

CC7031

2D Magnetic Induction Micropower Magnetic Sensor Switches

FEATURES

- ◆ AMR+HALL single chip architecture
- ◆ Micro-power, fast response speed, 33Hz operating frequency
- ◆ Operating ambient temperature: -40 ~ +85°C
- ◆ Wide supply voltage range: 1.8V ~ 5.5V
- ◆ Highly sensitive magnetic field detection, all-polar detection
- ◆ TO-92S and SOT23-3 small size packages
- ◆ Magnetic field detection direction: X-axis and Z-axis, 2D sensing
- ◆ Comply with RoHS requirements

APPLICATIONS

- ◆ Magnetoresistive sensor switches with 2D sensing for Instrumentation, Security, Fire Protection, etc.
- ◆ Level Meter

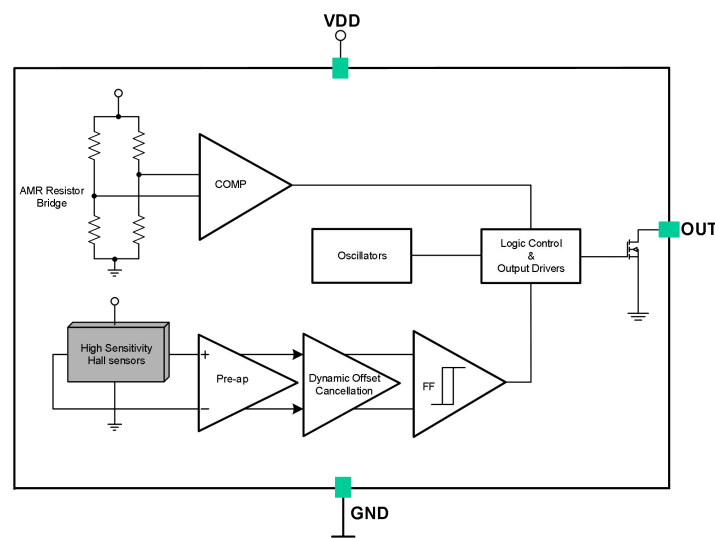
GENERAL DESCRIPTION

The CC7031 is a micro-power, high sensitivity full-polarity, open-drain output magnetic sensing chip with both AMR magnetoresistive and Hall built-in. It is suitable for portable electronics that use batteries as a power source, as well as other low-power circuits.

The CC7031 has an full-polarity magnetic field discrimination capability, which can be activated as long as the magnetic field north pole or south pole is close by, and the output turns off when the magnetic field is withdrawn, which reduces the hassle of identifying the magnetic poles during assembly. The internal circuitry of the CC7031 contains an AMR reluctance detection module, a Hall thin slice, a voltage regulator module, a signal amplification and processing module, a dynamic offset cancellation module, a latch module, and an open-drain output stage. As the CC7031 uses the advanced AMR+HALL principle, it is able to detect magnetic fields in both the X- and Z-axis directions. The product adopts dynamic offset cancellation technology, which eliminates offset voltages caused by package stresses, thermal stresses, and temperature gradients to improve device uniformity. At the same time, the product adopts its miniaturized packaging process, which makes the product have higher performance and market advantages.

CC7031 is available in SOT23-3 and TO-92S package, The operating temperature is -40 ~ 85°C

