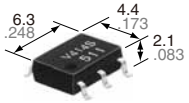
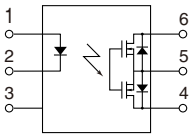
**Normally closed SOP6-pin type of 400V load voltage**

# PhotoMOS® GU SOP 1 Form B (AQV414S)



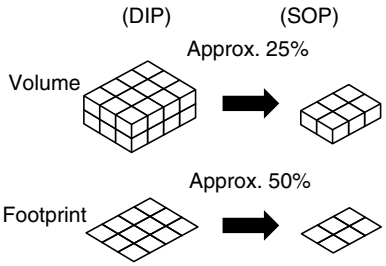

mm inch




**RoHS compliant**

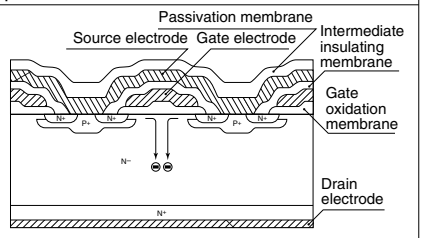
## FEATURES

**1. Miniature SOP6-pin package**
The device comes in a small SOP measuring (W) 4.4 × (L) 6.3 ×(H) 2.1 mm (W) .173× (L) .248×(H) .083 inch approx. 25% of the volume and 50% of the footprint size of DIP type.




**2. Low on-resistance (typ. 26 Ω) for normally-closed type**
This has been achieved thanks to the built-in MOSFET processed by our proprietary method, DSD (Double-Diffused and Selective Doping) method.

Cross section of the normally-closed type of power MOS




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

**4. Low-level off state leakage current of max. 1 μA**

## TYPICAL APPLICATIONS

- Telephones
- Measuring instruments
- Computers
- Industrial robots
- High-speed inspection machines

## TYPES

| | Output rating* | | Package | Part No. | | | Packing quantity | |
|---|---|---|---|---|---|---|---|---|
| | 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 | 400V | 100mA | SOP6-pin | AQV414S | AQV414SX | AQV414SZ | 1 tube contains: 75 pcs. 1 batch contains: 1,500 pcs. | 1,000 pcs. |

* Indicate the peak AC and DC values.
Note: For space reasons, only "V41S" is marked on the product. The two initial letters of the part number "AQ" and the packing style indicator "X" or "Z" have been omitted.

# RATING

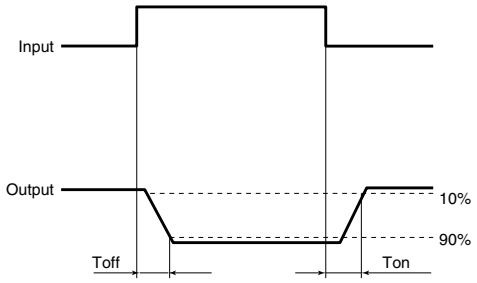
1. Absolute maximum ratings (Ambient temperature: 25°C 77°F)

