SGM05FB4D2
Ultra-Low Capacitance 4-Channel ESD Protection

GENERAL DESCRIPTION

The SGM05FB4D2 is an ultra-low capacitance ESD protection device. As a new generation TVS, it is applied to protect circuits from electrostatic discharge.

FEATURES

- **High ESD Withstand Voltage:**
  IEC 61000-4-2: ±17kV (Air)
  IEC 61000-4-2: ±15kV (Contact)
- **Low Profile Package: UTDFN-2.5×1-10AL**
- **Working Voltage: 5V and Below**
- **Rated Peak Pulse Current: 2.4A**
- **Channel Input Capacitance: 0.3pF (TYP)**

APPLICATIONS

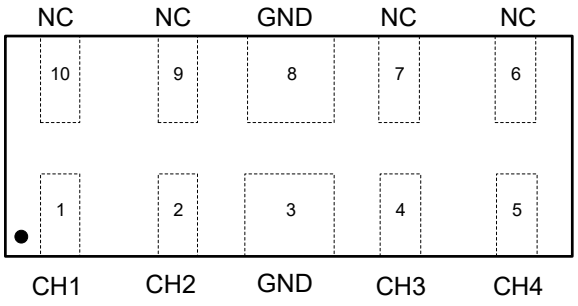
HDMI
USB3.0
DisplayPort Interface
IEEE 1394
10/100Mbit/s Ethernet
Desktop and Notebooks

PRODUCT SUMMARY

V_{RWM} (MAX)	I_{PPM} (TYP)	C_{IN} (TYP)
5V	2.4A	0.3pF

PIN CONFIGURATION

(TOP VIEW)



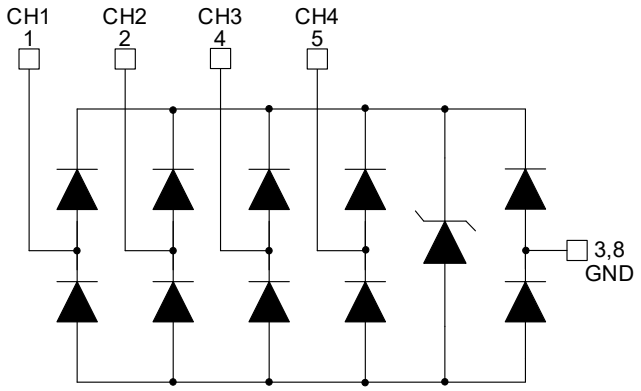
UTDFN-2.5×1-10AL

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNITS
Peak Pulse Current (t_P: 8/20μs)	I_{PPM}	2.4	A
ESD IEC 61000-4-2 (Air)	V_{ESD}	±17	kV
ESD IEC 61000-4-2 (Contact)		±15	
Operating Temperature Range	T_{OP}	-40 to +125	℃
Storage Temperature Range	T_{STG}	-55 to +150	℃
Lead Temperature (Soldering, 10s)		+260	℃

Stresses beyond those listed in Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

EQUIVALENT CIRCUIT

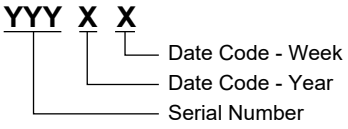


PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM05FB4D2	UTDFN-2.5×1-10AL	-40℃ to +125℃	SGM05FB4D2XUGX10G/TR	09ZXX	Tape and Reel, 3000

MARKING INFORMATION

NOTE: XX = Date Code.



