FEATURES

Monitors Temperature, Humidity, Barometric Pressure and Light

- Compatible with all EDS and Maxim 1-Wire® bus masters*
- Uses 1-Wire communication protocol
- Globally unique 1-wire 64-Bit serial number
- Pass-through 1-Wire connection
- Supports Conditional Search with user-definable conditions
- Highly accurate Temperature, Humidity and Barometric Pressure sensors
- Updates temperature data every 2 seconds
- Updates light data readings 4 times per second
- Updates Barometric Pressure in millibars (hPa) and inches of mercury every second
- Updates relative humidity, dew point, humidex, and heat index readings every second
- Optional latching relay may be controlled independently or by alarm status
- Applications include thermostatic controls, industrial systems, consumer products, thermometers, or any temperature/humidity/light/barometric pressure sensitive system

DESCRIPTION

The EDS **Environmental Sensor Line**, OW-ENV, offers an innovative way to easily *monitor and control* temperature, humidity, barometric pressure, and/or light in indoor environments. The wall mount sensor features high accuracy temperature, humidity, and barometric pressure sensors. The product also contains a light sensor, an LED, conditional search support, and a pass-through 1-Wire connection. Together these features offer an efficient and flexible system for monitoring the temperature, humidity, barometric pressure, and light levels at one or more locations within a building.

The sensor was specifically designed for easy communications. Any general-purpose 1-Wire host adapter* should be capable of reading data from the sensor.

The conditional search support allows the 1-Wire host adapter to quickly identify the alarm status for numerous parameters; and the LED and optional latching relay can be configured to behave in a variety of ways, including:

- Activate when an alarm parameter is met and deactivate when the alarm byte is cleared
- Activate when an alarm parameter is met and deactivate when readings return to normal range
- Controlled independent of alarm status.

The LED and optional relay response times are extremely fast; the sensors are able to respond appropriately (activate fan/alarm siren/etc.) even before the monitoring application is aware an alarm has been triggered. Since, the EDS Environmental Sensor line's alarm functions can operate independently of the 1-Wire host adapter the sensor may be used as a standalone thermostat, humidistat, pressurestat and/or light sensor.

Part Numbers:

TEMPERATURE/HUMIDITY	OW-ENV-TH
TEMPERATURE/HUMIDITY/RELAY	OW-ENV-THR
TEMPERATURE/HUMIDITY/BAROMETRIC PRESSURE/LIGHT	OW-ENV-THPL
TEMPERATURE/HUMIDITY/BAROMETRIC PRESSURE/LIGHT/RELAY	OW-ENV-THPLR
TEMPERATURE/LIGHT	OW-ENV-TL
TEMPERATURE/LIGHT/RELAY	OW-ENV-TLR
TEMPERATURE/BAROMETRIC PRESSURE	OW-ENV-TP
TEMPERATURE/BAROMETRIC PRESSURE/RELAY	OW-ENV-TPR
TEMPERATURE/RELAY	OW-ENV-TR

* Tested models include the HA7Net, OW-SERVER, HA2, HA3, HA4B, HA5, HA7E, HA7S, DS9490R#, DS9097U, and LinkUSB™

