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BGF149

High-Speed Mini-/Micro-SD Card ESD Protection and EMI Filter

Datasheet

Rev. 1.3, 2012-06-20
Final

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Revision History Rev. 1.2, 2012-05-11

Page or Item	Subjects (major changes since previous revision)
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Rev. 1.3, 2012-06-20

12	Figure 5-3 updated

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1 SIM Card Interface Filter and USB Interface with ESD Protection

1.1 Features

- Bidirectional ESD protection and EMI filter for High-Speed Mini-/Micro-SD card interface
- ESD protection according to IEC61000-4-2 for ± 15 kV contact discharge on all external IOs
- ESD protection according to IEC61000-4-2 for ± 2 kV contact discharge on all internal IOs
- Very good EMI filtering and very low cross talk due to small package parasitics
- Suitable for high speed applications due to low line capacitance to typical 8 pF
- Very low voltage dependency of line capacitance
- Very low leakage currents
- Integrated pull up resistors to enable proper line biasing
- Application requires very low PCB area using an optimized I/O arrangement
- 400 μm solder ball pitch
- RoHS and WEEE compliant package
- Complies with following standards: SD Card Specification V2.0, MicroSD Card Specification V1.0



1.2 Applications

- SIM Card Interface (Mini, Micro)
- USB Interface

1.3 Description

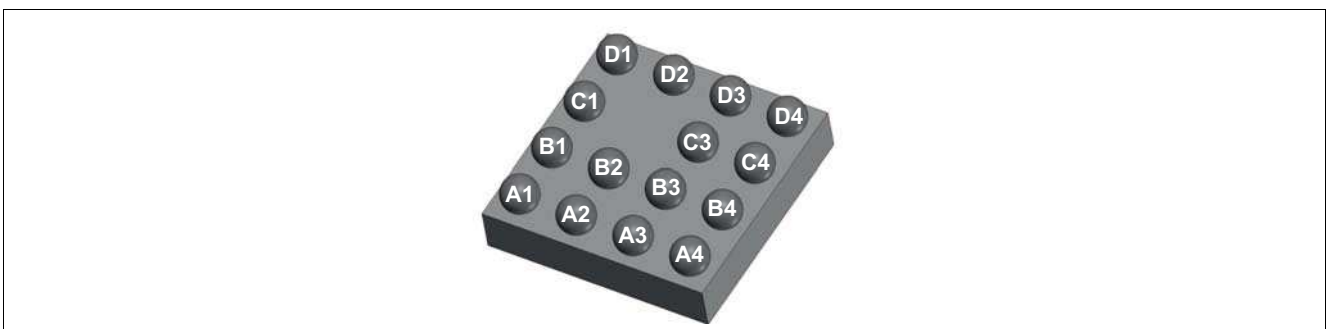


Figure 1-1 Pin connection

The BGF149 is an ESD protection and EMI filter circuit for a high speed multi media card and mini-/micro-SD-interface with integrated pull up resistors. External pins are protected for ± 15 kV contact discharge according to IEC61000-4-2. Due to the low electrical capacitance of each line BGF149 is well suitable for high speed applications. The wafer level package is a green lead-free and halogen-free package with a size of only 1.55 mm x 1.55 mm and a total height of 0.5 mm.

