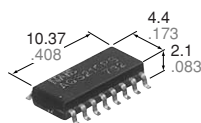


# NAIS

## DAA (Data Access Arrangement) circuit package. SOP 16-pin type.

# GU PhotoMOS (AQS210PS)



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.

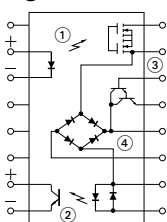
### 4. Tape and reel

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>	5V	
	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	

# GU PhotoMOS (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
		Maximum	3mA
	LED turn off current	Minimum	0.4mA
		Typical	0.8mA
	LED dropout voltage	Typical	1.25 (1.14 V at $I_F=5mA$ )
		Maximum	1.5V
Output	On resistance	Typical	18Ω
		Maximum	25Ω
	Off state leakage current	Maximum	1μA
Transfer characteristics	Turn on time*	Typical	0.23ms
		Maximum	2.0ms
	Turn off time*	Typical	0.04ms
		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	2mA
		Maximum	6mA
	LED turn off current	Minimum	5μA
		Typical	35μA
	LED dropout voltage	Typical	1.14 (1.25 V at $I_F=50mA$ )
		Maximum	1.5V
Output	Saturation voltage	Typical	0.08V
		Maximum	0.5V
	Off state leakage current	Typical	0.01nA
		Maximum	500nA
	Current transfer ratio	Minimum	33%
		Typical	100%
Transfer characteristics	Turn on time*	Typical	0.01ms
	Turn off time*	Typical	0.03ms

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

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

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

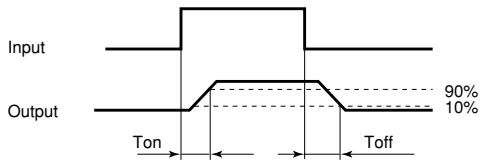
Item		Symbol	AQS210PS	Condition
Saturation voltage	Typical	$V_{CE(SAT)}$	0.73V	$I_C=120mA$
	Maximum		1.5V	
Collector leakage current	Maximum	$I_{CEX}$	1 $\mu$ A	$V_{CE}=10V, I_B=0mA$
DC current gain	Minimum	$h_{FE}$	10,000	$I_C=120mA$ $V_{CE}=10V$
	Typical		30,000	
Total harmonic distortion	Maximum	—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

## 5) Others

Item		Symbol	AQS210PS	Condition
Transfer characteristics	I/O capacitance	Typical	$C_{iso}$	—
		Maximum		
	Initial I/O isolation resistance	Minimum	$R_{iso}$	1,000M $\Omega$

\*Turn on/Turn off time

For type of connection, see page 33.



■ For Dimensions, see Page 28.

■ For Schematic and Wiring Diagrams, see Page 33.

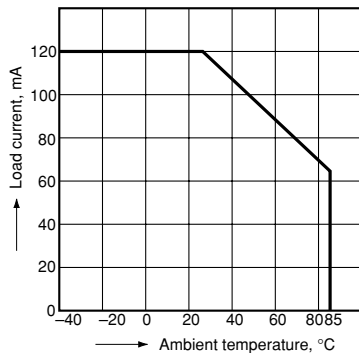
■ For Cautions for Use, see Page 36.

## REFERENCE DATA

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

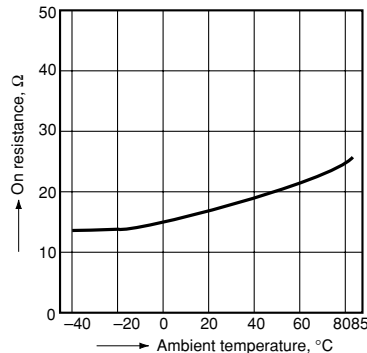
1. Load current vs. ambient temperature characteristics

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



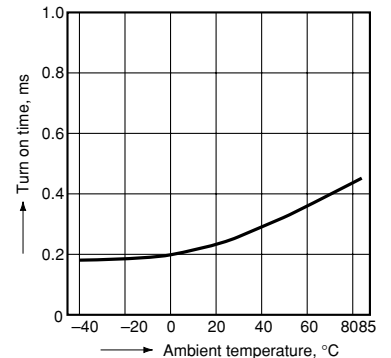
2. On resistance vs. ambient temperature characteristics

