

## Ambient Light Sensor and Proximity Sensor with I<sup>2</sup>C Interface

### APM-16D18-00-DF8/TR8

#### Features

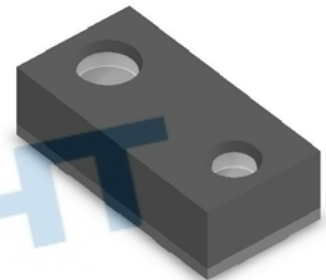
##### Ambient Light Sensor

- 16bit ADC resolution
- Specially coated photo diode with an optical response similar to human eyes
- High resolution (0.08mLux/count)
- 50Hz/60Hz flicker noise and IR rejection
- Amplifier with adjustable gain (x1, x4, x16, x128)
- Individual programmable low and high threshold for interrupt function
- Programmable interrupt persistence counter (x1, x4, x8, x16)
- Programmable integration time

##### Proximity Sensor

- 10~16bit ADC resolution
- Specially coated photo diode with a narrow optical response in a specified infrared range
- Amplifier with adjustable gain (x1, x2, x4, x8)
- IR driver output with adjustable sink current up to 125mA
- Adjustable number of pulse for the IR proximity signal
- Individual programmable low and high threshold for interrupt function
- Programmable interrupt persistence counter (x1, x4, x8, x16)
- Programmable update/sleep time
- Current sink driver for IR LED

- RoHS compliant and Pb Free package



#### Description

The APM-16D18-00-DF8/TR8 is a digital output ambient light and proximity sensor with I<sup>2</sup>C interface and interrupt. It has a flexible and wide operating range for the ambient light sensor with a maximum resolution of 0.08mLux/count and a maximum detectable illumination of 42949Lux. The PS function has adjustable number of IR pulses from 1 to 256 and flexible IR LED driving current from 12.5mA to 125mA, to meet different application requirements. Furthermore it is equipped with a filter to reduce unwanted IR signals and noise comes from the environment.

#### Applications

- Detection of ambient for controlling the backlight of TFT LCD display.
- Automatic residential and commercial lighting management.
- Automatic contrast enhancement for electronic signboard.
- Mobile phone, Smart phone, PDA, Tablet PC.

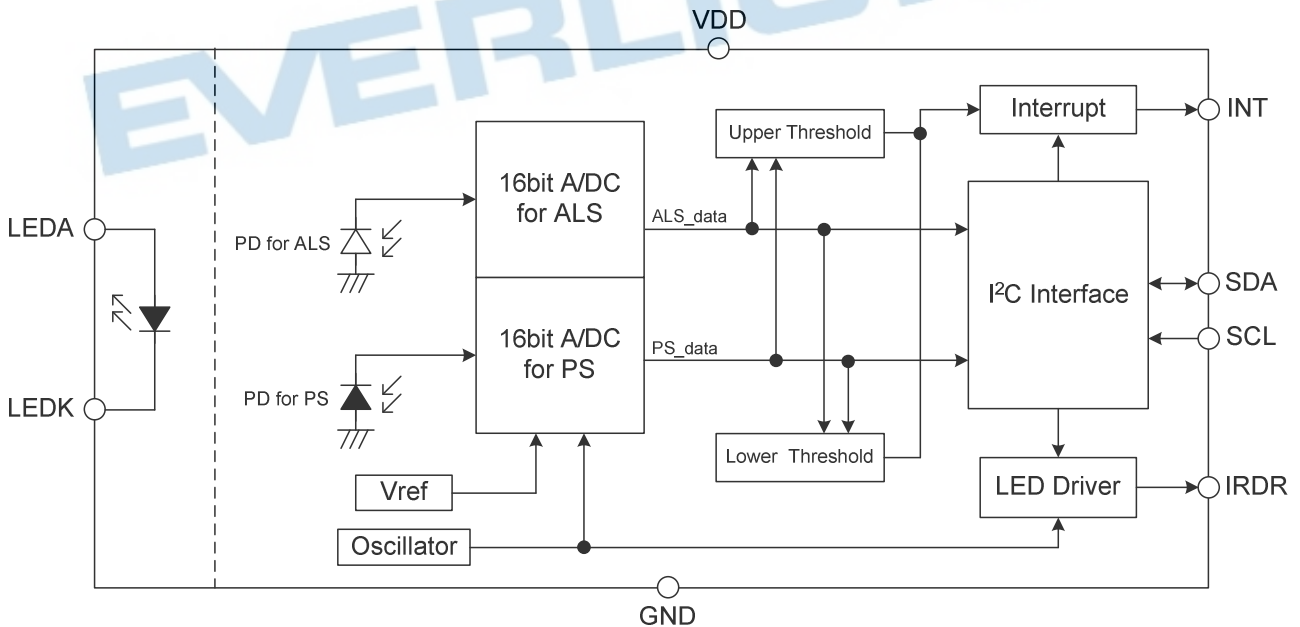
### Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Rating	Unit
Storage Temperature	T <sub>STG</sub>	-40 ~ 100	°C
Supply Voltage	V <sub>DD</sub>	-0.3 ~ 3.6	V
Digital Output Voltage	V <sub>O</sub>	-0.3 ~ 3.6	V
Digital Output Current	I <sub>O</sub>	10	mA

### Recommended Operating Conditions (Ta=25°C)

Parameter	Symbol	Rating	Unit
Operating Temperature	T <sub>OPR</sub>	-40 ~ 85	°C
Operating Supply Voltage	V <sub>DD</sub>	1.7 ~ 3.5	V

### Block Diagram & Pad Descriptions



## Pad Description

Pad	I/O	Function
VDD	Power	Power supply
GND	Power	Ground
IRDR	Output	IR LED sink current driver
SDA	I/O	I <sup>2</sup> C data input/output terminal
SCL	Input	I <sup>2</sup> C de-rail clock input terminal
INT	Output	Interrupt output pin (Open drain output)
LEDA	Input	IR LED Anode, connected with VDD
LEDK	Output	IR LED Cathode, connected with IRDR pin

## Electro-Optical Characteristics (Ta=25°C, VDD=3.0V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Shutdown Current	I <sub>STD</sub>	-	0.1	0.5	μA	Software disable or auto power down
<b>Ambient Light Sensor</b>						
Supply Current	I <sub>DD1</sub>	-	130	180	μA	ALS mode
Dark Output	ALS <sub>0</sub>			3	Counts	Ev=0 lx, ALS gain x 128, Tint=800ms
ALS A/DC resolution			16		bit	
ALS detection resolution		-	0.00008	-	lx/count	ALS gain x 128, Tint=3200ms
ALS maximum detection		-	42949	-	Lx	ALS gain x 1, Tint=50ms
ALS A/D conversion time	T <sub>ALS</sub>	50	-	3200	ms	
ALS sensitivity peak wavelength	λ <sub>PALS</sub>	545	555	565	nm	
<b>Proximity Sensor</b>						
PS Supply current	I <sub>DD2</sub>	-	175	240	uA	IR driver off
	I <sub>WAIT</sub>	-	-	30	uA	Wait state
PS dark output	P <sub>S0</sub>	-	-	20	count	No IR-LED, PS gain x 8, Pulse=32, IRDR=100mA ADC=16bit
PS output at DC light source		-	1	-	count	Ev=10,000lx or 2,500uW/cm2
PS A/DC resolution		10		16	bit	
PS A/D conversion time	T <sub>PS</sub>	0.4	-	25.2	ms	

