RoHS

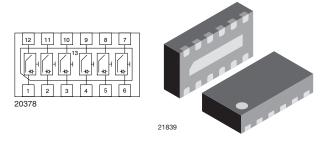
HALOGEN FREE

GREEN



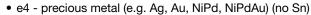
Vishay Semiconductors

6-Channel EMI-Filter with ESD-Protection



FEATURES

- Ultra compact LLP2513-13L package
- Low package profile of 0.6 mm
- 6-channel EMI-filter
- · Low leakage current
- Line resistance $R_S = 100 \Omega$
- Typical cut off frequency f_{3dB} = 130 MHz
- ESD-protection acc. IEC 61000-4-2
 ± 18 kV contact discharge
 ± 25 kV air discharge



 Material categorization: for definitions of compliance please see <u>www.vishay.com/doc?99912</u>

MARKING (example only)

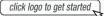


Dot = pin 1 marking

YY = 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		
VEMI65AB-HCI	VEMI65AB-HCI-GS08	3000	15 000		

PACKAGE DATA						
DEVICE NAME	PACKAGE NAME	TYPE CODE	WEIGHT	MOLDING COMPOUND FLAMMABILITY RATING	MOISTURE SENSITIVITY LEVEL	SOLDERING CONDITIONS
VEMI65AB-HCI	LLP2513-13L	98	5.5 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	Peak temperature max. 260 °C

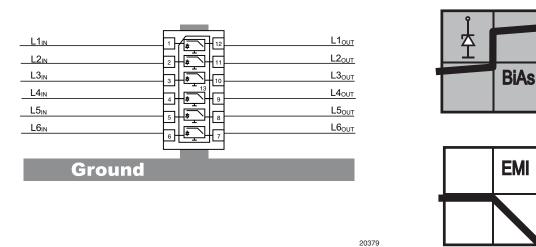
ABSOLUTE MAXIMUM RATINGS						
PARAMETER	TEST CONDITIONS	SYMBOL	VALUE	UNIT		
Peak pulse current	All I/O pin to pin 13; acc. IEC 61000-4-5; $t_p = 8/20 \mu s$; single shot	I _{PPM}	4	А		
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses	\/	± 18	kV		
	Air discharge acc. IEC 61000-4-2; 10 pulses	V_{ESD}	± 25	N.V		
Operating temperature	Junction temperature	T_J	-40 to +125	°C		
Storage temperature		T _{STG}	-55 to +150	°C		



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APPLICATION NOTE

With the VEMI65AB-HCI 6 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 behavior is Bidirectional and Asymmetric (BiAs).



The 6 independent EMI-filter are placed between

pin 1 and pin 12,

pin 2 and pin 11,

pin 3 and pin 10,

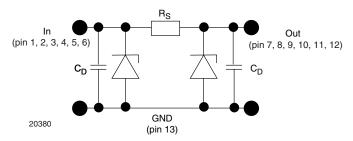
pin 4 and pin 9,

pin 5 and pin 8 and

pin 6 and pin 7.

They all are connected to a common ground pin 13 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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ELECTRICAL CHARACTERISTICS All inputs (pin 1 to pin 6) to ground (pin 13) (T _{amb} = 25 °C, unless otherwise specified)							
PARAMETER	TEST CONDITIONS / REMARKS	SYMBOL	MIN.	TYP.	MAX.	UNIT	
Protection paths	Number of channels which can be protected	N _{channel}	-	-	6	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	-	0.25	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}	-	40	45	pF	
	at V _R = 2.5 V; f = 1 MHz	C _{IN}	-	24	28	pF	
ESD-clamping voltage	at ± 18 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}	-	130	-	MHz	

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

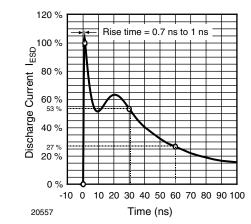


Fig. 1 - ESD Discharge Current Wave Form acc. IEC 61000-4-2 (330 Ω /150 pF)

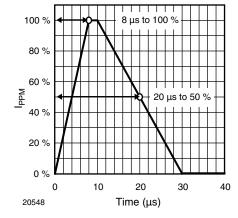


Fig. 2 - 8/20 µs Peak Pulse Current Wave Form acc. IEC 61000-4-5

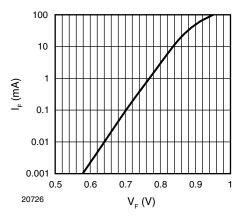


Fig. 3 - Typical Forward Current I_F vs. Forward Voltage V_F

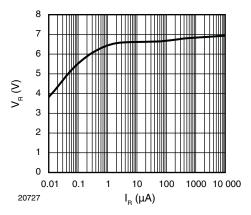


Fig. 4 - Typical Reverse Voltage V_R vs. Reverse Current I_R

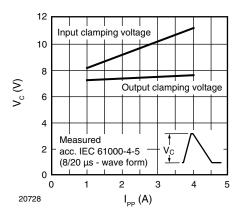


Fig. 5 - Typical Peak Clamping Voltage V_C vs. Peak Pulse Current I_{PP}

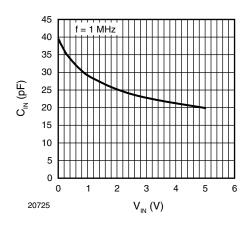


Fig. 6 - Typical Input Capacitance CIN vs. Input Voltage VIN

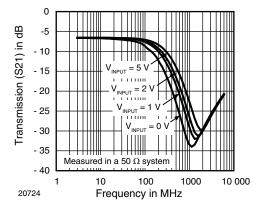
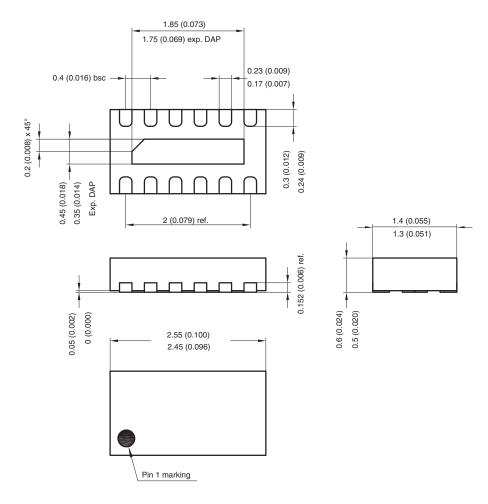


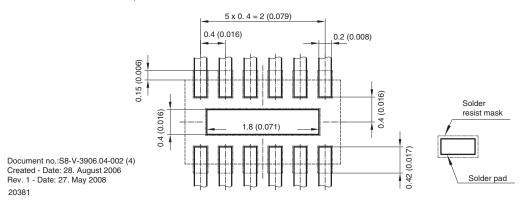
Fig. 7 - Typical Small Signal Transmission (S21) at $\,$ Z $_{O}$ = 50 $\,$ Ω

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PACKAGE DIMENSIONS in millimeters (inches): LLP2513-13L



Foot print recommendation:



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