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



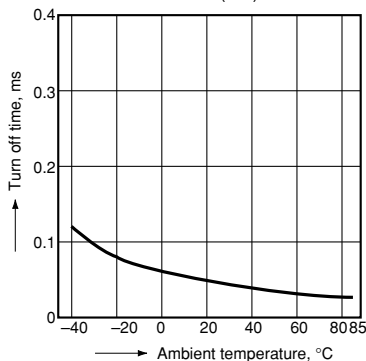
3. Turn on time vs. ambient temperature characteristics

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



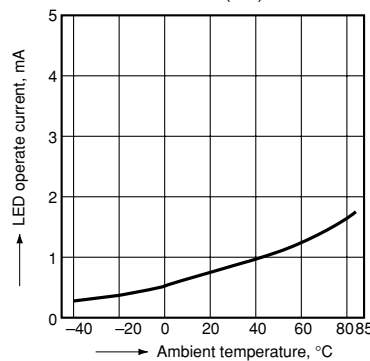
4. Turn off time vs. ambient temperature characteristics

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



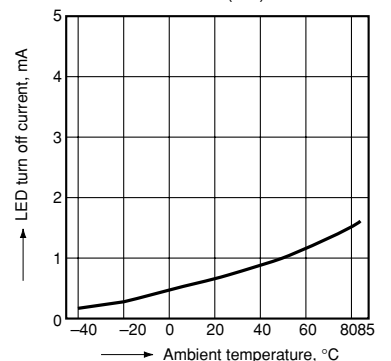
5. LED operate current vs. ambient temperature characteristics

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



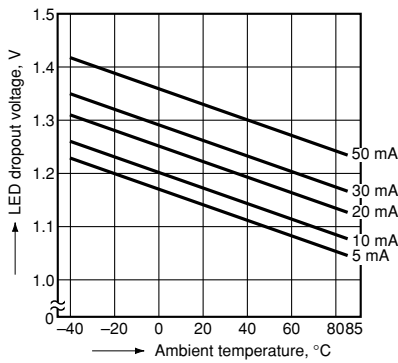
6. LED turn off current vs. ambient temperature characteristics

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

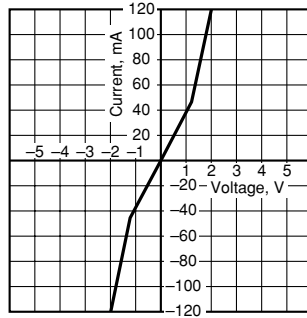


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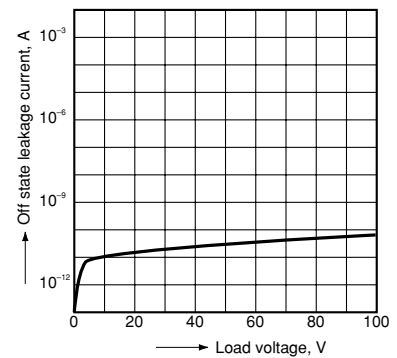
7. LED dropout voltage vs. ambient temperature characteristics  
LED current: 5 to 50 mA



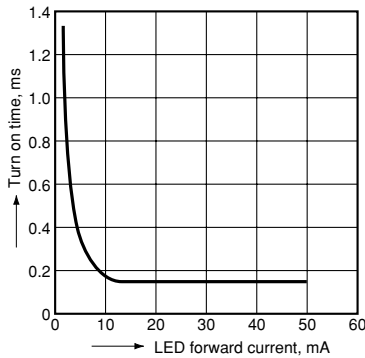
8. Voltage vs. current characteristics of output at MOS portion  
Measured portion: between terminals 15 and 16  
Ambient temperature: 25°C 77°F



