

# Panasonic ideas for life

### **Short circuit protection** (Non-latch type) only for DC load

# Photo MOS® GU 1 Form A Short Circuit Protection (AQV112KL)



### **FEATURES**

### TYPICAL APPLICATIONS

1. Protects Circuit from excess current

The short circuit protection function prevents the continued flow of short current. After short current is detected. load current is monitored, and if the load returns to normal, the device returns to normal operation.

2. No need for fuses, polyswitches, or other protectors

The built-in short circuit protection function eliminates the need for overcurrent protectors, reducing mounting costs and space requirements.

3. High capacity

Can control up to 0.5A (60V DC) load current.

mm inch

**RoHS** compliant

### • Industrial equipment

- Security equipment

#### **TYPES**

	Output rating*			Part No.					
			Package	Through hole terminal	S	surface-mount terminal		Packing quantity	
	Load Load	Load			Tape and reel packing style				
	voltage	current		Tube pac	king style	Picked from the 1/2/3-pin side	Picked from the 4/5/6-pin side	Tube	Tape and reel
DC only	60 V	500 mA	DIP6-pin	AQV112KL	AQV112KLA	AQV112KLAX	AQV112KLAZ	1 tube contains: 50 pcs. 1 batch contains: 500 pcs.	1,000 pcs.

<sup>\*</sup>Indicate the 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)

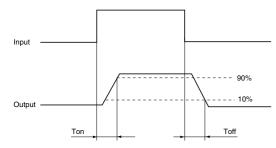
	Item	Symbol	AQV112KL(A)	Remarks
	LED forward current	lF	50 mA	
laaut	LED reverse voltage	VR	5 V	
Input	Peak forward current	IFP	1 A	f = 100 Hz, Duty factor = 0.1%
	Power dissipation	Pin	75 mW	
	Load voltage (peak AC)	VL	7 to 60V	
Output	Continuous load current	IL IL	0.5 A	Peak AC, DC
	Power dissipation	Pout	500 mW	
Total power dissipation		PT	550 mW	
I/O isolation voltage		Viso	1,500 V AC	
Tomporatura limita	Operating	Topr	<b>-40°C</b> to <b>+85°C</b> −40°F to +185°F	Non-condensing at low temperatures
Temperature limits	Storage	T <sub>stg</sub>	-40°C to +100°C -40°F to +212°F	

### GU 1 Form A Short Circuit Protection (AQV112KL)

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

	Item		Symbol	AQV112KL(A)	Condition	
Input	LED approve convent	Typical		0.8 mA	IL = 100mA	
	LED operate current	Maximum	Fon	10 mA		
	LED turn off current	Minimum	1	0.3 mA	IL = 100mA	
	LED turn on current	Typical	Foff	0.7 mA		
	LED dropout voltage	Typical	VF	1.35 V (1.17 V at I <sub>F</sub> = 10 mA)	I <sub>F</sub> = 50 mA	
	LED dropout voltage	Maximum	VF	1.5 V		
	On resistance	Typical	Ron	$0.55~\Omega$	IF = 10 mA IL = Max.	
	On resistance	Maximum	non	2.0 Ω		
Output	Load short circuit detection voltage	Typical	V <sub>LSHT</sub>	5 V	I <sub>F</sub> = 10 mA	
Output	Load Short circuit detection voltage	Maximum	VLSHI	7 V		
	Off state leakage current	Maximum	ILeak	1μΑ	I <sub>F</sub> = 0 mA V <sub>L</sub> = Max.	
		Typical	_	2.0 ms	I <sub>F</sub> = 10 mA	
	Turn on time*	Maximum	Ton	5.0 ms	IL = 100 mA VL = 10 V	
Transfer	Turn off time*	Typical	Toff	0.1 ms	IF = 10 mA IL = 100 mA VL = 10 V	
characteristics	Turri on time	Maximum	I off	1.0 ms		
	I/O capacitance	Typical	Ciso	0.8 pF	f = 1 MHz V <sub>B</sub> = 0 V	
	1/O Capacitarice	Maximum	Oiso	1.5 pF		
	Initial I/O isolation resistance	Minimum	Riso	1,000 MΩ	500 V DC	

<sup>\*</sup>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	lF	10	mA	

- **■** For Dimensions.
- **■** For Schematic and Wiring Diagrams.
- **■** For Cautions for Use.
- These products are not designed for automotive use.

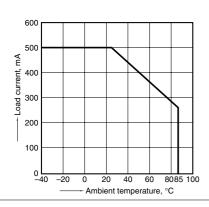
If you are considering to use these products for automotive applications, please contact your local Panasonic Corporation technical representative.

