

AS38-H39E-B13S

39 Bits Multi-Turn Absolute House Encoder with BiSS-C Mode Output

Data Sheet



Description

This AS38 absolute encoder is available with a high-resolution option of 39-bits (16-bits multi-turn and 23-bits single-turn). Structure wise, the single-turn absolute encoder contains the detector Opto-ASIC that is accompanied by a high-precision amplifier circuitry and coupled with a special multi-track code disk that rotates between the emitter and the detector.

On the multi-turn side, the power is harvested using the energy-harvesting technology. When the shaft is rotating, the magnet mounted on the shaft moves in tandem. The energy-harvesting coil module cuts the moving magnet field, and generates energy as a result. The beauty of the energy-harvesting effect is that the same amount of energy is generated independent of the rotation speed. The generated energy is sufficient to power the revolution tracking circuitry. Therefore, no miss counts occur even in the absence of an external power supply.

Features

- 39-bits resolution: 16-bits energy-harvesting multi-turn and 23-bits optical single-turn
- With CRC and alarm status bits
- Built in with BiSS-C mode communication protocol
- Overall encoder outer diameter $\varnothing 38$ mm, and maximum height of 40 mm
- Supporting 8-mm diameter of the blind hollow shaft

Benefits

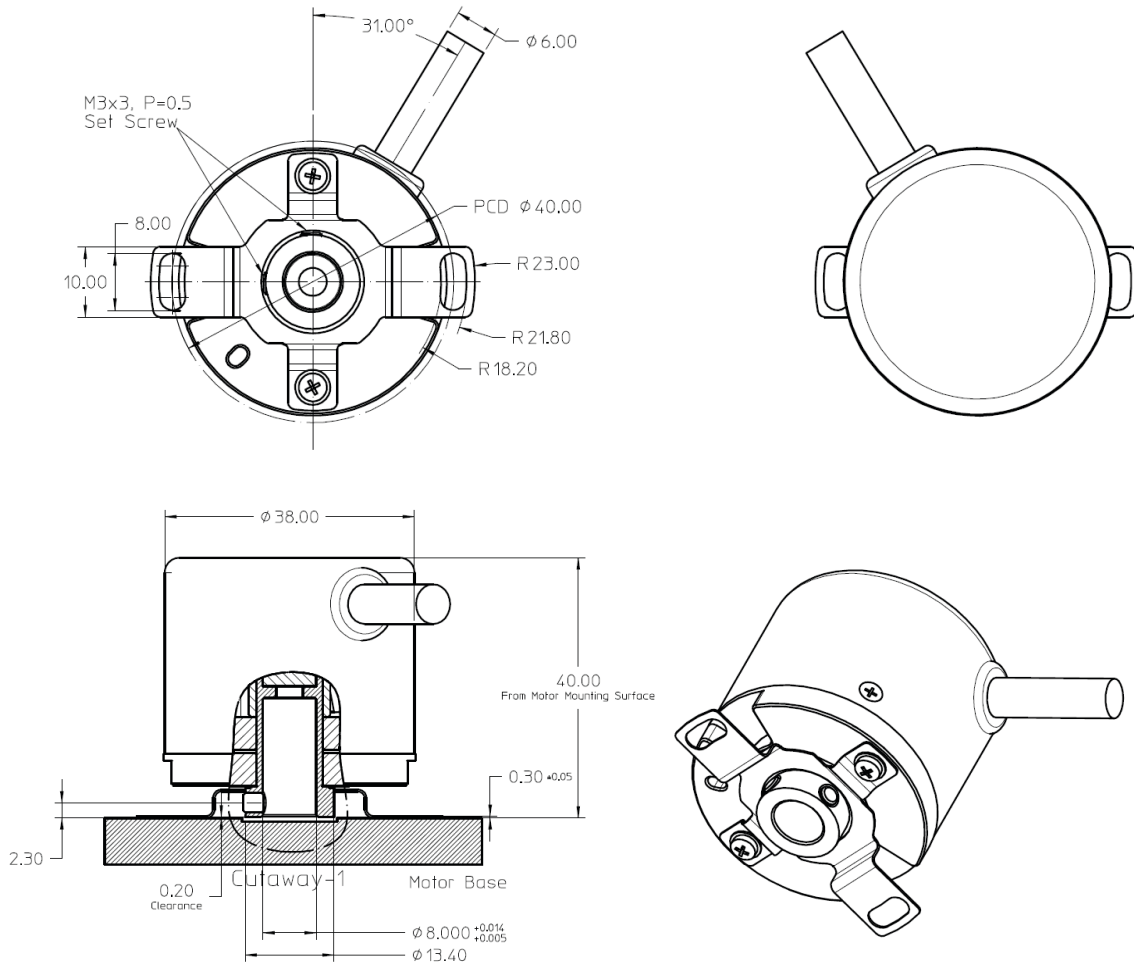
- No battery or capacitor is required for position detection during power failure
- Immediate position detection on power up

