
BTS-16110

Specifications

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BTS-16110 Specifications

Definitions

Warranted specifications describe the performance of a model under stated operating conditions and are covered by the model warranty.

Characteristics describe values that are relevant to the use of the model under stated operating conditions but are not covered by the model warranty.

- **Typical** specifications describe the performance met by a majority of models.
- **Nominal** specifications describe an attribute that is based on design, conformance testing, or supplemental testing.
- **Measured** specifications describe the measured performance of a representative model.

Specifications are **Typical** unless otherwise noted.

Conditions

Specifications are valid under the following conditions unless otherwise noted.

- Operating temperature of 15 °C to 40 °C guaranteed, 40 °C to 50 °C extended operating range
- Recommended calibration interval of 2 years. The BTS-16110 will not meet specifications unless operated within the recommended calibration interval
- Background calibration enabled
- 30 minutes warm-up time before operation

Input Characteristics

Table 1. General input characteristics

| | |
|---------------------|---------------------|
| Measurement signals | Voltage and current |
|---------------------|---------------------|

| | |
|-------------------------------------|--|
| Internal data rate | 1.25 MS/s |
| Internal ADC resolution | 18 bits |
| Input voltage range | $\pm 1,500$ V DC |
| Input current ranges | ± 10 V DC, ± 2 A DC, ± 667 mA DC |
| Data rates | 1.25 MS/s, 1 kS/s |
| Data format | 64-bit, double precision |
| -3 dB bandwidth, 1.25 MHz data rate | 60 kHz, typical |
| -3 dB bandwidth, 1 kHz data rate | 1 kHz, typical |

Table 2. Data rates

| | |
|-----------|----------------------------------|
| 1.25 MS/s | Voltage and current |
| 1 kS/s | 1 ms average voltage and current |

Table 3. Nominal voltages

| | |
|-------------|---------------------------|
| HI to LO | $\pm 1,500$ V DC, maximum |
| HI to Earth | $\pm 1,000$ V DC, maximum |
| LO to Earth | $\pm 1,000$ V DC, maximum |

Accuracy Specifications

Table 4. DC voltage \pm (% of reading + mV)

| Range | Input resistance | Two year at 15 °C to 40 °C |
|------------|------------------|--|
| 1,500 V DC | 10 M Ω | 0.03 + 100, maximum 0.006 + 10, typical |

Table 5. DC current \pm (% of reading + % of range)

| Range | Input resistance | Two year at 15 °C to 40 °C |
|-----------|----------------------|---|
| 10 V DC | $>1 \text{ G}\Omega$ | $0.01 + 0.001$, maximum $0.0025 + 0.0003$, typical |
| 2 A DC | $0.5 \text{ }\Omega$ | $0.05 + 0.005$, maximum $0.015 + 0.0015$, typical |
| 667 mA DC | $0.5 \text{ }\Omega$ | $0.05 + 0.0075$, maximum $0.015 + 0.0015$, typical |



Note Ambient temperature variations faster than 1 °C/min may disrupt the BTS-16110 thermal regulation.



Note Forced airflow over the BTS-16110 reduces its ability to thermoregulate at low temperatures and low input voltages.



Note Warranted specifications are valid from 15 °C to 40 °C. The device can operate at the non warranted specifications from 40 °C to 50 °C.



Note Prolonged operation at temperatures above 40 °C might cause device accuracy to shift outside of warranted specifications and require recalibration to restore accuracy specifications. Take all precautions to maintain ambient air temperatures within guaranteed accuracy specifications.