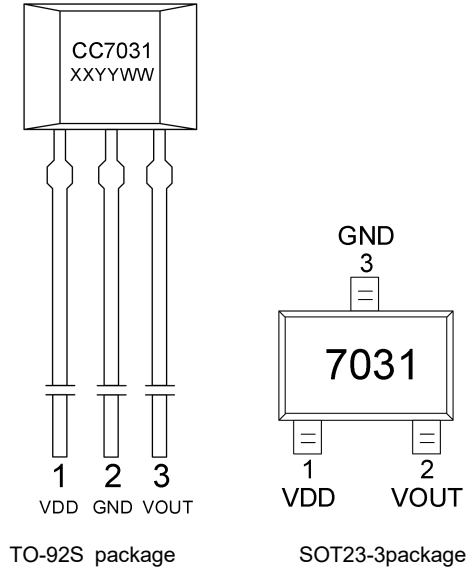
FUNCTION BLOCK DIAGRAM



ORDERING INFORMATION

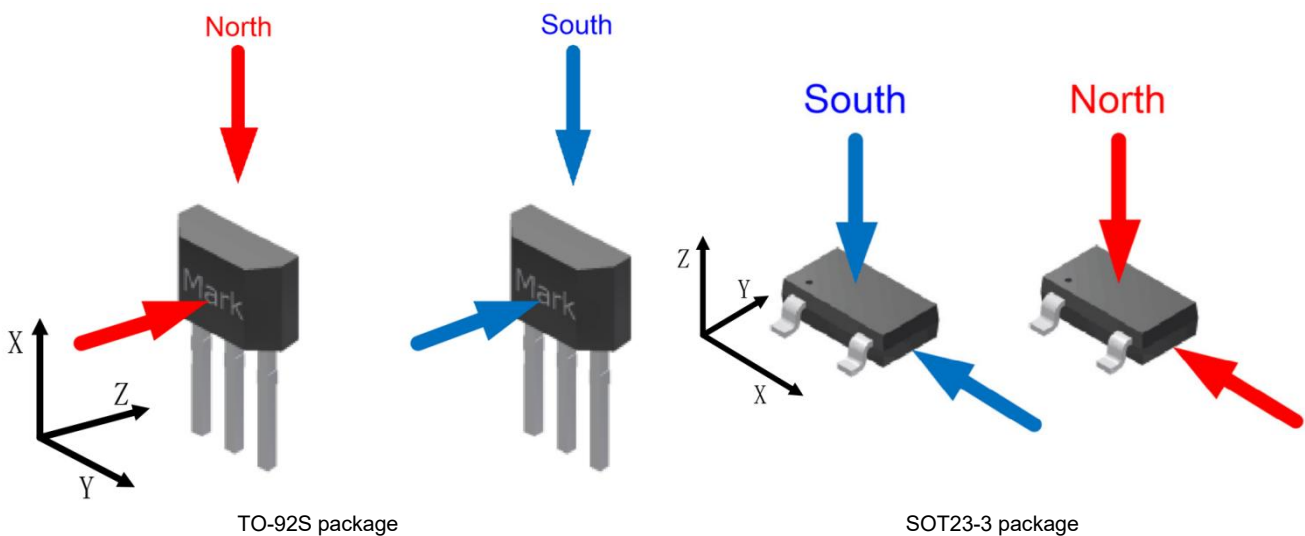
Part No.	Package	Packing Form
CC7031TO	TO-92S	Bulk, 1000 pcs/bulk
CC7031ST	SOT23-3	Reel, 3000pcs/reel

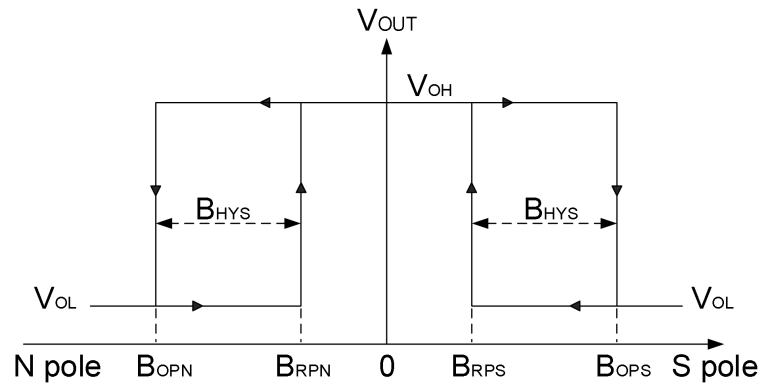
PINOUT DIAGRAM



Name	Number		Description
	TO-92S	SOT23-3	
VDD	1	1	Supply Power
GND	2	3	Ground
VOUT	3	2	Output

SWITCHING OUTPUT VS. MAGNETIC POLE





Note: The magnetic field is positive with the south pole added in the direction shown above.