INSTALLATION INSTRUCTIONS

1. Remove the Lid of Enclosure - Lightly depress against the two small (0.5"x 0.625") vented sections on the sides of the enclosure and pull the rear of the enclosure away from the front.
2. Inside will be a screw, which will later be used to secure the enclosure together. Set the screw aside until required.
3. Make certain the cables are not connected to power and the 1-Wire master.
4. Draw the 1-Wire network's insulated wires (commonly CAT5 twisted pair) from the within the mounting wall through the circular hole in the rear of the enclosure.
5. Mount the rear of the enclosure on the wall using the diagonal slots reserved for the screws.
6. A minimum of 3 wires (1-Wire Data, Power and Ground) is required. If the pass-through 1-Wire connection or the relay is being used additional wires will be necessary.
    a. Strip 1/8" of the 1-Wire Data, Power and Ground wires
        i. 1-Wire Data: screw-down terminals are labeled "OW" on the PCB, pin 3 on EDS products with RJ12 plugs/jacks and Blue wire on cabled EDS Sensors
        ii. Ground[1] **:** screw-down terminals are labeled "GND" on the PCB, pin 4 on EDS products with RJ12 plugs/jacks and White wire (previously Blue/White) on cabled EDS Sensors
        iii. Power: screw-down terminals are labeled "PWR" on the PCB, pin 6 on the OW-SERVER/HA7Net[2], Pin 6 on the OW-TEMP-B3-12RA, and Orange wire on cabled EDS Sensors
    b. Securely attach 1-Wire Data, Ground (power and data) and Power to the corresponding screw-down terminals (see Fig 1.) on the 8 channel terminal block. If power is being derived from pin 6 on the OW-SERVER or HA7Net only the Data ground will be needed.
7. To use the Pass-Through terminals make the same connections to the second set (OW, GND, GND, PWR) of terminals on the 8 channel block.
8. Wiring the Relay – When the relay function is populated on the EDS Environmental Sensor there will be a 4 Channel screw-down terminal. The individual connections (C, NO, NC, GND) will be labeled on the PCB Board. Since, the relay is a latching relay NO and NC terminals have the opposing states. The screw-down labeled C is the connection for the power source of the NO & NC terminals.

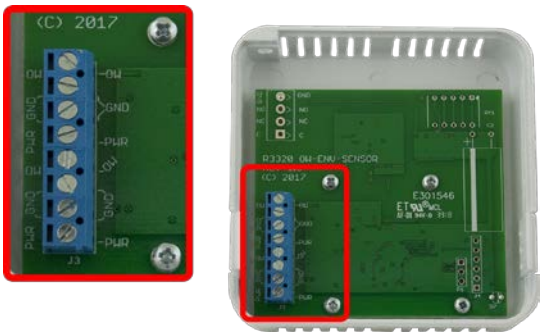

Fig 1. Screw-down terminals

Rating	
30 VDC	1.0 A (resistive)
110 VDC	0.3 A (resistive)
125 VAC	0.5 A (resistive)

[1] The 1-Wire Ground and Power Ground on the Environmental Sensor Product Line, OW-SERVER, and HA7Net are not isolated. Only 1 ground is needed as power is coming from the OW-SERVER or HA7Net.
[2] To supply 5Volts the HA7Net must have the RJ12 jumper properly configured (see HA7Net PCB for details).

MEMORY MAP

The memory consists of 3 pages of 32 bytes. Page 0 is the tag, page 1 and 2 contain operational data. Only page 2 can be written, pages 0 and 1 are read only.

Page 0

Addr	b7	b6	b5	b4	b3	b2	b1	b0		
0 - 27									Tag	R
28	2^3	2^2	2^1	2^0	2^3	2^2	2^1	2^0	Version, low	R
29	2^3	2^2	2^1	2^0	2^3	2^2	2^1	2^0	Version, high	R
30	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	ID, low	R
31	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8	ID, high	R

