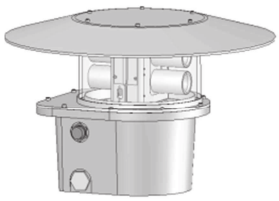
DOCUMENTATION

Détecteur Laser (ALS)



ALS-D Sensor Specifications

Parameter	Value
Maximal detection range (Wide & reflective object).	Up to 200m
Maximum Detection Range for a low (10%) reflective object	Max. 155m
Capability to detect crawling intruder (maximal detection distance).	100 – 150 m
Angular resolution	1 miliRadians (0.057°)
Maximal scanning angle	360°
Beam Inclination Angle	0° ÷ 4° Factory Preset
Required Detection Time (Algorithm at Maximum Performance for low false alarm rate).	2 second.
Number of Tracked Objects	16 simultaneously
Adaptivity to periodically movement objects (trees, bushes, etc.)	Yes
Scan Rate	0.75 ÷ 1.1 Hz
Pulse Repetition Frequency (PRF)	4.5 ÷ 6.6 kHz
Mounting Height	0-8m
Possibility additional tracking PTZ Dome camera / spotlight.	Yes
Output interface	RS485 Half duplex
Laser protection class	Class 1 (eye safe)
Wavelength	905nm
Operating Ambient Temperature	- 30°C ÷ + 50°C
Storage Temperature	- 50°C ÷ + 80°C
Supply voltage	12 VDC ± 10% @ 0.8 A (9.7 Watt)
Heater Supply voltage	12 VDC ± 10% @ 3.5 A (48 Watt)
Installation position	Vertical / Horizontal
Enclosure rating	IP 67
*Weight	10 Kg
*Dimensions (W x D x H)	265 x 300 x 315

Classe 1 : Laser sans danger. Aucune protection de l'œil.

Classe 2 : Laser à rayonnement visible. Protection de l'œil assurée par le réflexe palpébral.

Classe 3a : Laser de puissance moyenne. Vision directe dangereuse si elle est supérieure à 0,25 s.

Classe 3b : Laser dont la vision directe est toujours dangereuse. Ces lasers sont potentiellement dangereux si un faisceau direct ou une réflexion spéculaire est regardé par l'œil non protégé.

Classe 4 : Laser toujours dangereux en vision directe ou diffuse, créant des lésions cutanées et oculaires. Ils constituent un danger d'incendie. Exposition dangereuse au rayonnement direct ou diffus pour l'œil et la peau.

Caractéristiques carte LASERBOARD

- Liaison vers caméra en RS485 full duplex
- Liaison vers détecteur en RS485 half duplex (2 fils)
- Adressage du détecteur configurable *switchs*
- 4 adresses maxi à gérer
  - *2 switchs pour 4 adresses.*
- Baud rate configuré par switchs.
- Baud rate : **9600**, 14400, **19600**, 38400, 56000, 57600, 115200
  - *3 switchs pour 8 valeurs possibles (7 valeurs de débit et une pour l'autobaud rate)*
  - *Un octet transmis = 10 bits (1+8+1)*
  - *à 9600 bauds un octets est transmis en 1,04 ms*
  - *à 19600 bauds, en 510 µs*
  - *à 115200 bauds, en 87 µs*
- Gestion des pertes de communication / timeout
- Affichage des notifications #1, #2 et #3 par LED
- Fonction "Spy" ou "Full control"
  - Spy : (espion) la carte LaserBoard écoute en permanence (position esclave). Elle repère les données d'intrusions et de notifications du détecteur LASER.
  - Full control : La carte LaserBoard est maître de la communication. Elle gère la communication avec le détecteur LASER.
  - Période d'interrogation 400ms
- Sorties sur 32 contacts secs.
- 3 DELs d'affichage d'état
  - DEL rouge : erreur système #1 à #3
  - DEL orange : perte de communication -> 0,5s /0,5s
  - DEL verte : Intrusion (3s min)
- Calcule les 3 données Pan, Tilt et Zoom transmises à la caméra dôme par protocole PELCO D
- Bloc logiciel séparé et interchangeable pour la partie protocole du dôme
- Alimentation 12Vdc

