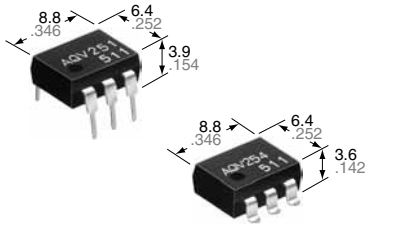
(Standard type) (Reinforced type)

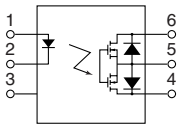
Panasonic
ideas for life

**High sensitivity and low on-resistance.**
**DIP (1 Form A) 6-pin type.**

# HE PhotoMOS (AQV25○)




mm inch




**RoHS Directive compatibility information**
**http://www.mew.co.jp/ac/e/environment/**

## 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 SMD terminal shape indicator “A” and the package style indicator “X” or “Z” are not marked on the relay.

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## 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<br>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 | | | | | | | | | | |

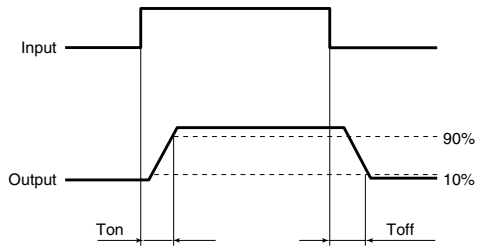
2. Electrical characteristics (Ambient temperature: 25°C 77°F)

| 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 | $V_F$ | — | 1.25 V (1.14 V at $I_F$ = 5 mA) | | | | | | | | | | $I_F$ = 50 mA |
| | | Maximum | | | 1.5 V | | | | | | | | | | |
| Output | On resistance | Typical | $R_{on}$ | A | 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<br>$I_L$ = Max.<br>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<br>$I_L$ = Max.<br>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<br>$I_L$ = Max.<br>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 mA<br>$V_L$ = 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<br>$I_L$ = Max. |
| | | Maximum | | | 3 ms | | 2 ms | 3 ms | 2 ms | | 1 ms | | 4 ms | 3 ms | |
| | Switching speed 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<br>$I_L$ = Max. |
| | | Maximum | | | 0.2 ms | | | | | | | | | | |
| | I/O capacitance | Typical | $C_{iso}$ | — | 1.3 pF | | | | | | | | | | f = 1 MHz<br>$V_B$ = 0 V |
| | | Maximum | | | 3 pF | | | | | | | | | | |
| | Initial I/O isolation resistance | Minimum | $R_{iso}$ | — | 1,000 MΩ | | | | | | | | | | 500 V DC |

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

For type of connection.

*Turn on/Turn off time

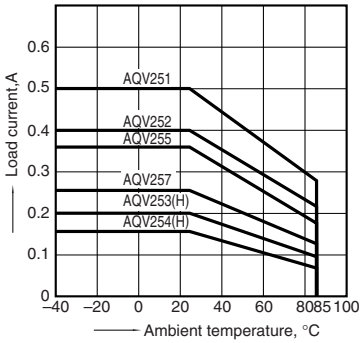



**■ For Dimensions.**
**■ For Schematic and Wiring Diagrams.**
**■ For Cautions for Use.**

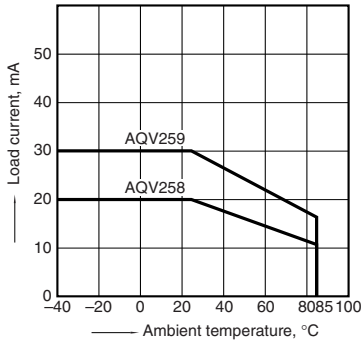
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# REFERENCE DATA

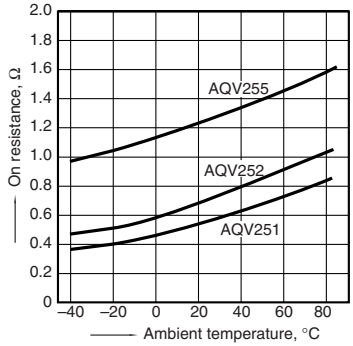
1.-(1) Load current vs. ambient temperature characteristics
Allowable ambient temperature: –40°C to +85°C
–40°F to +185°F ;
Type of connection: A



