

# cosmo High Voltage, Solid State Relay-MOSFET Output KAQW414/414A

UL 1577/ UL 508 (File No.E108430), FI EN60950 (File No.FI13698)

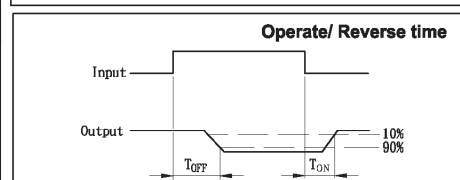
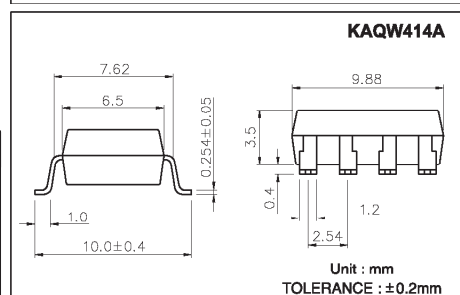
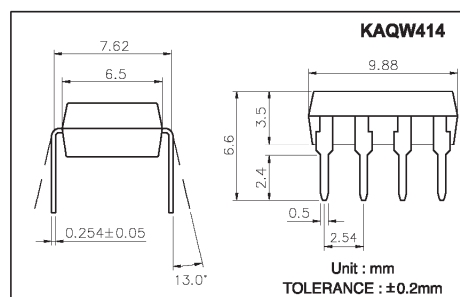
## Features

1. Normally Close, Single Pole Single Throw
2. Control 400VAC or DC Voltage
3. Switch 130mA Loads
4. LED control Current, 5mA
5. Low ON-Resistance
6.  $dv/dt$ , >500V/ms
7. Isolation Test Voltage, 3750VACrms

## Absolute Maximum Ratings

(Ta=25°C)

| Emitter ( Input )                          | Detector ( Output )                          |
|--------------------------------------------|----------------------------------------------|
| Reverse Voltage.....5.0V                   | Output Breakdown Voltage .....±400V          |
| Continuous Forward Current .....50mA       | Continuous Load Current .....±130mA          |
| Peak Forward Current .....1A               | Power Dissipation .....500mW                 |
| Power Dissipation .....100mW               |                                              |
| Derate Linearly from 25°C .....1.3mW/°C    |                                              |
| General Characteristics                    |                                              |
| Isolation Test Voltage .....3750VACrms     | Storage Temperature Range ...-40°C to +125°C |
| Isolation Resistance                       | Operating Temperature Range...-30°C to +85°C |
| Vio=500V, Ta=25°C .....≥10 <sup>10</sup> Ω | Junction Temperature.....100°C               |
| Total Power Dissipation .....550mW         | Soldering Temperature,                       |
| Derate Linearly from 25°C .....2.5mW/°C    | 2mm from case, 10 sec .....260°C             |



## Electro-optical Characteristics

(Ta=25°C)

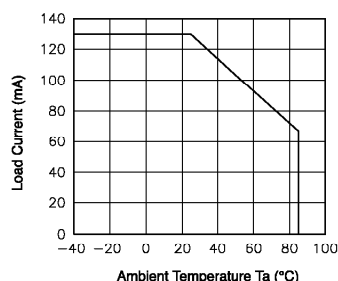
| Parameter                | Symbol            | Conditions                                              | Min. | Typ. | Max. | Unit |
|--------------------------|-------------------|---------------------------------------------------------|------|------|------|------|
| Emitter (Input)          |                   |                                                         |      |      |      |      |
| Forward Voltage          | V <sub>F</sub>    | I <sub>F</sub> = 10mA                                   |      | 1.2  | 1.5  | V    |
| Operation Input Current  | I <sub>FOFF</sub> | V <sub>L</sub> = ±20V, I <sub>L</sub> ≤ 5uA             |      |      | 5    | mA   |
| Recovery Input Current   | I <sub>FON</sub>  | V <sub>L</sub> = ±20V, I <sub>L</sub> = 100mA, t = 10mS | 0.2  |      |      | mA   |
| Detector (Output)        |                   |                                                         |      |      |      |      |
| Output Breakdown Voltage | V <sub>B</sub>    | I <sub>B</sub> = 50uA                                   | 400  |      |      | V    |
| Output Off-State Leakage | I <sub>TOFF</sub> | V <sub>T</sub> = 100V, I <sub>F</sub> = 10mA            |      | 0.2  | 2    | uA   |
| I/O Capacitance          | C <sub>ISO</sub>  | I <sub>F</sub> = 0, f = 1MHz                            |      | 6    |      | pF   |
| ON Resistance            | R <sub>ON</sub>   | I <sub>L</sub> = 100mA, I <sub>F</sub> = 0mA            |      | 40   | 50   | Ω    |
| Reverse (ON) Time        | T <sub>ON</sub>   | I <sub>F</sub> = 10mA, V <sub>L</sub> = ±20V            |      | 0.6  | 1.5  | ms   |
| Operate (OFF) Time       | T <sub>OFF</sub>  | t = 10ms, I <sub>L</sub> = ±100mA                       |      | 0.3  | 1.0  | ms   |

