



CT100

1D Linear Sensor

Features

- Operating Magnetic Field Range: ± 50 mT
- Stable Magnetic Performance over Temperature
- Linearity Error: $\pm 0.5\%$ from -20 mT to +20 mT
- Differential Outputs
- Supply Voltage: 1.0 V to 5.5 V
- Operating Temperature: -40°C to +125°C
- Package Options:
 - 6-lead SOT23
 - 6-lead DFN, 1.50 × 1.50 × 0.45 mm

Applications

- Linear Measurements
- Proximity Sensing
- Current Sensing

Product Description

The CT100 is a 1D linear sensor in full-bridge configuration from Crocus Technology developed on its patented MLU™ technology. The total magnetic field range for the CT100 is from -50 mT to +50 mT and it achieves a linearity error of $\pm 0.5\%$ for a range of -20 mT to +20 mT while providing XtremeSense™ performance to achieve unparalleled temperature stability. It supports a wide operating voltage range of 1.0 V to 5.5 V.

It is available in a 6-lead SOT23 package and for space critical applications, a low profile and small form factor 6-lead DFN package that is 1.50 × 1.50 × 0.45 mm in size.

Ordering Information

| Part Number | Operating Temperature Range | Output Type | Package | Packing Method |
|---------------|-----------------------------|--------------|---------------------------------------|----------------|
| CT100LW-IS6-M | -40°C to +85°C | Differential | 6-lead SOT23 2.90 x 2.80 x 1.20 mm | Tape & Reel |
| CT100LW-HS6-M | -40°C to +125°C | | | |
| CT100LW-ID6-M | -40°C to +85°C | Differential | 6-lead DFN 1.50 x 1.50 x 0.45 mm | Tape & Reel |
| CT100LW-HD6-M | -40°C to +125°C | | | |

