PIR sensor control chip

Patent

TTP135 Patent number

- Taiwan：M458035
- China ：ZL201320172117.9

Outline

- TTP135 Is a human infrared sensor control integrated circuits

Characteristic

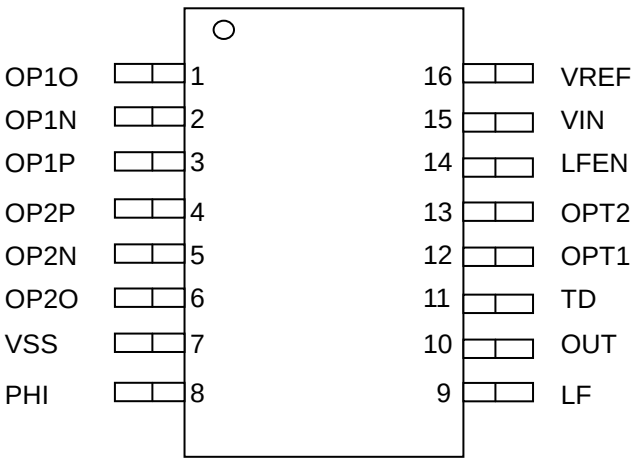
- Voltage operating range 4.5V～5.5V
- Operating current @VDD=5.0V，No load < 60uA
- Providing a delay timer from 3 seconds to 15 minutes（or from 6 seconds to 30 minutes）
- Provide a manual switch from auto-sensing（AUTO）to manual switch light mode （PMO：Personal Manual Override）
- Provide output（TWO LEVEL）two-stage brightness, daylight does not shine, at night maintains low output without night sense, night sense to high brightness output
- Ambient brightness detected input（PHI）
- Lamp dimming function（8 seconds Dimming to 30% brightness and 1.1 seconds more Dimming OFF）
- Six hours constant light function
- Manual Night Light features 8 hours
- Built-in low-voltage linear regulator（LDO）

Applications

- Human infrared sensor LED lights
- Automatic energy-efficient lighting occasions like garden, garage, hallway, stairs
- Monitoring, alarm, doorbell system like home, shops, offices, factories
- Automatic switching system like exhaust fans, ceiling fans
- Saving products or control systems like electronic albums, monitors, digital cameras, hunting cameras
- Wisdom toys control, smart appliances

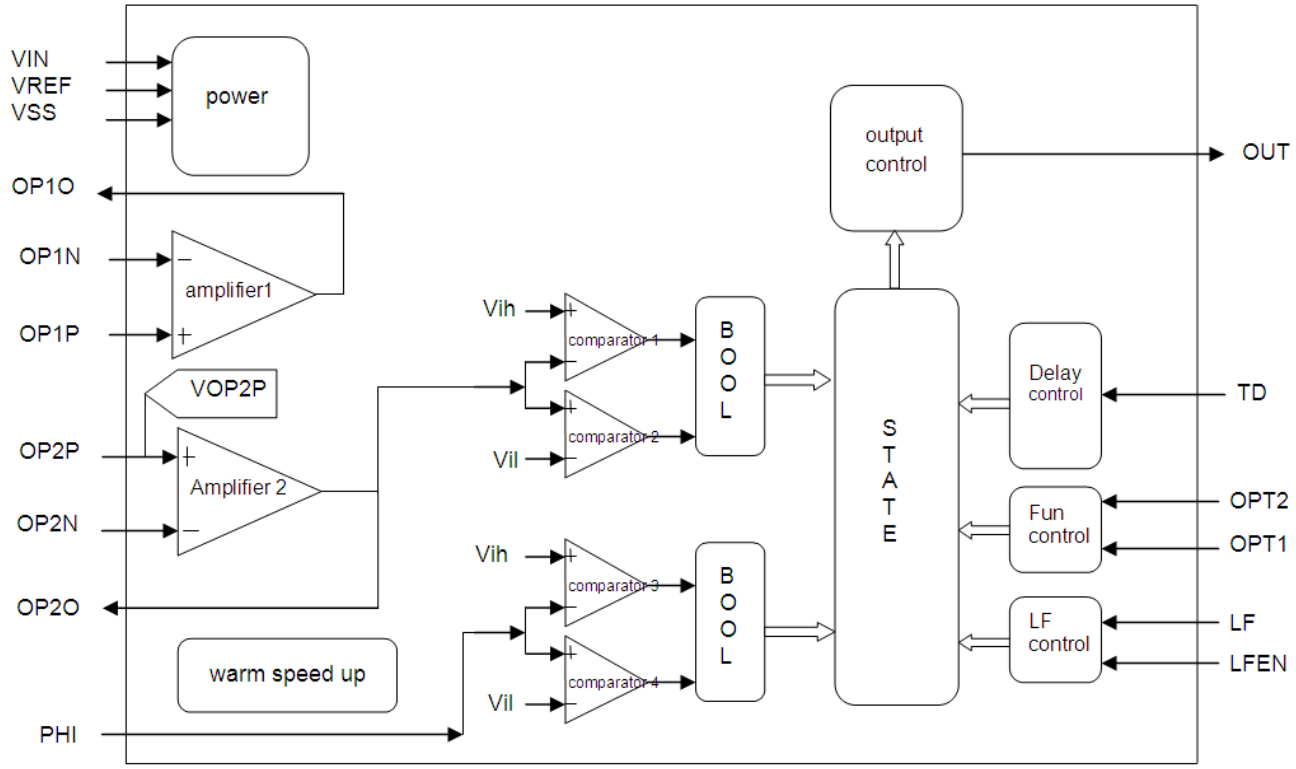
IC Pin diagram

TTP135-AOBN



SOP-16

IC Internal functional diagram



Pin Assignment TTP135-AOBN

Pin No.	Pin Name	I/O Type	Pad Description
1	OP1O	A_O	The first stage amplifier output
2	OP1N	I	The first stage amplifier negative input
3	OP1P	I	The first stage amplifier positive input
4	OP2P	I	The second stage amplifier negative input
5	OP2N	I	The second stage amplifier positive input
6	OP2O	A_O	The second stage amplifier output
7	VSS	P	Negative power supply
8	PHI	I	Day（PHI = L） / night （PHI = H） mode to determine input（when not judge PHI = H）
9	LF	I-PH	AC zero-crossing signal input（Accepted 50/60Hz pulse waveform）
10	OUT	O	Control output（output voltage amplitude is consistent with VIN）
11	TD	I/O	Output delay time setting
12	OPT1	I-TR	Setting Options 1 pin
13	OPT2	I-TR	Setting Options 2 pin
14	LFEN	I-PH	AC zero-crossing signal input enable pin
15	VIN	P	Positive power supply
16	VREF	O	Built-in regulator（LDO）output 3.3V ± 0.3V

Pin Type

- A_O ANALOG OUTPUT
- I CMOS INPUT
- O CMOS OUTPUT
- I-PH CMOS INPUT，Pulled-Up Resistor
- I-PL CMOS INPUT，Pulled-Down Resistor
- I-TR COMS INPUT，Tri-State
- P POWER SUPPLY / GND

Electrical Characteristics

- **Limiting values**

Parameter	Symbol	Condition	Values	Unit
Operating Temperature	T_{OP}	—	-20～+70	℃
Storage Temperature	T_{STG}	—	-50～+125	℃
Supply Voltage	VIN	Ta=25°C	VSS-0.3～VSS+5.5	V
Input Voltage	V_I	Ta=25°C	VSS-0.3～VIN+0.3	V
Note: VSS represents the system ground				

