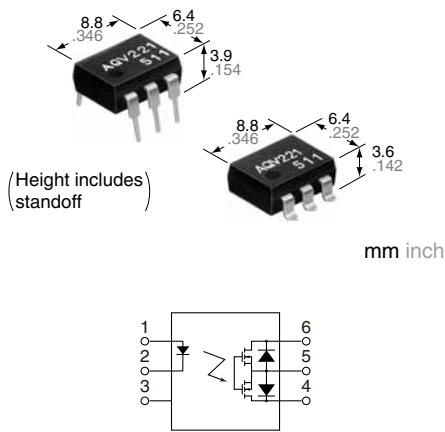




**1 Form A type**  
**Radio frequent switching**

PhotoMOS®  
**RF 1 Form A**  
(AQV22○)



**RoHS compliant**

### FEATURES

- High frequency characteristics with low capacitance between output terminals**  
Low output capacitance: typ. 4.8 pF  
Isolation loss: 40 dB or more (at 1 MHz) (AQV225)
- High speed switching**  
Turn on time: typ. 0.1 ms  
Turn off time: typ. 0.03 ms
- Low-level off state leakage current of typ. 0.03 nA**
- Controls low-level analog signals**  
PhotoMOS® features extremely low closed-circuit offset voltages to enable control of small analog signals without distortion.

### TYPICAL APPLICATIONS

- Measuring instruments**  
Scanner, IC checker, Board tester, etc.
- Audio visual equipment**  
CD, VCR
- Security equipment**

### TYPES

	Output rating*		Package	Part No.				Packing quantity	
	Load voltage	Load current		Through hole terminal	Surface-mount terminal		Tube	Tape and reel	
					Tape and reel packing style				
			Tube packing style	Picked from the 1/2/3-pin side	Picked from the 4/5/6-pin side				
AC/DC dual use	40 V	80 mA	DIP6-pin	AQV221	AQV221A	AQV221AX	AQV221AZ	1 tube contains: 50 pcs. 1 batch contains: 500 pcs.	1,000 pcs
	80 V	50 mA		AQV225	AQV225A	AQV225AX	AQV225AZ		

\*Indicate the peak AC and DC values.  
Note: The surface mount terminal shape 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	Type of connection	AQV221(A)	AQV225(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		
Load voltage (peak AC)		V <sub>L</sub>		40 V	80 V	
Output	Continuous load current	I <sub>L</sub>	A	0.08 A	0.05 A	A connection: Peak AC, DC B, C connection: DC
			B	0.09 A	0.06 A	
			C	0.12 A	0.075 A	
	Peak load current	I <sub>peak</sub>		0.18 A	0.15 A	A connection: 100 ms (1 shot), V <sub>L</sub> = DC
Power dissipation		P <sub>out</sub>		230 mW		
Total power dissipation		P <sub>T</sub>		280 mW		
I/O isolation voltage		V <sub>iso</sub>		1,500 V AC		
Temperature limits	Operating	T <sub>opr</sub>		-40°C to +85°C -40°F to +185°F		Non-condensing at low temperatures
	Storage	T <sub>stg</sub>		-40°C to +100°C -40°F to +212°F		

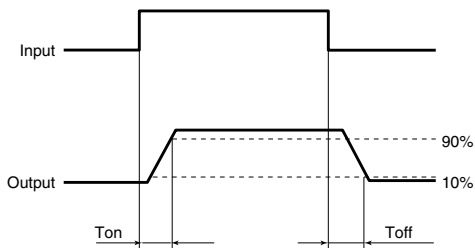
# RF 1 Form A (AQV22○)

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

Item		Symbol	Type of connection	AQV221(A)	AQV225(A)	Remarks	
Input	LED operate current	Typical	I <sub>Fon</sub>	0.9 mA		I <sub>L</sub> = Max.	
		Maximum		3 mA			
	LED turn off current	Minimum	I <sub>Foff</sub>	0.4 mA		I <sub>L</sub> = Max.	
		Typical		0.85 mA			
LED dropout voltage	Typical	V <sub>F</sub>	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	R <sub>on</sub>	A	22 Ω	36 Ω	I <sub>F</sub> = 5 mA I <sub>L</sub> = Max. Within 1 s on time
		Maximum			35 Ω	50 Ω	
		Typical	R <sub>on</sub>	B	13 Ω	21 Ω	
		Maximum			18 Ω	25 Ω	
	Output capacitance	Typical	C <sub>out</sub>	—	5.6 pF	4.8 pF	I <sub>F</sub> = 0 mA V <sub>B</sub> = 0 V f = 1 MHz
		Maximum			8 pF		
Off state leakage current	Typical	I <sub>Leak</sub>	—	0.03 nA		I <sub>F</sub> = 0 mA V <sub>L</sub> = Max.	
	Maximum			10 nA (1 nA or less)*			
Transfer characteristics	Turn on time**	Typical	T <sub>on</sub>	0.1 ms		I <sub>F</sub> = 5 mA I <sub>L</sub> = Max.	
		Maximum		0.3 ms			
	Turn off time**	Typical	T <sub>off</sub>	0.03 ms		I <sub>F</sub> = 5 mA I <sub>L</sub> = Max.	
		Maximum		0.1 ms			
	I/O capacitance	Typical	C <sub>iso</sub>	—	0.8 pF		f = 1 MHz 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	