Block Diagram

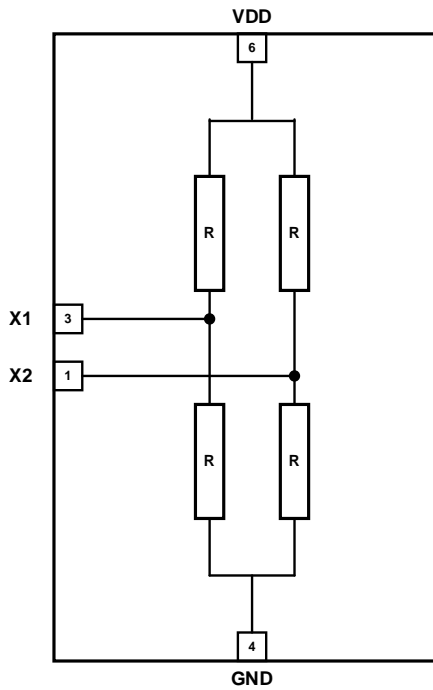


Figure 1. CT100 Functional Block Diagram for SOT23-6

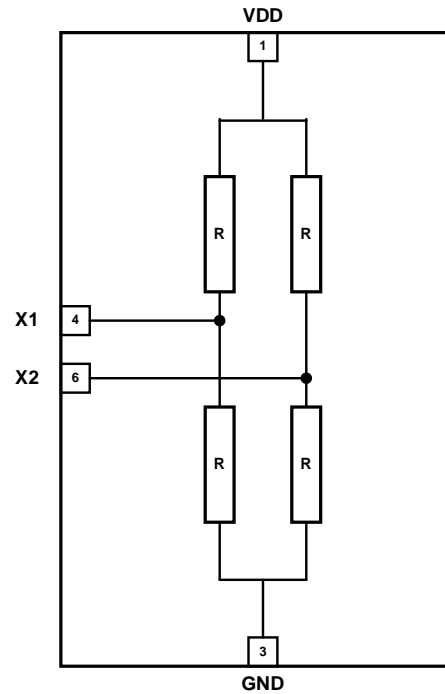


Figure 2. CT100 Functional Block Diagram for DFN-6

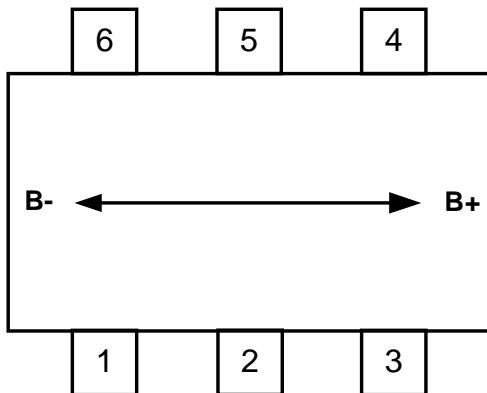


Figure 3. CT100 Axis of Sensitivity for SOT23-6 (Top Down View)

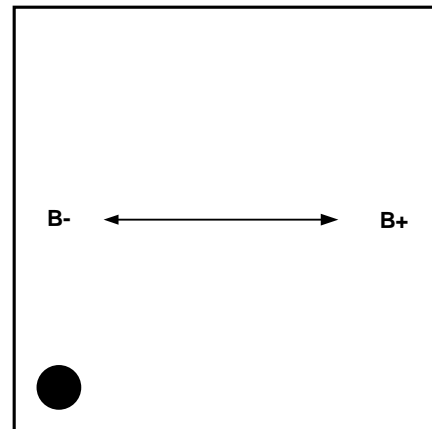


Figure 4. CT100 Axis of Sensitivity for DFN-6 (Top Down View)

Pin Configuration

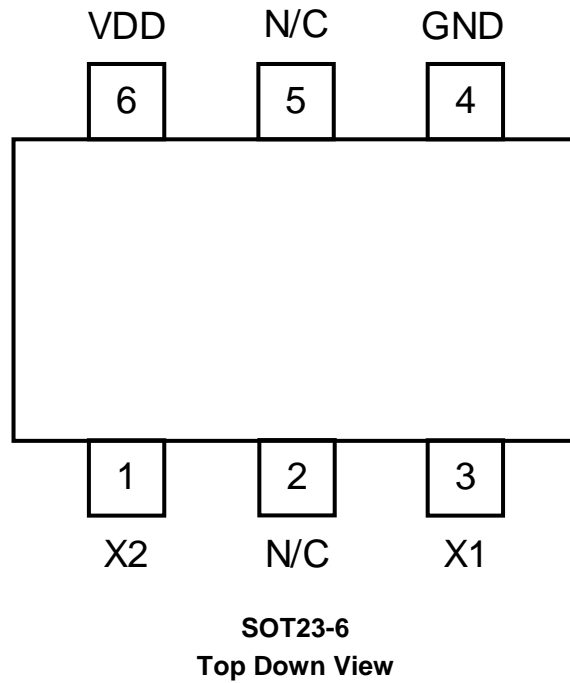
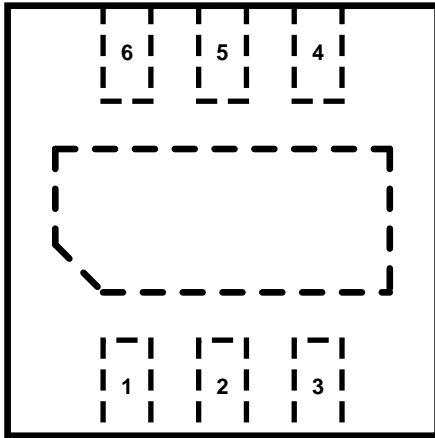


