# **VEMI85AC-HGK**

**Vishay Semiconductors** 

## 8-Channel EMI-Filter with ESD-Protection

#### **FEATURES**

- Ultra compact LLP3313-17L package
- Low package profile of 0.6 mm
- 8-channel EMI-filter
- Low leakage current
- Line resistance  $R_S = 100 \Omega$
- Typical cut off frequency f<sub>3dB</sub> = 240 MHz
- ESD-protection acc. IEC 61000-4-2
  - ± 10 kV contact discharge ± 12 kV air discharge
- e4 precious metal (e.g. Ag, Au, NiPd, NiPdAu) (no Sn)
- · Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

**MARKING** (example only)

21840

16 15 14 13 12 11 10 9

20388



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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		
VEMI85AC-HGK	VEMI85AC-HGK-GS08	3000	15 000		

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PACKAGE DATA							
DEVICE NAME	PACKAGE NAME	TYPE CODE	WEIGHT	MOLDING COMPOUND FLAMMABILITY RATING	MOISTURE SENSITIVITY LEVEL	SOLDERING CONDITIONS	
VEMI85AC-HGK	LLP3313-17L	9W	7.4 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	Peak temperature max. 260 °C	

ABSOLUTE MAXIMUM RATINGS					
PARAMETER	R TEST CONDITIONS		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 <sub>PPM</sub>	4	А	
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses	V	± 10	kV	
	Air discharge acc. IEC 61000-4-2; 10 pulses	V <sub>ESD</sub>	± 12		
Operating temperature	Junction temperature	ТJ	-40 to +125	°C	
Storage temperature		T <sub>STG</sub>	-55 to +150	°C	

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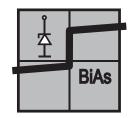


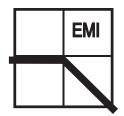
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#### **APPLICATION NOTE**

With the VEMI85AC-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 <sub>OUT</sub>
L2 <sub>OUT</sub>
L3 <sub>OUT</sub>
L4 <sub>OUT</sub>
L5 <sub>OUT</sub>
L6 <sub>OUT</sub>
L7 <sub>OUT</sub>
L8 <sub>OUT</sub>





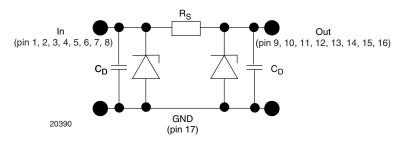
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The 8 independent EMI-filter are placed between

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<sub>3dB</sub>) pass the filter while high frequency signals (f > f<sub>3dB</sub>) 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.

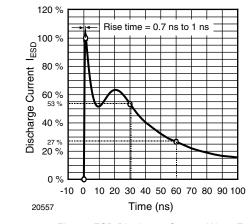
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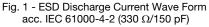


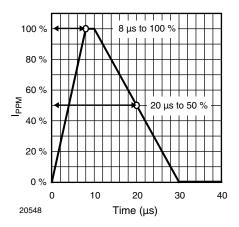
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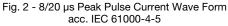
PARAMETER	TEST CONDITIONS/REMARKS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Protection paths	Number of channels which can be protected	N <sub>channel</sub>	-	-	8	channe
Reverse stand off voltage	Max. reverse working voltage	V <sub>RWM</sub>	-	-	5	V
Reverse voltage	at I <sub>R</sub> = 1 μA	V <sub>R</sub>	5	-	-	V
Reverse current	at $V_R = V_{RWM}$	I <sub>R</sub>	-	< 0.1	1	μA
Reverse break down voltage	at I <sub>R</sub> = 1 mA	V <sub>BR</sub>	6	6.8	-	V
Pos. clamping voltage	at $I_{PP} = 1$ A applied at the input, measured at the output; acc. IEC 61000-4-5	V <sub>C-out</sub>	-	-	7	V
	at $I_{PP} = I_{PPM} = 2$ A applied at the input, measured at the output; acc. IEC 61000-4-5	V <sub>C-out</sub>	-	-	8	V
Neg. clamping voltage	at $I_{PP}$ = -1 A applied at the input, measured at the output; acc. IEC 61000-4-5	V <sub>C-out</sub>	-1.4	-	-	V
	at $I_{PP} = I_{PPM} = -2$ A applied at the input, measured at the output; acc. IEC 61000-4-5	V <sub>C-out</sub>	-1.6	-	-	V
Input capacitance	at $V_R = 0 V$ ; f = 1 MHz	C <sub>IN</sub>	-	20	-	pF
	at V <sub>R</sub> = 2.5 V; f = 1 MHz	C <sub>IN</sub>	-	13	-	pF
ESD-clamping voltage	at ± 10 kV ESD-pulse acc. IEC 61000-4-2	V <sub>CESD</sub>	-	7.5	-	V
Line resistance	Measured between input and output; $I_S = 10 \text{ mA}$	R <sub>S</sub>	90	100	110	Ω
Cut-off frequency	$V_{IN}$ = 0 V; measured in a 50 $\Omega$ system	f <sub>3dB</sub>	-	240	-	MHz