- **DC / AC characteristics：（Test conditions at room temperature 25 ℃）**

Parameter	Symbol	Test Conditions	Minimum	Typical values	Maximum	Unit
Operating Voltage	VIN		4.5	5.0	5.5	V
Reference voltage	VREF	VIN = 5.0V	3.0	3.3	3.6	V
System frequency	Fosc	VIN = 5.0V, VREF = 3.3V Fosc = 16KHz±15%	13.6	16	18.4	KHz
Delay oscillation	Tosc	VIN = 5.0V, VREF = 3.3V R = 4.7K, C = 680PF	-	300	-	KHz
Operating Current	I_{OP}	VIN = 5.0VNo load, Fosc ON , Tosc OFF	-	40	60	uA
Input port	V_{IL}	The low voltage input Pin: OPT1,OPT2,LFEN,LF	0	-	0.2	VREF
	V_{IH}	The high voltage input Pin: OPT1,OPT2,LFEN,LF	0.8	-	1.0	VREF
	V_{IL}	The low voltage input Pin : PHI	-	1/3	-	VREF
	V_{IH}	The high voltage input Pin : PHI	-	2/3	-	VREF
Output port Sink Current	I_{OL}	VIN = 5.0V, V_{OL} = 0.5V Pin: OUT	-	35	-	mA
Output port Source Current	I_{OH}	VIN = 5.0V, V_{OH} = VIN-0.5V Pin: OUT	-	7	-	mA
Input Pull-low Resistor	R_{PL}	VIN = 5.0V, VREF = 3.3V Pin: OPT1,OPT2	-	100K	-	ohm
Input Pull-high Resistor	R_{PH}	VIN = 5.0V, VREF = 3.3V Pin: OPT1,OPT2,LFEN	-	100K	-	Ohm
		VIN = 5.0V, VREF = 3.3V Pin: LF	-	700K	-	
Six hours constant light	T6	VIN = 5.0V, VREF = 3.3V	5.1	6	6.9	HR
Small Nightlight 8 hours	T8	VIN = 5.0V, VREF = 3.3V	6.8	8	9.2	HR

Function Description

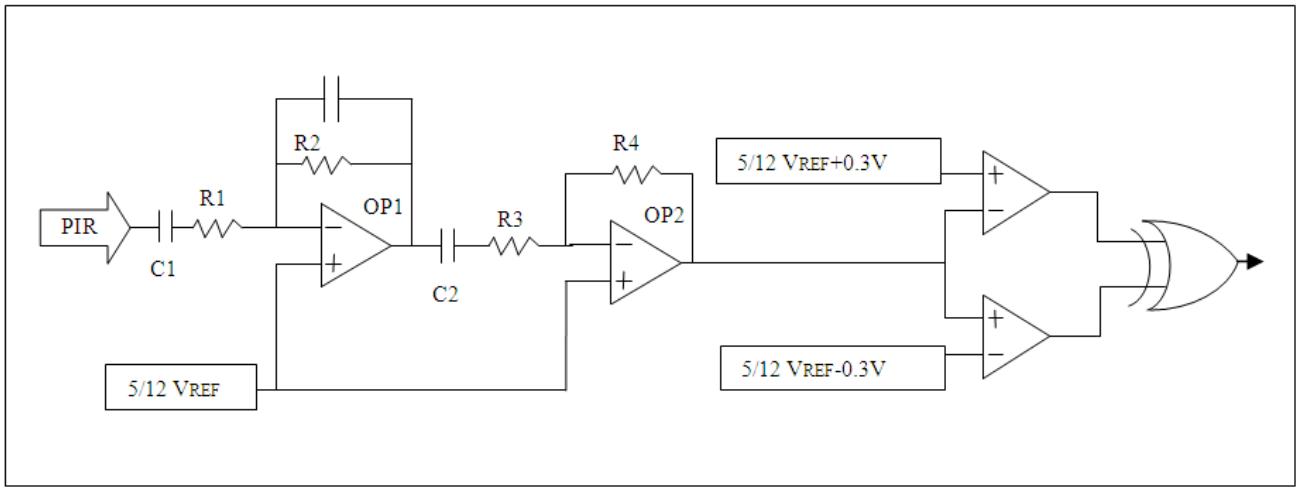
Ⅰ. Providing packages：

1. SOP16PIN：TTP135-AOBN

Ⅱ. Power ON initial

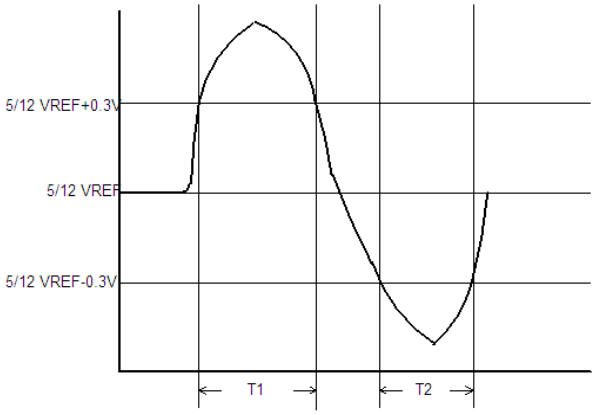
1. POWER ON, initialize the system, the system enters warm-up mode by default
2. The warm-up mode, OUT = H, the first stage OP automatically switch to Unity Gain 37 seconds
3. The warm-up is completed, when the PIR signal is stable, close the output（OUT = L）, then enter the Auto mode
4. Judging by the PHI pin signal for environment brightness, when in the night mode the PIR signal determines whether the trigger condition is met to determine the output
5. When there exists output（OUT = H）, and the PIR signal stability is for 2 seconds without triggering, the output delay off after TD
6. Judging by the PHI pin signal for environment brightness , when in the daytime mode, the PIR trigger signal will not be accepted
7. When the output from ON → OFF : PIR disable 1 second

Ⅲ. PIR signal trigger determination



Note： (1) R1, R3 < 100KΩ
(2) R2, R4 < 3MΩ
(3) C1, C2 < 22uF

1. There is one signal longer than 200ms in T1or T2
2. There are two signals generated larger than 50ms within two seconds
3. T1 = time of VPIR ≧ 5/12 VREF + 0.3V
4. T2 = time of VPIR ≦ 5/12 VREF - 0.3V
5. Window = 5/12VREF± 0.3 V



Ⅳ. Function selection table

Product	Power	Function	Description	DIM OFF	Select mode		PWM
TTP135	AC	Manual switch light mode	Eternal light 6 HR	DIM 30% OFF	A1		V
					A4		
			Eternal small night light 12.5%,8HR	DIM 30% OFF	A2		V
			Eternal small night light 6.25%,8HR	DIM 30% OFF	A3		V
			Eternal small night light 3.125%,8HR	DIM 30% OFF	A5		V
			6HR eternal light, small light 25%		A6		V
			6HR eternal light, small light 3.125%		A7		V
			6HR eternal light, small light 6.25%		A8		V
			6HR eternal light, small light 12.5%		A9		V
		Power on eternal light 6 hours	Auto-sensing switch mode			B4	
			Auto-sensing gradually faded mode	DIM 30% OFF		B5	V
		Dark lighting 6 hours	Auto-sensing full to small light mode			B6	V
			small light 3.125%				V
			Auto-sensing full to small light mode			B7	V
			small light 6.25%				V
		Auto-sensing full to small light mode	small light 12.5%			B8	V
			small light 6.25%			B9	V
	DC	Auto-sensing switch Mode			B1		
		Auto-sensing gradually faded mode		DIM 30% OFF	B2		V
		Auto-sensing full to small light mode	small light 12.5%		B3		V
		Power on eternal light 6 hours	Auto-sensing switch mode		B4		
			Auto-sensing gradually faded mode	DIM 30% OFF	B5		V
		Dark lighting 6 hours	Auto-sensing full to small light mode small light 3.125%		B6		V
			Auto-sensing full to small light mode small light 6.25%	Small light 6.25%	B7		V
		Auto-sensing full to small light mode	small light 12.5%		B8		V
			small light 6.25%		B9		V

- **Supplement**

Item	PWM high-output duty cycle	PWM frequency
small light 3.125%	3.125 %	500Hz
small light 6.25%	6.25 %	1KHz
small light 12.5%	12.5 %	1KHz
small light 25%	25 %	1KHz
Small night light 3.125%	3.125 %	500Hz
Small night light 6.25%	6.25 %	1KHz
Small night light 12.5%	12.5 %	1KHz

Ⅴ. Function table A

1. Option LFEN = 1（initial state）：by the time LF zero-crossing signal disappears to judge AC switch off time
2. Switching AC switch, AC switch off time > 1.5 seconds is considered re-power, < 1.5 seconds deemed to manual switch light mode（PMO）

