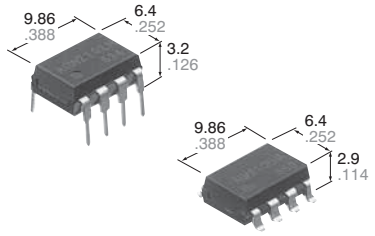
Panasonic
ideas for life

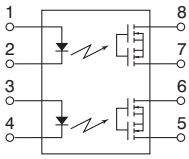
High cost-performance DIP8-pin type with reinforced insulation

PhotoMOS® GU-E 2 Form A (AQW21❍EH)



CAD Data

mm inch



FEATURES

1. Reinforced insulation of 5,000 V
More than 0.4 mm internal insulation distance between inputs and outputs. Con-forms to EN41003, EN60950 (reinforced insulation).
2. Applicable for 2 Form A use as well as two independent 1 Form A use
3. Controls low-level analog signals
PhotoMOS relays feature extremely low closed-circuit offset voltage to enable control of low-level analog signals without distortion.
4. High sensitivity and high speed response
Can control max. 0.14 A load current with 5 mA input current. Fast operation speed of typ. 0.5 ms (AQW210EH).
5. Low-level off state leakage current of max. 1 μA

TYPICAL APPLICATIONS

- Modem
- Telephone equipment
- Security equipment
- Sensing equipment

TYPES

	I/O isolation voltage	Output rating*		Package	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 1/2/3/4-pin side	Picked from the 5/6/7/8-pin side		
AC/DC dual use	Reinforced 5,000 V	60 V	500 mA	DIP8-pin	AQW212EH	AQW212EHA	AQW212EHAX	AQW212EHAZ	1 tube contains: 50 pcs. 1 batch contains: 500 pcs.	1,000 pcs.
		350 V	120 mA		AQW210EH	AQW210EHA	AQW210EHAX	AQW210EHAZ		
		400 V	100 mA		AQW214EH	AQW214EHA	AQW214EHAX	AQW214EHAZ		
		600 V	40 mA		AQW216EH	AQW216EHA	AQW216EHAX	AQW216EHAZ		

*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 relay.

RATING

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

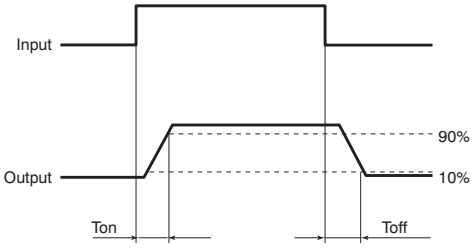
Item		Symbol	AQW212EH(A)	AQW210EH(A)	AQW214EH(A)	AQW216EH(A)	Remarks
Input	LED forward current	I_F	50mA				
	LED reverse voltage	V_R	5V				
	Peak forward current	I_{FP}	1A				f =100 Hz, Duty factor = 0.1%
	Power dissipation	P_{in}	75mW				
Output	Load voltage (peak AC)	V_L	60 V	350 V	400 V	600 V	
	Continuous load current	I_L	0.5 A (0.6 A)	0.12 A (0.14 A)	0.1 A (0.13 A)	0.04 A (0.05 A)	Peak AC, DC ( ): in case of using only 1 channel
	Peak load current	I_{peak}	1.5 A	0.36 A	0.3 A	0.15 A	100 ms (1 shot), V_L= DC
	Power dissipation	P_{out}	800mW				
Total power dissipation		P_T	850mW				
I/O isolation voltage		V_{iso}	5,000 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				

GU-E 2 Form A (AQW21❍EH)

