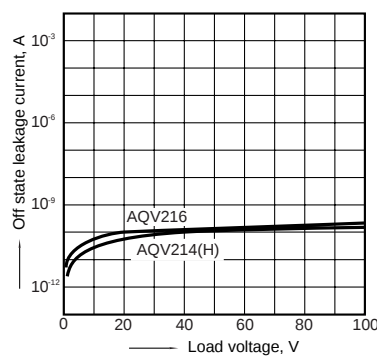
8-(2). Current vs. voltage characteristics of output at MOS portion

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



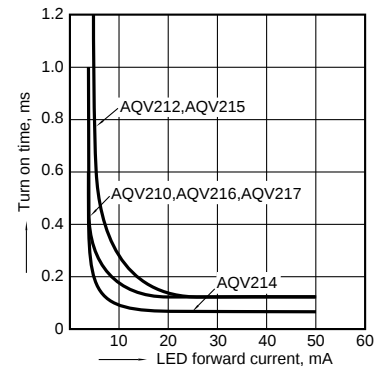
9. Off state leakage current vs. load voltage characteristics

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



10-(1). Turn on time vs. LED forward current characteristics

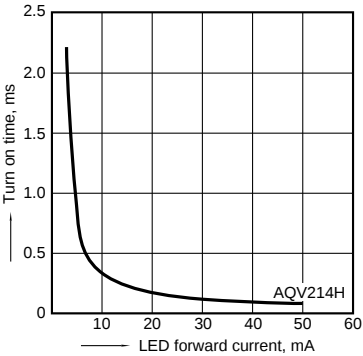
Measured portion: between terminals 4 and 6;
Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature: 25°C 77°F



GU PhotoMOS (AQV21○, AQV214H)

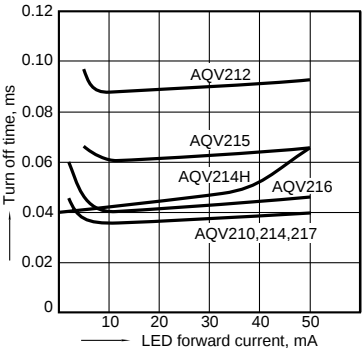
10-(2). Turn on time vs. LED forward current characteristics

Measured portion: between terminals 4 and 6;
Load voltage: 400 V (DC); Continuous load current: 120 mA (DC); Ambient temperature: 25°C 77°F



11. Turn off time vs. LED forward current characteristics

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



12. Output capacitance vs. applied voltage characteristics

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