Figure 5. CT100 Pin-out Diagram

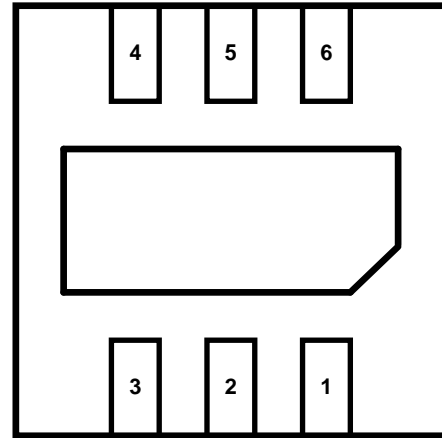
Pin Definitions

| SOT23-6 Pin # | Pin Name | Pin Description |
|---------------|----------|------------------------|
| 1 | X2 | Differential Output X2 |
| 2 | N/C | No Connect |
| 3 | X1 | Differential Output X1 |
| 4 | GND | Ground |
| 5 | N/C | No Connect |
| 6 | VDD | Supply Voltage |

Pin Configuration



DFN-6 – Top Down View



DFN-6 – Bottoms Up View

Figure 6. CT100 Pin-out Diagrams

Pin Definitions

| DFN-6 Pin # | Pin Name | Pin Description |
|-------------|----------|------------------------|
| 1 | VDD | Supply Voltage |
| 2 | N/C | No Connect |
| 3 | GND | Ground |
| 4 | X1 | Differential Output X1 |
| 5 | N/C | No Connect |
| 6 | X2 | Differential Output X2 |

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the CT100 and may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

| Symbol | Parameter | Min. | Max. | Unit |
|------------------|---|--|------|------|
| V _{DD} | Supply Voltage | -0.3 | 6.0 | V |
| V _{OUT} | Analog Output Pins Maximum Voltage | -660 | +660 | mV |
| ESD | Electrostatic Discharge Protection Level | Human Body Model (HBM) per JESD22-A114 | ±4.0 | kV |
| | | Charged Device Model (CDM) per JESD22-C101 | ±1.0 | |
| B _{MAX} | Maximum Magnetic Field @ T _A = +25°C | | ±200 | mT |
| T _{STG} | Storage Temperature | -65 | +160 | °C |
| T _L | Lead Soldering Temperature, 10 Seconds | | +260 | °C |

Recommended Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual operation of the CT100. Recommended operating conditions are specified to ensure optimal performance to the specifications. Crocus Technology does not recommend exceeding them or designing to absolute maximum ratings.

| Symbol | Parameter | Min. | Typ. | Max. | Unit | |
|------------------------|-------------------------------|---------------------|------|------|------|----|
| V _{DD} | Supply Voltage Range | 1.0 | 3.0 | 5.5 | V | |
| V _{OUT} | OUT Voltage Range | -605 | | +605 | mV | |
| B _{OPERATING} | Operating Magnetic Field | | | ±50 | mT | |
| T _A | Operating Ambient Temperature | Industrial | -40 | +25 | +85 | °C |
| | | Extended Industrial | -40 | +25 | +125 | |

Electrical & Magnetic Specifications

Unless otherwise specified: $V_{DD} = 1.0\text{ V}$ to 5.5 V and $T_A = -40^\circ\text{C}$ to $+150^\circ\text{C}$. Typical values are $V_{DD} = 3.0\text{ V}$ and $T_A = +25^\circ\text{C}$.