FUNC_A	Opt1	Opt2	Function description	OUT
A1 Eternal light 6HR	0	0	Auto-sensing gradually faded mode：ambient brightness detected → daytime mode → prohibit output（PWM = 0）→ ambient brightness detected → night mode → standby（PWM = 0%）→ wait PIR trigger → PIR trigger → all bright（PWM = 100%）→ No PIR signal → according to TD（3 seconds to 15 minutes）delay → 8 seconds gradually from 100% to 30% brightness → 1.1 seconds gradually eliminate to completely shut down the brightness → loops to start； manual eternal light mode：Switch AC Switch OFF / ON <1.5 second → switch to eternal light mode → PWM gradually light from 0% to 100% → 6 hours delay → 8 seconds gradually from 100% to 30% brightness → 1.1 seconds gradually eliminate to completely shut down → Auto-sensing gradually faded mode	LED
A2 Eternal small night light 12.5% 8HR	0	1	Auto-sensing gradually faded mode：ambient brightness detected → daytime mode → prohibit output（PWM = 0）→ ambient brightness detected → night mode → standby（PWM = 0%）→ wait PIR trigger → PIR trigger → all bright（PWM = 100%）→ No PIR signal → according to TD（3 seconds to 15 minutes） delay → 8 seconds gradually from 100% to 30% brightness → 1.1 seconds gradually eliminate to completely shut down the brightness → loops to start； manual night light mode 1：Switch AC Switch OFF / ON < 1.5 second → switch to night light mode 1（PWM = 12.5%）→ 8 hours delay → completely shut down the brightness → Auto-sensing gradually faded mode	LED
A3 Eternal small night light 6.25% 8HR	0	Z	Auto-sensing gradually faded mode：ambient brightness detected → daytime mode → prohibit output（PWM = 0）→ ambient brightness detected → night mode → standby（PWM = 0%）→ wait PIR trigger → PIR trigger → all bright（PWM = 100%）→ No PIR signal → according to TD（3 seconds to 15 minutes）delay → 8 seconds gradually from 100% to 30% brightness → 1.1 seconds gradually eliminate to completely shut down the brightness → loops to start； manual night light mode 2: Switch AC Switch OFF / ON < 1.5 second → switch to night light mode 1（PWM = 6.25%）→ 8 hours delay → completely shut down the brightness → Auto-sensing gradually faded mode	LED

FUNC_A	Opt1	Opt2	Function description	OUT
A4 Eternal light 6HR	1	0	Auto-sensing mode：ambient brightness detected → daytime mode → prohibit output（PWM = 0）→ ambient brightness detected → night mode → standby（PWM = 0%）→ wait PIR trigger → PIR trigger → all bright（PWM = 100%）→ No PIR signal → according to TD（3 seconds to 15 minutes）delay → completely shut down the brightness → loops to start； manual eternal light mode：Switch AC Switch OFF / ON < 1.5 second → switch to eternal light mode → all bright（PWM = 100%）→ 6 hours delay → completely shut down the brightness → Auto-sensing mode	Relay
A5 Eternal small night light 3.125% 8HR	1	1	Auto-sensing gradually faded mode：ambient brightness detected → daytime mode → prohibit output（PWM = 0）→ ambient brightness detected → night mode → standby（PWM = 0%）→ wait PIR trigger → PIR trigger → all bright（PWM = 100%）→ No PIR signal → according to TD（3 seconds to 15 minutes）delay → 8 seconds gradually from 100% to 30% brightness → 1.1 seconds gradually eliminate to completely shut down the brightness → loops to start； manual night light mode 3：Switch AC Switch OFF / ON < 1.5 second → switch to night light mode 1（PWM = 3.125%500Hz）→ 8 hours delay → completely shut down the brightness → Auto-sensing gradually faded mode	LED
A6 Eternal light 6HR full to small light 25%	1	Z	Auto-sensing full to small light mode：ambient brightness detected → daytime mode → prohibit output（PWM = 0）→ ambient brightness detected → night mode → small light mode（PWM=25%）→ wait PIR trigger → PIR trigger → all bright（PWM = 100%）→ No PIR signal → according to TD（3 seconds to 15 minutes）delay → small light mode（PWM=25%）→ loops to start； manual eternal light mode：Switch AC Switch OFF / ON < 1.5 second → switch to eternal light mode → PWM gradually light from 0% to 100%）→ 6 hours delay → small light mode（PWM=25%）→ Auto-sensing full to small light mode	LED
A7 Eternal light 6HR full to small light 3.125%	Z	0	Auto-sensing full to small light mode：ambient brightness detected → daytime mode → prohibit output（PWM = 0）→ ambient brightness detected → night mode → small light mode（PWM=3.125%500Hz）→ wait PIR trigger → PIR trigger → all bright（PWM = 100%）→ No PIR signal → according to TD（3 seconds to 15 minutes）delay → small light mode（PWM=3.125%500Hz）→ loops to start； manual eternal light mode：Switch AC Switch OFF / ON < 1.5 second → switch to eternal light mode → PWM gradually light from 0% to 100%）→ 6 hours delay → small light mode（PWM=3.125%500Hz）→ Auto-sensing full to small light mode	LED

FUNC_A	Opt1	Opt2	Function description	OUT
A8 Eternal light 6HR full to small light 6.25%	Z	1	Auto-sensing full to small light mode：ambient brightness detected → daytime mode → prohibit output（PWM = 0）→ ambient brightness detected → night mode → small light mode （PWM=6.25%1KHz）→ wait PIR trigger → PIR trigger → all bright（PWM = 100%）→ No PIR signal → according to TD（3 seconds to 15 minutes） delay → small light mode （PWM=6.25%1KHz）→ loops to start； manual eternal light mode：Switch AC Switch OFF / ON < 1.5 second → switch to eternal light mode → PWM gradually light from 0% to 100%）→ 6 hours delay → small light mode （PWM=6.25%1KHz）→ Auto-sensing full to small light mode	LED
A9 Eternal light 6HR full to small light 12.5%	Z	Z	Auto-sensing full to small light mode：ambient brightness detected → daytime mode → prohibit output（PWM = 0）→ ambient brightness detected → night mode → small light mode（PWM=12.5%1KHz）→ wait PIR trigger → PIR trigger → all bright（PWM = 100%）→ No PIR signal → according to TD （3 seconds to 15 minutes）delay → small light mode （PWM=12.5%1KHz）→ loops to start； manual eternal light mode：Switch AC Switch OFF / ON < 1.5 second → switch to eternal light mode → PWM gradually light from 0% to 100%）→ 6 hours delay → small light mode （PWM=12.5%1KHz）→ Auto-sensing full to small light mode	LED

Note： (1) Night light PWM frequency , from internal timer and providing 8 hours long （error ± 15% @ VREF = 3.3V, 25 ℃）

(2) Gradually faded mode PWM frequency = 128Hz

(3) Under PMO mode, when the state AC switch OFF / ON <1.5 seconds, it will automatically switch back to AUTO PIR trigger wait

