4-Channel LCR - EMI-Filter with ESD-Protection

Features

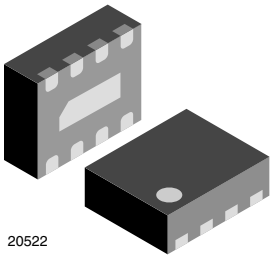
- Ultra compact LLP1713-9L package
- Low package profile of 0.6 mm
- 4-channel LC EMI-filter
- Low leakage current
- Line inductance L_S = 10 nH
- Low line resistance R_S = 12 Ω
- Typical cut off frequency f_{3dB} = 150 MHz
- ESD-protection acc. IEC 61000-4-2
  - ± 25 kV contact discharge
  - ± 25 kV air discharge
- Compliant to RoHS 2002/95/EC directive and in accordance to WEEE 2002/96/EC

Pb-free

e3

RoHS COMPLIANT

GREEN (5-2008)**



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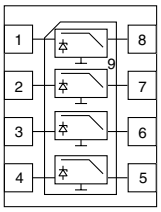

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Marking (example only)

20719

Dot = Pin 1 marking
Y = Type code (see table below)
XX = Date code

Ordering Information

Device name	Ordering code	Taped units per reel (8 mm tape on 7" reel)	Minimum order quantity
VEMI45LA-HNH	VEMI45LA-HNH-G-08	3000	15 000

Package Data

Device name	Package name	Marking code	Weight	Molding compound flammability rating	Moisture sensitivity level	Soldering conditions
VEMI45LA-HNH	LLP1713-9L	H	3.7 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	260 °C/10 s at terminals

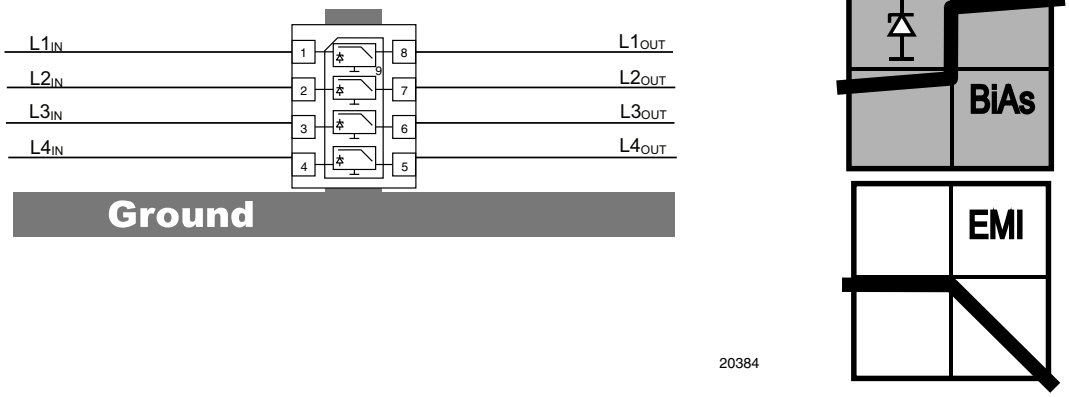
Absolute Maximum Ratings

Parameter	Test conditions	Symbol	Value	Unit
Peak pulse current	All I/O pin to pin 9; acc. IEC 61000-4-5; t_p = 8/20 µs; single shot	I_{PPM}	4	A
ESD immunity	Contact discharge acc. IEC61000-4-2; 10 pulses	V_{ESD}	± 25	kV
	Air discharge acc. IEC61000-4-2; 10 pulses		± 25	
Operating temperature	Junction temperature	T_J	- 40 to + 125	°C
Storage temperature		T_{STG}	- 55 to + 150	°C

** Please see document “Vishay Material Category Policy”: www.vishay.com/doc?99902

Application Note:

With the **VEMI45LA-HNH** 4 different signal or data lines can be filtered and clamped to ground. Due to the different clamping levels in forward and reverse direction the clamping behaviour is **Bi**directional and **As**ymmetric (**BiAs**).

