

# PhotoMOS RELAYS

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

| Item                             |                           |                 |                  | Sym-<br>bol       | Type of<br>connec-<br>tion | AQV210E(A)                                | AQV214E(A) | AQV210EH(A) | AQV214EH(A)                     | Condition                                                            |
|----------------------------------|---------------------------|-----------------|------------------|-------------------|----------------------------|-------------------------------------------|------------|-------------|---------------------------------|----------------------------------------------------------------------|
| Input                            | LED operate current       |                 | Typical          | I <sub>Fon</sub>  | —                          | 1.1 mA                                    | 1.1 mA     | 1.6 mA      | 1.6 mA                          | I <sub>L</sub> = Max.                                                |
|                                  |                           |                 | Maximum          |                   |                            | 3 mA                                      |            |             |                                 |                                                                      |
|                                  | LED turn off current      |                 | Minimum          | I <sub>Foff</sub> | —                          | 0.3 mA                                    | 0.3 mA     | 0.4 mA      | 0.4 mA                          | I <sub>L</sub> = Max.                                                |
|                                  |                           |                 | Typical          |                   |                            | 1.0 mA                                    | 1.0 mA     | 1.5 mA      | 1.5 mA                          |                                                                      |
|                                  | LED dropout voltage       |                 | Typical          | V <sub>F</sub>    | —                          | 1.14 V (1.25 V at I <sub>F</sub> = 50 mA) |            |             |                                 | I <sub>F</sub> = 5 mA                                                |
|                                  |                           |                 | Maximum          |                   |                            | 1.5 V                                     |            |             |                                 |                                                                      |
| Output                           | On resistance             |                 | Typical          | R <sub>on</sub>   | A                          | 23 Ω                                      | 30 Ω       | 23 Ω        | 30 Ω                            | I <sub>F</sub> = 5 mA<br>I <sub>L</sub> = Max.<br>Within 1 s on time |
|                                  |                           |                 | Maximum          |                   |                            | 35 Ω                                      | 50 Ω       | 35 Ω        | 50 Ω                            |                                                                      |
|                                  |                           |                 | Typical          | R <sub>on</sub>   | B                          | 11.5 Ω                                    | 22.5 Ω     | 11.5 Ω      | 22.5 Ω                          | I <sub>F</sub> = 5 mA<br>I <sub>L</sub> = Max.<br>Within 1 s on time |
|                                  |                           |                 | Maximum          |                   |                            | 17.5 Ω                                    | 25 Ω       | 17.5 Ω      | 25 Ω                            |                                                                      |
|                                  |                           |                 | Typical          | R <sub>on</sub>   | C                          | 6.0 Ω                                     | 11.3 Ω     | 6.0 Ω       | 11.3 Ω                          | I <sub>F</sub> = 5 mA<br>I <sub>L</sub> = Max.<br>Within 1 s on time |
|                                  |                           |                 | Maximum          |                   |                            | 8.8 Ω                                     | 12.5 Ω     | 8.8 Ω       | 12.5 Ω                          |                                                                      |
|                                  | Output capacitance        |                 | Typical          | C <sub>out</sub>  | A                          | 45 pF                                     |            |             |                                 | I <sub>F</sub> = 0<br>V <sub>B</sub> = 0<br>f = 1 MHz                |
|                                  | Off state leakage current |                 | Maximum          | —                 | —                          | 1 μA                                      |            |             |                                 | I <sub>F</sub> = 0<br>V <sub>L</sub> = Max.                          |
|                                  | Transfer characteristics  | Switching speed | Turn on time*    | Typical           | T <sub>on</sub>            | —                                         | 0.5 ms     | 0.5 ms      | 0.7 ms                          | 0.7 ms                                                               |
| Maximum                          |                           |                 |                  | 2.0 ms            |                            |                                           | 2.0 ms     | 2.0 ms      | 2.0 ms                          |                                                                      |
| Turn off time*                   |                           |                 | Typical          | T <sub>off</sub>  | —                          | 0.05 ms                                   |            |             |                                 | I <sub>F</sub> = 5 mA<br>I <sub>L</sub> = Max.                       |
|                                  |                           |                 | Maximum          |                   |                            | 1.0 ms                                    |            |             |                                 |                                                                      |
| I/O capacitance                  |                           | Typical         | C <sub>iso</sub> | —                 | 0.8 pF                     |                                           |            |             | f = 1 MHz<br>V <sub>B</sub> = 0 |                                                                      |
|                                  |                           | Maximum         |                  |                   | 1.5 pF                     |                                           |            |             |                                 |                                                                      |
| Initial I/O isolation resistance |                           | Minimum         | R <sub>iso</sub> | —                 | 1,000 MΩ                   |                                           |            |             | 500 V DC                        |                                                                      |