Input Noise

Table 6. DC voltage noise

| | |
|------------------------------------|---|
| 1 kS/s data rate with no averaging | 1 mV RMS, typical |
| 1.25 MS/s data rate | 75 mV RMS with background calibration enabled, typical 15 mV RMS with background calibration disabled, typical |

Table 7. DC current, voltage input noise

| | |
|---------------------|--------------------------|
| 1 kS/s data rate | 5 μ V RMS, typical |
| 1.25 MS/s data rate | 120 μ V RMS, typical |

Table 8. DC current, amps input noise

| | |
|---------------------|---|
| 1 kS/s data rate | 1.2 μ A (2 A)/0.8 μ A (667 mA) RMS, typical |
| 1.25 MS/s data rate | 30 μ A (2 A)/15 μ A (667 mA) RMS, typical |

Network/Ethernet Ports

Table 9. General network specifications

| | |
|--------------------------|--|
| Number of ports | 2 |
| Network interface | 10Base-T, 100Base-TX, 1000Base-T Ethernet |
| Compatibility | IEEE 802.3 |
| Communication rates | 10 Mb/s, 100 Mb/s, 1000 Mb/s auto-negotiated |
| Maximum cabling distance | 100 m/segment |

Network Timing and Synchronization

Table 10. Network timing and synchronization

| | |
|----------|--------------|
| Protocol | IEEE 802.1AS |
|----------|--------------|

| | |
|----------------------------------|------------|
| Network synchronization accuracy | <1 μ s |
|----------------------------------|------------|

USB Ports

Table 11. USB type-C device data port

| | |
|-----------------------------|-------------------|
| USB interface | USB 2.0, Hi-Speed |
| Maximum data rate | 480 Mb/s |
| Maximum current (from host) | 250 mA |

Table 12. USB type-C host display port

| | |
|-------------------|--------------------------|
| USB interface | USB 3.1 Gen1, SuperSpeed |
| Maximum data rate | 5 Gb/s |
| Maximum current | 900 mA |
| Alternate mode | DisplayPort |

Calibration

Table 13. Calibration

| | |
|--------------------------|------------|
| Recommended warm-up time | 30 minutes |
| Calibration interval | 2 years |

Power Requirements

Table 14. Power requirements

| | |
|-------------------------|----------------------|
| Voltage input range | 19 V DC to 30 V DC |
| Input power consumption | Up to 150 W, maximum |

Safety Voltages

Connect only voltages that are below these limits.

Table 15. Safety voltages

| | |
|----------------------|-------------------------------|
| Input voltage range | ±1,500 V DC |
| Input current ranges | ±10 V DC, ±2 A DC, ±667 mA DC |

Measurement Category

Table 16. Measurement category

| | |
|-----------------|-------------|
| CAT O and CAT I | ±1,000 V DC |
|-----------------|-------------|



Caution Do not connect the product to signals or use for measurements within Measurement Categories II, III, or IV.



Note Measurement Categories CAT O and CAT I are equivalent. These test and measurement circuits are for other circuits not intended for direct connection to the MAINS building installations of Measurement Categories CAT II, CAT III, or CAT IV.

Physical

Table 17. Physical specifications

| | |
|--------------------|---|
| Dimensions (L×W×H) | 327 mm × 147 mm × 83 mm (12.94 in. × 5.80 in. × 3.27 in.) |
| Weight | 3.63 kg (8.00 lb) |

Environmental Characteristics

Table 18. Temperature specifications

| | |
|-----------------------------------|-----------------|
| Warranted specification operating | 15 °C to 40 °C |
| Extended operating | 40 °C to 50 °C |
| Storage | -40 °C to 85 °C |

Table 19. Humidity specifications

| | |
|-----------|---------------------------------|
| Operating | 15% RH to 75% RH, noncondensing |
|-----------|---------------------------------|

| | |
|---------|--------------------------------|
| Storage | 5% RH to 95% RH, noncondensing |
|---------|--------------------------------|

Table 20. General environmental specifications

| | |
|------------------|---------|
| Pollution Degree | 2 |
| Maximum altitude | 2,000 m |

Table 21. Shock and vibration specifications

| | |
|-------------------------|------------------------------|
| Operating vibration | 5 Hz to 500 Hz, 0.3 g RMS |
| Non-operating vibration | 5 Hz to 500 Hz, 2.4 g RMS |
| Operating shock | 30 g, half-sine, 11 ms pulse |