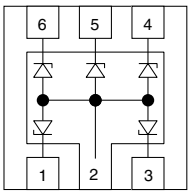
5-Line ESD Protection Diode Array in LLP75-6L



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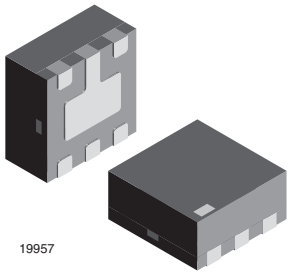

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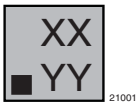
FEATURES

- Ultra compact LLP75-6L package
- Low package profile < 0.6 mm
- 5-line ESD protection
- Low leakage current I_R < 0.1 µA
- Low load capacitance of typ. 43 pF at V_R = 0 V
- ESD immunity acc. IEC 61000-4-2
  ± 30 kV contact discharge
  ± 30 kV air discharge
- Working voltage range V_{RWM} = 5 V
- e4 - precious metal (e.g. Ag, Au, NiPd, NiPdAu) (no Sn)
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free
e4
RoHS COMPLIANT
HALOGEN FREE
GREEN (5-2008)

MARKING (example only)



Dot = pin 1 marking
XX = date code
YY = type code (see table below)

DESIGN SUPPORT TOOLS

click logo to get started

3D Models Available

ORDERING INFORMATION			
DEVICE NAME	ORDERING CODE	TAPED UNITS PER REEL (8 mm TAPE ON 7" REEL)	MINIMUM ORDER QUANTITY
GMF05LC-HSF	GMF05LC-HSF-GS08	3000	15 000

PACKAGE DATA						
DEVICE NAME	PACKAGE NAME	TYPE CODE	WEIGHT	MOLDING COMPOUND FLAMMABILITY RATING	MOISTURE SENSITIVITY LEVEL	SOLDERING CONDITIONS
GMF05LC-HSF	LLP75-6L	1B	4.2 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	Peak temperature max. 260 °C

ABSOLUTE MAXIMUM RATINGS GMF05LC-HSF					
PARAMETER	TEST CONDITIONS		SYMBOL	VALUE	UNIT
Peak pulse current	BiAs-mode: each input (pin 1; 3 to pin 6) to ground (pin 2); acc. IEC 61000-4-5; t_p = 8/20 µs; single shot		I_{PPM}	5	A
Peak pulse power	BiAs-mode: each input (pin 1; 3 to pin 6) to ground (pin 2); acc. IEC 61000-4-5; t_p = 8/20 µs; single shot		P_{PP}	70	W
ESD immunity	BiAs-mode: each input (pin 1; 3 to pin 6) to ground (pin 2); acc. IEC 61000-4-2; 10 pulses	Contact discharge	V_{ESD}	± 30	kV
		Air discharge		± 30	kV
Operating temperature	Junction temperature		T_J	-55 to +125	°C
Storage temperature			T_{STG}	-55 to +150	°C

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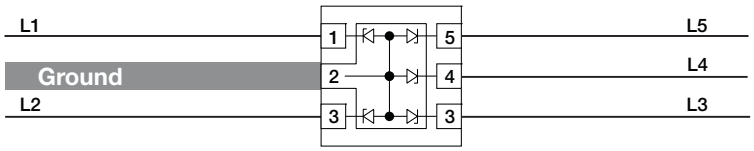
BiAs-MODE (5-line bidirectional asymmetrical protection mode)

With the GMF05LC-HSF up to 5 signal- or data-lines (L1 to L5) can be protected against voltage transients. With pin 2 connected to ground and pin 1; pin 3 up to pin 6 connected to a signal- or data-line which has to be protected. As long as the voltage level on the data- or signal-line is between 0 V (ground level) and the specified maximum reverse working voltage (V_{RWM}) the protection diode between data-line and ground offer a high isolation to the ground line. The protection device behaves like an open switch.

