Document Title

Ambient Light, Solar-UV, IR and Proximity Sensor with I2C digital interface

Revision History

Rev. No.	History	Issue Date	Remark
0.0	Initial issue	March 4, 2015	Preliminary

ASR8600

Ambient Light, Solar-UV, IR and Proximity Sensor

Preliminary ***with I2C digital interface***

General Description

The ASR8600 is an integrated sensor of ambient light (ALS), Infrared light (IR), Solar-UV, and proximity sensing (PS). It provides innovative algorithms which can be friendly in application. ASR8600 is a perfect solution in application for light and PS sensing.

ASR8600 ALS/IR sensing offers ASC (Auto Scale Control) mode other than traditional manual mode which needs user to manually set sensing time and gain to get proper resolution according to light intensity. With ASC mode, ASR8600 could automatically adjust the sensing time and gain to the best resolution for various light intensity. User just needs simply to read the measured light data in accuracy without any other setting. The ASC output data is in dynamic range of 16 bits up to 64K lux. The Solar-UV sensing adopts only ASC mode without manual mode option.

User can combine ASR8600 with LED or LD (Laser Diode) to do PS sensing, detecting the presence of nearby object to avoid any physical contact. The spectrum of LED/LD light source could be IR or Green selected by customer using user command. The driving current and pulse time of LED/LD is widely optional according to the distance to be detected.

To cancel the PS optical crosstalk from overlay reflection, ASR8600 offers PS Offset cancellation function. The PS Offset function can cancel the system internal reflection but still keep full dynamic range of 8 bits (256 steps) of PS output so that user has no need to modify the PS threshold setting when applying the PS Offset function.

ASR8600 also offers PS Auto Trim function if user requires a precise proximity distance to be detected in application. The PS Auto Trim function can automatically set optimized gain value in chip according to the distance between the preset object and chip, and the PS Trim value could be easily read out through user command, once the trim operation is done.

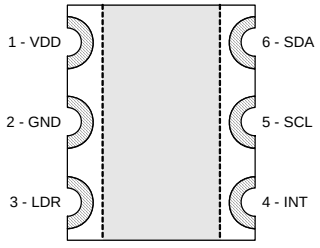
Applications

- Notebook / Monitor
- Smart phone (touch screen disable and backlight control)
- LCD display (backlight control)
- Table PC
- PDA
- Presence Detection
- Industrial sensor

Features

- Ambient Light, Solar-UV, IR and Proximity Sensor
- Ambient Light (ALS) / IR Sensing
  - ALS closes to human-eye response (UV/IR rejection)
  - IR detecting spectrum in range of near Infrared
  - 12 bits resolution with gain and integration time setting
  - ASC mode optional with 16 bits dynamic range
  - Detected dynamic rang up to 64K lux
  - Programmable high/low threshold interrupt
- Solar-UV Sensing
  - CIE Erythemal Action Spectrum weighted
  - 11 indexes calculated by 16 bits dynamic output data
- Proximity Sensing (PS)
  - Selectable light source of IR or Green
  - Wide range driving current of LED/LD, 2.5mA~300mA
  - Changeable PS pulse time from 0.1ms to 1.28ms
  - 8 bits effective counts
  - Programmable high/low threshold interrupt
  - PS Offset to cancel crosstalk without dynamic range loss
  - PS Auto Trim function for precise distance detection
- User trimming capable for overlay or environment correction
- I2C digital Interface up to 400KHz with Interrupt Pin
- Wait-time range from 0 to 5 seconds to save power
- 50/60Hz flicker noise rejection
- VDD = 2.5V to 3.6V
- Temperature compensation : -40°C to +85°C
- Low Power consumption
- Package option
  - 6-pin OCDFN (2mm x 2.5mm x 0.8mm)
  - All Pb-free (Lead-free) Products are RoHS2.0 Compliant

Pin Assignment

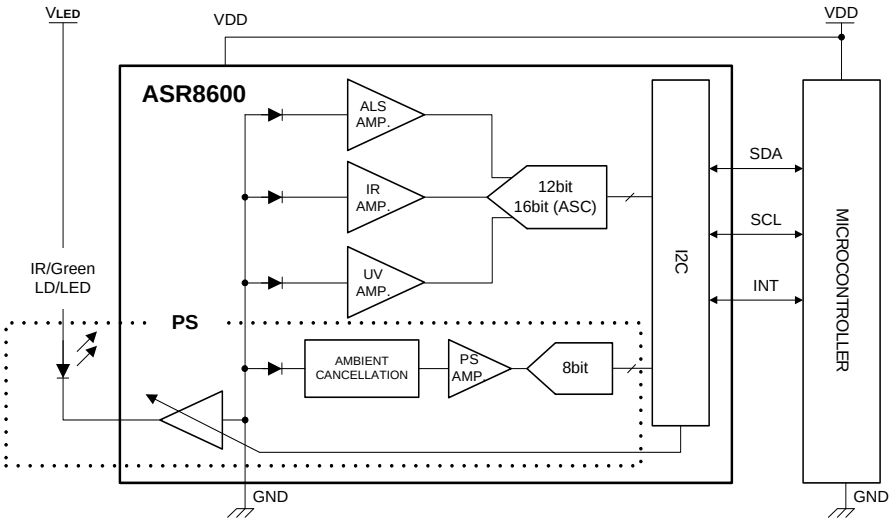


1	VDD Power	4	Interrupt
2	Ground	5	I2C Clock
3	LED Driving Port	6	I2C Data

Ordering Information

Part Number	Temp. Range	Package & Size	Packing	Lead-Free/RoHS
ASR8600	-40°C ~ +85°C	6pin OCDFN (2mm x 2.5mm x 0.8mm)	Tape and Reel	Compliant