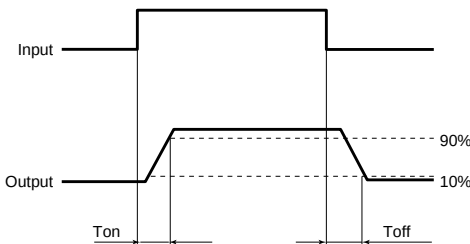
Note: Recommendable LED forward current

Standard type: 5 mA

Reinforced type: 5 to 10 mA

\*Turn on/Turn off time

For type of connection, see page 31.

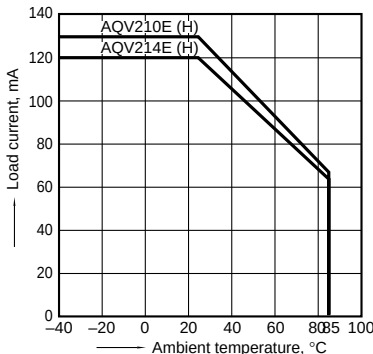


## REFERENCE DATA

### 1. Load current vs. ambient temperature characteristics

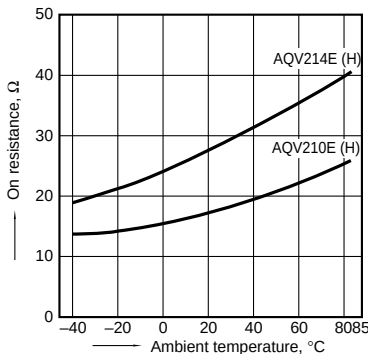
Allowable ambient temperature: -40°C to +85°C  
-40°F to +185°F

Type of connection: A



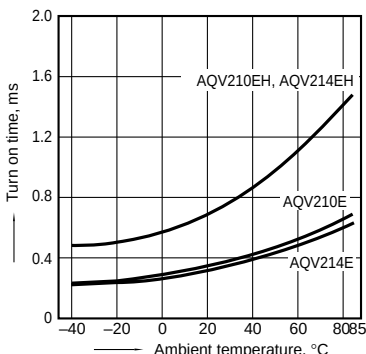
### 2. On resistance vs. ambient temperature characteristics

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



### 3. Turn on time vs. ambient temperature characteristics

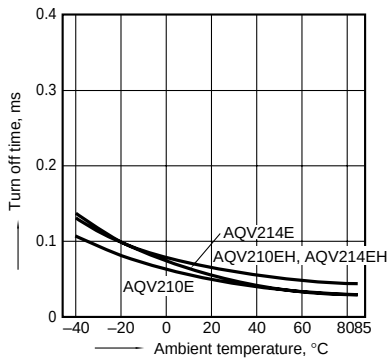
LED current: 5 mA;  
Load voltage: Max. (DC);  
Continuous load current: Max. (DC)



# AQV210E

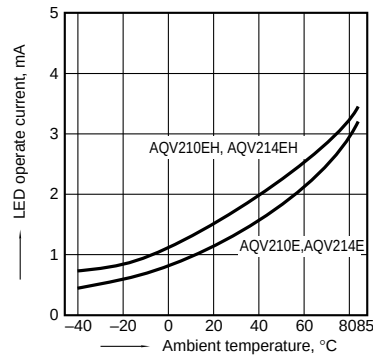
## 4. Turn off time vs. ambient temperature characteristics