| Item | | Symbol | Type of connection | AQV414S | 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) | $V_L$ | | 400 V | |
| | Continuous load current | $I_L$ | A | 0.10 A | A connection: Peak AC, DC<br>B, C connection: DC |
| | | | B | 0.11 A | |
| | | | C | 0.12 A | |
| | Peak load current | $I_{peak}$ | | 0.3 A | A connection: 100 ms (1 shot) $V_L$= DC |
| | Power dissipation | $P_{out}$ | | 450 mW | |
| Total power dissipation | | $P_T$ | | 500 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 | Type of connection | AQV414S | Remarks |
|---|---|---|---|---|---|---|
| Input | LED operate (OFF) current | Typical | $I_{Foff}$ | — | 0.6 mA | $I_L$= Max. |
| | | Maximum | | | 3 mA | |
| | LED reverse (ON) current | Minimum | $I_{Fon}$ | — | 0.4 mA | $I_L$= Max. |
| | | Typical | | | 0.55 mA | |
| | LED dropout voltage | Typical | $V_F$ | — | 1.25 V (1.14 V at $I_F$ = 5 mA) | $I_F$= 50 mA |
| | | Maximum | | | 1.5 V | |
| Output | On resistance | Typical | $R_{on}$ | A | 26 Ω | $I_F$= 0 mA<br>$I_L$= Max.<br>Within 1 s on time |
| | | Maximum | | | 50 Ω | |
| | | Typical | $R_{on}$ | B | 20 Ω | $I_F$ = 0 mA<br>$I_L$ = Max.<br>Within 1 s on time |
| | | Maximum | | | 25 Ω | |
| | | Typical | $R_{on}$ | C | 10 Ω | $I_F$ = 0 mA<br>$I_L$ = Max.<br>Within 1 s on time |
| | | Maximum | | | 12.5 Ω | |
| | Off state leakage current | Maximum | $I_{Leak}$ | — | 1 μA | $I_F$ = 5 mA, $V_L$ = Max. |
| Transfer characteristics | Operate (OFF) time* | Typical | $T_{off}$ | — | 0.47 ms | $I_F$= 0 mA → 5 mA<br>$V_L$ = Max. |
| | | Maximum | | | 1.0 ms | |
| | Reverse (ON) time* | Typical | $T_{on}$ | — | 0.28 ms | $I_F$= 5 mA → 0 mA<br>$V_L$ = Max. |
| | | Maximum | | | 1.0 ms | |
| | I/O capacitance | Typical | $C_{iso}$ | — | 0.8 pF | f = 1 MHz<br>$V_B$ = 0 V |
| | | Maximum | | | 1.5 pF | |
| | Initial I/C isolation resistance | Minimum | $R_{iso}$ | — | 1,000 MΩ | 500 V DC |

*Operate/Reverse time




# RECOMMENDED OPERATING CONDITIONS

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

| Item | Symbol | Recommended value | Unit |
|---|---|---|---|
| Input LED current | $I_F$ | 5 | mA |

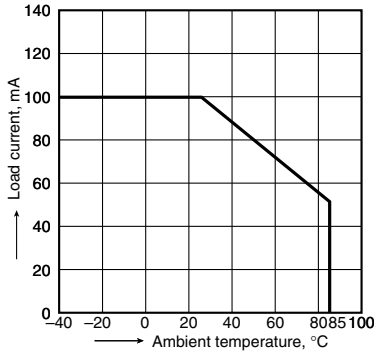
**■ These products are not designed for automotive use.**
**If you are considering to use these products for automotive applications, please contact your local Panasonic Corporation technical representative.**

# REFERENCE DATA

1. Load current vs. ambient temperature characteristics

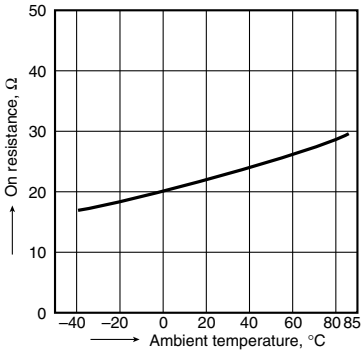
Allowable ambient temperature: –40°C to +85°C
–40°F to +185°F

Type of connection: A



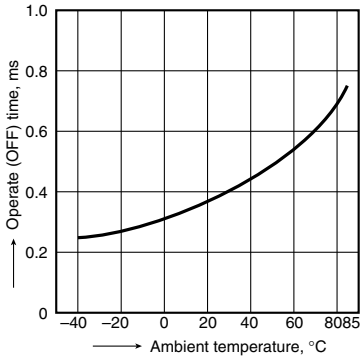

2. On resistance vs. ambient temperature characteristics

Measured portion: between terminals 4 and 6;
LED current: 0 mA;
Continuous load current: 100 mA (DC)



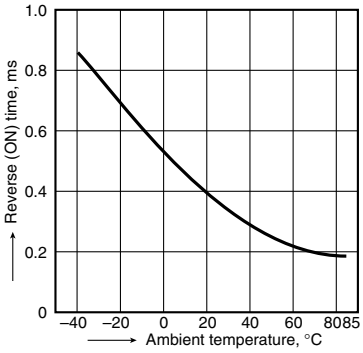

3. Operate (OFF) time vs. ambient temperature characteristics

LED current: 5 mA;
Load voltage: 400 V (DC);
Continuous load current: 100 mA (DC)



