# ESDARF03-1BF3

## Ultralow capacitance ESD protection for antenna

## Features

- ultralow diode capacitance 0.6 pF
- Single line, protected against 15 kV ESD
- breakdown voltage $V_{BR}$ = 6.0 V min.
- Flip Chip 400 µm pitch, lead-free
- very low leakage current
- very small PCB area
- RoHS compliant

### Benefits

- minimized impact on rise and fall times for maximum data integrity
- low PCB space occupation
- higher reliability through monolithic integration

### Complies with the following standards

- IEC 61000-4-2 level 4:
  - 15 kV (air discharge)
  - 8 kV (contact discharge)
- MIL STD 883G - Method 3015.7:
  - 25 kV (human body model)

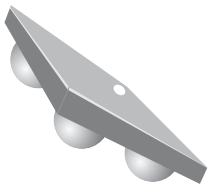
## Applications

- antenna protection
- DVB - H
- GPS

## Description

The ESDARF03-1BF3 is a monolithic, application specific discrete device dedicated to ESD protection of antennas.

Its ultralow line capacitance secures a high level of signal integrity without compromising the protection of sensitive chips against the most stringently characterized ESD strikes.



**Flip Chip**
**(4 bumps)**

**Figure 1. Pin layout (bump side)**

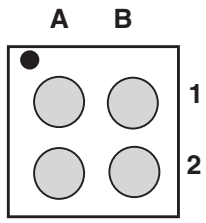
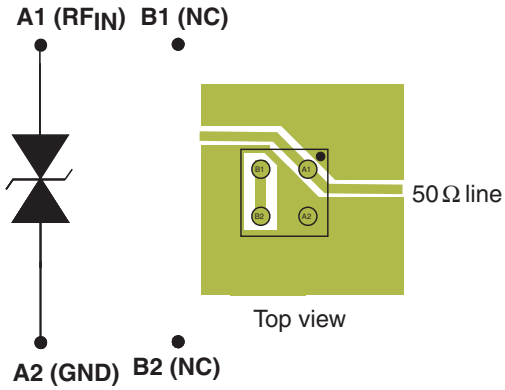



**Figure 2. Device configuration**




Note: Bumps B1 and B2 must be connected together on the PCB.

**TM**: IPAD is a trademark of STMicroelectronics.

# 1 Characteristics

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

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{PP}$ | ESD discharge IEC 61000-4-2, air discharge<br>ESD discharge IEC 61000-4-2, contact discharge | 15<br>8 | kV |
| $P_{PP}$ | Peak pulse power dissipation (8/20 µs) | 60 | W |
| $T_j$ | Maximum junction temperature | 125 | °C |
| $T_{op}$ | 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 @ $V_{RM}$
$V_{RM}$ = Stand-off voltage
$V_{CL}$ = Clamping voltage
$R_d$ = Dynamic impedance
$I_{pp}$ = Peak pulse current
$\alpha T$ = Voltage temperature coefficient
$V_F$ = Line capacitance

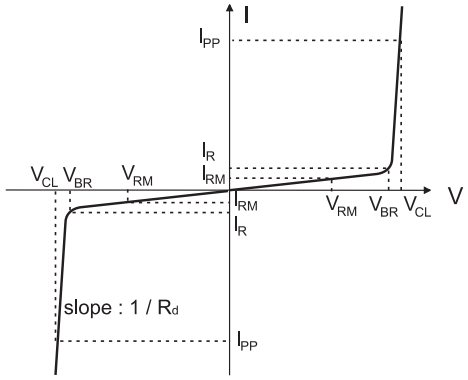



**Table 2. Electrical characteristics ($T_{amb}$ = 25 °C)**

| Symbol | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| $V_{BR}$ | $I_R$ = 1 mA | 6 | 9 | | V |
| $I_{RM}$ | $V_{RM}$ = 3 V | | | 100 | nA |
| $R_d$ | Exponential wave form 8/20 µs, $I_{pp}$ = 1 to 5 A | | 2.6 | | Ω |
| $\alpha T$ | $I_R$ = 1 mA | | | 5 | $10^{-4}$/ °C |
| $C_{line}$ | $V_{LINE}$ = 0 V, $V_{OSC}$ = 30 mV, F = 1 MHz | | 0.6 | 0.8 | pF |