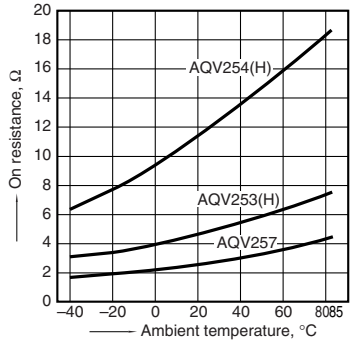

1.-(2) Load current vs. ambient temperature characteristics
Allowable ambient temperature: –40°C to +85°C
–40°F to +185°F ;
Type of connection: A



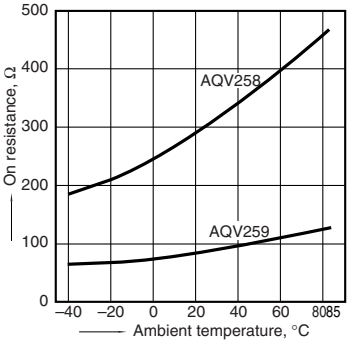

2.-(1) On resistance vs. ambient temperature characteristics
Measured portion: between terminals 4 and 6;
LED current: 5 mA;
Continuous load current: Max. (DC)



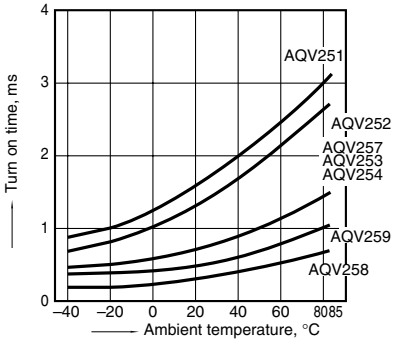

2.-(2) On resistance vs. ambient temperature characteristics
Measured portion: between terminals 4 and 6;
LED current: 5 mA;
Continuous load current: Max. (DC)



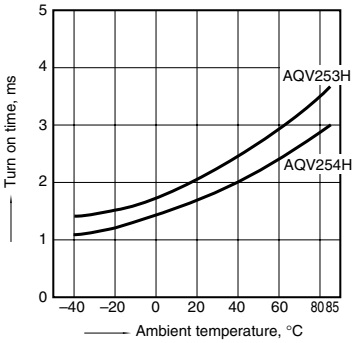

2.-(3) On resistance vs. ambient temperature characteristics
Measured portion: between terminals 4 and 6;
LED current: 5 mA;
Continuous load current: 30 mA (DC)



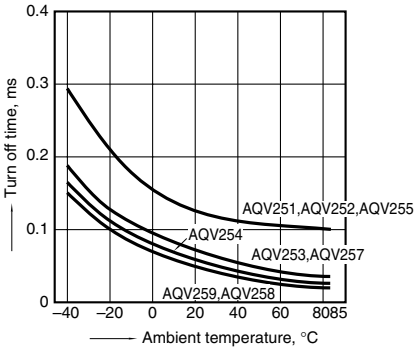

3.-(1) Turn on time vs. ambient temperature characteristics
LED current: 5 mA;
Load voltage: Max. (DC);
Continuous load current: Max. (DC)



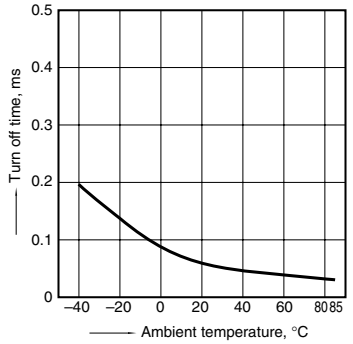

3.-(2) Turn on time vs. ambient temperature characteristics
LED current: 5 mA; Load voltage: Max. (DC);
Continuous load current: Max. (DC)



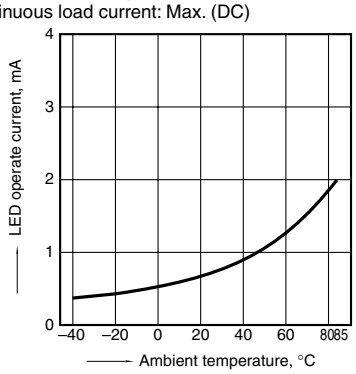

4.-(1) Turn off time vs. ambient temperature characteristics
LED current: 5 mA; Load voltage: Max. (DC);
Continuous load current: Max. (DC)



