

Description

The FS1012 MEMS mass flow sensor module measures the flow rate using the thermo-transfer (calorimetric) principle. The FS1012 is capable of measuring a gas or liquid medium.

The FS1012 offers key advantages over resistor-based flow solutions. The sensor utilizes thermopile sensing, which provides an excellent signal-to-noise ratio. The sensor comprises a “solid” thermal isolation technology and silicon-carbide coating to protect it from abrasive wear and provides robustness and long-term reliability. In comparison, other sensors typically contain a fragile membrane above an etched cavity for the thermal isolation base.

The FS1012 features the sensor fully assembled and wire-bonded out to a 6-pin header. Wetted materials consist of a glass fiber reinforced PA66 resin, epoxy, and silicon carbide.

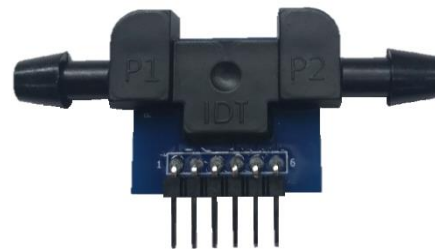
Features

- Gas or liquid mediums
- Robust “solid” isolation technology
- Resistant to surface contamination
- No cavity to cause clogging
- Resistant to vibration and pressure shock
- Low power application
- Sensitive at low flow rates and differential pressure levels
- Fast response: <5ms
- Millivolt output
- Supply voltage: 3V to 5V
- Module operating temperature range: 0°C to +85°C

Typical Applications

- Process controls and monitoring
- Oil and gas leak detection
- HVAC and air control systems
- CPAP and respiratory devices
- Liquid dispensing system

FS1012 Flow Sensor Module



Basic Application Circuits

Figure 1. Single-Ended Circuit Example

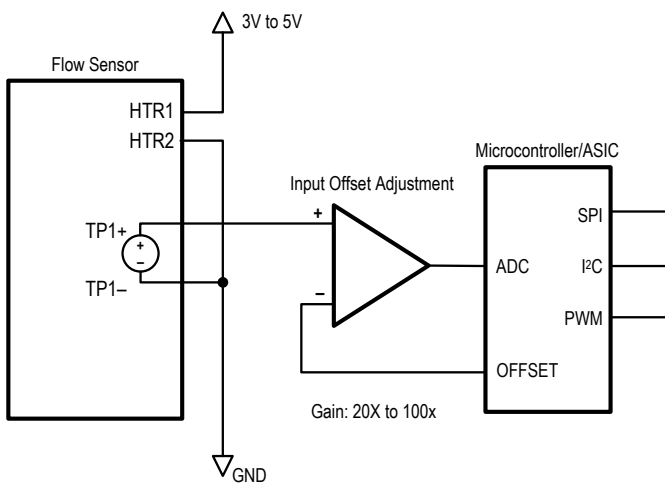
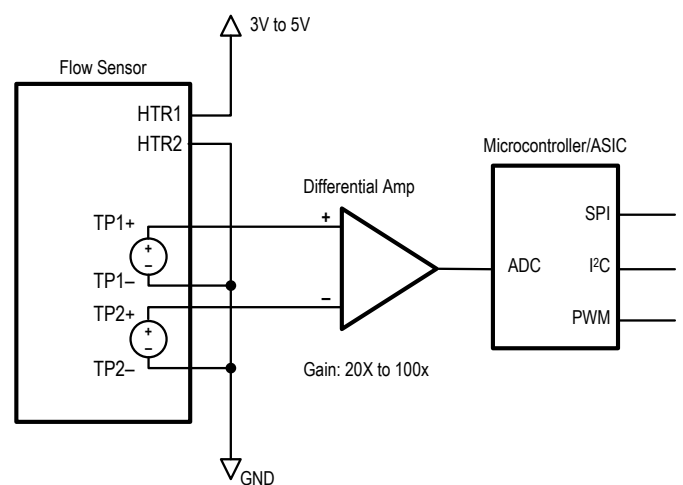
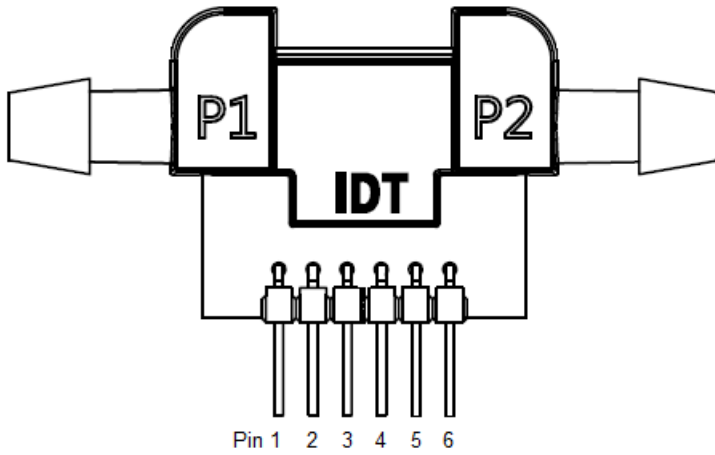