PS wait time setting	T <sub>PSWAIT</sub>	12.5	-	1600	ms	
PS sensitivity peak wavelength	λ <sub>PPS</sub>	-	850	-	nm	
<b>LED Driver</b>						
IRDR current setting	I <sub>LED</sub>	12.5	-	125	mA	
IRDR pulse width	T <sub>LEDW</sub>	16	20	24	us	
Pulse count		1	-	256	pulse	
IRDR rise time	T <sub>R</sub>	-	50.0	-	ns	
IRDR fall time	T <sub>F</sub>	-	50.0	-	ns	
IRDR pin low voltage	V <sub>LIRDR</sub>	-	-	200	mV	IRDR=125mA -
IRDR pin leak current		-10	-	10	uA	VDD is off
<b>Interrupt Function</b>						
INT output saturation voltage		-	-	0.4	V	VDD≥2.0V, I <sub>o</sub> =3.0mA
		-	-	0.2 x VDD	V	VDD<2.0V, I <sub>o</sub> =3.0mA
INT pin leak current		-10	-	10	uA	When inactive
<b>I<sup>2</sup>C Bus</b>						
I <sup>2</sup> C Bus clock frequency	F <sub>I<sup>2</sup>C</sub>	-	-	400	kHz	
Input voltage L	V <sub>IL</sub>	-	-	0.3 x VDD	V	
Input voltage H	V <sub>IH</sub>	0.7 x VDD	-	-	V	
SDA low level output voltage	V <sub>OL</sub>	-	-	0.4	V	VDD≥2.0V, I <sub>o</sub> =3.0mA
		-	-	0.2 x VDD	V	VDD<2.0V, I <sub>o</sub> =3.0mA
SDA low level output current	I <sub>OL</sub>	3.0	-	-	mA	V <sub>o</sub> =0.4V
		6.0	-	-	mA	V <sub>o</sub> =0.6V
High level input current	I <sub>IH</sub>	-10	-	10	uA	
Low level input current	I <sub>IL</sub>	-10	-	10	uA	

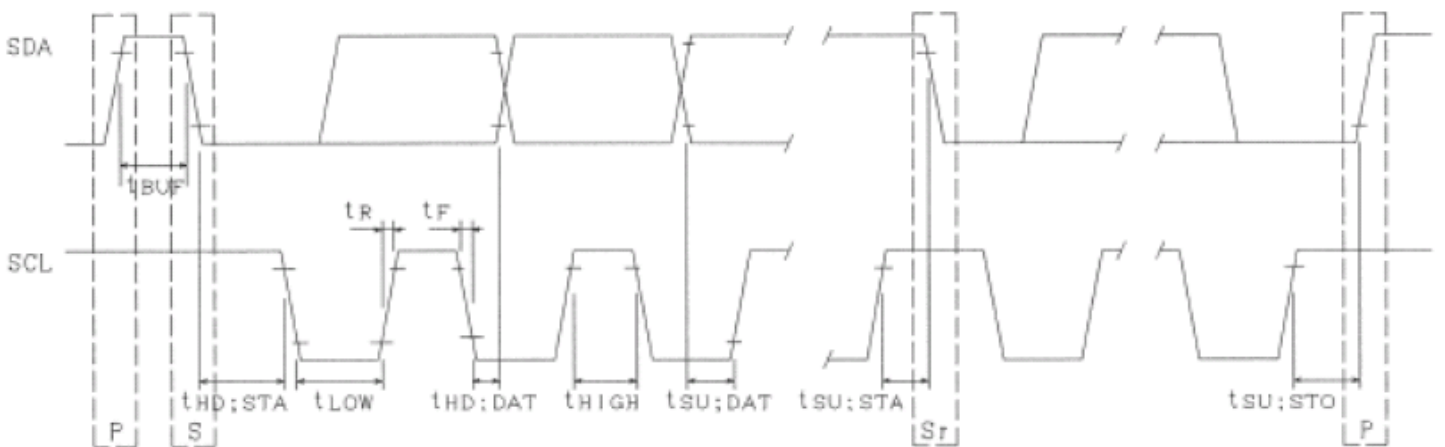
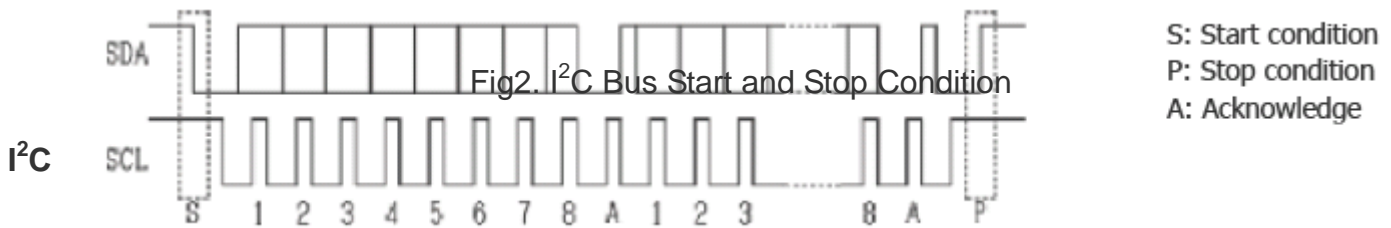


Fig1. I<sup>2</sup>C Bus Timing Diagram

## I<sup>2</sup>C Bus Conditions

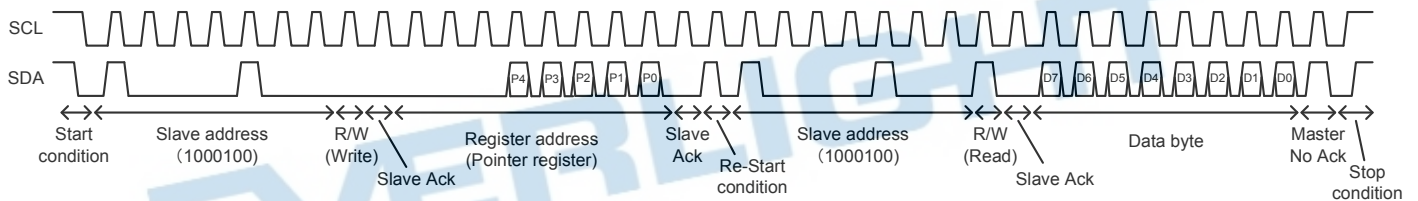
I<sup>2</sup>C bus is inter-IC bus system to transfer data by two lines of SDA and SCL. Data transfer is performed by one byte, and acknowledgement is sent when each byte is complete. Data transfer takes place MSB first from a start condition. For more detailed I<sup>2</sup>C bus system, please refer to the official I<sup>2</sup>C specification.



## Data Format

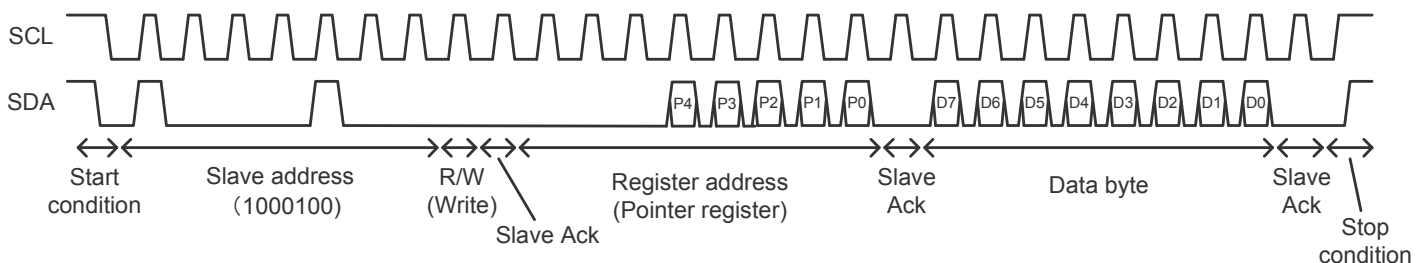
### Read Mode

The data format for read mode is set as below.



