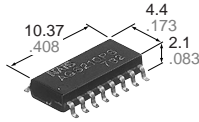


# NAIS

**GU (General Use) Type  
SOP Series  
Multi-function (DAA) 16pin  
Type**

# PhotoMOS RELAYS



mm inch

- (1) PhotoMOS Relay (for hookswitch, dial pulse)
  - (2) Optocoupler (for ring detection)
  - (3) Darlington for transistor (for electronic inductance)
  - (4) Diode bridge (for polarity protection)
2. Ultra-small package size

**2. SO package 16-Pin type in super miniature design**

The device comes in a super-miniature SO package 16-Pin type measuring (W)4.4 × (L)10.37 × (H) 2.1mm (W).173 × (L).408 × (H).083inch

**3. Ideal for PC card and Fax/Modem applications**

The small size provides additional space for increased functionality. The new device has been specifically designed for the PCMCIA embedded and handheld device markets.

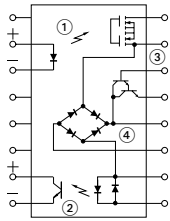
**4. Tape and reel**

The device comes standard in tape and reel (1,000 pcs./reel) for use with automatic insertion machines.

**5. Internal zener diode type also available**

## FEATURES

**1. DAA (Data Access Arrangement) circuit package**



## TYPICAL APPLICATIONS

- PCMCIA Modem card (Data/fax modem)
- Laptop and notebook computers
- PDA's
- Mobile computing equipment
- Medical equipment
- Security systems
- Meters (Water, Gas, Vending machine)

## TYPES

Type	Relay portion Output rating*		Part No.		Packing quantity in tape and reel
	Load voltage	Load current	Picked from the 1/2/3/4/5/6/7/8-pin side	Picked from the 9/10/11/12/13/14/15/16-pin side	
AC/DC type	350V	120mA	AQS210PSX	AQS210PSZ	1,000 pcs.

\* Indicate the peak AC and DC values.

Notes: (1) Tape package is the standard packing style. Also available in tube. (Part No. suffix "X" or "Z" is not needed when ordering; Tube: 50 pcs.; Case: 1,000 pcs.)

(2) For space reasons, the package type indicator "X" and "Z" are omitted from the seal.

## RATING

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

**1) Relay portion (2, 3, 15, 16 pins)**

Item		Symbol	AQS210PS	Remarks
Input	LED forward current	I <sub>F</sub>	50mA	
	LED reverse voltage	V <sub>R</sub>	3V	
	Peak forward current	I <sub>FP</sub>	1A	f=100 Hz, Duty factor=0.1%
	Power dissipation	P <sub>in</sub>	75mW	
Output	Load voltage (peak AC)	V <sub>L</sub>	350V	
	Continuous load current	I <sub>L</sub>	0.12A	Peak AC,DC
	Peak load current	I <sub>peak</sub>	0.36A	100 ms (1 shot), V <sub>L</sub> = DC
	Power dissipation	P <sub>out</sub>	400mW	

**2) Detector portion (7, 8, 9, 10 pins)**

Item		Symbol	AQS210PS	Remarks
Input	LED forward current	I <sub>F</sub>	50mA	
	Peak forward current	I <sub>FP</sub>	1A	f = 100 Hz, Duty factor=0.1%
	Power dissipation	P <sub>in</sub>	75mW	
Output	Voltage between collector and emitter	BV <sub>CEO</sub>	30V	
	Power dissipation	P <sub>out</sub>	150mW	

**3) Bridge rectifier portion (10, 11, 12, 15 pins)**

Item		Symbol	AQS210PS	Remarks
Forward current		I <sub>F</sub>	140mA	
Peak forward current		I <sub>FP</sub>	500mA	t=10ms
Reverse voltage		V <sub>R</sub>	100V	

**AQS210PS**

## 4) Darlington portion (12, 13, 14 pins)

Item	Symbol	AQS210PS	Remarks
Output voltage	$BV_{CEC}$	40V	
Collector current	$I_c$	120mA	$V_{CE}=3.5V$
Power dissipation	$P_{out}$	500mW	

## 5) Others

Item	Symbol	AQS210PS	Remarks
Total power dissipation	$P_T$	650mW	
I/O isolation voltage	$V_{iso}$	1500V AC	
Temperature limits	Operating	$T_{opr}$	$-40^{\circ}C$ to $+85^{\circ}C$ $-40^{\circ}F$ to $+185^{\circ}F$
	Storage	$T_{stg}$	$-40^{\circ}C$ to $+100^{\circ}C$ $-40^{\circ}F$ to $+212^{\circ}F$