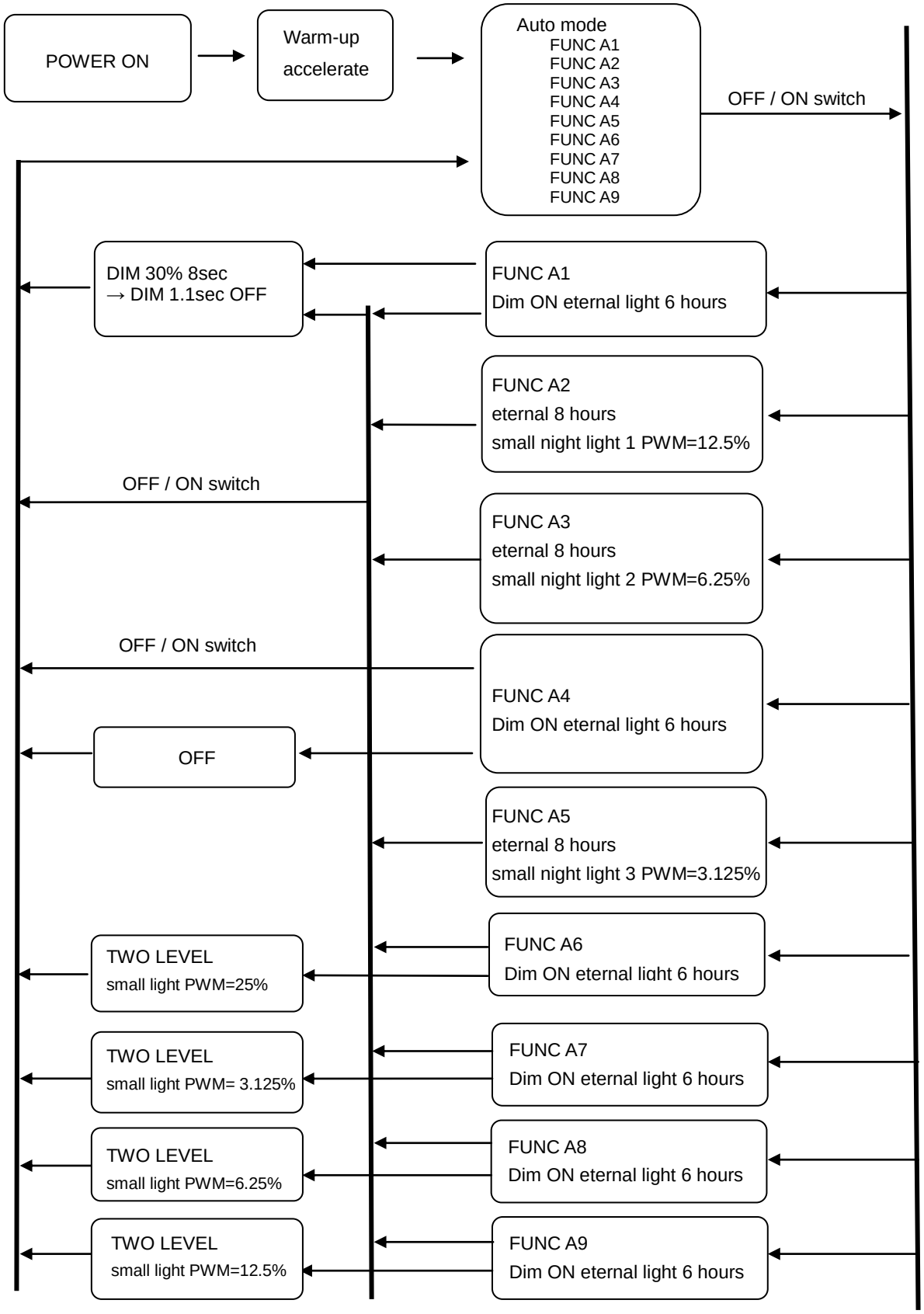
(4) Eternal light mode without PHI judgment, and the system provides an internal timer with 6 hours long（error of ± 15% @ VREF= 3.3V, 25 ℃）

(5) Under small light mode, when no sense at night, light a small lamp, and can be changed by PHI ambient brightness detect, when the environment is bright enough, it will cut off the output as daylight mode

(6) Under A1 ~ A9 mode switch, if no AC power with no LF signal in, the output will directly be off to save energy, the use of capacitive energy to hold state, if LF signal is back, then the system revert to the original state

(7) OFF / ON time（T）：a power time OFF / ON greater than 0.25 seconds and less than 1.5 seconds, switch between automatic mode or eternal light mode , or power-off time> 1.5 seconds, back on re-power

3. Action flowchart：A1～A9



Ⅵ. Function table B

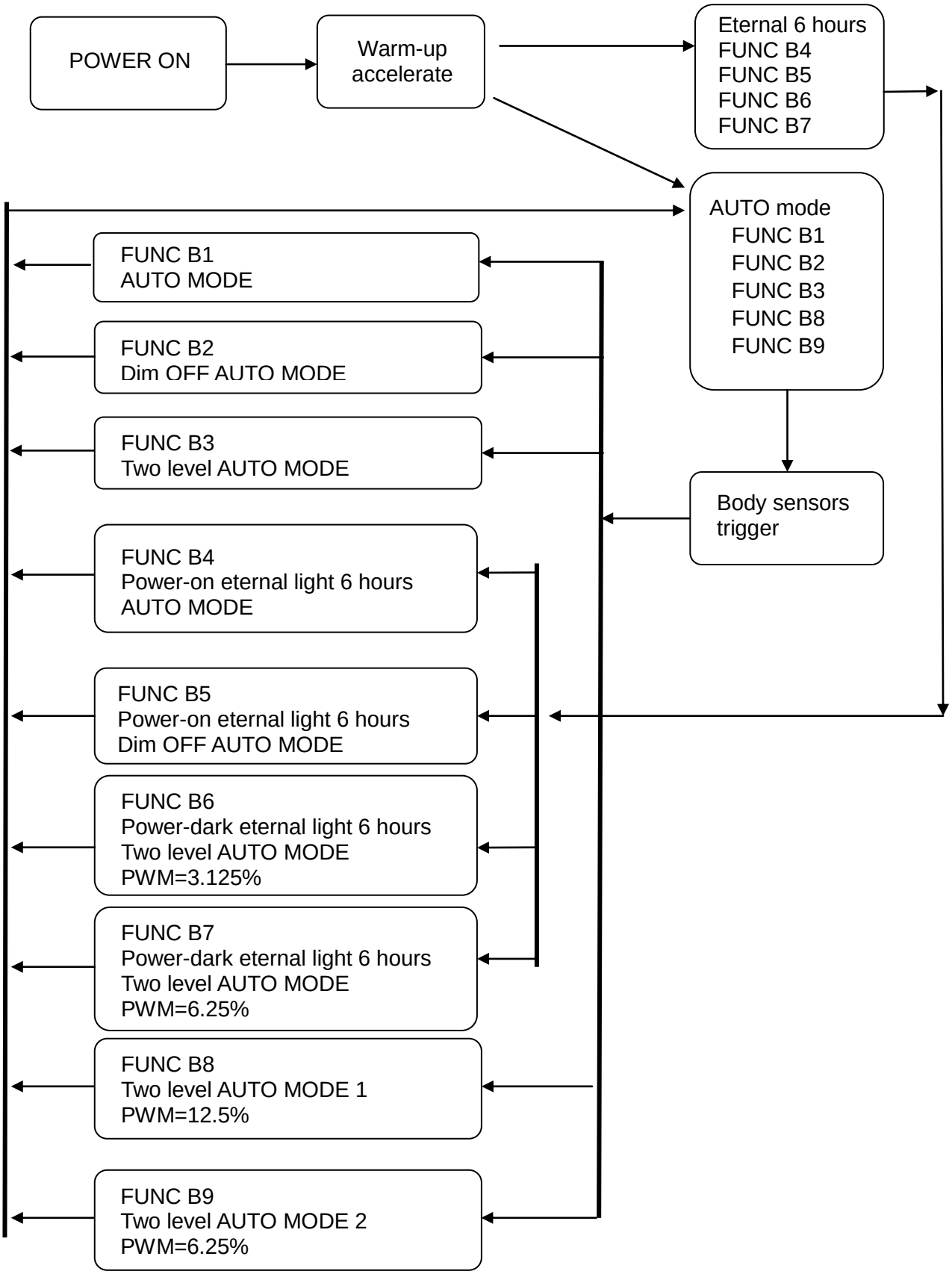
1. Option LFEN = 0；No judgment function for LF zero-crossing signal

