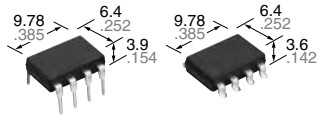




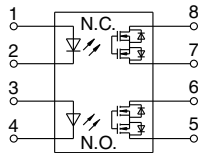
**Both 1 Form A and 1 Form B contacts incorporated in a compact DIP8-pin with low on-resistance**

**PhotoMOS<sup>®</sup>  
HE 1 Form A & 1 Form B  
(AQW654)**



(Height includes standoff)

mm inch



**RoHS compliant**

### FEATURES

- Applicable for 1 Form A and 1 Form B use as well as two independent 1 Form A and 1 Form B use**
- Controls low-level analog signals**  
PhotoMOS feature extremely low closed-circuit offset voltage to enable control of low-level analog signals without distortion.
- High sensitivity and low on-resistance**  
Can control max. 0.16 A load current with 5 mA input current. Low on-resistance of max. 11 Ω. (in case of using only 1 channel)
- Low-level off state leakage current of max. 1 μA**

### TYPICAL APPLICATIONS

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

### TYPES

|                | Output rating* |              | Package  | Part No.              |                                  |                                  |          | Packing quantity                                       |           |
|----------------|----------------|--------------|----------|-----------------------|----------------------------------|----------------------------------|----------|--|-----------|
|                |                |              |          | Through hole terminal | Surface-mount terminal           |                                  | Tube     | Tape and reel  |           |
|                | Load voltage   | Load current |          |                       | Tube packing style               | Tape and reel packing style      |          |  |           |
|                |                |              |          |                       | Picked from the 1/2/3/4-pin side | Picked from the 5/6/7/8-pin side |          |  |           |
| AC/DC dual use | 400 V          | 120 mA       | DIP8-pin | AQW654                | AQW654A                          | AQW654AX                         | AQW654AZ | 1 tube contains: 50 pcs.<br>1 batch contains: 500 pcs. | 1,000 pcs |

\*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. Absolute maximum ratings (Ambient temperature: 25°C 77°F)

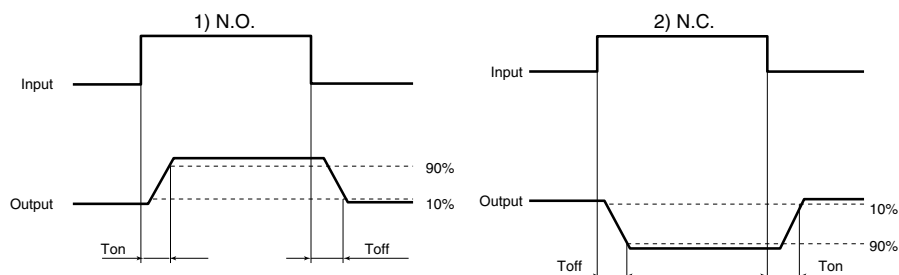
| Item                    | Symbol                  | AQW654(A)         | Remarks  |   |
|-------------------------|-------------------------|-------------------|--|---|
| Input                   | LED forward current     | I <sub>F</sub>    | 50 mA  |   |
|                         | LED reverse voltage     | V <sub>R</sub>    | 5 V  |   |
|                         | Peak forward current    | I <sub>FP</sub>   | 1 A  | f = 100 Hz, Duty factor = 0.1%                    |
|                         | Power dissipation       | P <sub>in</sub>   | 75 mW  |   |
| Output                  | Load voltage (peak AC)  | V <sub>L</sub>    | 400 V  |   |
|                         | Continuous load current | I <sub>L</sub>    | 0.12A (0.16 A)   | Peak AC, DC ( ) : in case of using only 1 channel |
|                         | Peak load current       | I <sub>peak</sub> | 0.36 A   | 100 ms (1 shot), V <sub>L</sub> = DC              |
|                         | Power dissipation       | P <sub>out</sub>  | 800 mW   |   |
| Total power dissipation | P <sub>T</sub>          | 850 mW            |  |   |
| I/O isolation voltage   | V <sub>iso</sub>        | 1,500 Vrms        |  |   |
| Ambient temperature     | Operating               | T <sub>opr</sub>  | -40 to +85°C -40 to +185°F (Non-icing at low temperatures) |   |
|                         | Storage                 | T <sub>stg</sub>  | -40 to +100°C -40 to +212°F                                |   |

