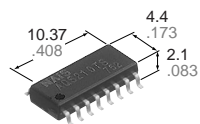


# NAIS

## GU (General Use) Type SOP Series Multi-function (1a,2a MOSFET & optocoupler) 16 Pin Type

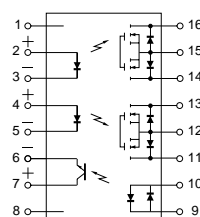
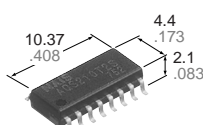
# PhotoMOS RELAYS

2 MOSFET Relay and  
1 optocoupler type

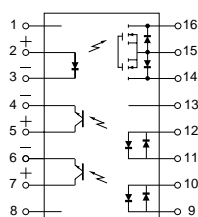


mm inch

1 MOSFET Relay and  
2 optocouplers type



Relay portion  
(2,3,14,15,16 pins)  
Detector portion  
(4,5,11,12,13 pins)  
Detector portion  
(6,7,9,10 pins)



Relay portion  
(2,3,14,15,16 pins)  
Detector portion  
(4,5,11,12 pins)  
Detector portion  
(6,7,9,10 pins)

## FEATURES

### 1. 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

### 2. 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.

### 3. Tape and reel

The device comes standard in a tape and reel (1,000 pcs./reel) to facilitate automatic insertion machines.

## 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

1 optocoupler type	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	350 V	100 mA	AQS210TSX	AQS210TSZ	1,000 pcs.

2 optocouplers type	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	350 V	120 mA	AQS210T2SX	AQS210T2SZ	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, 14, 15, 16 and 4, 5, 11, 12, 13 pins) [AQS210TS], (2, 3, 14, 15, 16 pins) [AQS210T2S]

Item	Symbol	Part No.		Remarks
		AQS210TS	AQS210T2S	
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	V <sub>L</sub>	350V	
	Continuous load current	I <sub>L</sub>	0.1A (0.12 A)	0.12A ( ) : in case of using only 1 channel
	Peak load current	I <sub>peak</sub>	0.36A	100 ms (1 shot), V <sub>L</sub> = DC
	Power dissipation	P <sub>out</sub>	600mW	400mW

2) Detector portion (6, 7, 9, 10 pins) [AQS210TS], (4, 5, 11, 12 and 6, 7, 9, 10 pins) [AQS210T2S]

Item	Symbol	Part No.		Remarks
		AQS210TS	AQS210T2S	
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	Output voltage	BV <sub>CEO</sub>	30V	
	Power dissipation	P <sub>out</sub>	150mW	100mW

3) Others

Item	Symbol	Part No.		Remarks
		AQS210TS	AQS210T2S	
Total power dissipation	P <sub>T</sub>	650mW		
I/O isolation voltage	V <sub>iso</sub>	1500V AC		
Temperature limits	Operating	T <sub>opr</sub>	-40°C to +85°C -40°F to +185°F	
	Storage	T <sub>stg</sub>	-40°C to +100°C -40°F to +212°F	

# AQS210TS, 210T2S

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

### 1) Relay portion (2, 3, 14, 15, 16 and 4, 5, 11, 12, 13 pins) [AQS210TS] (2, 3, 14, 15, 16 pins) [AQS210T2S]

Item		Symbol	AQS210TS	AQS210T2S	Condition
Input	LED operate current	Typical	0.9mA		I <sub>L</sub> =Max.
		Maximum	3mA		
	LED turn off current	Minimum	0.4mA		I <sub>L</sub> =Max.
		Typical	0.8mA		
LED dropout voltage	Typical	1.14 (1.25 V at I <sub>F</sub> =50mA)		I <sub>F</sub> =5mA	
	Maximum	1.5V			
Output	On resistance	Typical	17Ω		I <sub>F</sub> =5mA I <sub>L</sub> =Max. Within 1 s on time
		Maximum	25Ω		
	Off state leakage current	Maximum	1μA		I <sub>F</sub> =0 I <sub>L</sub> =Max.
Transfer characteristics	Turn on time*	Typical	0.23ms		I <sub>F</sub> =5mA I <sub>L</sub> =Max.
		Maximum	1.0 ms		
	Turn off time*	Typical	0.04ms		I <sub>F</sub> =5mA I <sub>L</sub> =Max.
		Maximum	1.0 ms		