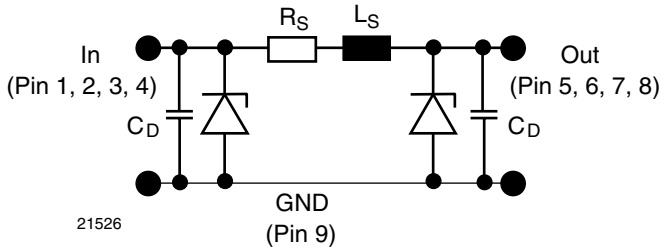


The 4 independent EMI-filter are placed between

pin 1 and pin 8,
pin 2 and pin 7,
pin 3 and pin 6 and
pin 4 and pin 5.

They all are connected to a common ground pin 9 on the backside of the package.

The circuit diagram of one EMI-filter-channel shows two identical Z-diodes at the input to ground and the output to ground. These Z-diodes are characterized by the breakthrough voltage level (V_{BR}) and the diode capacitance (C_D). Below the breakthrough voltage level the Z-diodes can be considered as capacitors. Together with these capacitors and the line resistance R_S between input and output the device works as a low pass filter. Low frequency signals ($f < f_{3dB}$) pass the filter while high frequency signals ($f > f_{3dB}$) will be shorted to ground through the diode capacitances C_D.



Each filter is symmetrical so that both ports can be used as input or output.

Electrical Characteristics

Ratings at 25 °C, ambient temperature unless otherwise specified

VEMI45LA-HNH

All inputs (pin 1, 2, 3 and 4) to ground (pin 9)

Parameter	Test conditions/remarks	Symbol	Min.	Typ.	Max.	Unit
Protection paths	Number of channels which can be protected	$N_{channel}$			4	channel
Reverse stand off voltage	at I_R = 1 µA	V_{RWM}	5			V
Reverse current	at $V_R = V_{RWM}$	I_R			1	µA
Reverse break down voltage	at I_R = 1 mA	V_{BR}	6			V
Pos. clamping voltage	at I_{PP} = 1 A applied at the input, measured at the output; acc. IEC 61000-4-5	$V_{C\text{-}out}$		7.7	8.5	V
	at $I_{PP} = I_{PPM}$ = 4 A applied at the input, measured at the output; acc. IEC 61000-4-5	$V_{C\text{-}out}$		8.3	9.5	V
Neg. clamping voltage	at I_{PP} = - 1 A applied at the input, measured at the output; acc. IEC 61000-4-5	$V_{C\text{-}out}$	- 1			V
	at $I_{PP} = I_{PPM}$ = - 4 A applied at the input, measured at the output; acc. IEC 61000-4-5	$V_{C\text{-}out}$	- 1.2			V
Input capacitance	at V_R = 0 V; f = 1 MHz	C_{in}		47	53	pF
	at V_R = 2.5 V; f = 1 MHz	C_{in}		28	31	pF
Line inductance	Measured between input and output	L_S		10		nH
Line resistance	Measured between input and output; I_S = 10 mA	R_S		12		Ω
Cut-off frequency	V_{IN} = 0 V; measured in a 50 Ω system	f_{3dB}		150		MHz

Typical Characteristics

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

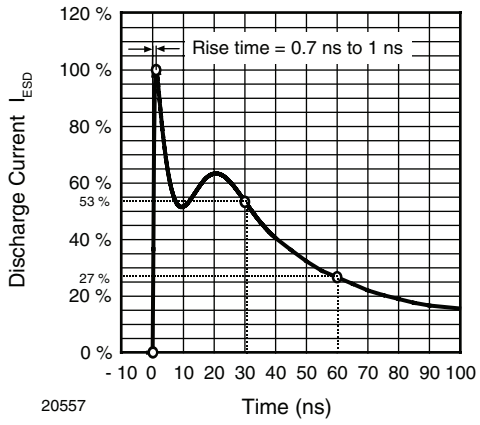


Figure 1. ESD Discharge Current Wave Form acc. IEC 61000-4-2 (330 Ω/150 pF)

