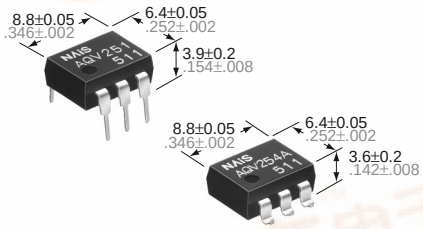
(Standard type) (Reinforced type)

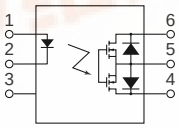
NAiS

HE (High-function Economy) Type [1-Channel (Form A) Type]

PhotoMOS RELAYS



mm inch



FEATURES

1. Highly sensitive and low on-resistance

2. Controls various types of loads such as relays, motors, lamps and solenoids.

3. Optical coupling for extremely high isolation
5,000 Vrms I/O isolation available.

4. Low-level off state leakage current

5. Eliminates the need for a power supply to drive the power MOSFET
A power supply used to drive the power MOSFET is unnecessary because of the built-in optoelectronic device. This results in easy circuit design and small PC board area.

6. Low thermal electromotive force (Approx. 1 μV)

TYPICAL APPLICATIONS

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

TYPES

1. I/O isolation voltage: 1,500 V AC

Output rating*		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		
40 V	500 mA	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		

2. I/O isolation voltage: Reinforced 5,000 V

Output rating*		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		
250 V	200 mA	AQV253H	AQV253HA	AQV253HAX	AQV253HAZ	1 tube contains 50 pcs. 1 batch contains 500 pcs.	1,000 pcs.
400 V	150 mA	AQV254H	AQV254HA	AQV254HAX	AQV254HAZ		

*Indicate the peak AC and DC values.
Note: For space reasons, the package type indicator "X" and "Z" are omitted from the seal.

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		3 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, C connection: 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	
			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										

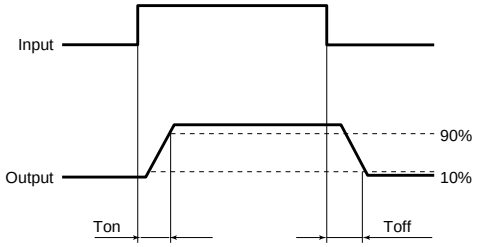
2. Electrical characteristics (Ambient temperature: 25°C 77°F)

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_{Fon}	—	0.9 mA								1.4 mA		I_L = Max.
		Maximum			3 mA										
	LED turn off current	Minimum	I_{Foff}	—	0.4 mA										I_L = Max.
		Typical			0.8 mA								1.3 mA		
	LED dropout voltage	Typical	V_F	—	1.14 V (1.25 V at I_F = 50 mA)										I_F = 5 mA
		Maximum			1.5 V										
Output	On resistance	Typical	R_{on}	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_F = 5 mA I_L = 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_{on}	B	0.3Ω	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_F = 5 mA I_L = 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_{on}	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_F = 5 mA I_L = 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	—	—	1 μA						10 μA		1 μA		I_F = 0 V_L = Max.
Transfer characteristics	Switching speed Turn on time*	Typical	T_{on}	—	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_F = 5 mA I_L = Max.
		Maximum			3 ms		2 ms	3 ms	2 ms		1 ms		4 ms	3 ms	
	Turn off time*	Typical	T_{off}	—	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_F = 5 mA I_L = Max.
		Maximum			0.2 ms										
	I/O capacitance	Typical	C_{iso}	—	1.3 pF										f = 1 MHz V_B = 0
		Maximum			3 pF										
	Initial I/O isolation resistance	Minimum	R_{iso}	—	1,000 MΩ										500 V DC

Note: Recommendable LED forward current
Standard type: 5 mA
Reinforced type: 5 to 10 mA

For type of connection, see Page 31.

