

BT8016

3.5 DIGIT THERMOMETER

DESCRIPTION

The BT8016 is a CMOS circuit provided with digital thermometer function. Temperature reading from -50°C to $+50^{\circ}\text{C}$ is detected by use of a thermistor as a sensor and temperature is displayed on a LCD by 0.2°C step. High accuracy is obtained in wide range of $-50^{\circ}\text{C} \sim +50^{\circ}\text{C}$ by providing non-linear correction circuit on the chip.

FEATURES

- Measurement accuracy: $\pm 1^{\circ}\text{C}$
- Resolution : 0.2°C ($^{\circ}\text{F}$)
- $3\frac{1}{2} + 7$ Indicators, $3\frac{1}{2}$ duty LCD
- Low power consumption
- Few external components
- Easiness in adjustment
- Single 1.5V battery operation
- Package Type: Bare chip

FUNCTIONS

- Measurable temperature range $-49^{\circ}\text{C} \sim +49.8^{\circ}\text{C}$ ($-57^{\circ}\text{F} \sim +121.8^{\circ}\text{F}$)
- Suitable Thermistor $R_T=10\text{K}\Omega \pm 1\%$ (at 25°C)
- Sampling Cycle 1 seconds, 3 seconds, 5 seconds, 10 seconds (Default 10 sec)
- Oscillation Frequency 32.768 kHz
- Temperature adjustment: Adjustment of temperature is made by adjusting fundamental resistance against
- Dispersion in resistance values of thermistors

ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	Value	Unit
Supply Voltage (V_{CC})	V_{CC}	- 0.1 ~ + 3.0	V
Operating Temperature Range	T_{opr}	- 50 ~ + 50	$^{\circ}\text{C}$
Storage Temperature Range	T_{stg}	- 50 ~ + 125	$^{\circ}\text{C}$

ELECTRICAL CHARACTERISTICS

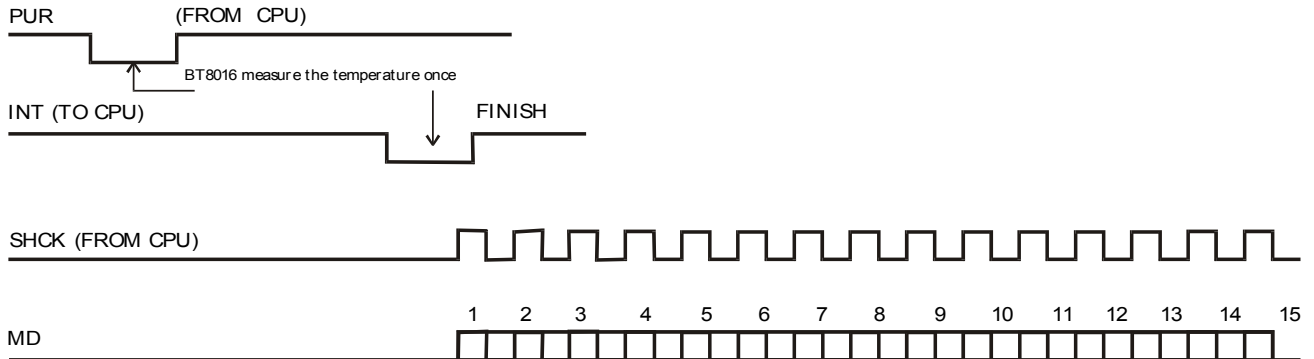
($T_a = 25^{\circ}\text{C}$, $V_{SS} = 0\text{V}$, $V_{CC} = 1.5\text{V}$ unless otherwise specified)

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Operating Voltage	V_{CC}		1.20	1.50	2.00	V
LCD Voltage	V_{DD}			3.00		V
Supply Current	I_{CC}	Operating		50	80	μA
	I_{STD}	Standby		5	10	μA

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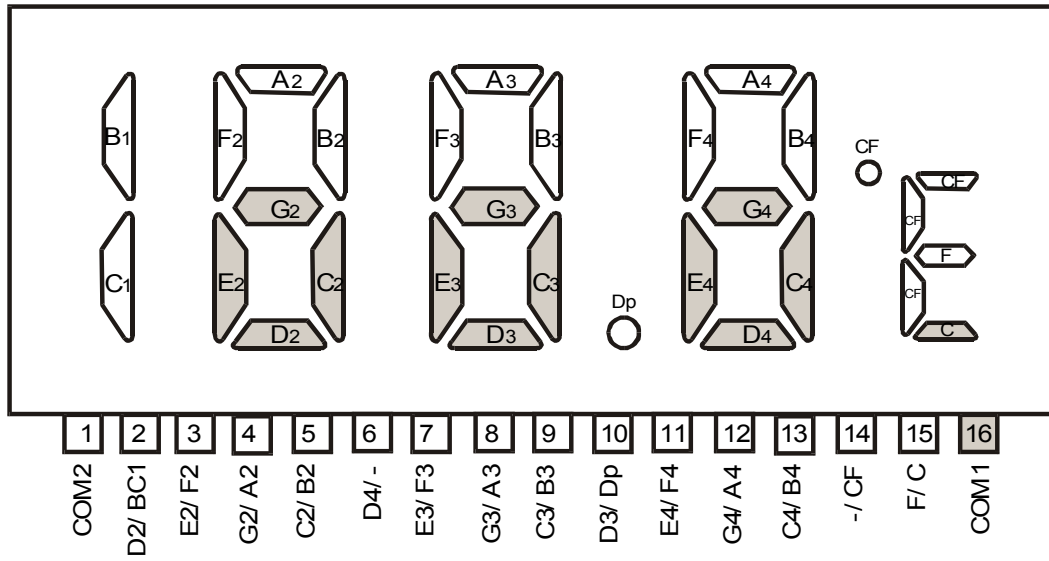
SERIAL OUTPUT

Temperature data converted serially by MD, SHCK INT, PUR terminals.
 Temperature data is output a total 15-bits data.

