PALS-2

The documentation for the Arduino Library

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About this document

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1 Arduino Library for the proximity and ambient light sensor PALS-2

1.1 Introduction

The infineon PALS-2 (packaged by Vishay as VCNL4135X01) is a proximity and ambient light sensor. It offers proximity and ambient light readings with 16-bit resolution. I2C protocol is used to communicate with the host microcontroller. It can be used for gesture recognition, touch screen locking and dimming of displays.

For the proximity function there are a built-in IRED driver and photo-pin-diode. LED driver current can be programmed and up to 3 external IREDs can be connected. Offset compensation can be enabled for the proximity measurement; with this feature the sensor writes the difference between the normal proximity value and the estimated offset into the corresponding register.

For the ambient light function there a one photo-pin-diode. Two additional photodiodes can receive light in the blue area.

Other features include: readouts either periodically or on-demand; interrupts for both functions, with adjustable lower/upper thresholds and persistence.

2 Bug List

File Pals2.cpp

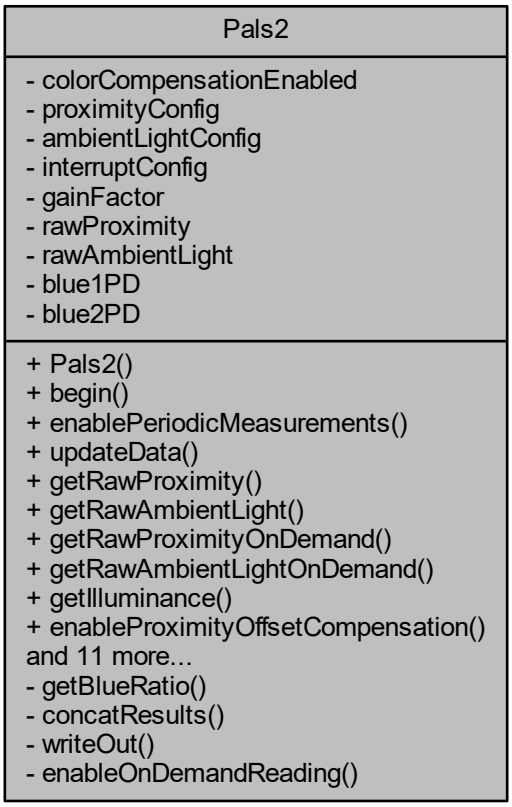
no Blue-PD value updates -> getIlluminance() not working;

in register 83h sensor measurement freezes if IRED output is not default(0): due to circuitry?

3 Data Structure Documentation

3.1 Pals2 Class Reference

Collaboration diagram for Pals2:



Public Member Functions

- void begin (void)

  Starts the sensor.
- void enablePeriodicMeasurements (void)

  Enables periodic measurements of proximity and ambient light values.
- void updateData (void)

  Updates measurement data. Needed to be called in each measurement cycle.
- uint16_t getRawProximity (void)

  Gets sensor measurement updates. Should be called after updateData(void) updateData().

- uint16_t getRawAmbientLight (void)

  Gets sensor measurement updates. Should be called after updateData(void) updateData()
- uint16_t getRawProximityOnDemand (void)
- uint16_t getRawAmbientLightOnDemand (void)
- float getIlluminance (void)
- void enableProximityOffsetCompensation (void)

  Enables proximity offset compensation. The raw proximity values read will be the difference between the actual measured value and the estimated offset value, thus 2 measurements are taken in each cycle. Works for both periodic and on-demand measurement.
- void disableProximityOffsetCompensation (void)

  Disables proximity offset compensation.
- void setProximityMeasurementRate (uint16_t rate)

  Sets the measurement rate of proximity measurement.
- void setInterruptPersistence (uint8_t persistence)

  Sets the number of consecutive measurements needed above/below the threshold for an interrupt to be generated.
- void enableProximityInterrupt (uint16_t topThreshold=0xFF, uint16_t bottomThreshold=0x00)

  Enables interrupts for proximity measurement and sets the lower/upper thresholds.
- void disableProximityInterrupt (void)

  Disables interrupts for proximity measurement.
- void enableAmbientLightInterrupt (uint16_t topThreshold=0xFF, uint16_t bottomThreshold=0x00)

  Enables interrupts for ambient light measurement and sets the lower/upper thresholds.
- void disableAmbientLightInterrupt (void)

  Disables interrupts for ambient light measurement.
- void enableColorCompensation (bool colorCompPeriod=0)

  For light sources with high intensity color compensation should be enabled (additional reading of blue PD will be conducted).
- void setADCGain (uint16_t adcGain)

  Sets the ADC gain, which affects the calculation of illuminance. A higher ADC gain leads to a higher illuminance value.
- void setAmbientLightMeasurementRate (uint8_t alsRate)

  Sets the rate of ambient light measurement. Number of measurements per second, which is an integer from 1 to 8.
- void **resetSensor** (void)

Private Member Functions

- float **getBlueRatio** (void)
- uint16_t **concatResults** (uint8_t upperByte, uint8_t lowerByte)
- void **writeOut** (uint16_t regNum, uint16_t val)
- void **enableOnDemandReading** (void)

Private Attributes

- bool **colorCompensationEnabled** = false

- uint8_t **proximityConfig** = 0
- uint8_t **ambientLightConfig** = 0
- uint8_t **interruptConfig** = 0
- float **gainFactor** = 81.79
- uint16_t **rawProximity** = 0
- uint16_t **rawAmbientLight** = 0
- uint16_t **blue1PD** = 0
- uint16_t **blue2PD** = 0

3.1.1 Member Function Documentation

3.1.1.1 begin()

```
void Pals2::begin (
            void  )
```

Starts the sensor.

