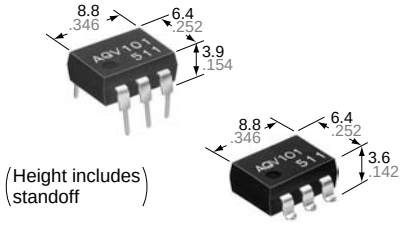
Panasonic
ideas for life

DIP6-pin type with wide variation Low on-resistance

PhotoMOS Relays
HF 1 Form A
(AQV10❍, 20❍)



mm inch

FEATURES

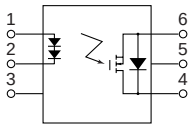
1. Controls low-level analog signals
PhotoMOS relays feature extremely low closed-circuit offset voltage to enable control of low-level analog signals without distortion.

2. Controlled with low-level input signals

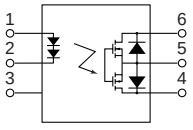
3. AC/DC dual use type and DC only type available.

TYPICAL APPLICATIONS

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



(AQV10 series)



(AQV20 series)

Compliance with RoHS Directive

TYPES

1. DC type (AQV10 series)

	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-pin side	Picked from the 4/5/6-pin side		
DC only	40 V	700 mA	DIP6-pin	AQV101	AQV101A	AQV101AX	AQV101AZ	1 tube contains: 50 pcs. 1 batch contains: 500 pcs.	1,000 pcs
	60 V	600 mA		AQV102	AQV102A	AQV102AX	AQV102AZ		
	250 V	300 mA		AQV103	AQV103A	AQV103AX	AQV103AZ		
	400 V	180 mA		AQV104	AQV104A	AQV104AX	AQV104AZ		

*Indicate the peak AC and DC values.
Note: The surface mount terminal indicator “A” and the packing style indicator “X” or “Z” are not marked on the relay.

2. AC/DC type (AQV20 series)

	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-pin side	Picked from the 4/5/6-pin side		
AC/DC dual use	40 V	500 mA	DIP6-pin	AQV201	AQV201A	AQV201AX	AQV201AZ	1 tube contains: 50 pcs. 1 batch contains: 500 pcs.	1,000 pcs
	60 V	400 mA		AQV202	AQV202A	AQV202AX	AQV202AZ		
	250 V	200 mA		AQV203	AQV203A	AQV203AX	AQV203AZ		
	400 V	150 mA		AQV204	AQV204A	AQV204AX	AQV204AZ		

*Indicate the peak AC and DC values.
Note: The surface mount terminal indicator “A” and the packing style indicator “X” or “Z” are not marked on the relay.

RATING

1. DC type

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

Item		Symbol	AQV101(A)	AQV102(A)	AQV103(A)	AQV104(A)	Remarks
Input	LED forward current	I_F	50 mA				
	LED reverse voltage	V_R	10 V				
	Peak forward current	I_{FP}	1 A				f = 100 Hz, Duty factor = 0.1%
	Power dissipation	P_{in}	150 mW				
Output	Load voltage (DC)	V_L	40 V	60 V	250 V	400 V	
	Continuous load current (DC)	I_L	0.7 A	0.6 A	0.3 A	0.18 A	
	Peak load current	I_{peak}	1.8 A	1.5 A	0.6 A	0.5 A	100 ms (1 shot)
	Power dissipation	P_{out}	360 mW				
Total power dissipation		P_T	410 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	AQV101(A)	AQV102(A)	AQV103(A)	AQV104(A)	Condition
Input	LED operate current	Typical	I_{Fon}	2.3 mA				I_L = Max.
		Maximum		5 mA				
	LED turn off current	Minimum	I_{Foff}	0.8 mA				I_L = Max.
		Typical		2.2 mA				
	LED dropout voltage	Typical	V_F	2.3 V				I_F = 10 mA
		Maximum		3 V				
Output	On resistance	Typical	R_{on}	0.3 Ω	0.37 Ω	2.7 Ω	6.3 Ω	I_F = 10 mA I_L = Max. Within 1 s on time
		Maximum		0.5 Ω	0.7 Ω	4 Ω	8 Ω	
	Off state leakage current	Maximum	I_{Leak}	1 μA				I_F = 0 mA, V_L = Max.
Transfer characteristics	Turn on time*	Typical	T_{on}	0.23 ms	0.22 ms	0.13 ms	0.09 ms	I_F = 10 mA I_L = Max.
		Maximum		1 ms				
	Turn off time*	Typical	T_{off}	0.07 ms			0.08 ms	I_F = 10 mA I_L = Max.
		Maximum		1 ms				
	I/O capacitance	Typical	C_{iso}	1.3 pF				f = 1 MHz V_B = 0 V
		Maximum		3 pF				
	Initial I/O isolation resistance	Minimum	R_{iso}	1,000 MΩ				500 V DC