Page 1

Addr	b7	b6	b5	b4	b3	b2	b1	b0		
32	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	ID, low	R
33	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8	ID, high	R
34	2^3	2^2	2^1	2^0	2^{-1}	2^{-2}	2^{-3}	2^{-4}	Temp, low	R
35	s	s	s	s	s	2^6	2^5	2^4	Temp, high	R
36	2^3	2^2	2^1	2^0	2^{-1}	2^{-2}	2^{-3}	2^{-4}	Humidity, low	R
37	s	s	s	s	s	2^6	2^5	2^4	Humidity, high	R
38	2^3	2^2	2^1	2^0	2^{-1}	2^{-2}	2^{-3}	2^{-4}	Dew point, low	R
39	s	s	s	s	s	2^6	2^5	2^4	Dew point, high	R
40	2^3	2^2	2^1	2^0	2^{-1}	2^{-2}	2^{-3}	2^{-4}	Humidex, low	R
41	s	s	s	s	s	2^6	2^5	2^4	Humidex, high	R
42	2^3	2^2	2^1	2^0	2^{-1}	2^{-2}	2^{-3}	2^{-4}	Heat index, low	R
43	s	s	s	s	s	2^6	2^5	2^4	Heat index, high	R
44	2^{-4}	2^{-5}	2^{-6}	2^{-7}	2^{-8}	2^{-9}	2^{-10}	2^{-11}	BP - millibars	R
45	2^4	2^3	2^2	2^1	2^0	2^{-1}	2^{-2}	2^{-3}	BP - millibars	R
46	s	2^{11}	2^{10}	2^9	2^8	2^7	2^6	2^5	BP - millibars	R
47	2^{-4}	2^{-5}	2^{-6}	2^{-7}	2^{-8}	2^{-9}	2^{-10}	2^{-11}	BP – inHg	R
48	2^4	2^3	2^2	2^1	2^0	2^{-1}	2^{-2}	2^{-3}	BP – inHg	R
49	s	2^{11}	2^{10}	2^9	2^8	2^7	2^6	2^5	BP – inHg	R
50	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Light - Lux	R
51	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8	Light - Lux	R
52	2^{23}	2^{22}	2^{21}	2^{20}	2^{19}	2^{18}	2^{17}	2^{16}	Light - Lux	R
53							LED	Rly	Relay / LED State	R
54	Hdex low	Hdex high	DP low	DP high	Hum low	Hum high	Tmp low	Tmp high	Alarm states	R
55	Light low	Light high	BP-hg low	BP-hg high	BP-mb low	BP-mb high	H Index low	H Index high	Alarm states	R
56	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Seconds counter 1	R
57	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8	Seconds counter 1	R
58	2^{23}	2^{22}	2^{21}	2^{20}	2^{19}	2^{18}	2^{17}	2^{16}	Seconds counter 1	R
59	2^{31}	2^{30}	2^{29}	2^{28}	2^{27}	2^{26}	2^{25}	2^{24}	Seconds counter 1	R

60	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Seconds counter 2	R
61	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8	Seconds counter 2	R
62	2^{23}	2^{22}	2^{21}	2^{20}	2^{19}	2^{18}	2^{17}	2^{16}	Seconds counter 2	R
63	2^{31}	2^{30}	2^{29}	2^{28}	2^{27}	2^{26}	2^{25}	2^{24}	Seconds counter 2	R

Page 2

Addr	b7	b6	b5	b4	b3	b2	b1	b0		
64	Hdex low	Hdex high	DP low	DP high	Hum low	Hum high	Tmp low	Tmp high	Conditional search	RW
65	Light low	Light high	BP-hg low	BP-hg high	BP-mb low	BP-mb high	H Index low	H Index high	Conditional search	RW
66	s	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Tmp alm high	RW
67	s	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Tmp alm low	RW
68	s	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Hum alm high	RW
69	s	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Hum alm low	RW
70	s	2^6	2^5	2^4	2^3	2^2	2^1	2^0	DP alm high	RW
71	s	2^6	2^5	2^4	2^3	2^2	2^1	2^0	DP alm low	RW
72	s	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Humidex alm high	RW
73	s	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Humidex alm low	RW
74	s	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Heat indx alm high	RW
75	s	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Heat indx alm low	RW
76	2^{-4}	2^{-5}	2^{-6}	2^{-7}	2^{-8}	2^{-9}	2^{-10}	2^{-11}	BP – millibars alm high	RW
77	2^4	2^3	2^2	2^1	2^0	2^{-1}	2^{-2}	2^{-3}	BP – millibars alm high	RW
78	s	2^{11}	2^{10}	2^9	2^8	2^7	2^6	2^5	BP – millibars alm high	RW
79	2^{-4}	2^{-5}	2^{-6}	2^{-7}	2^{-8}	2^{-9}	2^{-10}	2^{-11}	BP – millibars alm low	RW
80	2^4	2^3	2^2	2^1	2^0	2^{-1}	2^{-2}	2^{-3}	BP – millibars alm low	RW
81	s	2^{11}	2^{10}	2^9	2^8	2^7	2^6	2^5	BP – millibars alm low	RW
82	2^{-4}	2^{-5}	2^{-6}	2^{-7}	2^{-8}	2^{-9}	2^{-10}	2^{-11}	BP – inHg alm high	RW
83	2^4	2^3	2^2	2^1	2^0	2^{-1}	2^{-2}	2^{-3}	BP – inHg alm high	RW
84	s	2^{11}	2^{10}	2^9	2^8	2^7	2^6	2^5	BP – inHg alm high	RW
85	2^{-4}	2^{-5}	2^{-6}	2^{-7}	2^{-8}	2^{-9}	2^{-10}	2^{-11}	BP – inHg alm low	RW
86	2^4	2^3	2^2	2^1	2^0	2^{-1}	2^{-2}	2^{-3}	BP – inHg alm low	RW
87	s	2^{11}	2^{10}	2^9	2^8	2^7	2^6	2^5	BP – inHg alm low	RW
88	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Light – Lux alm high	RW
89	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8	Light – Lux alm high	RW
90	2^{23}	2^{22}	2^{21}	2^{20}	2^{19}	2^{18}	2^{17}	2^{16}	Light – Lux alm high	RW
91	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Light – Lux alm low	RW
92	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8	Light – Lux alm low	RW
93	2^{23}	2^{22}	2^{21}	2^{20}	2^{19}	2^{18}	2^{17}	2^{16}	Light – Lux alm low	RW
94					L1	L0	R1	R0	Relay / LED Function	RW
95							LED	Rly	Relay / LED State	RW