As soon as any positive transient voltage signal exceeds the break through voltage level of the protection diode, the diode becomes conductive and shorts the transient current to ground. Now the protection device behaves like a closed switch. The clamping voltage (V_C) is defined by the breakthrough voltage (V_{BR}) level plus the voltage drop at the series impedance (resistance and inductance) of the protection device.

Any negative transient signal will be clamped accordingly. The negative transient current is flowing in the forward direction of the protection diode. The low forward voltage (V_F) clamps the negative transient close to the ground level.

Due to the different clamping levels in forward and reverse direction the GMF05LC-HSF clamping behavior is bidirectional and asymmetrical (BiAs).



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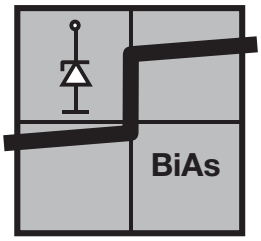


ELECTRICAL CHARACTERISTICS GMF05LC-HSF						
PARAMETER	**TEST CONDITIONS/REMARKS**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Protection paths	Number of lines which can be protected	$N_{channel}$	-	-	5	lines
Reverse stand-off voltage	at I_R = 1 µA	V_{RWM}	-	-	5	V
Reverse current	at V_R = V_{RWM} = 5 V	I_R	-	0.01	0.1	µA
Reverse breakdown voltage	at I_R = 1 mA	V_{BR}	6	-	8	V
Reverse clamping voltage	at I_{PP} = 1 A acc. IEC 61000-4-5	V_C	-	8	9.5	V
	at I_{PP} = I_{PPM} = 5 A acc. IEC 61000-4-5		-	11.5	12.5	V
Forward clamping voltage	at I_F = 1 A acc. IEC 61000-4-5	V_F	-	1.5	2	V
	at I_{PP} = I_{PPM} = 5 A acc. IEC 61000-4-5		-	3.1	4	V
Capacitance	at V_R = 0 V; f = 1 MHz	C_D	-	43	50	pF
	at V_R = 2.5 V; f = 1 MHz		-	25	-	pF

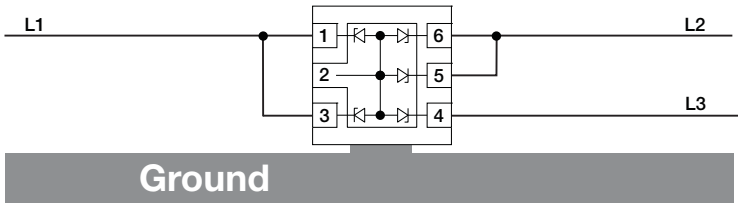
Note

- Ratings at 25 °C ambient temperature, unless otherwise specified. BiAs mode: each input (pin 1, 2, 3, to 6) to ground (pin 2).

If a higher surge current or peak pulse current (I_{PP}) is needed, some protection diodes in the GMF05LC-HSF can also be used in parallel in order to “multiply” the performance.

If two diodes are switched in parallel you get

- double surge power = double peak pulse current (2 x I_{PPM})
- half of the line inductance = reduced clamping voltage
- half of the line resistance = reduced clamping voltage
- double line capacitance (2 x C_D)
- double reverse leakage current (2 x I_R)



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TYPICAL CHARACTERISTICS

T_{amb} = 25 °C, unless otherwise specified

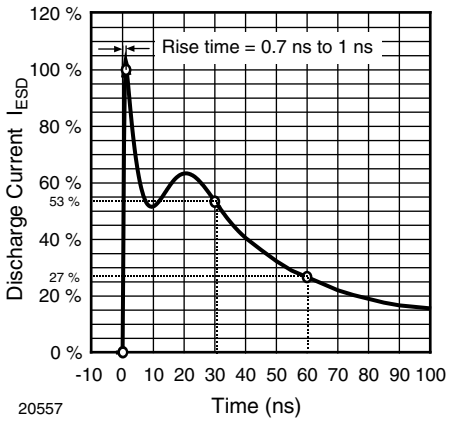

Fig. 1 - ESD Discharge Current Wave Form acc. IEC 61000-4-2 (330 Ω/150 pF)