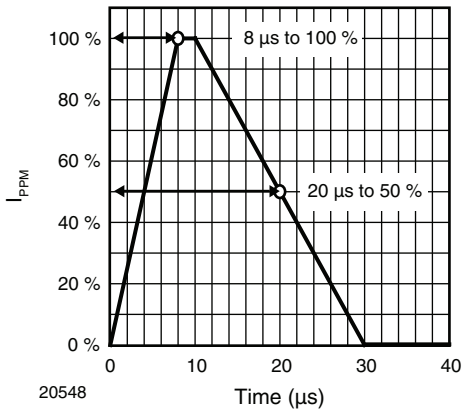


Figure 2. 8/20 µs Peak Pulse Current Wave Form acc. IEC 61000-4-5

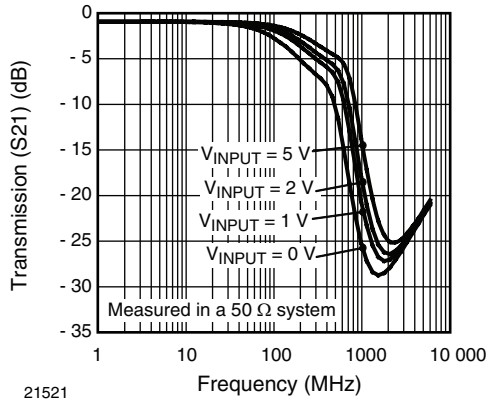


Figure 3. Typical Forward Small Signal Transmission (S21) at Z_O = 50 Ω

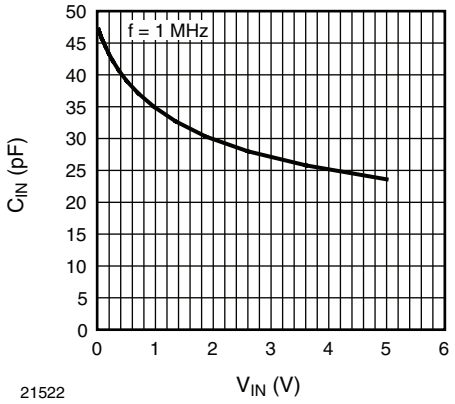


Figure 6. Typical Input Capacitance C_{IN} vs. Input Voltage V_{IN}

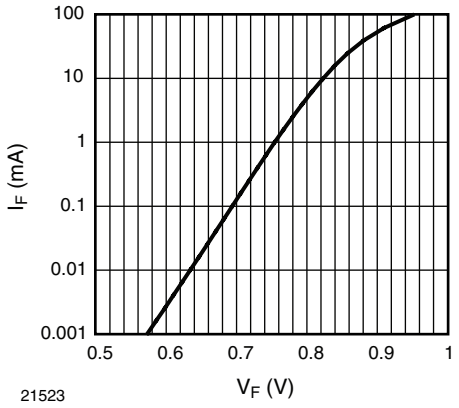


Figure 4. Typical Forward Current I_F vs. Forward Voltage V_F

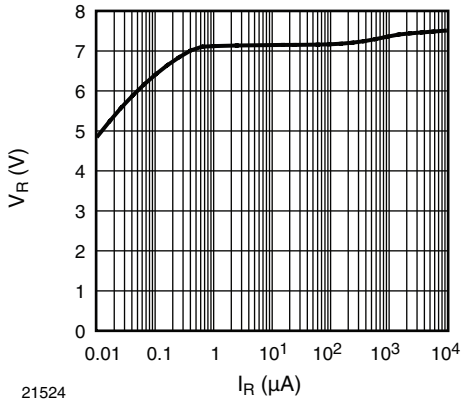