*Turn on/Turn off time

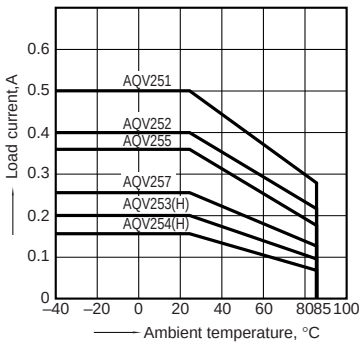


■ For Dimensions, see Page 27.
■ For Schematic and Wiring Diagrams, see Page 31.
■ For Cautions for Use, see Page 36.

REFERENCE DATA

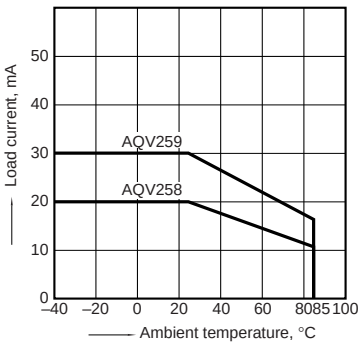
1.-(1) Load current vs. ambient temperature characteristics

Allowable ambient temperature: –40°C to +85°C
–40°F to +185°F ;
Type of connection: A



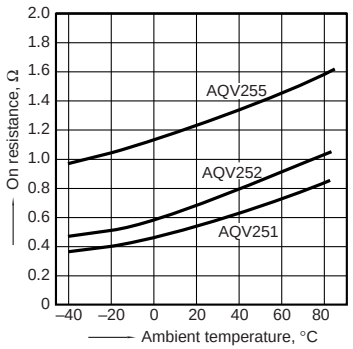
1.-(2) Load current vs. ambient temperature characteristics

Allowable ambient temperature: –40°C to +85°C
–40°F to +185°F ;
Type of connection: A



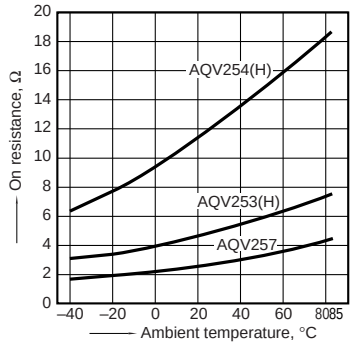
2.-(1) On resistance vs. ambient temperature characteristics

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



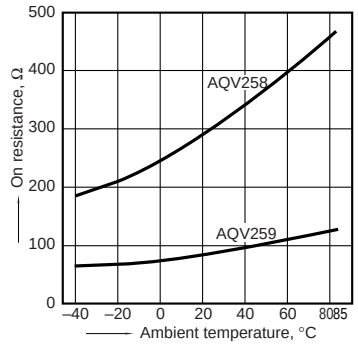
2.-(2) On resistance vs. ambient temperature characteristics

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



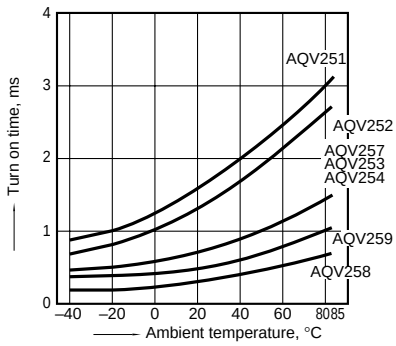
2.-(3) On resistance vs. ambient temperature characteristics

Measured portion: between terminals 4 and 6;
LED current: 5 mA;
Continuous load current: 30 mA (DC)



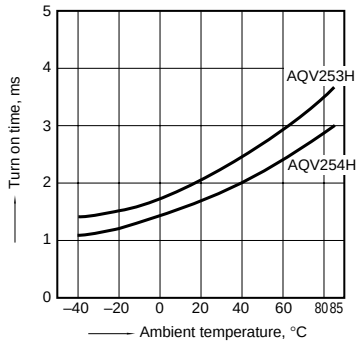
3.-(1) Turn on time vs. ambient temperature characteristics