Figure 2. Differential Circuit Example



Pin Assignments

Figure 3. Pin Assignments for Module – Top View



Pin Descriptions

Table 1. Pin Descriptions

| Pin Number | Pad Name | Type | Description |
|------------|----------|--------|------------------|
| 1 | TP1+ | Output | Thermopile 1 (+) |
| 2 | TP1- | Output | Thermopile 1 (-) |
| 3 | HTR1 | Input | Heater |
| 4 | HTR2 | Input | Heater |
| 5 | TP2- | Output | Thermopile 2 (-) |
| 6 | TP2+ | Output | Thermopile 2 (+) |

Absolute Maximum Ratings

The absolute maximum ratings are stress ratings only. Stresses greater than those listed below can cause permanent damage to the device. Functional operation of the FS1012 at absolute maximum ratings is not implied. Exposure to absolute maximum rating conditions may affect device reliability.

Table 2. Absolute Maximum Ratings

| Symbol | Parameter | Conditions | Minimum | Maximum | Units |
|-------------|-----------------------|------------|---------|---------|-------|
| V_H | Heater Voltage Supply | | | 5.6 | V |
| T_{STOR} | Storage Temperature | | -50 | 130 | °C |
| P_{BURST} | Burst Pressure | | | 10 | bar |

Recommended Operating Conditions

Table 3. Recommended Operating Conditions

| Symbol | Parameter | Minimum | Typical | Maximum | Units |
|---------------|--|---------|---------|---------|-------|
| T_{AMB} | Ambient Operating Temperature ^[a] | 0 | | 85 | °C |
| I_{HTR_CC} | Heater Driving Current – Constant Current ^[a] | | 10 | 20 | mA |
| V_{HTR_CV} | Heater Driving Voltage – Constant Voltage ^[a] | | 3 | 5.6 | V |

[a] Sensor specifications are tested at the wafer die level.

Electrical Characteristics

Table 4. Electrical Characteristics

Note: See important notes at the end of the table.

| Symbol | Parameter | Conditions | Minimum | Typical | Maximum | Units |
|-------------------|---|---|---------|---------|---------|------------|
| R_H | Heater Resistor ^[a] | | 230 | 290 | 400 | Ω |
| α_{HTR} | Heater Temperature Coefficient of Resistance ^[a] | | | 300 | | ppm/°C |
| V_{TP_OUT} | Thermopile Output ^[a] | 3V driving voltage, in air, 20°C, no flow | 30 | 35 | 60 | mV |
| R_{TP} | Thermopile Resistance ^[a] | 20°C | 100 | 210 | 300 | K Ω |
| $V_{TP_OUTDIFF}$ | Thermopile Differential Output ^[a] | 3V driving voltage, in air, 20°C, no flow | -1 | 0 | 1 | mV |
| t_{RESP} | Response Time | | | 5 | | ms |

| Symbol | Parameter | Conditions | Minimum | Typical | Maximum | Units |
|--|-------------|----------------|---------|---------|---------------|----------------|
| Standard Gas Flow Range^{[b], [c]} | | | | | | |
| | Gas Flow | FS1012-1020-NG | 0 | | 2 (2000) | SLPM (SCCM) |
| | | FS1012-1100-NG | 0 | | 10 (10000) | SLPM (SCCM) |
| Standard Liquid Flow Range^{[b], [c]} | | | | | | |
| | Liquid Flow | FS1012-1001-LQ | 0 | | 0.5 (500) | SLPM (SCCM) |
| | | FS1012-1002-LQ | 0 | | 1.0 (1000) | SLPM (SCCM) |

[a] Sensor specifications are tested at the wafer die level.