### Write Mode

The data format for write mode is set as below.



## Register

### Slave Address

Slave Address	Command Address	Operation
0x44 (7-bits)	0x88 (8-bits)	Write Command to APM-16D18-00-DF8/TR8
	0x89 (8-bits)	Read Data from APM-16D18-00-DF8/TR8

### Register Description

ADRS	REG NAME	DIR	DESCRIPTION	DEFAULT
00 <sub>H</sub>	OPERATION	R/W	Operation Mode Select Register	00 <sub>H</sub>
01 <sub>H</sub>	INTFLAG	R/W	Interrupt Flag Register	00 <sub>H</sub>
02 <sub>H</sub>	ASET	R/W	ALS Setting Register	04 <sub>H</sub>
04 <sub>H</sub>	ALTLB	R/W	ALS Interrupt Low threshold (LSB) Register	00 <sub>H</sub>
05 <sub>H</sub>	ALTHB	R/W	ALS Interrupt Low threshold (MSB) Register	00 <sub>H</sub>
06 <sub>H</sub>	ALHTLB	R/W	ALS Interrupt High threshold (LSB) Register	00 <sub>H</sub>
07 <sub>H</sub>	AHTHB	R/W	ALS Interrupt High threshold (MSB) Register	00 <sub>H</sub>
08 <sub>H</sub>	ADATAL	R	ALS Data(LSB) Register	00 <sub>H</sub>
09 <sub>H</sub>	ADATAH	R	ALS Data(MSB) Register	00 <sub>H</sub>
0A <sub>H</sub>	PSET	R/W	PS Setting Register	00 <sub>H</sub>
0B <sub>H</sub>	IRDRC	R/W	LED Drive Current Select Register	00 <sub>H</sub>
0C <sub>H</sub>	IRDRP	R/W	LED Drive Pulse Setting Register	00 <sub>H</sub>
0D <sub>H</sub>	PLTLB	R/W	PS Interrupt Low threshold (LSB) Register	00 <sub>H</sub>
0E <sub>H</sub>	PLTHB	R/W	PS Interrupt Low threshold (MSB) Register	00 <sub>H</sub>
0F <sub>H</sub>	PHTLB	R/W	PS Interrupt High threshold (LSB) Register	00 <sub>H</sub>
10 <sub>H</sub>	PHTHB	R/W	PS Interrupt High threshold (MSB) Register	00 <sub>H</sub>
11 <sub>H</sub>	PDATAH	R	PS Data(LSB) Register	00 <sub>H</sub>
12 <sub>H</sub>	PDATAH	R	PS Data(MSB) Register	00 <sub>H</sub>

#### Note:

1. All other addresses not shown in description are for testing purpose, please set command to default setting to avoid abnormal function.

## Function Description

ADRS	REG NAME	BIT								DEFAULT
		7	6	5	4	3	2	1	0	
00 <sub>H</sub>	OPERATION	ALSEN	AINTEN	APERSIST1	APERSIST0	PSEN	PINTEN	PPERSIST1	PPERSIST0	00 <sub>H</sub>
01 <sub>H</sub>	INTFLAG	ALTF	AHTF	AFLAG	-	PLTF	PHTF	PFLAG	-	00 <sub>H</sub>
02 <sub>H</sub>	ASET	AGAIN1	AGAIN0	AITIME2	AITIME1	AITIME0	1	-	-	04 <sub>H</sub>
04 <sub>H</sub>	ALTLB	ALT7	ALT6	ALT5	ALT4	ALT3	ALT2	ALT1	ALT0	00 <sub>H</sub>
05 <sub>H</sub>	ALTHB	ALT15	ALT14	ALT13	ALT12	ALT11	ALT10	ALT9	ALT8	00 <sub>H</sub>
06 <sub>H</sub>	AHTLB	AHT7	AHT6	AHT5	AHT4	AHT3	AHT2	AHT1	AHT0	00 <sub>H</sub>
07 <sub>H</sub>	AHTHB	AHT15	AHT14	AHT13	AHT12	AHT11	AHT10	AHT9	AHT8	00 <sub>H</sub>
08 <sub>H</sub>	ADATAL	ADATA7	ADATA6	ADATA5	ADATA4	ADATA3	ADATA2	ADATA1	ADATA0	00 <sub>H</sub>
09 <sub>H</sub>	ADATAH	ADATA15	ADATA14	ADATA13	ADATA12	ADATA11	ADATA0	ADATA9	ADATA8	00 <sub>H</sub>
0A <sub>H</sub>	PSET	PGAIN1	PGAIN0	PITIME2	PITIME1	PITIME0	PWTIME2	PWTIME1	PWTIME0	00 <sub>H</sub>
0B <sub>H</sub>	IRDRC	IRDRC3	IRDRC2	IRDRC1	IRDRC0	-	-	-	-	00 <sub>H</sub>
0C <sub>H</sub>	IRDRP	IRDRP7	IRDRP6	IRDRP5	IRDRP4	IRDRP3	IRDRP2	IRDRP1	IRDRP0	00 <sub>H</sub>
0D <sub>H</sub>	PLTLB	PLT7	PLT6	PLT5	PLT4	PLT3	PLT2	PLT1	PLT0	00 <sub>H</sub>
0E <sub>H</sub>	PLTHB	PLT15	PLT14	PLT13	PLT12	PLT11	PLT10	PLT9	PLT8	00 <sub>H</sub>
0F <sub>H</sub>	PHTLB	PHT7	PHT6	PHT5	PHT4	PHT3	PHT2	PHT1	PHT0	00 <sub>H</sub>
10 <sub>H</sub>	PHTHB	PHT15	PHT14	PHT13	PHT12	PHT11	PHT10	PHT9	PHT8	00 <sub>H</sub>
11 <sub>H</sub>	PDATA	PDATA7	PDATA6	PDATA5	PDATA4	PDATA3	PDATA2	PDATA1	PDATA0	00 <sub>H</sub>

12 <sub>H</sub>	PDATAH	PDATA15	PDATA14	PDATA13	PDATA12	PDATA11	PDATA10	PDATA9	PDATA8	00 <sub>H</sub>
-----------------	--------	---------	---------	---------	---------	---------	---------	--------	--------	-----------------

EVERLIGHT



## Command Register

### Operation mode select register (0x00)

7	6	5	4	3	2	1	0
ALSEN	AINTEN	APERSIST1	APERSIST0	PSEN	PINTEN	PPERSIST1	PPERSIST0

Default Value: 00<sub>H</sub>

#### 1. ALSEN: ALS enable setting

BIT 7	OPERATION
0	Disable ALS function
1	Enable ALS function

#### 2. AINTEN: ALS interrupt enable setting

BIT 6	OPERATION
0	Disable ALS interrupt function
1	Enable ALS interrupt function

#### 3. APERSIST: ALS persistence count setting

BITS [5:4]	OPERATION
00	1 integration time periods range.
01	4 integration time periods range.
10	8 integration time periods range.
11	16 integration time periods range.