SIM Card Interface Filter and USB Interface with ESD Protection

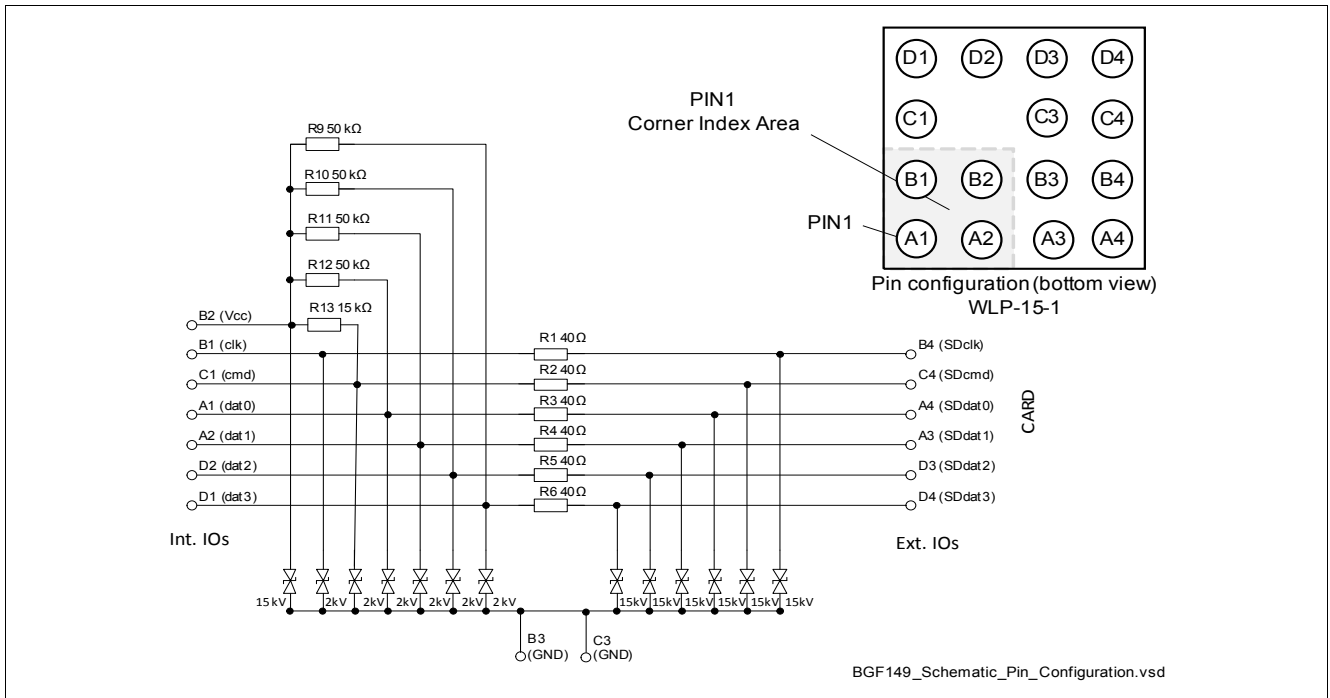


Figure 1-2 Schematic and Pin configuration

Type	Package	Marking	Chip
BGF149	WLP-15-1	49	N0771

2 Electrical Characteristics

Table 2-1 Maximum Ratings $T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Voltage at all pins to GND	V_P	0	-	14	V	
Operating temperature range	T_{OP}	-30	-	+85	$^\circ\text{C}$	
Storage temperature range	T_{STG}	-55	-	+150	$^\circ\text{C}$	
Contact discharge ¹⁾ at internal pins A1, A2, B1, C1, D1, D2 at external pins A3, A4, B2, B4, C4, D3, D4	V_{ESD}	-2 -15	- -	2 15	kV	

 1) V_{ESD} according to IEC61000-4-2 ($R = 330\ \Omega$, $C = 150\ \text{pF}$)

Attention: Stresses above the max. values listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. Maximum ratings are absolute ratings; exceeding only one of these values may cause irreversible damage to the integrated circuit.

