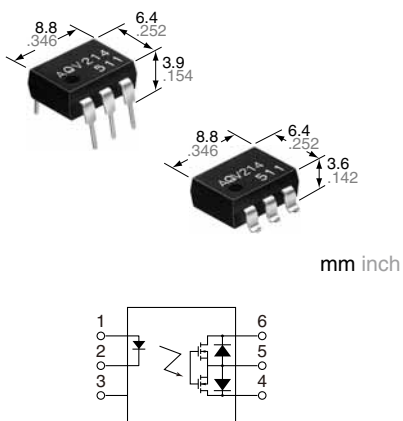


 (Standard type)
 
 (Reinforced type)

6-pin type for switching low-level analog signal

PhotoMOS[®]
GU 1 Form A
 (AQV210, AQV214H)



RoHS compliant

FEATURES

- 1. Controls low-level analog signals**
PhotoMOS feature extremely low closed-circuit offset voltage to enable control of low-level analog signals without distortion.
- 2. Controls various types of loads such as relays, motors, lamps and solenoids**
- 3. Optical coupling for extremely high isolation**
Unlike mechanical relays, the PhotoMOS combines LED and optoelectronic device to transfer signals using light for extremely high isolation.
- 4. Eliminates the need for a counter electromotive force protection diode in the drive circuits on the input side**
- 5. Stable on-resistance**

- 6. Low-level off state leakage current of max. 1 μ A**
- 7. Reinforced insulation type of I/O voltage 5,000V also available**

TYPICAL APPLICATIONS

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

TYPES

	I/O isolation	Output rating*		Package	Part No.				Packing quantity	
					Through hole terminal	Surface-mount terminal				
						Tube packing style	Tape and reel packing style		Tube	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 dual use	Standard 1,500 V AC	60V	550 mA	DIP6-pin	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: The surface mount terminal shape indicator "A" and the packing style indicator "X" or "Z" are not marked on the device.

GU 1 Form A (AQV210, AQV214H)

RATING

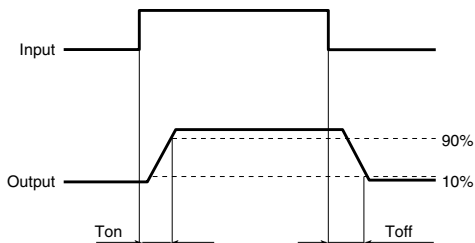
1. Absolute maximum ratings (Ambient temperature: 25°C 77°F)

Item	Symbol	Type of connection	AQV212(A)	AQV215(A)	AQV217(A)	AQV210(A)	AQV214(A)	AQV216(A)	AQV214H(A)	Remarks	
LED forward current	I_F		50 mA								
LED reverse voltage	V_R		5 V								
Peak forward current	I_{FP}		1 A							$f = 100 \text{ Hz}$, Duty factor = 0.1%	
Power dissipation	P_{in}		75 mW								
Load voltage (peak AC)	V_L		60 V	100 V	200 V	350 V	400 V	600 V	400 V		
Continuous load current	I_L	A	0.55 A	0.32 A	0.18 A	0.13 A	0.12 A	0.05 A	0.12 A	A connection: Peak AC, DC B, C connection: DC	
		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}		1.5 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), $V_L = \text{DC}$	
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								

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

Item	Symbol	Type of connection**	AQV212(A)	AQV215(A)	AQV217(A)	AQV210(A)	AQV214(A)	AQV216(A)	AQV214H(A)	Condition	
LED operate current	Typical	I_{fon}	1 mA							1.3 mA	$I_L = \text{Max.}$
	Maximum		3 mA								
LED turn off current	Minimum	I_{foff}	0.4 mA							1.2 mA	$I_L = \text{Max.}$
	Typical		0.79 mA								
LED dropout voltage	Typical	V_F	1.25 V (1.14 V at $I_F = 5 \text{ mA}$)							1.2 mA	$I_F = 50 \text{ mA}$
	Maximum		1.5 V								
On resistance	Typical	R_{on}	A	0.83 Ω	2.3 Ω	11.0 Ω	23 Ω	30 Ω	70 Ω	30 Ω	$I_F = 5 \text{ mA}$ $I_L = \text{Max.}$ 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	$I_F = 5 \text{ mA}$ $I_L = \text{Max.}$ 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	$I_F = 5 \text{ mA}$ $I_L = \text{Max.}$ 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			$I_F = 0 \text{ mA}$ $V_B = 0 \text{ V}$ $f = 1 \text{ MHz}$	
Off state leakage current	Maximum	I_{Leak}		1 μA							$I_F = 0 \text{ mA}$ $V_L = \text{Max.}$
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	$I_F = 5 \text{ mA}^{**}$ $I_L = \text{Max.}$
	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	$I_F = 5 \text{ mA}$ $I_L = \text{Max.}$
	Maximum		0.2 ms								
I/O capacitance	Typical	C_{iso}		0.8 pF							$f = 1 \text{ MHz}$ $V_B = 0 \text{ V}$
	Maximum		1.5 pF								
Initial I/O isolation resistance	Minimum	R_{iso}		1,000 M Ω							500 V DC

*Turn on/Turn off time



RECOMMENDED OPERATING CONDITIONS

Please obey the following conditions to ensure proper device operation and resetting.

