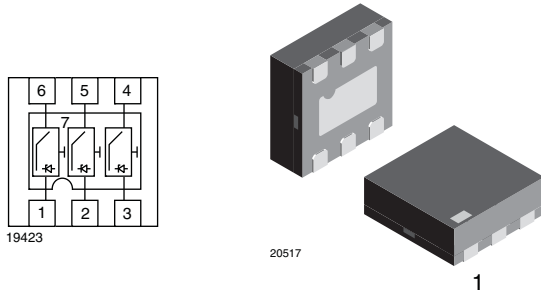


3-Channel EMI-Filter with ESD-Protection

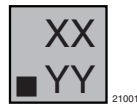


FEATURES

- Ultra compact LLP75-7L package
- 3-channel EMI-filter and ESD-protection
- Low leakage current
- Line resistance $R_S = 30 \Omega$
- Typical cut off frequency $f_{3dB} = 100 \text{ MHz}$
- ESD-protection acc. IEC 61000-4-2
± 30 kV contact discharge
± 30 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)



Dot = pin 1 marking

YY = type code (see table below)

XX = date code

ORDERING INFORMATION

DEVICE NAME	ORDERING CODE	TAPED UNITS PER REEL (8 mm TAPE ON 7" REEL)	MINIMUM ORDER QUANTITY
VEMI353A-HAF	VEMI353A-HAF-G-08	3000	15 000

PACKAGE DATA

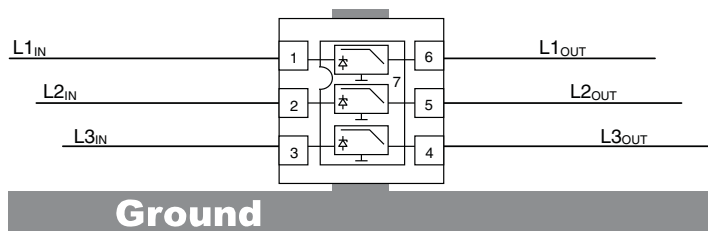
DEVICE NAME	PACKAGE NAME	TYPE CODE	WEIGHT	MOLDING COMPOUND FLAMMABILITY RATING	MOISTURE SENSITIVITY LEVEL	SOLDERING CONDITIONS
VEMI353A-HAF	LLP75-7L	9D	4.2 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	260 °C/10 s at terminals

ABSOLUTE MAXIMUM RATINGS

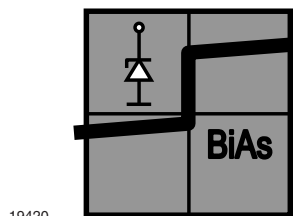
PARAMETER	TEST CONDITIONS	SYMBOL	VALUE	UNIT
Peak pulse current	All I/O pin to pin 7; acc. IEC 61000-4-5; $t_p = 8/20 \mu\text{s}$; single shot	I_{PPM}	4	A
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses	V_{ESD}	± 30	kV
	Air discharge acc. IEC 61000-4-2; 10 pulses		± 30	
Operating temperature	Junction temperature	T_J	- 40 to + 125	°C
Storage temperature		T_{STG}	- 55 to + 150	°C

APPLICATION NOTE

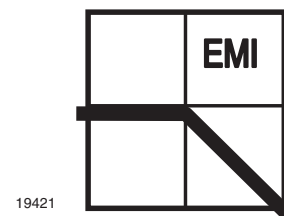
With the VEMI353A-HAF 3 different signal or data lines can be filtered and clamped to ground. Due to the different clamping levels in forward and reverse direction the clamping behavior is Bidirectional and Asymmetric (BiAs).



19424



19420



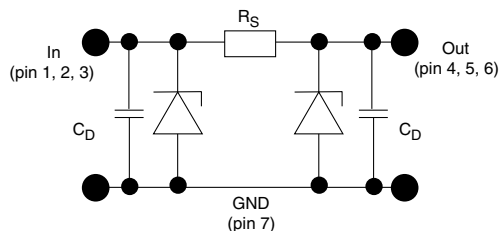
19421

The 3 independent EMI-filter are placed between

- pin 1 and pin 6
- pin 2 and pin 5, and
- pin 3 and pin 4.

They all are connected to a common ground pin 7 on the backside of the package. Each filter is symmetrical so that all ports (pin 1 to 6) can be used as input or output.

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 .



21060

Each filter is symmetrical so that both ports can be used as input or output.