Table 2-2 Electrical Characteristics $T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Resistors $R_1 \dots R_6$ $R_9 \dots R_{12}$ R_{13}	R	36 45 13.5	40 50 15	44 55 16.5	Ω k Ω k Ω	
Reverse current of ESD diodes	I_R	-	5	100	nA	$V_R = 3\ \text{V}$
Breakdown voltage of ESD diodes ¹⁾	V_{BR}	-	18.5 -12.5	-	V	$I_R = 1\ \text{mA}$ $I_R = -1\ \text{mA}$
Line capacitance ²⁾	C_L	6	8	12	pF	$V_R = 0\ \text{V}$

1) Current forced after snap-back

2) B2 connected to GND for measurement

3 Typical Characteristics

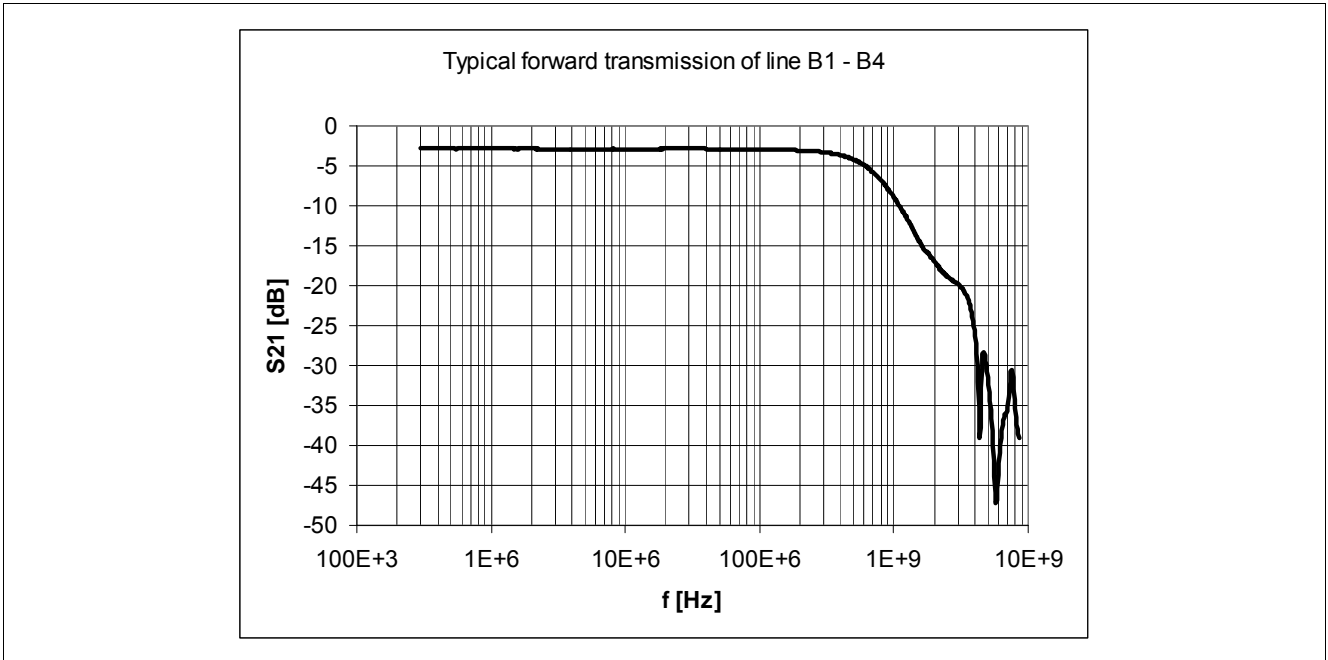


Figure 3-1 Typical filter characteristics of one filter channel ($Z_S = Z_L = 50 \Omega$, $V_R = 0$ V)