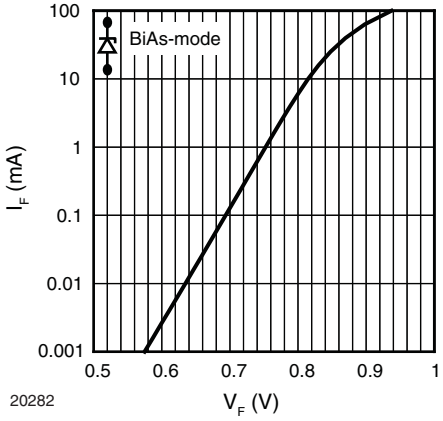

Fig. 4 - Typical Forward Current I_F vs. Forward Voltage V_F

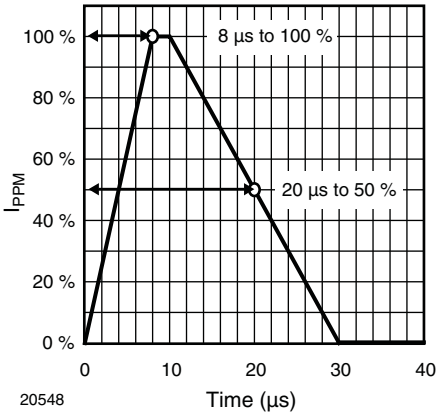

Fig. 2 - 8/20 µs Peak Pulse Current Wave Form acc. IEC 61000-4-5

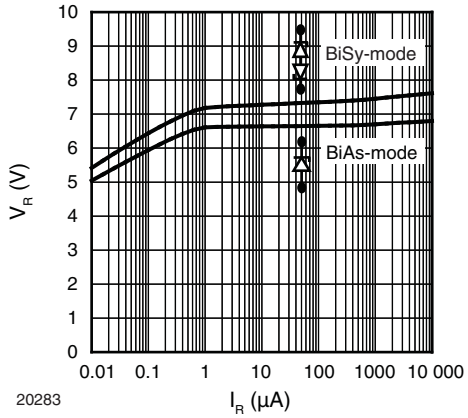

Fig. 5 - Typical Reverse Voltage V_R vs. Reverse Current I_R

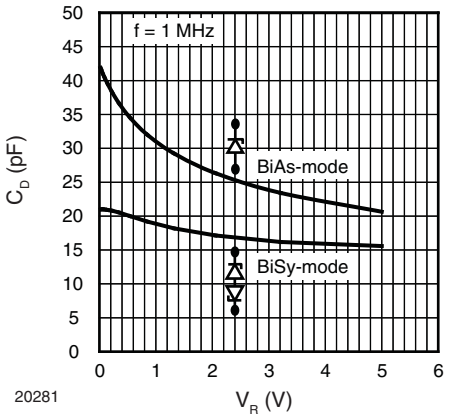

Fig. 3 - Typical Capacitance C_D vs. Reverse Voltage V_R

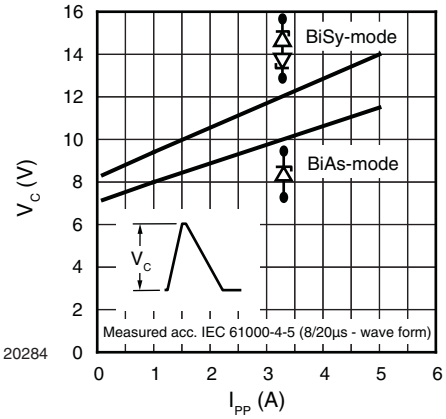

Fig. 6 - Typical Peak Clamping Voltage V_C vs. Peak Pulse Current I_{PP}

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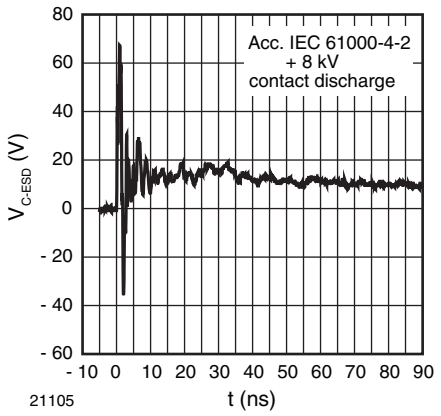