Caméra orientable dôme PELCO

DD4CBW35-X

Signal Format	PAL
Scanning System	2:1 Interlace/1:1 Progressive (user-selectable)
Image Sensor	1/4-inch CCD
Effective Pixels	752 (H) X 582 (V)
Horizontal Resolution	>540 TV lines
Lens	f/1.4 (focal length, 3.4~119 mm; 35X optical zoom, 12X digital zoom)
Zoom Speed	3.2/4.6/6.6 seconds
Horizontal Angle of View	55.8° at 3.4 mm wide zoom; 1.7° at 119 mm telephoto zoom
Focus	Automatic with manual override
Maximum Sensitivity at 35 IRE	0.50 lux at 1/50 sec. shutter speed (color) 0.062 lux at 1/3 sec. shutter speed (color) 0.00014 lux at 1/1.5 sec. shutter speed (B-W)
Sync System	Internal/AC line lock, phase adjustable using remote control, V-Sync
White Balance	Automatic with manual override
Shutter Speed	Automatic (electronic iris)/manual; 1/1.5~1/30,000
Iris Control	Automatic iris control with manual override
Gain Control	Automatic/off
Video Output	1 Vp-p, 75 ohms
Video Signal-to-Noise	>46–50 dB
Wide Dynamic Range	128X

Spectra® IV and Spectra IV SE Series

SWITCH SETTINGS

Before installing the dome drive, configure the receiver address, termination, and baud setting. The DIP switches used to configure these settings are located on the base of the dome drive.

SW2 SWITCHES 4–5: SERIAL PORT SETTINGS

RS-422 Setting (Default)

SW2-4 and SW2-5 should both be set to the OFF position for RS-422 setting.

For control, only two wires should be connected to the RX- and RX+ connectors on the circuit board inside the back box. For bidirectional control, four wires should be connected to the RX-, RX+, TX-, and TX+ connectors on the circuit board inside the back box.

RS-485, 4-Wire Setting

SW2-4 should be set to OFF and SW2-5 should be set to ON if a 4-wire serial port connection is used with RS-485.

Note: This setting is most commonly used with Pelco Endura® systems.

RS-485, 2-Wire Setting

SW2-4 and SW2-5 should both be set to the ON position if a 2-wire serial port connection is used with RS-485.

This setting is used to allow the Spectra dome system to transmit and receive commands on the same pair of wires. Only two wires should be connected to the RX- and RX+ connectors on the circuit board inside the back box.

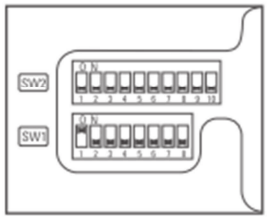


Figure 1. Default Switch Settings

Détecteur LASER (ALS)

A la mise en service, le détecteur laser calcule et mémorise une cartographie de référence, sur 360°. C'est la comparaison, en temps réel, entre les points de la cartographie de référence et la détection en cours qui permet de déterminer s'il y a intrusion. Il calcule alors en temps réel la position d'une intrusion dans sa zone de surveillance. Il communique alors deux données en coordonnées polaires : **la distance <range>** et **l'angle <azimut>.**

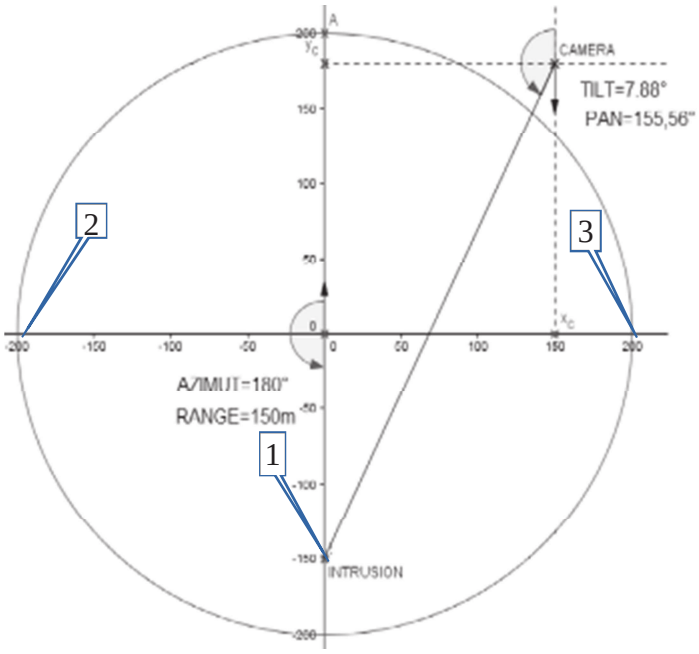
CAMERA DÔME

Il existe plusieurs types de caméras dôme qui sont souvent caractérisées par leur gamme de zoom et leur type de sortie vidéo : Par exemple la gamme utilisée par la société SERIES est la série SPECTRA 4 qui se décompose en plusieurs offres (zoom optique de 12x à 184x sortie PAL 752x582 et numérique si >x32).