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

Item			Symbol	AQW212EH(A)	AQW210EH(A)	AQW214EH(A)	AQW216EH(A)	Condition
Input	LED operate current	Typical	I_{Fon}	1.2mA				I_L=Max.
		Maximum		3.0mA				
	LED turn off current	Minimum	I_{Foff}	0.4mA				I_L=Max.
		Typical		1.1mA				
	LED dropout voltage	Typical	V_F	1.25 V (1.14 V at I_F=5mA)				I_F=50mA
		Maximum		1.5V				
Output	On resistance	Typical	R_{on}	0.83Ω	18Ω	26Ω	52Ω	I_F=5mA I_L=Max. Within 1 s on time
		Maximum		2.5Ω	25Ω	35Ω	120Ω	
	Off state leakage current	Maximum	I_{Leak}	1μA				I_F=0mA V_L=Max.
Transfer characteristics	Turn on time*	Typical	T_{on}	1ms	0.5ms			I_F=5mA I_L=Max.
		Maximum		4ms	2.0ms			
	Turn off time*	Typical	T_{off}	0.08ms			0.04ms	I_F=5mA I_L=Max.
		Maximum		1.0ms				
	I/O capacitance	Typical	C_{iso}	0.8pF				f =1MHz V_B =0V
		Maximum		1.5pF				
	Initial I/O isolation resistance	Minimum	R_{iso}	1,000MΩ				500V DC

*Turn on/Turn off time



RECOMMENDED OPERATING CONDITIONS

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

Item	Symbol	Recommended value	Unit
Input LED current	I_F	5 to 10	mA

■ Dimensions

■ Schematic and Wiring Diagrams

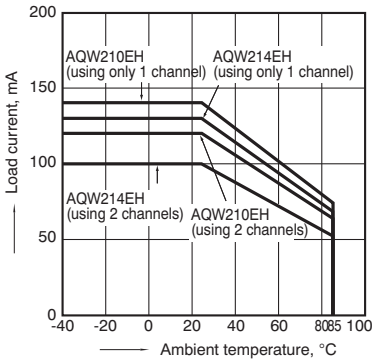
■ Cautions for Use

■ These products are not designed for automotive use.
If you are considering to use these products for automotive applications, please contact your local Panasonic technical representative.
Please refer to our information on PhotoMOS Relays for Automotive Applications.

REFERENCE DATA

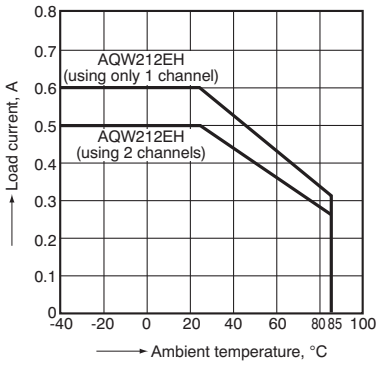
1-(1). Load current vs. ambient temperature characteristics

Allowable ambient temperature: –20°C to +85°C
–4°F to +185°F



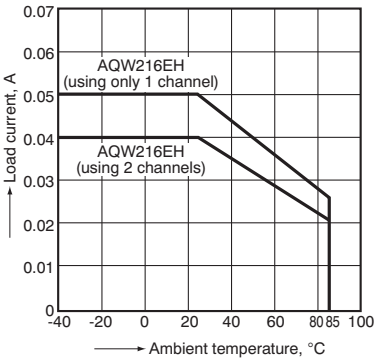
1-(2). Load current vs. ambient temperature characteristics

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



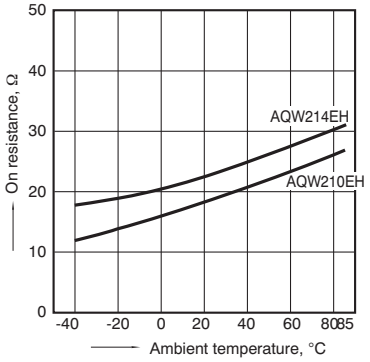
1-(3). Load current vs. ambient temperature characteristics

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



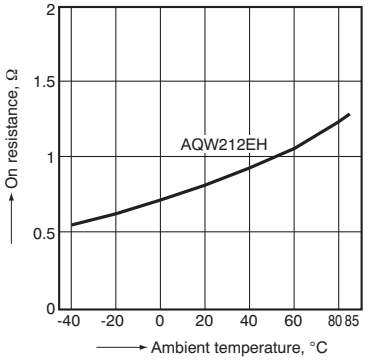
2-(1). On resistance vs. ambient temperature characteristics

Measured portion: between terminals 5 and 6, 7 and 8;
LED current: 5 mA; Load voltage: Max. (DC);
Continuous load current: Max. (DC)



