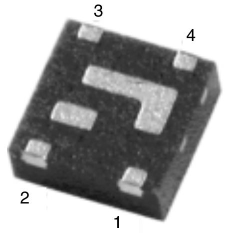
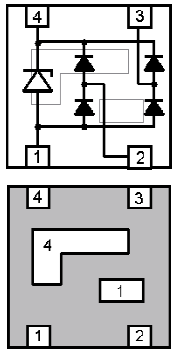
2-line BUS-port ESD-protection



(Bottom view)

20022



(Top view)

Features

- Ultra compact LLP70 package
- 2-Line USB ESD-protection
- high surge current:
  I_{PPM} = 40 A (at 8/20 µs acc. IEC 61000-4-5)
- Low leakage current
- Low load capacitance C_D < 10 pF
- ESD protection to IEC 61000-4-2 ± 30 kV (contact)
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

Mechanical Data

Case: LLP70-4A (plastic package); Non magnetic

Molding Compound Flammability Rating:
UL 94 V-0

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

Weight: 8.9 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:

20021

Square = Pin 1 marking

U1 = Type Code for “VBUS052A-DQ2”

S6 = Date Code (Example only)

Maximum Ratings and Thermal Characteristics

T_{amb} = 25 °C unless otherwise specified

Parameter	Symbol	Value	Unit
ESD Contact Discharge per IEC 61000-4-2	V_{ESD}	± 30	kV
Operating Temperature	T_J	- 40 to + 125	°C
Storage Temperature	T_{STG}	- 55 to + 150	°C

Electrical Characteristics

T_{amb} = 25 °C unless otherwise specified

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Reverse Stand-Off Voltage	at I_R = 1 µA PIN 2, 3 or 4 to PIN 1	V_{RWM}	5			V
Max. Reverse current	at V_R = 5 V PIN 2, 3 or 4 to PIN 1	I_R			1	µA
Max. Clamping voltage	at I_{PP} = 40 A PIN 2, 3 to PIN 1 Acc. IEC 61000-4-5	V_C		18.5	20	V
Max. Forward Clamping voltage	at I_F = 40 A PIN 1 to PIN 2 or 3 Acc. IEC 61000-4-5	V_F		7.6	9	V
Max. Peak pulse current	PIN 2, 3 or 4 to PIN 1 Acc. IEC 61000-4-5	I_{PPM}	40			A
Min. Reverse Breakdown Voltage	PIN 2, 3 or 4 to PIN 1 at I_R = 1 mA	V_{BR}	6		8	V
Line Capacitance	PIN 2 or 3 to PIN 1 at V_R = 0 V ; f = 1 MHz	C_D		6	10	pF
Line to Line Capacitance	PIN 2 to PIN 3 at V_R = 0 V ; f = 1 MHz	C_{D23}		3	5	pF
Line Capacitance	PIN 4 to PIN 1 at V_R = 0 V ; f = 1 MHz	C_{ZD}		480	500	pF
ESD-Immunity	PIN 2, 3 or 4 to PIN 1 10 pulses, both polarities acc. IEC 61000-4-2 device not damaged	V_{ESD}		± 30		kV

