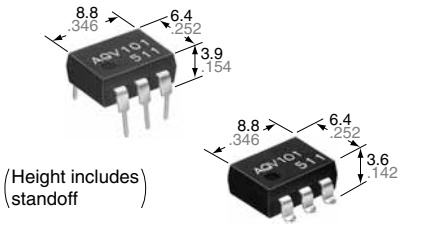
DIP6-pin type with wide variation Low on-resistance

PhotoMOS®
HF 1 Form A
(AQV10❍, 20❍)



mm inch

FEATURES

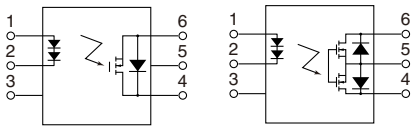
1. Controls low-level analog signals
PhotoMOS feature extremely low closed-circuit offset voltage to enable control of low-level analog signals without distortion.

2. 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)

RoHS compliant

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 device.

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 device.

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

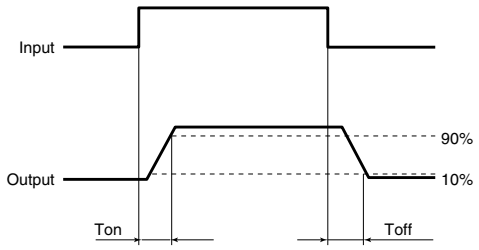
1) Absolute maximum ratings (Ambient temperature: 25°C 77°F)

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				

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

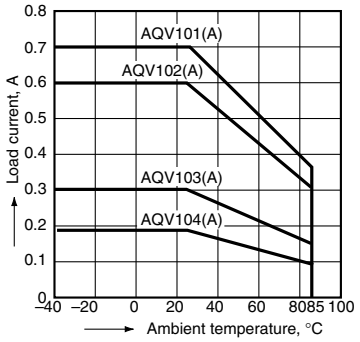
Please obey the following conditions to ensure proper device operation and resetting.

Item	Symbol	Recommended value	Unit
Input LED current	I_F	10	mA

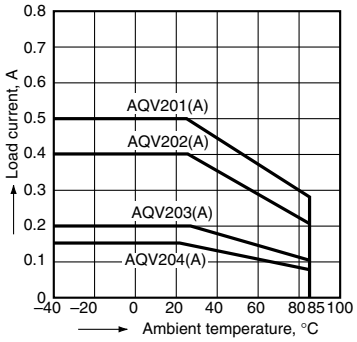
■ **These products are not designed for automotive use.**
If you are considering to use these products for automotive applications, please contact your local Panasonic Corporation technical representative.

REFERENCE DATA

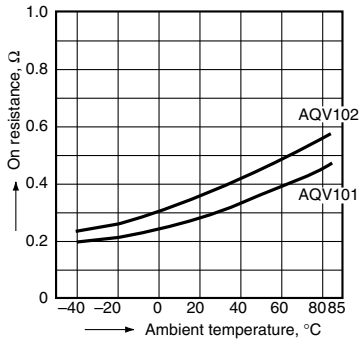
1.-(1) Load current vs. ambient temperature characteristics (DC type)
Allowable ambient temperature: –40°C to +85°C
–40°F to +185°F



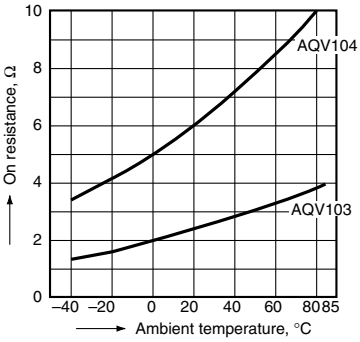
1.-(2) Load current vs. ambient temperature characteristics (AC/DC type)
Allowable ambient temperature: –40°C to +85°C
–40°F to +185°F
Type of connection: A



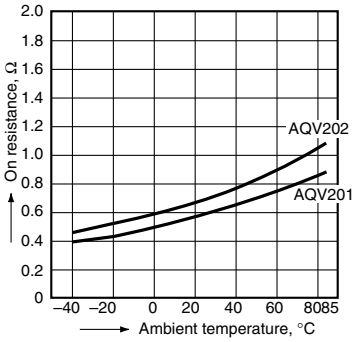
2.-(1) On resistance vs. ambient temperature characteristics (DC type: AQV101, AQV102)
LED current: 10 mA;
Continuous load current: Max. (DC)



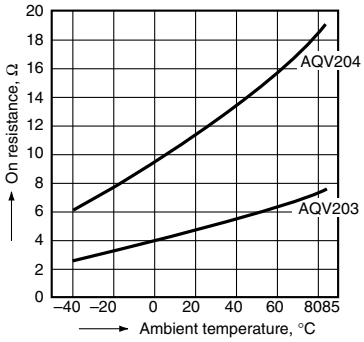
2.-(2) On resistance vs. ambient temperature characteristics (DC type: AQV103, AQV104)
LED current: 10 mA;
Continuous load current: Max. (DC)