\*Available as custom orders (1 nA or less)

\*\*Turn on/Turn off 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 <sub>F</sub>	5	mA

■ These products are not designed for automotive use.

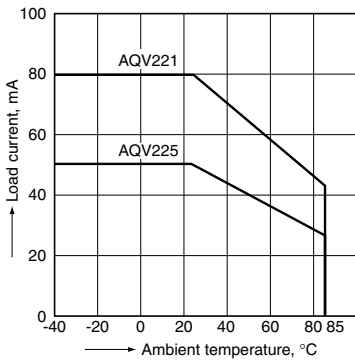
If you are considering to use these products for automotive applications, please contact your local Panasonic Corporation technical representative.

# REFERENCE DATA

## 1. Load current vs. ambient temperature characteristics

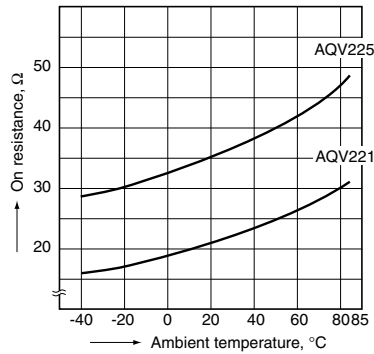
Allowable ambient temperature:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$   
 $-40^{\circ}\text{F}$  to  $+185^{\circ}\text{F}$

Type of connection: A



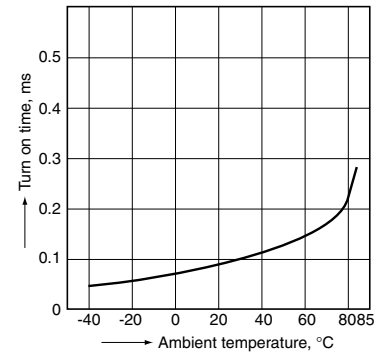
## 2. On resistance vs. ambient temperature characteristics

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



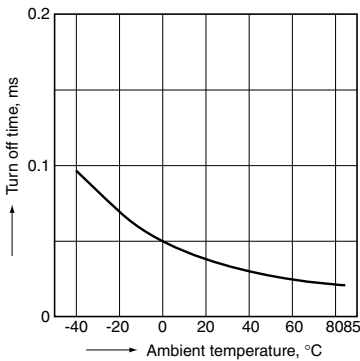
## 3. Turn on time vs. ambient temperature characteristics

Sample: AQV221, AQV225; LED current: 5 mA;  
 Load voltage: Max. (DC);  
 Continuous load current: Max. (DC)



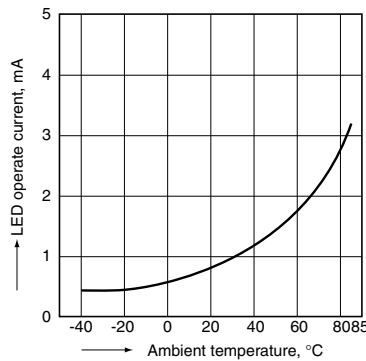
## 4. Turn off time vs. ambient temperature characteristics

Sample: AQV221, AQV225; LED current: 5 mA;  
 Load voltage: Max. (DC);  
 Continuous load current: Max. (DC)



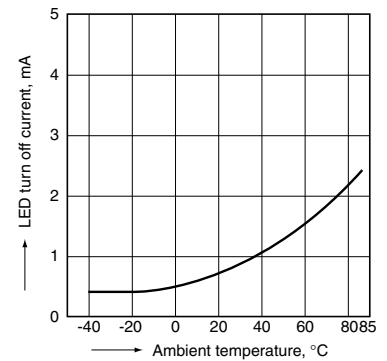
## 5. LED operate current vs. ambient temperature characteristics

Sample: AQV221, AQV225;  
 Load voltage: Max. (DC);  
 Continuous load current: Max. (DC)



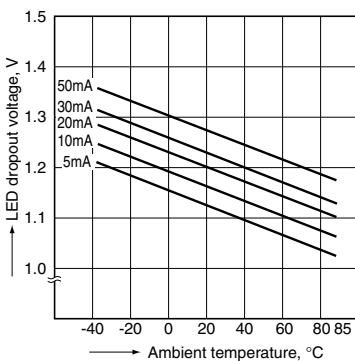
## 6. LED turn off current vs. ambient temperature characteristics