Ce type de caméra se caractérise par leur commande PTZ (*Pan Tilt Zoom*) :

Pan : panoramique de 0 à 360° **Tilt** : inclinaison verticale de 0 à 90°par rapport à l'horizontale

Zoom : agrandissement suivant modèle 12x à 32 x en optique et jusqu'à x184 en numérique



Représentation données d'intrusions (cas de la surveillance d'avion)

Le cercle représente la zone de détection pour le laser situé au centre au point 0.

La caméra est placée en coordonnées cartésiennes [Xc= 150 m, Yc=180 m et hauteur=50 m] par rapport au laser.

AZIMUT : angle intrusion par rapport à l'axe 0A sens trigonométrique (0 à 359,94°)

RANGE : distance intrusion par rapport au laser (0 à 200 m)

Protocole détecteur Laser

- Communication parameters

  Communication to and from the ALS occurs at 19 200 bps with 8 data bits and 1 stop bit, without parity checking (19200-8-N-1).

- Packet structure

  General protocol structure looks as follow :

1 byte	1 byte	1 byte	N bytes	1 byte
HeaderTag	Length & MasterTag	Address	Data bytes	Check sum

Where :

HeaderTag : always 0x55 (hexadecimal)

Length & MasterTag :

MasterTag : 8th bit defines packet direction (1 – from master Laserboard , 0 – from ALS).

Length : bit 1 to 7 (0….127) number of byte (Address and Data bytes).

Address : 1...255, 0 – broadcast address (mostly used in point to point configurations, because all ALS independently to their own addresses will response to all packets with destination address 0)

Data bytes : up to 126 bytes

Check sum : sum of all bytes in packet except check sum byte itself.
(HeaderTag + Length & MasterTag + Address + Data byte1 + ... + Data byteN)

Data Bytes description : master to laser

Request : command byte equal to 0x18
Additional byte for different request

command	Additional command	function
0x18	0x00	reset ALS
0X18	0X02	Intruder detected
0x18	0x03	State acknoledgment
0x18	0x0B	Voltage acknoledgment

Protocole détecteur Laser

Data Bytes description : laser to master

Reply : Intruder detected ?

Command byte equal 0x18 (hexadecimal)
Additional data consist from sub-packets.

Sub-packet structure :

1 byte	1 byte	N bytes
Size	Type	Data

Size : 0x04
Type : 0x00 (one intruder detected)
Data (N bytes intruder position)

bit	1 byte	2 byte	3 byte	4 byte
7	X	Azimuth_12	Azimuth_07	Range_07
6	X	Azimuth_11	Azimuth_06	Range_06
5	X	Azimuth_10	Azimuth_05	Range_05
4	X	Azimuth_09	Azimuth_04	Range_04
3	X	Azimuth_08	Azimuth_03	Range_03
2	X	Range_10	Azimuth_02	Range_02
1	X	Range_09	Azimuth_01	Range_01
0	X	Range_08	Azimuth_00	Range_00

X Unused value (no interpretation)

Range00...Range10 11 bits value that represents distance to intruder from ALS;
0 - min distance
1023 - max distance (200 m)

Azimuth00..Azimuth12 13 bits value that represent azimuth to intruder relatively to zero ALS ;
0 - equal 0 degrees
5999 - equal 359,94 degrees

Protocole PELCO D

Pelco's D-type controllers are set at 2400 bauds. The default setting for the dome drive is 2400 bauds. Byte format is : 1 start bit, 8 data bits, 1 stop bit, and no parity.

THE MESSAGE FORMAT

The format for a message is:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Sync Byte	Address	Command 1	Command 2	Data 1	Data 2	Checksum

Note that values in this document prefixed with "0x" are hexadecimal numbers.

The *synchronization byte* (Sync Byte) is *always* **0xFF**.

The *Address* is the logical address of the receiver/driver device being controlled.

The *Checksum* is calculated by performing the 8 bit (modulo 256) sum of the payload bytes (bytes 2 through 6) in the message.