#### 4. PSEN: PS enable setting

BIT 3	OPERATION
0	Disable PS function
1	Enable PS function

#### 5. PINTEN: PS interrupt enable setting

BIT 2	OPERATION
0	Disable PS interrupt function
1	Enable PS interrupt function

#### 6. PPERSIST: PS persistence counter setting

BITS [1:0]	OPERATION
00	1 integration cycle periods range.
01	4 integration time periods range.
10	8 integration time periods range.
11	16 integration time periods range.

### Interrupt flag register (0x01)

7	6	5	4	3	2	1	0
ALTF	AHTF	AFLAG	-	PLTF	PHTF	PFLAG	-

Default Value: 00<sub>H</sub>

ALTF: ALS low threshold flag

BIT 7	OPERATION
0	Interrupt is cleared or not triggered yet
1	Interrupt is triggered and will be clearable by write "0"

AHTF: ALS high threshold flag

BIT 6	OPERATION
0	Interrupt is cleared or not triggered yet
1	Interrupt is triggered and will be clearable by write "0"

AFLAG: ALS Flag

BIT 5	OPERATION
0	Interrupt is cleared or not triggered yet
1	Interrupt is triggered(ALTH or AHTH =1) and will be clearable by write "0"

PLTF: PS low threshold flag

BIT 3	OPERATION
0	Interrupt is cleared or not triggered yet
1	Interrupt is triggered and will be clearable by write "0"

PHTF: PS high threshold flag

BIT 2	OPERATION
0	Interrupt is cleared or not triggered yet
1	Interrupt is triggered and will be clearable by write "0"

PFLAG: PS flag

BIT 1	OPERATION
0	Interrupt is cleared or not triggered yet
1	Interrupt is triggered(PLTH or PHTH =1) and will be clearable by write "0"

### ALS setting register (0x02)

7	6	5	4	3	2	1	0
AGAIN1	AGAIN0	AITIME2	AITIME1	AITIME0	1	-	-

Default Value: 04<sub>H</sub>

AGAIN: ALS gain setting

BITS [7:6]	OPERATION
00	ALS gain 1x
01	ALS gain 4x
10	ALS gain 16x
11	ALS gain 128x

AITIME: ALS integration time

BITS [5:3]	OPERATION
000	50ms
001	100ms
010	200ms
011	400ms
100	800ms
101	1600ms
110	3200ms
111	Reserved

The detection resolution and maximum detection illumination of ALS are change as follows by the ALS gain and A/DC conversion time setup.

ALS Gain	ALS A/D conversion time	ALS Resolution	Maximum Detection	ADC Resolution
x1	50 ms	0.65536 lx/count	42949 lx	16 bit
	100 ms	0.32768 lx/count	21475 lx	
	200 ms	0.16384 lx/count	10737 lx	
	400 ms	0.08192 lx/count	5369 lx	
	800 ms	0.04096 lx/count	2684 lx	
	1600 ms	0.02048 lx/count	1342 lx	
	3200 ms	0.01024 lx/count	671 lx	
x4	50 ms	0.16384 lx/count	10737 lx	16 bit
	100 ms	0.08192 lx/count	5369 lx	
	200 ms	0.04096 lx/count	2684 lx	
	400 ms	0.02048 lx/count	1342 lx	
	800 ms	0.01024 lx/count	671 lx	
	1600 ms	0.00512 lx/count	336 lx	
	3200 ms	0.00256 lx/count	168 lx	
x16	50 ms	0.04096 lx/count	2684 lx	16 bit
	100 ms	0.02048 lx/count	1342 lx	
	200 ms	0.01024 lx/count	671 lx	
	400 ms	0.00512 lx/count	336 lx	
	800 ms	0.00256 lx/count	168 lx	
	1600 ms	0.00128 lx/count	84 lx	
	3200 ms	0.00064 lx/count	42 lx	
x128	50 ms	0.00512 lx/count	336 lx	16 bit
	100 ms	0.00256 lx/count	168 lx	
	200 ms	0.00128 lx/count	84 lx	
	400 ms	0.00064 lx/count	42 lx	
	800 ms	0.00032 lx/count	21 lx	
	1600 ms	0.00016 lx/count	10 lx	
	3200 ms	0.00008 lx/count	5 lx	

### ALS interrupt low threshold low byte (0x04) and high byte (0x05) register

7	6	5	4	3	2	1	0
ALT7	ALT6	ALT5	ALT4	ALT3	ALT2	ALT1	ALT0

Default Value: 00<sub>H</sub>

ALTLB: ALS low threshold LSB register

7	6	5	4	3	2	1	0
ALT15	ALT14	ALT13	ALT12	ALT11	ALT10	ALT9	ALT8

Default Value: 00<sub>H</sub>

ALTHB: ALS low threshold MSB register

### ALS interrupt high threshold low byte (0x06) and high byte (0x07) register

7	6	5	4	3	2	1	0
AHT7	AHT6	AHT5	AHT4	AHT3	AHT2	AHT1	AHT0

Default Value: 00<sub>H</sub>

AHTLB: ALS high threshold LSB register

7	6	5	4	3	2	1	0
AHT15	AHT14	AHT13	AHT12	AHT11	AHT10	AHT9	AHT8

Default Value: 00<sub>H</sub>

AHTHB: ALS high threshold MSB register.

An ALS interrupt event (AFLAG) is governed by the high and low thresholds in register 04, 05, 06, 07hex (ALTLB, ALTHB, AHTLB and AHTHB). The stored value to be used as the high and low trigger points for the ALS data registers 08 and 09hex crosses below to the low or high threshold specified.

**Note:** These ALS low and high threshold registers are 16bit wide.

### ALS data register low byte (0x08) and high byte (0x09)

7	6	5	4	3	2	1	0
ADATA7	ADATA6	ADATA5	ADATA4	ADATA3	ADATA2	ADATA1	ADATA0

Default Value: 00<sub>H</sub>

ADATAL: ALS data LSB register

7	6	5	4	3	2	1	0
ADATA15	ADATA14	ADATA13	ADATA12	ADATA11	ADATA10	ADATA9	ADATA8

Default Value: 00<sub>H</sub>

ADATAH: ALS data MSB register

**PS operation mode register (0x0A)**

7	6	5	4	3	2	1	0
PGAIN1	PGAIN0	PITIME2	PITIME1	PITIME0	PWTIME2	PWTIME1	PWTIME0

Default Value: 00<sub>H</sub>

PGAIN: PS gain setting

<b>BITS [7:6]</b>	<b>OPERATION</b>
00	PS gain 1x
01	PS gain 2x
10	PS gain 4x
11	PS gain 8x

PITIME: PS A/D conversion time

<b>BITS [5:3]</b>	<b>OPERATION</b>	<b>Resolution</b>	<b>Max. Counts</b>
000	0.4ms	10bit	1023
001	0.8ms	11bit	2047
010	1.6ms	12bit	4095
011	3.2ms	13bit	8191
100	6.3ms	14bit	16383
101	12.6ms	15bit	32767
110	25.2ms	16bit	65535
111	Reserved		

PWTIME: PS wait time

<b>BITS [2:0]</b>	<b>OPERATION</b>
000	12.5ms
001	25ms
010	50ms
011	100ms
100	200ms
101	400ms
110	800ms
111	1600ms