2. AC/DC type

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

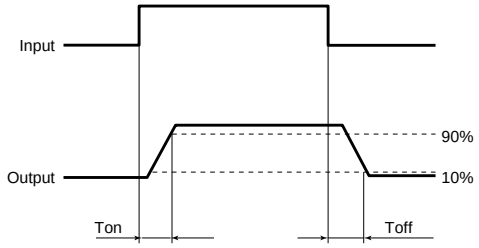
Item		Symbol	Type of connection	AQV201(A)	AQV202(A)	AQV203(A)	AQV204(A)	Remarks
Input	LED forward current	I_F		50 mA				
	LED reverse voltage	V_R		10 V				
	Peak forward current	I_{FP}		1 A				f = 100 Hz, Duty factor = 0.1%
	Power dissipation	P_{in}		150 mW				
Output	Load voltage (peak AC)	V_L		40 V	60 V	250 V	400 V	
	Continuous load current	I_L	A	0.5 A	0.4 A	0.2 A	0.15 A	A connection: Peak AC, DC B, C connection: DC
			B	0.7 A	0.6 A	0.3 A	0.18 A	
			C	1.0 A	0.8 A	0.4 A	0.25 A	
	Peak load current	I_{peak}		1.8 A	1.5 A	0.6 A	0.5 A	A connection 100 ms (1 shot) V_L = DC
	Power dissipation	P_{out}		360 mW				
Total power dissipation		P_T		410 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 temperature
	Storage	T_{stg}		–40°C to +100°C –40°F to +212°F				

HF 1 Form A (AQV10❍, 20❍)

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

Item			Symbol	Type of connection	AQV201(A)	AQV202(A)	AQV203(A)	AQV204(A)	Remarks
Input	LED operate current	Typical	I_{Fon}	—	2.4 mA				I_L = Max.
		Maximum			5 mA				
	LED turn off current	Minimum	I_{Foff}	—	0.8 mA				I_L = Max.
		Typical			2.2 mA				
	LED dropout voltage	Typical	V_F	—	2.3 V				I_F = 10 mA
		Maximum			3 V				
Output	On resistance	Typical	R_{on}	A	0.6 Ω	0.74 Ω	5.5 Ω	12.4 Ω	I_F = 10 mA I_L = Max. Within 1 s on time
		Maximum			1 Ω	1.4 Ω	8 Ω	16 Ω	
		Typical	R_{on}	B	0.3 Ω	0.37 Ω	2.7 Ω	6.2 Ω	I_F = 10 mA I_L = Max. Within 1 s on time
		Maximum			0.5 Ω	0.7 Ω	4 Ω	8 Ω	
		Typical	R_{on}	C	0.15 Ω	0.18 Ω	1.4 Ω	3.1 Ω	I_F = 10 mA I_L = Max. Within 1 s on time
		Maximum			0.25 Ω	0.35 Ω	2 Ω	4 Ω	
	Off state leakage current	Maximum	I_{Leak}	—	1 μA				I_F = 0 mA, V_L = Max.
Transfer characteristics	Turn on time*	Typical	T_{on}	—	0.38 ms	0.41 ms	0.21 ms	0.18 ms	I_F = 10 mA I_L = Max.
		Maximum			1 ms				
	Turn off time*	Typical	T_{off}	—	0.08 ms		0.07 ms		I_F = 10 mA I_L = Max.
		Maximum			1 ms				
	I/O capacitance	Typical	C_{iso}	—	1.3 pF				f = 1 MHz V_B = 0 V
		Maximum			3 pF				
	Initial I/O isolation resistance	Minimum	R_{iso}	—	1,000 MΩ				500 V 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	10	mA

