

DATA SHEET

CTSR218C-IS4 CTSR200 Series



1. General description

The Crocus CTSR200C series is a family of magnetic sensors designed for sensing low magnetic field. The advantage of the CTSR200C series includes thermally assisted and differential thermally assisted programming (TAS & DTAP), high sensitivity, high linearity, excellent frequency response, and low power.

The CTSR200C family of sensors is composed of multiple magnetic tunnel junctions (MTJs) made of magnetic thin films. The MTJ cell is constructed of two magnetic layers separated by a thin insulating oxide layer. One of the two magnetic layers has a fixed magnetic orientation and it is called a reference layer. The other magnetic layer, called a sensing layer, has flexibility in changing orientation in the presence of magnetic field. The orientation of sensing layer can be changed by 180 degree which results in modulating resistance of MTJ cell.

Consequently, the resistance of a sensor changes in the presence of magnetic field; the resistance depends on the relative magnetic orientations of a sensing layer to a fixed reference layer. When two magnetic layers have the same magnetic direction the resistance of sensor is low and when they are in anti-parallel position the sensor resistance is high. The change of resistance can be directly correlated to the intensity and angle of a magnetic field. Crocus has introduced multiple innovations around this basic principle in order to develop magnetic field sensor product line.

Crocus Technology sensor devices provide differential programming, high sensitivity, high stability, as well as highly reliable performance over a wide range of operating temperatures up to 250°C.

2. Key Features & Benefits

Key Features

- ❖ TAS and DTAP Programming
- ❖ High Sensitivity
- ❖ Magnetic field detection without external signal processing
- ❖ Single ended output signal
- ❖ High temperature operation
- ❖ High frequency performance
- ❖ Low frequency performance
- ❖ Supply voltage of 5.0 V
- ❖ Commercial & industrial temperature operating range
- ❖ Low power

Benefits

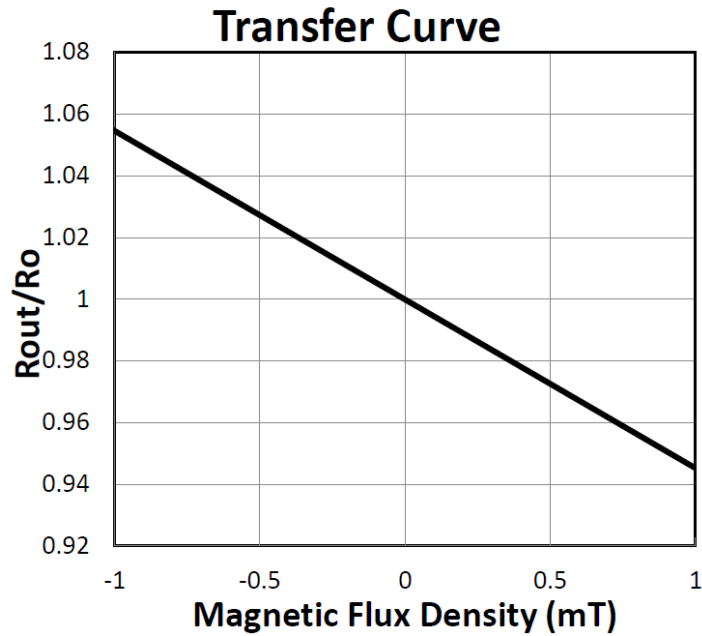
- ❖ Multiple applications
- ❖ Sensing low magnetic field
- ❖ Low hysteresis
- ❖ Excellent thermal stability
- ❖ Small form factor
- ❖ Low cost
- ❖ Simple signal processing circuit (if needed)

