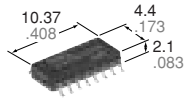
NAiS

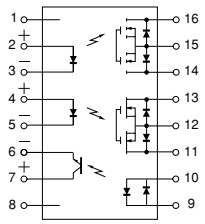
3-channel (1a1b MOSFET & optocoupler) SOP 16-pin type.

GU PhotoMOS (AQS610TS)

1a1b MOSFET Relay and 1 optocoupler type



mm inch



Relay portion
(2,3,14,15,16 pins)
(4,5,11,12,13 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	AQS610TSX	AQS610TSZ	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)

Item		Symbol	AQS610TS	Remarks
Input	LED forward current	I_F	50 mA	
	LED reverse voltage	V_R	5 V	
	Peak forward current	I_{FP}	1 A	f = 100 Hz, Duty factor = 0.1%
	Power dissipation	P_{in}	75 mW	
Output	Load voltage	V_L	350 V	
	Continuous load current	I_L	0.1 A (0.12 A)	( ) : in case of using only 1 channel
	Peak load current	I_{peak}	0.36 A	100 ms (1 shot), V_L = DC
	Power dissipation	P_{out}	600 mW	

2) Detector portion (6, 7, 9, 10 pins)

Item		Symbol	AQS610TS	Remarks
Input	LED forward current	I_F	50 mA	
	Peak forward current	I_{FP}	1 A	f = 100 Hz, Duty factor = 0.1%
	Power dissipation	P_{in}	75 mW	
Output	Output voltage	BV_{CEC}	30 V	
	Power dissipation	P_{out}	150 mW	

3) Others

Item		Symbol	AQS610TS	Remarks
Total power dissipation		P_T	650 mW	
I/O isolation voltage		V_{iso}	1500 V AC	
Temperature limits	Operating	T_{opr}	–40°C to +85°C –40°F to +185°F	Non-condensing at low temperatures
	Storage	T_{stg}	–40°C to +100°C –40°F to +212°F	

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

1) Relay portion (2, 3, 14, 15, 16 and 4, 5, 11, 12, 13 pins)

Item			Symbol	AQS610TS	Condition
Input	LED operate current	Typical	I_{Fon}	0.9 mA	I_L=Max.
		Maximum		3 mA	
	LED reverse current	Minimum	I_{Foff}	0.4 mA	I_L=Max.
		Typical		0.8 mA	
	LED dropout voltage	Typical	V_F	1.25 (1.14 V at I_F=5mA)	I_F=50mA
		Maximum		1.5 V	
Output	On resistance	Typical	R_{on}	18Ω	I_F = 5 mA (N.O.), I_F = 0 mA (N.C.) I_L = Max. Within 1 s on time
		Maximum		25Ω	
	Off state leakage current	Maximum	I_{Leak}	1μA	I_F= 0 mA (N.O.), I_F= 5 mA (N.C.) V_L = Max.
Transfer characteristics	Operate time*	Typical	T_{on}	0.23 ms (N.O.), 0.52 ms (N.C.)	I_F = 0 mA→5 mA I_L=Max.
		Maximum		1.0 ms	
	Reverse time*	Typical	T_{off}	0.04 ms (N.O.), 0.23 ms (N.C.)	I_F = 5 mA→0 mA I_L=Max.
		Maximum		1.0 ms	

Note: Recommendable LED forward current I_F = 5 mA

2) Detector portion (6, 7, 9, 10 pins)