Brief Block Diagram



Absolute Maximum Ratings*

Storage Temperature (TSTG) …….. -40°C to + 100°C
Lead Temperature during Soldering (Note 1)
D.C. Voltage on Any Pin to Ground Potential ……
…….. -0.6V to V_{CC} +0.6V
Transient Voltage (<20ns) on Any Pin to Ground Potential..
……. -2.0V to V_{CC} +2.0V
Supply Voltage (V_{CC}) ……..…… -0.6V to +4.0V
Electrostatic Discharge Voltage (Human Body model) (VESD) (Note 2) ……..…… -2000V to 2000V

Notes:
1. Compliant with JEDEC Std J-STD-020B (for small body, Sn-Pb or Pb assembly). For wave solder process, IC could meet 265°C, 5secs.
2. JEDEC Std JESD22-A114A (C1=100 pF, R1=1500Ω, R2=500Ω)

*Comments

Stressing the device above the rating listed in the Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only and operation of the device at these or any other conditions above those indicated in the operating sections of this specification is not implied. Exposure to Absolute Maximum Rating conditions for extended periods may affect device reliability.

Electrical Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_{CC}	Supply Voltage		2.5		3.6	V
T_A	Operating Temperature		-40		85	°C
I_{LI}	Input Leakage Current				± 2	µA
I_{LO}	Output Leakage Current				± 2	µA
V_{IL}	Input Low Voltage		–0.5		$0.3V_{CC}$	V
V_{IH}	Input High Voltage		$0.7V_{CC}$		V_{CC}+0.4	V
V_{OL}	Output Low Voltage	I_{SINK} = 6mA			0.4	V
I_{CC1}	Standby Current	No I2C activity		5	15	µA
I_{CC2}	Operating Current (@Wait Time=mS)	ALS only				µA
		IR only				µA
		PS only				µA
		PS only (LED pulse off)				µA
		Solar UV only				µA

Optical Characteristics

ALS/IR Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
λ_{P_ALS}	Peak Sensitivity Wavelength for ALS			550		nm
λ_{P_IR}	Peak Sensitivity Wavelength for IR					nm
$Data_{AI\_F}$	Full Scale ALS/IR Count		0		65535	Count
$Data_{AI\_O}$	Dark ALS/IR Count			0	1	Count
-	Detecting Intensity		0.125		65535	Lux
-	ALS/IR Sensing Tolerance				±10	%

PS Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
λ_{P_PS}	Peak Sensitivity Wavelength			850		nm
$Data_{PS\_F}$	Full Scale PS Count				255	Count
$Data_{PS\_O}$	PS Count w/o Object in Path			0	1	Count
I_{LED}	LED Sink Current		2.5/5	25	50	mA
			5/10	50	100	
			10/20	100	200	
			15/30	150	300	
t_{LED_P}	LED Pulse Period			10		µs
t_{LED_ON}	LED On Time			5		µs

Solar UV Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
λ_{P_SUV}	Peak Sensitivity Wavelength for Solar UV					nm
$Data_{SUV\_F}$	Full Scale Solar UV Count		0		65535	Count
$Data_{SUV\_O}$	Dark Solar UV Count			0	1	Count
-	Detecting Intensity		0.125		65535	Lux
-	Solar UV Sensing Tolerance				±15	%

Function Description

Light Sensor

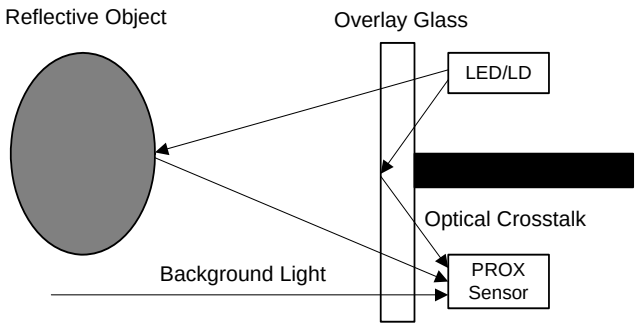
The ASR8600 converts light intensity of ambient light (ALS), Infrared light (IR) or Solar-UV to digital signal through I2C interface by various photodiodes and ADC circuit. The I2C interface follows Philip™ I2C specification with an open drain active Interrupt pin.