■ For Dimensions

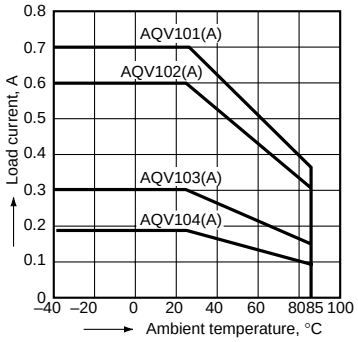
■ For Schematic and Wiring Diagrams

■ For Cautions for Use

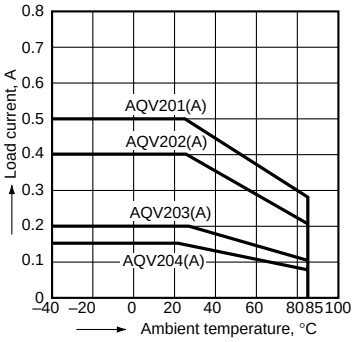
■ These products are not designed for automotive use.
If you are considering to use these products for automotive applications, please contact your local Panasonic Electric Works technical representative.
For more information

REFERENCE DATA

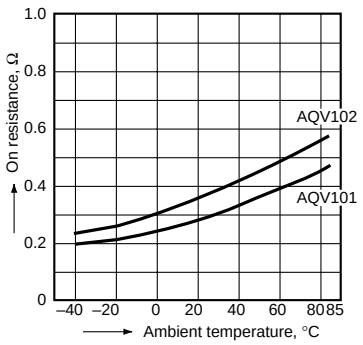
1.-(1) Load current vs. ambient temperature characteristics (DC type)
Allowable ambient temperature: –40°C to +85°C
–40°F to +185°F



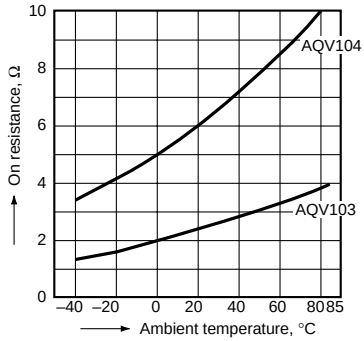
1.-(2) Load current vs. ambient temperature characteristics (AC/DC type)
Allowable ambient temperature: –40°C to +85°C
–40°F to +185°F
Type of connection: A



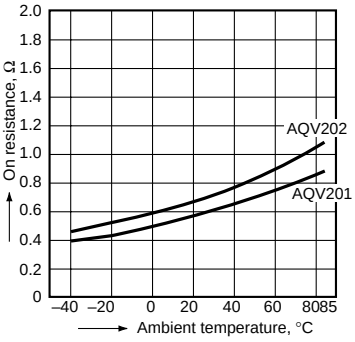
2.-(1) On resistance vs. ambient temperature characteristics (DC type: AQV101, AQV102)
LED current: 10 mA;
Continuous load current: Max. (DC)



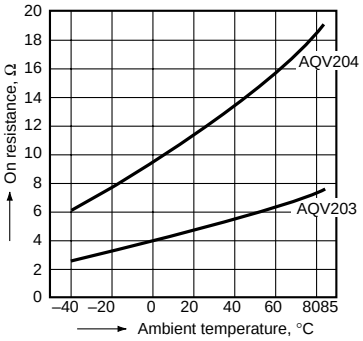
2.-(2) On resistance vs. ambient temperature characteristics (DC type: AQV103, AQV104)
LED current: 10 mA;
Continuous load current: Max. (DC)



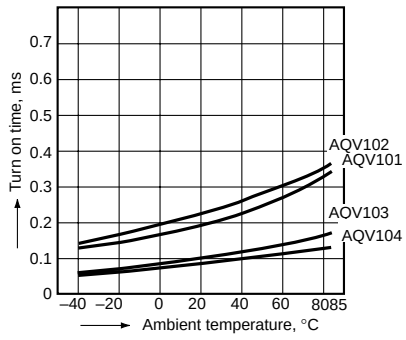
2.-(3) On resistance vs. ambient temperature characteristics
(AC/DC type: AQV201, AQV202)
Measured portion: between terminals 4 and 6;
LED current: 10 mA;
Continuous load current: Max. (DC)



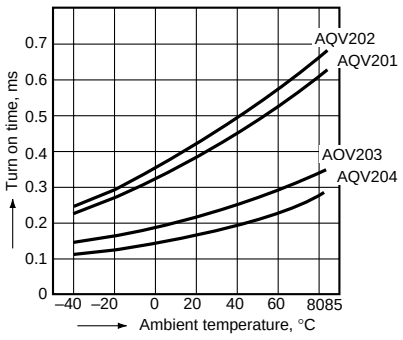
2.-(4) On resistance vs. ambient temperature characteristics
(AC/DC type: AQV203, AQV204)
Measured portion: between terminals 4 and 6;
LED current: 10 mA;
Continuous load current: Max. (DC)



