8-Channel EMI-Filter with ESD-Protection

FEATURES

8-channel EMI-filter Low leakage current

• Line resistance $R_S = 100 \Omega$

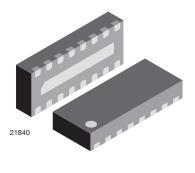
± 30 kV contact discharge

± 30 kV air discharge

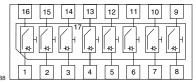
Ultra compact LLP3313-17L package
Low package profile of 0.6 mm

Typical cut off frequency f_{3dB} = 100 MHz

• ESD-protection acc. IEC 61000-4-2



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MARKING (example only)



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

DESIGN SUPPORT TOOLS



ORDERING INFORMATION					
DEVICE NAME	ORDERING CODE	TAPED UNITS PER REEL (8 mm TAPE ON 7" REEL)	MINIMUM ORDER QUANTITY		
VEMI85AA-HGK	VEMI85AA-HGK-GS08	3000	15 000		

click logo to get started

PACKAGE DATA						
DEVICE NAME	PACKAGE NAME	TYPE CODE	WEIGHT	MOLDING COMPOUND FLAMMABILITY RATING	MOISTURE SENSITIVITY LEVEL	SOLDERING CONDITIONS
VEMI85AA-HGK	LLP3313-17L	9R	7.4 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 17; acc. IEC 61000-4-5; $t_p = 8/20 \ \mu s$; single shot	I _{PPM}	4	A		
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	κv		
Operating temperature	Junction temperature	TJ	-40 to +125	°C		
Storage temperature		T _{STG}	-55 to +150	°C		

Rev. 1.8, 09-Jan-2019

1 For technical questions, contact: <u>EMIFilter@vishay.com</u> Document Number: 81386



RoHS COMPLIANT HALOGEN FREE GREEN (5-2008)

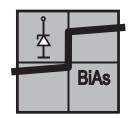
- e4 precious metal (e.g. Ag, Au, NiPd, NiPdAu) (no Sn)
- Material categorization: for definitions of compliance please see <u>www.vishay.com/doc?99912</u>

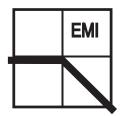


APPLICATION NOTE

With the VEMI85AA-HGK 8 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).

L1 _{IN}		L1 _{OUT}
L2 _{IN}		L2 _{OUT}
L3 _{IN}		L3 _{OUT}
L4 _{IN}		L4 _{OUT}
L5 _{IN}		L5 _{OUT}
L6 _{IN}		L6 _{OUT}
L7 _{IN}		L7 _{OUT}
L8 _{IN}	;↓₽;	L8 _{OUT}
Ground		





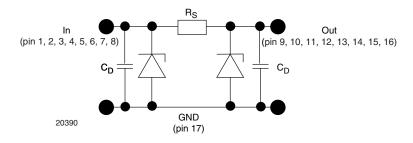
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The 8 independent EMI-filter are placed between

pin 1 and pin 16, pin 2 and pin 15, pin 3 and pin 14, pin 4 and pin 13, pin 5 and pin 12, pin 6 and pin 11, pin 7 and pin 10 and pin 8 and pin 9.

They all are connected to a common ground pin 17 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.

VEMI85AA-HGK

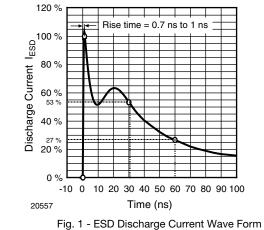


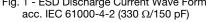
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PARAMETER	TEST CONDITIONS/REMARKS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Protection paths	Number of channels which can be protected	N _{channel}	-	-	8	channel
Reverse stand off voltage	Max. reverse working voltage	V _{RWM}	-	-	5	V
Reverse voltage	at I _R = 1 μA	V _R	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-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 \pm 30 kV ESD-pulse acc. IEC 61000-4-2	V _{CESD}	-	7.5	-	V
Line resistance	Measured between input and output; $I_S = 10 \text{ mA}$	R _S	90	100	110	Ω
Cut-off frequency	V_{IN} = 0 V; measured in a 50 Ω system	f _{3dB}	-	100	-	MHz

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





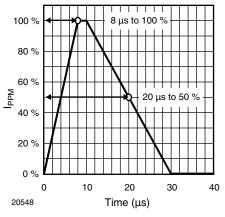


Fig. 2 - 8/20 µs Peak Pulse Current Wave Form acc. IEC 61000-4-5





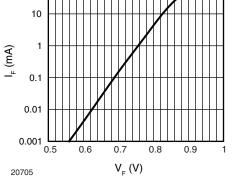


Fig. 3 - Typical Forward Current I_F vs. Forward Voltage V_F

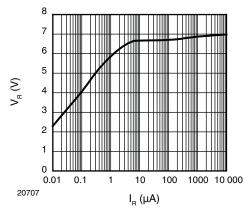


Fig. 4 - Typical Reverse Voltage V_R vs. Reverse Current I_R

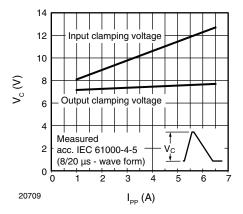


Fig. 5 - Typical Peak Clamping Voltage V_C vs. Peak Pulse Current I_{PP}

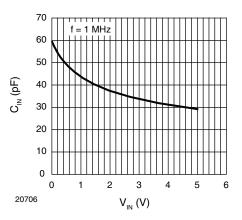
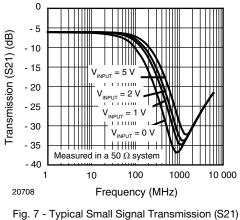


Fig. 6 - Typical Input Capacitance CIN vs. Input Voltage VIN

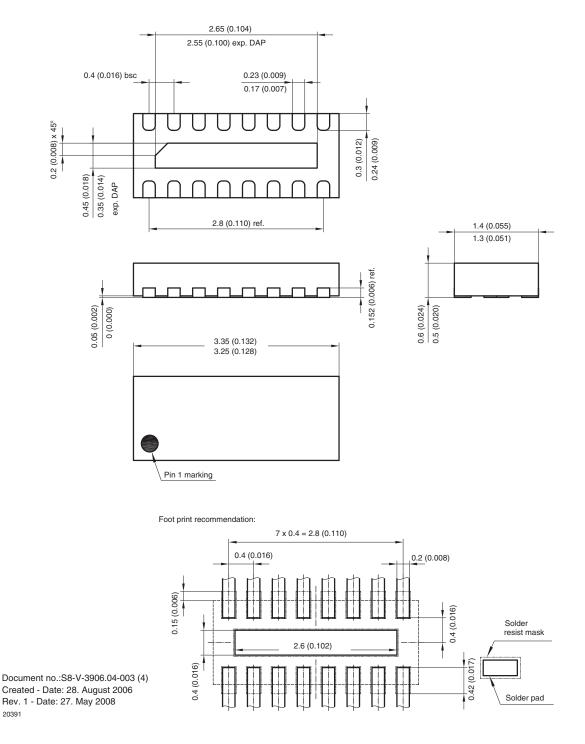


ig. 7 - Typical Small Signal Transmission (S21 at $~Z_{O}$ = 50 Ω

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PACKAGE DIMENSIONS in millimeters (inches): LLP3313-17L



5 For technical questions, contact: <u>EMIFilter@vishav.com</u>

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