[b] SLPM: Standard liter per minute.

[c] SCCM: Standard cubic centimeter per minute.

Flow Curves

The flow output curves are typical values at room conditions. The heater voltage is set at 5VDC. Flow input is from P1 to P2 out.

In general, use TP1 to measure gas flow and TP2 for liquid flow.

Figure 4. FS1012-1020-NG Flow Curve

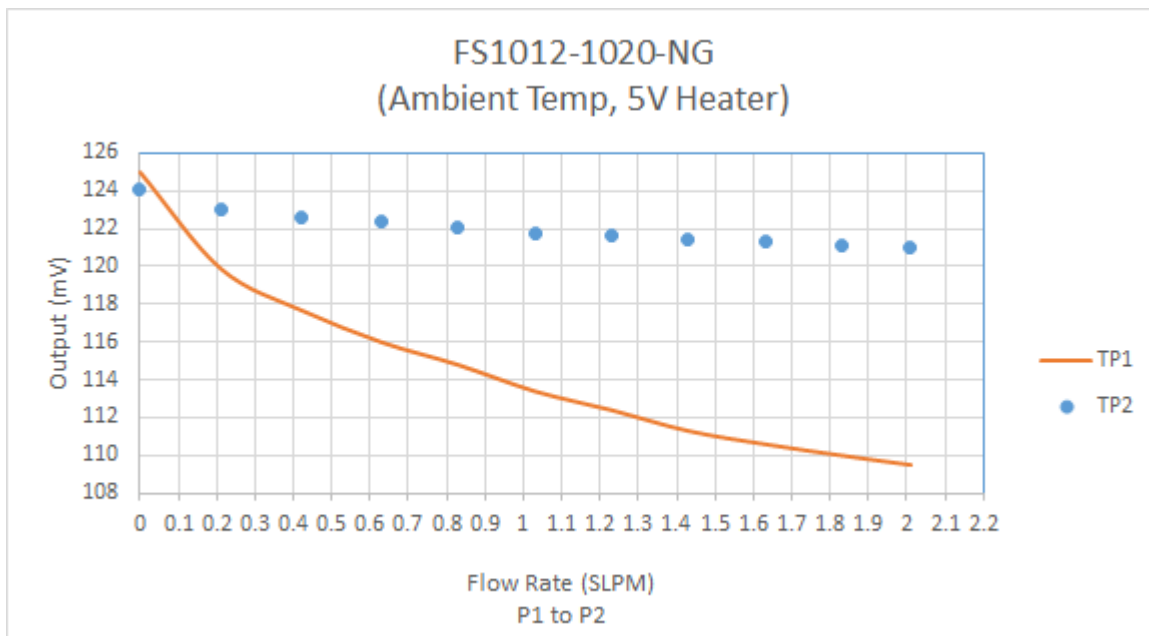


Figure 5. FS1012-1100-NG Flow Curve