The built-in ADC has 12 bits resolution. ASR8600 offers user flexibility selection in integration time or gain for different specific light detection range. If the light detection is in general purpose, the user can use ASC (Auto Scale Control) mode which can automatically adjust integration time and gain to the best resolution for various light intensity. The user has no need manually to set the integration time or gain. With ASC mode, the output data is in dynamic range of 16 bits. The Solar-UV sensing adopts only ASC mode internally without manual mode option.

If the sensor will be under an overlay that is not 100% transmissive to light source, the light data can be trimmed back to the correct one. Please contact AMIC for more information on adjusting these offset.

Proximity Sensor

Proximity sensing uses an external light source (generally an infrared emitter) to emit light, which is then viewed by the integrated light detector to measure the amount of reflected light when an object is in the light path. The amount of light detected from a reflected surface can then be used to determine an object's proximity to the sensor. The spectrum of external LED/LD light source can be IR or Green selected by customer using user command.



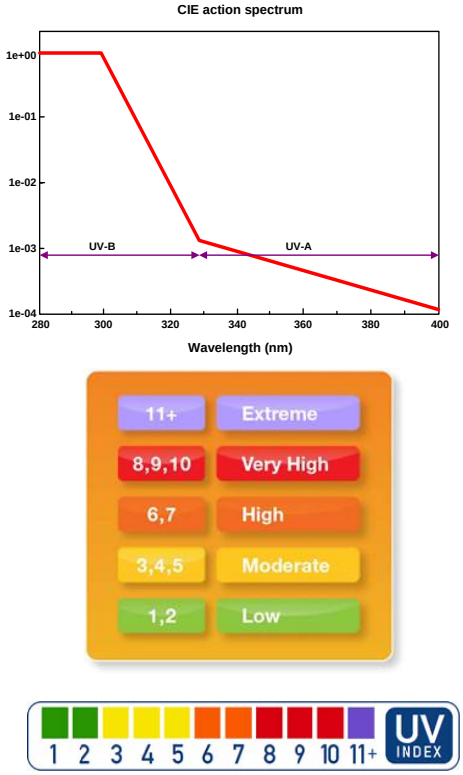
When the proximity sensing is enabled, the external LED/LD is driven by the built-in driver through the LDR pin. The driving current of LED/LD is widely optional with range from 2.5mA to 300mA, and the pulse time is also changeable from 0.1ms to 12.8ms. These optional settings are according to the distance to be detected in application.

The ADC resolution of PS sensing is 8 bits with PS Offset function to cancel the PS optical crosstalk from overlay reflection. The PS offset value can be measured by PS function without any object in front of the overlay, and set by 0xA5 user command of PS offset. The ASR8600 PS Offset function can cancel the system internal reflection but still keep full dynamic range of 8 bits (256 steps) of PS output, so that the user is no need to modify the PS threshold setting when applying PS Offset function.

ASR8600 also offers PS Auto Trim function if user requires precise proximity distance to be detected in application. The PS Auto Trim function can automatically set optimized gain value in chip according to the preset object distance in front of chip, and the value could be easily read out through user command once the trim operation is done.

Solar Ultraviolet (Solar_UV) Index

The Solar_UV Index is a number linearly related to the intensity of sunlight reaching the earth and is weighted according to the CIE Erythemal Action Spectrum. This weighting is a standardized measure of human skin's response to different wavelengths of sunlight from UVB to UVA. The UV Index has been standardized by the World Health Organization and includes a simplified consumer UV exposure level. ASR8600 can sense Solar_UV with 16 bits output data, and user can divide it by 100 times magnitude to get Solar_UV index.



CIE Erythemal Action Spectrum and UV Index Scale

Interrupt Function

The ASR8600 has an intelligent interrupt scheme designed for light and PS sensing. The active low interrupt pin is an open drain pull-down configuration. The interrupt pin serves as an alarm or monitoring function to determine whether the ambient light or PS data exceeds the upper threshold or goes below the lower threshold. The user can also configure the persistency for the interrupt to eliminate any false triggers, such as noise or sudden spikes in ambient light conditions. The user uses 0x00[3:0] to identify which interrupt status, light sensing or PS one, is raised.