### 2) Detector portion (6, 7, 9, 10 pins) [AQS210TS] (4, 5, 11, 12 and 6, 7, 9, 10 pins) [AQS210T2S]

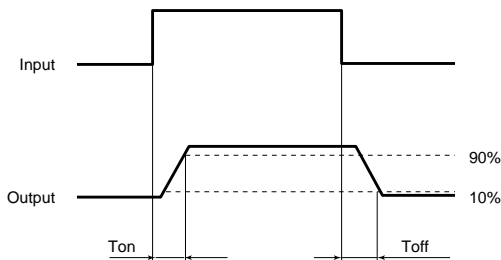
Item		Symbol	AQS210TS	AQS210T2S	Condition
Input	LED operate current	Typical	2mA		I <sub>C</sub> =2mA V <sub>CE</sub> =0.5V
		Maximum	6mA		
	LED turn off current	Minimum	5μA		I <sub>C</sub> =1μA V <sub>CE</sub> =5V
		Typical	35μA		
LED dropout voltage	Typical	1.14 (1.25 V at I <sub>F</sub> =50mA)		I <sub>F</sub> =5mA	
	Maximum	1.5V			
Output	Saturation voltage	Typical	0.08V		I <sub>F</sub> =15mA I <sub>C</sub> =2mA
		Maximum	0.5V		
	Off state leakage current	Typical	0.01nA		I <sub>F</sub> =0 V <sub>CE</sub> =5V
		Maximum	500nA		
Current transfer ratio	Minimum	33%		I <sub>F</sub> =5mA V <sub>CE</sub> =0.5V	
	Typical	100%			
Transfer characteristics	Turn on time*	Typical	0.01ms		I <sub>F</sub> =5mA V <sub>CE</sub> =5V I <sub>C</sub> =2mA
	Turn off time*	Typical	0.03ms		I <sub>F</sub> =5mA V <sub>CE</sub> =5V I <sub>C</sub> =2mA

### 3) Others

Item		Symbol	AQS210TS	AQS210T2S	Condition
Transfer characteristics	I/O capacitance	Typical	0.8pF		f =1 MHz V <sub>B</sub> =0
		Maximum	1.5pF		
	Initial I/O isolation resistance	Minimum	1,000MΩ		500V DC

\*Turn on/Turn off time

For type of connection, see page 34.



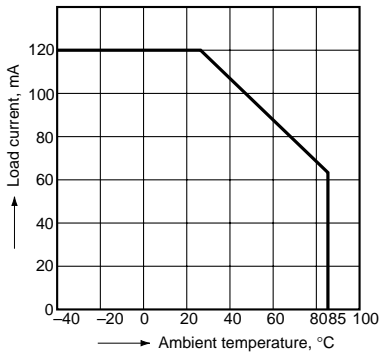
- For Dimensions, see Page 28.
- For Schematic and Wiring Diagrams, see Page 34.
- For Cautions for Use, see Page 36.

**REFERENCE DATA**

**[1] Relay portion (2, 3, 14, 15, 16 and 4, 5, 11, 12, 13 pins) [AQS210TS] (2, 3, 14, 15, 16 pins) [AQS210T2S]**

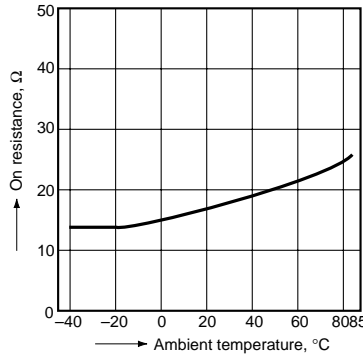
1. Load current vs. ambient temperature characteristics

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



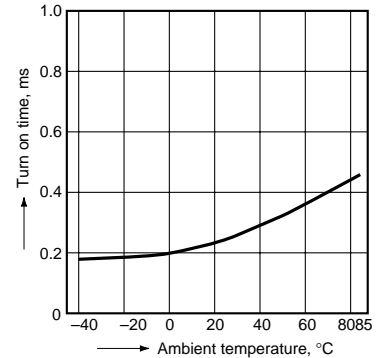
2. On resistance vs. ambient temperature characteristics

Measured portion: between terminals 14 and 16 (AQS210TS), (AQS210T2S); LED current: 5 mA; Load voltage: Max. (DC); Continuous load current: Max. (DC)