### IR LED drive current register (0x0B)

7	6	5	4	3	2	1	0
IRDRC3	IRDRC2	IRDRC1	IRDRC0	-	-	-	-

Default Value: 00<sub>H</sub>

IRDRC: IR LED drive current select register

BITS [7:4]	OPERATION
0000	12.5mA
0001	25mA
0010	37.5mA
0011	50mA
0100	62.5mA
0101	75mA
0110	87.5mA
0111	100mA
1000	112.5mA
1001	125mA
1010-1111	Reserved

### IR LED drive pulse count register (0x0C)

7	6	5	4	3	2	1	0
IRDRP7	IRDRP6	IRDRP5	IRDRP4	IRDRP3	IRDRP2	IRDRP1	IRDRP0

Default Value: 00<sub>H</sub>

IRDRP: IR LED drive pulse count setting register

BITS [7:0]	OPERATION
00000000	1
00000001	2
00000010	3
00000011	4
...	...
11111100	253
11111101	254
11111110	255
11111111	256

### PS interrupt low threshold low byte (0x0D) and high byte (0x0E) register

7	6	5	4	3	2	1	0
PLT7	PLT6	PLT5	PLT4	PLT3	PLT2	PLT1	PLT0

Default Value: 00<sub>H</sub>

PLTLB: PS low threshold LSB register

7	6	5	4	3	2	1	0
PLT15	PLT14	PLT13	PLT12	PLT11	PLT10	PLT9	PLT8

Default Value: 00<sub>H</sub>

PLTHB: PS low threshold MSB register

### PS interrupt high threshold low byte (0x0F) and high byte (0x10) register

7	6	5	4	3	2	1	0
PHT7	PHT6	PHT5	PHT4	PHT3	PHT2	PHT1	PHT0

Default Value: 00<sub>H</sub>

PHTLB: PS high threshold LSB register

7	6	5	4	3	2	1	0
PHT15	PHT14	PHT13	PHT12	PHT11	PHT10	PHT9	PHT8

Default Value: 00<sub>H</sub>

PHTHB: PS high threshold MSB register

An PS interrupt event (PFLAG) is governed by the high and low thresholds in register 0D, 0E, 0F, 10hex (PLTLB, PLTHB, PHTLB and PHTHB). The stored value to be used as the high and low trigger points for the PS data registers 11 and 12hex crosses below to the low or high threshold specified.

**Note:** These PS low and high threshold registers are 16bit wide.

### PS data register low byte (0x11) and high byte (0x12)

7	6	5	4	3	2	1	0
PDATA7	PDATA6	PDATA5	PDATA4	PDATA3	PDATA2	PDATA1	PDATA0

Default Value: 00<sub>H</sub>

PDATA1: PS data LSB register

7	6	5	4	3	2	1	0
PDATA15	PDATA14	PDATA13	PDATA12	PDATA11	PDATA10	PDATA9	PDATA8

Default Value: 00<sub>H</sub>

PDATAH: PS data MSB register

## Functional Description

### Shutdown Mode

Shutdown mode becomes effective when the power is turned on and when the shutdown mode is selected with the operation mode select register. Power consumption is typical 0.1uA in the shutdown mode; therefore, the power consumption can be reduced for standby mode. The operation mode register is readable and writable even in the shutdown mode.

### ALS Mode

The ALS mode is for measuring the ambient light illumination by using an ALS photodiode which is sensitivity to visible light.

A/D conversion cycle is started by specifying the ALS mode with the operation mode select register, and the output data corresponding to the illumination is stored in the data register after completing A/D conversion cycle.

### ALS Interrupt Function

The ALS interrupt function is for interrupting when the count of ALS output data meets the detection condition consecutively persistence count setting. In case of an interrupt event, the interrupt flag according to each condition is set to "1", and the interrupt pin is set to low level. The detection condition is that the ALS output data is lower than the low threshold register value or higher than high threshold register value. If the output data was out of the detection condition, count is reset to zero.

### Detection Condition

The number of detection is counted with condition below.

*ALS output data < Low Threshold Value "OR" ALS output data > High Threshold Value*

### Flag Set Condition

The interrupt flag is set with condition below and INT pin will be active.

*Detection count = ALS persistence setting count*

The number of persistence is selectable from 1, 4, 8, and 16 times by an Interrupt Setting Register.