ADVANCED FEATURE SET

Command	Byte 3	Byte 4	Byte 5	Byte 6	Response Type
Reserved Opcode	00	0x47	00	00	Not Applicable
Set Zero Position	00	0x49	00	00	General
Set Pan Position	00	0x4B	Pan position MSB	Pan position LSB	General
Set Tilt Position	00	0x4D	Tilt position MSB	Tilt position LSB	General
Set Zoom Position	00	0x4F	Zoom position MSB	Zoom position LSB	General
Query Pan Position	00	0x51	00	00	Extended (0x59)
Query Tilt Position	00	0x53	00	00	Extended (0x5B)
Query Zoom Position	00	0x55	00	00	Extended (0x5D)
Reserved Opcode	00	0x57	00	00	Not Applicable
Query Pan Response	00	0x59	Pan position MSB	Pan position LSB	Not Applicable
Query Tilt Response	00	0x5B	Tilt position MSB	Tilt position LSB	Not Applicable
Query Zoom Response	00	0x5D	Zoom position MSB	Zoom position LSB	Not Applicable
Set Magnification	00	0x5F	Mag position MSB	Mag position LSB	General
Query Magnification	00	0x61	00	00	Extended (0x63)
Query Magnification Response	00	0x63	Mag position MSB	Mag position LSB	Not Applicable
Reserved Opcode	00	0x65	00	00	Not Applicable

Set Zero Position (0x49)

This command is used to set the pan position that the unit uses as a zero reference point for the azimuth on-screen display. The unit's current pan position when this command is received becomes the zero reference point. This command performs the same function as the "Set Azimuth Zero" menu item.

Set Pan Position (0x4B)

This command is used to set the pan position of the device. The position is given in hundredths of a degree and has a range from 0 to 35999 (decimal). Example: the value to use to set the pan position to 45 degrees is 4500. Note that the value used here is always the "absolute" pan position. It **does not** take into account any adjustment to the screen display that may have been made by using the "Set Zero Position", opcode (0x49) command or the "Set Azimuth Zero" menu item.

Set Tilt Position (0x4D)

This command is used to set the tilt position of the device. The position is given in hundredths of a degree and has a range from 0 to 35999 (decimal). Generally these values are interpreted as follows:
Zero degrees indicates that the device is pointed horizontally (at the *horizon*). *Ninety degrees* indicates that the device is pointed straight down.

Examples:

1) the value used to set the tilt position to 45 degrees *below the horizon,* is 4500.

2) the value used to set the tilt position 30 degrees *above the horizon,* is 33000.

Note that different equipment will have different ranges of motion. To determine the abilities of a specific piece of equipment, refer to that device's operation manual.

The General Response

The General Response has the following format. Note that each block represents 1 byte.

Byte 1	Byte 2	Byte 3	Byte 4
Sync	Address	Alarm Information	Checksum

The alarm information is formatted as follows:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
None	Alarm 7	Alarm 6	Alarm 5	Alarm 4	Alarm 3	Alarm 2	Alarm 1

If the bit is on (1) then the alarm is active. If the bit is off (0) then the alarm is inactive.

The checksum is the sum of the ***transmitted command's checksum*** and the alarm information.

