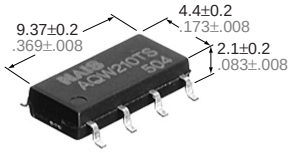
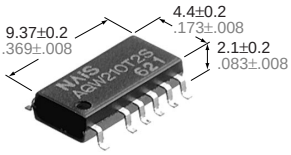
NAiS

GU (General Use) Type
SOP Series
Multi-function (MOSFET & optocoupler) Type

PhotoMOS RELAYS

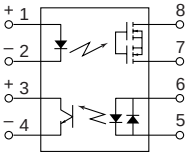


1 optocoupler type

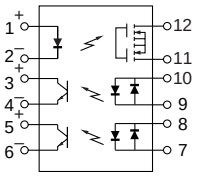


2 optocouplers type

mm inch



Relay portion
(1,2,7,8 pins)
Detector portion
(3,4,5,6 pins)



Relay portion
(1,2,11,12 pins)
Detector portion
(3,4,9,10 pins)
(5,6,7,8 pins)

FEATURES

1. Multi-function type with MOSFET and optocoupler
Instead of the conventional arrangement of a separate PhotoMOS relay and optocoupler, PhotoMOS relay and 2 optocoupler this new multi-function type encapsulates the PhotoMOS relay and optocoupler into one SOP package.

2. Ultra-small package size
Integration of the two devices makes a significant size reduction possible. The SOP package measures (W) 4.4 × (D) 9.37 × (H) 2.1 mm ((W) .173× (D) .369× (H) .083 inch).

3. Ideal for PC card and Fax/Modem applications
The small size provides additional space for increased functionality, without sacrificing any of the performance of conventional MOSFET relay and optocoupler, PhotoMOS relay and 2 optocoupler combinations. The new device has been specifically designed for the PCMCIA market.

4. Also available in 8-pin SOP package
2 Form A MOSFET relays are also available in a single 8-pin SOP package.

TYPICAL APPLICATIONS

• PCMCIA/JEIDA standard FAX/Modem card

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-pin side	Picked from the 5/6/7/8-pin side	
AC/DC type	350 V	120 mA	AQW210TSX	AQW210TSZ	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-pin side	Picked from the 7/8/9/10/11/12-pin side	
AC/DC type	350 V	120 mA	AQW210T2SX	AQW210T2SZ	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)
Relay portion (1, 2, 7, 8 pins) [AQW210TS], (1,2,11,12 pins) [AQW210T2S]

Item		Symbol	AQW210TS	AQW210T2S	Remarks
Input	LED forward current	I_F	50 mA		
	LED reverse voltage	V_R	3 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	0.12 A		Peak AC, DC
	Peak load current	I_{peak}	0.36 A		100 ms. (1 shot), V_L = DC
	Power dissipation	P_{out}	400 mW		

Detector portion (3, 4, 5, 6 pins) [AQW210TS], (3,4,9,10 and 5,6,7,8 pins) [AQW210T2S]

Item		Symbol	AQW210TS	AQW210T2S	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	100 mW	

Others

Item		Symbol	AQW210TS	AQW210T2S	Remarks
Total power dissipation		T_P	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		

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

Relay portion (1,2,7,8 pins) [AQW210TS] (1,2,11,12 pins) [AQW210T2S]

Item			Symbol	AQW210TS	AQW210T2S	Condition
Input	LED operate current	Typical	I_{Fon}	0.9 mA		I_L= Max.
		Maximum		3 mA		
	LED turn off current	Minimum	I_{Foff}	0.4 mA		I_L = Max.
		Typical		0.8 mA		
	LED dropout voltage	Typical	V_F	1.14 V (1.25 V at I_F = 50 mA)		I_F = 5 mA
		Maximum		1.5 V		
Output	On resistance	Typical	R_{on}	16 Ω		I_F = 5 mA I_L = Max. Within 1 s on time
		Maximum		35 Ω		
	Off state leakage current	Maximum	I_{leak}	1 μA		I_F = 0 I_L= Max.
Transfer characteristics	Turn on time*	Typical	T_{on}	0.23 ms		I_F = 5 mA I_L = Max.
		Maximum		0.5 ms		
	Turn off time*	Typical	T_{off}	0.04 ms		I_F = 5 mA I_L = Max.
		Maximum		0.2 ms		

Note: Recommendable LED forward current I_F = 5 mA.