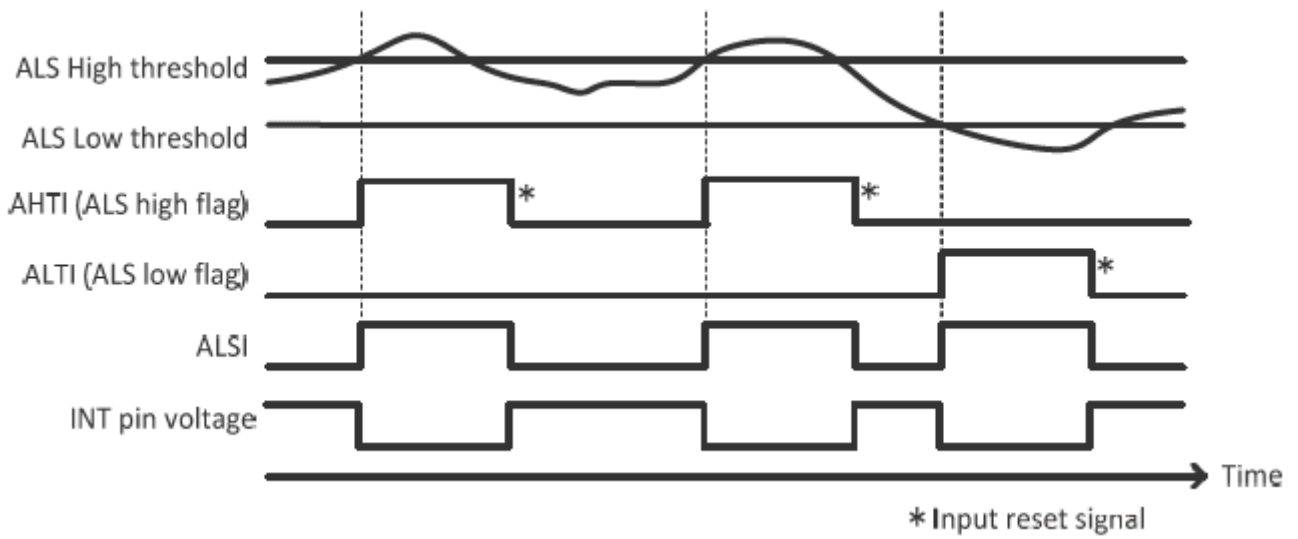


Fig5. ALS Interrupt Operation Timing Diagram

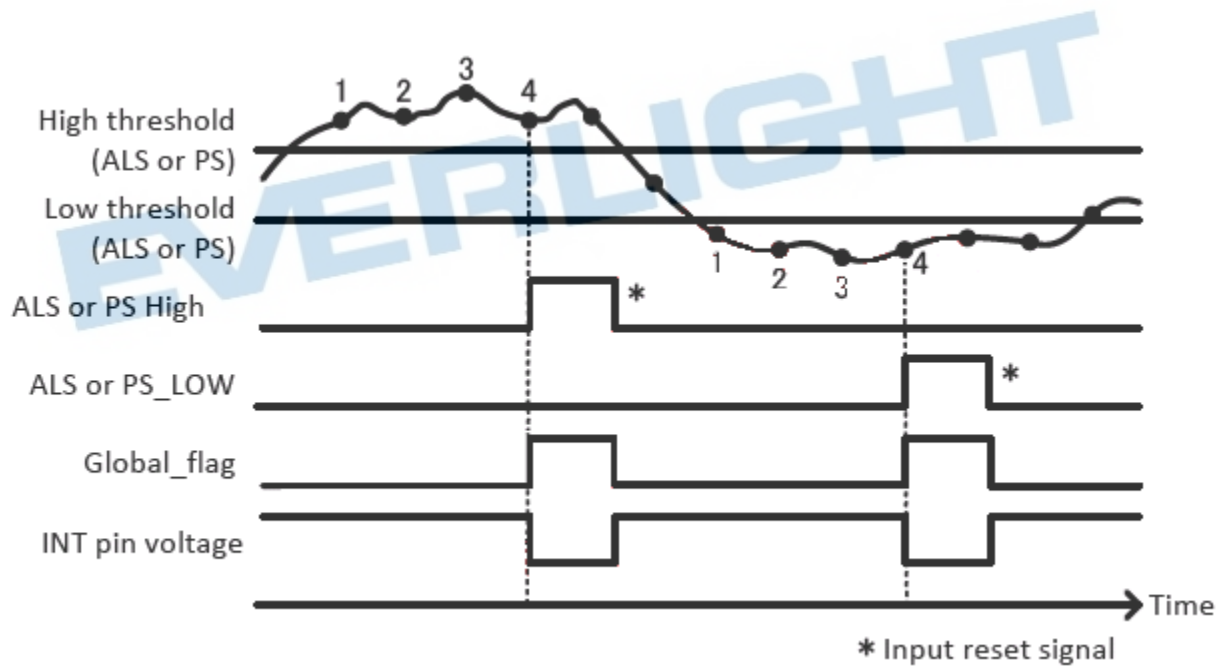


Fig6. Interrupt Operation Timing Diagram

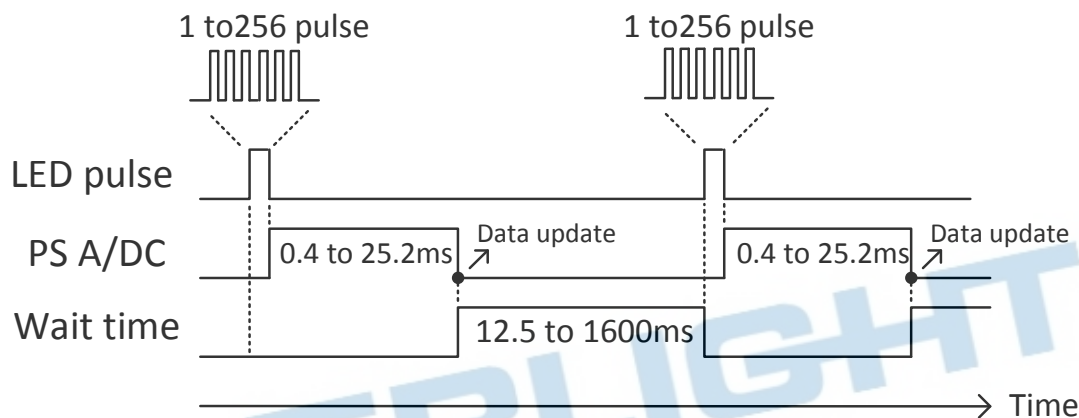
(e.g.) Persistence count is set as 4 times

## PS Mode

The proximity sensor drives the IR-LED connected to IRDR pin and detects the intensity of the reflected IR light of an object close to the sensor.

The IR-LED drive and ADC conversion cycle are started by setting the PS enable bit in the operation select register. The output data corresponding to the reflected IR intensity is stored in the data register.

The IR-LED is controlled by an integrated LED driver with sink output. The drive current value (12.5 to 125mA) and the pulse count (1 to 256 pulses) are selectable to adjust the proximity detection distance. Moreover, measurement interval in PS mode can be adjusted with PS wait time (12.5 to 1600ms) which will reduce the overall current consumption.



## PS Interrupt Function

The PS interrupt function is interrupting when the count of the PS output data meets the detection condition consecutively persistence count setting. In case of an interrupt event, the interrupt flag according to each condition is set to "1", and the interrupt output pin is set to low level. The detection condition is that the PS output data is lower than the low threshold register value or higher than the high threshold register value. If the output data was out of the detection condition, the count is reset to zero.

Once the interrupt flag has been activated by crossing the high threshold value and is then reset, it can be activated again only when output value drops below the low threshold value. Also when a low interrupt occurred, the next event which can trigger the interrupt is if the PS value exceeds the high threshold value.

## Detection Condition

The number of detection is counted with condition below.

*PS output data* < *Low Threshold Value* "OR" *PS output data* > *High Threshold Value*

### Flag Set Condition

The interrupt flag is set with condition below and INT pin will be active.

$$\text{Detection count} = \text{PS persistence setting count}$$

The number of persistence is selectable from 1, 4, 8, and 16 times by an Interrupt Setting Register.