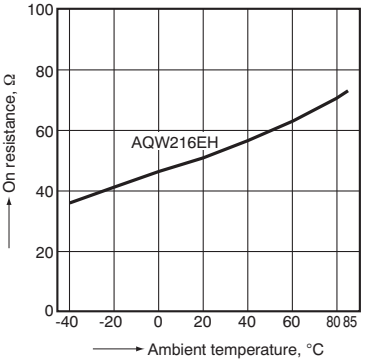
2-(2). On resistance vs. ambient temperature characteristics

Measured portion: between terminals 5 and 6, 7 and 8;
LED current: 5 mA; Load voltage: Max. (DC);
Continuous load current: Max. (DC)



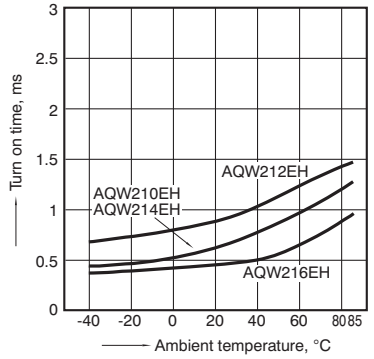
2-(3). On resistance vs. ambient temperature characteristics

Measured portion: between terminals 5 and 6, 7 and 8;
LED current: 5 mA; Load voltage: Max. (DC);
Continuous load current: Max. (DC)



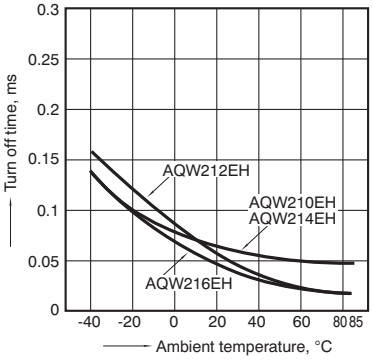
3. Turn on time vs. ambient temperature characteristics

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



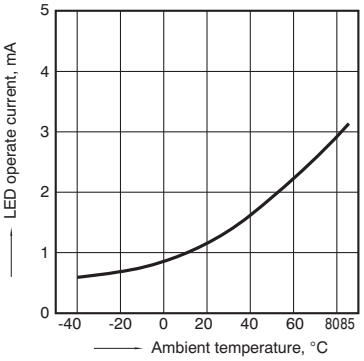
4. Turn off time vs. ambient temperature characteristics

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



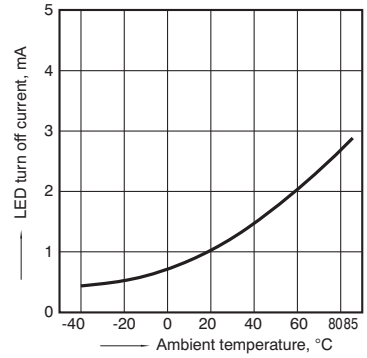
5. LED operate current vs. ambient temperature characteristics

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



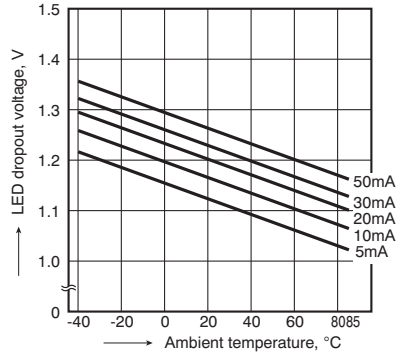
6. LED turn off current vs. ambient temperature characteristics

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



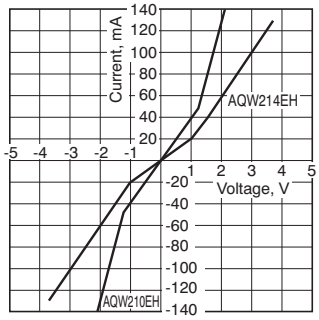
7. LED dropout voltage vs. ambient temperature characteristics

Sample: All types; LED current: 5 to 50 mA



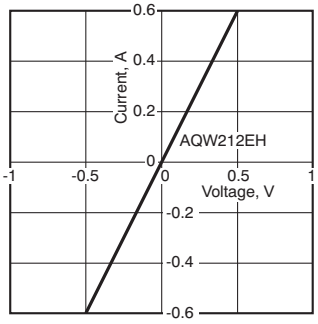
8-(1). Current vs. voltage characteristics of output at MOS portion