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Power Supply	VDD	-0.3~5.5	V
Magnetic Flux Density	B	unlimited	Gs
Operating Ambient Temperature	T_A	-40~85	°C
Storage Temperature	T_S	-50~125	°C
Electrostatic Discharge	ESD(HBM)	6000	V
Moisture Sensitivity Level		MSL3	

Note: Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

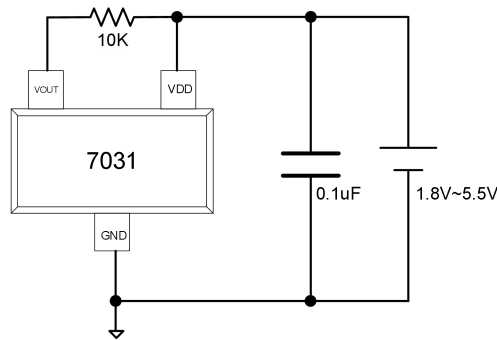
ELECTRICAL PARAMETERS ($V_{DD}=3.3V$, $T_A=25^\circ C$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply Power	VDD		1.8	3.3	5.5	V
Output High Voltage	V_{OH}	$I_{OUT(SOURCE)}=1mA$	$0.8 \times V_{DD}$	-	-	
Output Low Voltage	V_{OL}	$I_{OUT(SINK)}=1mA$	-	-	$0.2 \times V_{DD}$	
Average Quiescent Current	$I_{DD(AVG)}$	VOUT pin suspended	-	4.9	-	uA
Enable Current	$I_{DD(EN)}$		-	2	-	mA
Disable Current	$I_{DD(DIS)}$		-	3	-	uA
Output Source Current	$I_{OUT(SOURCE)}$		-	-	1	mA
Output Sink Current	$I_{OUT(SINK)}$		-	-	1	mA
Awake Time	T_{AWAKE}		-	30	-	us
Period	T_{PERIOD}		-	30	-	ms
Duty Cycle	D.C.		-	0.1%	-	

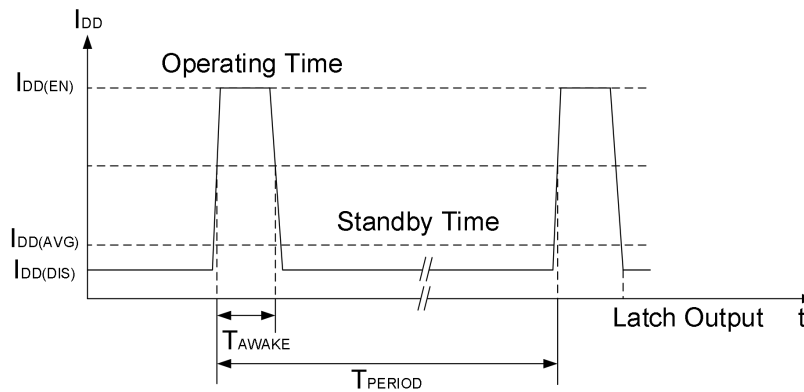
MAGNETIC SPECIFICATIONS ($V_{DD}=3.3V$, $T_A=25^{\circ}C$, unless otherwise specified)

Parameter	Symbol	Condition	Min	Typ.	Max	Unit
X-axis South Pole Operating Point	B_{OPS_X}	$V_{DD}=3.3V @ T_A=25^{\circ}C$	10	20	30	Gs
X-axis South Pole Release Point	B_{RPS_X}	$V_{DD}=3.3V @ T_A=25^{\circ}C$	5	15	25	Gs
X-axis North Pole Operating Point	B_{OPN_X}	$V_{DD}=3.3V @ T_A=25^{\circ}C$	-10	-20	-30	Gs
X-axis North Pole Release Point	B_{RPN_X}	$V_{DD}=3.3V @ T_A=25^{\circ}C$	-5	-15	-25	Gs
X-axis Hysteresis	B_{HYS_X}	$V_{DD}=3.3V @ T_A=25^{\circ}C$	2	5	8	Gs
Z-axis South Pole Operating Point	B_{OPS_Z}	$V_{DD}=3.3V @ T_A=25^{\circ}C$	10	20	30	Gs
Z-axis South Pole Release Point	B_{RPS_Z}	$V_{DD}=3.3V @ T_A=25^{\circ}C$	5	15	25	Gs
Z-axis North Pole Operating Point	B_{OPN_Z}	$V_{DD}=3.3V @ T_A=25^{\circ}C$	-10	-20	-30	Gs
Z-axis North Pole Release Point	B_{RPN_Z}	$V_{DD}=3.3V @ T_A=25^{\circ}C$	-5	-15	-25	Gs
Z-axis Hysteresis	B_{HYS_Z}	$V_{DD}=3.3V @ T_A=25^{\circ}C$	2	5	8	Gs