* If the relay is not populated the bits pertaining to the Relay Function and LED State should be ignored.

Temperature, Humidity, Dew Point, Humidex and Heat Index

These values are stored in 2 bytes of data on page 1 with the least significant byte first (LSB). They are stored as a 16-bit two's complement number. The most significant bits defines whether the number will be negative (1) or positive (0). Readings can be calculated taking the given value and dividing the number by 16. For example, if F8FFh (LSB) was read the value could be calculated as such:

F8FFh (LSB) = FFF8h (MSB)	Converting LSB to MSB	
1111 1111 1111 1000 (binary) = FFF8h	Converting from hex to binary	
0000 0000 0000 0111	Inverting data	Skip step if sign bit is positive
0000 0000 0000 1000	Add 1	Skip step if sign bit is positive
0000 0000 0000 1000 = 0008h = 8 (decimal)	Converting to decimal	
8/16 (decimal) = 0.5	Divide by 16 (decimal)	
-0.5	Apply sign designated by most significant bit	

Value	Digital Output MSB (binary)	Digital Output MSB (hex)
+125	0000 0111 1101 0000	07D0h
+85	0000 0101 0101 0000	0550h
+25.0625	0000 0001 1001 0001	0191h
+10.125	0000 0000 1010 0010	00A2h
+0.5	0000 0000 0000 1000	0008h
0	0000 0000 0000 0000	0000h
-0.5	1111 1111 1111 1000	FFF8h
-10.125	1111 1111 0101 1110	FF5Eh
-25.0625	1111 1110 0110 1111	FE6Fh
-40	1111 1101 1000 0000	FD80h

Barometric Pressure - Millibars and inHg

These values are stored in 3 bytes of data on page 1 with the least significant byte first (LSB). They are stored as a 24-bit two's complement number. The most significant bit defines whether the number will be negative (1) or positive (0). Readings can be calculated taking the given value and dividing the number by 2048. For example, if 00FCFFh (LSB) was read the value could be calculated as such:

00FCFFh (LSB) = FFFC00h (MSB)	Converting LSB to MSB	
1111 1111 1111 1100 0000 0000 (binary) = FFCF00h	Converting from hex to binary	
0000 0000 0000 0011 1111 1111	Inverting data	Skip step if sign bit is positive
0000 0000 0000 0100 0000 0000	Add 1	Skip step if sign bit is positive
0000 0000 0000 0100 0000 0000 = 400h = 1024 (decimal)	Converting to decimal	
1024/2048 (decimal) = 0.5	Divide by 2048 (decimal)	
-0.5	Apply sign designated by most significant bit	