FUNC_B	Opt1	Opt2	Function description	OUT
B1	0	0	Auto-sensing mode：ambient brightness detected → daytime mode → prohibit output（PWM = 0）→ ambient brightness detected → night mode → standby（PWM = 0%）→ wait PIR trigger → PIR trigger → all bright（PWM = 100%）→ No PIR signal → according to TD（3 seconds to 15 minutes）delay → completely shut down the brightness → loops to start：	Relay
B2	0	1	Auto-sensing gradually faded mode：ambient brightness detected → daytime mode → prohibit output（PWM = 0）→ ambient brightness detected → night mode → standby（PWM = 0%）→ wait PIR trigger → PIR trigger → all bright（PWM = 100%）→ No PIR signal → according to TD（3 seconds to 15 minutes）delay → 8 seconds gradually from 100% to 30% brightness → 1.1 seconds gradually eliminate to completely shut down the brightness → loops to start；	LED
B3 Full to small light 25%	0	Z	Auto-sensing full to small light mode：ambient brightness detected → daytime mode → prohibit output（PWM = 0）→ ambient brightness detected → night mode → small light mode（PWM=12.5%1KHz）→ wait PIR trigger → PIR trigger → all bright（PWM = 100%）→ No PIR signal → according to TD（3 seconds to 15 minutes）delay → small light mode（PWM=25%）→ loops to start；	LED
B4 Power-on eternal light 6HR	1	0	Power-on eternal light 6 hours mode：Power-on → PWM = 100% → 6 hr delay → completely shut down the brightness → Auto-sensing mode Auto-sensing mode：ambient brightness detected → daytime mode → prohibit output（PWM = 0）→ ambient brightness detected → night mode → standby（PWM = 0%）→ wait PIR trigger → PIR trigger → all bright（PWM = 100%）→ No PIR signal → according to TD（3 seconds to 15 minutes）delay → completely shut down the brightness → loops to start；	Relay
B5 Power-on eternal light 6HR	1	1	Power-on eternal light 6 hours mode：Power-on → DIM ON PWM=100% → 6 hr delay → DIM OFF → completely shut down the brightness → Auto-sensing gradually faded mode Auto-sensing gradually faded mode：ambient brightness detected → daytime mode → prohibit output（PWM = 0）→ ambient brightness detected → night mode → standby（PWM = 0%）→ wait PIR trigger → PIR trigger → all bright（PWM = 100%）→ No PIR signal → according to TD（3 seconds to 15 minutes）delay → 8 seconds gradually from 100% to 30% brightness → 1.1 seconds gradually eliminate to completely shut down the brightness → loops to start；	LED

FUNC_B	Opt1	Opt2	Function description	OUT
B6 Power- dark lighting full to small light 3.125%	1	Z	Power-dark lighting 6 hours mode：Power-on → DIM ON PWM=100% → ambient brightness detected for daytime mode → completely shut down the brightness →Wait into dark for six hours eternal light → ambient brightness detected for night mode → 6 hr delay → completely shut down the brightness → Auto-sensing full to small light mode Auto-sensing full to small light mode：ambient brightness detected → daytime mode → prohibit output（PWM = 0）→ ambient brightness detected → night mode → small light mode（PWM=3.125%500Hz）→ wait PIR trigger → PIR trigger → all bright（PWM = 100%）→ No PIR signal → according to TD（3 seconds to 15 minutes）delay → small light mode（PWM=3.125%500Hz）→ loops to start；	LED
B7 Power- dark lighting full to small light 6.25%	Z	0	Power-dark lighting 6 hours mode：Power-on → DIM ON PWM=100% → ambient brightness detected for daytime mode → completely shut down the brightness → Wait into dark for six hours eternal light → ambient brightness detected for night mode → 6 hr delay → completely shut down the brightness → Auto-sensing full to small light mode Auto-sensing full to small light mode：ambient brightness detected → daytime mode → prohibit output（PWM = 0）→ ambient brightness detected → night mode → small light mode（PWM=6.25%1KHz）→ wait PIR trigger → PIR trigger → all bright（PWM = 100%）→ No PIR signal → according to TD（3 seconds to 15 minutes）delay → small light mode（PWM=6.25%1KHz）→ loops to start；	LED *
B8 Full to small light 12.5%	Z	1	Auto-sensing full to small light mode：ambient brightness detected → daytime mode → prohibit output（PWM = 0）→ ambient brightness detected → night mode → small light mode（PWM=12.5%）→ wait PIR trigger → PIR trigger → all bright（PWM = 100%）→ No PIR signal → according to TD（3 seconds to 15 minutes）delay → small light mode（PWM=12.5%）→ loops to start；	LED
B9 Full to small light 6.25%	Z	Z	Auto-sensing full to small light mode：ambient brightness detected → daytime mode → prohibit output（PWM = 0）→ ambient brightness detected → night mode → small light mode（PWM= 6.25%）→ wait PIR trigger → PIR trigger → all bright（PWM = 100%）→ No PIR signal → according to TD（3 seconds to 15 minutes）delay → small light mode（PWM=6.25%）→ loops to start；	LED

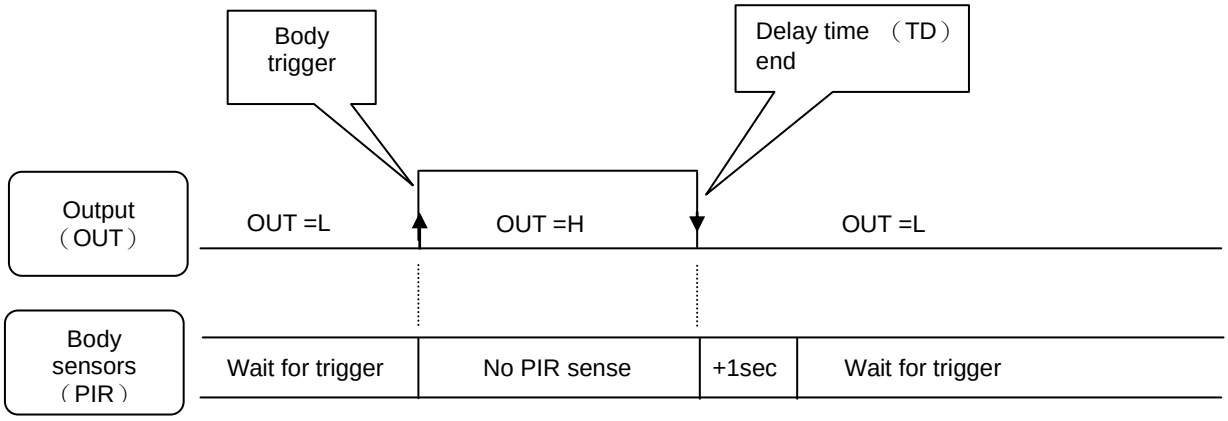
Note：
(1) Small lights 25%, 12.5%, 6.25% PWM frequency = 1KHz, 3.125% PWM frequency = 500Hz
(2) Gradually faded mode PWM frequency = 128Hz
(3) Eternal light mode without PHI judgment（Except for power-dark lighting）, and the system provides an internal timer with 6 hours long（error of ± 15% @ VREF= 3.3V, 25 ℃）
(4) Under small light mode, when no sense at night, light a small lamp, and can be changed by PHI ambient brightness detect, when the environment is bright enough, it will cut off the output as daylight mode

2. Action flowchart：B1～B9

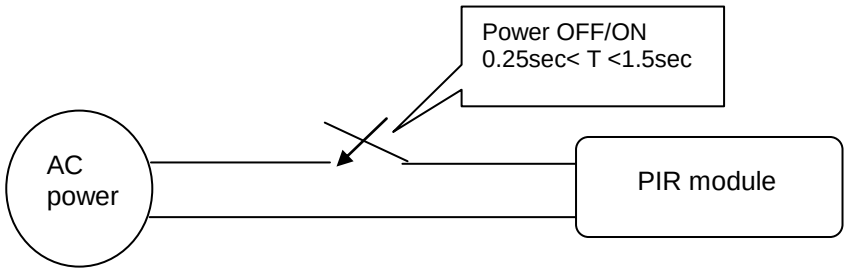


Ⅶ. Mode Function explanation

1. Auto-sensing mode（AUTO）



2. Manual switch eternal light mode（PMO）



(1) OFF / ON time(T)：A power time OFF / ON greater than 0.25 seconds and less than 1.5 seconds, switch between automatic mode or eternal light mode