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

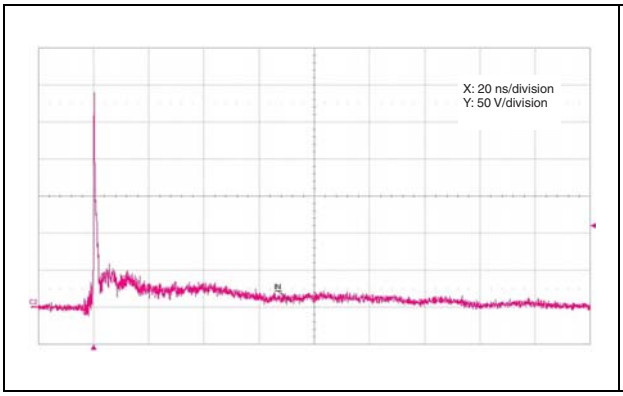



**Figure 5. ESD response to IEC 61000-4-2 (-8 kV contact discharge)**

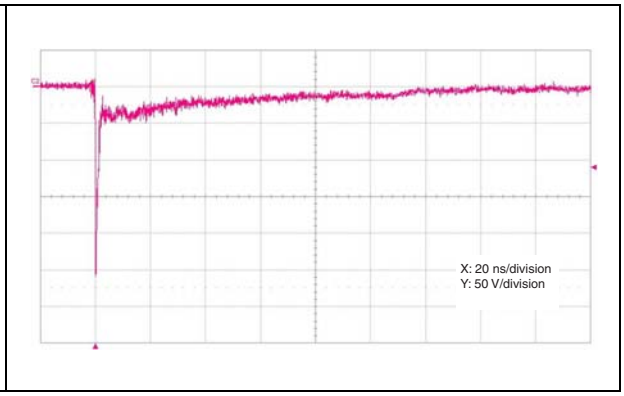