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Units |
|-------------------|---|---|------|------|-----------|--|
| Magnetic | | | | | | |
| $B_{OPERATING}$ | Operating Magnetic Field ⁽¹⁾ | | | | ± 50 | mT |
| Electrical | | | | | | |
| R_{BRIDGE} | Bridge Resistance | | 20 | | 40 | k Ω |
| P_D | Power Consumption | $V_{DD} = 3.0\text{ V}$, $R_{BRIDGE} = 30\text{ k}\Omega$ | | 0.30 | | mW |
| V_{OFFSET} | Offset Voltage | | -5 | | +5 | mV/V |
| S | Sensitivity (Full-bridge Gain) | $B_{OPERATING} = \pm 20\text{ mT}$ | 3.8 | 4.5 | 5.2 | mV/V/mT |
| TCR_{BRIDGE} | Temperature Coefficient Resistance of Bridge ⁽¹⁾ | | | | 600 | ppm/ $^\circ\text{C}$ |
| TCO | Temperature Coefficient of Offset Voltage ⁽¹⁾ | | | | 3.0 | $\mu\text{V/V}/^\circ\text{C}$ |
| TCS | Temperature Coefficient of Sensitivity ⁽¹⁾ | | | -250 | -350 | ppm/ $^\circ\text{C}$ |
| L | Linearity | $B_{OP} = \pm 20\text{ mT}$ | | | ± 0.5 | % |
| E_{HYST} | Hysteresis Error | $B_{OP} = \pm 20\text{ mT}$, $T_A = +25^\circ\text{C}$ | | | 0.05 | % |
| e_N | Output Noise ⁽¹⁾ | $f = 10\text{ Hz}$, $V_{DD} = 1.0\text{ V}$, $B_{OPERATING} = 0\text{ mT}$, $T_A = +25^\circ\text{C}$ | | | 700 | nV _{RMS} / $\sqrt{\text{Hz}}$ |

(1) Guaranteed by design and characterization.

Electrical Characteristics

$V_{DD} = 1.0\text{ V}$ and $T_A = +25^\circ\text{C}$.