ELECTRICAL CHARACTERISTICS All inputs (pin 1, 2 and 3) to ground (pin 7)
($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

PARAMETER	TEST CONDITIONS/REMARKS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Protection paths	Number of channels which can be protected	$N_{channel}$	-	-	3	channel
Reverse stand off voltage	Max. reverse working voltage	V_{RWM}	-	-	5	V
Reverse voltage	at $I_R = 1\text{ }\mu\text{A}$	V_R	5	-	-	V
Reverse current	at $V_R = 5\text{ V}$	I_R	-	-	1	μA
Reverse break down voltage	$I_R = 1\text{ mA}$	V_{BR}	6	-	-	V
Pos. clamping voltage	at $I_{PP} = 1\text{ A}$ applied at the input, measured at the output; acc. IEC 61000-4-5	V_{C-out}	-	-	7.8	V
	at $I_{PP} = I_{PPM} = 4\text{ A}$ applied at the input, measured at the output; acc. IEC 61000-4-5	V_{C-out}	-	-	8	V
Neg. clamping voltage	at $I_{PP} = -1\text{ A}$ applied at the input, measured at the output; acc. IEC 61000-4-5	V_{C-out}	- 1	-	-	V
	at $I_{PP} = I_{PPM} = -4\text{ A}$ applied at the input, measured at the output; acc. IEC 61000-4-5	V_{C-out}	- 1.2	-	-	V
Input capacitance	at $V_R = 0\text{ V}$; $f = 1\text{ MHz}$	C_{IN}	-	60	-	pF
	at $V_R = 2.5\text{ V}$; $f = 1\text{ MHz}$	C_{IN}	-	37	-	pF
ESD-clamping voltage	at $\pm 30\text{ kV}$ 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	27	30	35	Ω
Cut-off frequency	$V_{IN} = 0\text{ V}$; measured in a $50\text{ }\Omega$ system	f_{3dB}	-	100	-	MHz

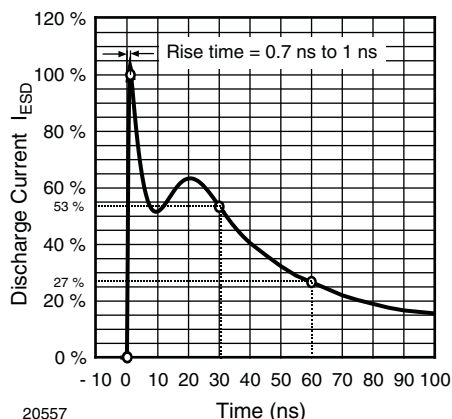
TYPICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)