Typical Characteristics

T_{amb} = 25 °C unless otherwise specified

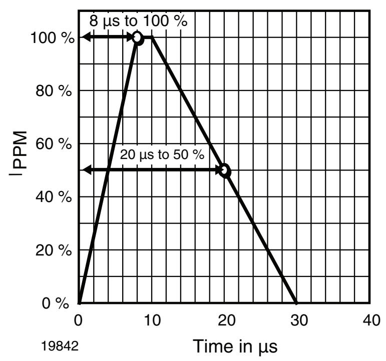


Figure 1. 8/20 µs Peak Pulse Current wave form acc. IEC 61000-4-5

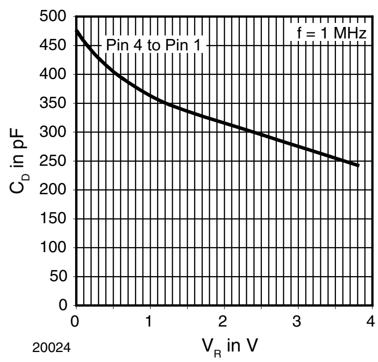


Figure 2. Typical Capacitance C_D vs. Reverse Voltage V_R

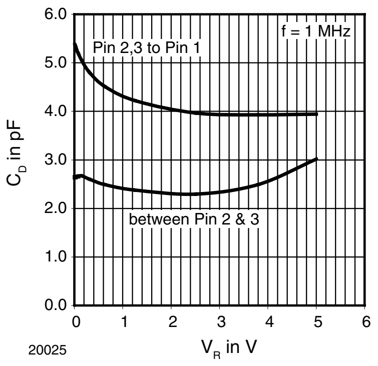


Figure 3. Typical Capacitance C_D vs. Reverse Voltage V_R

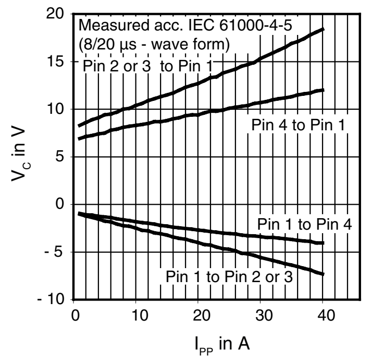


Figure 6. Typical Clamping Voltage vs. Peak Pulse Current I_{PP}

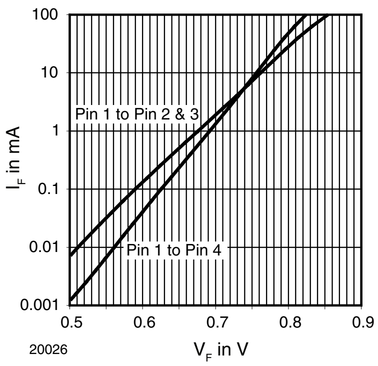


Figure 4. Typical Forward Current I_F vs. Forward Voltage V_F

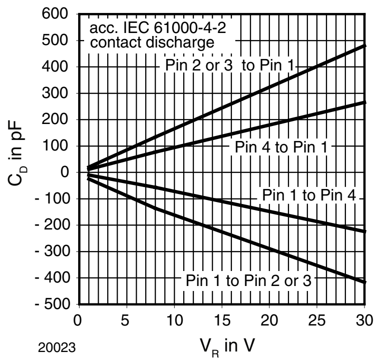


Figure 7. Typical Clamping voltage at ESD contact discharge (Acc. IEC 61000-4-2)

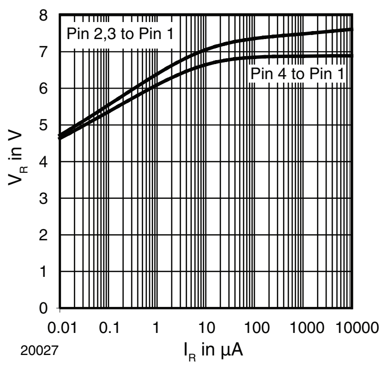


Figure 5. Typical Reverse Voltage V_R vs. Reverse Current I_R

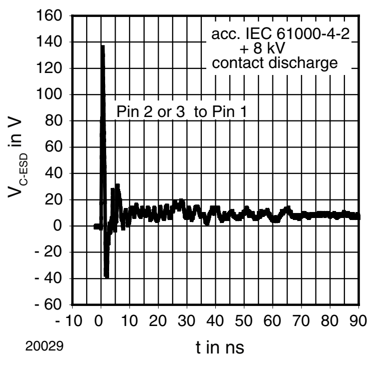


Figure 8. Typical Clamping performance at 8 kV contact discharge (Acc. IEC 61000-4-2)

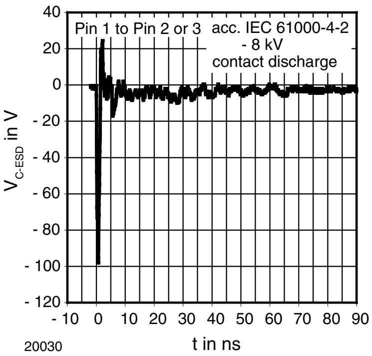
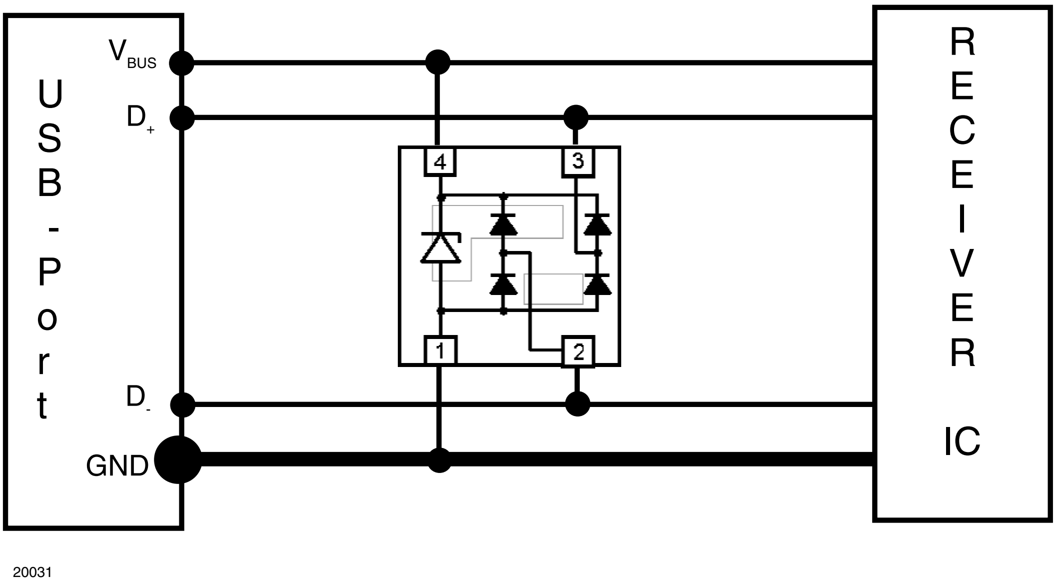