Magnetic and Electrical Specifications

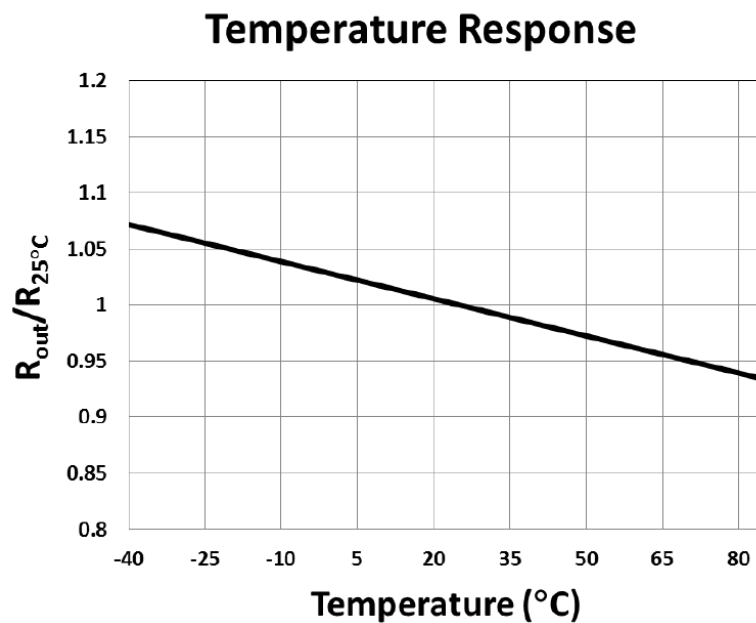
Parameter	Description	Min	Typical	Max	Unit
Voltage Supply (V_B)*		4.5	5	5.5	V
R_o	(at zero external field and 10 mA bias)	16	18	20	k Ω
Input Bias (I_{IN})			10		mA
R_{IN}			30		Ω
Sensitivity			50		T ⁻¹
Linearity Range			(+/-) 1		mT
Linearity Error	sweep (+/-) 1 mT		2.0		% FS
Hysteresis	3 sweeps (+/-) 1 mT		1.0		% FS
Max. Exposed Field			1		T
Operating Frequency		DC		500	MHz
Operating Temperature		-40		85	$^{\circ}$ C
Temperature Coefficient of Resistance	(at 10 mA input bias)		-0.1		% $^{\circ}$ C ⁻¹
Temperature Coefficient of Sensitivity			0.35		% $^{\circ}$ C ⁻¹
Package	SOT23-6		2.9x1.6x1.1		mm