Présentation des secteurs caméras fixes

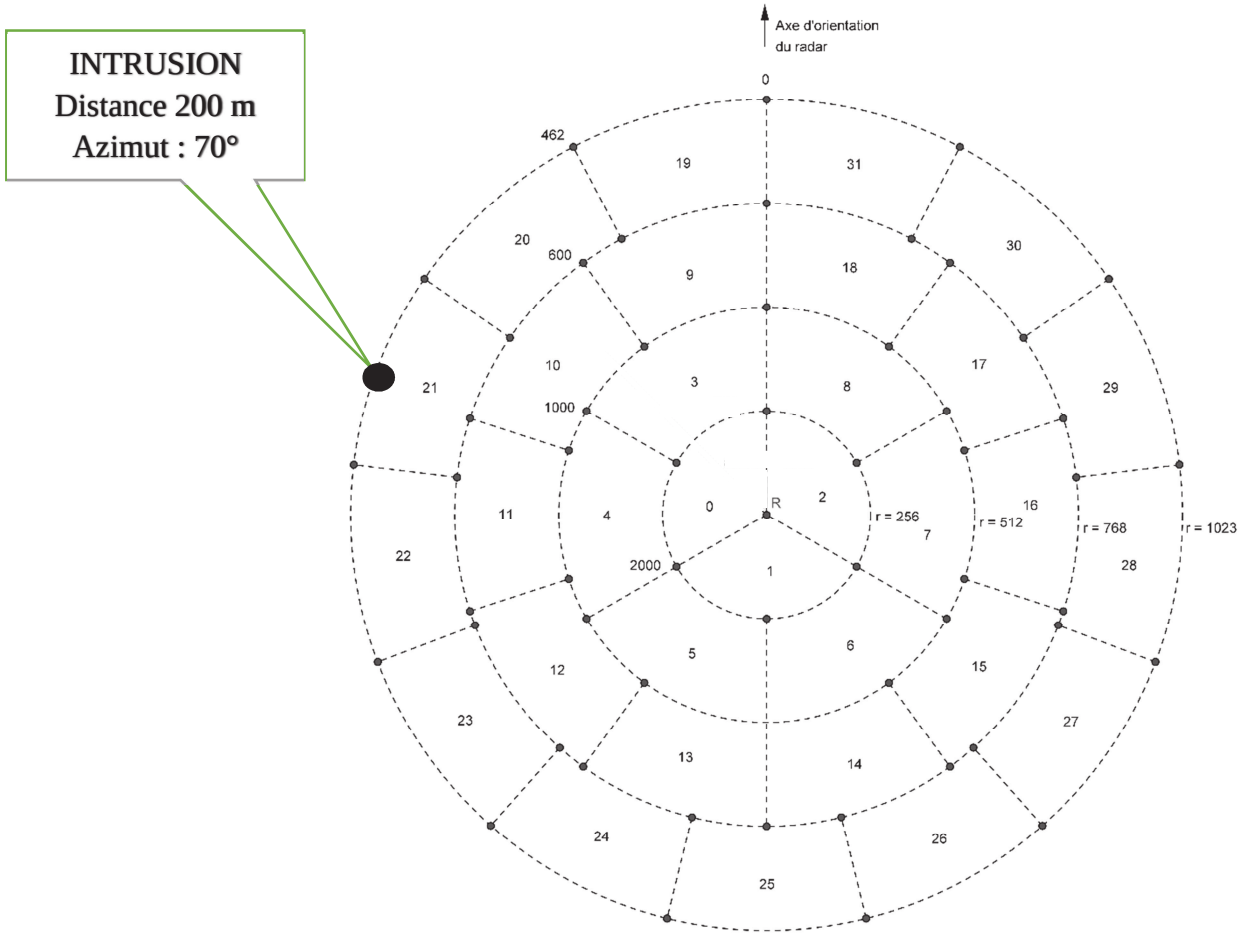
Comme on peut le voir sur la figure si dessous, l'aire de détection du laser est divisée en 32 secteurs numérotées de 0 à 31.

Le détecteur laser fournit deux informations :

- La distance (0 à 200 m) codée par un entier " Range " variant de 0 à 1023. Soit un pas de 0,195 m.
- L'angle sous lequel le détecteur voit la cible par rapport à son axe d'orientation (0 à 359,94°) codé par un entier " Azimut " variant de 0 à 5999. Soit un pas de 0,06°.

L'ensemble des secteurs sont disposés sur 4 bandes circulaires (ou couronnes) de largeur 50 m :

- La couronne 0 est un disque de rayon 50 m (0 < Range < 256) divisée en 3 secteurs de 120° soit 2000 x 0,06° numérotés de 0 à 2.
- La couronne 1 qui étend son rayon de 50 m à 100 m (256 < Range < 512) est divisée en six secteurs de 60° soit 1000 x 0,06° numérotés de 3 à 8.
- La couronne 2, de 100 m à 150 m (512 < Range<768) est divisée en 10 secteurs de 36° soit 600 x 0,06° numérotés de 9 à 18.
- La couronne 3, de 150 m à 200 m (768<Range<1023) est divisée en 13 secteurs de 27,69° soit 462 x 0,06° numérotés de 19 à 31.



Fonction de détection secteur

L'aire de détection du laser est divisée en 32 secteurs. On obtient le numéro du secteur par l'appel de la fonction *detection_secteur()* .

Description : *unsigned char detection_secteur(unsigned int range, unsigned int azimut)*

Calcule le numéro du secteur en fonction de la position de l'intrusion.

Paramètres :

unsigned int range : distance intrusion variant de 0 à 1023.

unsigned int azimut : angle intrusion variant de 0 à 5999.

Variable de retour:

unsigned secteur : numéro du secteur de 0 à 31.