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

## 1) Relay portion (2, 3, 15, 16 pins)

Item		Symbol	AQS210PS	Condition
Input	LED operate current	Typical	0.9mA	$I_L=Max.$
		Maximum	3mA	
	LED turn off current	Minimum	0.4mA	$I_L=Max.$
		Typical	0.8mA	
LED dropout voltage	Typical	1.14 (1.25 V at $I_F=50mA$ )		$I_F=5mA$
	Maximum	1.5V		
Output	On resistance	Typical	18Ω	$I_F=5mA$ $I_L=Max.$ Within 1 s on time
		Maximum	25Ω	
	Off state leakage current	Maximum	$I_{Leak}$	
Transfer characteristics	Turn on time*	Typical	$T_{on}$	$I_F=5mA$ $I_L=Max.$
		Maximum	2.0ms	
	Turn off time*	Typical	$T_{off}$	0.04ms $I_F=5mA$ $I_L=Max.$
		Maximum	1.0ms	

Note: Recommendable LED forward current  $I_F=5mA$ .

## 2) Detector portion (7, 8, 9, 10 pins)

Item		Symbol	AQS210PS	Condition
Input	LED operate current	Typical	$I_{Fon}$	$I_c=2mA$ $V_{CE}=0.5V$
		Maximum	6mA	
	LED turn off current	Minimum	$I_{Foff}$	$I_c=1\mu A$ $V_{CE}=5V$
		Typical	35μA	
LED dropout voltage	Typical	1.14 (1.25 V at $I_F=50mA$ )		$I_F=5mA$
	Maximum	1.5V		
Output	Saturation voltage	Typical	$V_{on}$	$I_F=15mA$ $I_c=2mA$
		Maximum	0.5V	
	Off state leakage current	Typical	$I_{CEO}$	$I_F=0$ $V_{CE}=5V$
		Maximum	500nA	
Current transfer ratio	Minimum	—	33% $I_F=5mA$ $V_{CE}=0.5V$	
	Typical	100%		
Transfer characteristics	Turn on time*	Typical	$T_{on}$	$I_F=5mA$ $V_{CE}=5V$ $I_c=2mA$
	Turn off time*	Typical	$T_{off}$	$I_F=5mA$ $V_{CE}=5V$ $I_c=2mA$

## 3) Diode Bridge portion (10, 11, 12, 15 pins)

Item		Symbol	AQS210PS	Condition
Forward dropout voltage	Typical	$I_F$	0.9V	$I_F=120mA$
	Maximum		1.2V	
Reverse leakage current	Maximum	$I_R$	10μA	$V_R=100V$

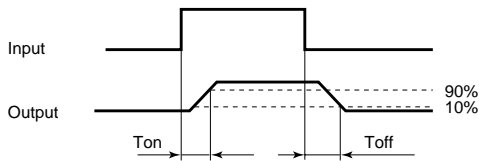
4) Darlington transistor portion (12, 13, 14 pins)

Item		Symbol	AQS210PS	Condition
Saturation voltage	Typical	$V_{CE(SAT)}$	0.73V	$I_C=120mA$
	Maximum		1.5V	
Collector leakage current	Maximum	$I_{CEX}$	1 $\mu$ A	$V_{CE}=10V, I_B=0mA$
DC current gain	Minimum	$h_{FE}$	10,000	$I_C=120mA$ $V_{CE}=10V$
	Typical		30,000	
Total harmonic distortion	Maximum	—	-80dB	$I_C=40mA, f_o=300Hz$ @-10dBm

5) Others

Item		Symbol	AQS210PS	Condition
Transfer characteristics	I/O capacitance	Typical	0.8pF	—
		Maximum	1.5pF	
	Initial I/O isolation resistance	Minimum	$R_{iso}$	

\*Turn on/Turn off time



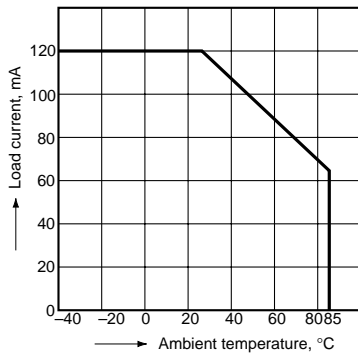
- For Dimensions, see Page 441.
- For Schematic and Wiring Diagrams, see Page 446.
- For Cautions for Use, see Page 449.