* note: this product also works with voltage supply of 1.2V and 3V

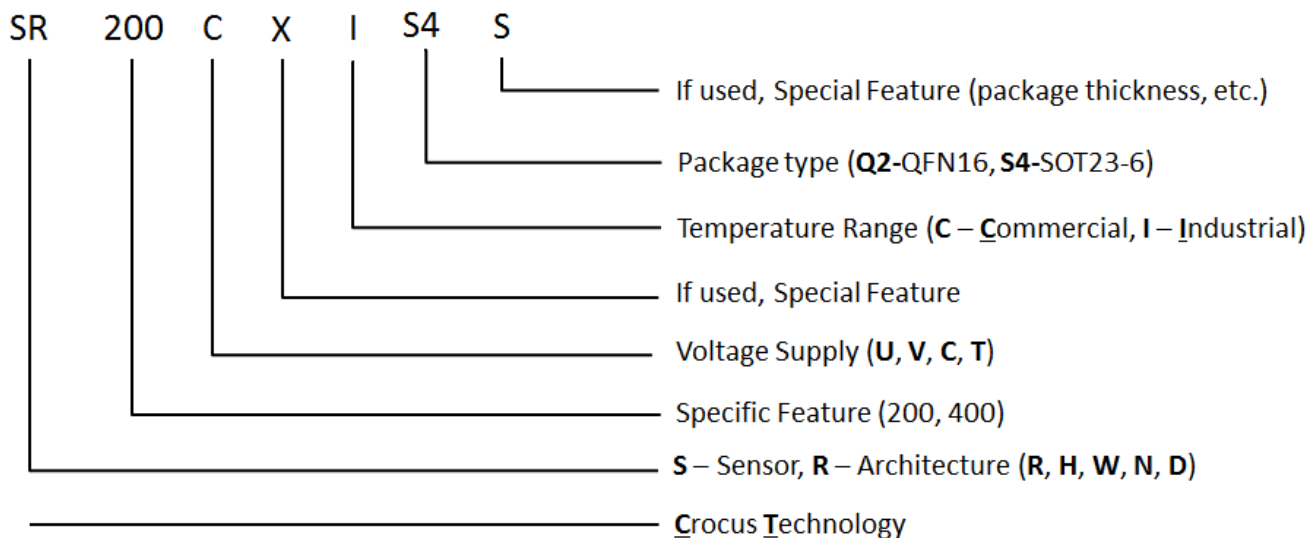
Transfer Graph



R_{out} Temperature Response

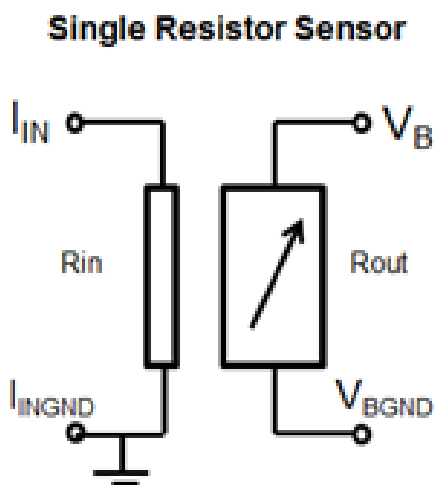


Product Code



R – Single Resistor, H – Differential Resistors, W – Wheatstone Bridge, N – Analog Output, D – Digital Output
 Voltage Supply: U – 1.2 V, V – 3 V, C – 5 V, T – 12 V to 15 V

Equivalent Electrical Circuit

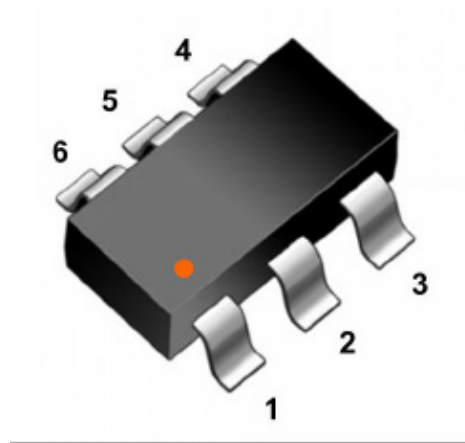


Pin Configuration

Pin Name	Pin Number	Pin Function
V_B	1	Output
V_{BGND}	3	Output ground
I_{IN}	2	Input, bias current
I_{INGND}	4	Input ground
DNU	5,6	Do Not Use

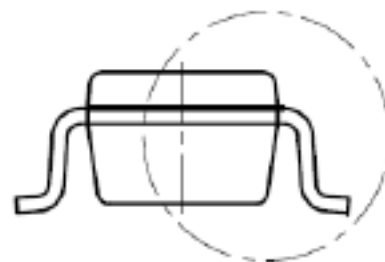
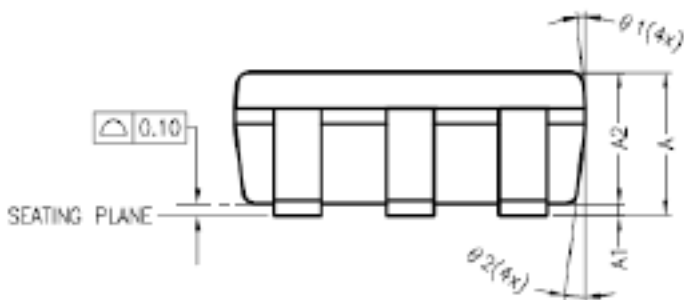
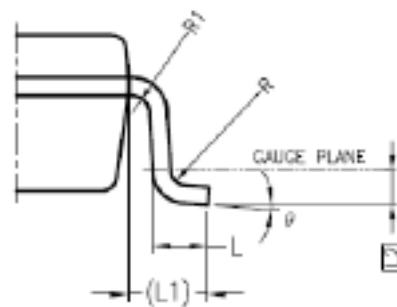
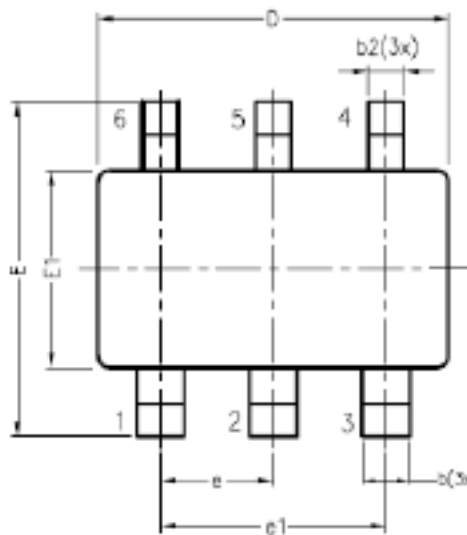
Package Information