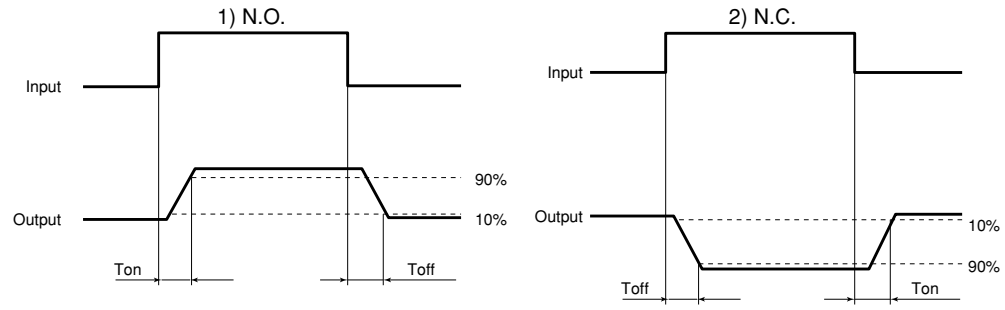
Item			Symbol	AQS610TS	Condition
Input	LED operate current	Typical	I_{Fon}	2 mA	I_C = 2 mA V_{CE} = 0.5 V
		Maximum		6 mA	
	LED turn off current	Minimum	I_{Foff}	5μA	I_C = 1μA V_{CE} = 5 V
		Typical		35μA	
	LED dropout voltage	Typical	V_F	1.25 (1.14 V at I_F = 5 mA)	I_F = 50 mA
		Maximum		1.5 V	
Output	Saturation voltage	Typical	V_{on}	0.08 V	I_F = 15 mA I_C = 2 mA
		Maximum		0.5 V	
	Off state leakage current	Typical	I_{CEO}	0.01 nA	I_F = 0 V_{CE} = 5 V
		Maximum		500 nA	
	Current transfer ratio	Minimum	—	33%	I_F = 5 mA V_{CE} = 0.5 V
		Typical		100%	
Transfer characteristics	Turn on time*	Typical	T_{on}	0.01 ms	I_F = 5 mA V_{CE} = 5 V I_C=2 mA
	Turn off time*	Typical	T_{off}	0.03ms	I_F = 5 mA V_{CE} = 5 V I_C = 2 mA

3) Others

Item			Symbol	AQS610TS	Condition
Transfer characteristics	I/O capacitance	Typical	C_{iso}	0.8pF	f = 1 MHz V_B = 0
		Maximum		1.5pF	
	Initial I/O isolation resistance	Minimum	R_{iso}	1,000MΩ	500V DC

*Operate/Reverse time

For type of connection



■ For Dimensions
■ For Schematic and Wiring Diagrams
■ For Cautions for Use

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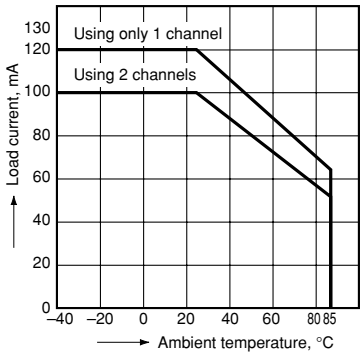
REFERENCE DATA

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

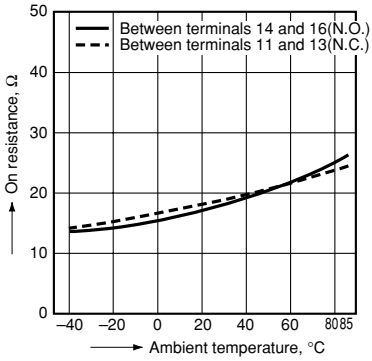
1. Load current vs. ambient temperature characteristics

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



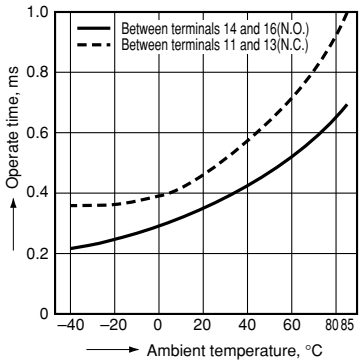
2. On resistance vs. ambient temperature characteristics

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



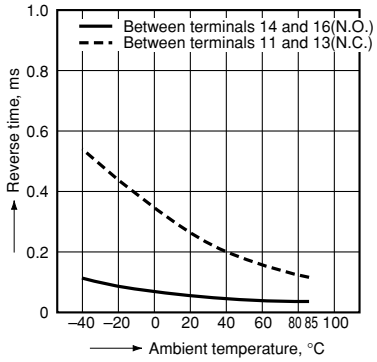
3. Operate time vs. ambient temperature characteristics