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

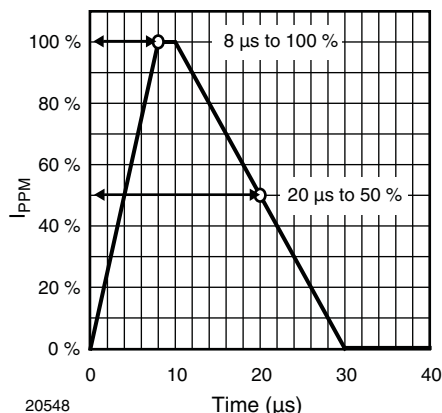
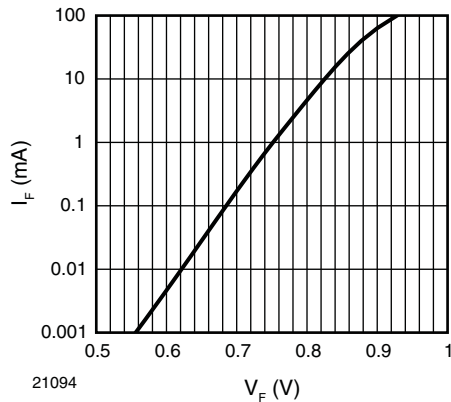
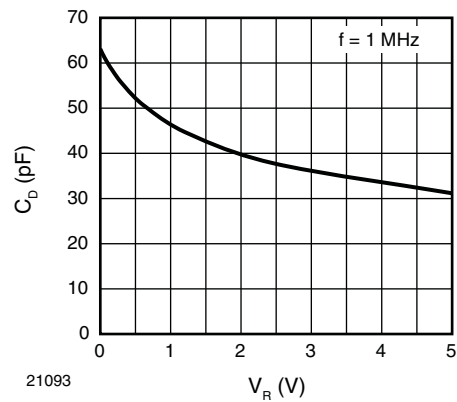
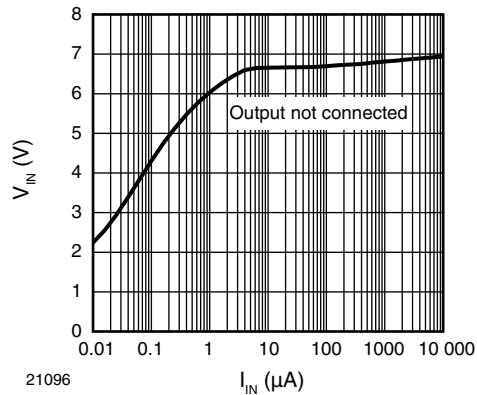
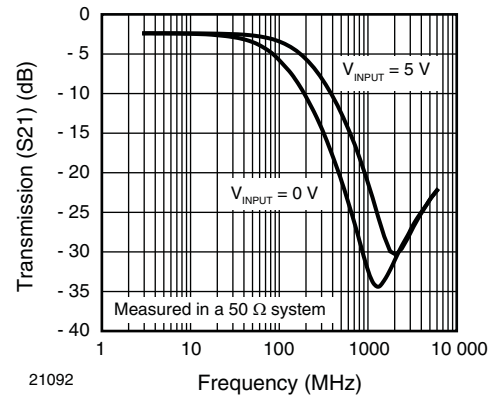
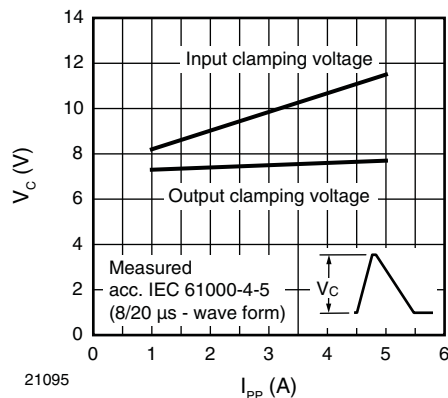
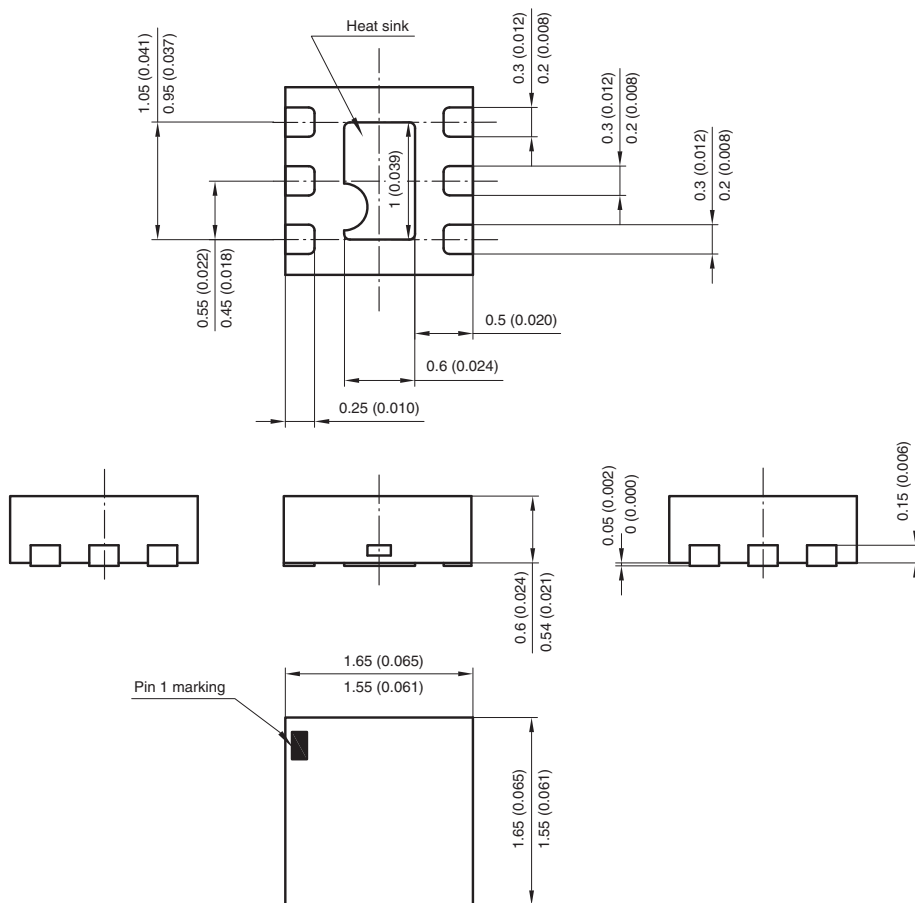


Fig. 2 - 8/20 μs Peak Pulse Current Wave Form
acc. IEC 61000-4-5

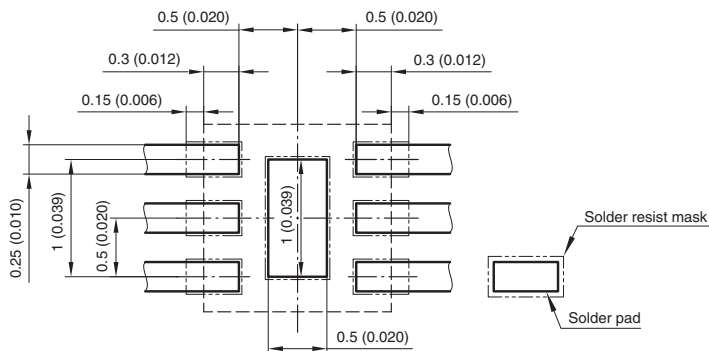

Fig. 3 - Typical Forward Current I_F vs. Forward Voltage V_F

Fig. 6 - Typical Capacitance C_D vs. Reverse Voltage V_R

Fig. 4 - Typical Input Voltage V_{IN} vs. Input Current I_{IN}

Fig. 7 - Typical Small Signal Transmission (S_{21}) at $Z_O = 50 \Omega$

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



PACKAGE DIMENSIONS in millimeters (inches): **LLP75-7L**



Foot print recommendation:



Document no.:S8-V-3906.02-014 (4)
Created - Date: 04. April 2006
20500



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