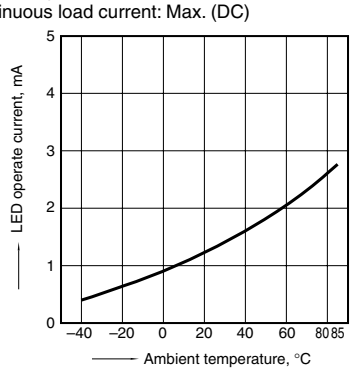

4.-(2) Turn off time vs. ambient temperature characteristics
Sample: AQV253H, AQV254H
LED current: 5 mA; Load voltage: Max. (DC);
Continuous load current: Max. (DC)



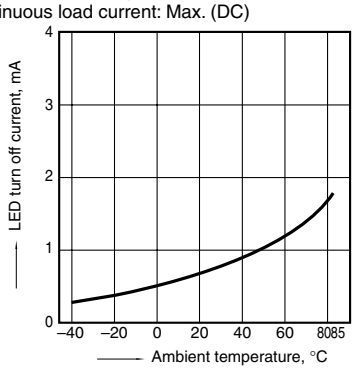

5.-(1) LED operate current vs. ambient temperature characteristics
Sample: AQV251, AQV252, AQV253, AQV254, AQV259; Load voltage: Max. (DC);
Continuous load current: Max. (DC)




5.-(2) LED operate current vs. ambient temperature characteristics
Sample: AQV253H,AQV254H;
Load voltage: Max. (DC);
Continuous load current: Max. (DC)

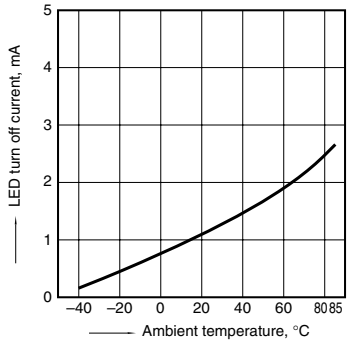



6. -(1) LED turn off current vs. ambient temperature characteristics
Sample: AQV251, AQV252, AQV253, AQV254, AQV259; Load voltage: Max. (DC);
Continuous load current: Max. (DC)

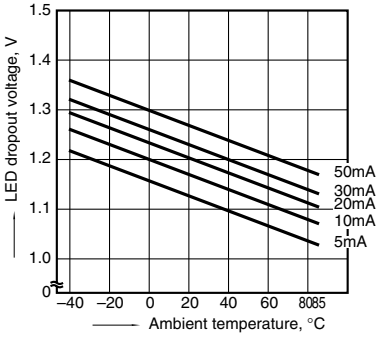



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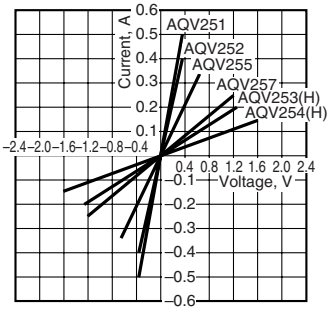
6.-(2) LED turn off current vs. ambient temperature characteristics
Sample: AQV251, AQV252, AQV253, AQV254, AQV259; Load voltage: Max. (DC);
Continuous load current: Max. (DC)



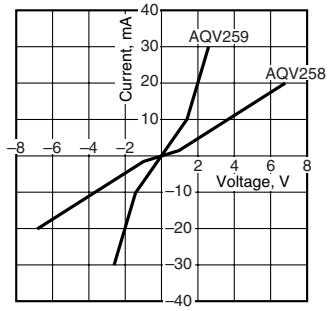

7. LED dropout voltage vs. ambient temperature characteristics
LED current: 5 to 50 mA



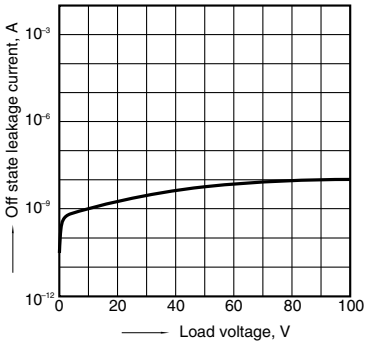

8.-(1) Current vs. voltage characteristics of output at MOS portion
Measured portion: between terminals 4 and 6;
Ambient temperature: 25°C 77°F