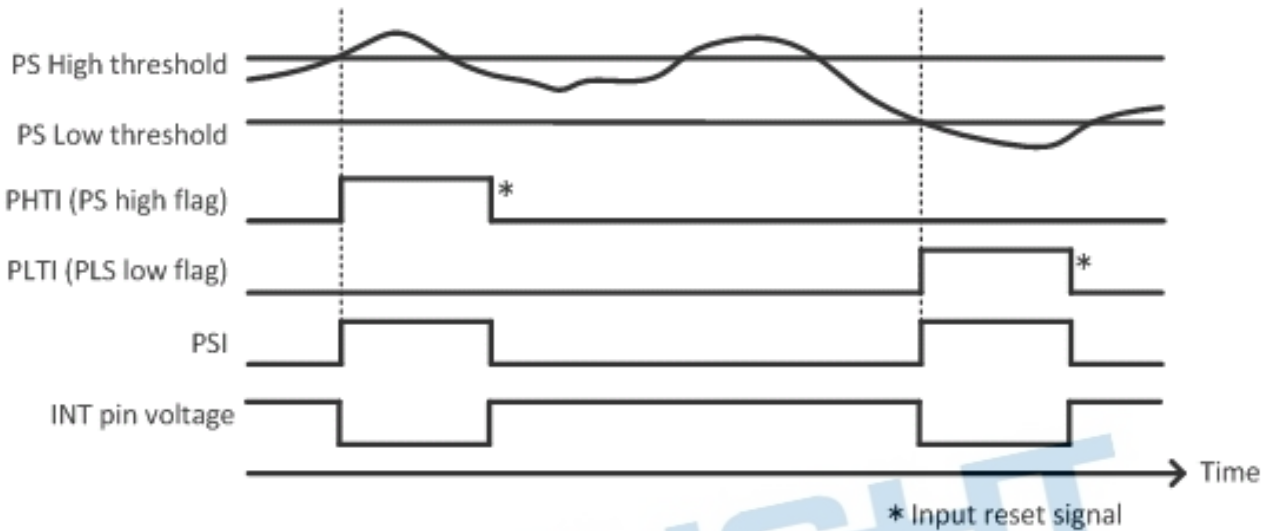
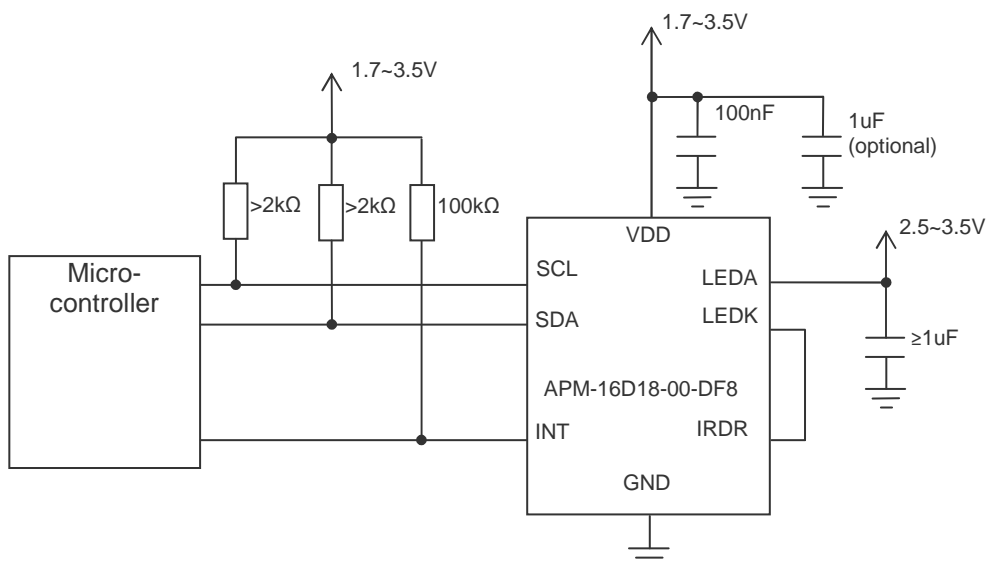
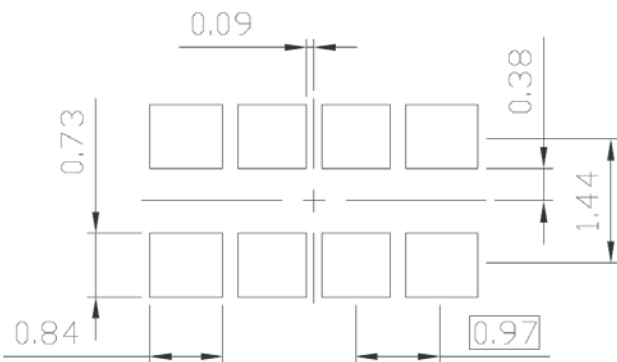
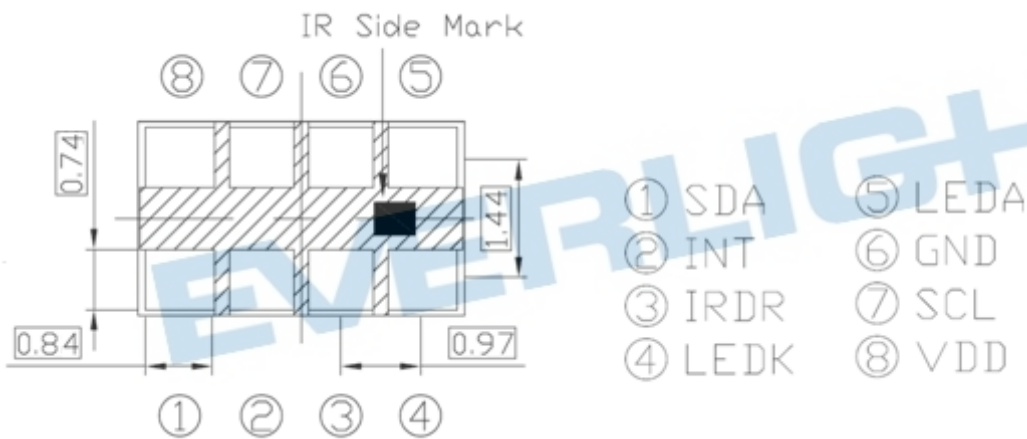
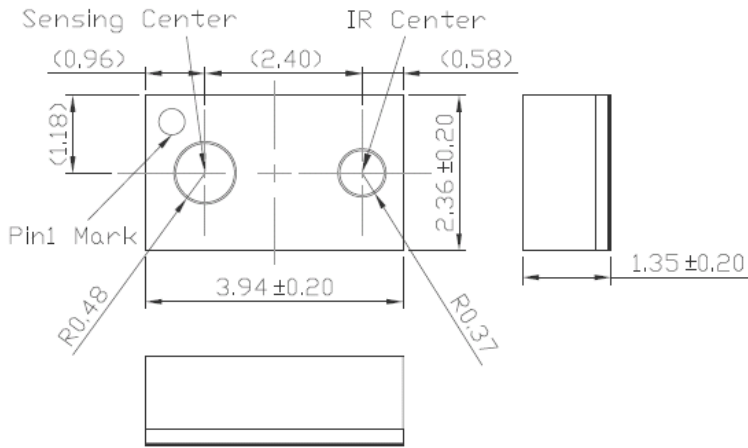


Fig7. PS Interrupt Operation Timing Diagram

### Typical Application Circuit



Package Dimensions and recommended solder pad layout



Unit: mm  
 Tolerances: ± 0.2mm

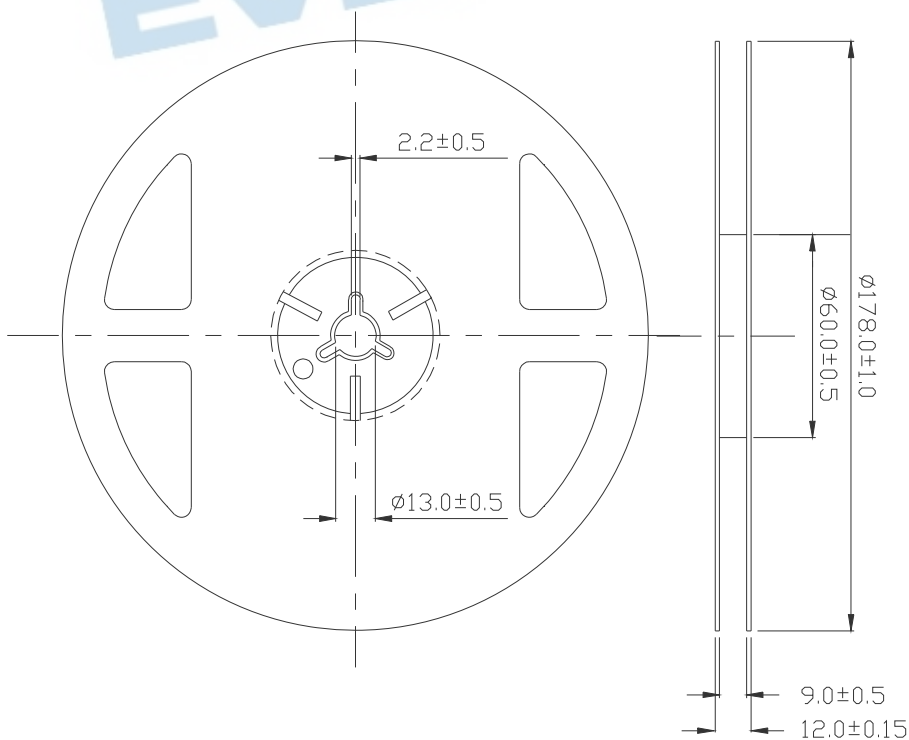
Moisture Resistant Packing Materials

Label Explanation

- CPN: Customer's Product Number
- P/N: Product Number
- QTY: Packing Quantity
- CAT: Luminous Intensity Rank
- HUE: Dom. Wavelength Rank
- REF: Forward Voltage Rank
- LOT No: Lot Number