System Operation State

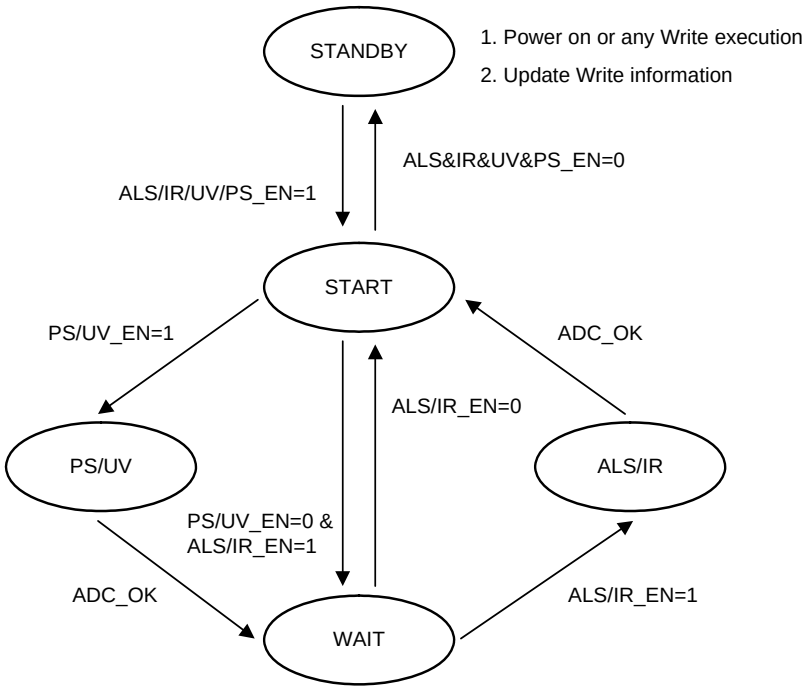
The ASR8600 provides control of ambient light (ALS), IR light, Solar-UV, proximity sensing (PS) detection, and power management through an internal state machine. After a power on reset, the device is in standby mode. As soon as any of light or PS sensing bit is enable, the device will move to the start state, and then it will continue through PS/UV, wait, and ALS/IR states.

If any Write command is executed during sensing in operation, then the device will interrupt the sensing process and move back to standby stage. It will then restart the process according the new writing conditions.

Regarding the enable setting of PS/UV and ALS/IR, customer can refer to the register 0x01 configuration.

VDD Power-up and Power Supply Considerations

Upon power-up, a VDD slew rate of 0.5V/ms or greater is preferable. After power-up, or if the user's power supply is temporarily fluctuated by unknown noise causing system abnormal, AMIC recommends the user to issue a soft reset command 0x5B with data 0xB5, and then rewrite all registers to the desired values. If the user prefers a hardware reset method instead of soft reset, please set VDD = 0V for 1 second or more, and then power up at the required slew rate.



I2C Protocol

The bus interface and control are accomplished through an I2C compatible, 2-wire serial interface consisting of a serial-data line (SDA) and a serial-clock line (SCL). SDA and SCL facilitate communication between the IC and the master at clock rate up to 400k Hz. The devices support the 7-bit I2C addressing protocol and 8-bit register address and data byte.

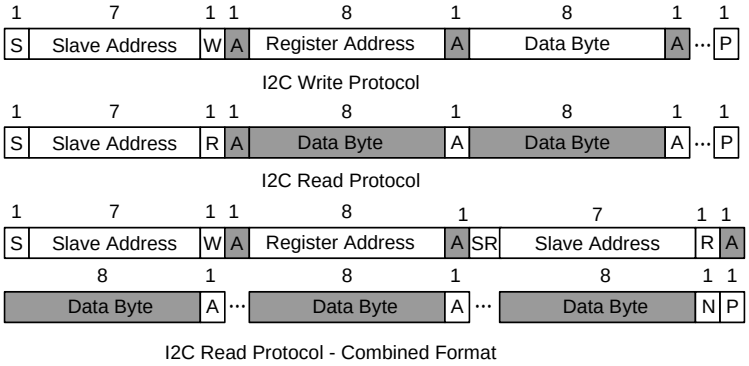
The I2C standard provides for three types of bus transaction: read, write, and a combined protocol.

During a write operation, after (slave_address + R/W) byte, the first byte written is a register address followed by data byte. If a read command is issued, the register address from the previous command will be used for data access. In a combined protocol, the first byte written is the register address followed by reading a series of data bytes.

ASR8600 slave address is 1001010X, which 0x94 is Write to ASR8600, and 0x95 is Read from ASR8600.

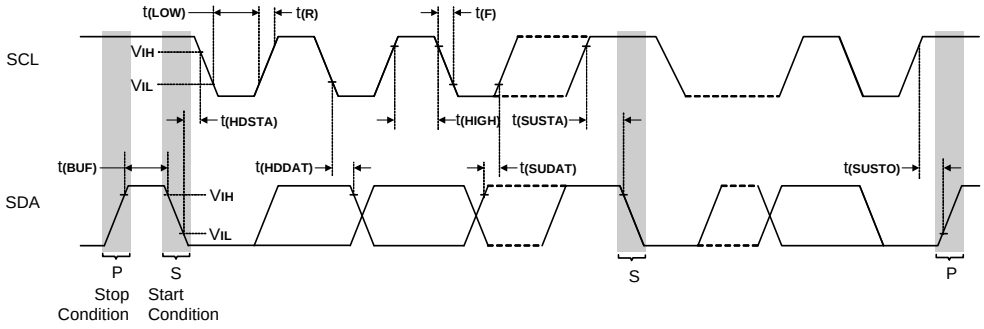
The I2C bus protocol follows Philip™ (now NXP company) I2C specification. For a complete description of I2C protocol, please refer to NXP I2C design specification.