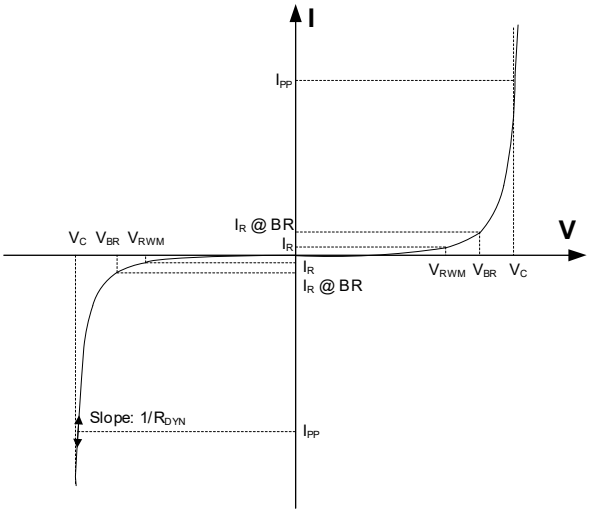
Green (RoHS & HSF): SG Micro Corp defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your SGMICRO representative directly.

DISCLAIMER

SG Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.

ELECTRICAL PARAMETERS

SYMBOL	PARAMETER
V_{RWM}	Reverse Stand-Off Voltage
V_{BR}	Reverse Breakdown Voltage
I_R	Reverse Leakage Current
I_R @ BR	Reverse Leakage Current @ Breakdown
V_C	Clamping Voltage @ I_{PP}
I_{PP}	Peak Pulse Current
R_{DYN}	Dynamic Resistance



ELECTRICAL CHARACTERISTICS

(T_A = +25℃, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Reverse Stand-Off Voltage	V_{RWM}	Pin 1, 2, 4, 5 to pin 3, 8 = GND			5	V
Reverse Breakdown Voltage	V_{BR}	I_R = 1mA, pin 1, 2, 4, 5 to pin 3, 8 = GND	6	7.2	8.5	V
Reverse Leakage Current	I_R	$V_{P1,P2,P4,P5}$ = 5V, $V_{P3,P8}$ = GND			500	nA
Channel Input Capacitance	C_{IN}	V_R = 0V, f = 1MHz, I/O to GND		0.3	0.4	pF
Channel to Channel Capacitance	C_{XTALK}	V_R = 0V, f = 1MHz, I/O to I/O		0.3		pF
Surge Clamping Voltage (1)	$V_{C-SURGE}$	I_{PPM} = 2.4A		11.6		V
ESD Clamping Voltage (2)	V_C	I_{TLP} = 8A (Equivalent IEC61000-4-2 Contact + 4kV)		15.4		V
		I_{TLP} = 16A (Equivalent IEC61000-4-2 Contact + 8kV)		22.5		V
Dynamic Resistance (2)	R_{DYN}	t_P = 100ns		0.89		Ω

NOTES:

1. Non-repetitive current pulse 8/20μs exponential decay waveform according to IEC 61000-4-5, 2Ω source impedance.
2. Non-repetitive current pulse, transmission line pulse (TLP) t_P = 100ns; square pulse.