# HE 1 Form A & 1 Form B (AQW654)

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

| Item                             |                           | Symbol                                   | AQW654(A)                     | Condition  |   |
|----------------------------------|---------------------------|--|-------------------------------|--|---|
| Input                            | LED operate current       | Typical                                  | 0.9 mA                        | I <sub>L</sub> = Max.  |   |
|                                  |                           | Maximum                                  | 3 mA                          |  |   |
|                                  | LED reverse current       | Minimum                                  | 0.4 mA                        | I <sub>L</sub> = Max.  |   |
|                                  |                           | Typical                                  | 0.8 mA                        |  |   |
| LED dropout voltage              | Typical                   | 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                                  | 11 Ω                          | I <sub>F</sub> = 5 mA (N.O.) I <sub>F</sub> = 0 mA (N.C.)<br>I <sub>L</sub> = Max.<br>Within 1 s |   |
|                                  |                           | Maximum                                  | 16 Ω                          |  |   |
|                                  | Off state leakage current | Maximum                                  | I <sub>Leak</sub>             | 1 μA   | I <sub>F</sub> = 0 mA (N.O.)<br>I <sub>F</sub> = 5 mA (N.C.)<br>V <sub>L</sub> = Max. |
| Transfer characteristics         | Operate time*             | Typical                                  | 0.8 ms (N.O.) 1.2 ms (N.C.)   |  | I <sub>F</sub> = 0 mA → 5 mA<br>I <sub>L</sub> = Max.                                 |
|                                  |                           | Maximum                                  | 2 ms                          |  |   |
|                                  | Reverse time*             | Typical                                  | 0.04 ms (N.O.) 0.36 ms (N.C.) |  | I <sub>F</sub> = 5 mA → 0 mA<br>I <sub>L</sub> = Max.                                 |
|                                  |                           | Maximum                                  | 1 ms                          |  |   |
|                                  | I/O capacitance           | Typical                                  | 0.8 pF                        |  | f = 1 MHz<br>V <sub>B</sub> = 0 V   |
| Maximum                          |                           | 1.5 pF                                   |                               |  |   |
| Initial I/O isolation resistance | Minimum                   | R <sub>iso</sub>                         | 1,000 MΩ                      | 500 V DC   |   |

\*Operate/Reverse time



## 3. Recommended operating conditions (Ambient temperature: 25°C 77°F)

Please use under recommended operating conditions to obtain expected characteristics.

| Item                              | Symbol         | Number of used channels | Min. | Max.         | Unit |
|-----------------------------------|----------------|-------------------------|------|--------------|------|
| LED current                       | I <sub>F</sub> | 1ch<br>2ch              | 5    | 30           | mA   |
| Load voltage (Peak AC)            | V <sub>L</sub> |                         | —    | 320          | V    |
| AQW654(A) Continuous load current | I <sub>L</sub> | 1ch<br>2ch              | —    | 0.16<br>0.12 | A    |

■ These products are not designed for automotive use.

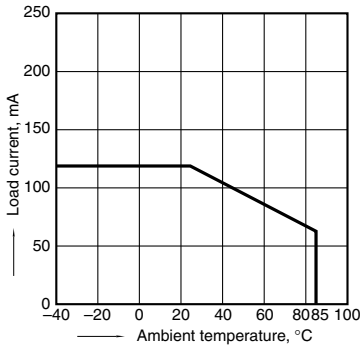
If you are considering to use these products for automotive applications, please contact your local Panasonic Corporation technical representative.

## REFERENCE DATA

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

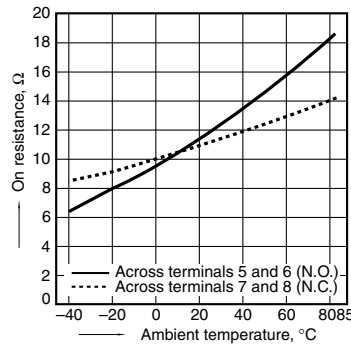
Allowable ambient temperature:  $-40$  to  $+85^{\circ}\text{C}$   
 $-40$  to  $+185^{\circ}\text{F}$

When using 2 channels



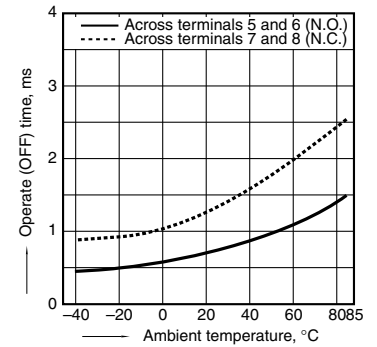
### 2. On resistance vs. ambient temperature characteristics

Measured portion: between terminals 5 and 6, 7 and 8; LED current: 5 mA; Load voltage: 400 V (DC); Continuous load current: 120 mA (DC)



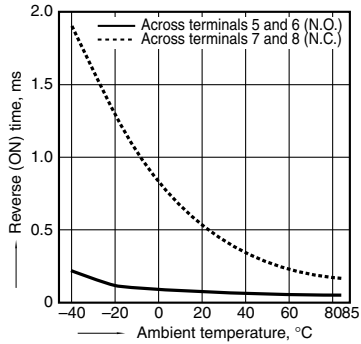
### 3. Operate time vs. ambient temperature characteristics

LED current: 5 mA; Load voltage: 400 V (DC); Continuous load current: 120 mA (DC)