**Figure 6. Junction capacitance versus frequency (typical values)**

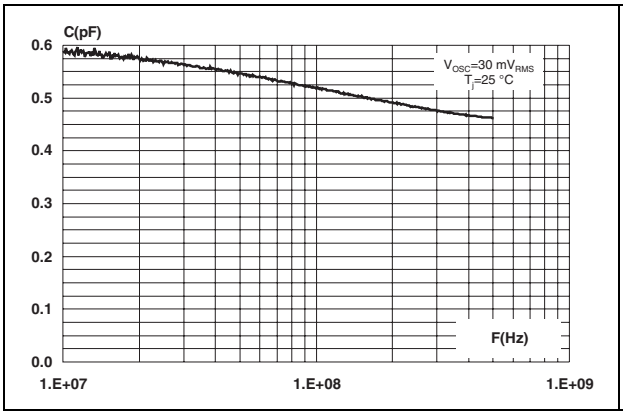



**Figure 7. S21 attenuation measurement**

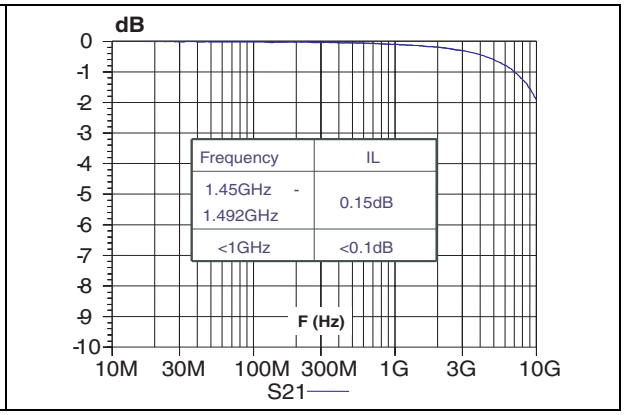
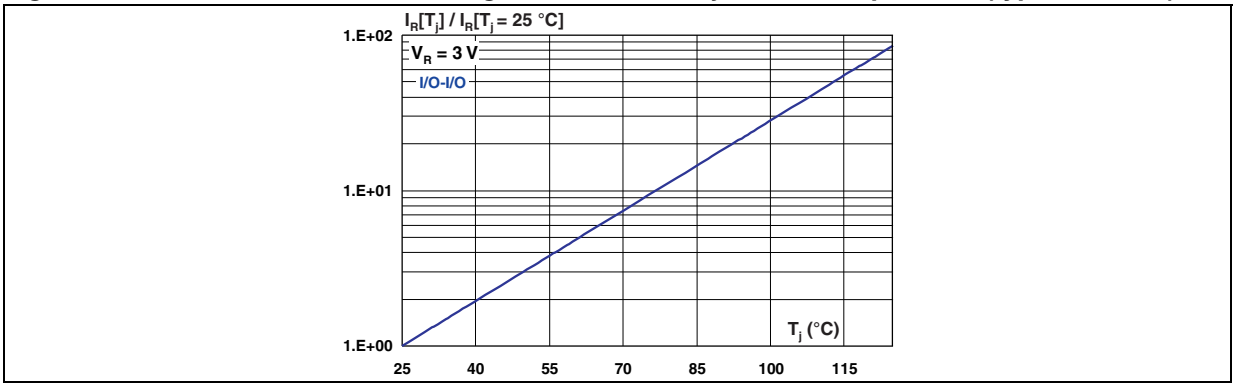
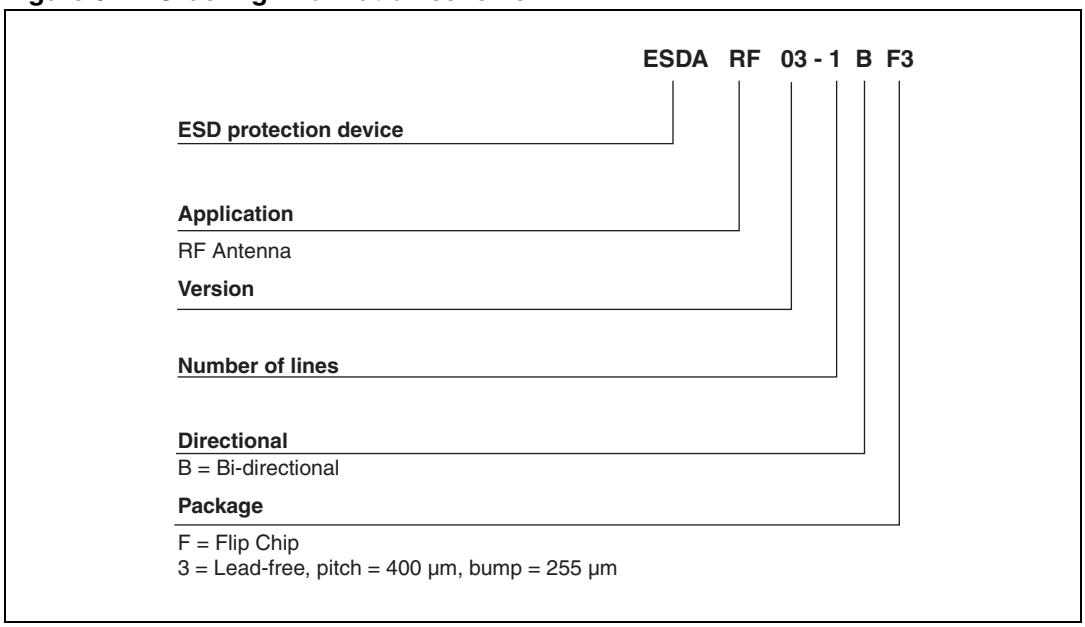