I2C Protocols



A Acknowledge (0)
N Not Acknowledge (1)
P Stop Condition
R Read (1)
S Start Condition
SR Repeated Start Condition
W Write (0)
··· Condition of protocol
Master-to-Slave
Slave-to-Master

Timing Diagrams



I2C Bus Timing Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit
$f_{(SCL)}$	Serial-Clock Frequency	0		400	KHz
$t_{(HIGH)}$	Clock High Period	0.6			µs
$t_{(LOW)}$	Clock Low Period	1.3			µs
$T_{(R)}$	Clock/Data Rise Time		100		ns
$T_{(F)}$	Clock/Data Fall Time		100		ns
$t_{(SUDAT)}$	Data Setup Time	0.1			µs
$t_{(HDDAT)}$	Data Hold Time	0			µs
$t_{(BUF)}$	Bus Free Time Between STOP and START	1.3			µs
$t_{(HDSTA)}$	Hold Time (Repeated) Start Condition	0.6			µs
$t_{(SUSTA)}$	Repeated Start Condition Setup Time	0.6			µs
$t_{(SUSTO)}$	Stop Condition Setup Time	0.6			µs
$t_{(SP)}$	Pulse Width of Suppressed Spike	0		50	ns

ASR8600 Register Map

ASR8600 slave address is 1001010X, which 0x94 is Write to ASR8600, and 0x95 is Read from ASR8600

System Registers

ADDR	R/W	Function	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0	Default
0x5B	W	Soft Reset	0xB5								
0xE3	R	Device ID	0x37								

Status Bits and Operation Command Registers

0x00	R	Data Ready & Interrupt Status Bits	ALS/ IR_RDY	PS_RDY	Solar_UV/ UV_RDY	---	ALS/ IR_INTS	PS_Hi_ INTS	PS_Lo_ INTS	(PS_Auto Trim_INTS)	0x00
0x01	R/W	Operation Control	WT [2:0]			ALS/IR_EN[1:0]		PS/Solar_UV/UV_ EN[1:0]		(PS_Auto_ Trim_EN)	0x00

ALS/IR Registers

0x02	R/W	ALS/IR Command	ASC	ALS/IR_IT [2:0]		ALS/IR_GAIN [1:0]	ALS/IR_PRST [1:0]	0x00
0x03	R	Data Low Byte	ALS/IR_Data_Lo_Byte [7:0]					0x00
0x04	R	Data High Byte	ALS/IR_Data_Hi_Byte [11:8], ASC mode [15:8]					0x00
0x05	R/W	High Threshold Low Byte	ALS/IR_HiTH_Lo_Byte [7:0]					0x00
0x06	R/W	High Threshold High Byte	ALS/IR_HiTH_Hi_Byte [11:8], ASC mode [15:8]					0x00
0x07	R/W	Low Threshold Low Byte	ALS/IR_LoTH_Lo_Byte [7:0]					0x00
0x08	R/W	Low Threshold High Byte	ALS/IR_LoTH_Hi_Byte [11:8], ASC mode [15:8]					0x00

PS Registers

0x09	R/W	PS Command	---	PS_PT [2:0]	PS_I [1:0]	PS_PRST [1:0]	0x00
0x0A	R	Data	PS_Data [7:0]				0x00
0x0B	R/W	High Threshold	PS_Hi_TH [7:0]				0x00
0x0C	R/W	Low Threshold	PS_Lo_TH [7:0]				0x00
0x0D	R/W	PS Light Source	PS Driving Current Magnification [3:0]		PS Light Type (IR/Green) [3:0]		0x00

UV Registers

0x0E	R	Data Low Byte	Solar_UV (or UV) _Data_Lo_Byte [7:0]				0x00
0x0F	R	Data High Byte	Solar_UV (or UV) _Data_Hi_Byte [15:8]				0x00
0x10	R/W	Solar_UV/UV Command (Reserved)	UV_ASC#	UV_IT [2:0]	UV_GAIN [1:0]	Pre_Amp _Range[1:0]	0x00

Trim Registers

0xA0	R/W	ALS Trim-Time	ALS Trim-Time [7:0]	0x40
0xA1	R/W	IR Trim-Time	IR Trim-Time [7:0]	0x40
0xA2	R/W	ALS Trim-Gain	ALS Trim-Gain [7:0]	0x20
0xA3	R/W	IR Trim-Gain	IR Trim-Gain [7:0]	0x20
0xA4	R/W	PS Trim	PS Trim [7:0]	0xC8
0xA5	R/W	PS Offset	PS Offset [7:0]	0x00
0xA6	R/W	Solar_UV Trim-Time	Solar_UV Trim-Time [7:0]	0x40
0xA7	R/W	Solar_UV Trim-Gain	Solar_UV Trim-Gain [7:0]	0x20
0xA8	R/W	UV Trim-Time	UV Trim-Time [7:0]	0x40
0xA9	R/W	UV Trim-Gain	UV Trim-Gain [7:0]	0x20

Status Bits and Operation Command Registers

Register 0x00 (Data Ready & Interrupt Status Bits)