Measured portion: between terminals 5 and 6, 7 and 8;
Ambient temperature: 25°C 77°F



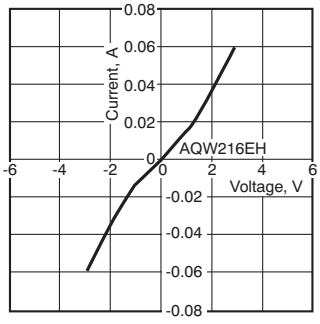
8-(2). Current vs. voltage characteristics of output at MOS portion

Measured portion: between terminals 3 and 4;
Ambient temperature: 25°C 77°F



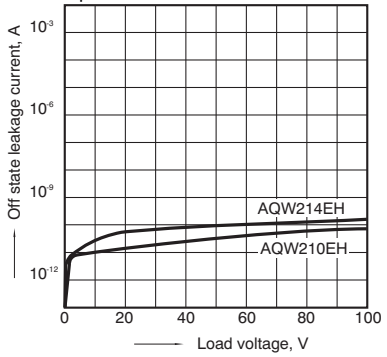
8-(3). Current vs. voltage characteristics of output at MOS portion

Measured portion: between terminals 3 and 4;
Ambient temperature: 25°C 77°F



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

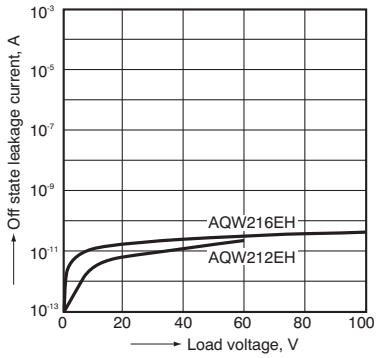
Measured portion: between terminals 5 and 6, 7 and 8;
Ambient temperature: 25°C 77°F



GU-E 2 Form A (AQW21❍EH)

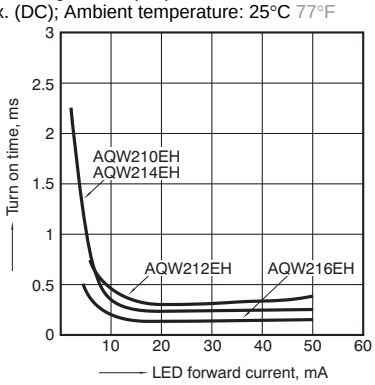
9-(2). Off state leakage current vs. load voltage characteristics

Measured portion: between terminals 5 and 6, 7 and 8;
Ambient temperature: 25°C 77°F



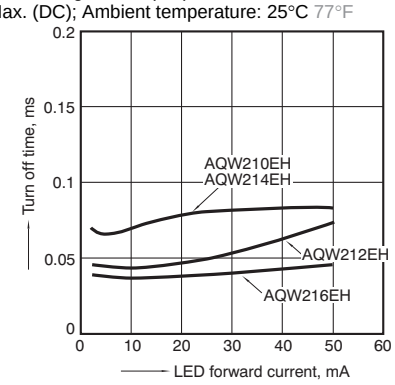
10.Turn on time vs. LED forward current characteristics

Sample: All types
Measured portion: between terminals 5 and 6, 7 and 8;
Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature: 25°C 77°F



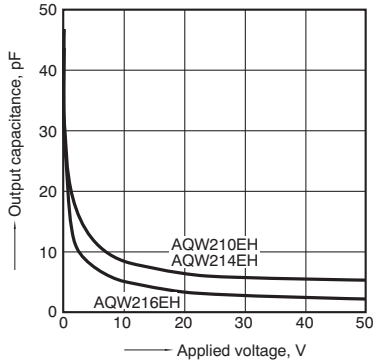
11.Turn off time vs. LED forward current characteristics

Sample: All types
Measured portion: between terminals 5 and 6, 7 and 8;
Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature: 25°C 77°F



12-(1). Output capacitance vs. applied voltage characteristics

Measured portion: between terminals 5 and 6, 7 and 8;
Frequency: 1 MHz; Ambient temperature: 25°C 77°F



12-(2). Output capacitance vs. applied voltage characteristics

Measured portion: between terminals 5 and 6, 7 and 8;
Frequency: 1 MHz; Ambient temperature: 25°C 77°F