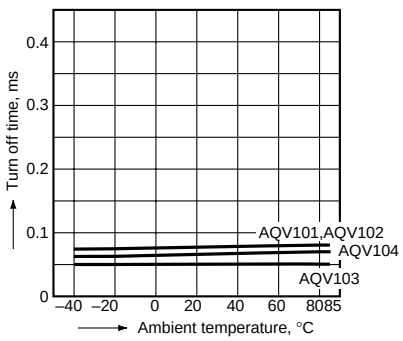
3.-(1) Turn on time vs. ambient temperature characteristics (DC type)
LED current: 10 mA;
Load voltage: Max. (DC);
Continuous load current: Max. (DC)



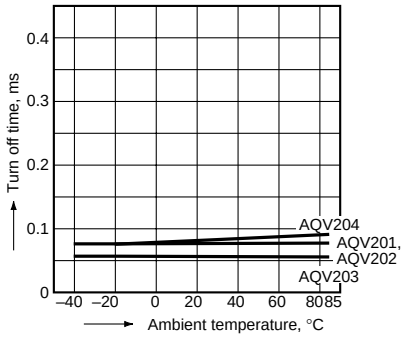
3.-(2) Turn on time vs. ambient temperature characteristics (AC/DC type)
LED current: 10 mA;
Load voltage: Max. (DC);
Continuous load current: Max. (DC)



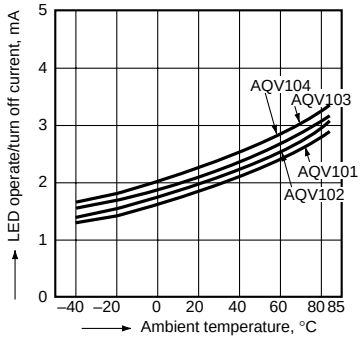
4.-(1) Turn off time vs. ambient temperature characteristics (DC type)
LED current: 10 mA;
Load voltage: Max. (DC);
Continuous load current: Max. (DC)



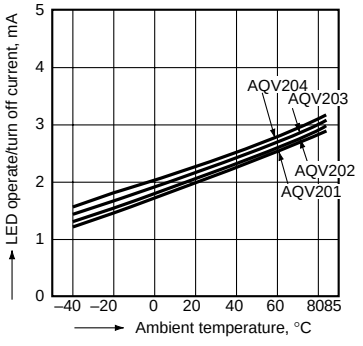
4.-(2) Turn off time vs. ambient temperature characteristics (AC/DC type)
LED current: 10 mA; Load voltage: Max. (DC);
Continuous load current: Max. (DC)



5.-(1) LED operate/turn off current vs. ambient temperature characteristics (DC type)
Load voltage: Max. (DC);
Continuous load current: Max. (DC)

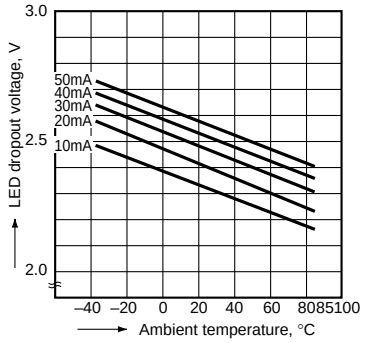


5.-(2) LED operate/turn off current vs. ambient temperature characteristics (AC/DC type)
Load voltage: Max. (DC);
Continuous load current: Max. (DC)

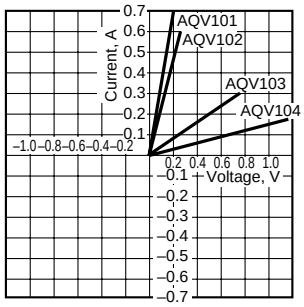


HF 1 Form A (AQV10❍, 20❍)

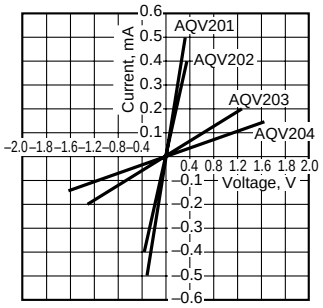
6. LED dropout voltage vs. ambient temperature characteristics
Sample: AQV202
LED current: 10 to 50 mA