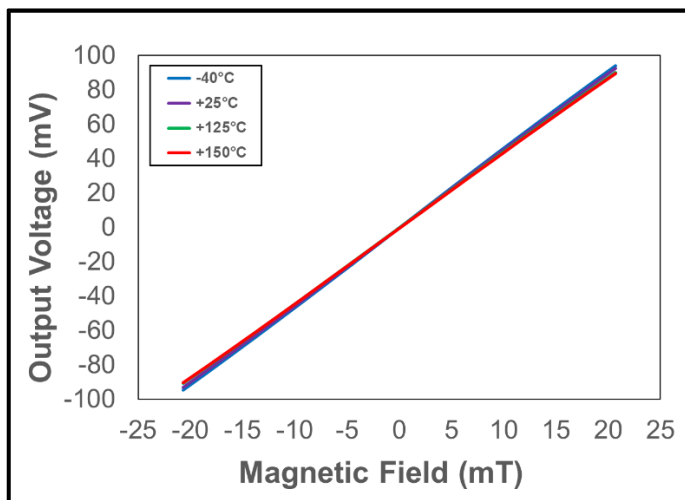


Figure 7. Sensitivity: Output Voltage vs. Magnetic Field vs. Temperature

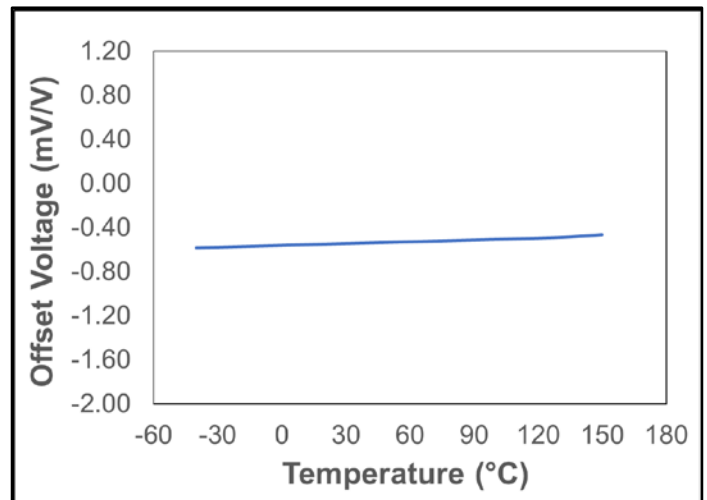


Figure 8. Offset Voltage vs. Temperature

Recommended Application Circuit

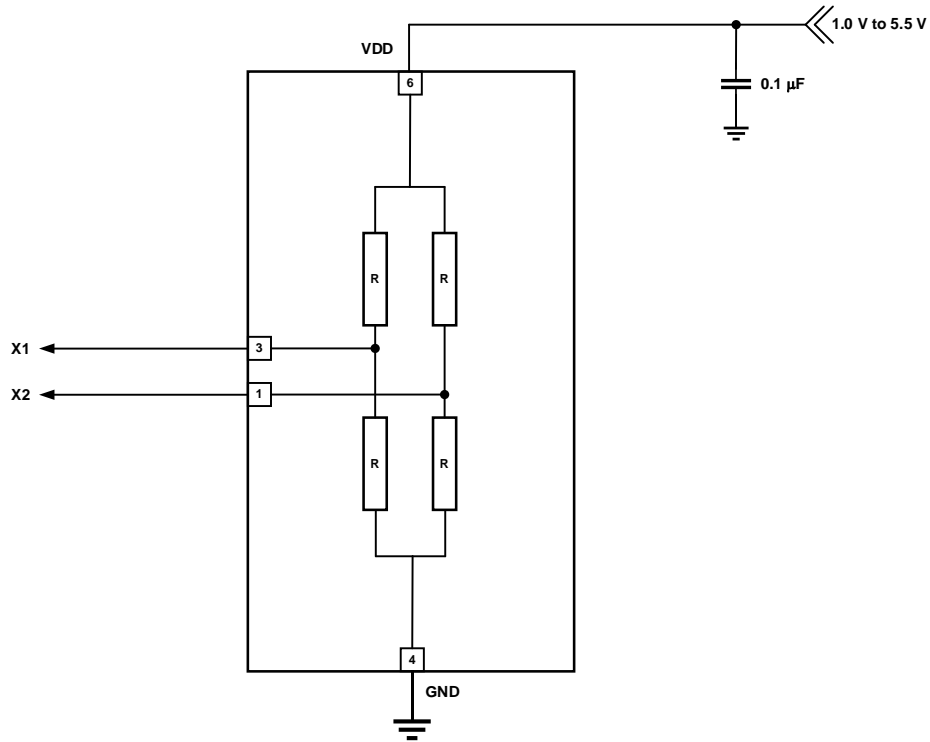


Figure 9. CT100 (SOT23-6) Application Diagram

Table 1. Recommended External Components

| Component | Description | Vendor & Part Number | Parameter | Min. | Typ. | Max. | Unit |
|------------------|-------------|-----------------------------|-----------|------|------|------|------|
| C _{BYP} | 0.1 μF, X7R | Murata GRM033Z71A104KE14 | C | | 0.1 | | μF |
| | | Others | | | | | |

