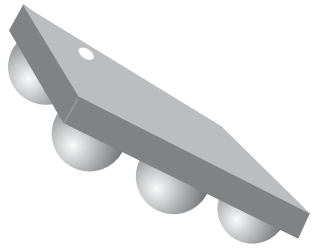
ECMF02-3F3

Common mode filter with ESD protection

Datasheet – production data



Flip Chip
6 bumps

Figure 1. Pin configuration (bump side)

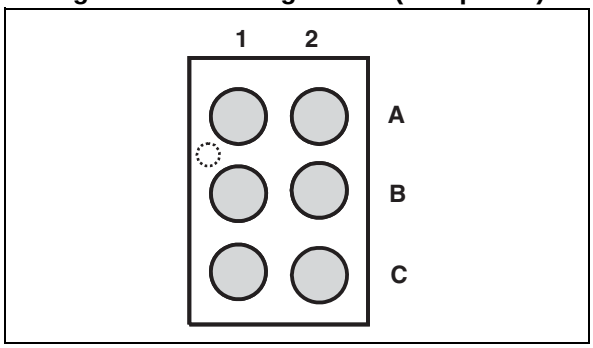
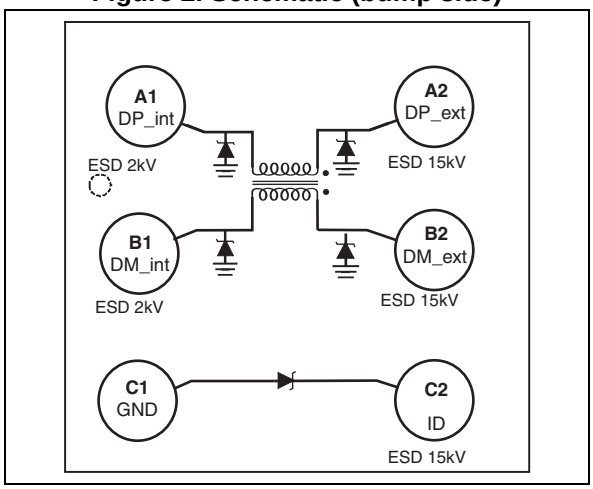


Figure 2. Schematic (bump side)



Features

- Very large differential bandwidth
- Very low PCB space consumption
- High ESD robustness: IEC 61000-4-2 level 4
- Withstand 1000 ESD strikes
- Lead-free Flip-Chip package
- Small footprint
- Very low profile

Complies with the following standard:

- IEC 61000-4-2 level 4:
  - ±15 kV (air discharge)
  - ±8 kV (contact discharge)

Applications

Where transient overvoltage protection in ESD sensitive equipment is required such as:

- Mobile phones
- Computers
- Portable navigation devices
- Digital still cameras
- Portable multimedia players

Description

The ECMF02-3F3 is a highly integrated common mode filter designed to suppress EMI/RFI common mode noise on high speed differential serial buses.

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1 Characteristics

Table 1. Absolute maximum ratings (T_{amb} = 25 °C)

Symbol	Parameter	Value	Unit
V_{PP}	IEC 61000-4-2 (C = 150 pF, R = 330 Ω) External pins (A2, B2 and C2): level 4 Air discharge Contact discharge Internal pins (A1, B1): level 1 Air discharge Contact discharge	 15 8 2 2	kV
P_d	Line resistance power dissipation at 85 °C (top max)	60	mW
T_j	Operating temperature range	- 30 to + 85	°C
T_{stg}	Storage temperature range	- 55 to 150	°C

Figure 3. Electrical characteristics (definitions)

Symbol **Parameter**

V_{BR} = Breakdown voltage
I_{RM} = Leakage current @V_{BM}
R_{DC} = Serial resistance

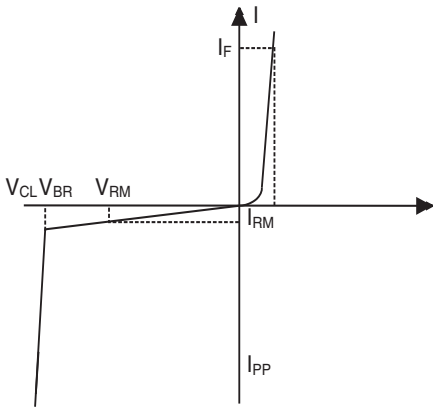


Table 2. Electrical characteristics (values, T_{amb} = 25 °C)

Symbol	Test conditions	Min.	Typ.	Max.	Unit
V_{BR}	I_R = 1 mA	6			V
I_{RM}	V_{RM} = 3 V per line			100	nA
R_{DC}	DC serial resistance		3.4	4.5	Ω