Applications

- Robot and robotic engineering
- Factory automation
- Angular and linear positioning system
- CNC machine tool

NOTE Avago encoders are not recommended for use in safety-critical applications; for example, ABS braking systems, power steering, life support systems, and critical care medical equipment. Please contact a sales representative if more clarification is needed.

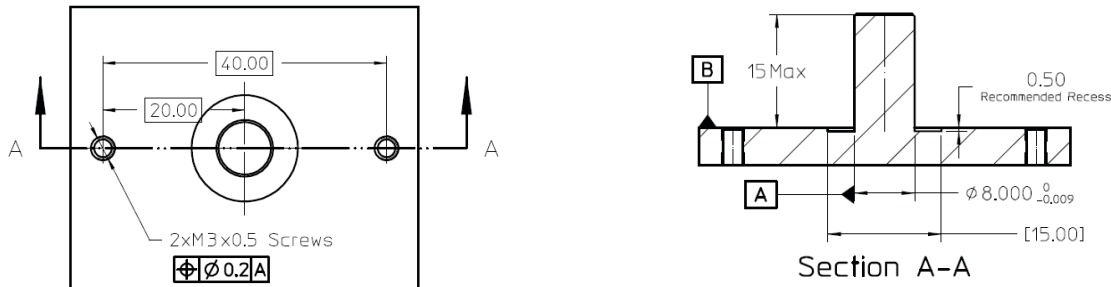
Package Dimensions



NOTE

1. Dimensions are in millimeters
2. Third angle projection
3. Unless otherwise specified, all tolerances are within ± 0.5 mm
4. Recommended to have a recess on motor mounting surface to prevent encoder shaft interfere with motor base.

Recommended Shaft and Mounting Holes Requirement



NOTE

1. Dimensions are in millimeters
2. Third angle projection
3. Unless otherwise specified, all tolerances are within ± 0.5 mm
4. Recommended to have a recess on motor mounting surface to prevent encoder shaft interfere with motor base.

Device Selection Guide

| Part Number | Resolution | Operating Temperature (°C) | Output Communication | Output Code | DC Supply Voltage (V) |
|-------------|---|----------------------------|----------------------|-------------|-----------------------|
| AS38-H39E | 39 bits (16 bits MT+ 23 bits ST) ^a | -20°C~105 °C | BiSS-C | Binary | 5.0V $\pm 10\%$ |

a. ST: Single-turn; MT : Multi-turn

Electrical Specifications

| Parameter | Units | Limits | Remark |
|--------------------------------|-------|-----------------------------|--------------|
| Single-turn Resolution | Count | 8,388,607 (23 bits) | |
| Multi-turn Resolution | Count | 65,535 (16 bits) | |
| Fault Status | Bit | 8 bits | |
| CRC | Bit | 8 bits | |
| Main Supply Current | mA | Typical ≤ 120 mA | Without load |
| Electrically Permissible Speed | rpm | $\leq 6,000\text{min}^{-1}$ | |

Mechanical Specifications

| Parameter | Units | Limits | Remark |
|------------------------------|-------|-----------------------------|--------------------|
| Mechanical Permissible Speed | rpm | $\leq 6,000\text{min}^{-1}$ | |
| Vibration | | G level: 10G; 10~2000Hz | Per IEC 60068-2-6 |
| Shock | | 6ms; Half Sine; 200G | Per IEC 60068-2-27 |