Tableaux déclarés dans une bibliothèque à l'initialisation du programme :

```
// tableau contenant le n° du premier secteur de chaque couronne
premier_secteur[4] = {0, 3, 9,19};

// tableau contenant l'angle du secteur pour chaque couronne
angle_secteur[4] = {2000, 1000, 600, 462};
```

```
unsigned char detection_secteur(unsigned int range, unsigned int azimut)
{
 unsigned char couronne, secteur ;
 couronne = range / 256;
 secteur = premier_secteur[couronne] + azimut / angle_secteur[couronne];
 return secteur ;
}
```

8-Bit I/O Expander with Serial Interface

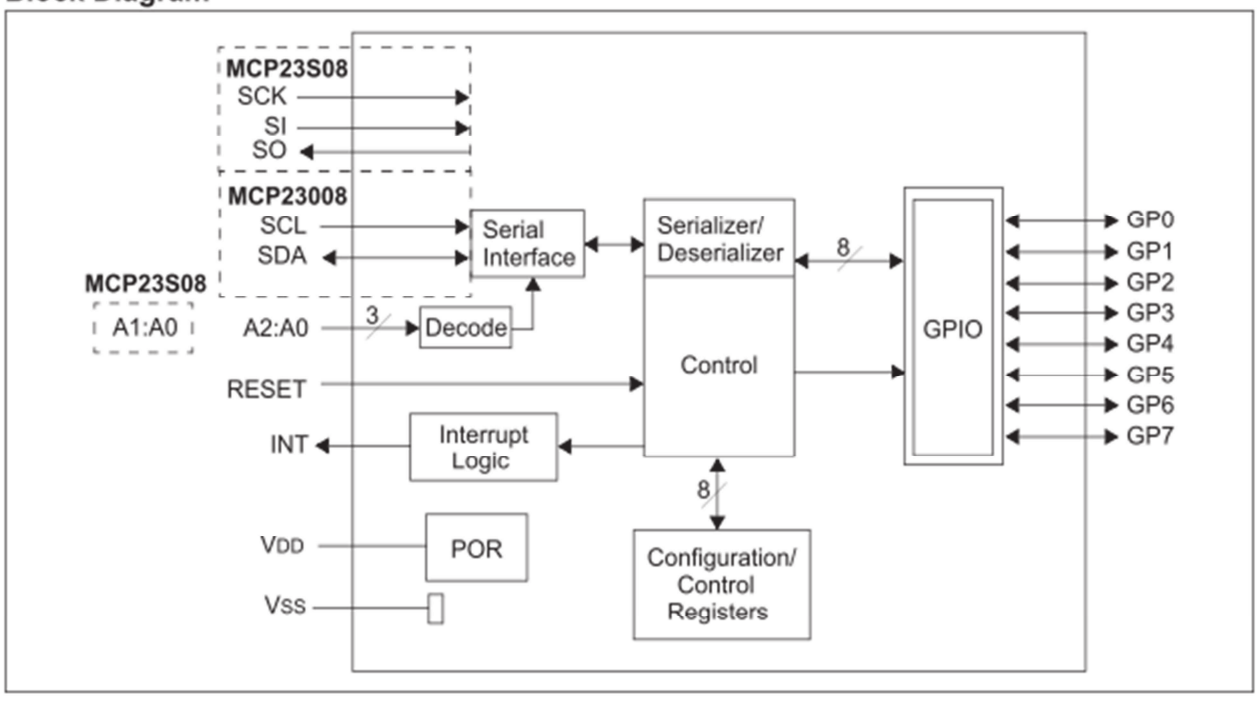
Features

- 8-bit remote bidirectional I/O port
  - I/O pins default to input
- High-speed I^2C™ interface (**MCP23008**)
  - 100 kHz
  - 400 kHz
  - 1.7 MHz
- High-speed SPI interface (**MCP23S08**)
  - 10 MHz
- Hardware address pins
  - Three for the MCP23008 to allow up to eight devices on the bus
  - Two for the MCP23S08 to allow up to four devices using the same chip-select
- Configurable interrupt output pin
  - Configurable as active-high, active-low or open-drain
- Configurable interrupt source
  - Interrupt-on-change from configured defaults or pin change
- Polarity Inversion register to configure the polarity of the input port data
- External reset input
- Low standby current: 1 µA (max.)
- Operating voltage:
  - 1.8V to 5.5V @ -40°C to +85°C
    I^2C @ 100 kHz
    SPI @ 5 MHz
  - 2.7V to 5.5V @ -40°C to +85°C
    I^2C @ 400 kHz
    SPI @ 10 MHz
  - 4.5V to 5.5V @ -40°C to +125°C
    I^2C @ 1.7 kHz
    SPI @ 10 MHz