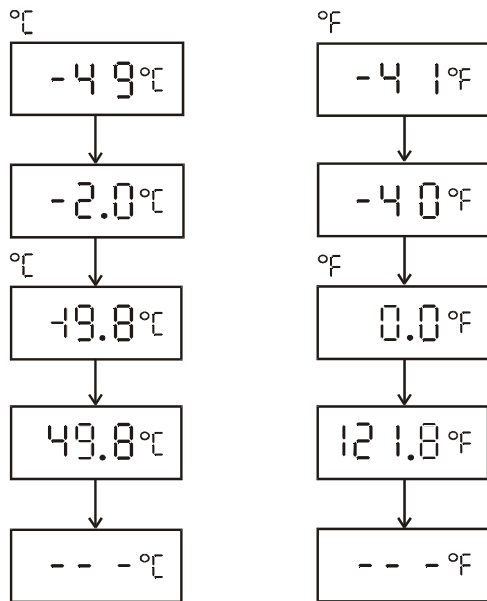


Bit No.	Function	Remark
01	Polarity	Polarity (1= Minus; 0 = Plus)
02		(Hundred digit) (°C no use)
03	80	
04	40	
05	20	
06	10	
07	8	
08	4	
09	2	
10	1	
11	0.8	
12	0.4	
13	0.2	
14	0.1	
15	(°C/°F)	(0 = °C; 1 = °F)

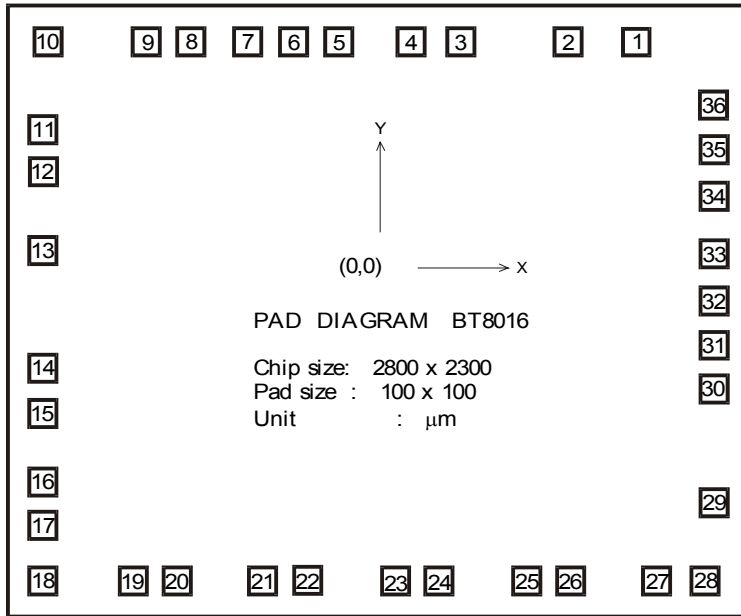
LCD FORMAT



DISPLAY FORMAT



PAD DIAGRAM



NOTE: Substrate is connected to V_{SS}

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PAD ASSIGNMENT

Pad No.	Signal	Description	X	Y	Pad No.	Signal	Description	X	Y
1	OSC2	Oscillator circuit	969	1014	19	SEG10	LCD segment drive	-923	-1016
2	PUR		713	1014	20	SEG9	LCD segment drive	-763	-1016
3	S1	Pin option, select the thermistor sampling cycle (default 10 seconds)	314	1014	21	SEG8	LCD segment drive	-434	-1016
4	S2		80	1014	22	SEG7	LCD segment drive	-269	-1016
		S1	S2	SAMPLING CYCLE, sec					
		V _{SS}	V _{SS}	10					
		V _{SS}	V _{CC}	1					
		V _{CC}	V _{SS}	2					
		V _{CC}	V _{CC}	5					
5	CAP1	Booster capacitor	-148	1014	23	SEG6	LCD segment drive	59	-1016
6	T1	Test input	-318	1014	24	SEG5	LCD segment drive	224	-1016
7	T2	Test input	-517	1014	25	SEG4	LCD segment drive	552	-1016
8	ADJ	Adjust the fixed temperature (active high)	-714	1014	26	SEG3	LCD segment drive	718	-1016
9	REF	Terminal for temperature detection	-876	1014	27	SEG2	LCD segment drive	1046	-1016
10	THER	Terminal for temperature detection	-1244	1014	28	SEG1	LCD segment drive	1229	-1016
11	CAP	Terminal for temperature detection	-1266	685	29	COM1	LCD common drive	1261	-723
12	V _{CC}	Supply voltage	-1266	525	30	V _{DD}	LCD supply voltage	1261	-295
13	CAP2	Booster capacitor	-1266	223	31	V _{SS}	GND	1261	-127
14	COM2	LCD common drive	-1266	-213	32	CF	°C/°F Terminal, default (V _{SS}) select °C	1261	40
15	SEG14	LCD segment drive	-1266	-383	33	INT	Signal to interrupt the MPU	1261	218
16	SEG13	LCD segment drive	-1266	-646	34	MD	Serial Data	1261	431
17	SEG12	LCD segment drive	-1266	-808	35	SHCK	Serial shift Clock Input	1261	606
18	SEG11	LCD segment drive	-1266	-1016	36	OSC1	Oscillator circuit	1261	772