Sample: AQV221, AQV225;  
 Load voltage: Max. (DC);  
 Continuous load current: Max. (DC)



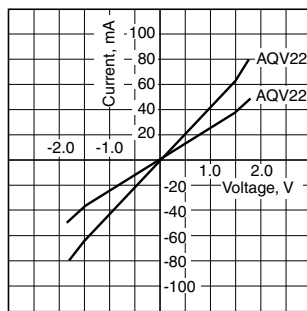
## 7. LED dropout voltage vs. ambient temperature characteristics

Sample: AQV221, AQV225;  
 LED current: 5 to 50 mA



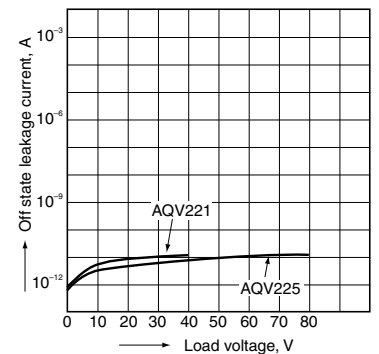
## 8. Current vs. voltage characteristics of output at MOS portion

Measured portion: between terminals 4 and 6;  
 Ambient temperature:  $25^{\circ}\text{C}$   $77^{\circ}\text{F}$



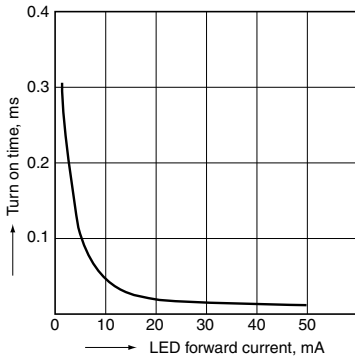
## 9. Off state leakage current vs. load voltage characteristics

Measured portion: between terminals 4 and 6;  
 Ambient temperature:  $25^{\circ}\text{C}$   $77^{\circ}\text{F}$



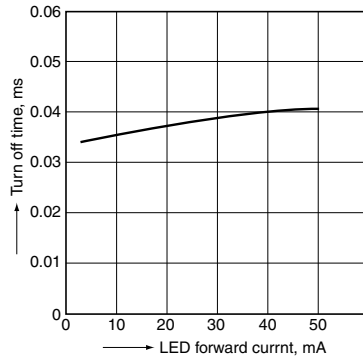
## 10. Turn on time vs. LED forward current characteristics

Sample: AQV221, AQV225;  
 Measured portion: between terminals 4 and 6;  
 Load voltage: Max. (DC);  
 Continuous load current: Max. (DC);  
 Ambient temperature: 25°C 77°F



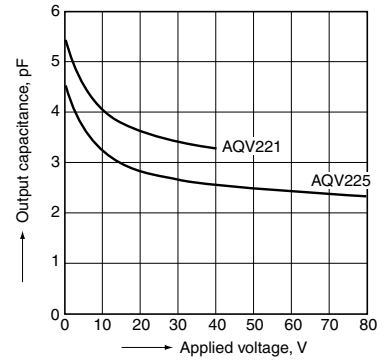
## 11. Turn off time vs. LED forward current characteristics

Sample: AQV221, AQV225;  
 Measured portion: between terminals 4 and 6;  
 Load voltage: Max. (DC);  
 Continuous load current: Max. (DC);  
 Ambient temperature: 25°C 77°F



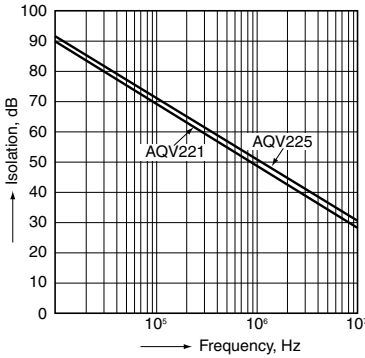
## 12. Output capacitance vs. applied voltage characteristics

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



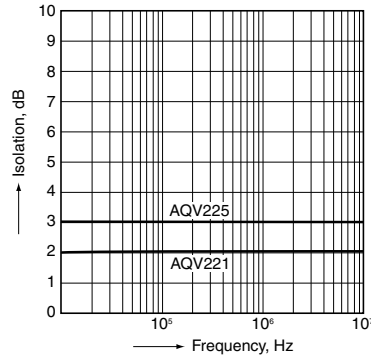
## 13. Isolation vs. frequency characteristics (50Ω impedance)

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





## 14. Insertion loss vs. frequency characteristics (50Ω impedance)

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



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