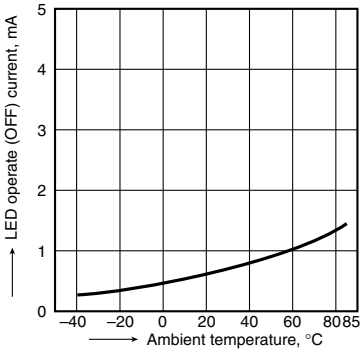

4. Reverse (ON) time vs. ambient temperature characteristics

LED current: 50 mA;
Load voltage: 400 V (DC);
Continuous load current: 100 mA (DC)



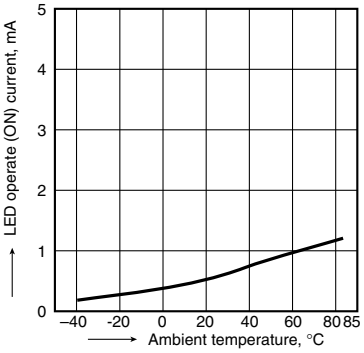

5. LED operate (OFF) current vs. ambient temperature characteristics

Load voltage: 400 V (DC);
Continuous load current: 100 mA (DC)



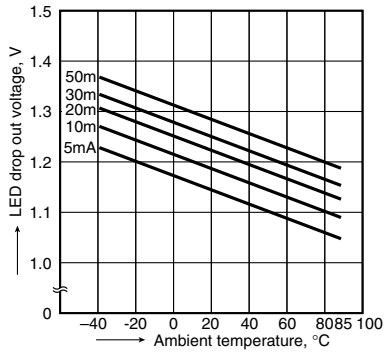

6. LED reverse (ON) current vs. ambient temperature characteristics

Load voltage: 400 V (DC);
Continuous load current: 100 mA (DC)



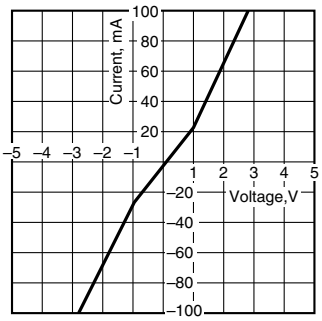

7. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



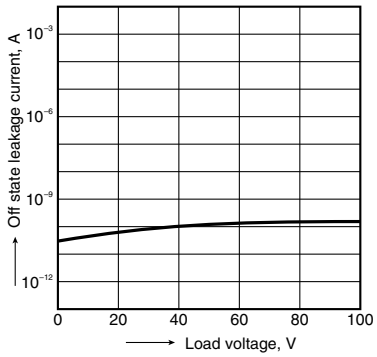

8. Current vs. voltage characteristics of output at MOS portion

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



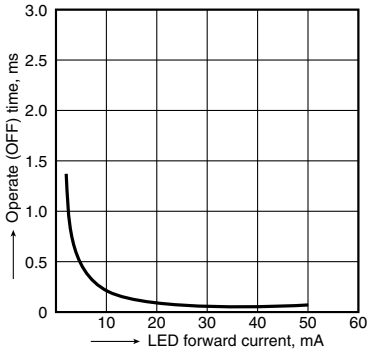

9. Off state leakage current vs. load voltage characteristics

Measured portion: between terminals 4 and 6;
LED current: 5 mA;
Ambient temperature: 25°C 77°F



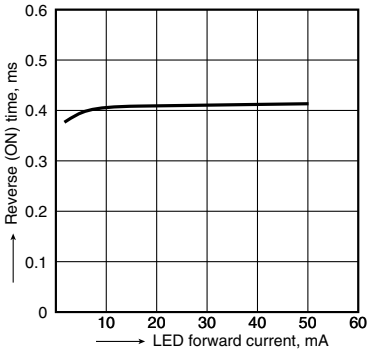
10. Operate (OFF) time vs. LED forward current characteristics

Measured portion: between terminals 4 and 6;
Load voltage: 400 V (DC); Continuous load current: 100 mA (DC); Ambient temperature: 25°C 77°F




11. Reverse (ON) time vs. LED forward current characteristics

Measured portion: between terminals 4 and 6;
Load voltage: 400 V (DC); Continuous load current: 100 mA (DC); Ambient temperature: 25°C 77°F




12. Output capacitance vs. applied voltage characteristics

Measured portion: between terminals 4 and 6;
LED current: 5 mA; Frequency: 1 MHz;
Ambient temperature: 25°C 77°F