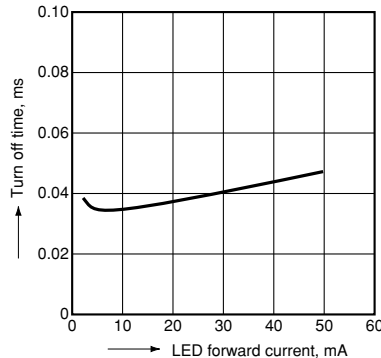
9. Off state leakage current  
Measured portion: between terminals 15 and 16  
Ambient temperature: 25°C 77°F



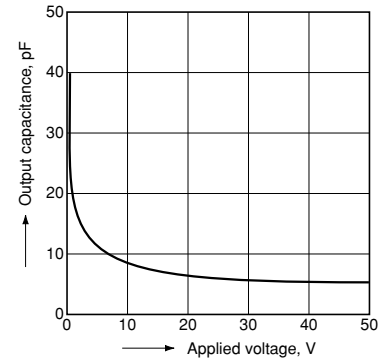
10. LED forward current vs. turn on time characteristics  
Measured portion: between terminals 15 and 16  
Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature: 25°C 77°F



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



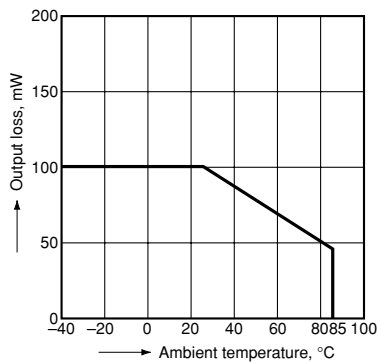
12. Applied voltage vs. output capacitance characteristics  
Measured portion: between terminals 15 and 16  
Frequency: 1 MHz; Ambient temperature: 25°C 77°F



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

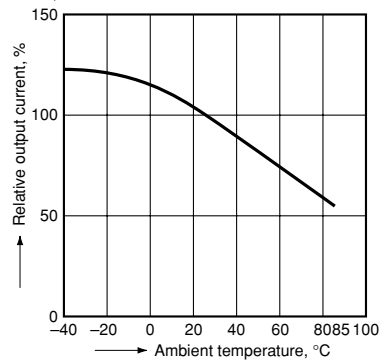
1. Output loss vs. ambient temperature characteristics

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

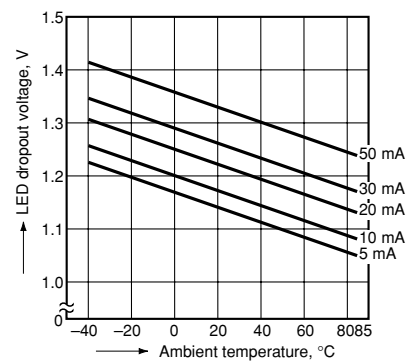


2. Relative output current vs. ambient temperature characteristics

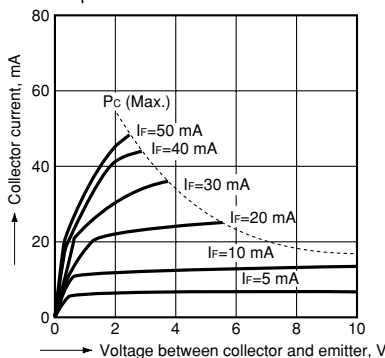
Measured portion: between terminals 7 and 8  
I<sub>F</sub> = 5 mA, V<sub>CE</sub> = 0.5 V DC



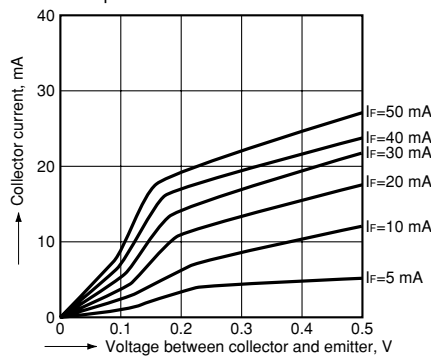
3. LED dropout voltage vs. ambient temperature characteristics  
LED current: 5 to 50 mA



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