Alarm	Digital Output MSB (binary)	Digital Output MSB (hex)
+800	0001 1001 0000 0000 0000 0000	190000h
+85	0000 0010 1010 1000 0000 0000	02A800h
+25.0625	0000 0000 1100 1000 1000 0000	C80080h
+10.125	0000 0000 0101 0001 0000 0000	005100h
+0.5	0000 0000 0000 0100 0000 0000	000400h
0	0000 0000 0000 0000 0000 0000	000000h
-0.5	1111 1111 1111 1100 0000 0000	FFFC00h
-10.125	1111 1111 1010 1111 0000 0000	FFAF00h
-200	1111 1001 1100 0000 0000 0000	F9C000h

Light – Lux

Light reading is stored in a 24-bit unsigned integer format with the LSB first. See memory locations 50 to 52.

Alarms
Alarm values for temperature, humidity, dew point, humidex, and heat index are programmed as signed integers, 1 byte in length. They are stored in non-volatile memory from byte 66 to 75.

Barometric pressure alarms are stored in 24-bit twos complement format with the least significant byte first (LSB), between memory locations 76 to 81. The most significant bit defines whether the number will be negative (1) or positive (0). Alarms can be calculated taking the given value and dividing the number by 2048. For example, if 00FCFFh (LSB) was read the value could be calculated as such:

00FCFFh (LSB) = FFFC00h (MSB)	Converting LSB to MSB	
1111 1111 1111 1100 0000 0000 (binary) = FFCF00h	Converting from hex to binary	
0000 0000 0000 0011 1111 1111	Inverting data	Skip step if sign bit is positive
0000 0000 0000 0100 0000 0000	Add 1	Skip step if sign bit is positive
0000 0000 0000 0100 0000 0000 = 400h = 1024 (decimal)	Converting to decimal	
1024/2048 (decimal) = 0.5	Divide by 2048 (decimal)	
-0.5	Apply sign designated by most significant bit	

Alarm	Digital Output MSB (binary)	Digital Output MSB (hex)
+800	0001 1001 0000 0000 0000 0000	190000h
+85	0000 0010 1010 1000 0000 0000	02A800h
+25.0625	0000 0000 1100 1000 1000 0000	C80080h
+10.125	0000 0000 0101 0001 0000 0000	005100h
+0.5	0000 0000 0000 0100 0000 0000	000400h
0	0000 0000 0000 0000 0000 0000	000000h
-0.5	1111 1111 1111 1100 0000 0000	FFFC00h
-10.125	1111 1111 1010 1111 0000 0000	FFAF00h
-200	1111 1001 1100 0000 0000 0000	F9C000h

Light alarms are stored in a 24-bit unsigned integer format. See memory locations 88 to 93.

Alarm States
Alarms are calculated every time a reading is made from a sensor, which is every second for barometric pressure and humidity, every 250ms for light and every 2 seconds for temperature. If the reading is above the high alarm value, the corresponding high alarm bit is set, and if the reading is below the low alarm value, the low alarm bit is set. Alarm bits can only be cleared by sending the clear alarms command (0x33), which clears all alarm bits. No provision is made to clear individually selected alarm bits.

Conditional Search
The device will respond to the conditional search command from a master if any or all of the conditional search bits are set. The conditional search bits are set when an alarm becomes active and are cleared only under program control, by writing to the appropriate bit(s) at locations 64 and 65.

Seconds Counters
These 32 bit counters (bytes 56 to 63) are set to zero at power up and increment approximately once per second.

Relay and LED

The relay and LED may operate in any of the following modes:

Mode	Bit L1 (LED) or R1 (Relay)	Bit L0 (LED) or R0 (Relay)
(0) On with any alarm, off if no alarms active*	0	0
(1) On with any alarm, off when clear alarms command received*	0	1
(2) On and Off under command using State bit (address 95)	1	0
(3) Always off	1	1

* Mode 0 and 1 uses hysteresis to avoid rapid changes in the LED and/or relay. The parameter is in alarm when it is greater than (high alarm) or less than (low alarm) the threshold value. It moves out of alarm when it is less than (high alarm) or greater than (low alarm) the threshold value plus the hysteresis:

- Temperature - 1°C
- Humidity – 1 %
- Dew Point – 1°C
- Humidex - 1°C
- Heat Index - 1°C
- BP, millibars – 1
- BP, inHg (inches of mercury) – 0.1
- Light – 10 lux

The state of the LED is stored in non-volatile memory and is restored at power-up. Since the relay is latching, its state remains the same, even when power is removed.