Figure 4. SDD21 differential attenuation versus frequency

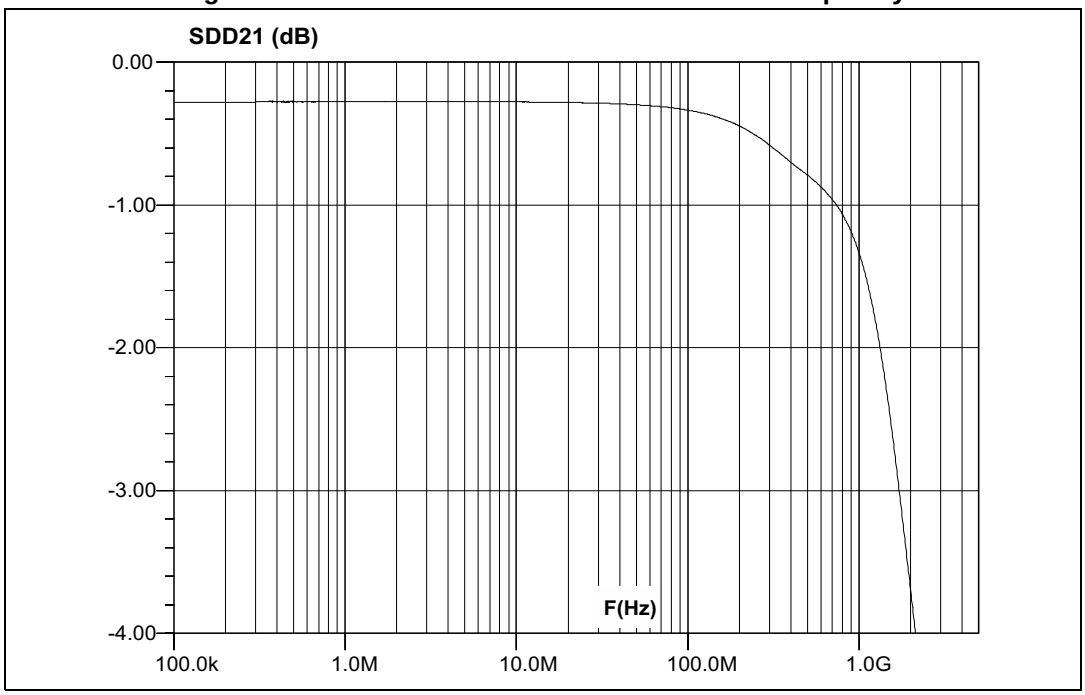


Figure 5. SCC21 common mode attenuation versus frequency (ID pin floating)

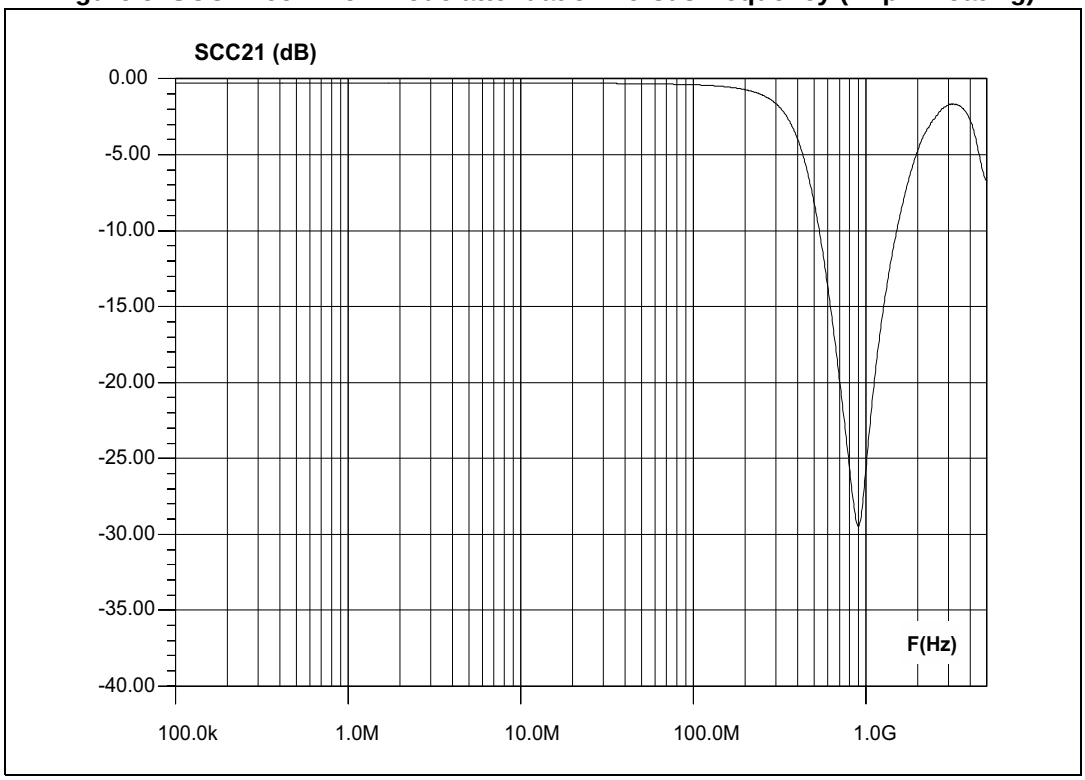


Figure 6. SDD11 / SDD22 differential return loss versus frequency (ID pin floating)