ADDR	R/W	Function	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0	Default
0x00	R	Data Ready & Interrupt Status Bits	ALS/ IR_RDY	PS_RDY	Solar_UV/ UV_RDY	---	ALS/ IR_INTS	PS_Hi_ INTS	PS_Lo_ INTS	(PS_Auto Trim_INTS)	0x00

Bit	Name	Function Description	
7:5	Data Ready Status	Data_Ready Status Bit ([7]=ALS/IR_RDY, [6]=PS_RDY, [5]=Solar_UV/UV_RDY)	
		0	Data is NOT available to be used since power-on or last "clear".
		1	The data is available after enable. Once this bit is set, the only 2 ways to clear it to 0 are to read this register or set such sensing disable.
3:1	Interrupt Status	Interrupt Status Bits ([3]=ALS/IR_INTS, [2]=PS_Hi_INTS, [1]=PS_Lo_INTS)	
		0	No interrupt event has occurred since power-on or last "clear".
		1	The data has exceeded the designated window limits defined by Threshold registers, and persist timer is equal to the set Persist count. Once this bit is set, the only 2 ways to clear it to 0 are to read this register or set such sensing disable.
0	PS_Auto_ Trim Interrupt Status	PS_Auto_Trim Interrupt Status Bit	
		0	No PS_Auto_Trim interrupt event has occurred since power-on or last “clear”.
		1	The PS_Auto_Trim process has finished. Once this bit is set, the only 2 ways to clear it to 0 are to read this register or set PS_Auto_Trim_EN bit to 0.

Register 0x01 (Operation Control)

ADDR	R/W	Function	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0	Default
0x01	R/W	Operation Control	WT [2:0]			ALS/IR_EN[1:0]		PS/Solar_UV/UV_ EN[1:0]		(PS_Auto_ Trim_EN)	0x00

Bit	Name	Function Description			
7:5	Wait Time	Wait Time Setting for power consumption control			
		000	40ms x1 = 40ms	100	40ms x32 = 1280ms = 1.28s
		001	40ms x4 = 160ms	101	40ms x64 = 2560ms = 2.56s
		010	40ms x8 = 320ms	110	40ms x128 = 5120ms = 5.12s
		011	40ms x16 = 640ms	111	Reserved to NO wait time
4:3	ALS/IR_Enable	ALS/IR Sensing enable			
		00	ALS/IR sensing disable	10	IR sensing enable
		01	ALS sensing enable	11	Reserved
2:1	PS/Solar_UV/ UV_Enable	PS/Solar_UV/UV Sensing enable			
		00	PS/Solar_UV/UV sensing disable	10	Solar UV sensing enable
		01	PS sensing enable	11	UV sensing enable
0	PS_Auto_ Trim_Enable	PS Auto Trimming enable			
		0	PS auto trimming disable	1	PS auto trimming enable

ALS/IR Registers

Register 0x02 (ALS/IR Command Set)

ADDR	R/W	Function	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0	Default
0x02	R/W	ALS/IR Command	ASC	ALS/IR_IT [2:0]			ALS/IR_Gain [1:0]		ALS/IR_PRST [1:0]		0x00

Bit	Name	Function Description			
7	Auto Scale Control (ASC mode)	Auto Scale Control of ASL/IR mode			
		0	ASL/IR_IT and ASL/IR-Gain are controlled by register 0x02[6:4] and 0x02[3:2].		
		1	When ASC is active, ASL/IR_IT and ASL/IR-G are automatically scaled by internal circuit; the ASL/IR_IT and ALS/IR_G can only be read as the internal scaled ones, and ALS/IR Data and Hi/Lo threshold would be defined as 16 bits of [15:0].		
6:4	ALS/IR_IT	ALS Integration Time Setting for sensitivity range selection			
		000	40ms x1 = 40ms	011	40ms x8 = 320ms
		001	40ms x2 = 80ms	100	40ms x16 = 640ms
		010	40ms x4 = 160ms		
3:2	ALS/IR_Gain	ALS/IR Gain Setting for sensitivity range selection			
		00	x1 Gain	10	x4 Gain
		01	x2 Gain	11	x8 Gain
1:0	ALS/IR_PRST	ALS/IR Persist Setting for consecutive count of data value out of threshold range			
		00	1 count	10	4 counts
		01	2 counts	11	8 counts

Register 0x03/04/05/06/07/08 (ALS/IR Data and Hi/Lo Threshold)

ADDR	Name	Function Description
0x03	ALS/IR Data Low Byte [7:0]	Read ALS/IR_Data 12 bits of [11:0]. If ASC mode is active, the data is auto scaled as 16 bits of [15:0].
0x04	ALS/IR Data High Byte [11:8], ASC mode = [15:8]	
0x05	ALS/IR_HiTH Low Byte [7:0]	The ALS/IR High Threshold registers provide the values to be used as the high trigger point for interrupt generation. An interrupt is generated when the value of ALS/IR conversion is greater than the high threshold. If ASC mode is active, the data is defined as 16 bits of [15:0].
0x06	ALS/IR_HiTH High Byte [11:8], ASC mode = [15:8]	
0x07	ALS/IR_LoTH Low Byte [7:0]	The ALS/IR Low Threshold registers provide the values to be used as the low trigger point for interrupt generation. An interrupt is generated when the value of ALS/IR conversion is lower than the low threshold. If ASC mode is active, the data is defined as 16 bits of [15:0].
0x08	ALS/IR_LoTH High Byte [11:8], ASC mode = [15:8]	