**REFERENCE DATA**

[1] Relay portion (2, 3, 15, 16 pins) [AQS210PS]

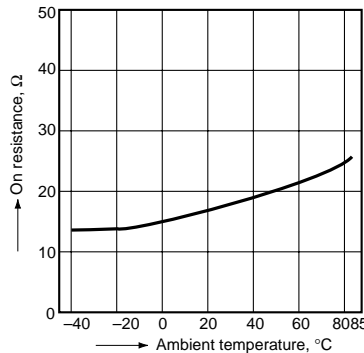
1. Load current vs. ambient temperature characteristics

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



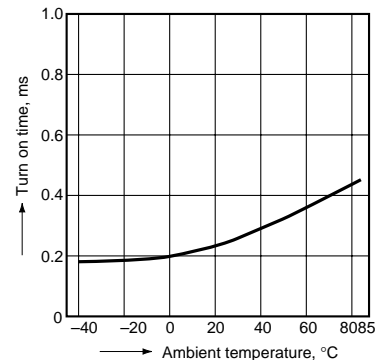
2. On resistance vs. ambient temperature characteristics

Measured portion: between terminals 15 and 16  
LED current: 5 mA; Load voltage: Max. (DC);  
Continuous load current: Max. (DC)



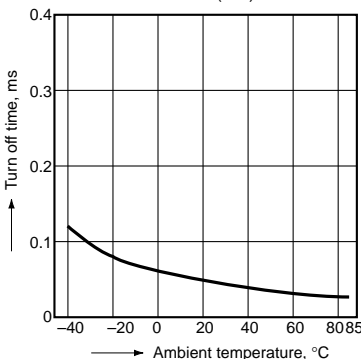
3. Turn on time vs. ambient temperature characteristics

LED current: 5 mA; Load voltage: Max. (DC);  
Continuous load current: Max. (DC)



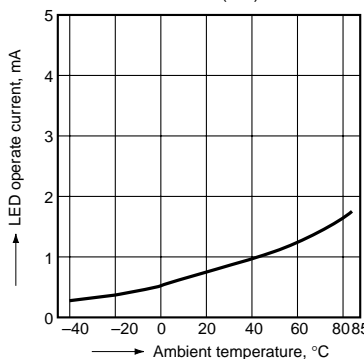
4. Turn off time vs. ambient temperature characteristics

LED current: 5 mA; Load voltage: Max. (DC);  
Continuous load current: Max. (DC)



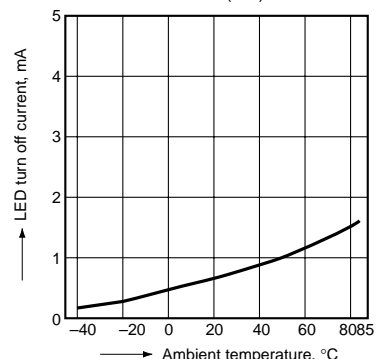
5. LED operate current vs. ambient temperature characteristics

Load voltage: Max. (DC);  
Continuous load current: Max. (DC)



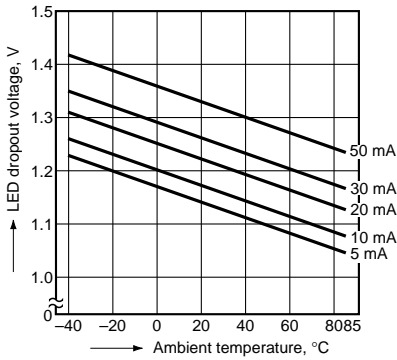
6. LED turn off current vs. ambient temperature characteristics

Load voltage: Max. (DC);  
Continuous load current: Max. (DC)

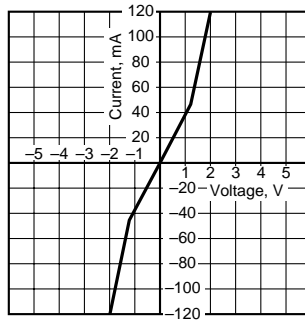


# AQS210PS

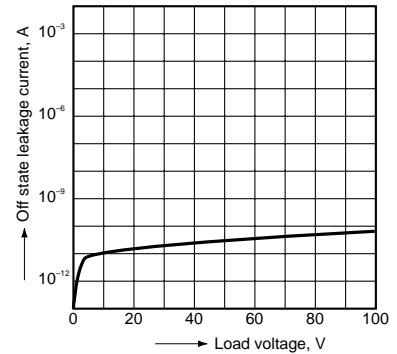
7. LED dropout voltage vs. ambient temperature characteristics  
LED current: 5 to 50 mA



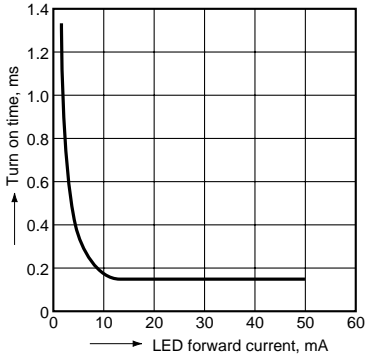
8. Voltage vs. current characteristics of output at MOS portion  
Measured portion: between terminals 15 and 16  
Ambient temperature: 25°C 77°F