Fig. 7 - Typical Clamping Performance at + 8 kV Contact Discharge (acc. IEC 61000-4-2)

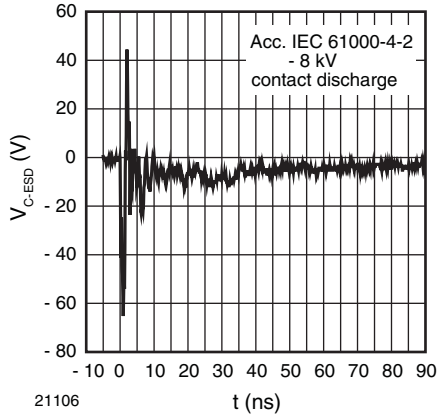

Fig. 8 - Typical Clamping Performance at - 8 kV Contact Discharge (acc. IEC 61000-4-2)

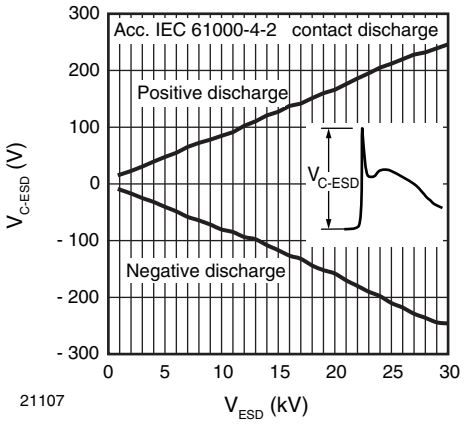

Fig. 9 - Typical Peak Clamping Voltage at ESD Contact Discharge (acc. IEC 61000-4-2)