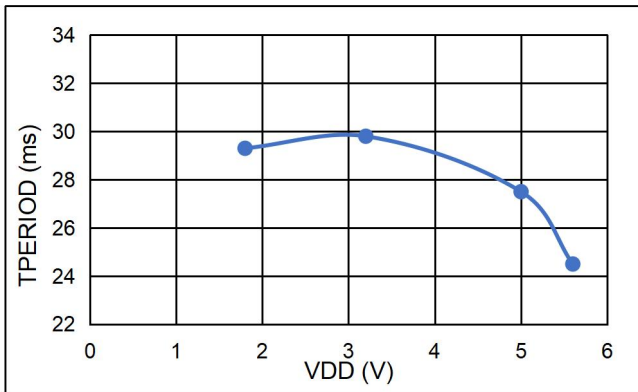
TYPICAL APPLICATION CIRCUIT



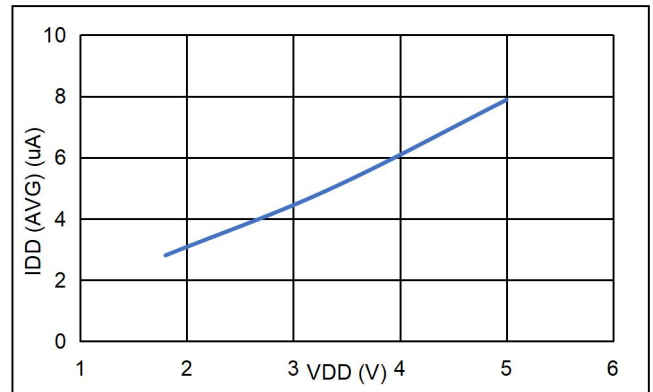
WORKING SEQUENCE DIAGRAM



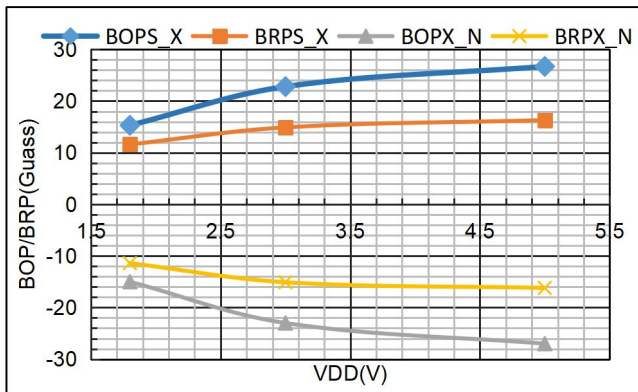
WAVEFORM & CURVE ($V_{DD}=3.3V$, $T_A=25^{\circ}C$, unless otherwise specified)