1-WIRE COMMUNICATIONS

The device communicates via 1-wire at standard speed only; overdrive is not supported. All memory pages are 32 bytes, CRC16 and a 32 byte scratchpad is used to write data to the device.

ROM Commands

After the bus master has detected a presence pulse, it can issue a ROM command. These commands operate on the unique 64-bit ROM codes of each slave device and allow the master to single out a specific device if many are present on the 1-Wire bus. These commands also allow the master to determine how many and what types of devices are present on the bus or if any device has experienced an alarm condition. There are five ROM commands, and each command is 8 bits long. The ROM commands function the same as on other 1-wire devices. The master device must issue an appropriate ROM command before issuing a function command.

Alarm Search ROM – 0xEC

The operation of this command is identical to the operation of the Search ROM command except that only slaves with a set conditional search flag (bytes 64 and 65) will respond. This command allows the master device to determine if any EDS Environmental Sensor is in an alarm. After every Alarm Search cycle (i.e., Alarm Search command followed by data exchange), the bus master must return to Step 1 (Initialization) in the transaction sequence. See the Operation—Alarm Signaling section for an explanation of alarm flag operation.

Search ROM – 0xF0

When a system is initially powered up, the master must identify the ROM codes of all slave devices on the bus, which allows the master to determine the number of slaves and their device types. The master learns the ROM codes through a process of elimination that requires the master to perform a Search ROM cycle (i.e., Search ROM command followed by data exchange) as many times as necessary to identify all of the slave devices. If there is only one slave on the bus, the simpler Read ROM command (see below) can be used in place of the Search ROM process. For a detailed explanation of the Search ROM procedure, refer to the iButton® Book of Standards at www.maxim-ic.com/ibuttonbook. After every Search ROM cycle, the bus master must return to Step 1 (Initialization) in the transaction sequence.

Match ROM – 0x55

The match ROM command followed by a 64-bit ROM code sequence allows the bus master to address a specific slave device on a multi-drop or single-drop bus. Only the slave that exactly matches the 64-bit ROM code sequence will respond to the function command issued by the master; all other slaves on the bus will wait for a reset pulse.

Skip ROM – 0xCC

The master can use this command to address all devices on the bus simultaneously without sending out any ROM code information. For example, the master can clear all alarming EDS Environmental Sensors on the bus perform simultaneous clearing of alarms by issuing a Skip ROM command followed by a Clear alarms [0x33] command.

Note that the Read Scratchpad [0xAA] command can follow the Skip ROM command only if there is a single slave device on the bus. In this case, time is saved, by allowing the master to read from the slave without sending the device's 64-bit ROM code. A Skip ROM command followed by a Read Scratchpad command will cause a data collision on the bus if there is more than one slave since multiple devices will attempt to transmit data simultaneously.

Read ROM – 0x33

This command can only be used when there is one slave on the bus. It allows the bus master to read the slave's 64-bit ROM code without using the Search ROM procedure. If this command is used when there is more than one slave present on the bus, a data collision will occur when all the slaves attempt to respond at the same time.

Memory / Control Commands

Write scratchpad – 0x0F
Read scratchpad – 0xAA
Copy scratchpad – 0x55
Read memory no CRC – 0xF0
Read memory with CRC – 0xA5
Clear alarms – 0x33

Write Scratchpad – 0x0F
After issuing the Write Scratchpad command, the master must first provide the 2-byte target address, followed by the data to be written to the scratchpad. The data will be written to the scratchpad starting at the byte offset (T4:T0). The ending offset (E4:E0) will be the byte offset at which the master stops writing data. Only full data bytes are accepted. If the last data byte is incomplete, its content will be ignored.