TYPICAL CHARACTERISTICS (T<sub>amb</sub> = 25 °C, unless otherwise specified)



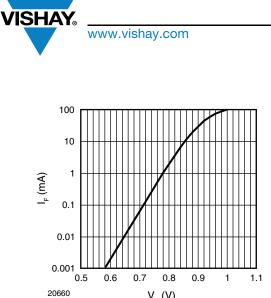








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 $$^{20660}$$   $$V_{\rm F}$$  (V) Fig. 3 - Typical Forward Current I<sub>F</sub> vs. Forward Voltage  $V_{\rm F}$ 

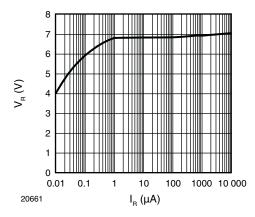


Fig. 4 - Typical Reverse Voltage  $V_R$  vs. Reverse Current  $I_R$ 

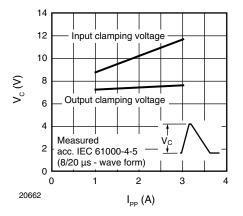


Fig. 5 - Typical Peak Clamping Voltage V<sub>C</sub> vs. Peak Pulse Current  $I_{PP}$ 

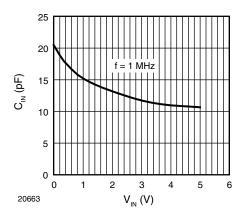


Fig. 6 - Typical Input Capacitance  $C_{IN}$  vs. Input Voltage  $V_{IN}$ 

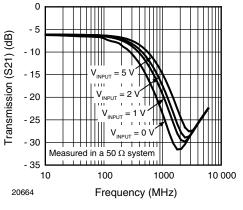


Fig. 7 - Typical Small Signal Transmission (S21) at  $Z_O$  = 50  $\Omega$ 

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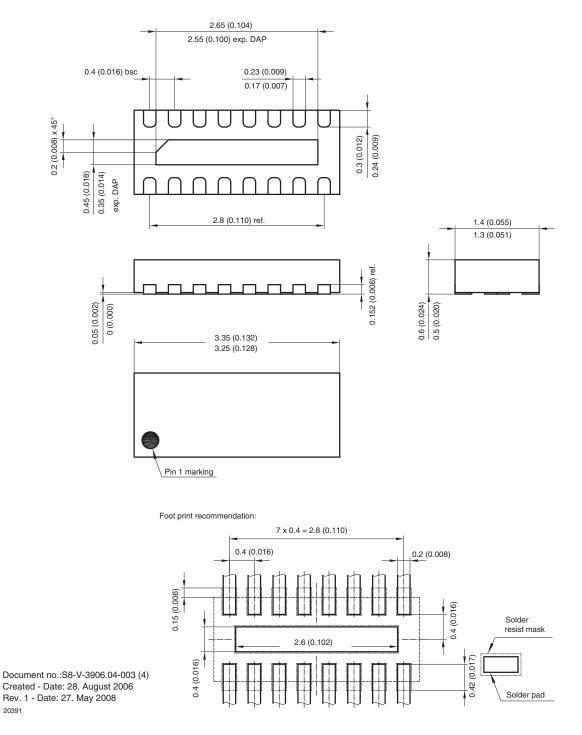
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#### PACKAGE DIMENSIONS in millimeters (inches): LLP3313-17L



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