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



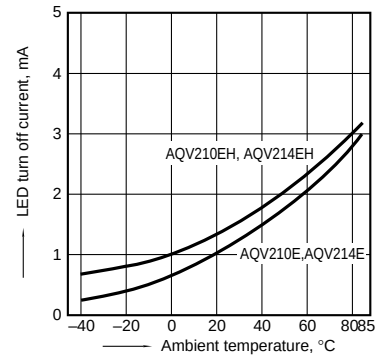
## 5. LED operate current vs. ambient temperature characteristics

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



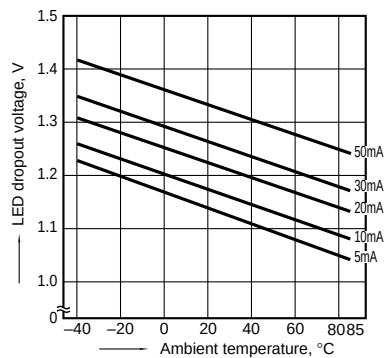
## 6. LED turn off current vs. ambient temperature characteristics

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



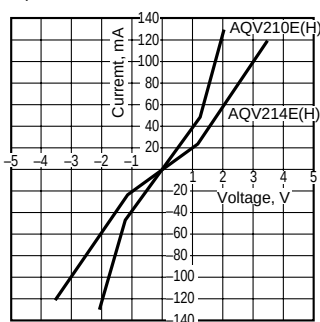
## 7. LED dropout voltage vs. ambient temperature characteristics

Sample: All types  
LED current: 5 to 50 mA



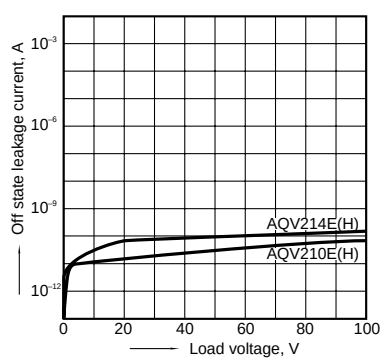
## 8. Voltage vs. current characteristics of output at MOS portion

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



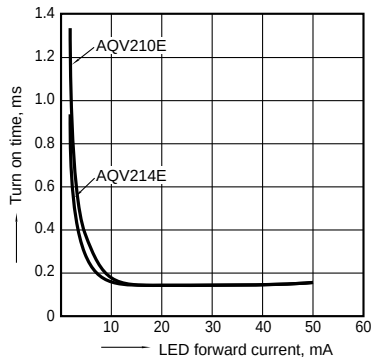
## 9. Off state leakage current

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



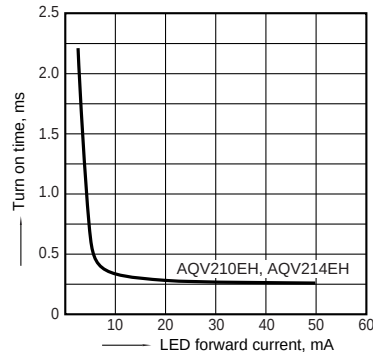
## 10-(1). LED forward current vs. turn on time characteristics

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



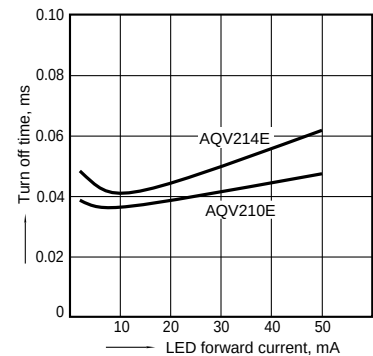
## 10-(2). LED forward current vs. turn on time characteristics

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



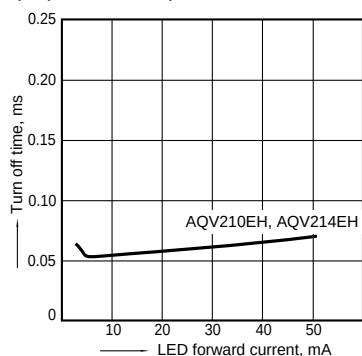
## 11-(1). LED forward current vs. turn off time characteristics

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. Applied voltage vs. output capacitance characteristics

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