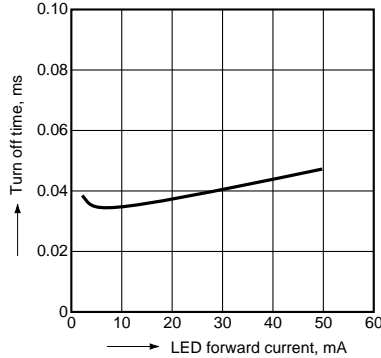
9. Off state leakage current  
Measured portion: between terminals 15 and 16  
Ambient temperature: 25°C 77°F



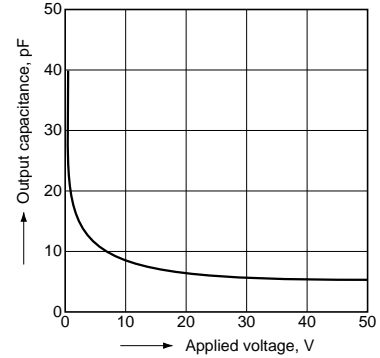
10. LED forward current vs. turn on time characteristics  
Measured portion: between terminals 15 and 16  
Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature: 25°C 77°F



11. LED forward current vs. turn off time characteristics  
Measured portion: between terminals 15 and 16  
Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature: 25°C 77°F

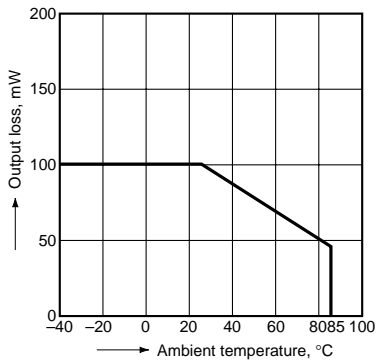


12. Applied voltage vs. output capacitance characteristics  
Measured portion: between terminals 15 and 16  
Frequency: 1 MHz; Ambient temperature: 25°C 77°F

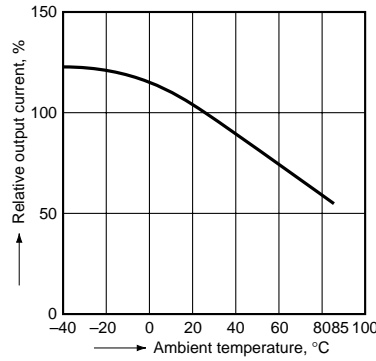


## [2] Detector portion (7, 8, 9, 10 pins)

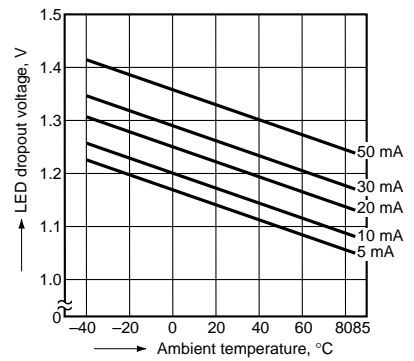
1. Output loss vs. ambient temperature characteristics  
Allowable ambient temperature: -40°C to +85°C  
-40°F to +185°F



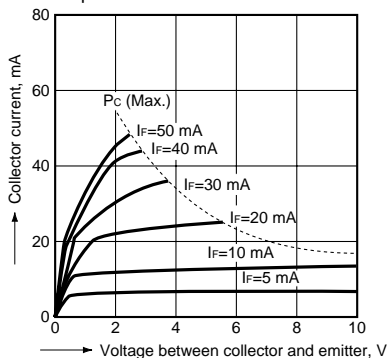
2. Relative output current vs. ambient temperature characteristics  
Measured portion: between terminals 7 and 8  
I<sub>F</sub> = 5 mA, V<sub>CE</sub> = 0.5 V DC



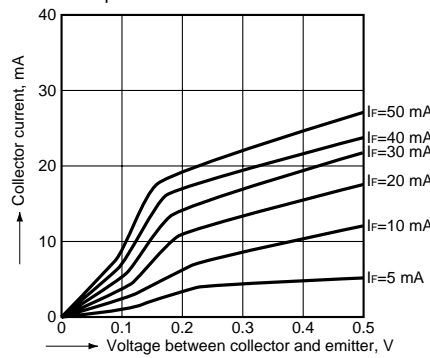
3. LED dropout voltage vs. ambient temperature characteristics  
LED current: 5 to 50 mA



4-1. Collector current vs. voltage between collector and emitter characteristics (I<sub>C</sub>-V<sub>CE</sub>)  
Measured portion: between terminals 7 and 8  
Ambient temperature: 25°C 77°F



4-2. Collector current vs. voltage between collector and emitter characteristics (I<sub>C</sub>-V<sub>CE</sub>)  
Measured portion: between terminals 7 and 8  
Ambient temperature: 25°C 77°F



5. Off state leakage current  
Measured portion: between terminals 7 and 8  
I<sub>F</sub> = 0 mA  
T<sub>a</sub> = 25°C 77°F