PS Registers

Register 0x09 (PS Command Set)

ADDR	R/W	Function	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0	Default
0x09	R/W	PS Command	---	PS_PT [2:0]			PS_I [1:0]		PS_PRST [1:0]		0x00

Bit	Name	Function Description							
7	Reserved	Reserved, default=0							
6:4	PS_PT	PS Light Pulse Time Setting							
		000	0.1ms x1 = 0.1ms			100	0.1ms x16 = 1.6ms		
		001	0.1ms x2 = 0.2ms			101	0.1ms x32 = 3.2ms		
		010	0.1ms x4 = 0.4ms			110	0.1ms x64 = 6.4ms		
		011	0.1ms x8 = 0.8ms			111	0.1ms x128 = 12.8ms		
3:2	PS_I	PS Light Driving Current Setting, the current can be magnified as x1, x2, x10, x20 times by 0x0D[7:4].							
		00	2.5mA	01	5mA	10	10mA	11	15mA
1:0	PS_PRST	PS Persist Setting for consecutive count of data value out of threshold range							
		00	1 count			10	3 counts		
		01	2 counts			11	4 counts		

Register 0x0A/0B/0C (PS Data and Hi/Lo Threshold)

ADDR	Name	Function Description
0x0A	PS Data	Read the PS_Data 8 bits of [7:0].
0x0B	PS Hi_THreshold	The PS Hi_THreshold registers provide the values to be used as the high trigger point for interrupt generation. An interrupt is generated when the value of proximity conversion is higher than the threshold.
0x0C	PS Lo_THreshold	The PS Lo_THreshold registers provide the values to be used as the low trigger point for interrupt generation. An interrupt is generated when the value of proximity conversion is lower than the threshold.

Register 0x0D (PS Driving Current Magnification and Light Type Selection)

ADDR	R/W	Function	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0	Default
0x0D	R/W	PS Light Source	PS Driving Current Magnification				PS Light Type (IR/Green)				0x00

Bit	Name	Function Description			
7:4	PS Light Current Magnification	PS Driving Current Magnification of PS_I 0x09[3:2]			
		0000	x1 current	0101	x10 current
		1000	x2 current	1101	x20 current
3:0	PS Light Type	PS Light Type (IR/Green)			
		0000	IR Light	0101	Green Light

UV Registers

Register 0x0E/0F (UV Data)

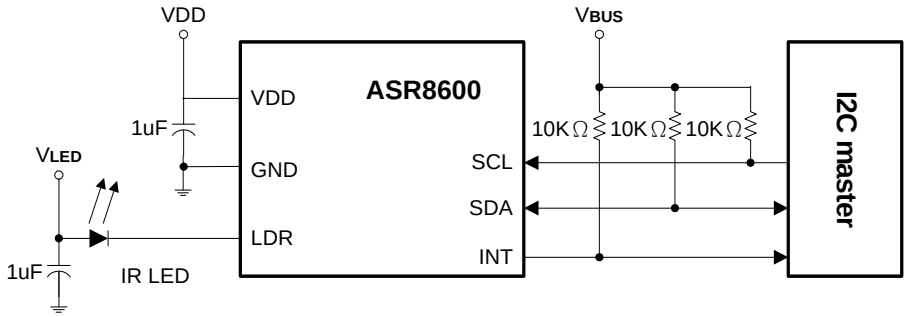
ADDR	Name	Function Description
0x0E	UV Data Low Byte [7:0]	Read Solar_UV (or UV)_Data 16 bits of [15:0].
0x0F	UV Data High Byte [15:8]	

Register 0x10 (UV Command Set - Reserved)

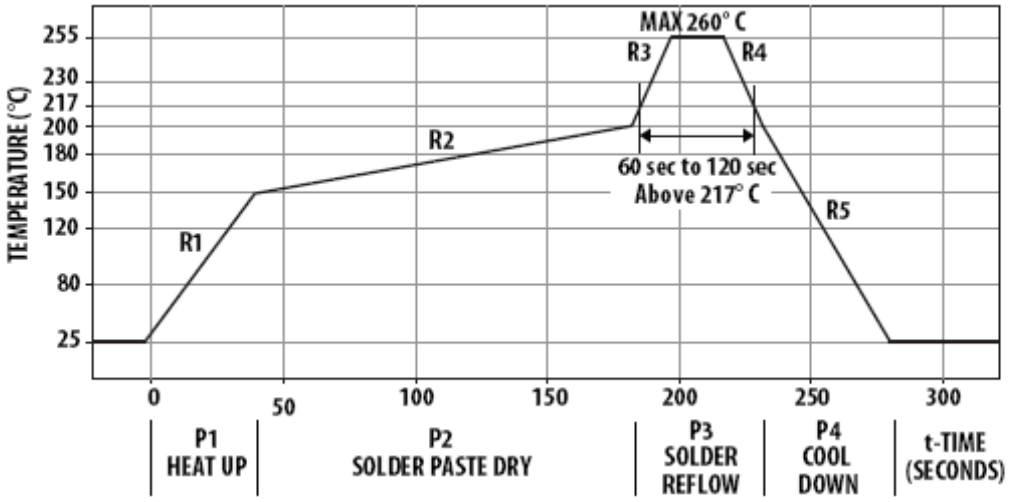
ADDR	R/W	Function	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0	Default
0x10	R/W	Solar_UV/UV Command (Reserved)	UV_ASC#	UV_IT [2:0]			UV_GAIN [1:0]		Pre_Amp _Gain_Range[1:0]		0x00