For more information.

#### REFERENCE DATA

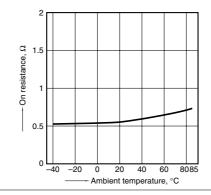
1. Load current vs. ambient temperature characteristics

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



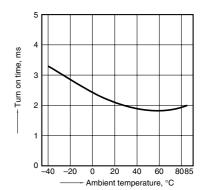
2. On resistance vs. ambient temperature characteristics

Measured portion: between terminals 4 and 6; LED current: 10 mA; Load current: Max.(DC)



3. Turn on time vs. ambient temperature characteristics

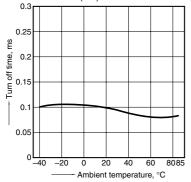
Measured portion: between terminals 4 and 6; LED current: 10 mA; Load voltage: 10V (DC); Load current: 100 mA



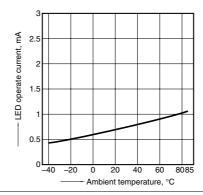
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4. Turn off time vs. ambient temperature characteristics

Measured portion: between terminals 4 and 6; LED current: 10 mA; Load voltage: 10 V (DC); Load current: 100 mA (DC)

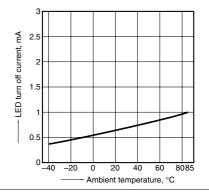


5. LED operate current vs. ambient temperature characteristics Measured portion: between terminals 4 and 6; Load current: 100 mA



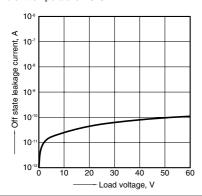
6. LED turn off current vs. ambient temperature characteristics

Measured portion: between terminals 4 and 6; Load current: 100 mA



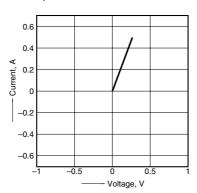
7. Off state leakage current vs. load voltage characteristics

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

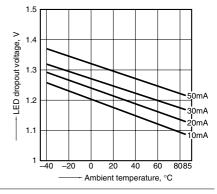


8. Current vs. voltage characteristics of output at MOS portion

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

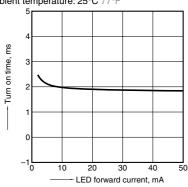


9. LED dropout voltage vs. ambient temperature characteristics Measured portion: between terminals 1 and 2; LED current: 10 to 50 mA



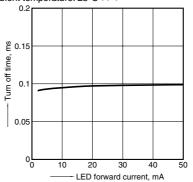
10. Turn on time vs. LED forward current characteristics

Measured portion: between terminals 4 and 6; Load voltage: 10 V (DC); Load current: 100 mA (DC); Ambient temperature:  $25^{\circ}C$   $77^{\circ}F$ 



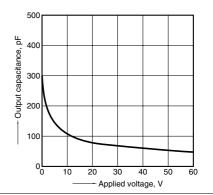
11. Turn off time vs. LED forward current characteristics

Measured portion: between terminals 4 and 6; Load voltage: 10 V (DC); Load current: 100 mA (DC); Ambient temperature: 25°C 77°F



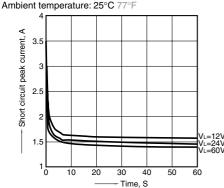
12. Output capacitance vs. applied voltage characteristics

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



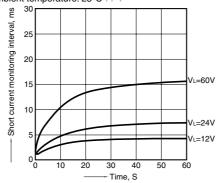
13. Short circuit peak current vs. time characteristics

Measured portion: between terminals 4 and 6; LED current: 10 mA; Load resistance: 0; Ambient temperature: 25°C 77°E



 Short current monitoring interval vs. time characteristics

Measured portion: between terminals 4 and 6; LED current: 10 mA; Load resistance: 0; Ambient temperature:  $25^{\circ}C$   $77^{\circ}F$ 



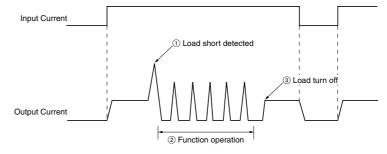
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### What is short circuit protection Non-latch type?

If the load current reaches a predetermined overcurrent level, the output-side short circuit protection function cuts off the load current. It then monitors the load current, and if it returns to normal, automatically recovers to normal device operation.

In order to operate the short circuit protection function, ensure that the input current is at least I<sub>F</sub> = 10 mA.

Operation chart (Non-latch type)



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