Detector portion (3,4,5,6 pins) [AQW210TS] (3,4,9,10 and 5,6,7,8 pins) [AQW210T2S]

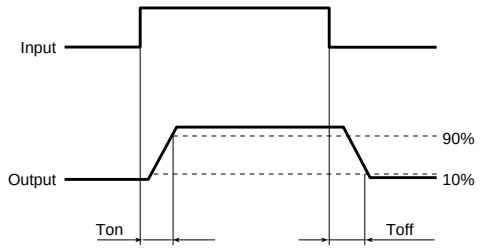
Item			Symbol	AQW210TS	AQW210T2S	Condition
Input	LED operate current	Typical	I_{Fon}	2 mA		I_C= 2 mA V_{CE} = 0.5 V
		Maximum		6 mA		
	LED turn off current	Minimum	I_{Foff}	5 μA		I_C = 1 μA V_{CE} = 5 V
		Typical		35 μA		
	LED dropout voltage	Typical	V_F	1.14 V (1.25 V at I_F = 50 mA)		I_F = 5 mA
		Maximum		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}	0.03 ms		I_F = 5 mA V_{CE} = 5 V I_C = 2 mA

Detector portion

Item			Symbol	AQW210TS	AQW210T2S	Remarks
Input	I/O capacitance	Typical	C_{iso}	0.8 pF		f = 1 MHz V_B= 0
		Maximum		1.5 pF		
	Intial I/O isolation resistance	Minimum	R_{iso}	1,000 MΩ		DC 500 V

*Turn on/Turn off time

For type of connection, see page 33.

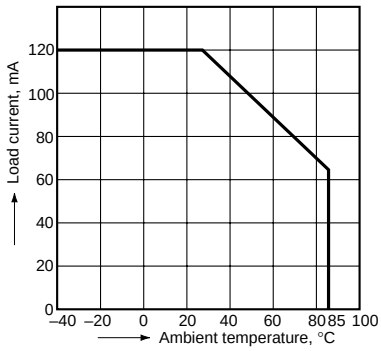


REFERENCE DATA

[1] Relay portion (1, 2, 7, 8 pins) [AQW 210TS] (1, 2, 11, 12 pins) [AQW210T2S]

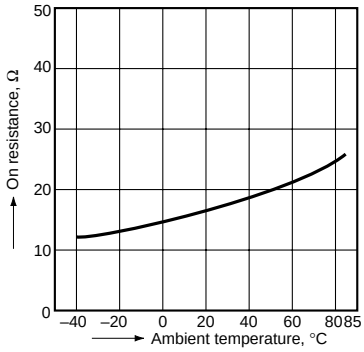
1. Load current vs. ambient temperature characteristics

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



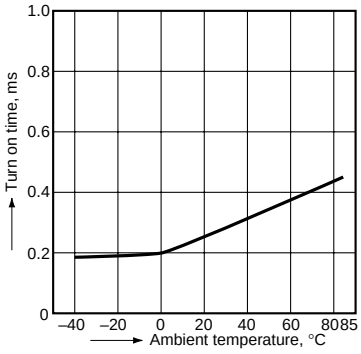
2. On resistance vs. ambient temperature characteristics

Measured portion: between terminals 7 and 8 (AQW210TS), 11 and 12 (AQW210T2S); LED current: 5 mA; Load voltage: Max. (DC); Continuous load current: Max. (DC)



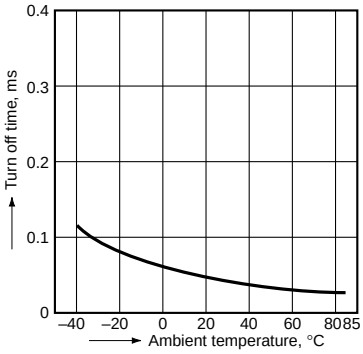
3. Turn on time vs. ambient temperature characteristics

