



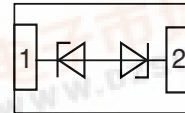
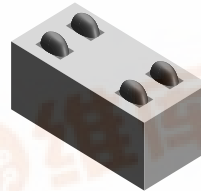
# VESD05C-FC1

Vishay Semiconductors

## Flip Chip Protection Diode - Chip Size 0402

### Description

Flip Chip is a chip with all packaging and interconnections manufactured on the wafer prior to dicing. The interconnections are made of solder bumps on i/o pads. Our device utilizes a silicon P/N junction for excellent clamping (protection) performance with low leakage current characteristic.



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### Features

- ESD protection to IEC 61000-4-2 30 kV (air)
- ESD protection to IEC 61000-4-2 8 kV (contact)
- ESD protection to IEC 61000-4-5 (lightning): 8/20  $\mu$ s,  $I_{PPM} = 10$  mA
- 120 W peak pulse power dissipation per line (8/20  $\mu$ s)
- Suitable for high frequency applications (low capacitance, low parasitic inductance)
- Low clamping voltage
- Minimum PCB space needed (0.5 mm<sup>2</sup>), < 0.55 mm height, only 0.47 mg/pcs
- No need for underfill material and/or additional solder
- Can be assembled using standard SMT pick & place equipment, reflow processes per J-STD-020 and assembly methods
- Green product

### Applications

Cellular phones  
 Personal digital assistants (PDA), notebook computers  
 MP3 players  
 GPS  
 Digital cameras  
 Bluetooth  
 Audio amplifiers  
 DVD  
 Power management systems  
 Read write heads for hard drives  
 Modules for watches  
 CPU  
 Digital TV's and satellites receivers  
 SMART cards

### Mechanical Data

**Case:** Flip Chip 1005

Standard EIA chip size: 0402

8 mm tape and reel per EIA-481-1-A/IEC60286

Top contacts: 4 solder bumps 100  $\mu$ m in height (nominal)

Bumps of SnAgCu (lead-free)<sup>1)</sup>

<sup>1)</sup> also available with PbSn bumps



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## Absolute Maximum Ratings

Ratings at 25 °C, ambient temperature unless otherwise specified

| Parameter                                  | Test condition     | Symbol           | Value | Unit |
|--------------------------------------------|--------------------|------------------|-------|------|
| Peak pulse power dissipation <sup>1)</sup> | 8/20 $\mu$ s pulse | P <sub>PPM</sub> | 120   | W    |
| Peak pulse current                         | 8/20 $\mu$ s pulse | I <sub>PPM</sub> | 10    | A    |
| ESD Air discharge per IEC 61000-4-2        |                    | V <sub>ESD</sub> | >30   | kV   |
| ESD Contact discharge per IEC 61000-4-2    |                    | V <sub>ESD</sub> | >8    | kV   |
| Soldering temperature                      |                    | T <sub>sd</sub>  | 260   | °C   |
| Soldering time                             |                    | t                | 10    | s    |

<sup>1)</sup> Non-repetitive current pulse

## Thermal Characteristics

Ratings at 25 °C, ambient temperature unless otherwise specified

| Parameter             | Test condition | Symbol           | Value         | Unit |
|-----------------------|----------------|------------------|---------------|------|
| Operating temperature |                | T <sub>J</sub>   | - 55 to + 150 | °C   |
| Storage temperature   |                | T <sub>STG</sub> | - 55 to + 150 | °C   |

## Electrical Characteristics

| Reverse Stand-off Voltage | Min. Breakdown Voltage | Max. Clamping Voltage                      |                                             | Max. Leakage Current | Capacitance                          |
|---------------------------|------------------------|--------------------------------------------|---------------------------------------------|----------------------|--------------------------------------|
|                           | V <sub>BR</sub>        | @ I <sub>PPM</sub> = 1 A<br>@ 8/20 $\mu$ s | @ I <sub>PPM</sub> = 10 A<br>@ 8/20 $\mu$ s |                      | @ V <sub>R</sub> = 0 V,<br>f = 1 MHz |
| V <sub>RWM</sub>          | @ 1 mA                 | V <sub>C</sub>                             |                                             | @ V <sub>RWM</sub>   | C <sub>D</sub>                       |
| V                         | V                      | V                                          | V                                           | $\mu$ A              | pF                                   |
| 5                         | 6                      | 9                                          | 12                                          | 20                   | 75                                   |