- SOT23-6 (2.9x2.8 mm)

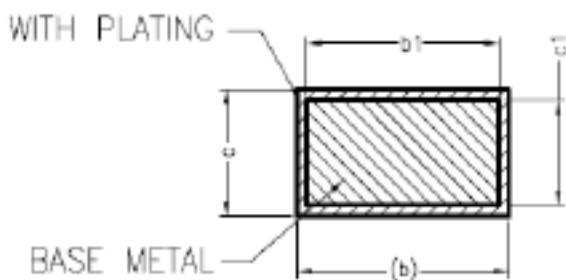


- Package drawing

Please see next page



SEE VIEW B



SECTION A-A

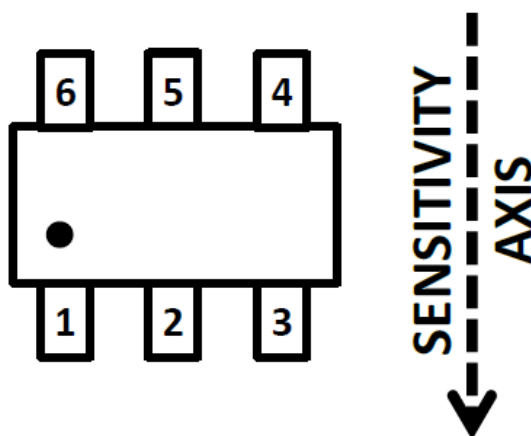
NOTE :

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. DIMENSION D DOES NOT INCLUDE MOLD FLASH, PROTRUSION OR GATE BURRS. MOLD FLASH PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.25 mm PER END. DIMENSION E1 DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 mm PER SIDE.
3. THE PACKAGE TOP MAY BE SMALLER THAN THE PACKAGE BOTTOM. DIMENSION D AND E1 ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY EXCLUSIVE OF MOLD FLASH, TIE BAR BURRS, GATE BURRS AND INTERLEAD FLASH, BUT INCLUDING ANY MISMATCH BETWEEN THE TOP AND BOTTOM OF THE PLASTIC BODY.
4. DIMENSION "b" DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 mm TOTAL IN EXCESS OF THE "b" DIMENSION AT MAXIMUM MATERIAL CONDITION. THE DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OF THE FOOT. MINIMUM SPACE BETWEEN PROTRUSION AND AN ADJACENT LEAD SHALL NOT BE LESS THAN 0.07 mm.
5. LEAD FRAME MATERIAL : EFTEC 64T
6. LEAD 1,2,3 MAY BE WIDER THAN LEADS 4,5,6 FOR PACKAGE ORIENTATION



SYMBOLS	DIMENSIONS IN MILLIMETERS		
	Min	NOM	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	-----	0.45
b2	0.30	-----	0.40
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
0	0°	4°	8°
01	5°	6°	15°
02	5°	8°	15°

Sensitivity Direction



Shipping & Handling Instruction

Crocus CTSR200 series products are electrostatic sensitive. Only antistatic, static dissipative and conductive packaging containers can be used. Filler materials used should be antistatic, noncorrosive, and should not crumble, flake, powder, shred or be of fibrous construction. Conductive packing materials are preferred during shipping. Under no circumstances should components be removed from their approved containers except at an ESD protected workstation.

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