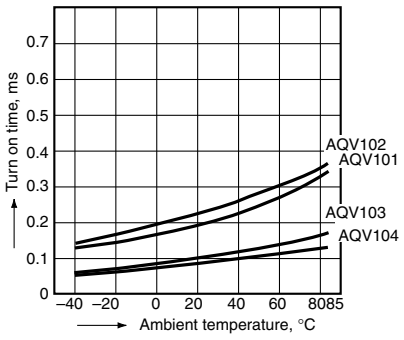
2.-(3) On resistance vs. ambient temperature characteristics
(AC/DC type: AQV201, AQV202)
Measured portion: between terminals 4 and 6;
LED current: 10 mA;
Continuous load current: Max. (DC)



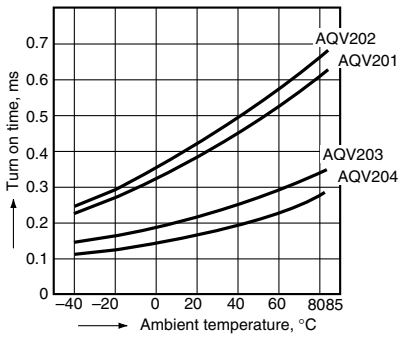
2.-(4) On resistance vs. ambient temperature characteristics
(AC/DC type: AQV203, AQV204)
Measured portion: between terminals 4 and 6;
LED current: 10 mA;
Continuous load current: Max. (DC)



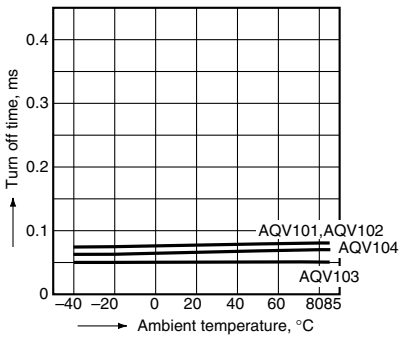
3.-(1) Turn on time vs. ambient temperature characteristics (DC type)
LED current: 10 mA;
Load voltage: Max. (DC);
Continuous load current: Max. (DC)



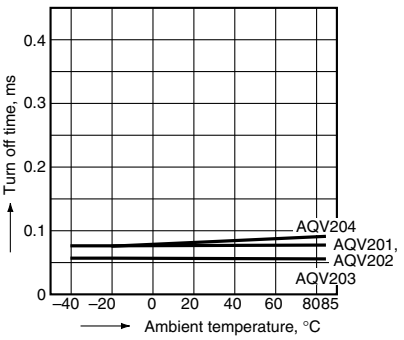
3.-(2) Turn on time vs. ambient temperature characteristics (AC/DC type)
LED current: 10 mA;
Load voltage: Max. (DC);
Continuous load current: Max. (DC)



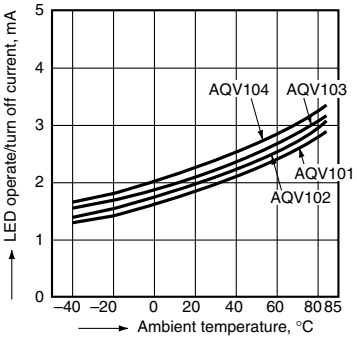
4.-(1) Turn off time vs. ambient temperature characteristics (DC type)
LED current: 10 mA;
Load voltage: Max. (DC);
Continuous load current: Max. (DC)



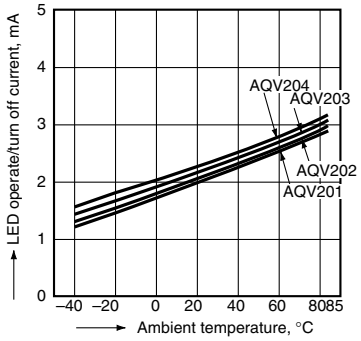
4.-(2) Turn off time vs. ambient temperature characteristics (AC/DC type)
LED current: 10 mA; Load voltage: Max. (DC);
Continuous load current: Max. (DC)



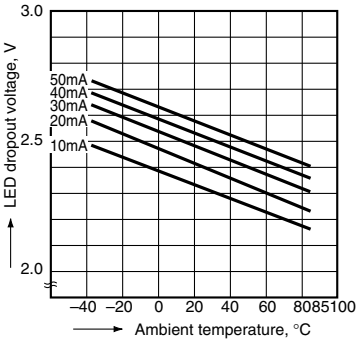
5.-(1) LED operate/turn off current vs. ambient temperature characteristics (DC type)
Load voltage: Max. (DC);
Continuous load current: Max. (DC)



