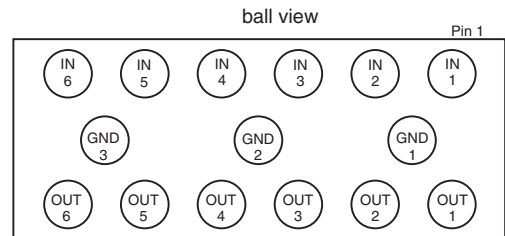


## 6-channel Flip-Chip EMI Filter with ESD-Protection

### Features

- Ultra compact Flip-Chip package
- In-line pinning
- 3 dB Cut-off frequency = 60 MHz
- Series resistance 100 Ohms
- Low leakage current
- ESD protection to IEC 61000-4-2 ± 30 kV
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC



19464

### Mechanical Data

**Case:** FC2 (FlipChip/BGA)

**Terminals:** High temperature soldering guaranteed: 260 °C/10 sec. at terminals

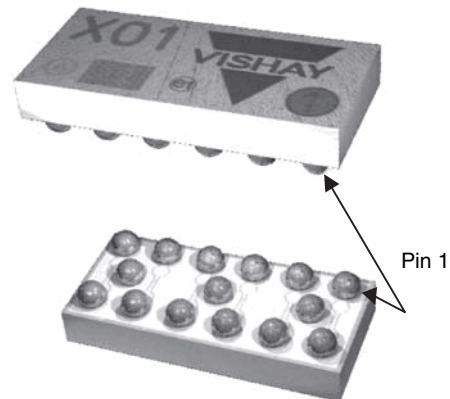
**Weight:** 5.5 mg

**Packaging Codes/Options:**

GS18 = 10 k per 13" reel (8 mm tape), 10 k/box

GS08 = 3 k per 7" reel (8 mm tape), 15 k/box

**Marking:** X01



19463\_1

### Absolute Maximum Ratings

(T<sub>A</sub> = 25 °C unless otherwise specified)

Parameter	Symbol	Value	Unit
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>	± 30	kV

### Thermal Characteristics

(T<sub>A</sub> = 25 °C unless otherwise specified)

Parameter	Symbol	Value	Unit
Operating Temperature	T <sub>J</sub>	- 40 to + 85	°C
Storage Temperature	T <sub>STG</sub>	- 55 to + 150	°C

### Electrical Characteristics

( $T_A = 25\text{ }^\circ\text{C}$  unless otherwise specified)

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Reverse Stand-Off Voltage	Input to ground	$V_{RWM}$	5			V
Line resistance	between input and output	$R_S$	90	100	110	$\Omega$
Cut-off Frequency	3 dB - attenuation	$f_{3dB}$		60		MHz
Attenuation	$f = 800\text{ MHz} - 2\text{ GHz}$	$S_{21}$		- 30		dB
Input current	Input to ground at $V_{RWM}$ output not connected	$I_R$			1	$\mu\text{A}$
Max. clamping output voltage	Output to ground $V_{in-ESD} = 8\text{ kV}$	$V_{C-Out}$			8	V
Max. Peak pulse current	each Input to ground See Fig. 1	at $I_{PPM}$	5			A
Reverse Breakdown Voltage	at $I_R = 1\text{ mA}$ each input or output to ground	$V_{BR}$	6.5			V
Capacitance	at $V_R = 0\text{ V}$ ; $f = 1\text{ MHz}$ each input or output to ground	$C_{IN}$		90		pF

