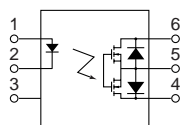
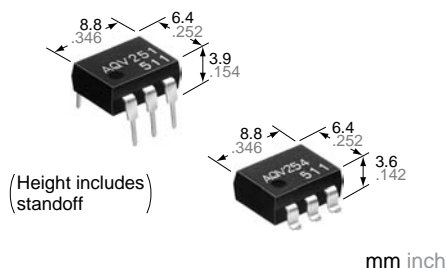


**DIP6-pin type**  
**with low on-resistance**  
**and high cost-performance**

**PhotoMOS Relays**  
**HE 1 Form A**  
**(AQV250)**



## FEATURES

1. Low on-resistance of typ.  $0.6\Omega$  (AQV251)
2. Reinforced insulation type of 5,000V I/O isolation available
3. Wide variation of 40V to 1,500V load voltage

## TYPICAL APPLICATIONS

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

Compliance with RoHS Directive

## TYPES

	I/O isolation	Output rating*		Package	Part No.				Packing quantity	
					Through hole terminal	Surface-mount terminal			Tube	Tape and reel
						Tube packing style		Tape and reel packing style		
		Load voltage	Load current			Picked from the 1/2/3-pin side	Picked from the 4/5/6-pin side			
AC/DC dual use	1,500V	40 V	500 mA	DIP6-pin	AQV251	AQV251A	AQV251AX	AQV251AZ	1 tube contains: 50 pcs. 1 batch contains: 500 pcs.	1,000 pcs.
		60 V	400 mA		AQV252	AQV252A	AQV252AX	AQV252AZ		
		100 V	350 mA		AQV255	AQV255A	AQV255AX	AQV255AZ		
		200 V	250 mA		AQV257	AQV257A	AQV257AX	AQV257AZ		
		250 V	200 mA		AQV253	AQV253A	AQV253AX	AQV253AZ		
		400 V	150 mA		AQV254	AQV254A	AQV254AX	AQV254AZ		
		1,000 V	30 mA		AQV259	AQV259A	AQV259AX	AQV259AZ		
		1,500 V	20 mA		AQV258	AQV258A	AQV258AX	AQV258AZ		
		Reinforced 5,000V	250 V		200 mA	AQV253H	AQV253HA	AQV253HAX		
		400 V	150 mA		AQV254H	AQV254HA	AQV254HAX	AQV254HAZ		

\*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

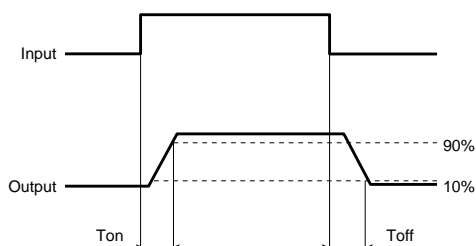
### 1. Absolute maximum ratings (Ambient temperature: 25°C 77°F)

Item	Symbol	Type of connection	AQV251(A)	AQV252(A)	AQV255(A)	AQV257(A)	AQV253(A)	AQV254(A)	AQV259(A)	AQV258(A)	AQV253H(A)	AQV254H(A)	Remarks	
Input	LED forward current	$I_F$	50 mA											
	LED reverse voltage	$V_R$	5 V											
	Peak forward current	$I_{FP}$	1 A										f = 100 Hz, Duty factor +0.1%	
	Power dissipation	$P_{in}$	75 mW											
Output	Load voltage (peak AC)	$V_L$	40 V	60 V	100 V	200 V	250 V	400 V	1,000 V	1,500 V	250 V	400 V		
	Continuous load current	$I_L$	A	0.5 A	0.4 A	0.35 A	0.25 A	0.2 A	0.15 A	0.03 A	0.02 A	0.2 A	0.15 A	A connection: Peak AC, DC
			B	0.7 A	0.6 A	0.45 A	0.35 A	0.3 A	0.18 A	0.04 A	0.025 A	0.3 A	0.18 A	B, C connection: DC
			C	1.0 A	0.8 A	0.70 A	0.5 A	0.4 A	0.25 A	0.05 A	0.04 A	0.4 A	0.25 A	
	Peak load current	$I_{peak}$	1.8 A	1.5 A	1.0 A	0.75 A	0.6 A	0.5 A	0.09 A	0.06 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						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											