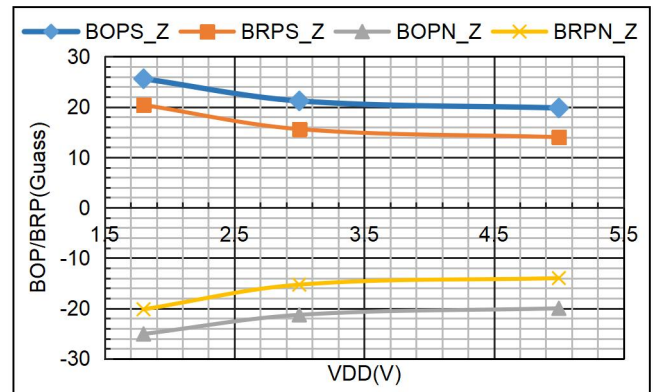
T_{PERIOD} vs. V_{DD}



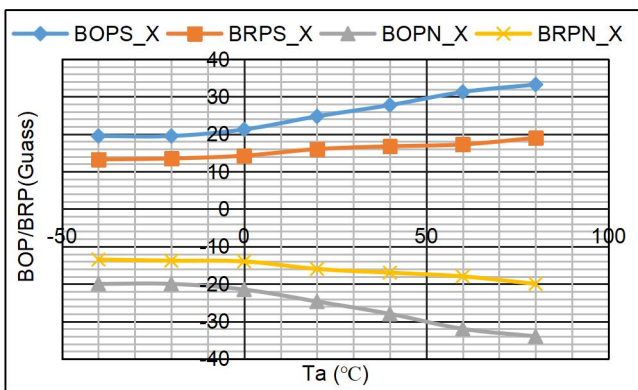
I_{DD(AVG)} vs. V_{DD}



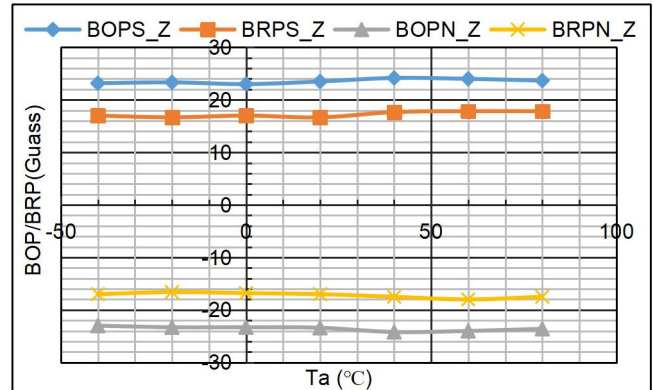
X-axis magnetic parameters vs. V_{DD}



Z-axis magnetic parameters vs. V_{DD}



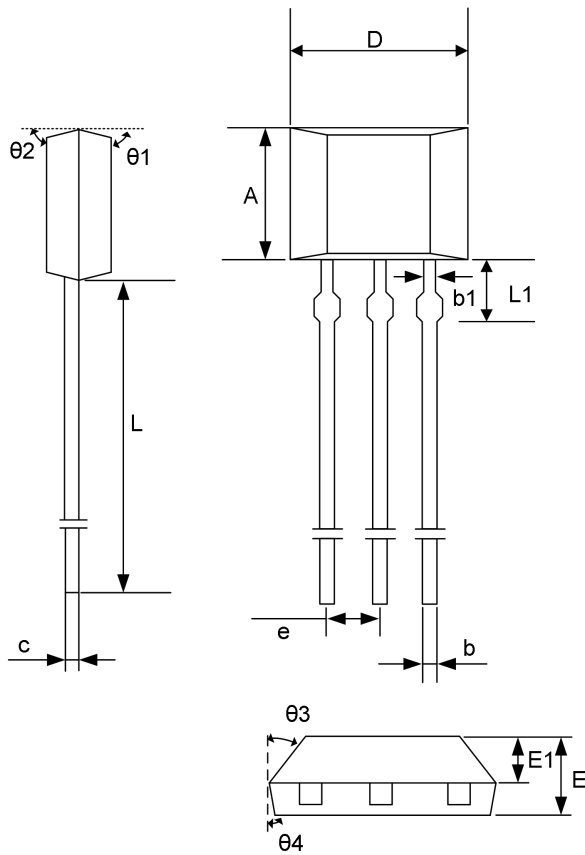
X-axis magnetic parameters vs. T_a



Z-axis magnetic parameters vs. T_a

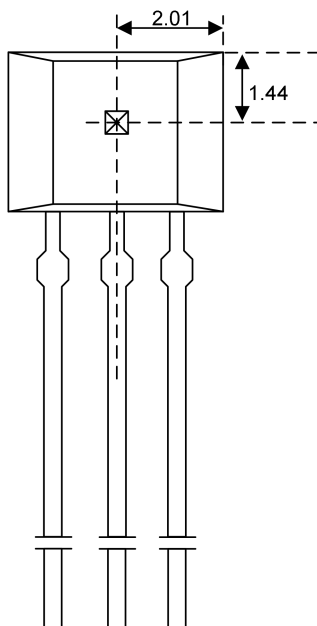
PACKAGE INFORMATION

(1)TO-92S Package



Symbol	Millimeter		
	Min.	Typ.	Max.
A	2.90	3.00	3.10
b	0.35	0.39	0.56
b1	-	0.44	-
c	0.36	0.38	0.51
D	3.9	4.0	4.1
e	1.27BSC		
E	1.42	1.52	1.62
E1	-	0.75	-
L	13.5	14.5	15.5