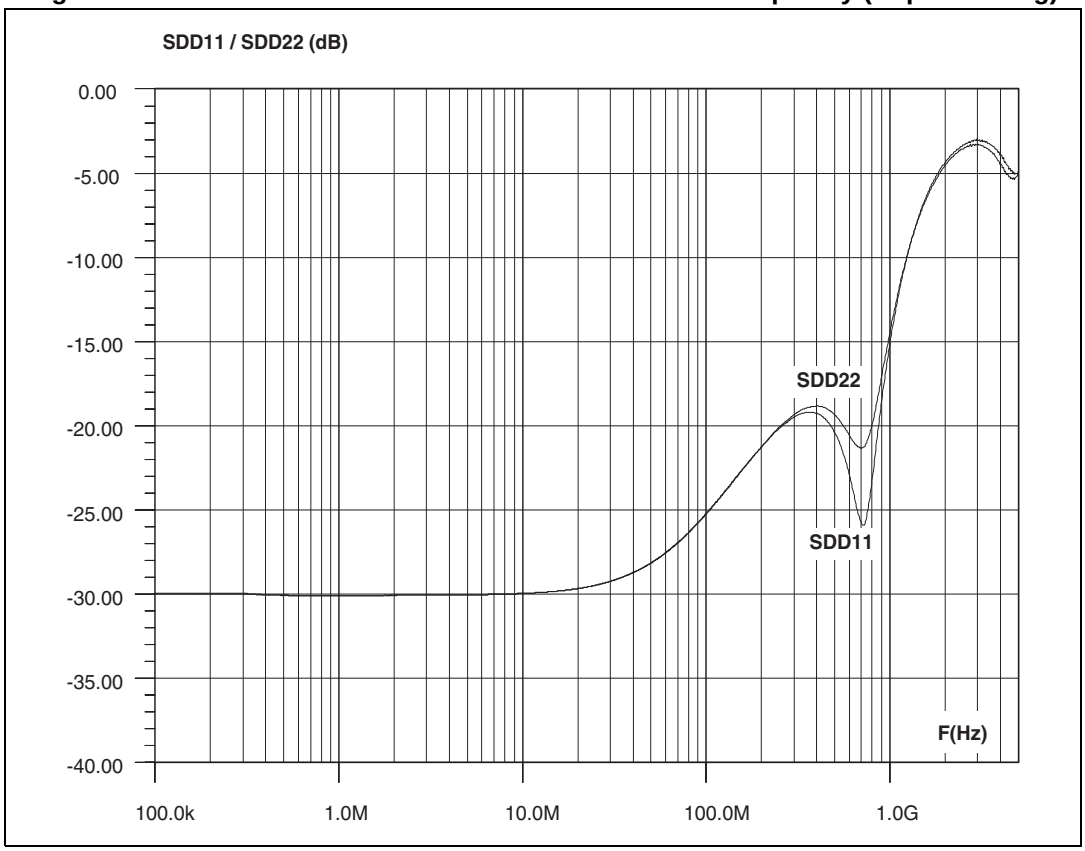


Figure 7. Eye diagram (according to USB 2.0 high speed specification mask1)