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

Item		Symbol	Type of connection	AQV251(A)	AQV252(A)	AQV255(A)	AQV257(A)	AQV253(A)	AQV254(A)	AQV259(A)	AQV258(A)	AQV253H(A)	AQV254H(A)	Condition		
Input	LED operate current	Typical	I <sub>Fon</sub>	0.9 mA								1.4 mA		I <sub>L</sub> = Max.		
		Maximum		3 mA												
	LED turn off current	Minimum	I <sub>Foff</sub>	0.4 mA												I <sub>L</sub> = Max.
		Typical		0.8 mA								1.3 mA				
LED dropout voltage	Typical	V <sub>F</sub>	—	1.25 V (1.14 V at I <sub>F</sub> = 5 mA)												I <sub>F</sub> = 50 mA
	Maximum			1.5 V												
Output	On resistance	Typical	R <sub>on</sub>	A	0.6 Ω	0.74 Ω	1.8 Ω	2.6 Ω	5.5 Ω	12.4 Ω	85 Ω	345 Ω	5.5 Ω	12.4 Ω	I <sub>F</sub> = 5 mA I <sub>L</sub> = Max. Within 1 s on time	
		Maximum			1 Ω	1.4 Ω	2.5 Ω	4 Ω	8 Ω	16 Ω	200 Ω	500 Ω	8 Ω	16 Ω		
		Typical	R <sub>on</sub>	B	0.3 Ω	0.37 Ω	0.9 Ω	1.4 Ω	2.7 Ω	6.2 Ω	60 Ω	345 Ω	2.7 Ω	6.2 Ω	I <sub>F</sub> = 5 mA I <sub>L</sub> = Max. Within 1 s on time	
		Maximum			0.5 Ω	0.7 Ω	1.25 Ω	2 Ω	4 Ω	8 Ω	100 Ω	500 Ω	4 Ω	8 Ω		
		Typical	R <sub>on</sub>	C	0.15 Ω	0.18 Ω	0.45 Ω	0.7 Ω	1.4 Ω	3.1 Ω	30 Ω	160 Ω	1.4 Ω	3.1 Ω	I <sub>F</sub> = 5 mA I <sub>L</sub> = Max. Within 1 s on time	
		Maximum			0.25 Ω	0.35 Ω	0.63 Ω	1 Ω	2 Ω	4 Ω	50 Ω	250 Ω	2 Ω	4 Ω		
Off state leakage current	Maximum	I <sub>Leak</sub>	—	1 μA						10 μA		1 μA		I <sub>F</sub> = 0 mA V <sub>L</sub> = Max.		
Transfer characteristics	Turn on time*	Typical	T <sub>on</sub>	1.7 ms	1.4 ms	0.9 ms	1.5 ms	0.8ms	0.8ms	0.6ms	0.35 ms	2.4ms	1.8ms	I <sub>F</sub> = 5 mA I <sub>L</sub> = Max.		
		Maximum		3 ms		2 ms	3 ms	2 ms		1 ms		4 ms	3 ms			
	Turn off time*	Typical	T <sub>off</sub>	—	0.07 ms		0.09 ms	0.1 ms	0.06 ms	0.05 ms	0.04 ms		0.06 ms	0.05 ms	I <sub>F</sub> = 5 mA I <sub>L</sub> = Max.	
		Maximum		0.2 ms												
	I/O capacitance	Typical	C <sub>iso</sub>	—	1.3 pF											
Maximum		3 pF														
Initial I/O isolation resistance	Minimum	R <sub>iso</sub>	—	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 <sub>F</sub>	Standard type: 5 Reinforced insulation type: 5 to 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

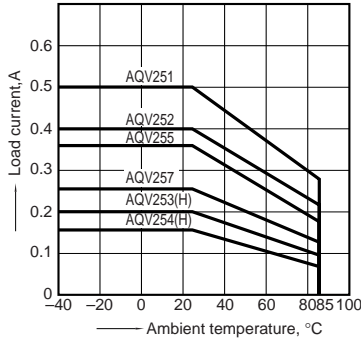
# HE 1 Form A (AQV25○)