(2) OFF/ON time（T），power-off time> 1.5 seconds, back on re-power

3. Eternal light 6 hours

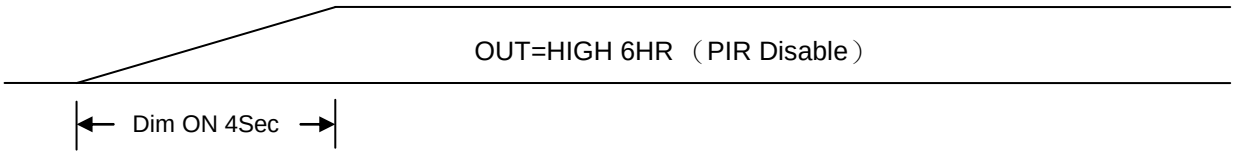
(1) The system frequency provides internal counter timer 6 hours（error of ± 15% @ VREF = 3.3V, 25 ℃）

(2) 6 hours after the end of the output transitions, it will disable PIR signal 1 second

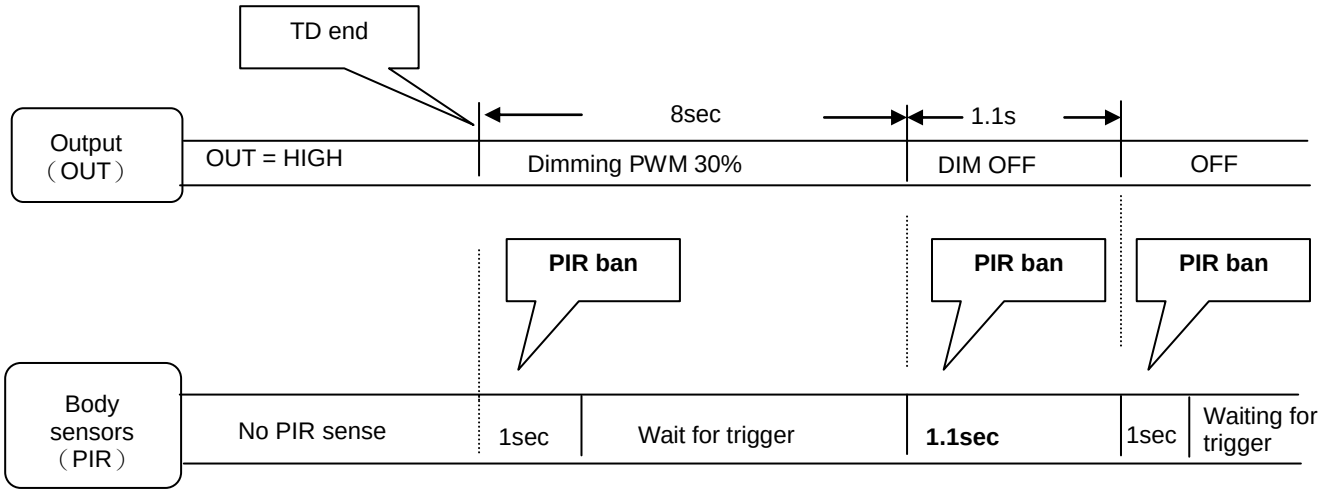
(3) When the timing < during 6 hours: the PHI does not judge the "night" or "day" state

(4) The timing <during 6 hours: There OFF / ON occurred T <1.5 seconds, it will automatically switch back to the corresponding AUTO mode, as for the delay time, it according to the TD to do delay time

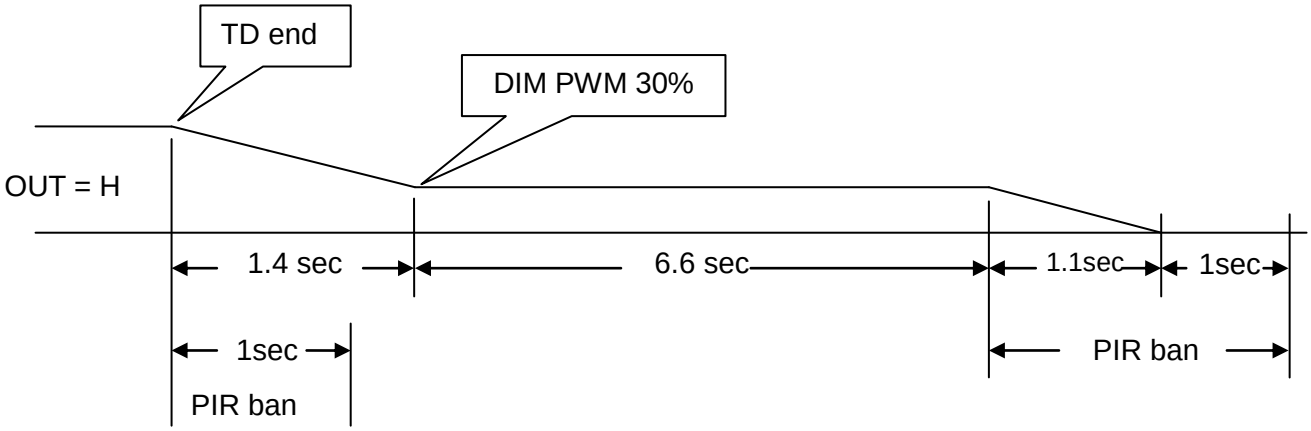
(5) FUNC A1 and FUNC A6 timing diagram of Dim On



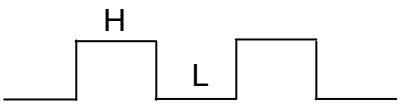
4. The output（OUT）Dimming 30% 8 second alert



(1) Dimming 30% 8 second alert



(2) PWM 30% OUT waveform as follows：（proportionally）



H : L = 3 : 7

During DIM the PWM frequency is 128Hz, duty cycle from 100% gradient to 3:7

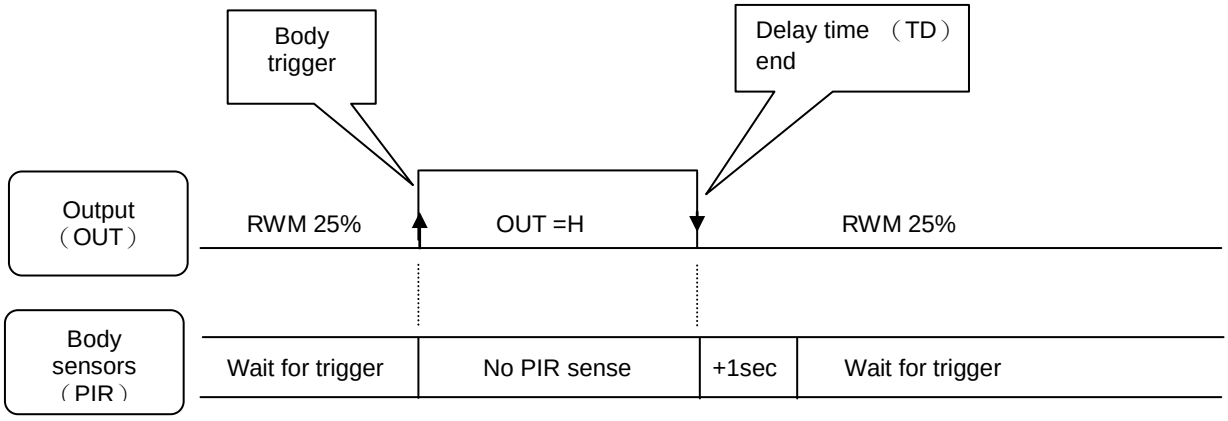
(3) In the alert time, not PHI "day" or "night" state judge

5. output（OUT）DIM OFF

(1) The OUT changes in the duty ratio of 30% for1.4 seconds, and then maintain 6.6 seconds , if no PIR trigger are within 6.6 seconds, and then Dim OFF 1.1 seconds to OFF

(2) During DIM 30% 8 sec + Dim the OFF 1.1 seconds time ,no PHI "day" or "night" state judge