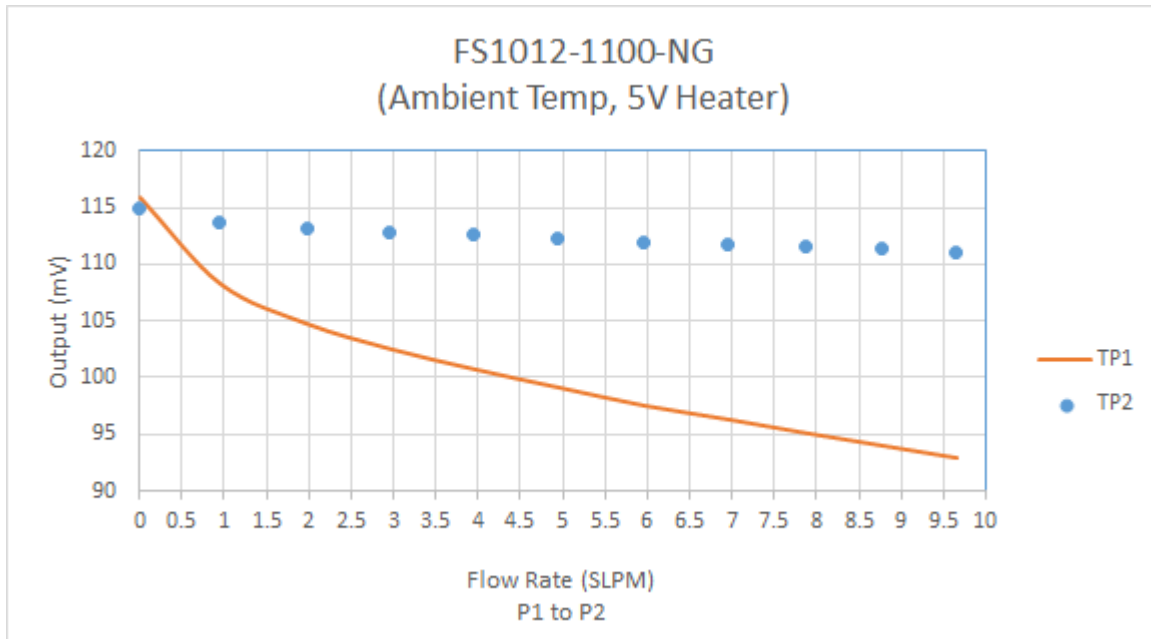


Figure 6. FS1012-1001-LQ Flow Curve

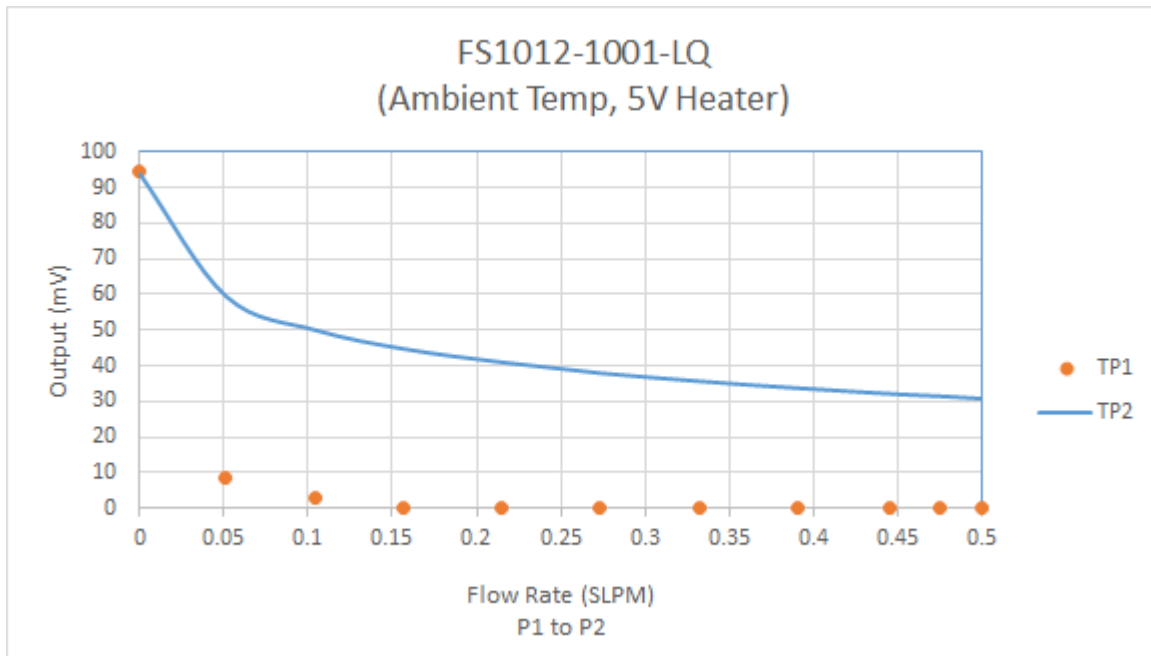
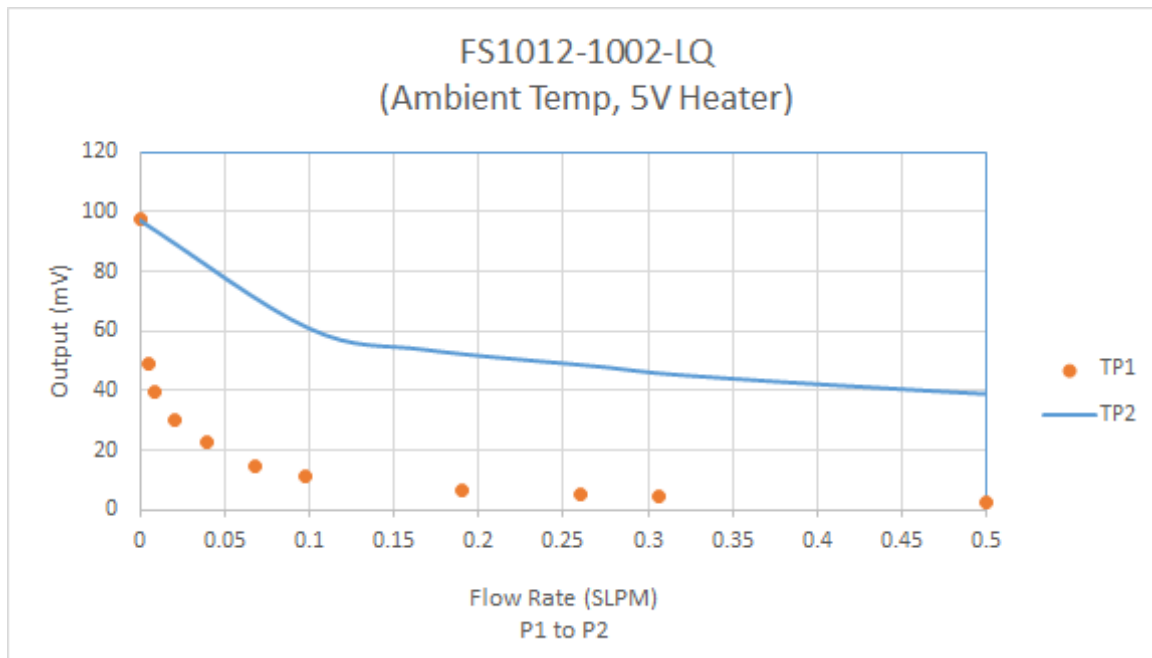
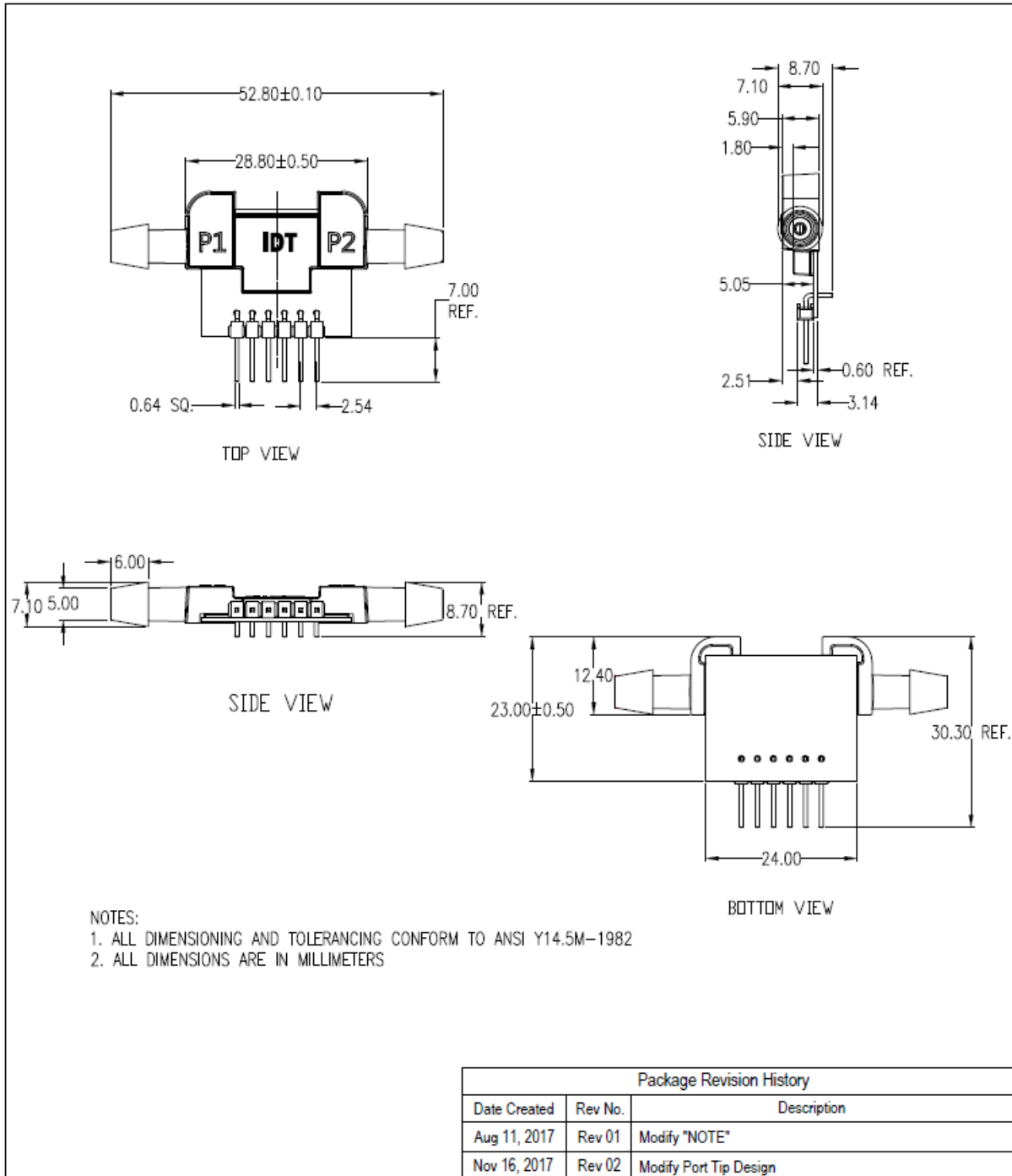