## REFERENCE DATA

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

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

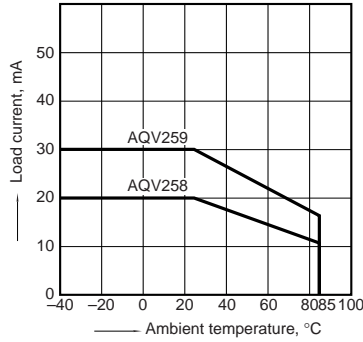
Type of connection: A



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

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

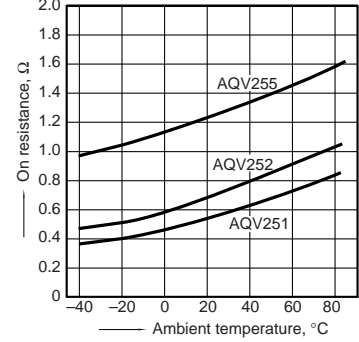
Type of connection: A



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

Measured portion: between terminals 4 and 6;  
 LED current: 5 mA;

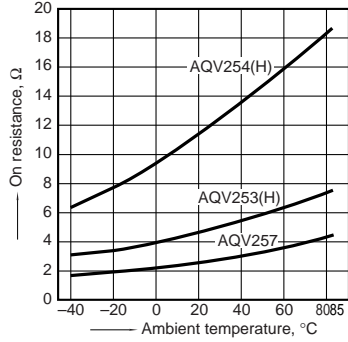
Continuous load current: Max. (DC)



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

Measured portion: between terminals 4 and 6;  
 LED current: 5 mA;

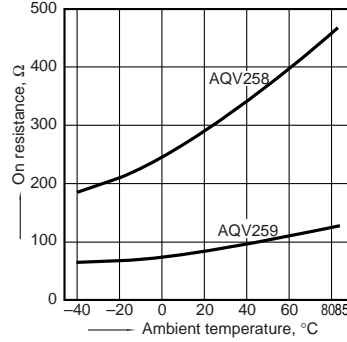
Continuous load current: Max. (DC)



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

Measured portion: between terminals 4 and 6;  
 LED current: 5 mA;

Continuous load current: 30 mA (DC)

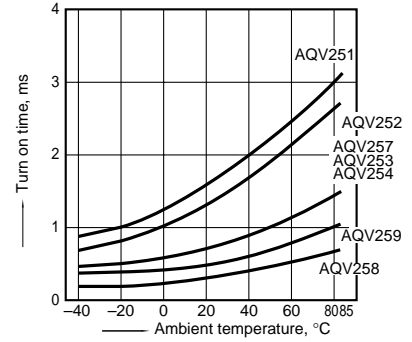


3.-(1) Turn on time vs. ambient temperature characteristics

LED current: 5 mA;

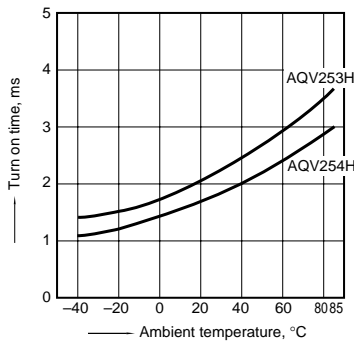
Load voltage: Max. (DC);

Continuous load current: Max. (DC)



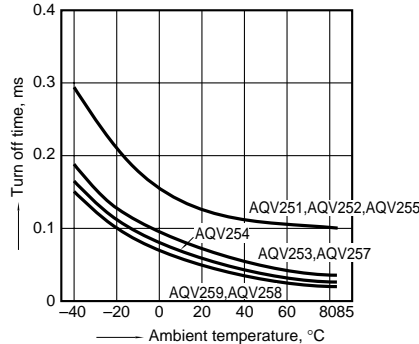
3.-(2) Turn on time vs. ambient temperature characteristics

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



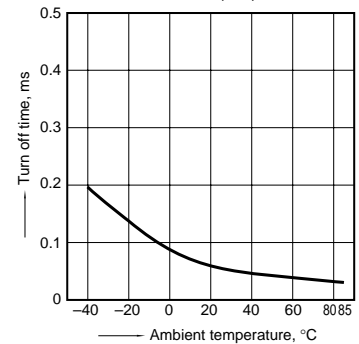
4.-(1) Turn off time vs. ambient temperature characteristics