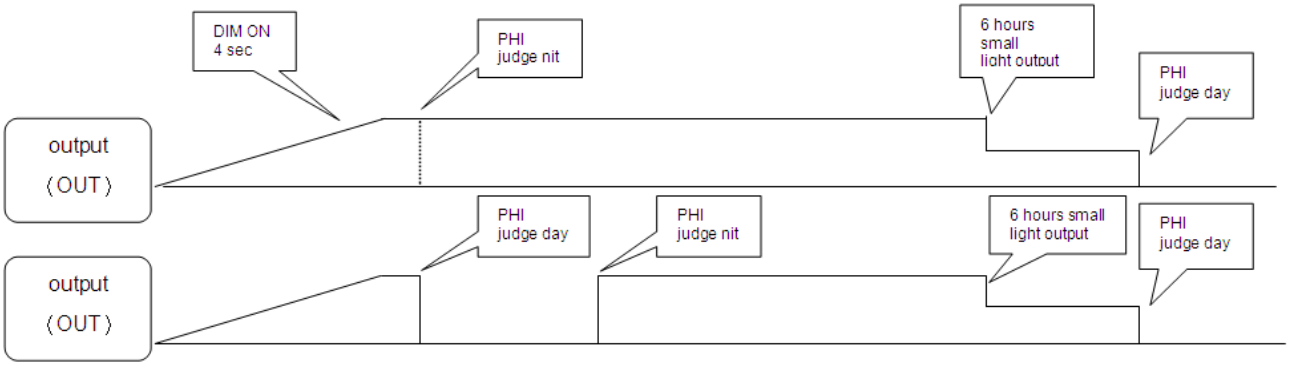
6. two-stage brightness TWO LEVEL



(1) PWM 25% duty cycle output is OUT H: L = 25: 75, fixed output frequency = 1KHz

(2) OUT output according to the set mode, there are four Duty Cycle: 3.125%, 6.25%, 12.5%, 25%

7. Power-dark lighting 6 hours mode



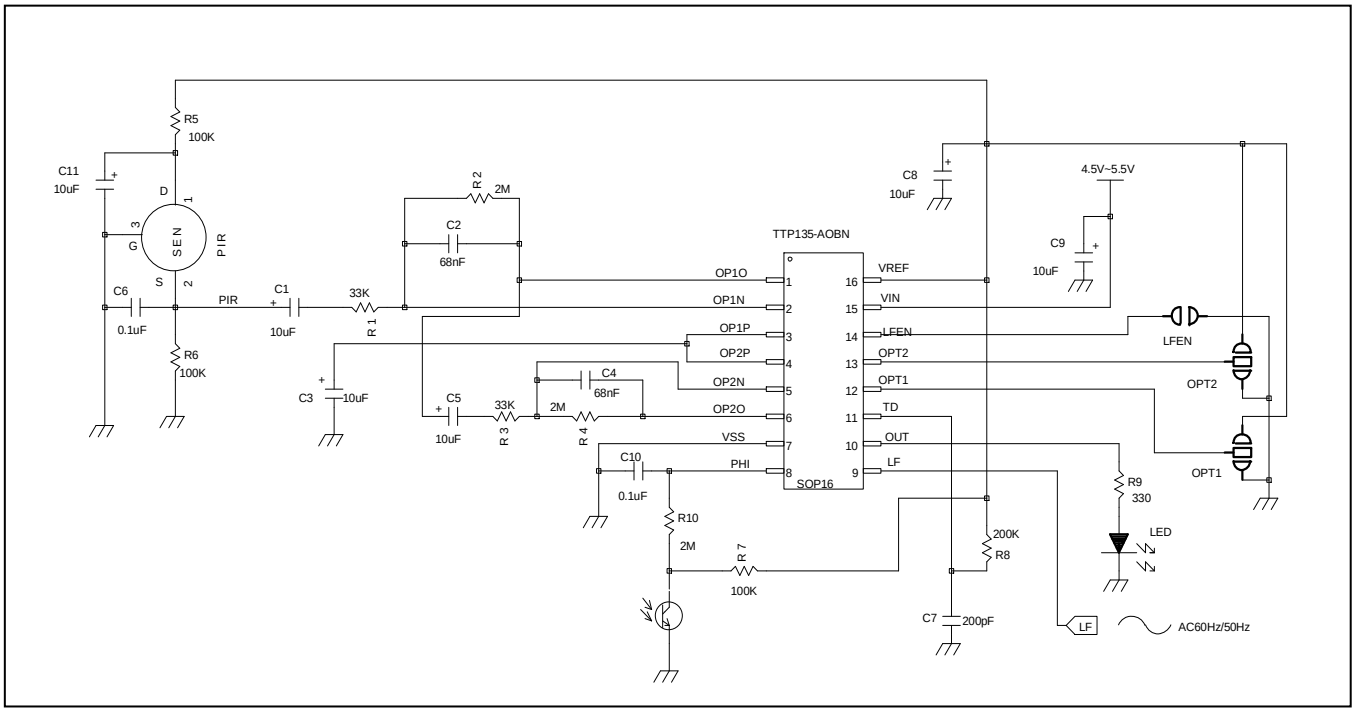
Ⅷ. Photo Transistor（PHI）

Determine the ambient brightness during the day（Day）or at night（Night）state

1. PHI voltage ≧ 2/3 VREF → as "night" mode and duration of at least 1 second
2. PHI voltage ≦ 1/3 VREF → as "day" mode and duration of at least 2 seconds
3. PHI voltage 1/3 VREF <VPHI <2/3 VREF → maintain the original state unchanged
4. PHI voltage has anti-shake function（De-bounce Noise）31ms（For Noise or PHI transfer）
5. When DIM PWM 30% and DIM OFF, not to judge the brightness of the environment, to be
6. in the FUNC A2 and FUNC A3 night light mode, without the ambient brightness judgments
7. hours in manual switch light modes, not to judge the brightness of the environment

Ⅸ. Application circuit schematics

1. **Basic Application Circuit** Reference only



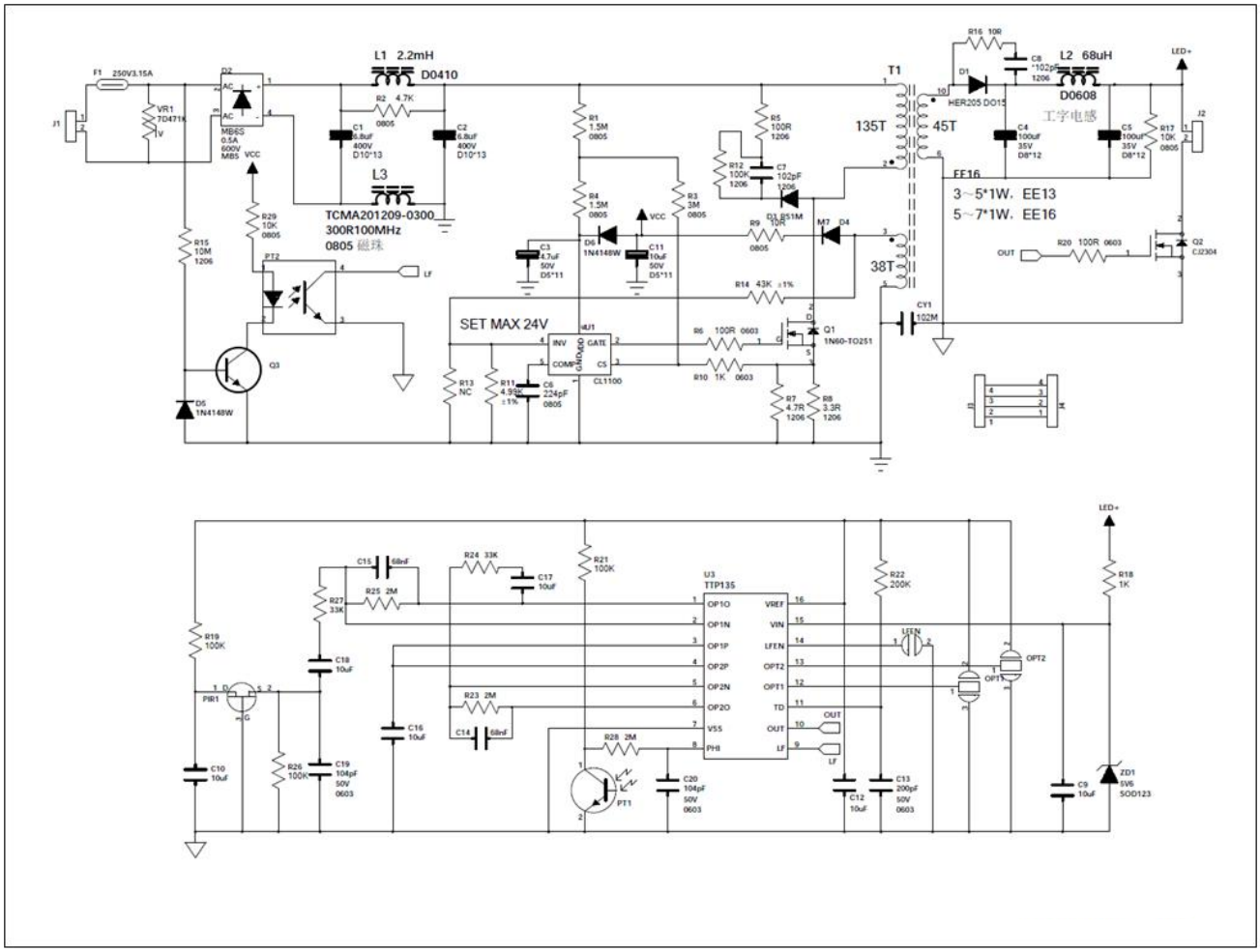
TD The delay time and output resistors, capacitors follows：