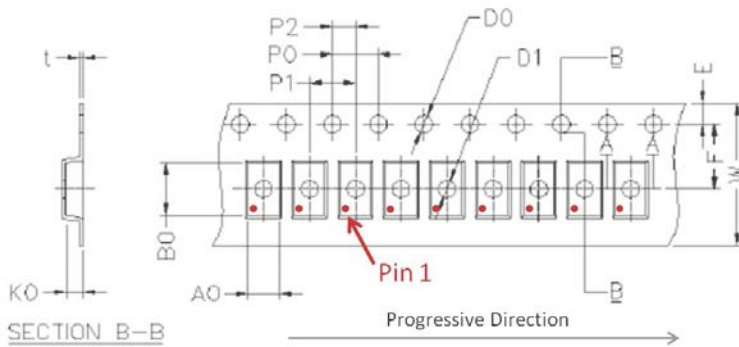


Reel Dimensions



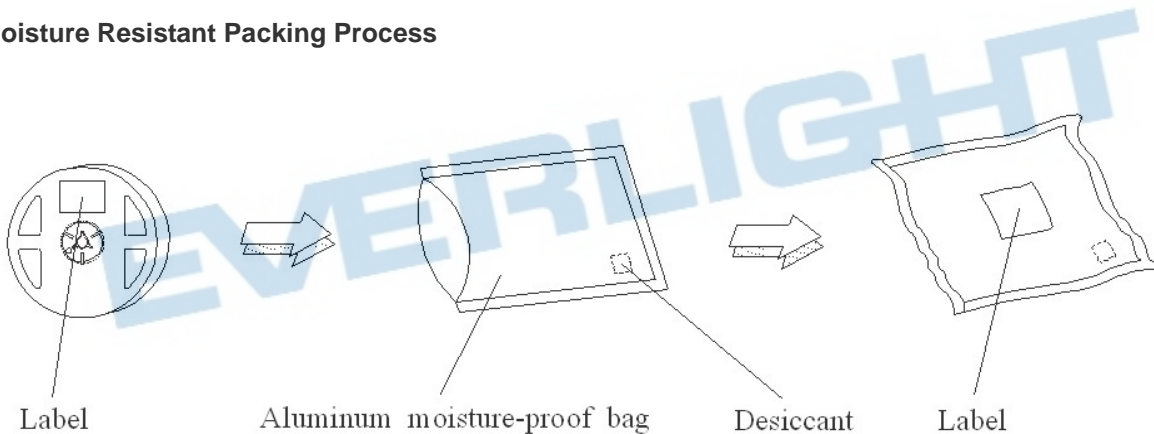
Unit: mm  
 Tolerances: ± 0.1mm

**Carrier Tape Dimensions: Loaded Quantity 2000 pcs Per Reel**



W	E	F
12.00+0.1 -0.3	1.75±0.10	5.50±0.1
D0	D1	P0
1.50+0.10 -0	1.50±0.10	4.00±0.1
P1	P2	t
4.00±0.10	2.00±0.1	0.3±0.05
A0	B0	K0
2.7±0.1	4.5±0.1	1.9±0.1

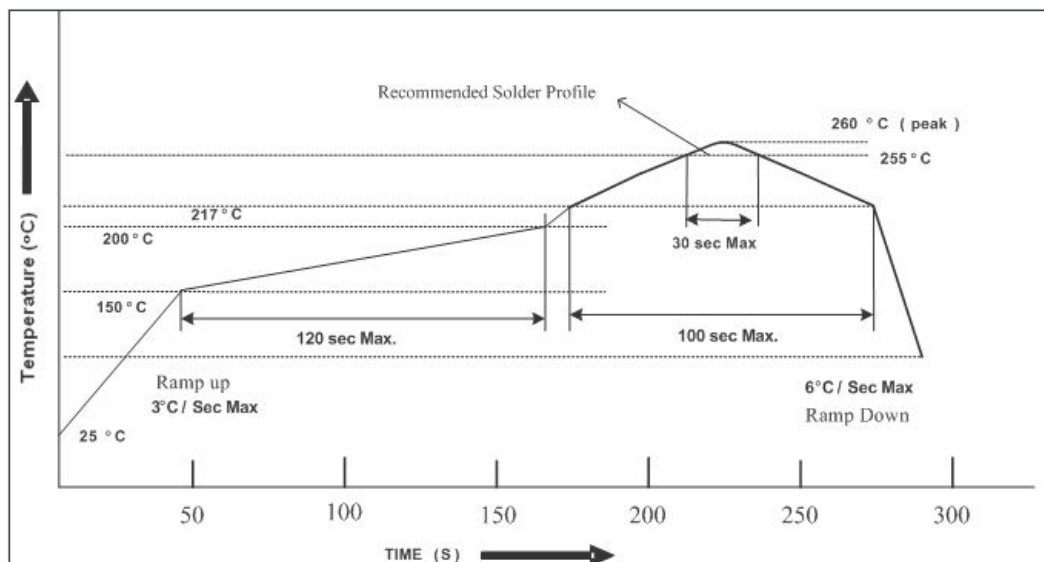
**Moisture Resistant Packing Process**



**Recommended method of storage**

1. Do not open moisture proof bag before devices are ready to use.
2. Shelf life in sealed bag from the bag seal date: 18 months at 10°C~30°C and < 90% RH.
3. After opening the package, the devices must be stored at 10°C~30°C and ≤ 60%RH, and used within 168 hours (floor life).
4. If the moisture absorbent material (desiccant material) has faded or unopened bag has exceeded the shelf life or devices (out of bag) have exceeded the floor life, baking treatment is required.
5. If baking is required, refer to IPC/JEDEC J-STD-033 for bake procedure or recommend the following conditions:  
 192 hours at 40°C +5/-0°C and < 5 % RH (reeled/tubed/loose units) or  
 96 hours at 60°C ± 5°C and < 5 % RH (reeled/tubed/loose units) or  
 24 hours at 125°C ± 5°C, not suitable for reel or tubes.

## Recommended Solder Profile



### Notice:

1. Reflow soldering should not be done more than two times.
2. When soldering, do not put stress on the devices during heating.
3. After soldering, do not warp the circuit board.
4. Reference: IPC/JEDEC J-STD-020D

## DISCLAIMER

1. EVERLIGHT reserves the right(s) on the adjustment of product material mix for the specification.
2. The product meets EVERLIGHT published specification for a period of twelve (12) months from date of shipment.
3. The graphs shown in this datasheet are representing typical data only and do not show guaranteed values.
4. When using this product, please observe the absolute maximum ratings and the instructions for using outlined in these specification sheets. EVERLIGHT assumes no responsibility for any damage resulting from the use of the product which does not comply with the absolute maximum ratings and the instructions included in these specification sheets.
5. These specification sheets include materials protected under copyright of EVERLIGHT. Reproduction in any form is prohibited without obtaining EVERLIGHT's prior consent.
6. This product is not intended to be used for military, aircraft, automotive, medical, life sustaining or life saving applications or any other application which can result in human injury or death. Please contact authorized Everlight sales agent for special application request.

EVERLIGHT



单击下面可查看定价，库存，交付和生命周期等信息

[>>Everlight\(亿光\)](#)