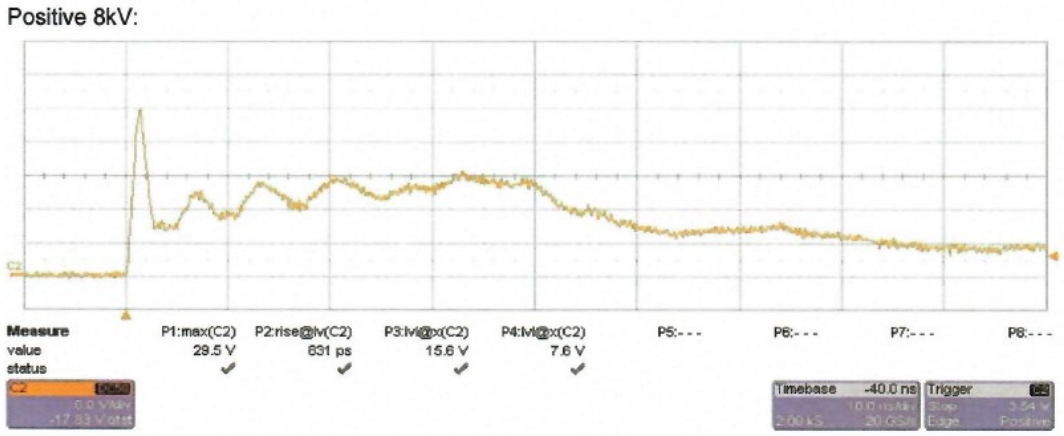


Figure 1. Typical Pulses ESD 8kV Contact per IEC 61000-4-2

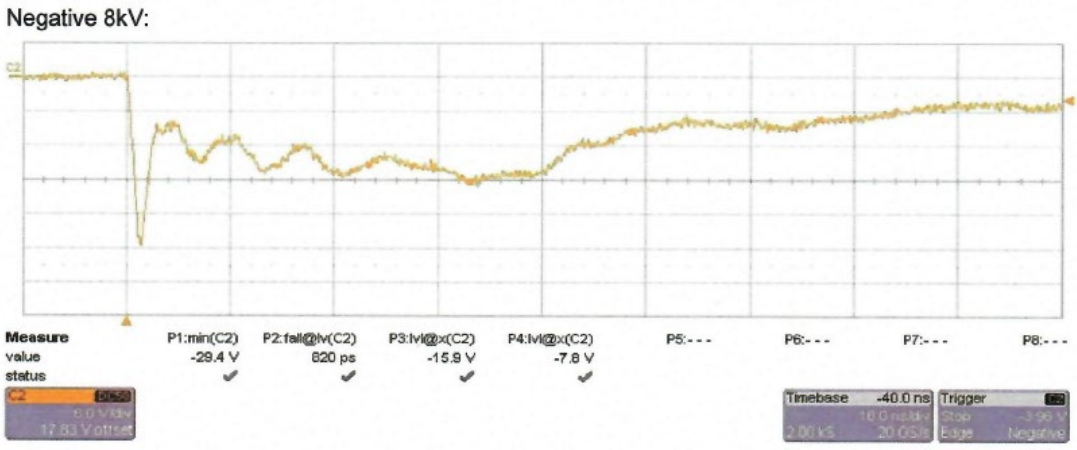
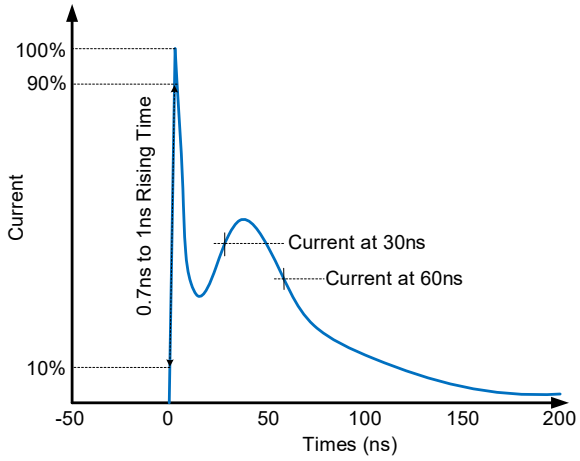


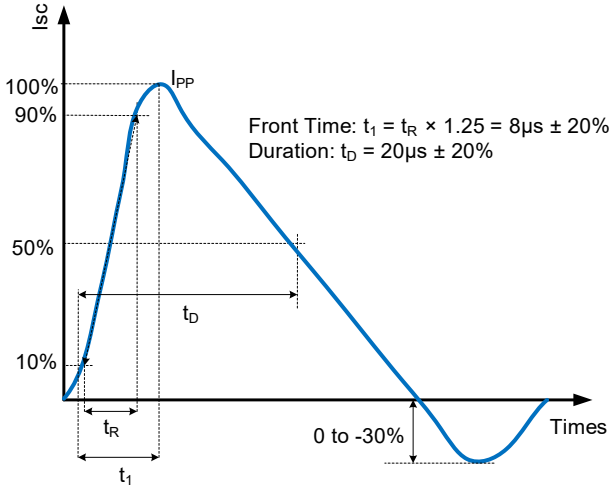
Figure 2. Typical Pulses ESD -8kV Contact per IEC 61000-4-2