Other Specifications

| Parameter | Units | Limits | Remark |
|--|---------|--|---------------------------|
| System Accuracy | arc-sec | ±80 | Room temperature |
| Counting Direction | | Increase with clockwise shaft rotation | View from coupling side |
| Position Calculation Time | ns | Refer to BiSS C T _{busy time} | |
| Initialization Time | ms | 500 | |
| Output Connection | | Pig tail cable | Approximate 200mm (AWG28) |
| Relative Air Humidity (Non-Condensing) | RH% | 90 | At 40 °C |
| Shaft Radial Play | mm | ±0.05 | |
| Shaft Axial Play | mm | ±0.1 | |
| Storage Temperature | °C | -20 to 105 | |

BiSS-C Interface – Register Communication

Description

Refer to BiSS-C Interface Protocol Description Rev C5 document for detailed information of BiSS-C Register Communication.

http://biss-interface.com/files/Bissinterface_c5es.pdf

Figure 1 Register Write Access

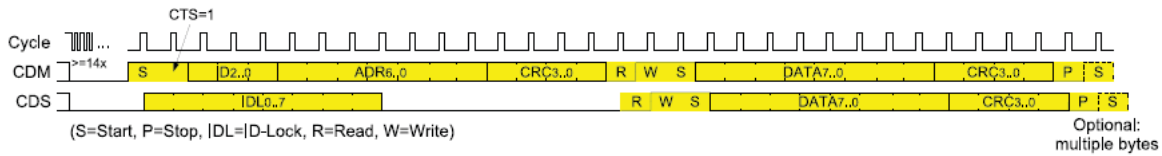


Figure 2 Register Read Access

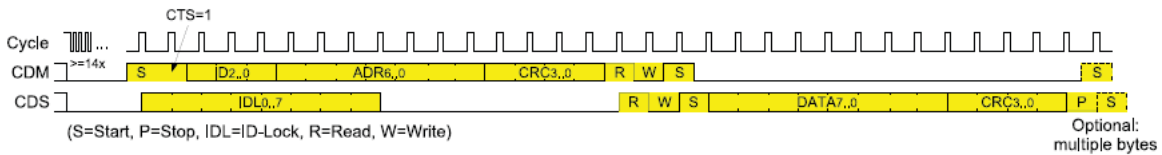
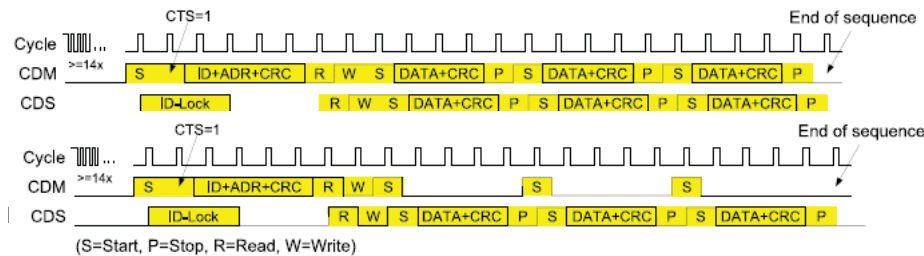


Figure 3 Writing Several Registers



BiSS-C Interface – Register Assignment

Description

Refer to BiSS-C Interface Protocol Description Rev C5 document for detail information of BiSS-C Register Assignment.
http://biss-interface.com/files/Bissinterface_c5es.pdf

There are a total of 10 register banks user areas (register bank 0 to register bank 9) that are accessible by users.

The memory data is kept in nonvolatile memory.

Table 1 Register Assignments

| Address (Decimal) | Address (Hexadecimal) | Name | Size | Memo |
|-------------------|-----------------------|-----------------|-----------------------|------|
| 0 ... 63 | 0x00 ... 0x3F | Register bank | 64 bytes | |
| 64 | 0x40 | Bank selection | 0 ... 8 bits (1 byte) | a, b |
| 65 | 0x41 | EDS-Bank | 0 ... 8 bits (1 byte) | a, c |
| 66 ... 67 | 0x42 ... 0x43 | Profile ID | 16 bits (2 bytes) | c, d |
| 68 ... 71 | 0x44 ... 0x47 | Serial number | 32 bits (4 bytes) | c, d |
| 72 ... 119 | 0x48 ... 0x77 | Slave register | 48 bytes | |
| 120 ... 125 | 0x78 ... 0x7D | Device ID | 48 bits (6 bytes) | c, d |
| 127 ... 127 | 0x7E ... 0x7F | Manufacturer ID | 16 bits (2 bytes) | c, d |

- a. If no blank switchover is used, the register should not be implemented.
- b. Unused register contents must therefore be filled with "0."
- c. Register is protected against accidental writing.
- d. The value is saved as a big endian; i.e, with the highest value byte at the lowest value address.