Bit	Name	Function Description			
7	UV_ASC#	Auto Scale Control of Solar_UV/UV mode			
		0	ASC mode is active; UV_IT and UV-G are automatically scaled by internal circuit. The UV_IT and UV_G can only be read as the internal scaled ones, and UV Data would be defined as 16 bits of [15:0].		
		1	UV_IT and UV-Gain are controlled by register 0x10[6:4] and 0x10[3:2].		
6:4	UV_IT [2:0]	Solar_UV Integration Time Setting		UV Integration Time Setting	
		000	40ms x1 = 40ms	0.32s x1 = 0.32s	
		001	40ms x2 = 80ms	0.32s x2 = 0.64s	
		010	40ms x4 = 160ms	0.32s x4 = 1.28s	
		011	40ms x8 = 320ms	0.32s x8 = 2.56s	
		100	40ms x16 = 640ms	0.32s x16 = 5.12s	
3:2	UV_GAIN [1:0]	UV Gain Setting for sensitivity range selection			
		00	x1 Gain	10	x4 Gain
		01	x2 Gain	11	x8 Gain
1:0	Pre_Amp_Range[1:0] (Reserved)	Pre_Amp Gain Range of All Sensing			
		00	Pre_Amp Gain Range by default value of each sensing		
		01	Pre_Amp Gain Range of x2 ~x6		
		10	Pre_Amp Gain Range of x5 ~x9		
		11	Pre_Amp Gain Range of x9 ~x13		

Application Circuit Reference



Recommended Reflow Profile

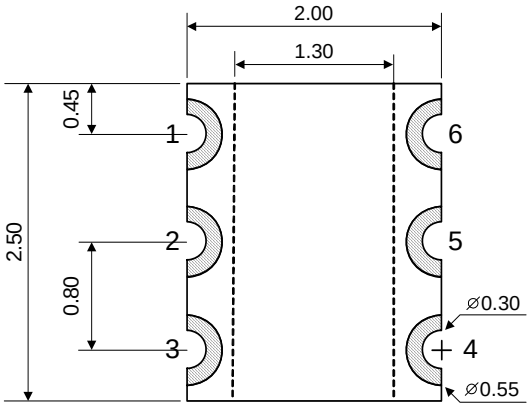


Process Zone	Symbol	△T	Maximum △T/△time or Duration
Heat Up	P1, R1	25°C to 150°C	3°C/s
Solder Paste Dry	P2, R2	150°C to 200°C	100s to 180s
Solder Reflow	P3, R3	200°C to 260°C	3°C/s
	P3, R4	260°C to 200°C	-6°C/s
Cool Down	P4, R5	200°C to 25°C	-6°C/s
Time maintained above liquidus point, 217°C		> 217°C	60s to 120s
Peak Temperature		260°C	-
Time within 5°C of actual Peak Temperature		> 255°C	20s to 40s
Time 25°C to Peak Temperature		25°C to 260°C	8 mins

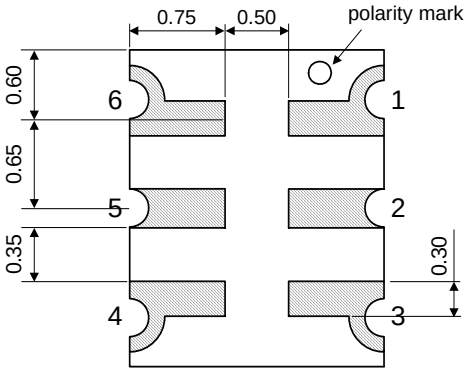
Package Information

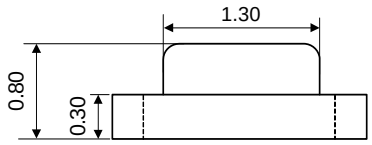
OCDFN 6L (2mm x 2.5mm x 0.8mm) Outline Dimensions unit: mm

TOP VIEW



BOTTOM VIEW





SIDE VIEW

1	VDD Power	**4**	Interrupt
2	Ground	**5**	I2C Clock
3	LED Driving Port	**6**	I2C Data