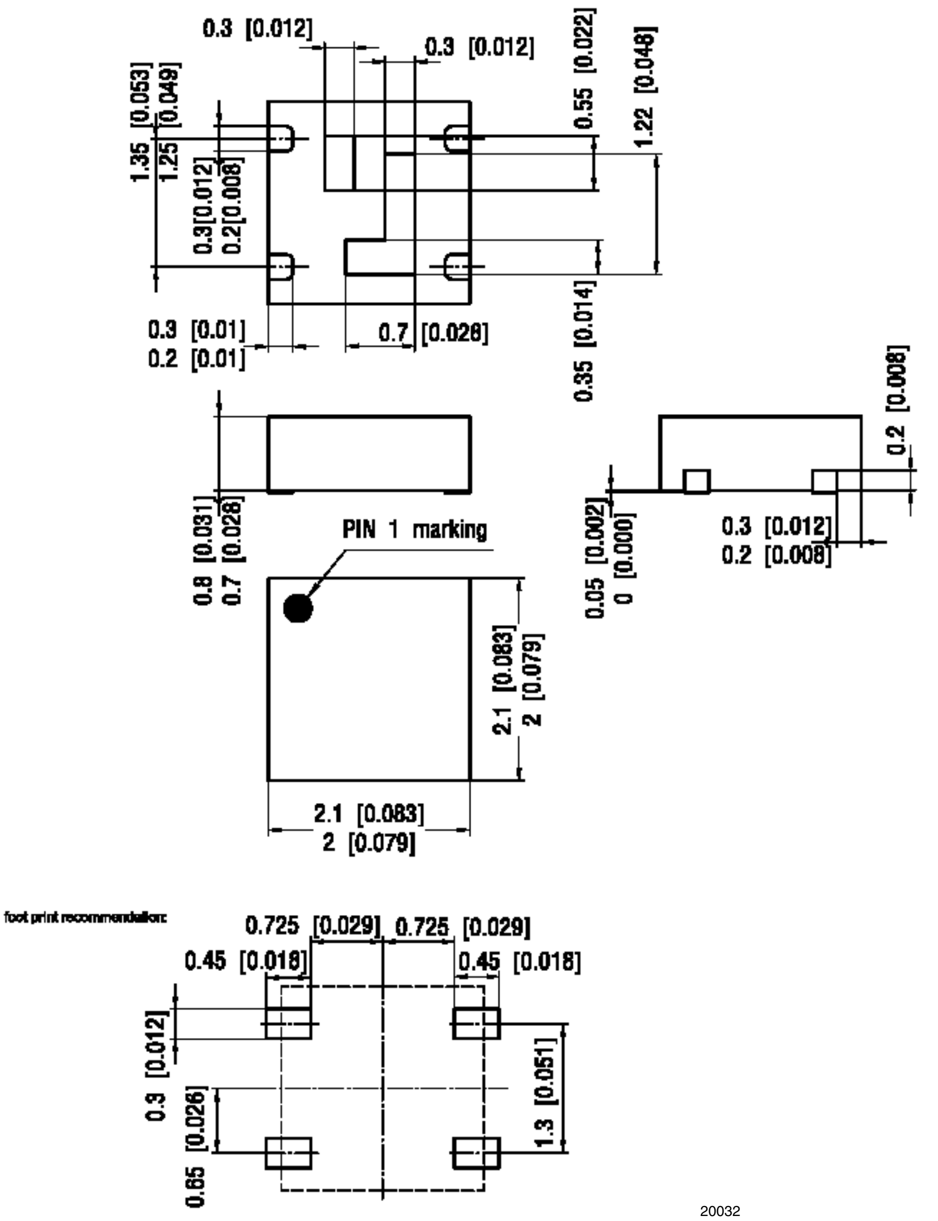
Figure 9. Typical Clamping performance at - 8 kV contact discharge (Acc. IEC 61000-4-2)

Application Note:

With the VBUS052A-DQ2 one high speed USB-port can be protected against transient voltage signals. Negative transients will be clamped close below the ground level while positive transients will be clamped close above the 5 V working range. An avalanche diode clamps the supply line (V_{BUS} at Pin no. 4) to ground (Pin no. 1). The high speed data lines, D_+, D_-, are connected to Pin no. 2 and 3. As long as the signal voltage on the data lines is between the ground- and the V_{CC} -level, the low capacitance PN-Diodes offer a very high isolation to V_{BUS}, ground and to the other data line. But as soon as any transient signal exceed this working range, one of the PN-diodes gets in the forward mode and clamps the transient to ground or the avalanche break through voltage level.



Package Dimensions in mm (Inches) LLP70-4A



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.

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

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