（Test conditions are not considered stable PIR trigger time, the actual delay time due to steady time increases of PIR application circuit becomes longer）

Capacitance（C7）	Resistance（R8）	Time
200pF	47K	8.5 sec
200pF	100K	17 sec
200pF	200K	35 sec
200pF	330K	56 sec
200pF	680K	117 sec
200pF	1M5	247 sec

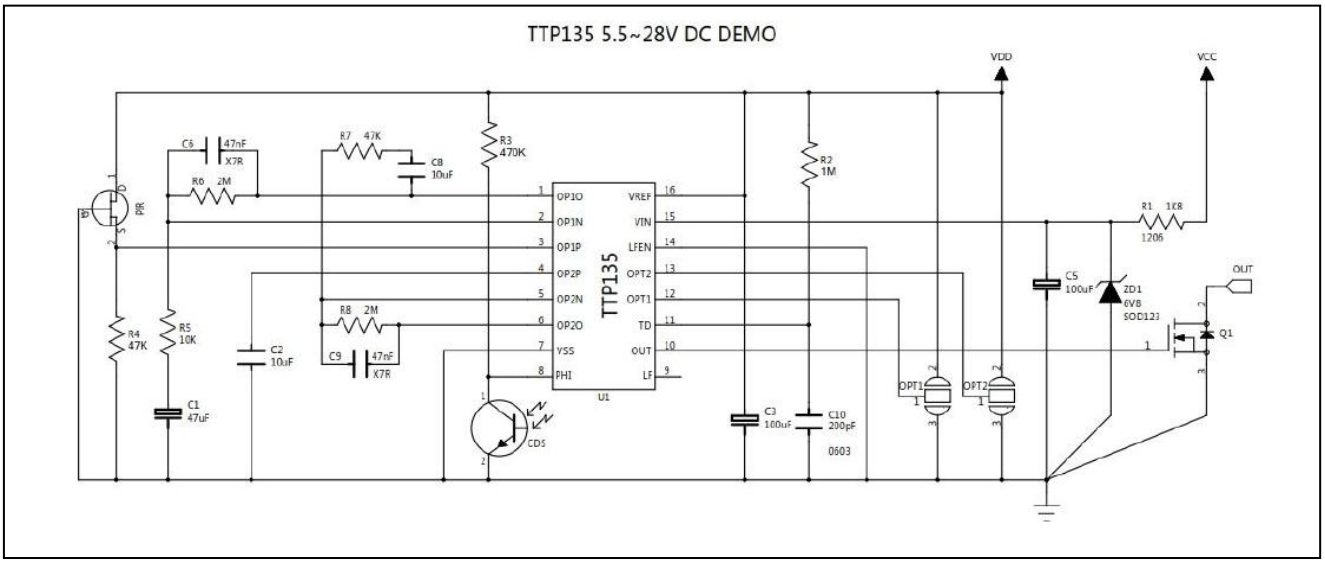
2. Isolated LED Driver Application Examples

Reference only



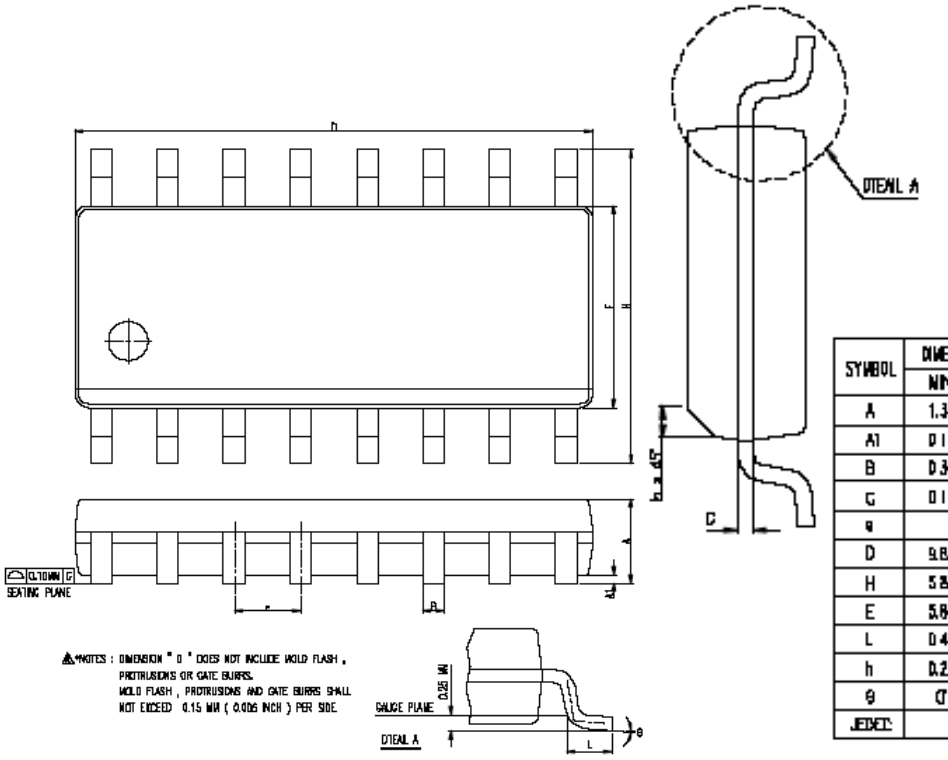
3. 5.5~28V DC Application Examples

Reference only



Package Outline

SOP-16



SYMBOL	DIMENSION IN MM		DIMENSION IN INCH	
	MIN	MAX	MIN.	MAX.
A	1.35	1.75	0.0532	0.0688
A1	0.10	0.25	0.0040	0.0098
B	0.33	0.51	0.013	0.020
C	0.19	0.25	0.0075	0.0098
e	1.27 BSC		0.050 BSC	
D	9.80	10.00	0.3859	0.3937
H	5.80	6.20	0.2284	0.2440
E	3.80	4.00	0.1497	0.1574
L	0.40	1.27	0.016	0.050
h	0.25	0.50	0.0099	0.0196
θ	0°	8°	0°	8°
JEDEC	MS-012 (AC)			

Ordering Information

TTP 135

Package Type	Chip Type	Wafer Type
TTP135-AOBN	-----	-----

Revision History

1. 2014/6/06 - The original version：V_1.1
2. 2016/1/19 - Modify basic application example version : V_1.3
3. 2017/04/17- Increase basic application example version : V_1.4
4. 2017/12/29- Modify VFER Voltage 3.3V ±0.3V version : V_1.5
5. 2020/05/04- Revise incorrect format. version : V_1.6