## Schematic and Wiring Diagrams

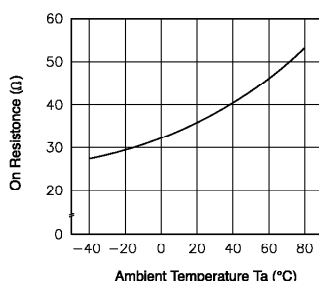
| Type                     | Schematic | Output configuration | Load  | Connection | Wiring Diagrams                                                 |
|--------------------------|-----------|----------------------|-------|------------|-----------------------------------------------------------------|
| KAQW414<br>&<br>KAQW414A |           | 2b                   | AC/DC | -          | <p>(1) Two independent 1 Form B use</p> <p>(2) 2 Form B use</p> |

## Data Curve

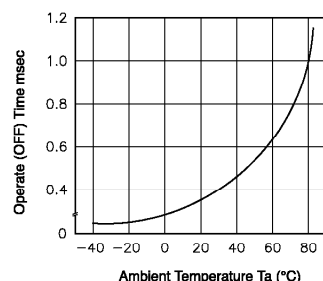
**Fig.1** Load current vs. ambient temperature  
Allowable ambient temperature:  
-40°C to +85°C



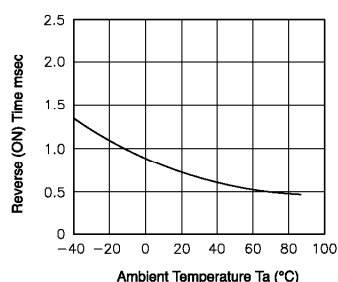
**Fig.2** On resistance vs. ambient temperature  
Across terminals 5,7 and 6,8 pin  
LED current: 0mA  
Continuous load current: 130mA(DC)



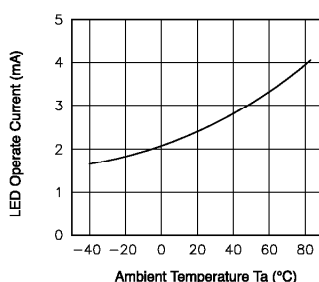
**Fig.3** Operate (OFF) time vs. ambient temperature  
Load voltage: 400V(DC)  
LED current: 5mA  
Continuous load current: 130mA(DC)



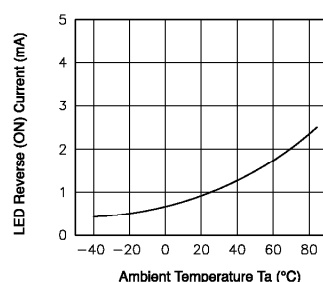
**Fig.4** Reverse (ON) time vs. ambient temperature  
LED current: 5mA  
Load voltage: 400V(DC)  
Continuous load current: 130mA(DC)



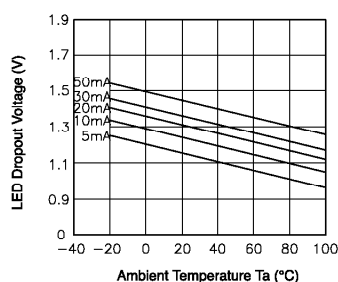
**Fig.5** LED operate (OFF) vs. ambient temperature  
Load voltage: 400V(DC)  
Continuous load current: 130mA(DC)



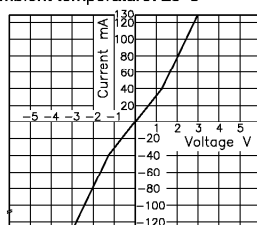
**Fig.6** LED reverse (ON) current vs. ambient temperature  
Load voltage: 400V(DC)  
Continuous load current: 130mA(DC)



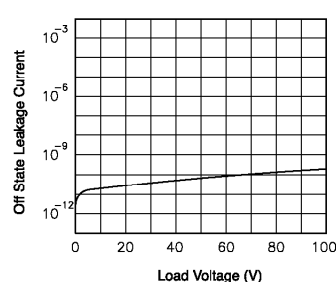
**Fig.7** LED dropout voltage vs. ambient temperature  
LED current: 5 to 50mA



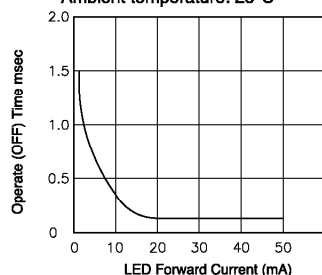
**Fig.8** Voltage vs. current characteristics of output at MOS FET portion  
Measured portion: across terminals 5,7 and 6,8 pin  
Ambient temperature: 25°C



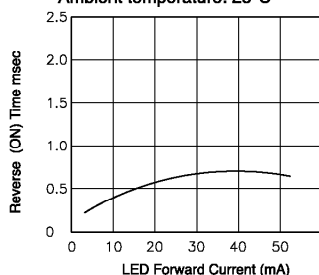
**Fig.9** Off state leakage current  
Across terminals 5,7 and 6,8 pin  
Ambient temperature: 25°C



**Fig.10** LED forward current vs. operate (OFF) time  
Across terminals 5,7 and 6,8 pin;  
Load voltage: 400V (DC);  
Continuous load current: 130mA (DC);  
Ambient temperature: 25°C



**Fig.11** LED forward current vs. reverse time  
Across terminals 5,7 and 6,8 pin;  
Load voltage: 400V (DC);  
Continuous load current: 130mA (DC);  
Ambient temperature: 25°C



**Fig.12** Applied voltage vs. output capacitance  
Across terminals 5,7 and 6,8 pin  
Frequency: 1MHz  
Ambient temperature: 25°C