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



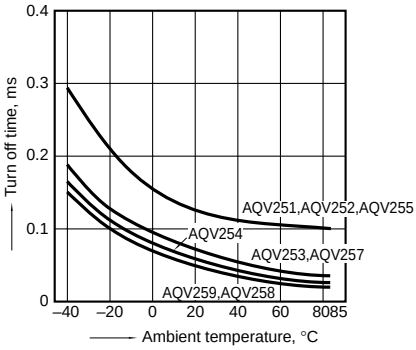
3.-(2) Turn on time vs. ambient temperature characteristics

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



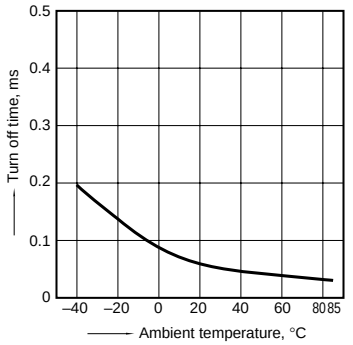
4.-(1) Turn off time vs. ambient temperature characteristics

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



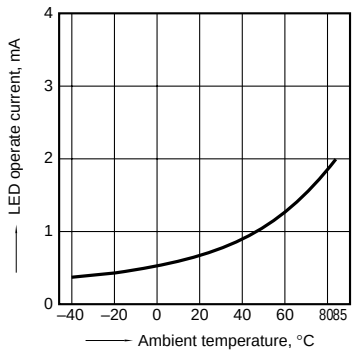
4.-(2) Turn off time vs. ambient temperature characteristics

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



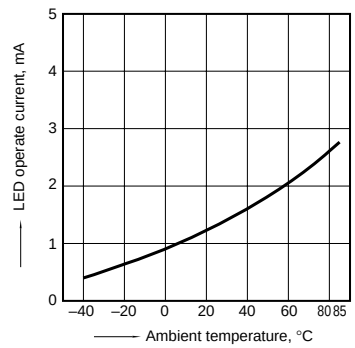
5.-(1) LED operate current vs. ambient temperature characteristics

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



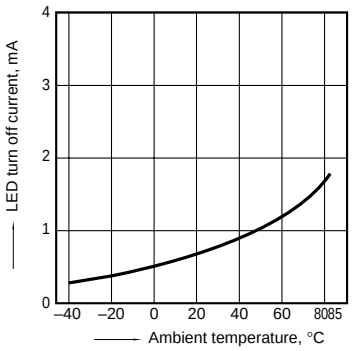
5.-(2) LED operate current vs. ambient temperature characteristics

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



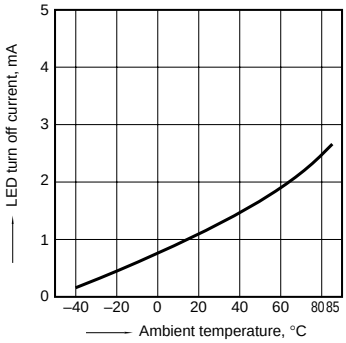
6. -(1) LED turn off current vs. ambient temperature characteristics

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



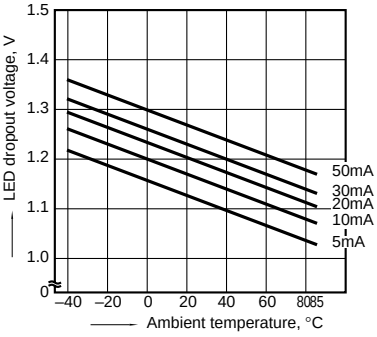
6. -(2) LED turn off current vs. ambient temperature characteristics

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



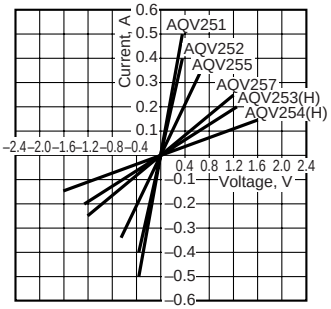
7. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



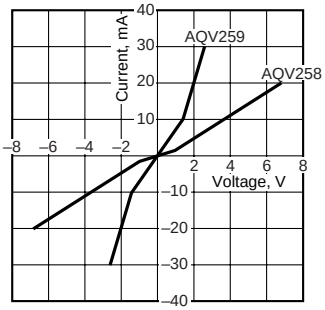
8.-(1) Voltage vs. current characteristics of output at MOS portion