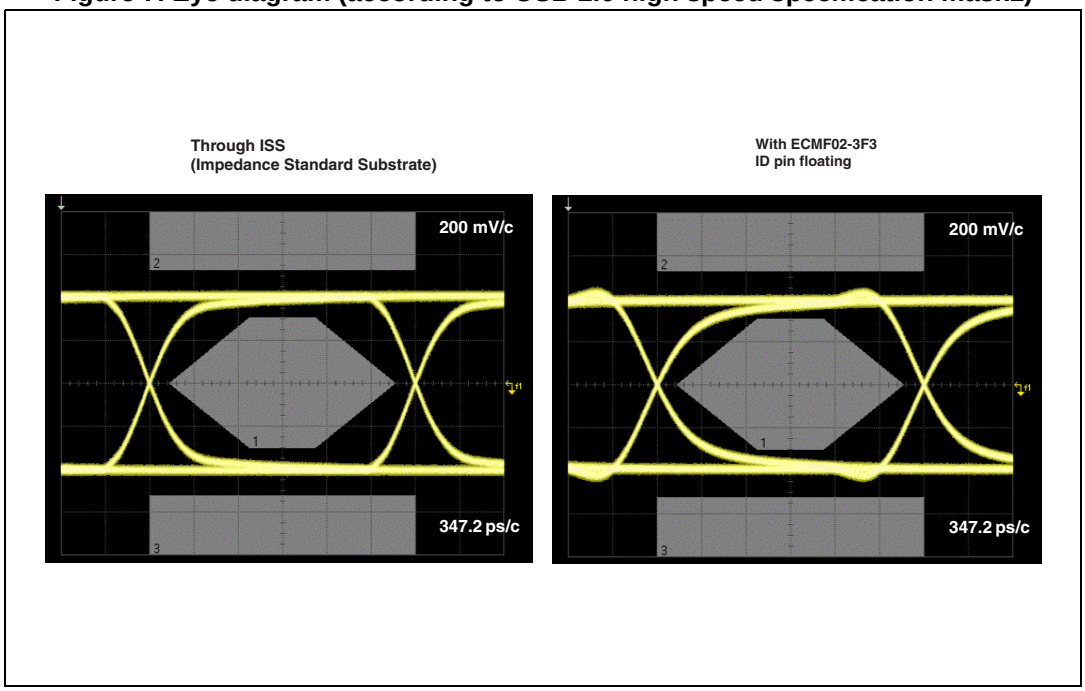


Figure 8. TDR: $Z_{0\ DIFF}$ = 100 Ω, t_R = 400 ps (10% - 90%),

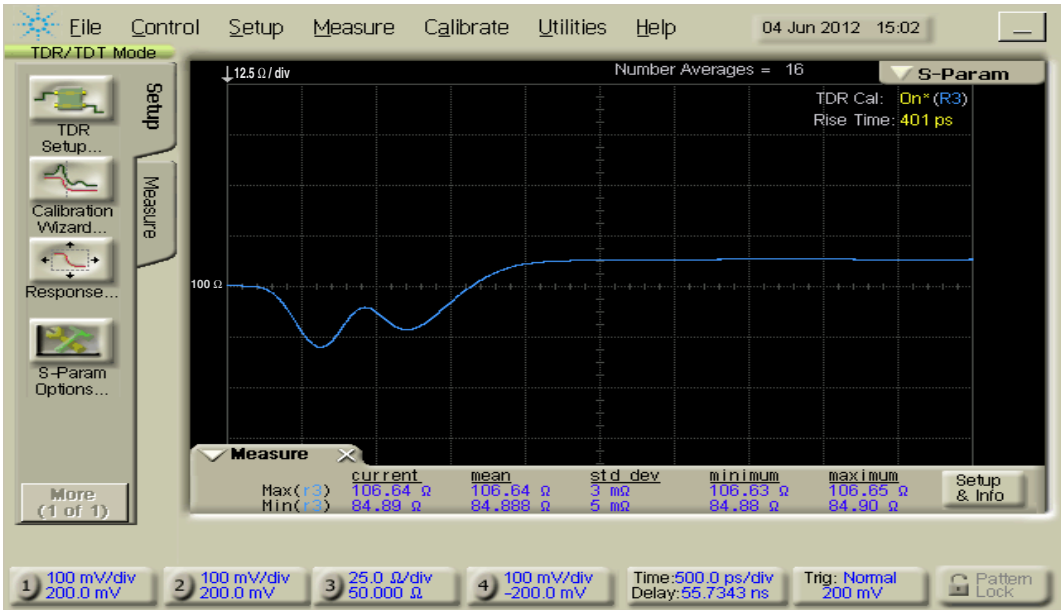


Figure 9. ESD response to IEC 61000-4-2 (+8 kV contact discharge)