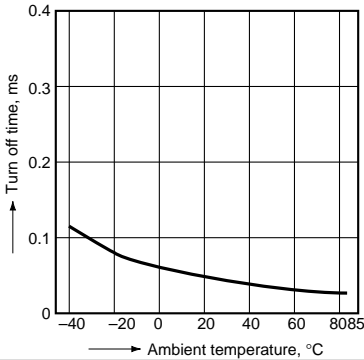
3. Turn on time vs. ambient temperature characteristics

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



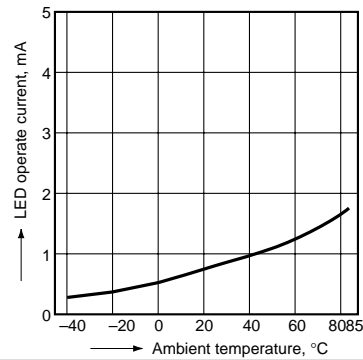
4. Turn off time vs. ambient temperature characteristics

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



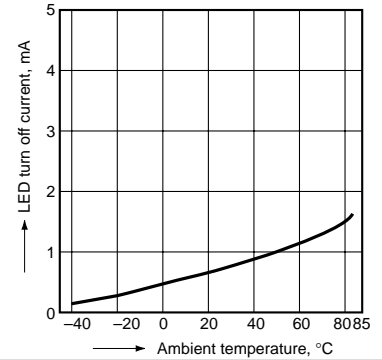
5. LED operate current vs. ambient temperature characteristics

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



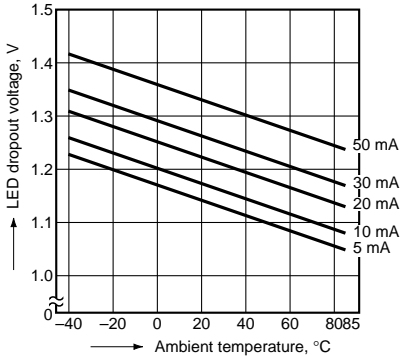
6. LED turn off current vs. ambient temperature characteristics

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



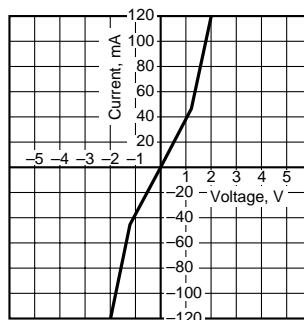
7. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



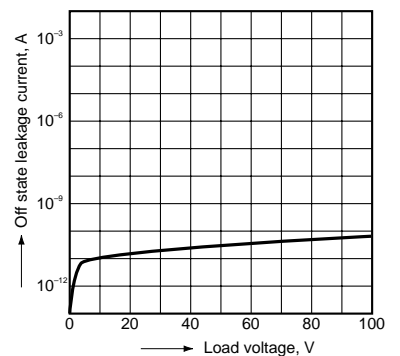
8. Voltage vs. current characteristics of output at MOS portion

Measured portion: between terminals 14 and 16 (AQS210TS), (AQS210T2S); Ambient temperature: 25°C 77°F



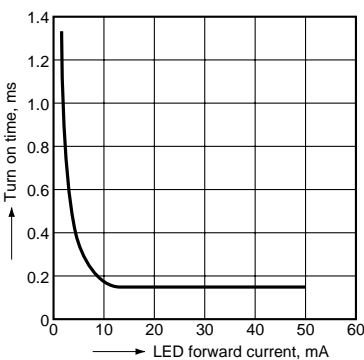
9. Off state leakage current

Measured portion: between terminals 14 and 16 (AQS210TS), (AQS210T2S); Ambient temperature: 25°C 77°F



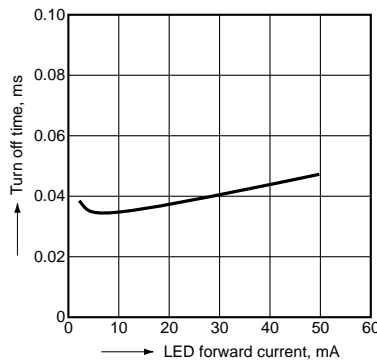
10. LED forward current vs. turn on time characteristics

Measured portion: between terminals 14 and 16 (AQS210TS), (AQS210T2S); Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature: 25°C 77°F