Figure 7. Typical Reverse Voltage V_R vs. Reverse Current I_R

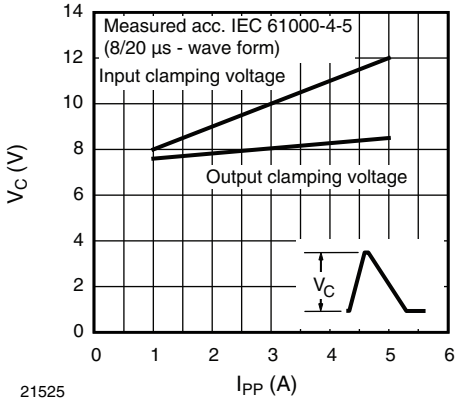
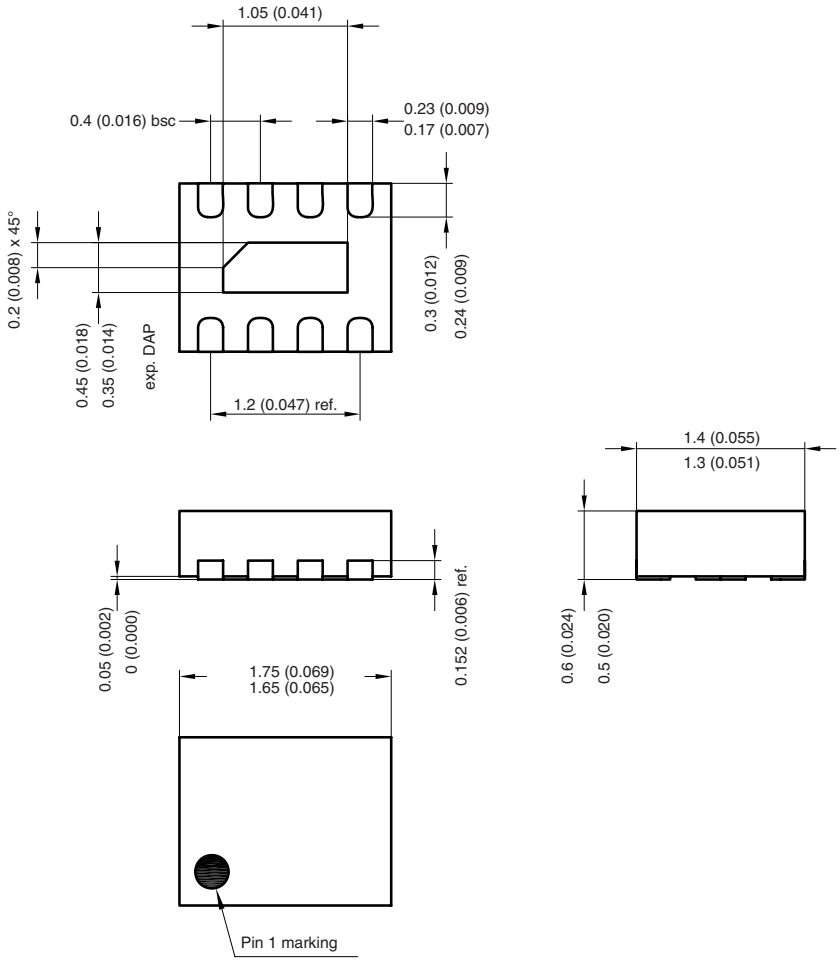
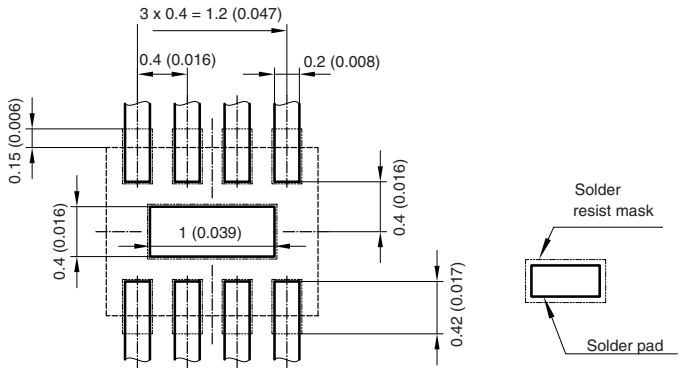


Figure 5. Typical Peak Clamping Voltage V_C vs. Peak Pulse Current I_{PP}

Package Dimensions in mm (Inches): LLP1713-9L



Foot print recommendation:



Document no.:S8-V-3906.04-001 (4)
Created - Date: 28. August 2006
Rev. 1 - Date: 27. May 2008
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