TYPICAL PERFORMANCE CHARACTERISTICS

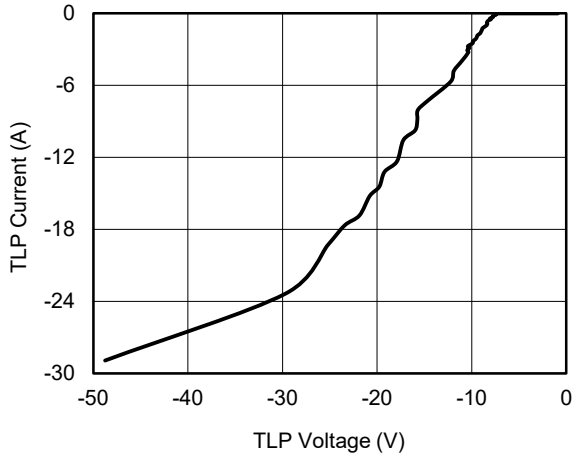
ESD Pulse Waveform per IEC 61000-4-2



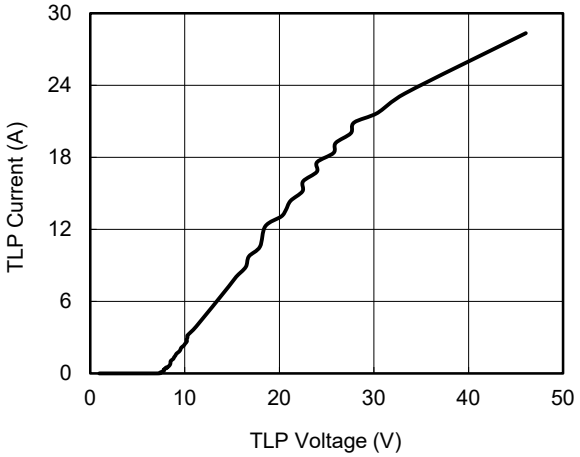
8/20μs Waveform per IEC 61000-4-5



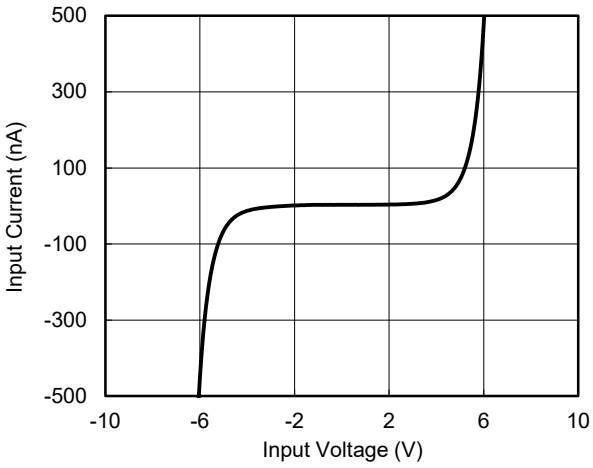
TLP_ I/O Pin (-) to GND Pin (+)



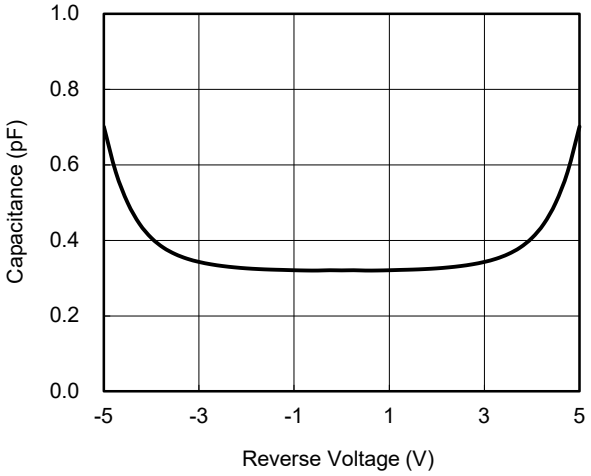
TLP_I/O Pin (+) to GND Pin (-)



IV Curve



Capacitance vs. Reverse voltage



APPLICATION INFORMATION

The SGM05FB4D2 is applied to keep four data lines protect from transient over-voltage like ESD stress pulse. The four protected data lines are connected to the protection pin 1, pin 2, pin 4 and pin 5. The pin 3 and pin 8 are the negative pins connect to GND.