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



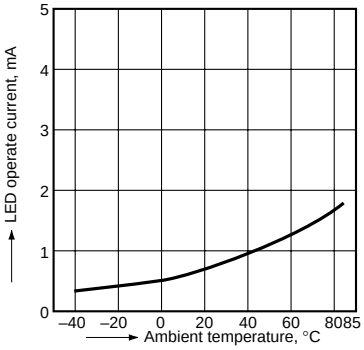
4. Turn off time vs. ambient temperature characteristics

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



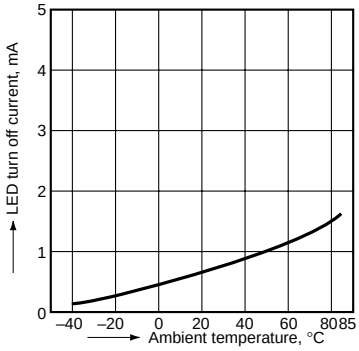
5. LED operate current vs. ambient temperature characteristics

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



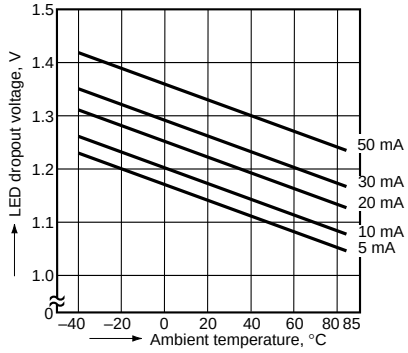
6. LED turn off current vs. ambient temperature characteristics

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



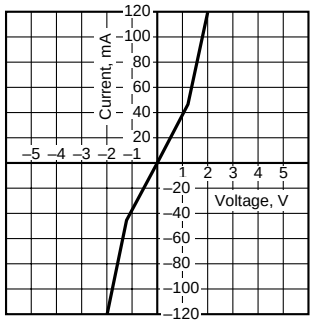
7. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



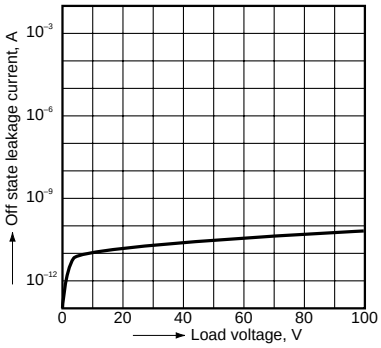
8. Voltage vs. current characteristics of output at MOS portion

Measured portion: between terminals 7 and 8 (AQW210TS), 11 and 12 (AQW210T2S); Ambient temperature: 25°C 77°F



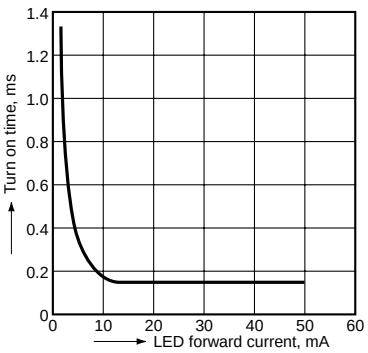
9. Off state leakage current

Measured portion: between terminals 7 and 8 (AQW210TS), 11 and 12 (AQW210T2S); Ambient temperature: 25°C 77°F



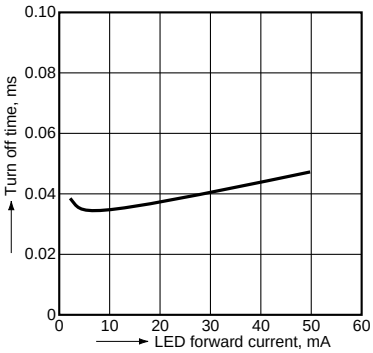
10. LED forward current vs. turn on time characteristics

Measured portion: between terminals 7 and 8 (AQW210TS), 11 and 12 (AQW210T2S); Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature: 25°C 77°F



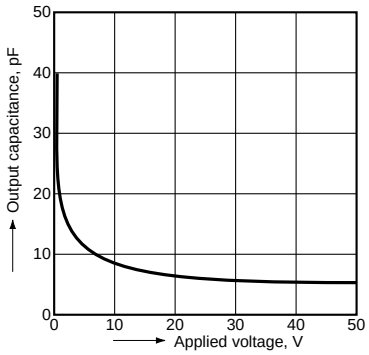
11. LED forward current vs. turn off time characteristics