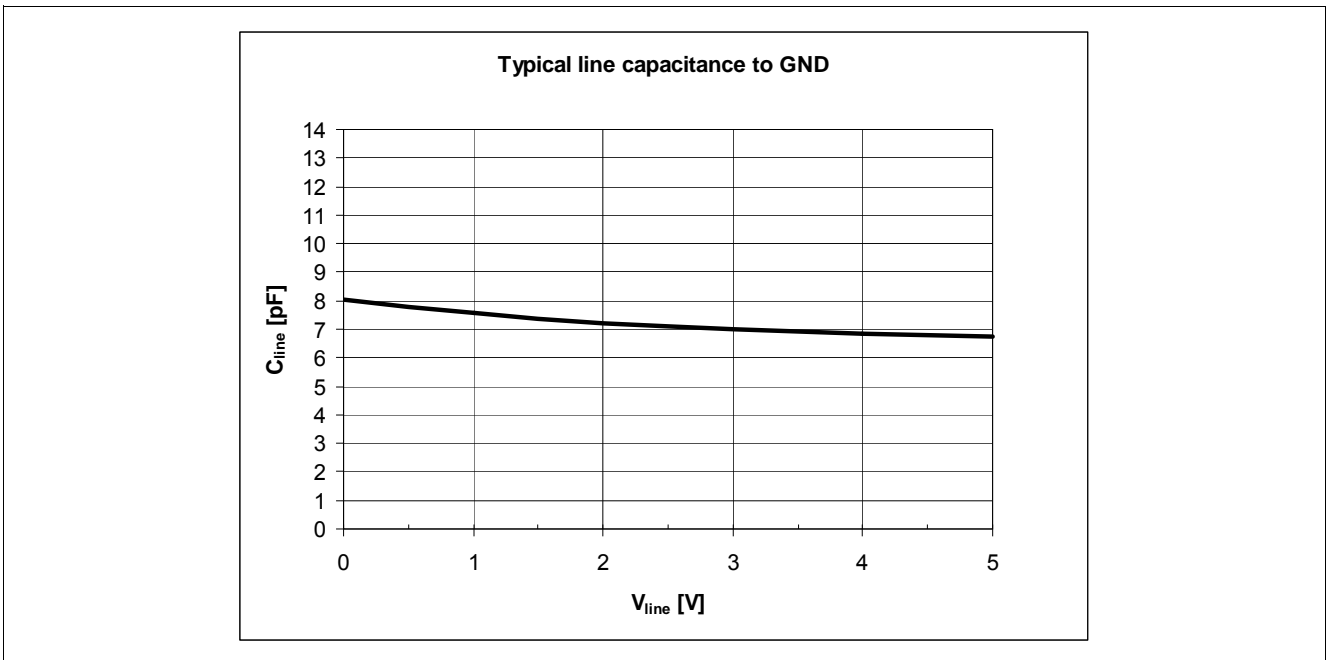


Figure 3-2 Typical line capacitance versus bias voltage

4 Application and Signal Routing

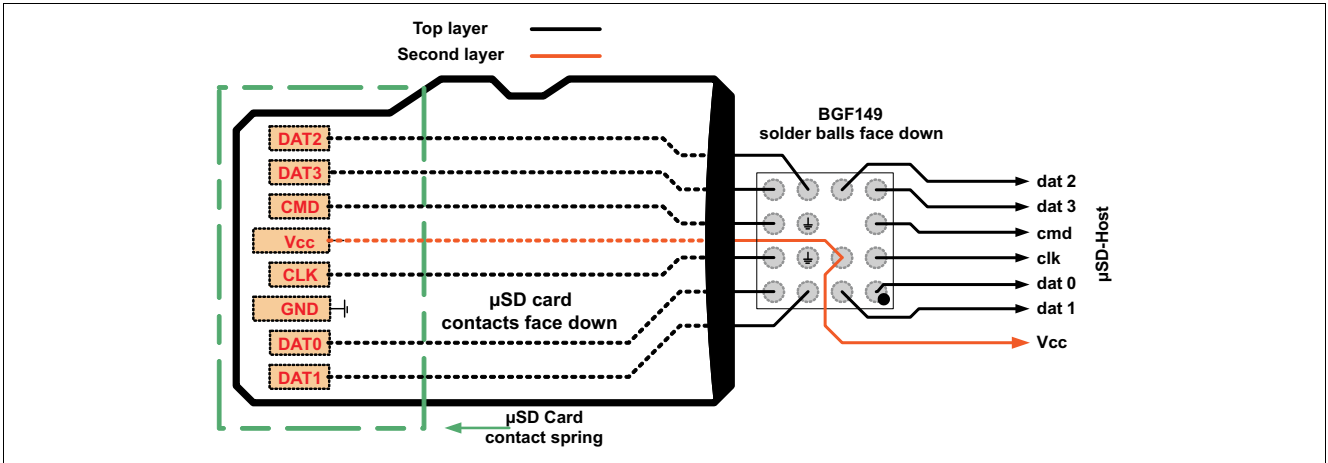


Figure 4-1 Application example with signal routing