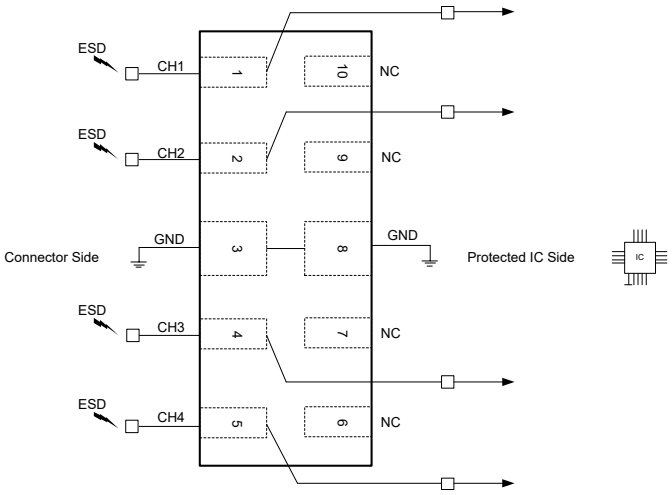


Figure 3. Application Diagram

The recommended guidelines are as follows:

1. **TVS Placement**
   Place the TVS as close as possible to the input connector.
2. **TVS's Trace Layout**
   Avoid running protected traces in parallel with unprotected traces.
   Minimize the path length between the TVS and the protected line.
   Minimize parallel signal path length.
   Route the protected traces as straight as possible.
3. **GND Layout**
   Avoid using a common ground point shared with the TVS transient return path.
   Minimize the length of the TVS transient return path to ground.
   Use ground vias as close as possible to the TVS transient return to ground.

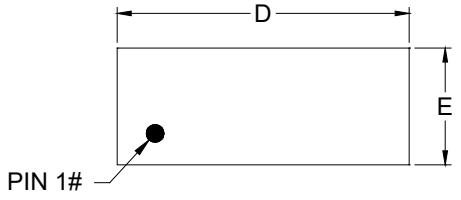
REVISION HISTORY

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

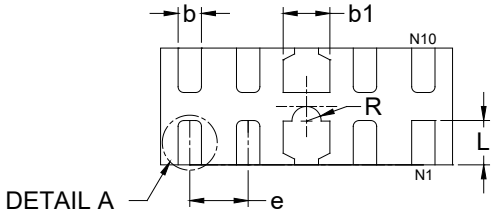
Changes from Original (APRIL 2024) to REV.A	Page
Changed from product preview to production data	All