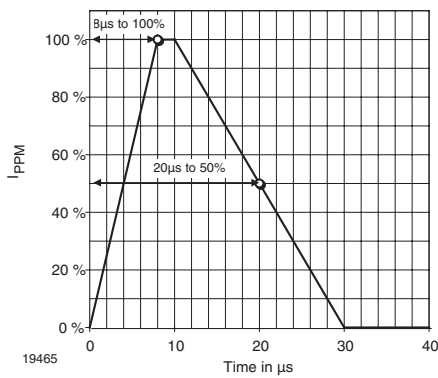


Figure 1. 8/20  $\mu\text{s}$  Peak Pulse Current wave from IEC 61000-4-5

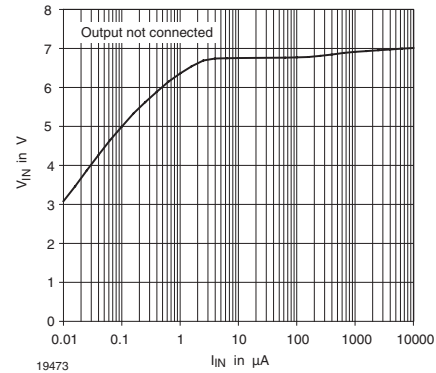


Figure 3. Typical Input Voltage  $V_{IN}$  vs. Input Current  $I_{IN}$

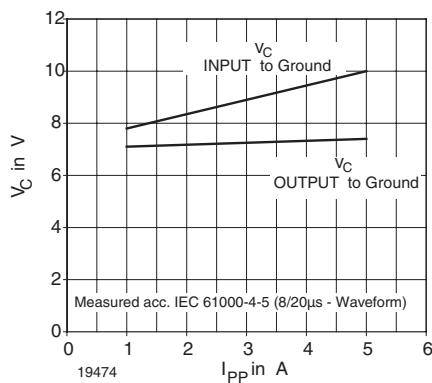


Figure 2. Typical Clamping Voltage vs. Peak Pulse Current  $I_{PP}$

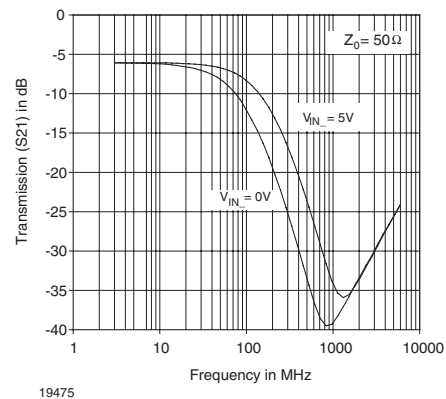


Figure 4. Typical small signal transmission ( $S_{21}$ ) at  $Z_0 = 50\text{ Ohm}$

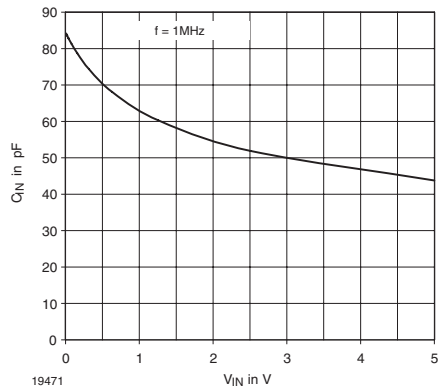
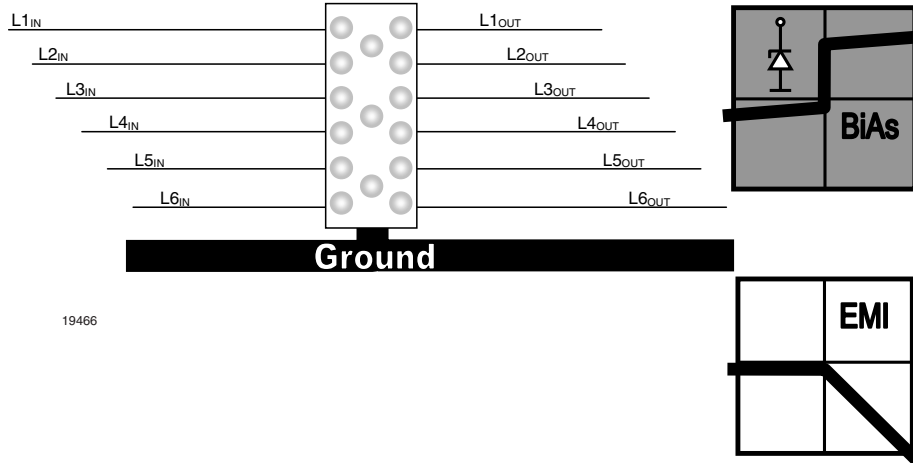


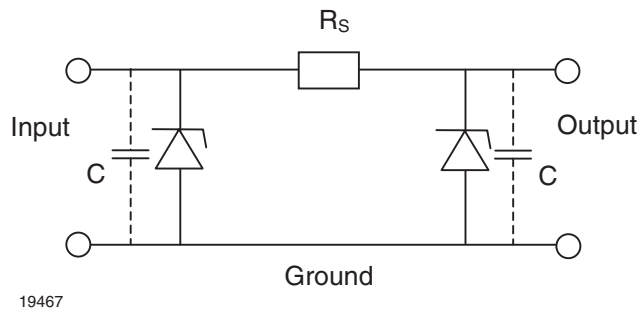
Figure 5. Typical Input Capacitance  $C_{IN}$  vs. Input Voltage  $V_{IN}$

## Application Note:

- a) With the **VEMI65A6-FC2** 6 different signal or data lines can be filtered and clamped to ground. Due to the different clamping levels in forward and reverse direction the clamping behavior is **Bi**directional and **Asy**mmetric (**BiAs**).