SOT23-6 Package Drawing and Dimensions

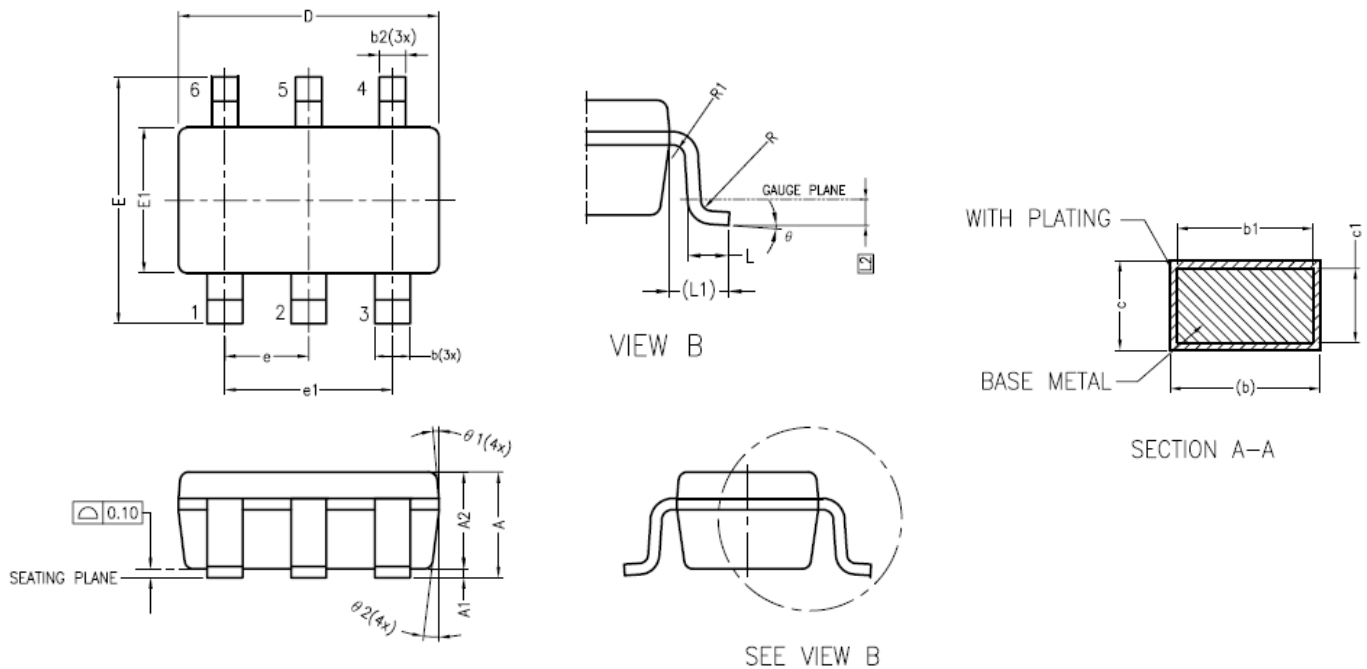


Figure 10. 6-Lead SOT23 Package Drawing

Table 2. CT100 6-Lead SOT23 Package Dimensions

| Symbol | Dimensions in Millimeters (mm) | | |
|--------|--------------------------------|------|------|
| | Min. | Typ. | Max. |
| A | 1.05 | 1.20 | 1.35 |
| A1 | 0.00 | 0.10 | 0.15 |
| A2 | 1.00 | 1.10 | 1.20 |
| b | 0.40 | - | 0.50 |
| b1 | 0.40 | 0.40 | 0.45 |
| c | 0.08 | - | 0.22 |
| c1 | 0.08 | 0.13 | 0.20 |
| D | 2.80 | 2.90 | 3.00 |
| E | 2.60 | 2.80 | 3.00 |
| E1 | 1.50 | 1.60 | 1.70 |
| e | 0.95 BSC | | |
| e1 | 1.90 BSC | | |
| L | 0.35 | 0.43 | 0.60 |
| L1 | 0.60 REF | | |
| L2 | 0.25 BSC | | |
| R | 0.10 | - | - |
| R1 | 0.10 | - | 0.25 |
| theta | 0° | 4° | 8° |
| theta1 | 5° | 6° | 15° |
| theta2 | 5° | 8° | 15° |

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DFN-6 Package Drawing and Dimensions