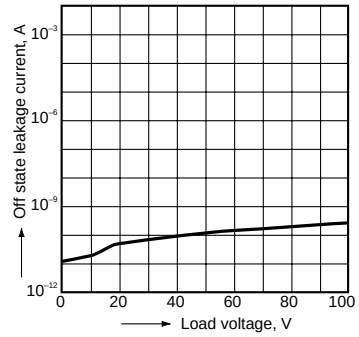
7.-(1) Current vs. voltage characteristics of output at MOS portion (DC type)
Ambient temperature: 25°C 77°F



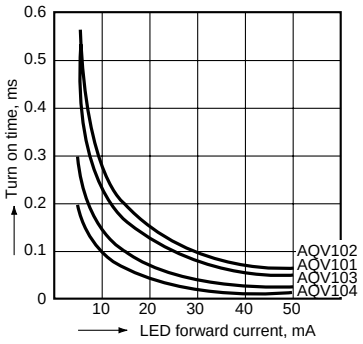
7.-(2) Current vs. voltage characteristics of output at MOS portion (AC/DC type)
Measured portion: between terminals 4 and 6;
Ambient temperature: 25°C 77°F



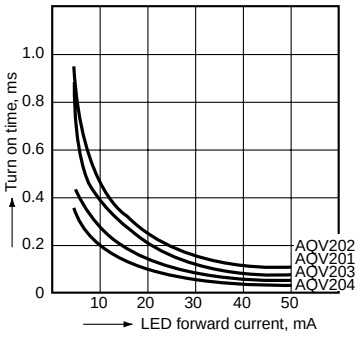
8. Off state leakage current vs. load voltage characteristics
Sample: AQV204;
Measured portion: between terminals 4 and 6;
Ambient temperature: 25°C 77°F



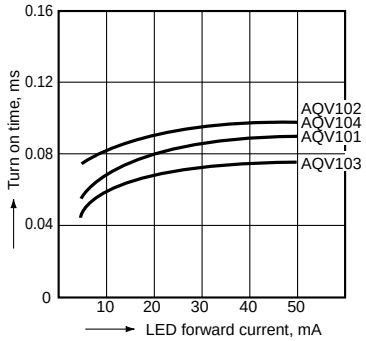
9.-(1) Turn on time vs. LED forward current characteristics (DC type)
Load voltage: Max. (DC);
Continuous load current: Max. (DC);
Ambient temperature: 25°C 77°F



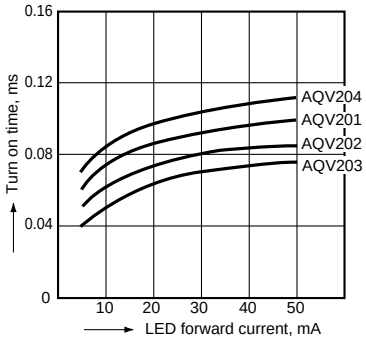
9.-(2) Turn on time vs. LED forward current characteristics (AC/DC type)
Measured portion: between terminals 4 and 6;
Load voltage: Max. (DC);
Continuous load current: Max. (DC);
Ambient temperature: 25°C 77°F



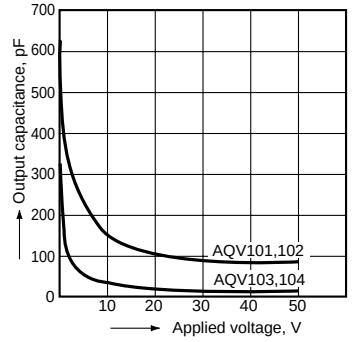
10.-(1) Turn off time vs. LED forward current characteristics (DC type)
Load voltage: Max. (DC);
Continuous load current: Max. (DC);
Ambient temperature: 25°C 77°F



10.-(2) Turn off time vs. LED forward current characteristics (AC/DC type)
Measured portion: between terminals 4 and 6;
Load voltage: Max. (DC);
Continuous load current: Max. (DC);
Ambient temperature: 25°C 77°F



11.-(1) Output capacitance vs. applied voltage characteristics (DC type)
Frequency: 1 MHz;
Ambient temperature: 25°C 77°F



11.-(2) Output capacitance vs. applied voltage characteristics (AC/DC type)
Measured portion: between terminals 4 and 6;
Frequency: 1 MHz;
Ambient temperature: 25°C 77°F