# BGF117

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

# **RF & Protection Devices**



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# BGF117

Revision History: 2010-01-15, V2.0

Previous Version:2009-09-28, V1.2

Subjects (major changes since last revision)
Target status removed



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

# 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 of 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



WLP-16-4-N



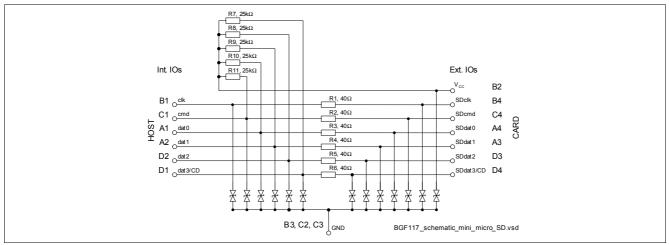


Figure 1 Schematic

#### Description

BGF117 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 BGF117 is well suited 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 0.6 mm.

Туре	Package	Marking	Chip
BGF117	WLP-16-4	17	N0740



# Table 1 Maximum Ratings

Parameter	Symbol	Values			Unit	Note /
		Min.	Тур.	Max.		Test Condition
Voltage at all pins to GND	VP	0		5.5	V	
Operating temperature range	T <sub>OP</sub>	-40		+85	°C	
Storage temperature range	T <sub>STG</sub>	-65		+150	°C	
Electrostatic Discharge According to IEC	61000-4-2		<u>-</u>			
External IOs: A3, A4, B2, B4, C4, D3, D4	VE	-15		15	kV	Contact discharge
Internal IOs: A1, A2, B1, C1, D1, D2	V	-2		2	kV	Contact discharge

## Table 2 Electrical Characteristics<sup>1)</sup>

Parameter	Symbol	Values			Unit	Note /
		Min.	Тур.	Max.		Test Condition
Resistors $R_1R_6$	R <sub>16</sub>	36	40	44	Ω	
Resistors $R_7R_{11}$	R <sub>711</sub>	20	25	30	kΩ	
Reverse current of ESD protection diodes	IR		5	100	nA	V <sub>R</sub> = 3 V
Breakdown voltage of ESD diodes <sup>2)</sup>	$V_{(BR)}$	-	18.5 -12.5	-	V	$I_{(BR)}$ = 1 mA $I_{(BR)}$ = -1 mA
Line capacitance <sup>3)</sup> Capacitance of each line to GND	CT		8	9.5	pF	$V_{\rm R} = 0 \rm V$

1) at *T*<sub>A</sub> = 25 °C

2) After snap-back

3) B2 is connected to GND for measurement



# **Typical electrical characteristics**

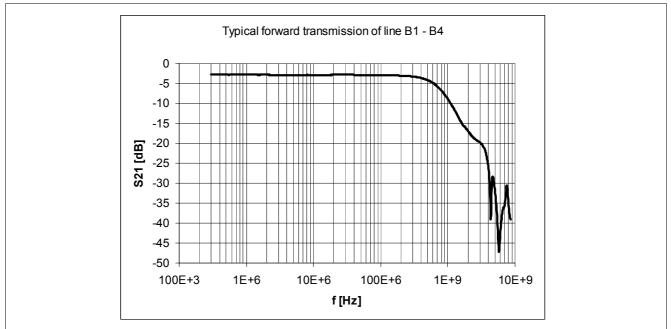


Figure 2 Typical filter characteristics of one filter channel ( $Z_s = Z_L = 50$  Ohm,  $V_R = 0V$ )

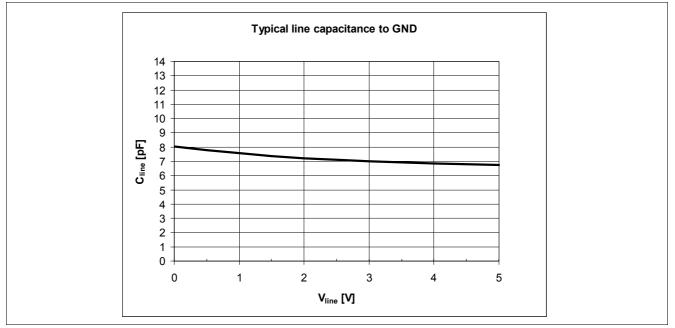


Figure 3 Typical line capacitance versus bias voltage



# Application & signal routing

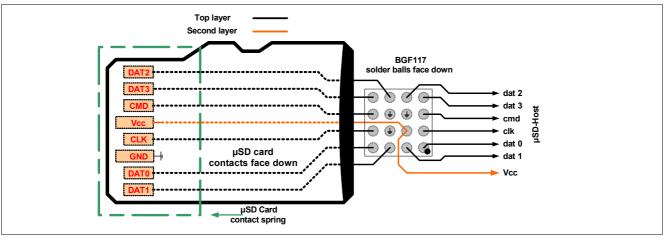
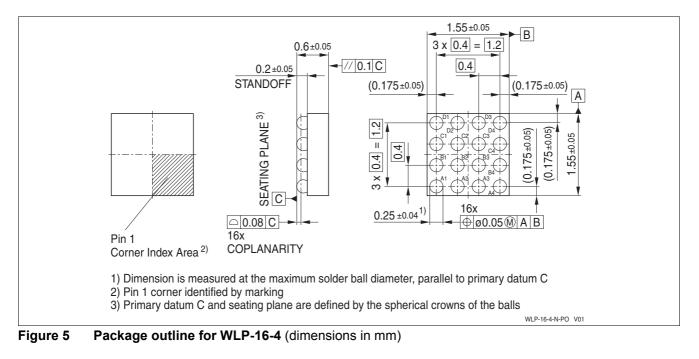


Figure 4 Application example with signal routing

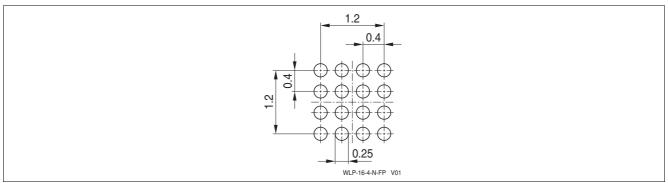
Pull-up resistors for the data and command lines are integrated in BGF117 (R7 to R11) to prevent bus floating in case no card is inserted or all card drivers are in high impedance mode.

# Package outline





# Footprint





#### Таре

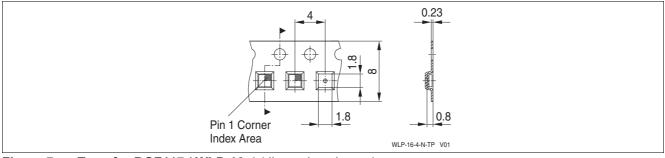


Figure 7 Tape for BGF117 / WLP-16-4 (dimensions in mm)