Packages

- 18-pin PDIP (300 mil)
- 18-pin SOIC (300 mil)
- 20-pin SSOP
- 20-pin QFN

Block Diagram



1.3 Serial Interface

This block handles the functionality of the I^2C (MCP23008) or SPI (MCP23S08) interface protocol. The MCP23X08 contains eleven registers that can be addressed through the serial interface block (Table 1-2):

TABLE 1-2: REGISTER ADDRESSES

Address	Access to:
00h	IODIR
01h	IPOL
02h	GPINTEN
03h	DEFVAL
04h	INTCON
05h	IOCON
06h	GPPU
07h	INTF
08h	INTCAP (Read-only)
09h	GPIO
0Ah	OLAT

1.3.3 SPI INTERFACE

1.3.3.1 SPI Write Operation

The SPI Write operation is started by lowering $\overline{CS}$. The Write command (slave address with R/W bit cleared) is then clocked into the device. The opcode is followed by an address and at least one data byte.

1.3.3.2 SPI Read Operation

The SPI Read operation is started by lowering $\overline{CS}$. The SPI read command (slave address with R/W bit set) is then clocked into the device. The opcode is followed by an address, with at least one data byte being clocked out of the device.

1.4.2 ADDRESSING SPI DEVICES (MCP23S08)

The MCP23S08 is a slave SPI device. The slave address contains five fixed bits and two user-defined hardware address bits (pins A1 and A0), with the read/write bit filling out the control byte. Figure 1-3 shows the control byte format.

FIGURE 1-3: SPI CONTROL BYTE FORMAT

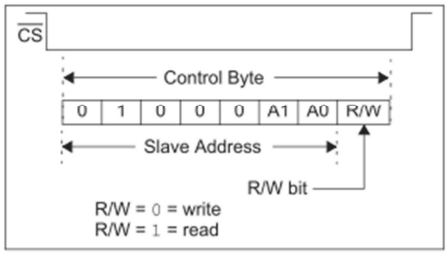
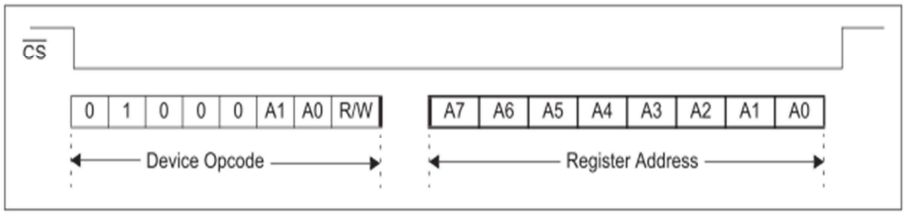


FIGURE 1-5: SPI ADDRESSING REGISTERS



1.6.10 PORT (GPIO) REGISTER

The GPIO register reflects the value on the port. Reading from this register reads the port. Writing to this register modifies the Output Latch (OLAT) register.

REGISTER 1-10: GPIO – GENERAL PURPOSE I/O PORT REGISTER (ADDR 0x09)

R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0
GP7	GP6	GP5	GP4	GP3	GP2	GP1	GP0
bit 7							bit 0

Legend:			
R = Readable bit	W = Writable bit	U = Unimplemented bit, read as '0'	
-n = Value at POR	'1' = Bit is set	'0' = Bit is cleared	x = Bit is unknown

bit 7-0 **GP7:GP0:** These bits reflect the logic level on the pins <7:0>
1 = Logic-high.
0 = Logic-low.

1.6.6 CONFIGURATION (IOCON) REGISTER

The IOCON register contains several bits for configuring the device:

- The Sequential Operation (SEQOP) controls the incrementing function of the address pointer. If the address pointer is disabled, the address pointer does not automatically increment after each byte is clocked during a serial transfer. This feature is useful when it is desired to continuously poll (read) or modify (write) a register.
- The Slew Rate (DISSLW) bit controls the slew rate function on the SDA pin. If enabled, the SDA slew rate will be controlled when driving from a high to a low.
- The Hardware Address Enable (HAEN) control bit enables/disables the hardware address pins (A1, A0) on the MCP23S08. This bit is not used on the MCP23008. The address pins are always enabled on the MCP23008.
- The Open-Drain (ODR) control bit enables/ disables the INT pin for open-drain configuration.
- The Interrupt Polarity (INTPOL) control bit sets the polarity of the INT pin. This bit is functional only when the ODR bit is cleared, configuring the INT pin as active push-pull.