L1	-	1.6	-
θ_1	-	6°	-
θ_2	-	3°	-
θ_3	-	45°	-
θ_4	-	3°	-

Hall Location



Notes:

All dimensions are in millimeters.

Marking:

1st Line: CC7031 - Name of the device

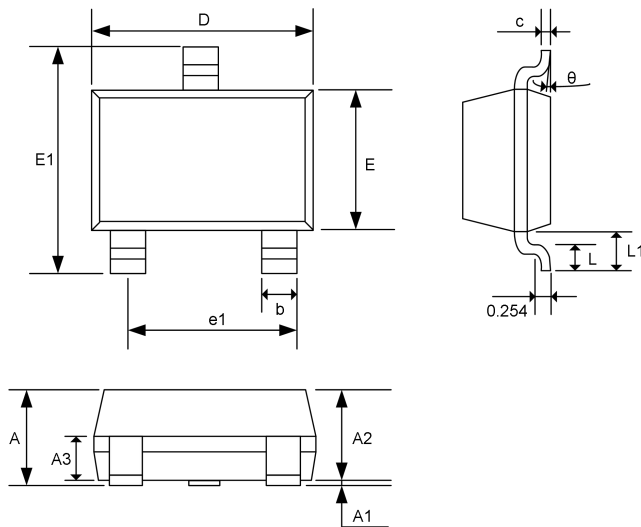
2nd Line: XXYYWW

XX – code

YY – last 2 digits of year

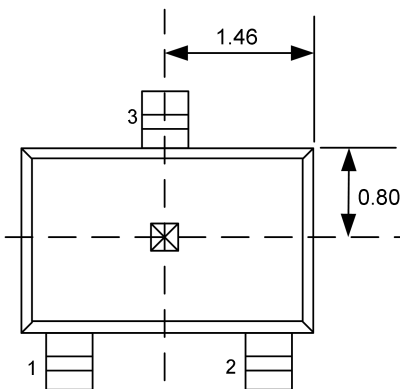
WW – week

(2)SOT23-3 Package



Symbol	Millimeter		
	Min.	Typ.	Max.
A	-	-	1.35
A1	0.04	0.08	0.12
A2	1.00	1.10	1.20
A3	0.55	0.65	0.75
b	0.37	0.40	0.43
c	0.11	0.16	0.21
D	2.77	2.90	3.07
E	1.40	1.60	1.80
E1	2.70	2.85	3.00
e1	1.80	1.90	2.00
L	0.35	0.45	0.55
L1	0.55	0.65	0.75
θ	0°	-	8°

Hall Location



Notes:

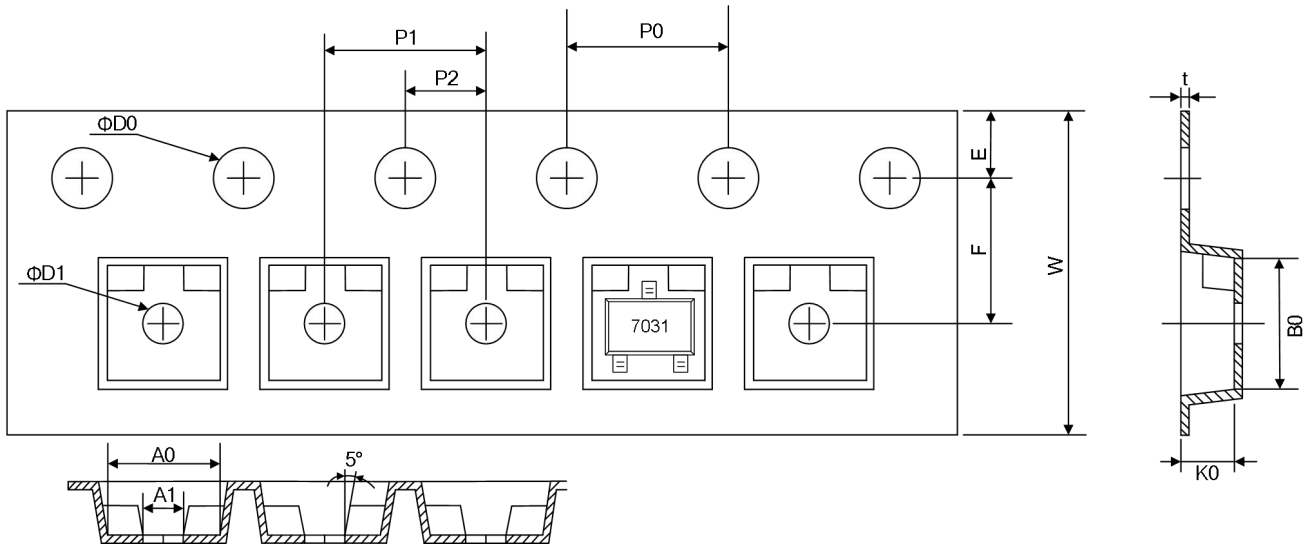
All dimensions are in millimeters.

Marking:

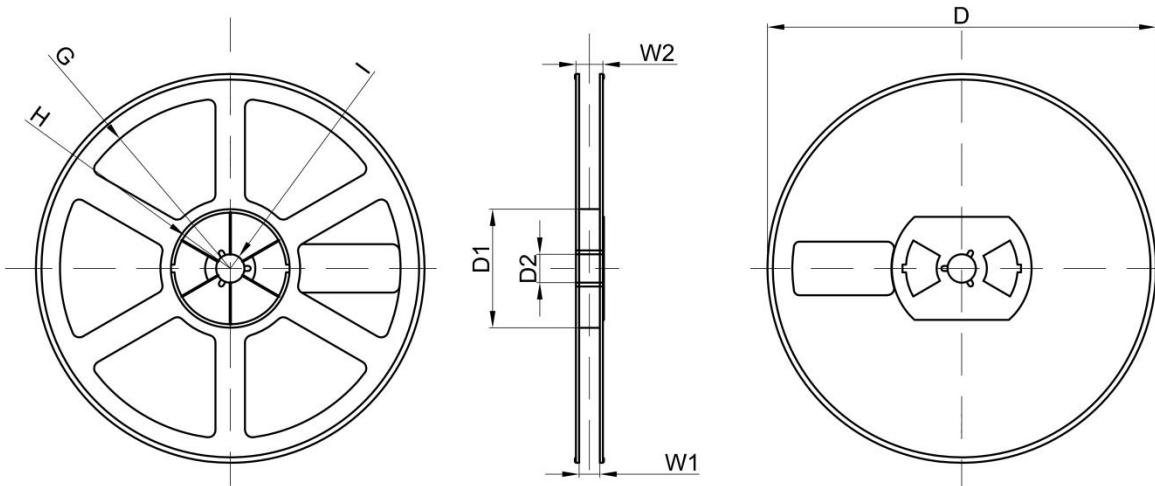
1st Line: 7031

TAPE AND REEL INFORMATION

SOT23-3 Tape



Symbol	Millimeter		
	Min.	Typ.	Max.
W	7.90	8.00	8.10
E	1.65	1.75	1.85
F	3.40	3.50	3.60
D0	1.40	1.50	1.60
D1	0.90	1.00	1.10
P0	3.90	4.00	4.10
P1	3.90	4.00	4.10
P2	1.95	2.00	2.05
t	0.20	0.25	0.30
A0	3.15	3.20	3.25
A1	0.85	0.95	1.05
B0	3.20	3.25	3.30
K0	1.27	1.32	1.37
10*P0	39.80	40.00	40.20