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



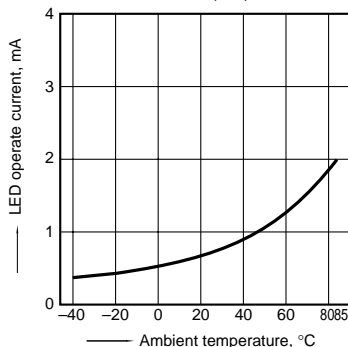
4.-(2) Turn off time vs. ambient temperature characteristics

Sample: AQV253H, AQV254H  
 LED current: 5 mA; Load voltage: Max. (DC);  
 Continuous load current: Max. (DC)



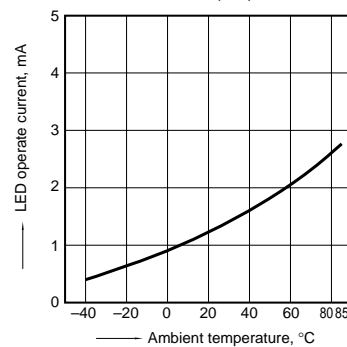
5.-(1) LED operate current vs. ambient temperature characteristics

Sample: AQV251, AQV252, AQV253, AQV254, AQV259; Load voltage: Max. (DC);  
 Continuous load current: Max. (DC)



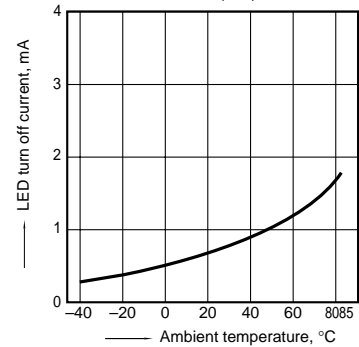
5.-(2) LED operate current vs. ambient temperature characteristics

Sample: AQV253H, AQV254H;  
 Load voltage: Max. (DC);  
 Continuous load current: Max. (DC)



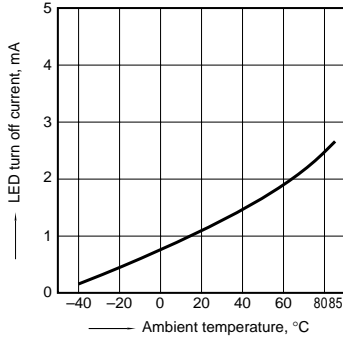
6.-(1) LED turn off current vs. ambient temperature characteristics

Sample: AQV251, AQV252, AQV253, AQV254, AQV259; Load voltage: Max. (DC);  
 Continuous load current: Max. (DC)



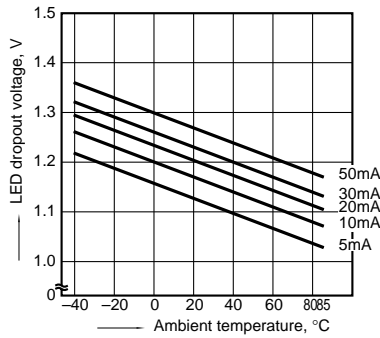
## 6.-(2) LED turn off current vs. ambient temperature characteristics

Sample: AQV251, AQV252, AQV253, AQV254, AQV259; Load voltage: Max. (DC); Continuous load current: Max. (DC)



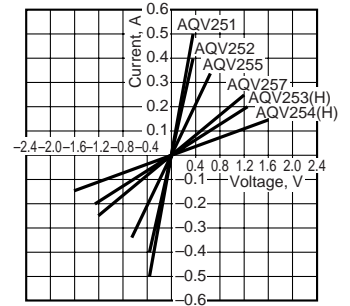
## 7. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



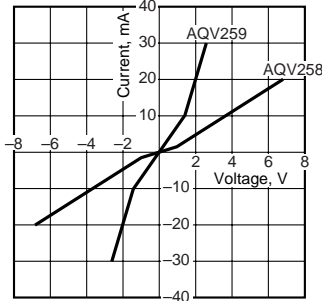
## 8.-(1) Current vs. voltage characteristics of output at MOS portion