PACKAGE OUTLINE DIMENSIONS

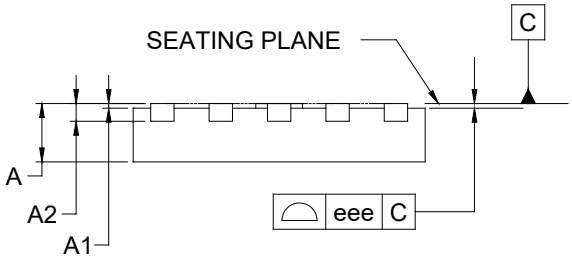
UTDFN-2.5×1-10AL



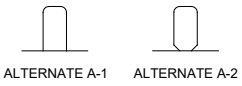
TOP VIEW



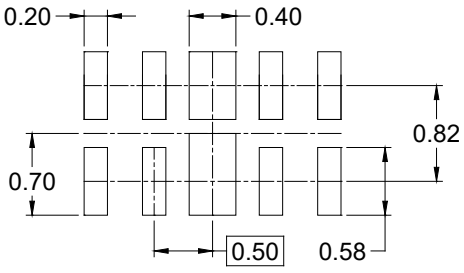
BOTTOM VIEW



SIDE VIEW



DETAIL A
ALTERNATE TERMINAL CONSTRUCTION



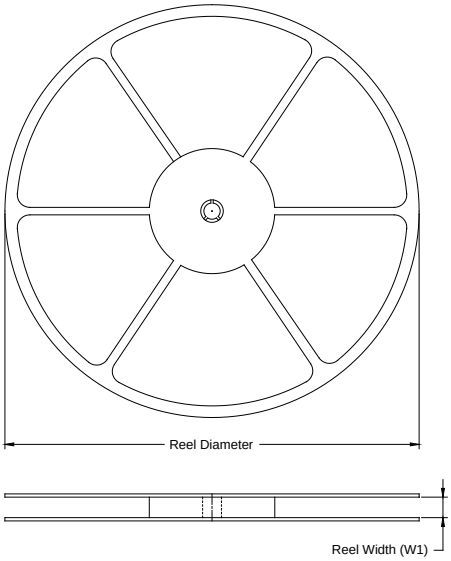
RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Dimensions In Millimeters		
	MIN	MOD	MAX
A	0.450	-	0.550
A1	0.000	-	0.050
A2	0.150 REF		
b	0.150	-	0.250
b1	0.350	-	0.450
D	2.400	-	2.600
E	0.900	-	1.100
e	0.500 BSC		
L	0.280	-	0.480
R	0.075	-	0.175
eee	0.050		

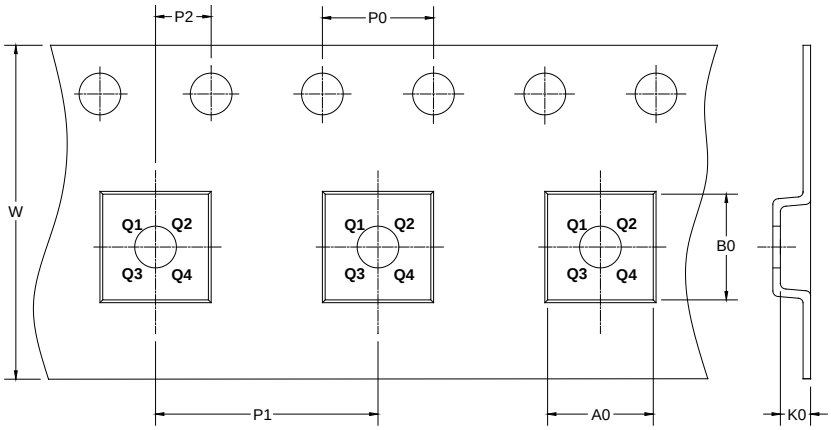
NOTE: This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



DIRECTION OF FEED

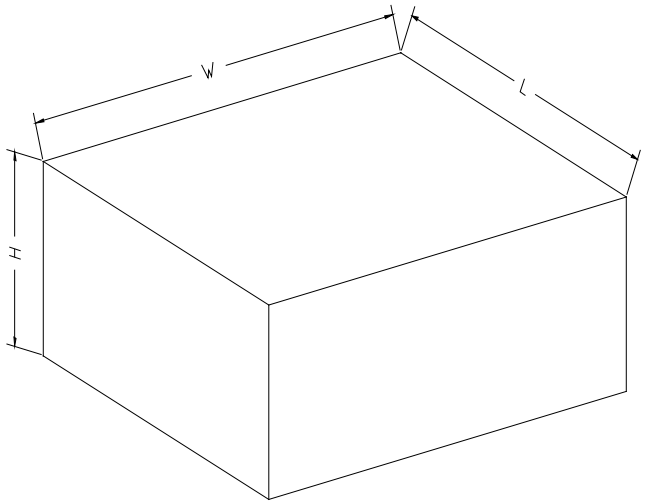
NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
UTDFN-2.5×1-10AL	7"	8.6	1.25	2.70	0.70	4.0	4.0	2.0	8.0	Q1

DD0001

CARTON BOX DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF CARTON BOX

Reel Type	Length (mm)	Width (mm)	Height (mm)	Pizza/Carton
7″ (Option)	368	227	224	8
7″	442	410	224	18

DD0002