Table 2 Memory Map (Nonvolatile Memory)

| EEPROM Address | BiSS C | | Remarks |
|----------------|--------|-----------|--|
| | Page | Address | |
| 000h ~ 27Fh | 0 | 00h~ 3Fh | User Area |
| | 1 | 00h~ 3Fh | |
| | 2 | 00h~ 3Fh | |
| | 3 | 00h~ 3Fh | |
| | 4 | 00h~ 3Fh | |
| | 5 | 00h~ 3Fh | |
| | 6 | 00h~ 3Fh | |
| | 7 | 00h~ 3Fh | |
| | 8 | 00h~ 3Fh | |
| | 9 | 00h~ 3Fh | |
| 280h ~ 2FFh | 10 | 00h~ 3Fh | Avago Reservation Area |
| | 11 | 00h~ 3Fh | |
| 300h ~ 37Fh | 12 | 00h~ 3Fh | |
| | 13 | 00h~ 3Fh | |
| 380h ~ 3BFh | 14 | 00h~ 3Fh | |
| 03Ch ~ 3FFh | | 40 h | Bank Selection |
| | | 41h | EDS-Bank (User prohibited write) |
| | | 42h ~ 43h | Profile ID (User prohibited write) |
| | | 44h ~ 47h | Serial Number (User prohibited write) |
| | | 48h ~ 77h | Slave Register (Refer to the Slave Register Description user area) |
| | | 78h ~ 7Dh | Device ID (User prohibited write) |
| | | 7Eh ~ 7Fh | Manufacturer ID (User prohibited write) |

Slave Register Descriptions

Address 72(0x48) – Warning Status [7:0]

| Bit7 | Bit6 | Bit5 | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 |
|------|------|------|------|------|------|-----------------|-----------------|
| N/A | | | | | | Lis_err Warning | LED_err Warning |

Address 73(0x49) – Error Status [7:0]

| Bit7 | Bit6 | Bit5 | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 |
|------|------|------|------|--------------|------|------------------|--------------|
| N/A | | | | MT_err Error | N/A | Memory_err Error | XC_err Error |

Address 74(0x4A) – Encoder Clear Command

| Bit7 | Bit6 | Bit5 | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 |
|------|------|------|------|------------------------------------|----------------------------------|-------------------------------|-------------------------------|
| N/A | N/A | N/A | N/A | Warning clear command ^a | Error clear command ^a | ST clear command ^a | MT clear command ^a |

- a. Encoder Clear Command operation.
 a. Write 1 to execute one time clear command.
 b. Only one command should be accessed for each time.

Other Slave Registers

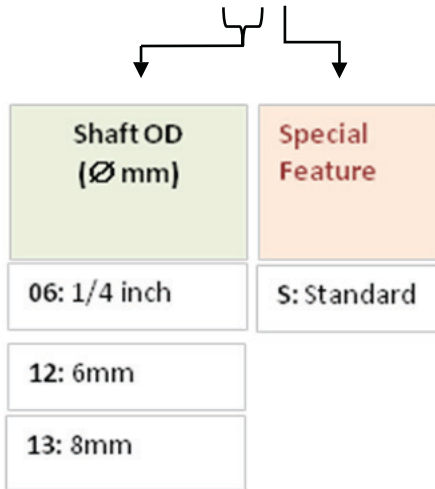
- Avago Reservation Area – The user should consult Avago before accessing this area.

Pigtail Cable Information

| No | Color | Description |
|----|--------|----------------------|
| 1 | RED | VCC, Positive Supply |
| 2 | BLACK | GND, Ground |
| 3 | BROWN | MA+ |
| 4 | WHITE | MA- |
| 5 | ORANGE | SLO+ |
| 6 | BLUE | SLO- |

Ordering Information

AS38-H39E- B XXX



NOTE Refer to the factory for sample order and lead time.

For product information and a complete list of distributors, please go to our web site:

www.avagotech.com

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