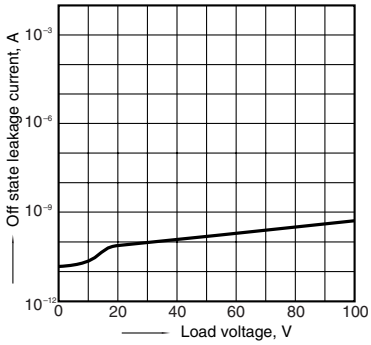

8.-(2) Current vs. voltage characteristics of output at MOS portion
Sample: AQV259
Measured portion: between terminals 4 and 6;
Ambient temperature: 25°C 77°F



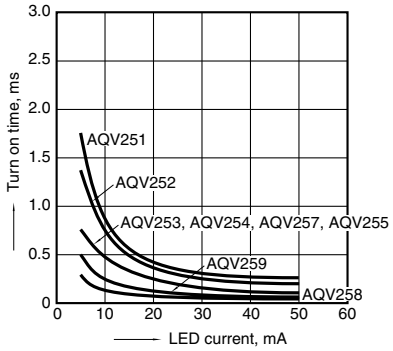

9-(1). Off state leakage current vs. load voltage characteristics
Sample: AQV259;
Measured portion: between terminals 4 and 6;
Ambient temperature: 25°C 77°F



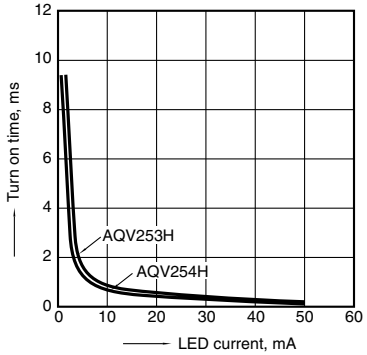

9-(2). Off state leakage current vs. load voltage characteristics
Sample: AQV254H;
Measured portion: between terminals 4 and 6;
Ambient temperature: 25°C 77°F



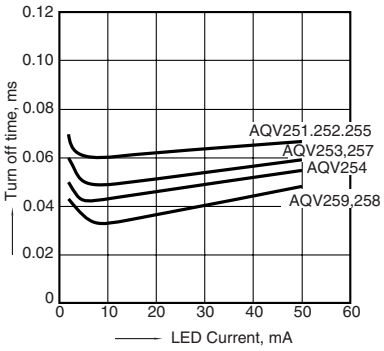

10-(1). Turn on time vs. LED forward current characteristics
Measured portion: between terminals 4 and 6;
Load voltage: Max. (DC); Continuous load current:
Max. (DC); Ambient temperature: 25°C 77°F



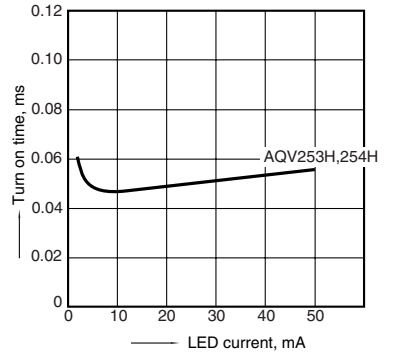

10-(2). Turn on time vs. LED forward current characteristics
Measured portion: between terminals 4 and 6;
Load voltage: Max. (DC); Continuous load current:
Max. (DC); Ambient temperature: 25°C 77°F



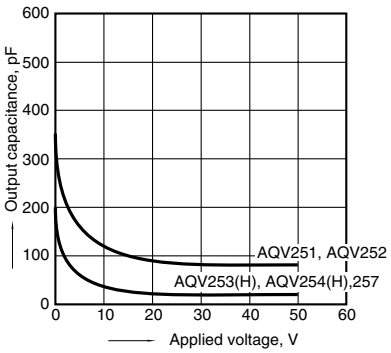

11-(1). Turn off time vs. LED forward current characteristics
Measured portion: between terminals 4 and 6;
Load voltage: Max. (DC); Continuous load current:
Max. (DC); Ambient temperature: 25°C 77°F



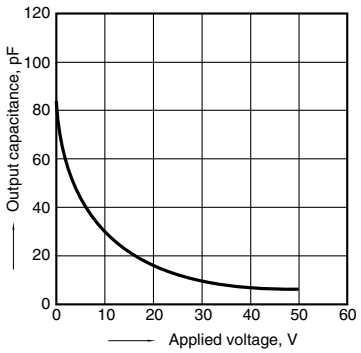

11-(2). Turn off time vs. LED forward current characteristics
Measured portion: between terminals 4 and 6;
Load voltage: Max. (DC); Continuous load current:
Max. (DC); Ambient temperature: 25°C 77°F




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




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