When executing the Write Scratchpad command, the CRC generator inside the EDS Environmental Sensor calculates a CRC of the entire data stream, starting at the command code and ending at the last data byte sent by the master. This CRC is generated using the CRC16 polynomial by first clearing the CRC generator and then shifting in the command code (0Fh) of the Write Scratchpad command, the Target Addresses TA1 and TA2 as supplied by the master and all the data bytes. The master may end the Write Scratchpad command at any time. However, if the ending offset is 11111b, the master may send 16 read time slots and will receive an inverted CRC16 generated by the EDS Environmental Sensor.

Read Scratchpad – 0xAA
This command is used to verify scratchpad data and target address. After issuing the Read Scratchpad command, the master begins reading. The first 2 bytes will be the target address. The next byte will be the ending offset/data status byte (E/S) followed by the scratchpad data beginning at the byte offset (T4:T0). Regardless of the actual ending offset, the master may read data until the end of the scratchpad after which it will receive an inverted CRC16 of the command code, Target Addresses TA1 and TA2, the E/S byte, and the scratchpad data starting at the target address. After the CRC is read, the bus master will read logical 1s from the EDS Environmental Sensor until a reset pulse is issued.

Copy Scratchpad – 0x55
This command is used to copy data from the scratchpad to the writable memory sections. Applying Copy Scratchpad to the Relay/LED State Byte can control the relay and/or LED provided that functionality has been enabled (see Relay and LED section for details). After issuing the Copy Scratchpad command, the master must provide a 3-byte authorization pattern, which can be obtained by reading the scratchpad for verification. This pattern must exactly match the data contained in the three address registers (TA1, TA2, E/S, in that order). A pattern of alternating 1s and 0s will be transmitted after the data has been copied until the master issues a reset pulse.

The data to be copied is determined by the three address registers. The scratchpad data from the beginning offset through the ending offset will be copied, starting at the target address. Anywhere from 1 to 32 bytes may be copied to memory with this command.

Read Memory no CRC – 0xF0
The Read Memory command may be used to read the entire memory. After issuing the command, the master must provide the 2-byte target address. After the 2 bytes, the master reads data beginning from the target address and may continue until the end of memory, at which point logic 0s will be read. It is important to realize that the target address registers will contain the address provided. The ending offset/data status byte is unaffected.

To safeguard data in the 1-Wire environment when reading and to simultaneously speed up data transfers, it is recommended to make use of the Read Memory with CRC (0xA5) whenever possible. The 16-bit CRC ensures rapid, error-free data transfers that eliminate having to read a page multiple times to verify whether if the received data is correct.

Read Memory with CRC – 0xA5
The Read Memory with CRC command works essentially the same way as the simple Read Memory, except for the 16-bit CRC that the EDS Environmental Sensor generates and transmits following the last data byte of a memory page.

After having sent the command code of the Read Memory with CRC command, the bus master sends a 2-byte address (TA1 = T7:T0, TA2 = T15:T8) that indicates a starting byte location. With the subsequent read data time slots the master receives data from the EDS Environmental Sensor starting at the initial address and continuing until the end of a 32-byte page is reached. At that point the bus master will send 16 additional read data time slots and receive an inverted 16-bit CRC. With subsequent read data time slots the master will receive data starting at the beginning of the next page followed again by the inverted CRC for that page. This sequence will continue until the bus master resets the device.

With the initial pass through the Read Memory with CRC flow, the 16-bit CRC value is the result of shifting the command byte into the cleared CRC generator followed by the 2 address bytes and the contents of the data memory. Subsequent

passes through the Read Memory with CRC flow will generate a 16-bit CRC that is the result of clearing the CRC generator and then shifting in the contents of the data memory page. After the 16-bit CRC of the last page is read, the bus master will receive logical 0s from the EDS Environmental Sensor until a reset pulse is issued.

Clear Alarms – 0x33
The Clear Alarms command is used to set all bits at bytes 54 and 55 to 0. The clearing the alarms has the ability to effect relay state, and LED state depending on the configuration. Additional information on the possible effects is available in *Relay and LED* and/or *Conditional Search* sections of the manual.

Family Code
The family code is 0x7E.