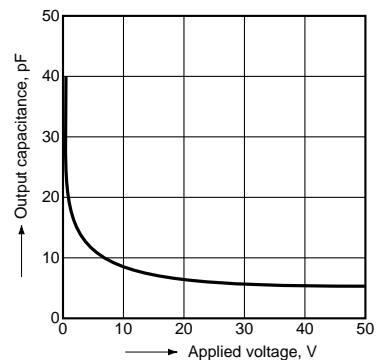
11. LED forward current vs. turn off time characteristics

Measured portion: between terminals 14 and 16 (AQS210TS), (AQS210T2S); 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 14 and 16 (AQS210TS), (AQS210T2S); Frequency: 1 MHz; Ambient temperature: 25°C 77°F

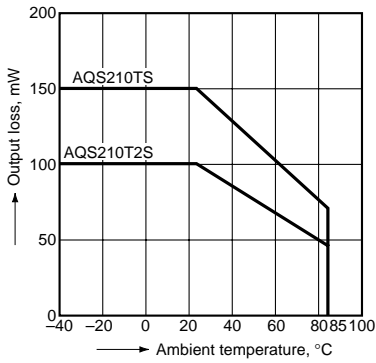


# AQS210TS, 210T2S

## [2] Detector portion (6, 7, 9, 10 pins) [AQS210TS] (4, 5, 11, 12 pins and 6, 7, 9, 10 pins) [AQS210T2S]

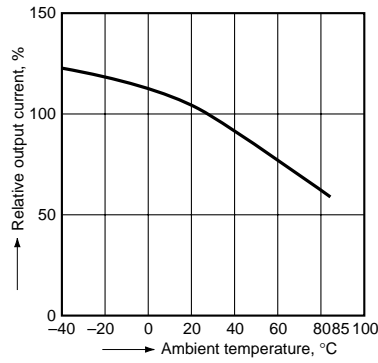
1. Output loss vs. ambient temperature characteristics

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



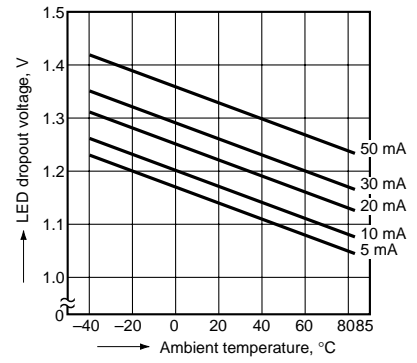
2. Relative output current vs. ambient temperature characteristics

Measured portion: between terminals 6 and 7 (AQS210TS), (AQS210T2S)  
 $I_F = 5\text{ mA}$ ,  $V_{CE} = 0.5\text{ V DC}$



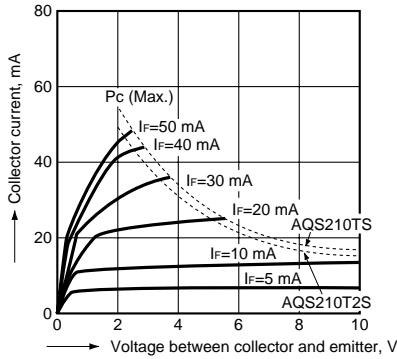
3. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



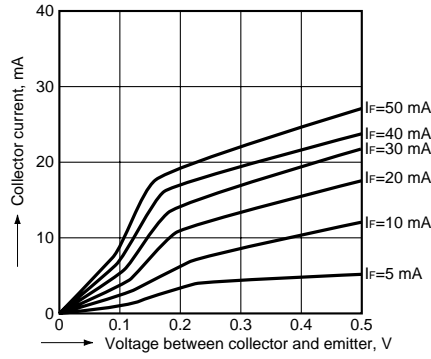
4-1. Collector current vs. voltage between collector and emitter characteristics ( $I_C$ - $V_{CE}$ )

Measured portion: between terminals 6 and 7 (AQS210TS), (AQS210T2S)  
 Ambient temperature:  $25^{\circ}\text{C}$   $77^{\circ}\text{F}$



4-2. Collector current vs. voltage between collector and emitter characteristics ( $I_C$ - $V_{CE}$ )

Measured portion: between terminals 6 and 7 (AQS210TS), (AQS210T2S)  
 Ambient temperature:  $25^{\circ}\text{C}$   $77^{\circ}\text{F}$



5. Off state leakage current

Measured portion: between terminals 6 and 7 (AQS210TS), (AQS210T2S)  
 $I_F = 0\text{ mA}$   
 $T_a = 25^{\circ}\text{C}$   $77^{\circ}\text{F}$