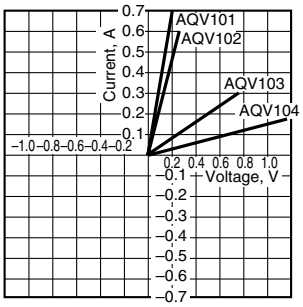
5.-(2) LED operate/turn off current vs. ambient temperature characteristics (AC/DC type)
Load voltage: Max. (DC);
Continuous load current: Max. (DC)



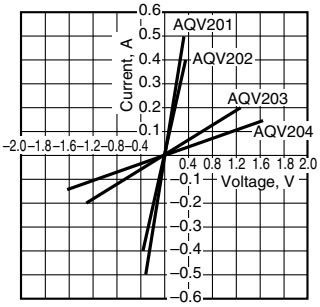
6. LED dropout voltage vs. ambient temperature characteristics
Sample: All types
LED current: 10 to 50 mA



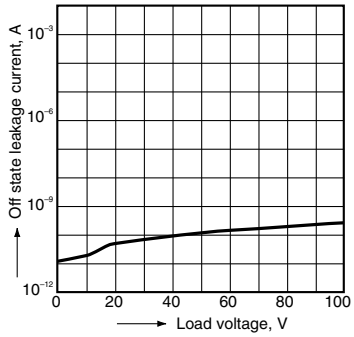
7.-(1) Current vs. voltage characteristics of output at MOS portion (DC type)
Ambient temperature: 25°C 77°F



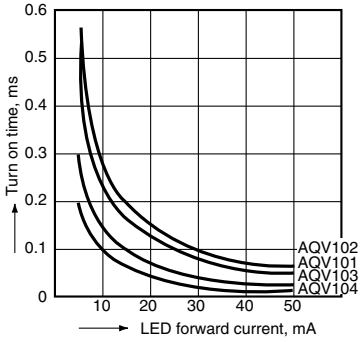
7.-(2) Current vs. voltage characteristics of output at MOS portion (AC/DC type)
Measured portion: between terminals 4 and 6;
Ambient temperature: 25°C 77°F



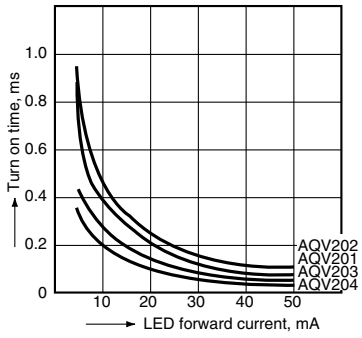
8. Off state leakage current vs. load voltage characteristics
Sample: AQV204;
Measured portion: between terminals 4 and 6;
Ambient temperature: 25°C 77°F



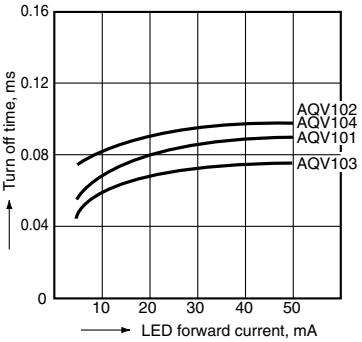
9.-(1) Turn on time vs. LED forward current characteristics (DC type)
Load voltage: Max. (DC);
Continuous load current: Max. (DC);
Ambient temperature: 25°C 77°F



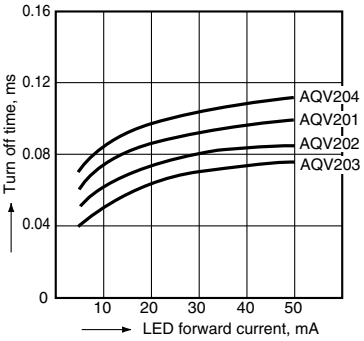
9.-(2) Turn on time vs. LED forward current characteristics (AC/DC type)
Measured portion: between terminals 4 and 6;
Load voltage: Max. (DC);
Continuous load current: Max. (DC);
Ambient temperature: 25°C 77°F



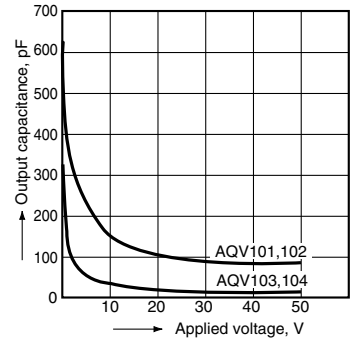
10.-(1) Turn off time vs. LED forward current characteristics (DC type)
Load voltage: Max. (DC);
Continuous load current: Max. (DC);
Ambient temperature: 25°C 77°F



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