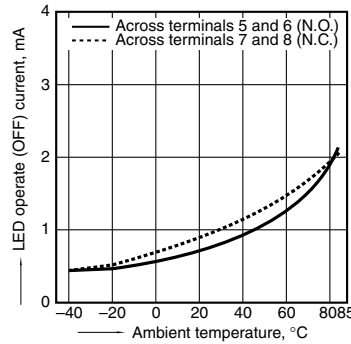
### 4. Reverse time vs. ambient temperature characteristics

LED current: 5 mA; Load voltage: 400 V (DC); Continuous load current: 120 mA (DC)



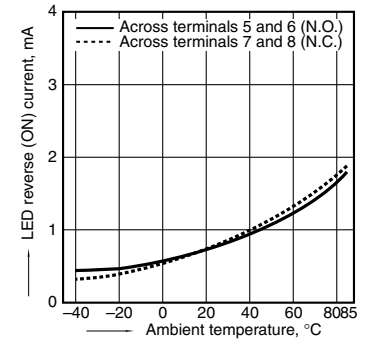
### 5. LED operate current vs. ambient temperature characteristics

Load voltage: 400 V (DC); Continuous load current: 120 mA (DC)



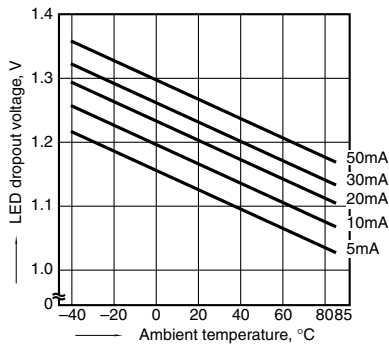
### 6. LED reverse current vs. ambient temperature characteristics

Load voltage: 400 V (DC); Continuous load current: 120 mA (DC)



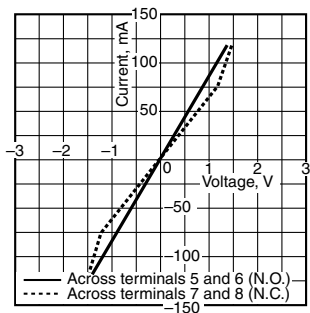
### 7. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



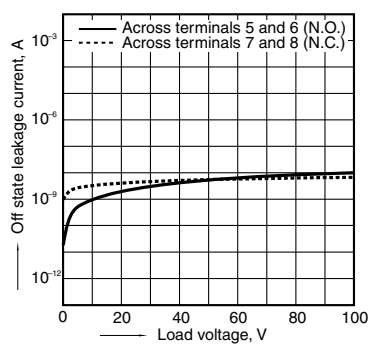
### 8. Current vs. voltage characteristics of output at MOS portion

Measured portion: between terminals 5 and 6, 7 and 8; Ambient temperature:  $25^{\circ}\text{C}$   $77^{\circ}\text{F}$



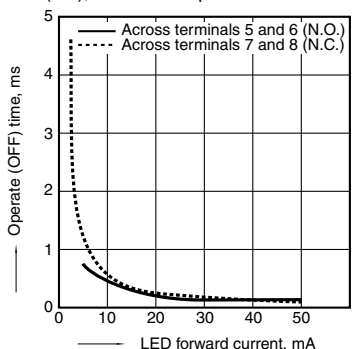
### 9. Off state leakage current vs. load voltage characteristics

Measured portion: between terminals 5 and 6, 7 and 8; Ambient temperature:  $25^{\circ}\text{C}$   $77^{\circ}\text{F}$



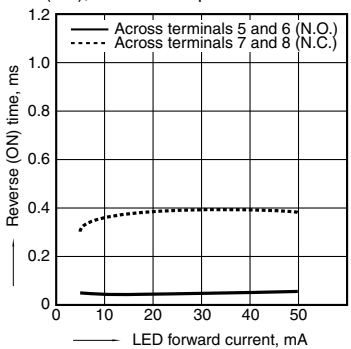
### 10. Operate time vs. LED forward current characteristics

Measured portion: between terminals 5 and 6, 7 and 8; Load voltage: 400 V (DC); Continuous load current: 120 mA (DC); Ambient temperature:  $25^{\circ}\text{C}$   $77^{\circ}\text{F}$



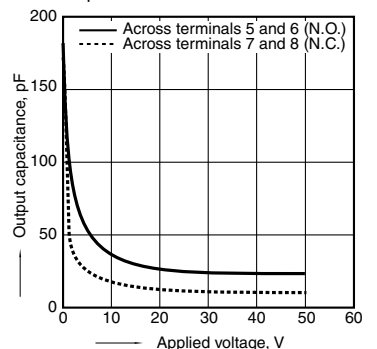
### 11. Reverse time vs. LED forward current characteristics

Measured portion: between terminals 5 and 6, 7 and 8; Load voltage: 400 V (DC); Continuous load current: 120 mA (DC); Ambient temperature:  $25^{\circ}\text{C}$   $77^{\circ}\text{F}$



### 12. Output capacitance vs. applied voltage characteristics

Measured portion: between terminals 5 and 6, 7 and 8; Frequency: 1 MHz; Ambient temperature:  $25^{\circ}\text{C}$   $77^{\circ}\text{F}$



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