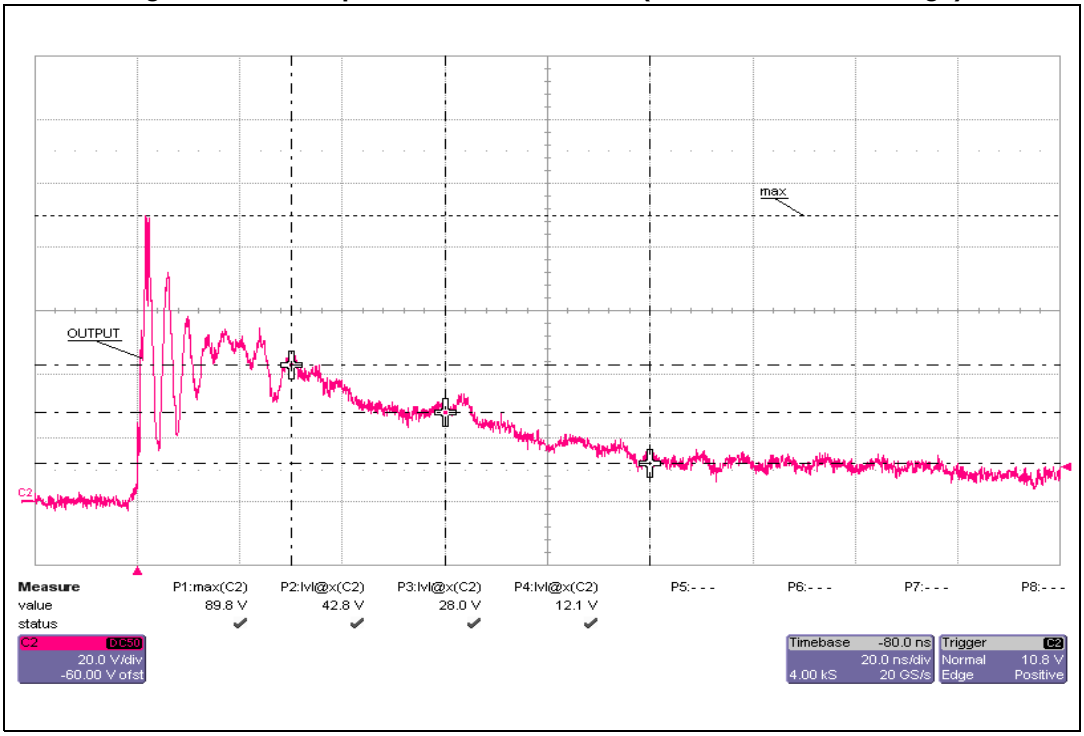
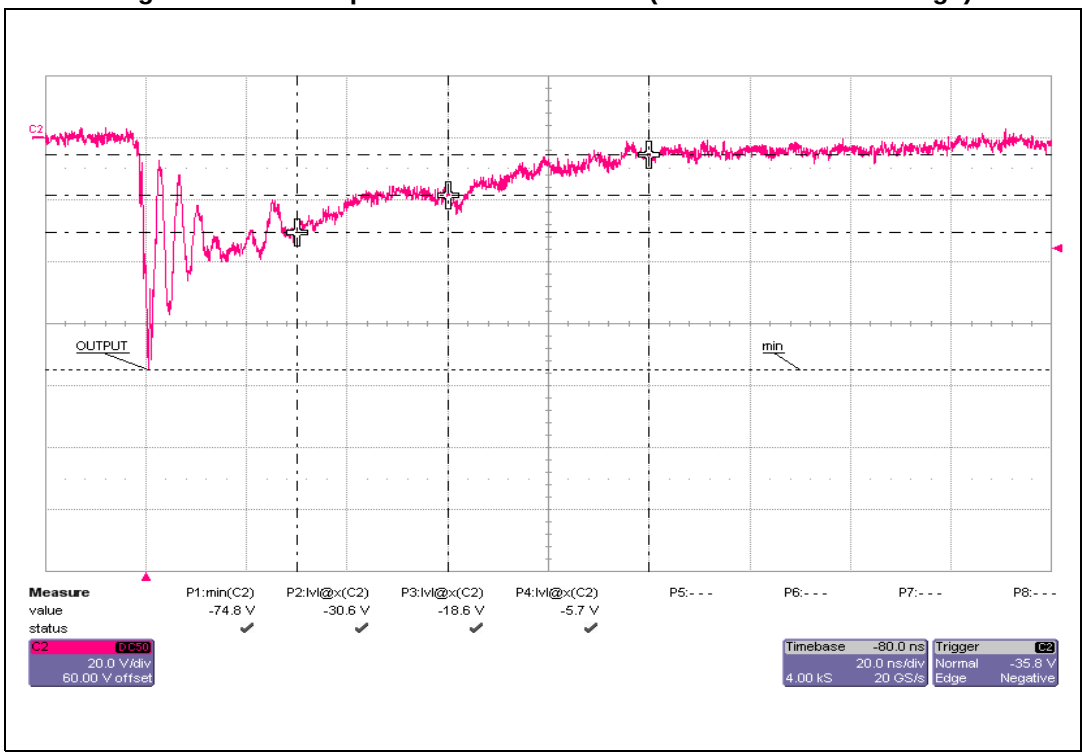
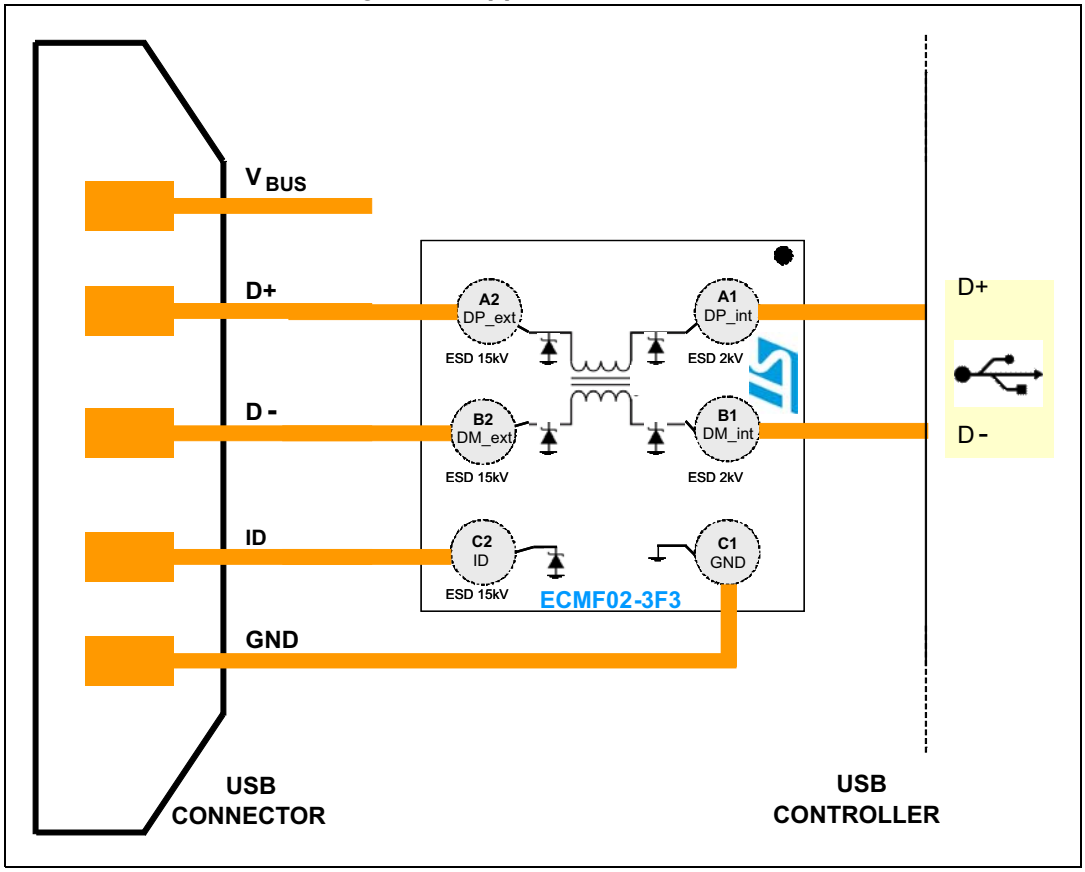