## Typical Characteristics (T<sub>amb</sub> = 25 °C unless otherwise specified)

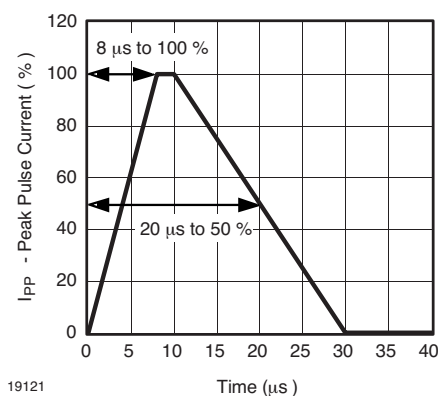


Figure 1. Pulse Waveform 8/20  $\mu$ s acc. IEC 61000 - 4 - 5

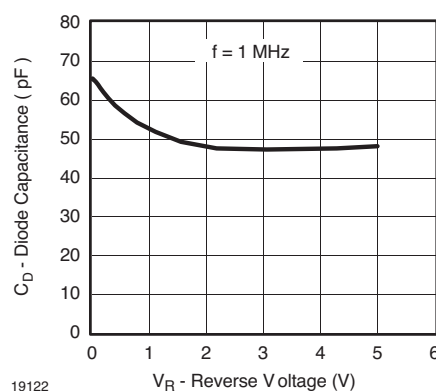


Figure 2. Typ. Diode Capacitance vs. Reverse Voltage

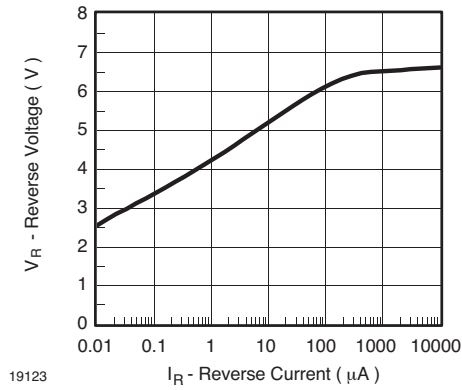


Figure 3. Reverse Voltage vs. Reverse Current

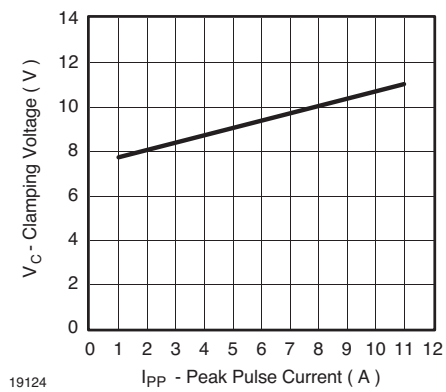


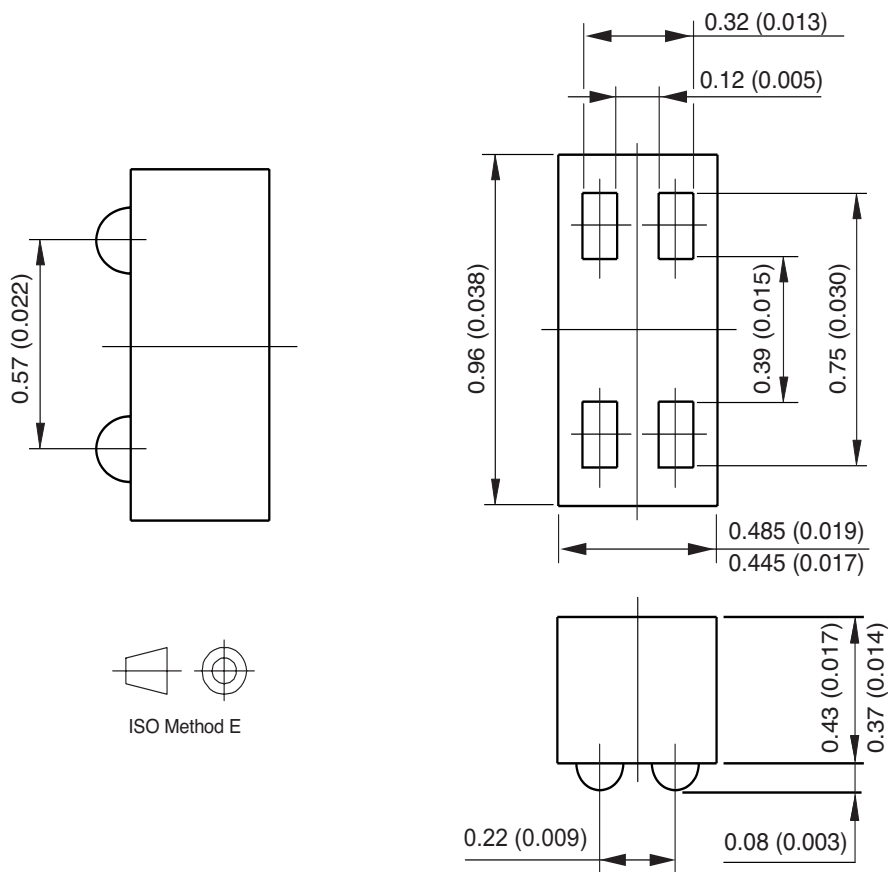
Figure 4. Clamping Voltage vs. Peak Pulse Current

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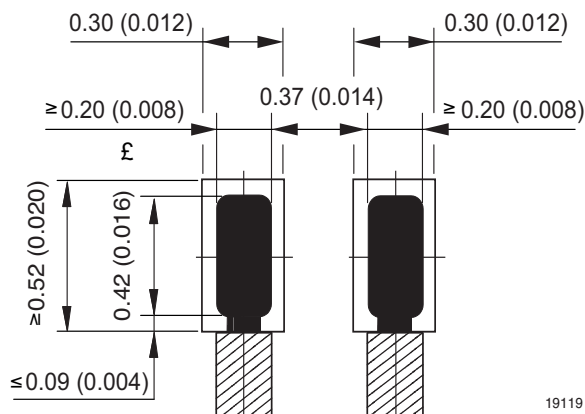


## Package Dimensions in mm (Inches)



### Mounting Pad Layout

- Solder land
- Solder resist opening
- Copper area



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## Ozone Depleting Substances Policy Statement

It is the policy of **Vishay Semiconductor GmbH** to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

**Vishay Semiconductor GmbH** has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

**Vishay Semiconductor GmbH** can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

### **We reserve the right to make changes to improve technical design and may do so without further notice.**

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Vishay Semiconductors products for any unintended or unauthorized application, the buyer shall indemnify Vishay Semiconductors against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

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