Item	Symbol	Recommended value	Unit
Input LED current	I_F	Standard type: 5 Reinforced type: 5 to 10	mA

■ These products are not designed for automotive use.

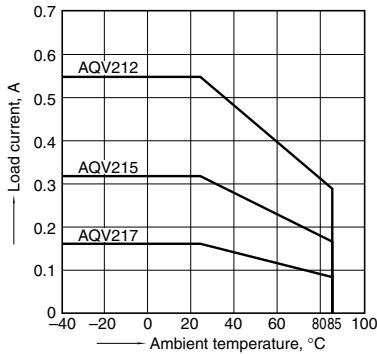
If you are considering to use these products for automotive applications, please contact your local Panasonic Corporation technical representative.

REFERENCE DATA

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

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

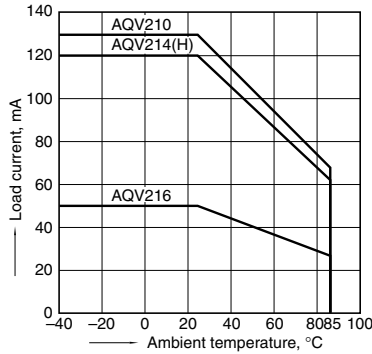
Type of connection: A



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

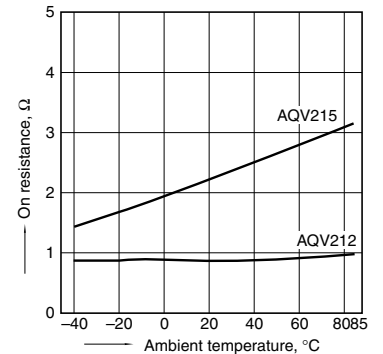
Allowable ambient temperature: -40°C to $+85^{\circ}\text{C}$
 -40°F to $+185^{\circ}\text{F}$

Type of connection: A



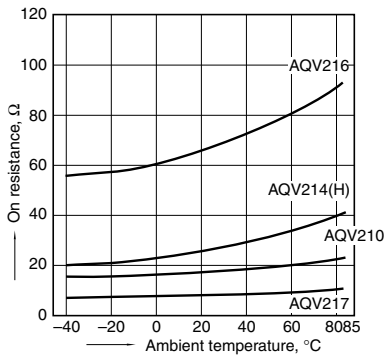
2-(1). On resistance vs. ambient temperature characteristics

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



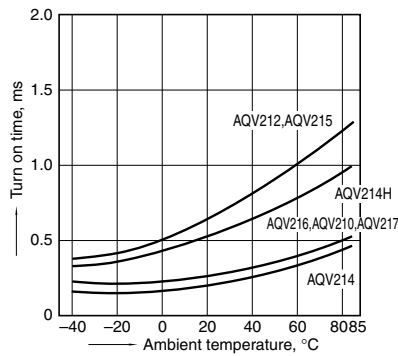
2-(2). On resistance vs. ambient temperature characteristics

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



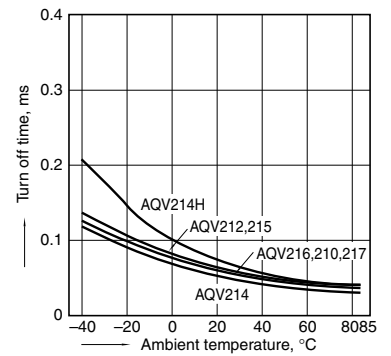
3. Turn on time vs. ambient temperature characteristics

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



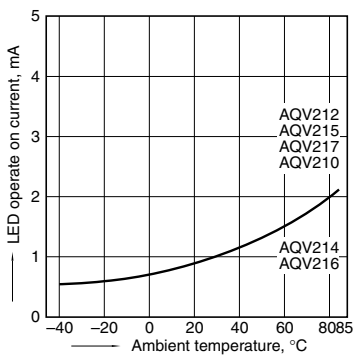
4. Turn off time vs. ambient temperature characteristics

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



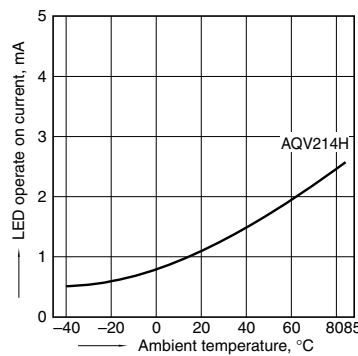
5-(1). LED operate current vs. ambient temperature characteristics

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



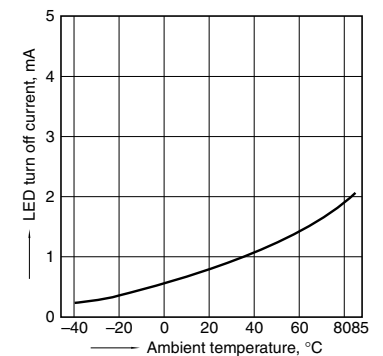
5-(2). LED operate current vs. ambient temperature characteristics