Pull-up resistors for the data and command lines are integrated in BGF149 (R9 to R13) to prevent bus floating in case no card is inserted or all card drivers are in high impedance mode.

5 Package

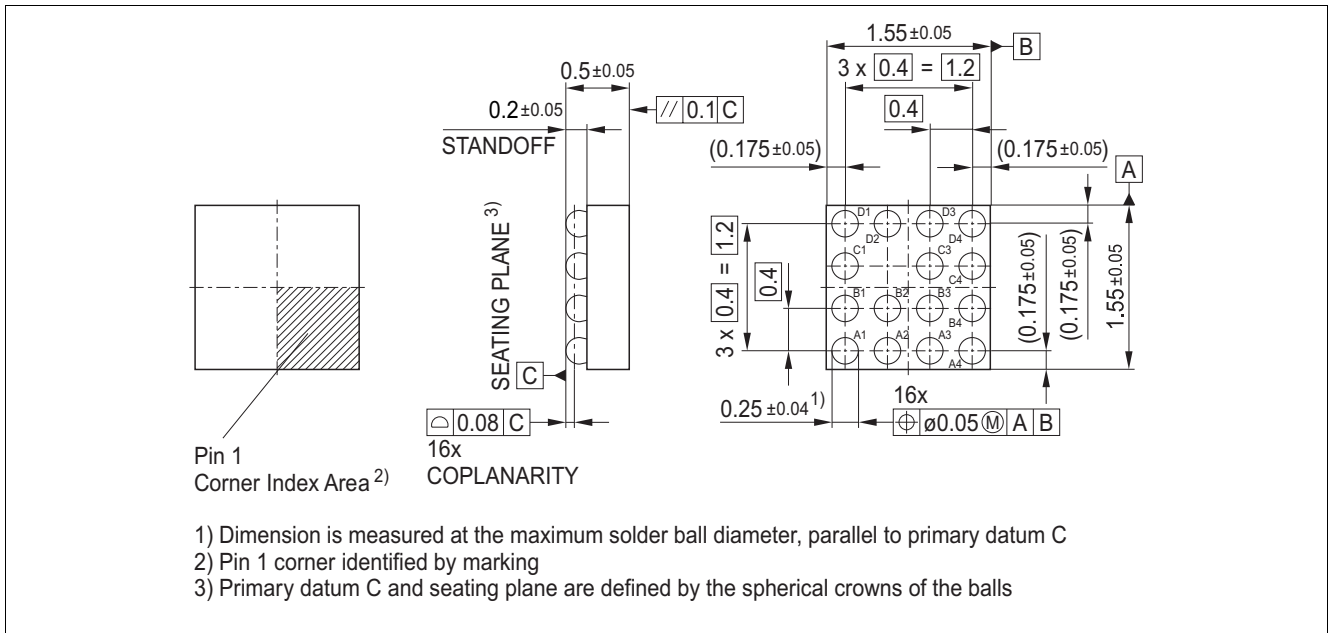


Figure 5-1 Package outline for WLP-15-1 (dimension in mm)