Figure 7. FS1012-1002-LQ Flow Curve



Package Outline Drawings

Figure 8. FS1012 Module Outline Drawings



Ordering Information

Note: The part code depends on the application. In the part code, NG refers to “non-corrosive gas” and LQ refers to “liquid.”

| Orderable Part Number | Description and Package | Shipping Packaging | Temperature |
|-----------------------|---|--------------------|--------------|
| FS1012-1020-NG | 0 to 2 SLPM gas flow sensor mounted on a circuit board with a flow housing | Box | 0°C to +85°C |
| FS1012-1100-NG | 0 to 10 SLPM gas flow sensor mounted on a circuit board with a flow housing | Box | 0°C to +85°C |
| FS1012-1001-LQ | 0 to 0.5 SLPM (500 SCCM) liquid flow sensor mounted on a circuit board with a flow housing | Box | 0°C to +85°C |
| FS1012-1002-LQ | 0 to 1.0 SLPM (1000 SCCM) liquid flow sensor mounted on a circuit board with a flow housing | Box | 0°C to +85°C |

Revision History

| Revision Date | Description of Change |
|-------------------|---|
| November 19, 2018 | Update module dimensions drawing, change Table 2 spec, added flow curves. |
| September 8, 2017 | Updated module dimensions drawing. |
| July 20, 2017 | Initial release of the datasheet. |



Corporate Headquarters

6024 Silver Creek Valley Road
San Jose, CA 95138
www.IDT.com

Sales

1-800-345-7015 or 408-284-8200
Fax: 408-284-2775
www.IDT.com/go/sales

Tech Support

www.IDT.com/go/support

DISCLAIMER Integrated Device Technology, Inc. (IDT) and its affiliated companies (herein referred to as "IDT") reserve the right to modify the products and/or specifications described herein at any time, without notice, at IDT's sole discretion. Performance specifications and operating parameters of the described products are determined in an independent state and are not guaranteed to perform the same way when installed in customer products. The information contained herein is provided without representation or warranty of any kind, whether express or implied, including, but not limited to, the suitability of IDT's products for any particular purpose, an implied warranty of merchantability, or non-infringement of the intellectual property rights of others. This document is presented only as a guide and does not convey any license under intellectual property rights of IDT or any third parties.

IDT's products are not intended for use in applications involving extreme environmental conditions or in life support systems or similar devices where the failure or malfunction of an IDT product can be reasonably expected to significantly affect the health or safety of users. Anyone using an IDT product in such a manner does so at their own risk, absent an express, written agreement by IDT.

Integrated Device Technology, IDT and the IDT logo are trademarks or registered trademarks of IDT and its subsidiaries in the United States and other countries. Other trademarks used herein are the property of IDT or their respective third party owners. For datasheet type definitions and a glossary of common terms, visit www.idt.com/go/glossary. All contents of this document are copyright of Integrated Device Technology, Inc. All rights reserved.

Данный компонент на территории Российской Федерации

Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru

moschip.ru_4

moschip.ru_6

moschip.ru_9