RoHS

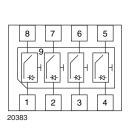
HALOGEN **FREE**

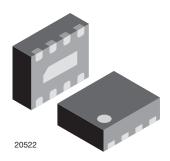
GREEN



Vishay Semiconductors

4-Channel EMI-Filter with ESD-Protection





MARKING (example only)

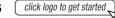


Dot = pin 1 marking Y = type code (see table below) XX = date code

DESIGN SUPPORT TOOLS

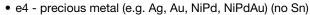
Models Available





FEATURES

- Ultra compact LLP1713-9L package
- Low package profile of 0.6 mm
- 4-channel EMI-filter
- · Low leakage current
- Line resistance $R_S = 100 \Omega$
- Typical cut off frequency f_{3dB} = 100 MHz
- ESD-protection acc. IEC 61000-4-2 ± 30 kV contact discharge ± 30 kV air discharge



· Material categorization: for definitions of compliance please see www.vishav.com/doc?99912

ORDERING INFORMATION					
DEVICE NAME ORDERING CODE		TAPED UNITS PER REEL (8 mm TAPE ON 7" REEL)	MINIMUM ORDER QUANTITY		
VEMI45AA-HNH	VEMI45AA-HNH-GS08	3000	15 000		

PACKAGE DATA							
DEVICE NAME	PACKAGE NAME	TYPE CODE	WEIGHT	MOLDING COMPOUND FLAMMABILITY RATING	MOISTURE SENSITIVITY LEVEL	SOLDERING CONDITIONS	
VEMI45AA-HNH	LLP1713-9L	Α	3.7 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	Peak temperature max. 260 °C	

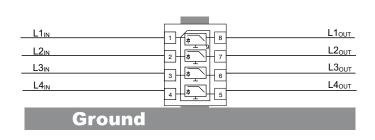
ABSOLUTE MAXIMUM RATINGS							
PARAMETER	TEST CONDITIONS	SYMBOL	VALUE	UNIT			
Peak pulse current	All I/O pin to pin 9; acc. IEC 61000-4-5; t _p = 8/20 µs; single shot	I _{PPM}	4	А			
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses	V _{ESD}	± 30	kV			
	Air discharge acc. IEC 61000-4-2; 10 pulses	VESD	± 30				
Operating temperature	Junction temperature	TJ	-40 to +125	°C			
Storage temperature		T _{STG}	-55 to +150	°C			

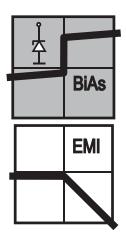


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APPLICATION NOTE

With the VEMI45AA-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 <u>Bi</u>directional and <u>Asymmetric</u> (BiAs).





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The 4 independent EMI-filter are placed between

pin 1 and pin 8,

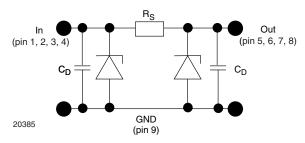
pin 2 and pin 7,

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.

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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	Max. reverse working voltage	V _{RWM}	-	-	5	V
Reverse voltage	at I _R = 1 μA				-	V
Reverse current	at V _R = V _{RWM}	I _R	-	-	1	μΑ
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-out}	-	-	7	V
	at I _{PP} = I _{PPM} = 4 A applied at the input, measured at the output; acc. IEC 61000-4-5	V _{C-out}	-	-	8	V
Neg. clamping voltage	at I _{PP} = -1 A applied at the input, measured at the output; acc. IEC 61000-4-5	V _{C-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-out}	- 1.2	-	-	V
Input capacitance	at V _R = 0 V; f = 1 MHz	C _{IN}	-	60	-	pF
	at V _R = 2.5 V; f = 1 MHz	C _{IN}	-	36	-	pF
ESD-clamping voltage	at ± 30 kV ESD-pulse acc. IEC 61000-4-2	V _{CESD}	-	7.5	-	V
Line resistance	Measured between input and output; I _S = 10 mA	R _S	90	100	110	Ω
Cut-off frequency	$V_{IN} = 0 \text{ V}$; measured in a 50 Ω system	f _{3dB}	-	100	-	MHz

TYPICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

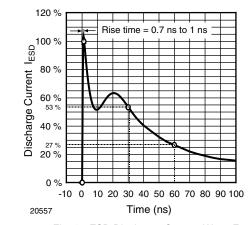


Fig. 1 - ESD Discharge Current Wave Form acc. IEC 61000-4-2 (330 $\Omega/150$ pF)

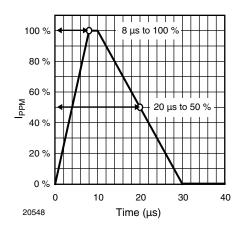


Fig. 2 - 8/20 µs Peak Pulse Current Wave Form acc. IEC 61000-4-5





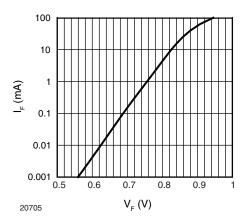


Fig. 3 - Typical Forward Current I_F vs. Forward Voltage V_F

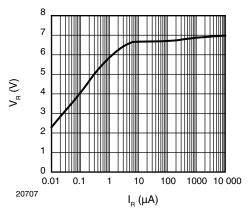


Fig. 4 - Typical Reverse Voltage V_R vs. Reverse Current I_R

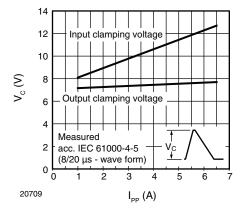


Fig. 5 - Typical Peak Clamping Voltage V_C vs. Peak Pulse Current I_{PP}

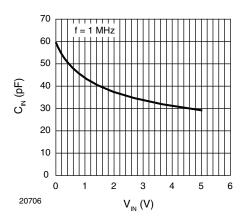


Fig. 6 - Typical Input Capacitance C_{IN} vs. Input Voltage V_{IN}

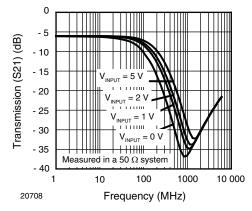
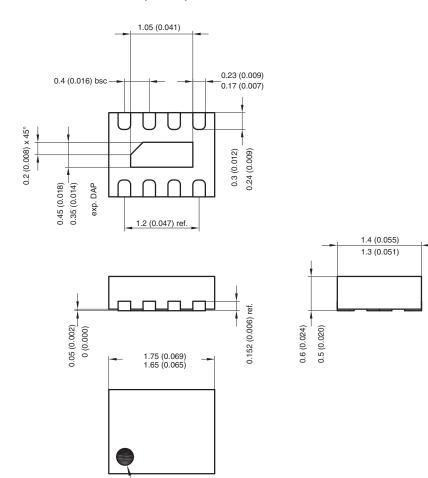


Fig. 7 - Typical Small Signal Transmission (S21) at $\,$ Z $_{O}$ = 50 $\,$ Ω

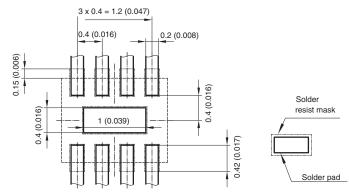
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PACKAGE DIMENSIONS in millimeters (inches): LLP1713-9L



Foot print recommendation:

Pin 1 marking



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