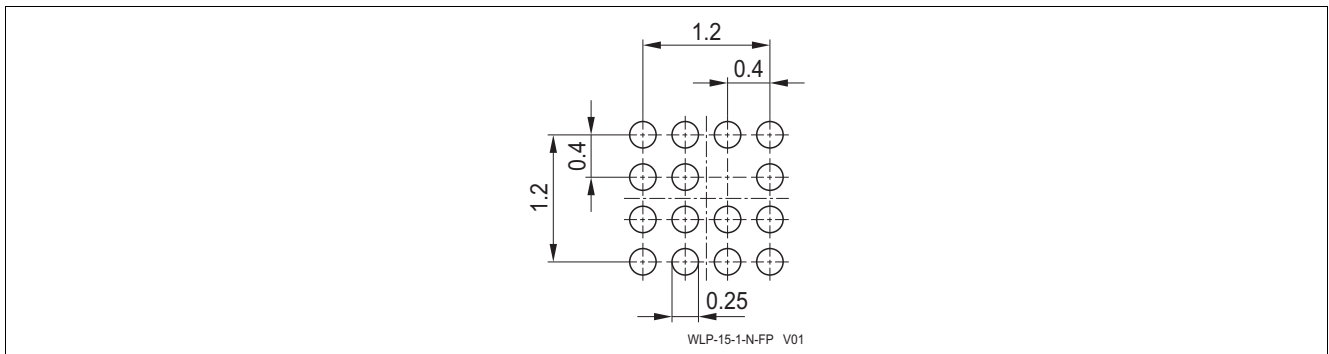


Figure 5-2 Package footprint for WLP-15-1 (dimension in mm)

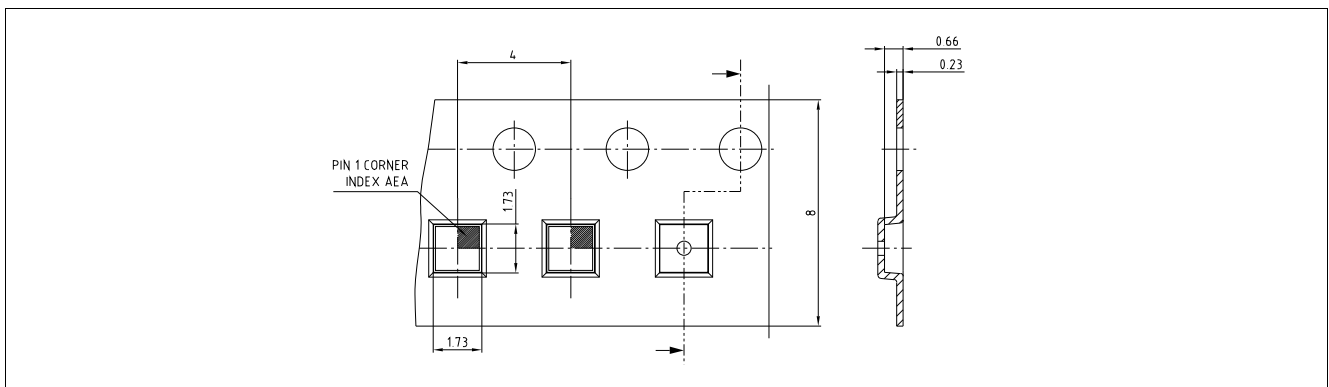


Figure 5-3 Tape and Reel Information for WLP-15-1 (dimension in mm)

Terminology

C_L	Line capacitance
EMI	Electromagnetic interference
ESD	Electrostatic Discharge
GND	Ground
I_R	Reverse current
R	Resistance
RoHs	Restriction of Hazardous Substance directive
PCB	Printed circuit board
S_{21}	Forward transmission coefficient in 50 Ohm-system
SIM	Subscriber Identity Module
T_A	Ambient temperature
T_{OP}	Operation temperature
T_{stg}	Storage temperature
TVS	Transparent Voice Signalling
USB	Universal Serial Bus
V_{BR}	Breakdown voltage
V_{ESD}	Electrostatic discharge voltage
V_F	Forward voltage
V_P	Voltage at all pind to GND
V_R	Reverse voltage
WEEE	Waste Electrical and Electronic Equipment

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