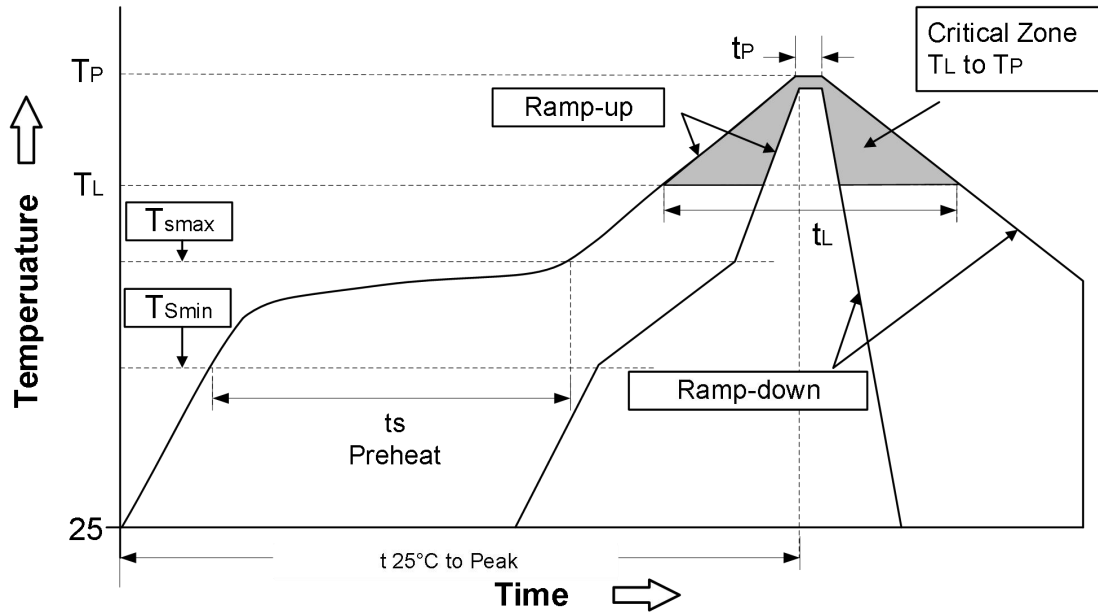


Symbol	Millimeter		
	Min.	Typ.	Max.
D	-	Φ178	-
D1	-	54.40	-
D2	-	13.00	-
G	-	R78.00	-
H	-	R25.60	-
I	-	R6.50	-
W1	-	9.50	-
W2	-	12.30	-

RECOMMENDED WELDING CONDITIONS

SOT23-3 Welding Conditions

1. Thermal reflow profile



2. Thermal reflow setting

Distribution Map Features	Package thickness <2.5mm & Package volume<350mm ³
Average tilt rise rate (T_L to T_P)	Maximum 3°C/s
Preheat	
-Minimum Temperature (T_{Smin})	100°C
-Maximum Temperature (T_{Smax})	150°C
-Time (min-max) (t_s)	60-120s
T_{Smax} - T_L tilt rise rate	
Keep the above time	
-Temperature (T_L)	183°C
-Time (t_L)	60-150s
Peak Temperature(T_P)	260 +0/-5°C
Time within 5°C of actual peak temperature (t_p)	20-40s
Tilt descent rate	Maximum 6°C/s
Time from 25°C to peak temperature	Maximum 6 min

3. Manual welding conditions

Manual welding conditions	260°C/10s
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CrossChip

CrossChip Microsystems Inc. was founded in 2013, is a national high-tech enterprise, engaged in integrated circuit design and sales. The company has strong technical strength, has more than 60 kinds of patents, mainly used in Hall sensor signal processing, with the following product lines:

- ✓ High precision linear Hall sensor
- ✓ All kinds of Hall switches
- ✓ Single phase motor drive
- ✓ Single chip current sensor
- ✓ AMR Magnetoresistance sensor
- ✓ Isolation drive class chip

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