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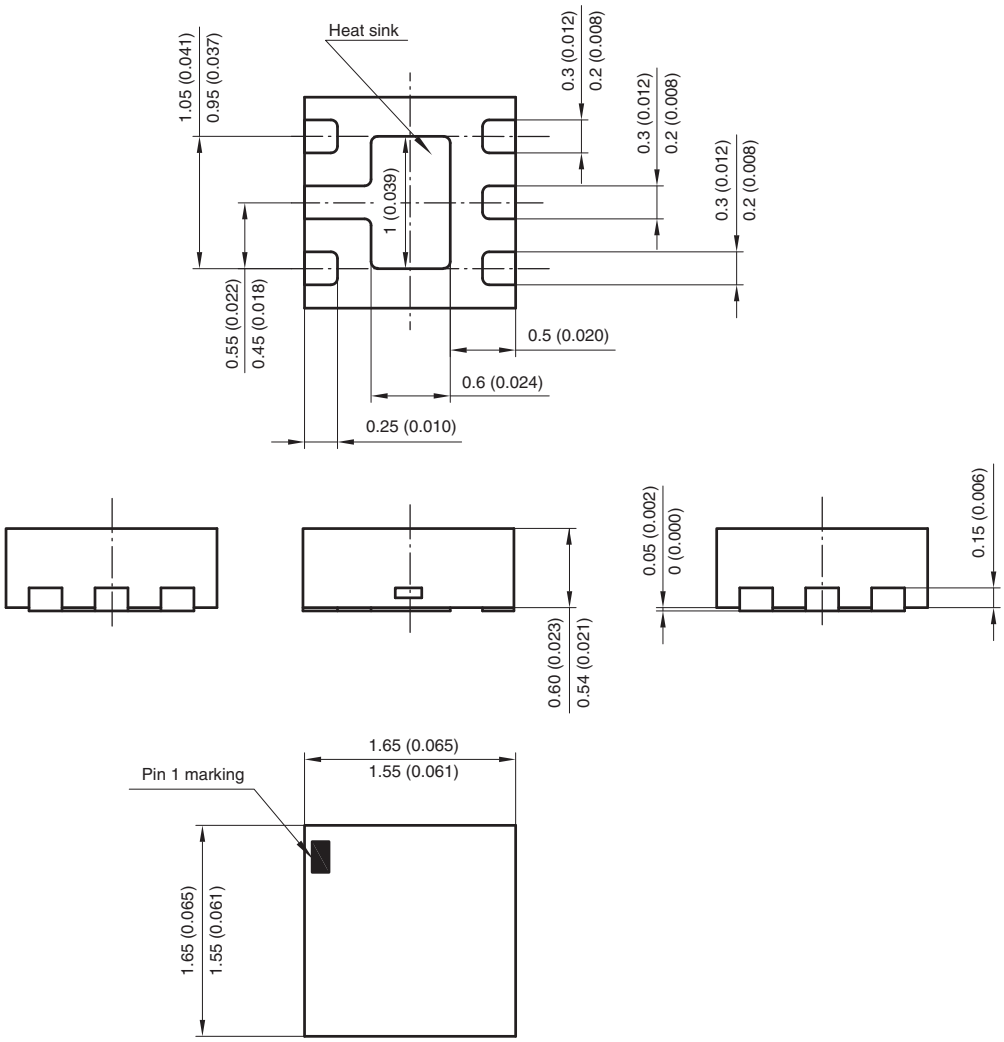
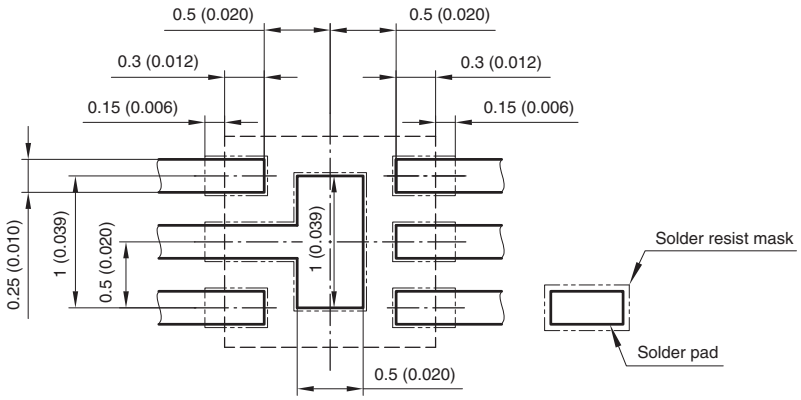
PACKAGE DIMENSIONS in millimeters (inches): **LLP75-6L**



Foot print recommendation:



Document no.:S8-V-3906.02-010 (4)
Created - Date: 04. MAY 2005
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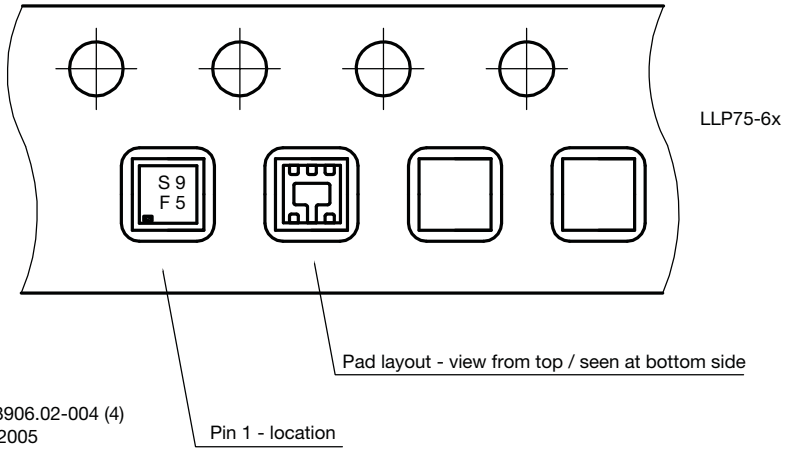

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