REGISTER 1-6: IOCON – I/O EXPANDER CONFIGURATION REGISTER (ADDR 0x05)

U-0	U-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	U-0
—	—	SEQOP	DISSLW	HAEN	ODR	INTPOL	—
bit 7							bit 0

Legend:			
R = Readable bit	W = Writable bit	U = Unimplemented bit, read as '0'	
-n = Value at POR	'1' = Bit is set	'0' = Bit is cleared	x = Bit is unknown

bit 7-6 **Unimplemented:** Read as '0'.

bit 5 **SEQOP:** Sequential Operation mode bit.
1 = Sequential operation disabled, address pointer does not increment.
0 = Sequential operation enabled, address pointer increments.

bit 4 **DISSLW:** Slew Rate control bit for SDA output.
1 = Slew rate disabled.
0 = Slew rate enabled.

bit 3 **HAEN:** Hardware Address Enable bit (MCP23S08 only).
Address pins are always enabled on MCP23008.
1 = Enables the MCP23S08 address pins.
0 = Disables the MCP23S08 address pins.

bit 2 **ODR:** This bit configures the INT pin as an open-drain output.
1 = Open-drain output (overrides the INTPOL bit).
0 = Active driver output (INTPOL bit sets the polarity).

bit 1 **INTPOL:** This bit sets the polarity of the INT output pin.
1 = Active-high.
0 = Active-low.

bit 0 **Unimplemented:** Read as '0'.

RelaisG6L1F-12 VDC et circuit ULN 2803A

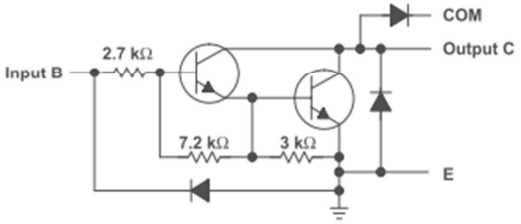
RELAIS G6L-1F-12 VDC

■ Coil Ratings

Single-side Stable Relays (G6L-1P, G6L-1F)

Rated voltage	3 VDC	4.5 VDC	5 VDC	12 VDC	24 VDC
Rated current	60.0 mA	40.0 mA	36.0 mA	15.0 mA	9.6 mA
Coil resistance	50.0 Ω	112.5 Ω	139.0 Ω	800.0 Ω	2,504.0 Ω
Must operate voltage	75% max. of rated voltage				
Must release voltage	10% min. of rated voltage				
Maximum voltage	150% of rated voltage				130% of rated voltage
Power consumption	Approx. 180 mW				Approx. 230 mW

schematic (each Darlington pair)

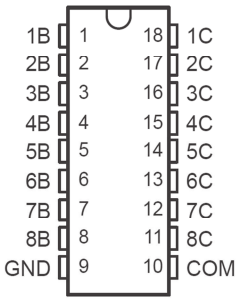


ULN2803A
DARLINGTON TRANSISTOR ARRAY

SLRS049E – FEBRUARY1997 – REVISED JULY 2006

- **500-mA Rated Collector Current (Single Output)**
- **High-Voltage Outputs . . . 50 V**
- **Output Clamp Diodes**
- **Inputs Compatible With Various Types of Logic**
- **Relay Driver Applications**
- **Compatible with ULN2800A Series**

DW OR N PACKAGE
(TOP VIEW)



description/ordering information

The ULN2803A is a high-voltage, high-current Darlington transistor array. The device consists of eight NPN Darlington pairs that feature high-voltage outputs with common-cathode clamp diodes for switching inductive loads. The collector-current rating of each Darlington pair is 500 mA. The Darlington pairs may be connected in parallel for higher current capability.

Applications include relay drivers, hammer drivers, lamp drivers, display drivers (LED and gas discharge), line drivers, and logic buffers. The ULN2803A has a 2.7-kΩ series base resistor for each Darlington pair for operation directly with TTL or 5-V CMOS devices.

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$V_{CE(sat)}$	Collector-emitter saturation voltage	I_I = 250 μA, I_C = 100 mA, See Figure 5		0.9	1.1	V
		I_I = 350 μA, I_C = 200 mA, See Figure 5		1	1.3	
		I_I = 500 μA, I_C = 350 mA, See Figure 5		1.3	1.6	