Measured portion: between terminals 7 and 8 (AQW210TS), 11 and 12 (AQW210T2S); Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature: 25°C 77°F



12. Applied voltage vs. output capacitance characteristics

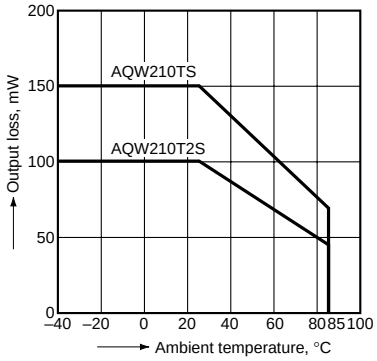
Measured portion: between terminals 7 and 8 (AQW210TS), 11 and 12 (AQW210T2S); Frequency: 1 MHz; Ambient temperature: 25°C 77°F



[2] Detector portion (3, 4, 5, 6 pins) [AQW 210TS] (3/4/9/10 pins and 5/6/7/8 pins) [AQW210T2S]

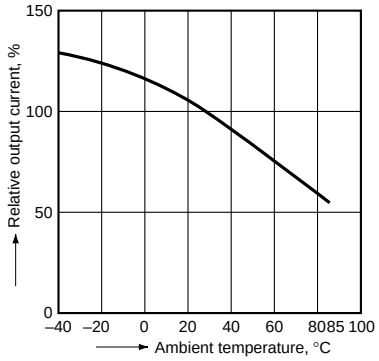
1. Output loss vs. ambient temperature characteristics

Allowable temperature range: –40° to 85°C
–40 to 185°F



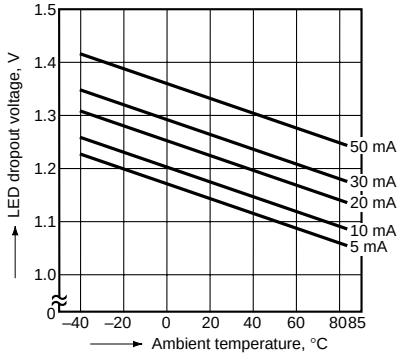
2. Relative output current vs. ambient temperature characteristics

Measured portion: between terminals 3 and 4 (AQW210TS), 3 and 4, 5 and 6 (AQW210T2S)
I_F = 5 mA, V_{CE} = 0.5 V DC



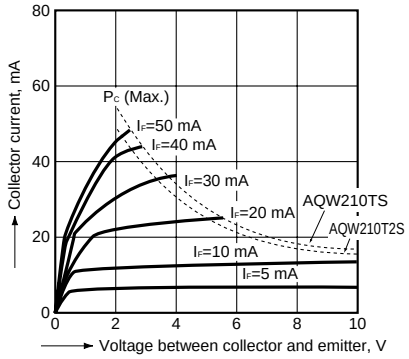
3. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



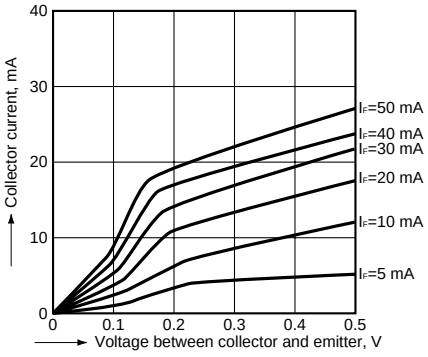
4-1. Collector current vs. voltage between collector and emitter characteristics (I_C-V_{CE})

Measured portion: between terminals 3 and 4 (AQW210TS), 3 and 4, 5 and 6 (AQW210T2S)
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 3 and 4 (AQW210TS), 3 and 4, 5 and 6 (AQW210T2S)
Ambient temperature: 25°C 77°F



5. Off state leakage current

Measured portion: between terminals 3 and 4 (AQW210TS), 3 and 4, 5 and 6 (AQW210T2S)
LED current: 0 mA
Ambient temperature: 25°C 77°F