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



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

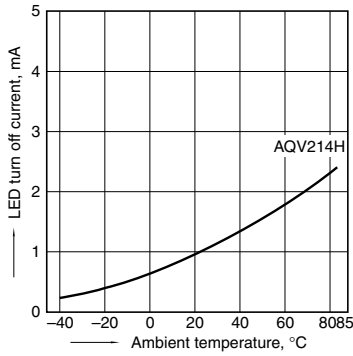
Load voltage: Max. (DC);
 Continuous load current: Max. (DC)



GU 1 Form A (AQV210, AQV214H)

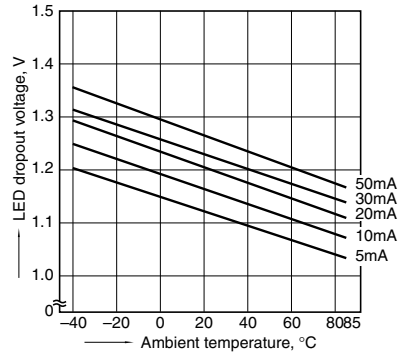
6-(2). LED turn off current vs. ambient temperature characteristics

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



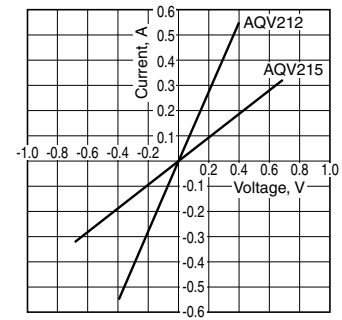
7. LED dropout voltage vs. ambient temperature characteristics

Sample: All types
LED current: 5 to 50 mA



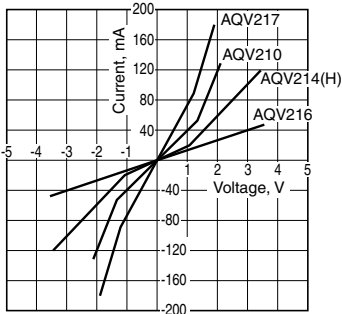
8-(1). Current vs. voltage characteristics of output at MOS portion

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



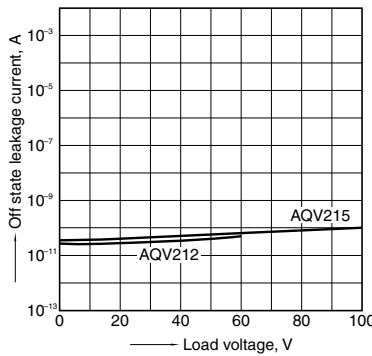
8-(2). Current vs. voltage characteristics of output at MOS portion

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



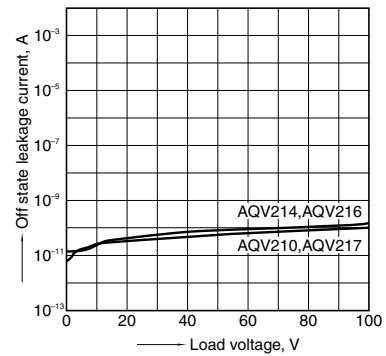
9-(1). Off state leakage current vs. load voltage characteristics

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



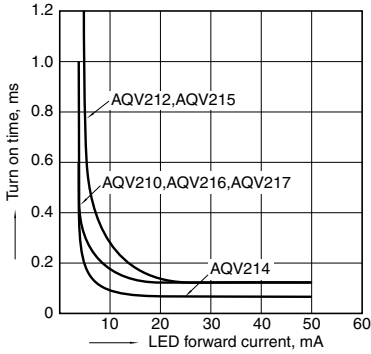
9-(2). Off state leakage current vs. load voltage characteristics

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



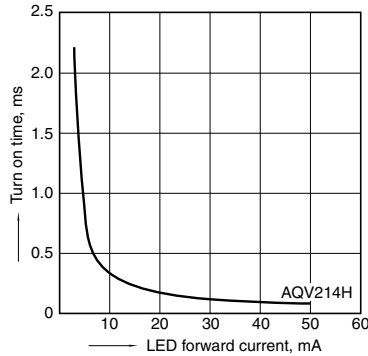
10-(1). Turn on time vs. LED forward current characteristics

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



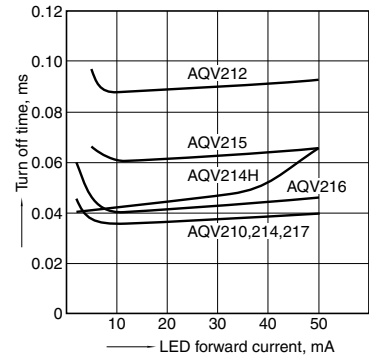
10-(2). Turn on time vs. LED forward current characteristics

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