Figure 10. ESD response to IEC 61000-4-2 (- 8 kV contact discharge)



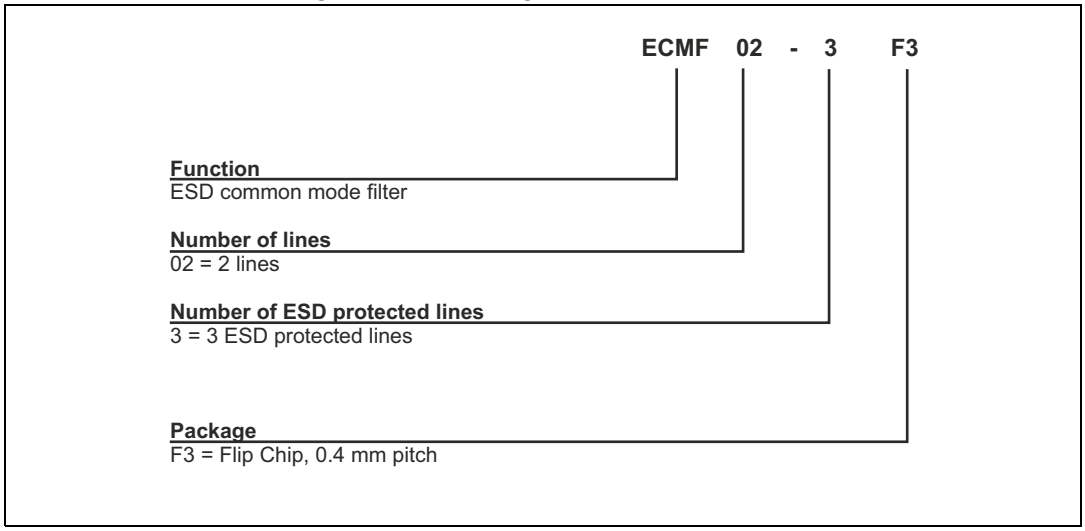
2 USB 2.0 application schematic

Figure 11. Application schematic



3 Ordering information scheme

Figure 12. Ordering information scheme



4 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK® is an ST trademark.