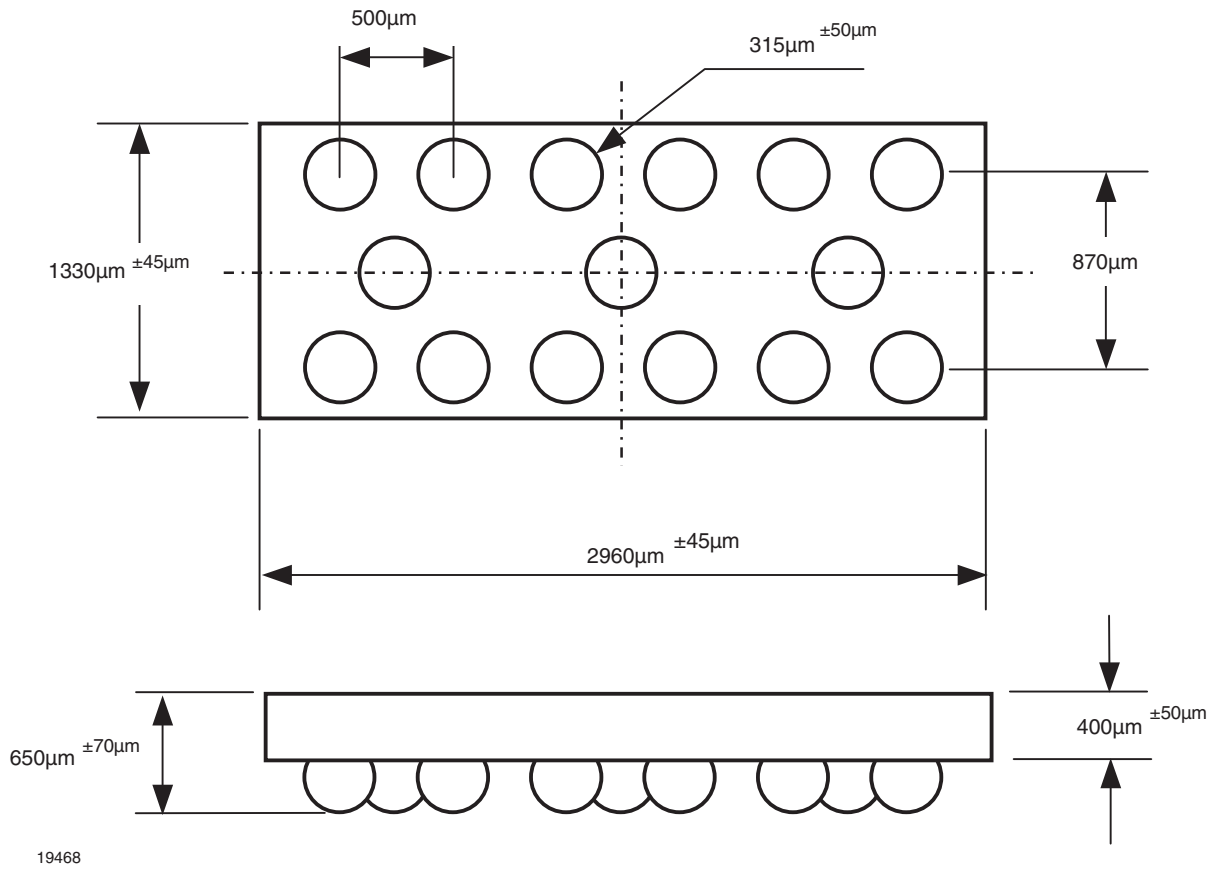


Circuit diagram of one EMI-Filter-Channel

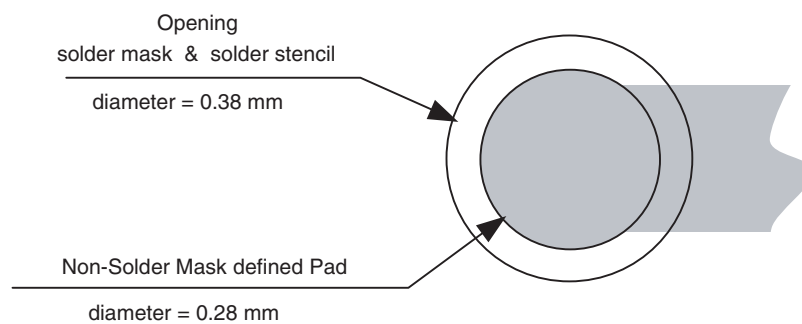


Each filter is symmetrical so that both ports can be used as Input or Output.

## Package Dimensions in mm (Inches)



## Foot print recommendation:



19469

### 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.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany



## Notice

Specifications of the products displayed herein are subject to change without notice. Vishay Intertechnology, Inc., or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Vishay's terms and conditions of sale for such products, Vishay assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of Vishay products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Vishay for any damages resulting from such improper use or sale.