Tag
The tag provides identification for each EDS device type. It consists of three parts: the description, followed by the firmware version number and then the device ID number. The description is the product name as an ASCII text string; i.e. EDS0064 XXXXXX. The firmware version is a 2 byte number provided in BCD format, LSB first. For example: 0x36,0x01 represents the firmware version 1.36. The 2 byte device ID uniquely identifies this device from others with the same family code. This is also presented in BCD format, LSB first. Therefore 0x64,0x00 represents Device ID 0064. The device ID portion of the tag is duplicated at the beginning of the next page so that the user can read one page and retrieve all necessary information to work with the device.

2^3	2^2	2^1	2^0	2^3	2^2	2^1	2^0	Version, low
2^3	2^2	2^1	2^0	2^3	2^2	2^1	2^0	Version, high
2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	ID, low
2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8	ID, high

EDS ENVIRONMENTAL SENSOR IDS

TAG ID	Tag Hex	Tag Bin (LSB first)	Features
EDS0064	0064	0110 0100 0000 0000	Temp with relay
EDS0065	0065	0110 0101 0000 0000	Temp, humidity
EDS0066	0066	0110 0110 0000 0000	Temp, barometric pressure
EDS0067	0067	0110 0111 0000 0000	Temp, light
EDS0068	0068	0110 1000 0000 0000	Temp, humidity, barometric pressure and light

SPECIFICATIONS

PARAMETER	MIN	TYP	MAX	UNITS
Operating Temperature Range	-40	-	85	°C
Temperature Accuracy at -10 to 85°C	-0.4	±0.3	+0.4	°C
Temperature Accuracy at -40 to -10°C	-0.9	-	0.9	°C
Temperature Resolution	-	0.0625	-	°C
RH Accuracy: 0% to 80% RH	-3	±2	+3	% RH
RH Accuracy: 80% to 100% RH	-4.5	±3	+4.5	% RH
Pressure Accuracy: 700 to 1,100 hPa at 0 to 65°C	-2.5	±1	+2.5	hPa/Millibar
Pressure Accuracy: 300 to 700 hPa at 0 to 65°C	-3	±1	+3	hPa/Millibar
Pressure Accuracy: at -20 to 0°C	-4	±1.5	+4	hPa/Millibar
Pressure Accuracy: 20.67 to 32.48	-0.07	±0.03	+0.07	inHg
Measurement Range	300	-	1,100	hPa/Millibar
Maximum Pressure	-	-	10,000	hPa/Millibar
Light Measurement Range	0	-	65535	Lux
Light Sensitivity	-20	-	+20	%
Relay Voltage Rating (DC)	-	110	-	Volts
Relay Current Rating (DC)	-	2	-	Amps
Relay Switching Power Rating (DC, resistive load)	-	-	30	Watts
Relay Voltage Rating (AC)	-	125	-	Volts
Relay Current Rating (AC)	-	2	-	Amps
Relay Switching Power Rating (AC, resistive load)	-	-	62.5	VA
Supply Voltage	4	-	18	Volts
Active Current	-	7.5	-	mA
Enclosure Dimensions (L x W x H)	80	80	21	mm

Relay Rating	
30 VDC	1.0 A (resistive)
110 VDC	0.3 A (resistive)
125 VAC	0.5 A (resistive)

Regulatory Compliance

FEDERAL COMMUNICATIONS COMMISSION (FCC) COMPLIANCE STATEMENT

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

INDUSTRY CANADA (IC) COMPLIANCE STATEMENT

This Class B digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

EUROPEAN COMMUNITY (EC) DIRECTIVES CONFORMITY

APPLICATION OF COUNCIL DIRECTIVE 2004/108/EC Standard to which Conformity is Declared:

EN 61326-1:2006	(Emmissions)
EN 61326-2-3:2006	(Immunity)
EN 61000-3-2:2006+A1:2009+A2:2009	(Harmonics)
EN 61000-3-3:2008	(Flicker)

CE FC

Caution: *The manufacturer is not responsible for any radio or television interference caused by using other than recommended cables or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate this equipment.*

Acknowledgements

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