3.1.1.2 disableAmbientLightInterrupt()

```
void Pals2::disableAmbientLightInterrupt (
            void  )
```

Disables interrupts for ambient light measurement.

3.1.1.3 disableProximityInterrupt()

```
void Pals2::disableProximityInterrupt (
            void  )
```

Disables interrupts for proximity measurement.

3.1.1.4 disableProximityOffsetCompensation()

```
void Pals2::disableProximityOffsetCompensation (
            void  )
```

Disables proximity offset compensation.

3.1.1.5 enableAmbientLightInterrupt()

```
void Pals2::enableAmbientLightInterrupt (
            uint16_t topThreshold = 0xFF,
            uint16_t bottomThreshold = 0x00 )
```

Enables interrupts for ambient light measurement and sets the lower/upper thresholds.

Parameters

topThreshold	Upper threshold. By default 65536
bottomThreshold	Lower threshold. By default 0

3.1.1.6 enableColorCompensation()

```
void Pals2::enableColorCompensation (
            bool colorCompPeriod = 0 )
```

For light sources with high intensity color compensation should be enabled (additional reading of blue PD will be conducted).

Parameters

colorCompPeriod	The period of color compensation measurement; 0 for a shorter period (0 to 10ms) and 1 for a longer period (10 to 100ms)

3.1.1.7 enablePeriodicMeasurements()

```
void Pals2::enablePeriodicMeasurements (
            void  )
```

Enables periodic measurements of proximity and ambient light values.

3.1.1.8 enableProximityInterrupt()

```
void Pals2::enableProximityInterrupt (
            uint16_t topThreshold = 0xFF,
            uint16_t bottomThreshold = 0x00 )
```

Enables interrupts for proximity measurement and sets the lower/upper thresholds.

Parameters

topThreshold	Upper threshold. By default 65536
bottomThreshold	Lower threshold. By default 0

3.1.1.9 enableProximityOffsetCompensation()

```
void Pals2::enableProximityOffsetCompensation (
            void  )
```

Enables proximity offset compensation. The raw proximity values read will be the difference between the actual measured value and the estimated offset value, thus 2 measurements are taken in each cycle. Works for both periodic and on-demand measurement.

3.1.1.10 getIlluminance()

```
float Pals2::getIlluminance (
            void  )
```

Returns

the illuminance value computed from ALS and blue photodiode values.

3.1.1.11 getRawAmbientLight()

```
uint16_t Pals2::getRawAmbientLight (
            void  )
```

Gets sensor measurement updates. Should be called after updateData(void) updateData()

Returns

raw ambient light value as an integer from 0 to 65536.

3.1.1.12 getRawAmbientLightOnDemand()

```
uint16_t Pals2::getRawAmbientLightOnDemand (
            void  )
```

Returns

a single raw ambient light value measured on demand.

3.1.1.13 getRawProximity()

```
uint16_t Pals2::getRawProximity (
            void  )
```

Gets sensor measurement updates. Should be called after updateData(void) updateData().

Returns

raw proximity value as an integer from 0 to 65536.

3.1.1.14 getRawProximityOnDemand()

```
uint16_t Pals2::getRawProximityOnDemand (
            void  )
```

Returns

a single raw proximity value measured on demand.

3.1.1.15 setADCGain()

```
void Pals2::setADCGain (
            uint16_t adcGain )
```

Sets the ADC gain, which affects the calculation of illuminance. A higher ADC gain leads to a higher illuminance value.

Parameters

adcGain	ADC gain in fA, can be 200/800/3200/25600; for any other value the default (200 fA) is taken

3.1.1.16 setAmbientLightMeasurementRate()

```
void Pals2::setAmbientLightMeasurementRate (
            uint8_t alsRate )
```

Sets the rate of ambient light measurement. Number of measurements per second, which is an integer from 1 to 8.

3.1.1.17 setInterruptPersistence()

```
void Pals2::setInterruptPersistence (
            uint8_t persistence )
```

Sets the number of consecutive measurements needed above/below the threshold for an interrupt to be generated.

Parameters

persistence	Number of valid measurements needed, which is one of the numbers from [1, 2, 4, 8, 16, 32, 64, 128].

3.1.1.18 setProximityMeasurementRate()

```
void Pals2::setProximityMeasurementRate (
            uint16_t rate )
```

Sets the measurement rate of proximity measurement.

Parameters

rate	Number of measurements per second. Can be one of the numbers from [2, 4, 8, 16, 32, 64, 128, 256].

3.1.1.19 updateData()

```
void Pals2::updateData (
            void  )
```

Updates measurement data. Needed to be called in each measurement cycle.

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