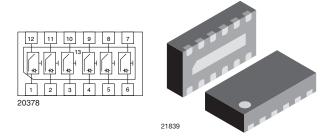


6-Channel EMI-Filter with ESD-Protection



MARKING (example only)



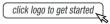
Dot = pin 1 marking

YY = type code (see table below)

XX = date code

Models Available

DESIGN SUPPORT TOOLS



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



- e4 precious metal (e.g. Ag, Au, NiPd, NiPdAu) (no Sn)
- 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		
VEMI65AB-HCI	VEMI65AB-HCI-GS08	3000	15 000		

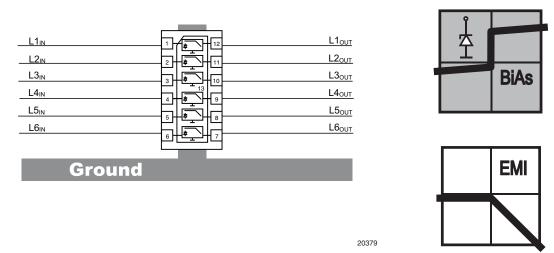
PACKAGE DATA						
DEVICE NAME	PACKAGE NAME	TYPE CODE WEIGHT MOLDING COMPOUND MOISTURE SENSITIVITY LEVEL		SOLDERING CONDITIONS		
VEMI65AB-HCI	LLP2513-13L	98	5.5 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	Peak temperature max. 260 °C

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	V_{ESD}	± 18	kV		
	Air discharge acc. IEC 61000-4-2; 10 pulses	VESD	± 25			
Operating temperature	Junction temperature	TJ	-40 to +125	°C		
Storage temperature		T _{STG}	-55 to +150	°C		



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 <u>Bi</u>directional and <u>Asymmetric</u> (BiAs).



The 6 independent EMI-filter are placed between

pin 1 and pin 12,

pin 2 and pin 11,

pin 3 and pin 10,

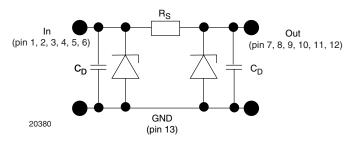
pin 4 and pin 9,

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.

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)

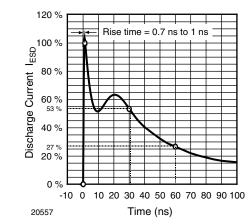


Fig. 1 - ESD Discharge Current Wave Form acc. IEC 61000-4-2 (330 Ω /150 pF)

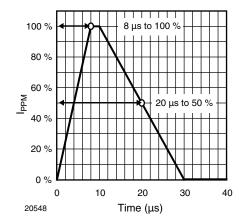


Fig. 2 - 8/20 µs Peak Pulse Current Wave Form acc. IEC 61000-4-5

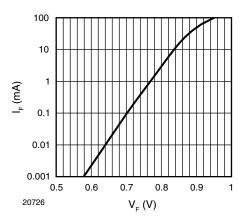


Fig. 3 - Typical Forward Current I_F vs. Forward Voltage V_F

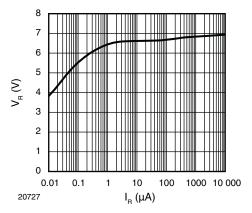


Fig. 4 - Typical Reverse Voltage V_R vs. Reverse Current I_R

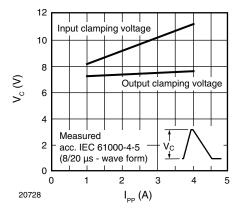


Fig. 5 - Typical Peak Clamping Voltage V_{C} vs. Peak Pulse Current I_{PP}

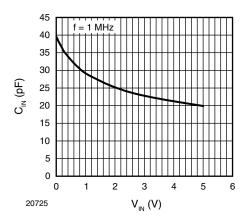


Fig. 6 - Typical Input Capacitance CIN vs. Input Voltage VIN

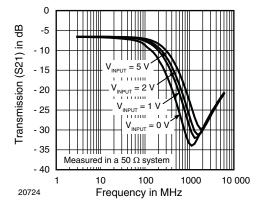
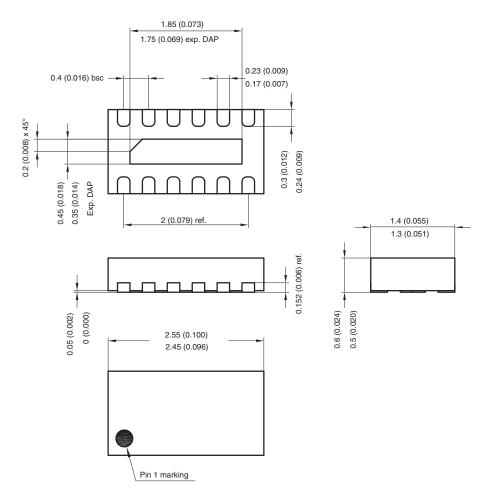
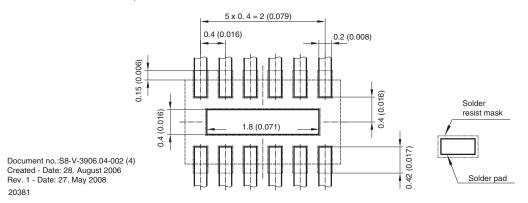


Fig. 7 - Typical Small Signal Transmission (S21) at $\,$ Z $_{O}$ = 50 $\,$ Ω

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



Foot print recommendation:





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