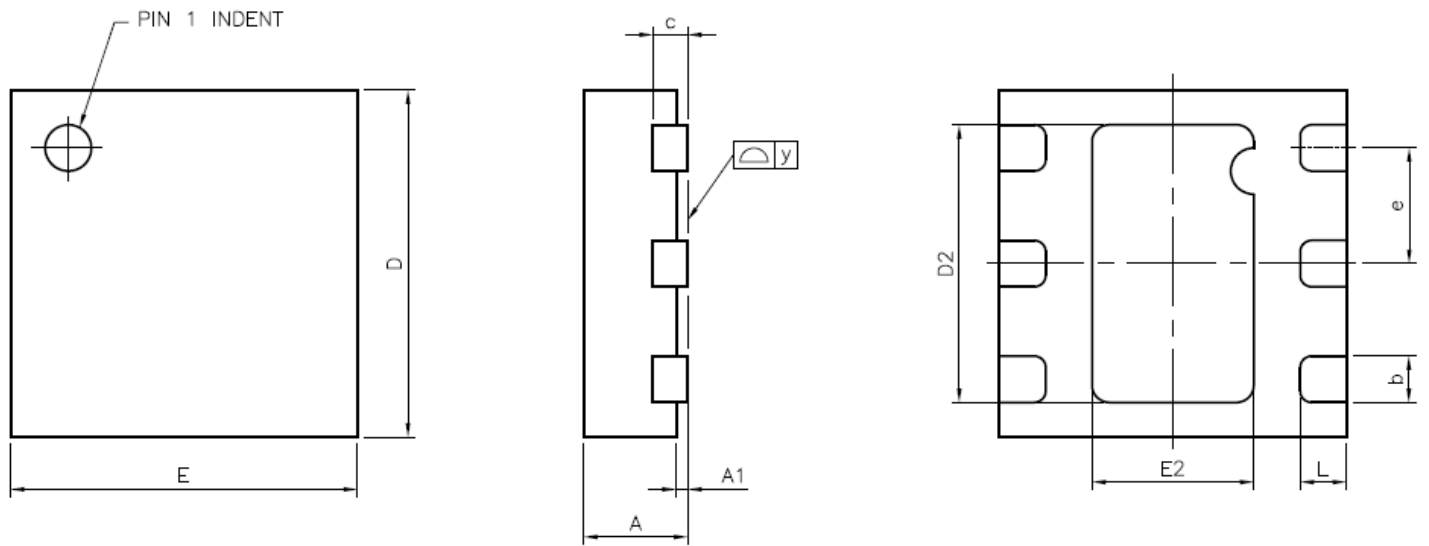


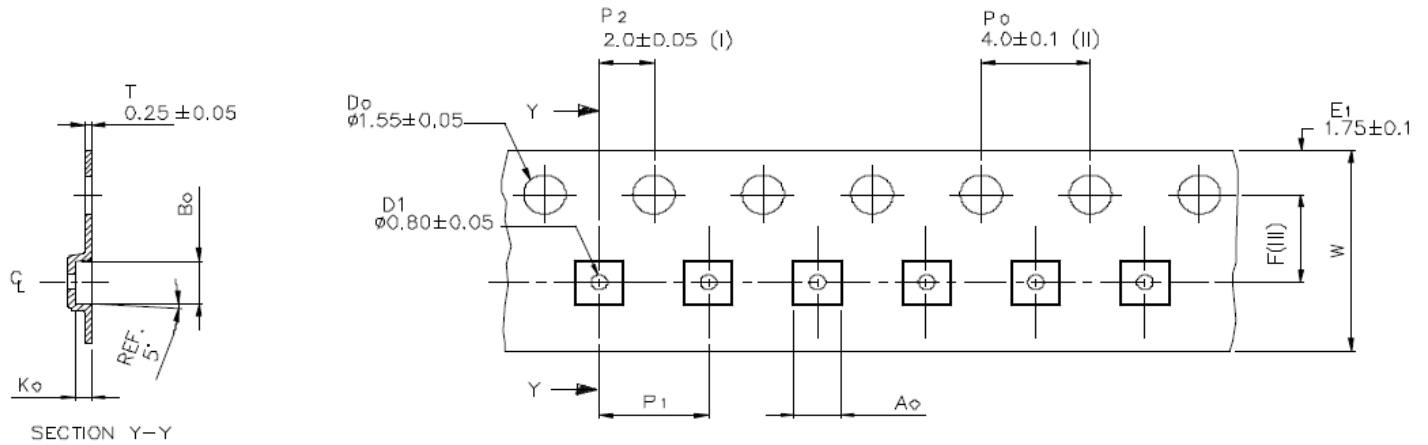
Figure 12. DFN-6 Package Drawing

Table 3. CT100 DFN-6 Package Dimensions

| Symbol | Dimensions in Millimeters (mm) | | |
|--------|--------------------------------|----------|-------|
| | Min. | Typ. | Max. |
| A | 0.40 | 0.45 | 0.50 |
| A1 | 0.00 | 0.02 | 0.05 |
| b | 0.15 | 0.20 | 0.25 |
| c | - | 0.15 REF | - |
| D | 1.40 | 1.50 | 1.60 |
| D2 | 1.15 | 1.20 | 1.25 |
| E | 1.40 | 1.50 | 1.60 |
| E2 | 0.65 | 0.70 | 0.75 |
| e | - | 0.50 | - |
| L | 0.15 | 0.20 | 0.25 |
| y | 0.000 | - | 0.075 |

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DFN-6 Tape & Pocket Drawing and Dimensions



NOTES:

- I. Measured from centerline of sprocket hole to centerline of pocket.
- II. Cumulative tolerance of 10 sprocket holes is ± 0.20 .
- III. Measured from centerline of sprocket hole to centerline of pocket.
- IV. Other material available.

Figure 13. Tape and Pocket Drawing for DFN-6 Package

Table 4. DFN-6 Tape and Pocket Dimensions

| Symbol | Dimension (mm) |
|--------|-----------------|
| Ao | 1.70 ± 0.05 |
| Bo | 1.70 ± 0.05 |
| Ko | 0.60 ± 0.05 |
| F | 3.50 ± 0.05 |
| P1 | 4.00 ± 0.10 |
| DW | 8.00 ± 0.30 |

Package Information

Table 5. CT100 Package Information

| Part Number | Package Type | # of Leads | Package Quantity | Lead Finish | Eco Plan ⁽¹⁾ | MSL Rating ⁽²⁾ | Operating Temperature ⁽³⁾ | Device Marking |
|---------------|--------------|------------|------------------|-------------|-------------------------|---------------------------|--------------------------------------|----------------|
| CT100LW-IS6-M | SOT23 | 6 | 3,000 | Sn | Green & RoHS | 1 | -40°C to +85°C | CT YWWS |