Figure 13. Package dimensions

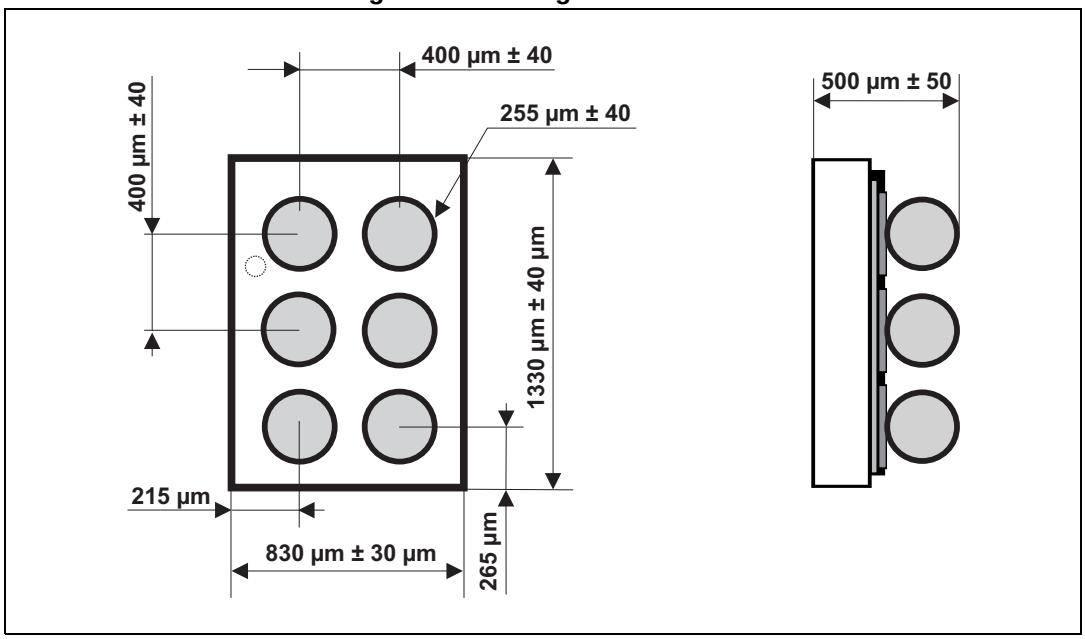


Figure 14. Marking

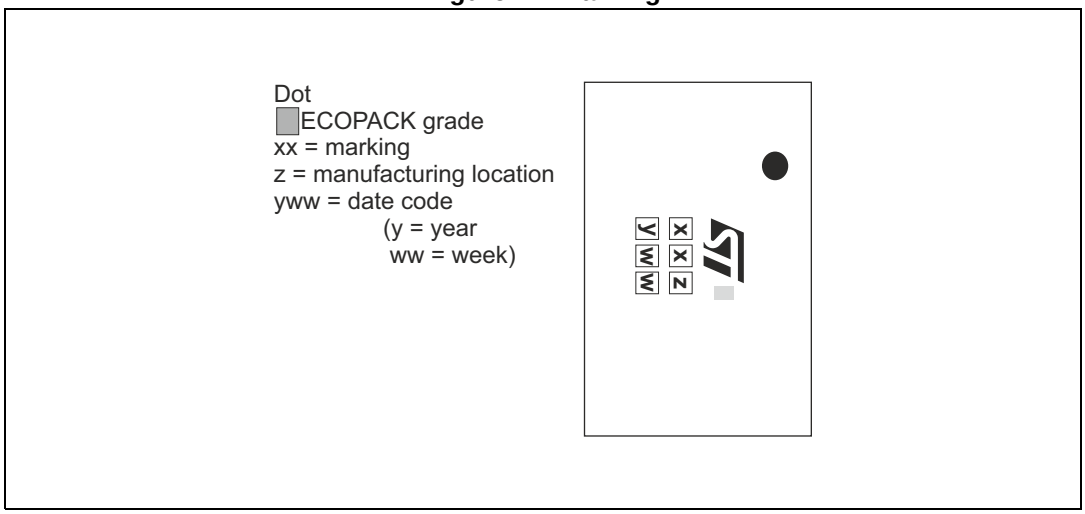


Figure 15. Footprint recommendations

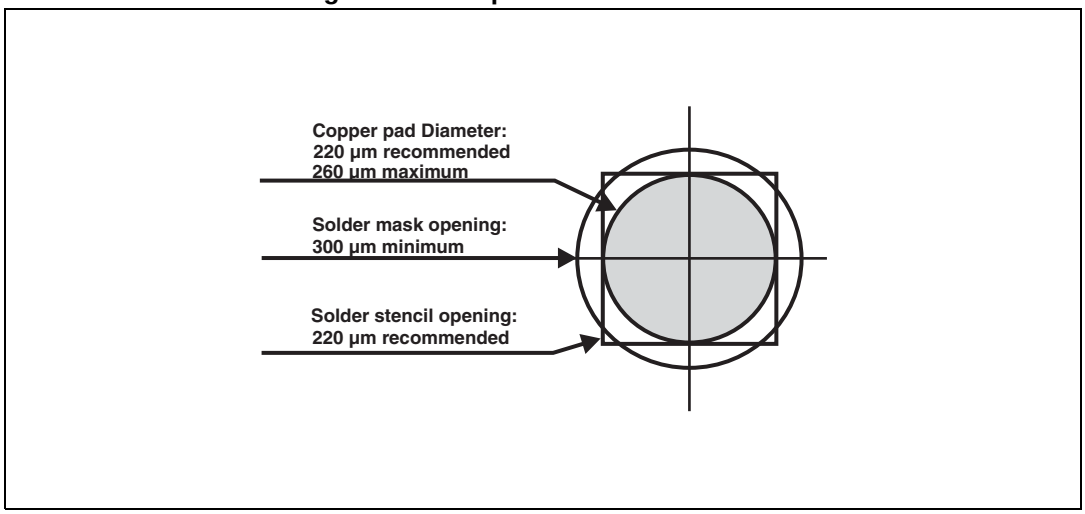
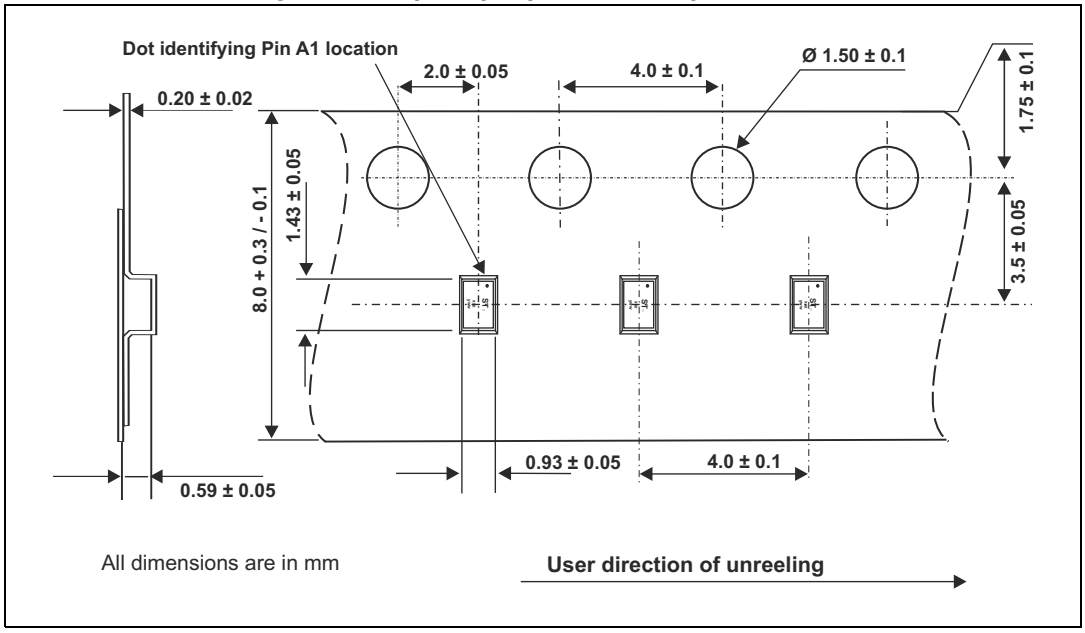


Figure 16. Flip Chip tape and reel specification



Note: More information is available in the application notes:

AN2348, "IPAD™ 400 µm Flip Chip: package description and recommendations for use"

AN1751, "EMI filters: recommendations and measurements"

5 Ordering information

Table 3. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
ECMF02-3F3	KH	Flip Chip	1.2 mg	5000	Tape and reel 7”

6 Revision history

Table 4. Document revision history

Date	Revision	Changes
19-Nov-2012	1	Initial release.
22-May-2013	2	Moved dot position in *Figure 13*. Moved arrow in *Figure 16* to point to pin A1 location.
19-Dec-2013	3	Corrected typographical error in *Figure 13*.

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