**Figure 8. Relative variation of leakage current versus junction temperature (typical values)**



# 2 Ordering information scheme

**Figure 9. Ordering information scheme**



# 3 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 10. Package dimensions**

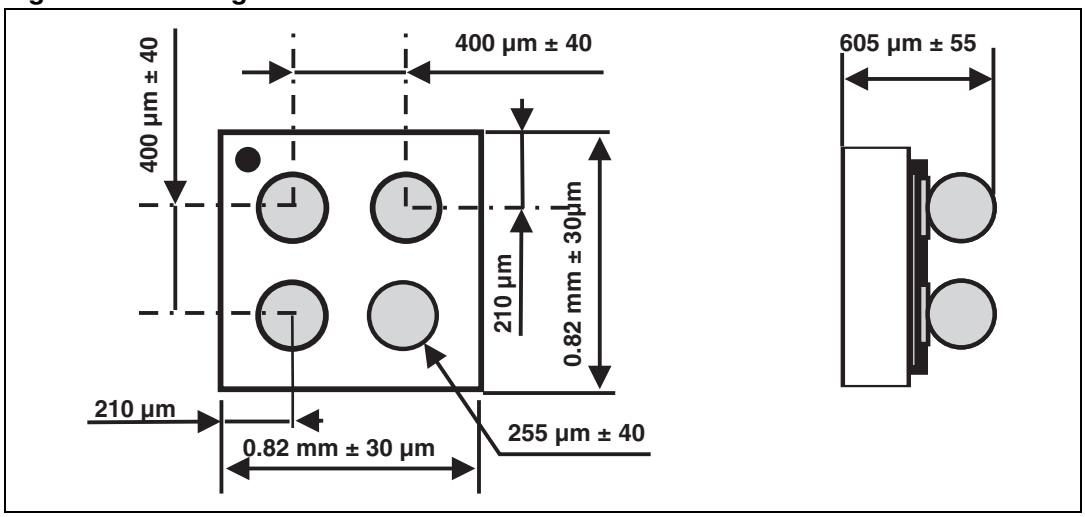



**Figure 11. Footprint recommendations**

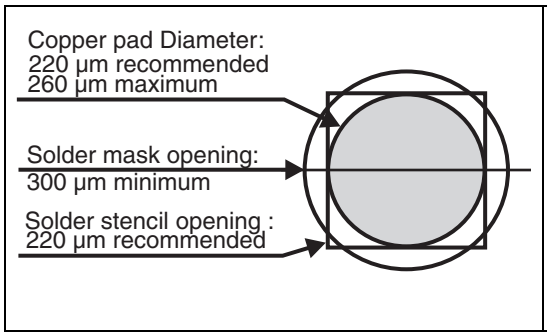



**Figure 12. Marking**

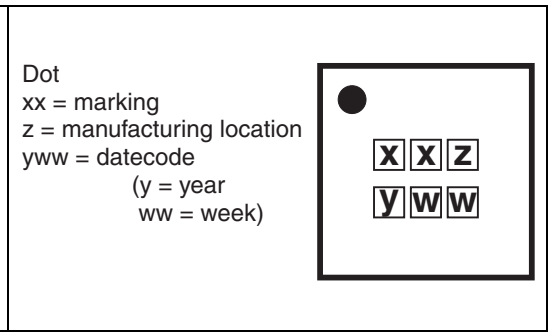
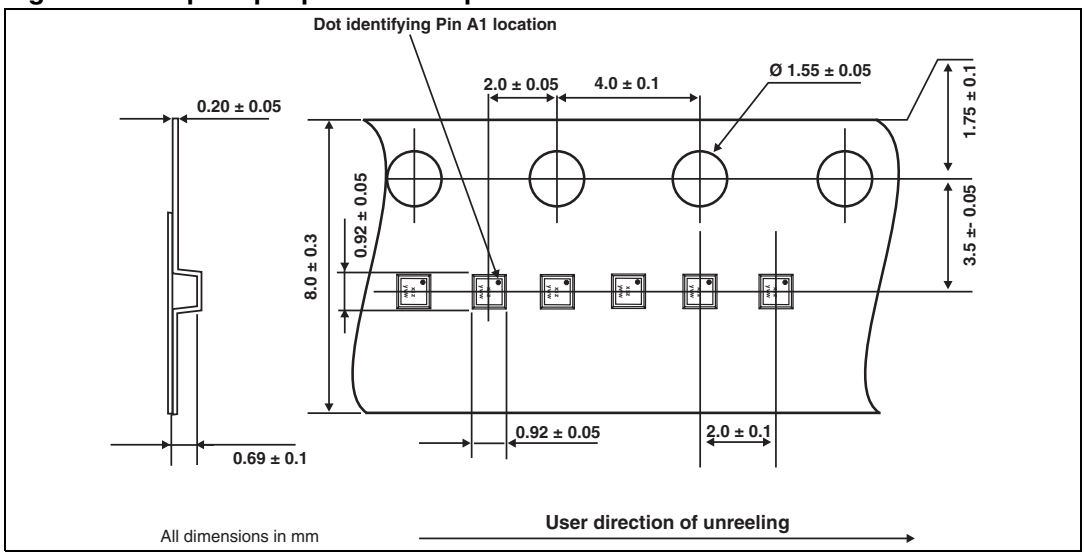


**Figure 13. Flip Chip tape and reel specifications**




*Note: More information is available in the application notes:*
*AN2348: "400 µm Flip Chip: Package description and recommendations for use"*
*AN1751: "EMI Filters: Recommendations and measurements"*

# 4 Ordering information

**Table 3. Ordering information**

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|---|---|---|---|---|---|
| ESDARF03-1BF3 | R3 | Flip Chip | 0.91 mg | 5000 | Tape and reel (7") |

# 5 Revision history

**Table 4. Document revision history**

| Date | Revision | Changes |
|---|---|---|
| 15-Nov-2010 | 1 | Initial release. |

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