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



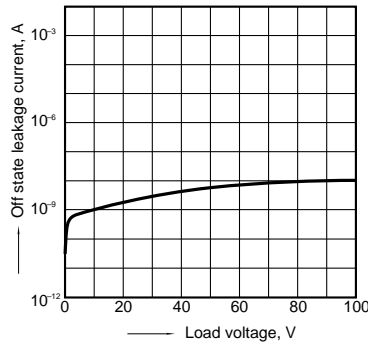
## 8.-(2) Current vs. voltage characteristics of output at MOS portion

Sample: AQV259; Measured portion: between terminals 4 and 6; Ambient temperature: 25°C 77°F



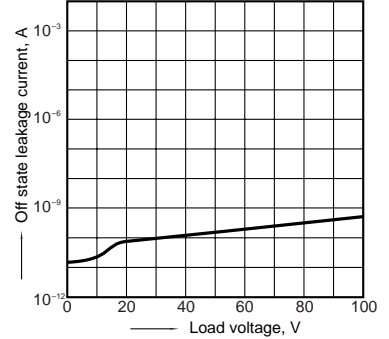
## 9.-(1) Off state leakage current vs. load voltage characteristics

Sample: AQV259; Measured portion: between terminals 4 and 6; Ambient temperature: 25°C 77°F



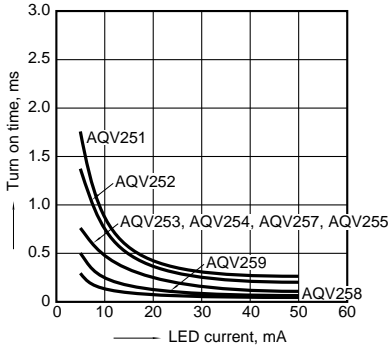
## 9.-(2) Off state leakage current vs. load voltage characteristics

Sample: AQV254H; Measured portion: between terminals 4 and 6; Ambient temperature: 25°C 77°F



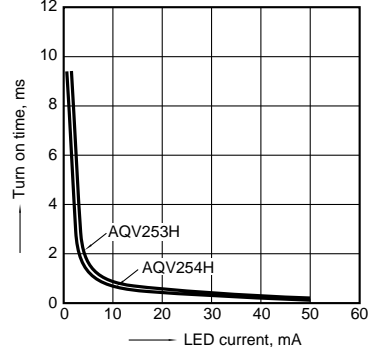
## 10.-(1) Turn on time vs. LED forward current characteristics

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



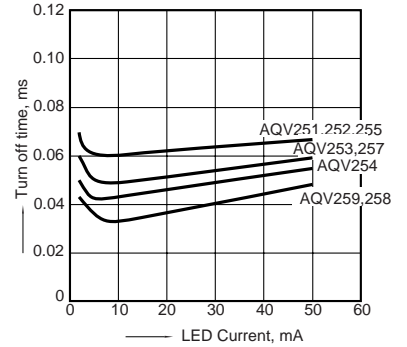
## 10.-(2) Turn on time vs. LED forward current characteristics

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



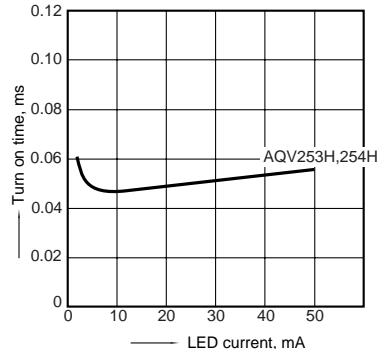
## 11.-(1) Turn off time vs. LED forward current characteristics

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



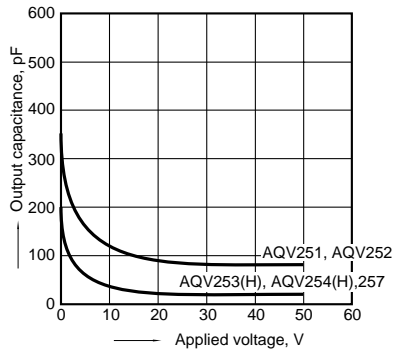
## 11.-(2) Turn off time vs. LED forward current characteristics

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



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

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



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

Sample: AQV259; Measured portion: between terminals 4 and 6; Frequency: 1 MHz; Ambient temperature: 25°C 77°F