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



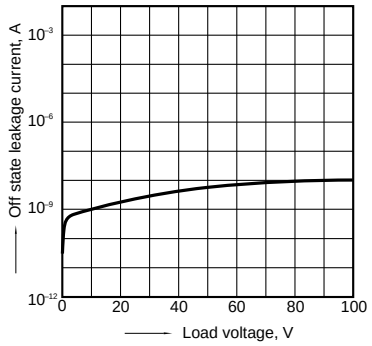
8.-(2) Voltage vs. current characteristics of output at MOS portion

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



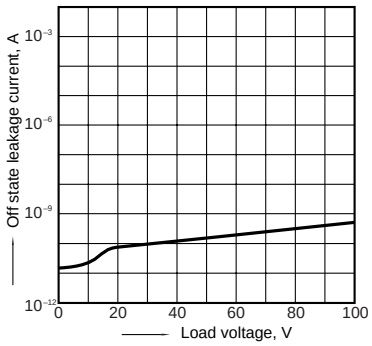
9-(1). Off state leakage current

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



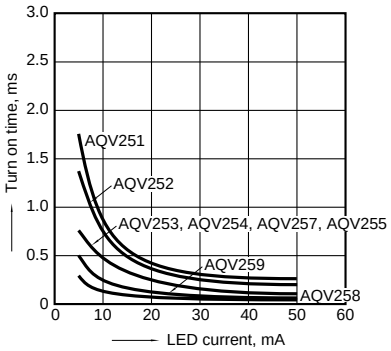
9-(2). Off state leakage current

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



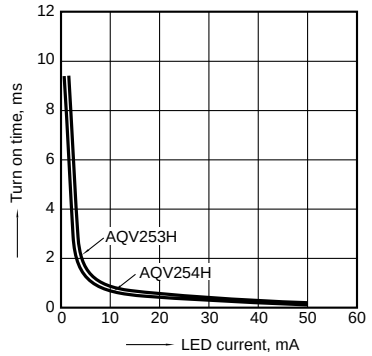
10-(1). LED forward current vs. turn on time characteristics

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



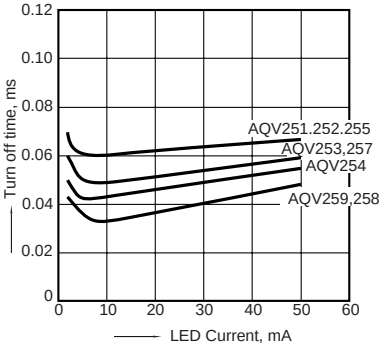
10-(2). LED forward current vs. turn on time characteristics

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



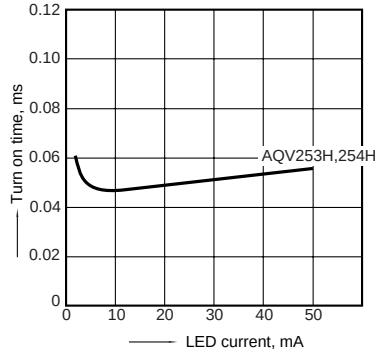
11-(1). LED forward current vs. turn off time characteristics

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



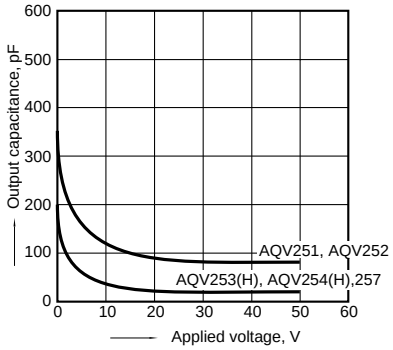
11-(2). LED forward current vs. turn off time characteristics

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



12.-(1) Applied voltage vs. output capacitance characteristics

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



12.-(2) Applied voltage vs. output capacitance characteristics

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