| CT100LW-HS6-M | SOT23 | 6 | 3,000 | Sn | Green & RoHS | 1 | -40°C to +125°C | CT YWWS |
| CT100LW-ID6-M | DFN | 6 | 3,000 | Sn | Green & RoHS | 3 | -40°C to +85°C | C YZ |
| CT100LW-HD6-M | DFN | 6 | 3,000 | Sn | Green & RoHS | 3 | -40°C to +125°C | C YZ |

- (1) RoHS is defined as semiconductor products that are compliant to the current EU RoHS requirements. It also will meet the requirement that RoHS substances do not exceed 0.1% by weight in homogeneous materials. Green is defined as the content of Chlorine (Cl), Bromine (Br) and Antimony Trioxide based flame retardants satisfy JS709B low halogen requirements of $\leq 1,000$ ppm.
- (2) MSL Rating = Moisture Sensitivity Level Rating as defined by JEDEC standard classifications.
- (3) Package will withstand ambient temperature range of -40°C to +150°C and storage temperature range of -65°C to +160°C.
- (4) Device Marking for SOT23 is defined as XZ YWWS where XZ = part number, Y = year, WW = work week and S = sequential number. DFN is defined as X where X = part number and YZ = date code information.

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Product Status Definition

| Data Sheet Identification | Product Status | Definition |
|---------------------------|---|--|
| Objective | Proposed New Product Idea or In Development | Data sheet contains design target specifications and are subject to change without notice at any time. |
| Preliminary | First Production | Data sheet contains preliminary specifications obtained by measurements of early samples. Follow-on data will be published at a later date as more test data is acquired. Crocus reserves the right to make changes to the data sheet at any time. |
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