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



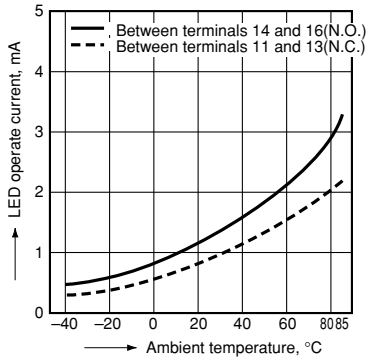
4. Reverse time vs. ambient temperature characteristics

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



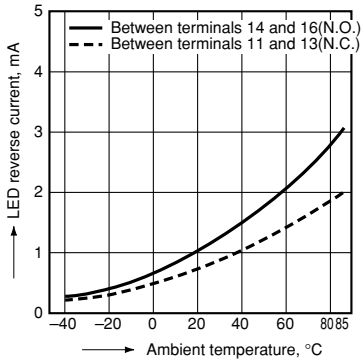
5. LED operate current vs. ambient temperature characteristics

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



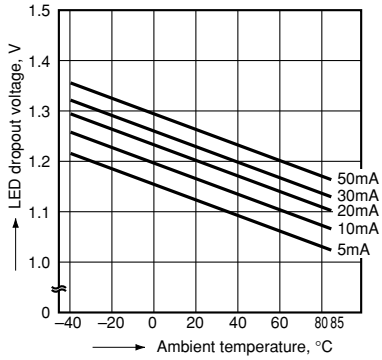
6. LED reverse current vs. ambient temperature characteristics

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



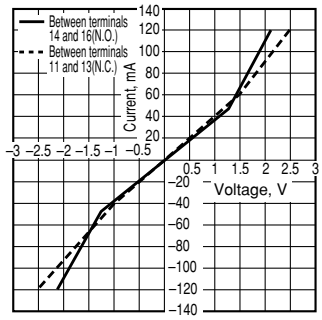
7. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



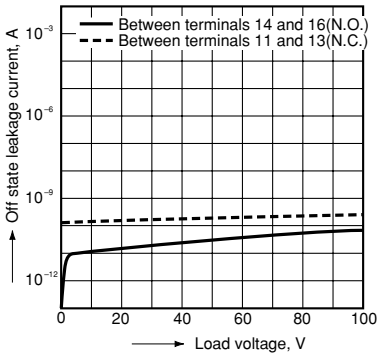
8. Voltage vs. current characteristics of output at MOS portion

Ambient temperature: 25°C 77°F



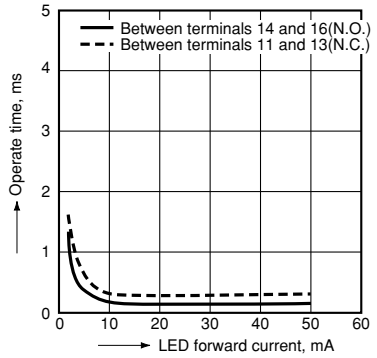
9. Off state leakage current

Ambient temperature: 25°C 77°F



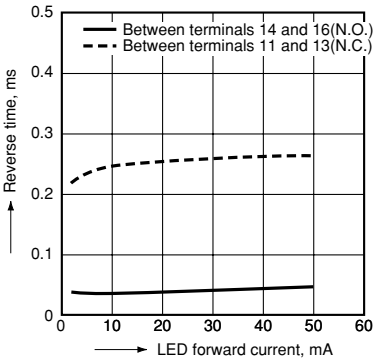
10. LED forward current vs. operate time characteristics

Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature: 25°C 77°F



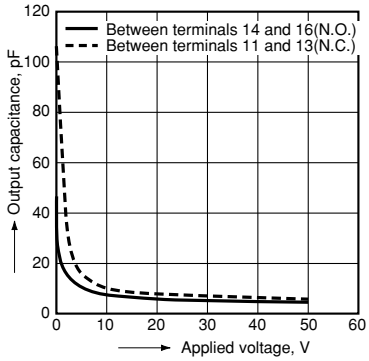
11. LED forward current vs. reverse time characteristics

Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature: 25°C 77°F



12. Applied voltage vs. output capacitance characteristics

Frequency: 1 MHz; Ambient temperature: 25°C 77°F



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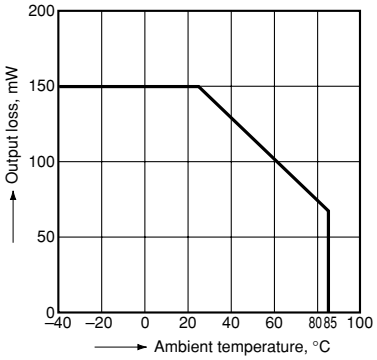
[2] Detector portion (6, 7, 9, 10 pins)

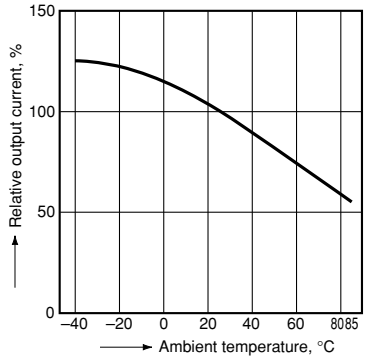
1. Output loss vs. ambient temperature characteristics

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



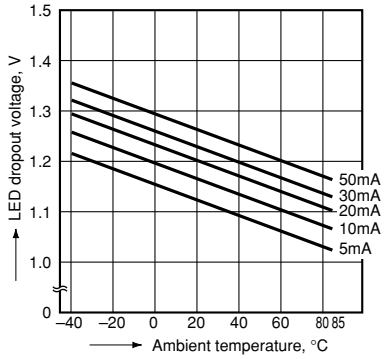
2. Relative output current vs. ambient temperature characteristics

Measured portion: between terminals 6 and 7
I_F = 5 mA, V_{CE} = 0.5 V DC



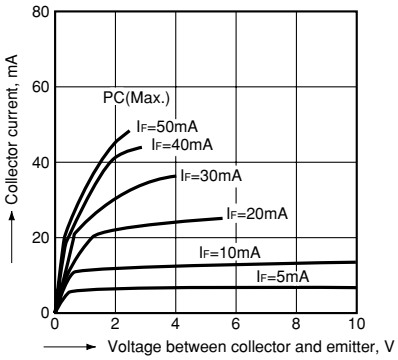
3. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



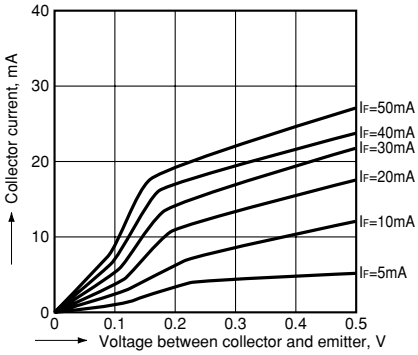
4-1. Collector current vs. voltage between collector and emitter characteristics (I_C-V_{CE})

Measured portion: between terminals 6 and 7
Ambient temperature: 25°C 77°F



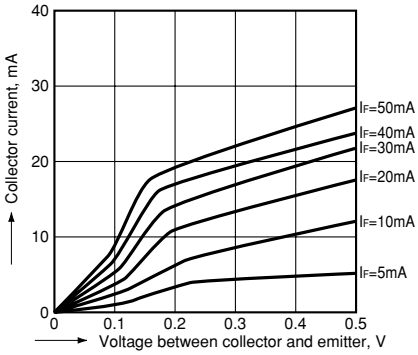
4-2. Collector current vs. voltage between collector and emitter characteristics (I_C-V_{CE})

Measured portion: between terminals 6 and 7
Ambient temperature: 25°C 77°F



5. Off state leakage current

Measured portion: between terminals 6 and 7
I_F= 0 mA
T_a= 25°C 77°F



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