MAX66960

-80ºC Temperature Data Logger with External Thermistor Probe

General Description

The MAX66960 is a temperature data logger that is ideally suited to monitor and log the ambient temperature of enclosures that use dry ice as a coolant. It consists of a precision logging module with a thermistor-based temperature probe that is permanently attached. In the application the temperature probe is inserted into the dry ice cooled area of a container and the logger module is placed in a container location isolated from the -78.5°C extremes created by the dry ice. An attached USB cable and connector provide the PC connection for setup of a logging mission and download of mission data.

Applications

- Dry Ice Refrigerated Cold-Chain Verification
- In-Transit Monitoring of Temperature-Sensitive Products
- Time-Stamped Recording of Time/Temperature Excursions

Benefits and Features

- Provides High-Quality Assessment of Storage Temperature Profiles
  - 16-Bit Temperature Measurements with Storage for 65,536 Time-Stamped Values
  - Flexibility to Monitor and Datalog Long Duration Shipments with Short-Duration Time Intervals
  - Rugged IP42 Construction Survives Harsh Environments
  - Meets CE EMC Directive of EN 61326-1
  - Tested for Portable Electronic Devices for Use on Airplanes per RTCA/DO-160G
- Highly Configurable Options for Data Logging and Security
  - Optimize Logger Operation for Specific Shipment Conditions
  - Protect Settings and Data from Unauthorized Modification
- Easy to Start/Stop Logging of Missions
  - Pushbuttons and LEDs for Control and Status
  - Visual Indication of Logger and Battery Status

***Ordering Information* appears at end of data sheet.**



19-7460; Rev 1; 1/17

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Absolute Maximum Ratings

Operating Temperature Range
(Thermistor Probe) .....-80°C to +60°C
Operating Temperature Range
(Logging Module).....-30°C to +60°C

Storage Temperature Range (Logging Module)..-30°C to +60°C

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Specifications

(Limits are 100% tested at T_A = +25°C. Limits are guaranteed over the operating temperature range by design and characterization.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
OPERATING CONDITONS						
Measuring Interval	t_{MI}		60s		273hrs	
Battery Life (Note 1)	t_{BL}	T_{MODULE} = +25°C, t_{MI} = 10 min		1		years
Operating Temperature, Logging Module	T_{MODULE}		-30		+60	°C
Operating Temperature, Thermistor Probe (Note 2)	T_{PROBE}		-80		-10	°C
Temperature Accuracy (Note 3)	T_{ERR}	-80°C < T_{PROBE} ≤ -40°C, T_{MODULE} = +25°C	-1.7		+ 1.7	°C
		-40°C < T_{PROBE} ≤ -10°C, T_{MODULE} = +25°C	-2.5		+2.5	
Thermal Response Time Constant (Note 4)	t_{RESP}			5		s
PHYSICAL DIMENSIONS						
Weight				83		g
Logger Module Dimensions		Length		69		mm
		Width		79		mm
		Height		25		mm
Thermistor Probe Length		Logger module to thermistor probe tip		1625		mm

Note 1: USB-to-PC connection is to be limited to 5 years total connectivity over the batteries lifetime to prevent excessive back charging.
Note 2: Higher temperature ranges can be read for the thermistor probe, but accuracy is guaranteed for this temperature range.
Note 3: Temperature accuracy represents a 3 sigma value.
Note 4: The time constant is the time required for a thermistor to react to a step change in temperature. For example, if exposed to a change from -50°C to +50°C, the 63% time constant would be the time required for the thermistor to indicate a temperature at +13°C.

Detailed Description

The MAX66960 provides a range of temperature data logging options that are configurable from PC software. Logging parameters such as temperature sample rate, alarms, and start condition are user-set while connected to a PC through a USB port. Typically, the device is configured for a logging mission so that it remains in a low-power idle state until ready for use at which point the start pushbutton is pressed and the mission initiates. Once a mission is started, the logging module takes periodic readings and stores them with time/date stamp according to the configured state. Status LEDs on the logging module enable visual determination and confirmation that a mission is running, the monitored temperature environment has remained within the target range, the health of the battery, and more.

Data-Logging Missions

The rate at which thermistor probe readings are measured and stored is user-configurable from one sample per 60 seconds to one sample every 273 hours. With a datalog memory space that can store up to 65,536 samples of 16 bits each, the sample rate is user-selectable to provide the maximum number of samples over the expected mission duration.

The device also provides flexibility with the event that initiates a mission, including:

- Start pushbutton on the module
- Immediately after PC configuration
- After a user-configured delay. This is helpful when a sample spends a fixed delay in a controlled environment such as a laboratory or warehouse, and then released later for shipping.
- Upon triggering a temperature exception alarm. Data logging can begin when the temperature falls below a configured minimum temperature or rises above a configured maximum.

Logger Unique Identification and Security

Each MAX66960 is factory programmed with a unique and unalterable 64-bit serial number that electronically identifies the logger module and provide strong end-system use traceability. This serial number is readable by PC software. In addition, the device provides a dedicated 512-byte general-purpose memory space that can be used to store any data such as information that identifies the end system.

Mission log data, configuration settings, and general-purpose memory can be secured with two-level password protection. Protection is configurable to either read or write functions.

Ordering Information

PART	TEMP RANGE
MAX66960#	-80°C to +60°C

#Denotes RoHS-compliant.

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	12/14	Initial release	—
1	1/17	Updated *General Description*, *Benefits and Features*, added improved accurate measurement temperature range, updated temperature measurement accuracy, updated minimum measuring interval, and updated length of thermistor cable	1–3

For pricing, delivery, and ordering information, please contact Maxim Direct at 1-888-629-4642, or visit Maxim Integrated's website at www.maximintegrated.com.

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