

Selection guide - ESD protection diodes for automotive applications

Number of protected lines uni- directional		C <sub>line</sub> typ (pF)	P <sub>PP</sub> max (W) <sup>1) 2)</sup>	ESD rating <sup>3)</sup> max (kV)	I <sub>RM</sub> max (μA) @	V <sub>RWM</sub> (V)	Configuration	Type	Packages	Size (mm)
2	1	210	24 <sup>1)</sup>	30	5	3		MMBZ5V6AL		2.9 x 1.3 x 1.0 mm
		170	24 <sup>1)</sup>	30	0.5	3		MMBZ6V2AL		
		150	24 <sup>1)</sup>	30	0.5	4.5		MMBZ6V8AL		
		160	24 <sup>1)</sup>	30	0.3	6		MMBZ9V1AL		
		135	24 <sup>1)</sup>	30	0.3	6.5		MMBZ10VAL		
		110	40 <sup>1)</sup>	30	0.2	8.5		MMBZ12VAL		
		85	40 <sup>1)</sup>	30	0.05	12		<b>MMBZ15VAL</b>		
		70	40 <sup>1)</sup>	30	0.05	14.5		MMBZ18VAL		
		62	40 <sup>1)</sup>	30	0.05	17		MMBZ20VAL		
		48	40 <sup>1)</sup>	30	0.05	22		<b>MMBZ27VAL</b>		
2	1	42	40 <sup>1)</sup>	30	0.05	26		MMBZ33VAL		
		110	40 <sup>1)</sup>	30	0.2	8.5		MMBZ12VDL		
		85	40 <sup>1)</sup>	30	0.1	12.8		<b>MMBZ15VDL</b>		
		70	40 <sup>1)</sup>	30	0.05	14.5		MMBZ18VCL		
		62	40 <sup>1)</sup>	30	0.05	17		MMBZ20VCL		
		48	40 <sup>1)</sup>	30	0.05	22		<b>MMBZ27VCL</b>		
	2	42	40 <sup>1)</sup>	30	0.05	26		MMBZ33VCL		
		11	200 <sup>2)</sup>	23	0.05	24		<b>PESD1CAN</b>		
		25	230 <sup>2)</sup>	30	0.01	24		<b>PESD2CAN</b>		
		11 <sup>4)</sup>	200 <sup>2)</sup>	23	0.05	24		<b>PESD1FLEX</b>		
	1	13	160 <sup>2)</sup>	23	0.05	15 (diode 1) 24 (diode 2)		<b>PESD1LIN</b>	SOD323 (SC-76) 	1.7 x 1.25 x 0.95 mm

Types in bold are included in the Launch Pack <sup>1)</sup>10/1000 μs acc. to IEC 61643-321 <sup>2)</sup>8/20 μs acc. to IEC61000-4-5 <sup>3)</sup>ESD pulse acc. to IEC61000-4-2 <sup>4)</sup>f = 5 MHz; VR = 0 V



# ESD protection diodes for automotive applications

Advanced protection for FlexRay, LIN, and CAN systems

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Proven protection that reduces failures

These protection diodes, specifically designed for automotive applications, reduce failures by protecting Electronic Control Units (ECU) against ElectroStatic Discharge (ESD) and other transient pulses that can enter the ECU via the battery or data-bus lines.

They protect a range of electronic components, including FlexRay bus transceivers, Local Interconnect Network (LIN), and Controller Area Network (CAN) devices against human-body discharge according to MIL-STD-883 class 3, and comply with IEC 61000-4-2 level 4 (air and contact discharge), IEC 61000-4-5 (8/20 μs pulse), and IEC 61643-321 (10/1000 μs pulse) standards.

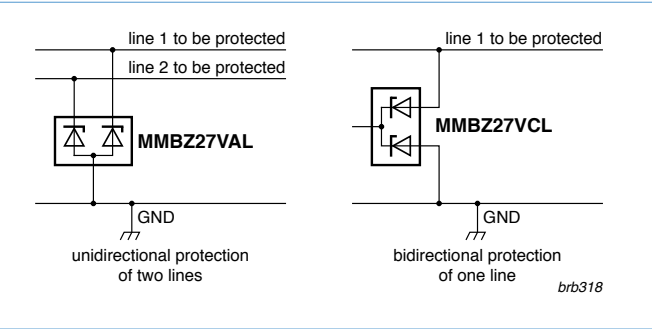
MMBZ series

These devices offer single line bidirectional or dual-line unidirectional transient overvoltage protection in a small SOT23 package.

Key features

- ▶ Common cathode or common anode configuration
- ▶ Max. peak pulse power:  $P_{PP} = 40\text{ W}$  at  $t_p = 10/1000\text{ }\mu\text{s}$
- ▶ Ultra-low leakage current:  $I_{RM} < 1\text{ nA}$
- ▶ ESD protection of up to 30 kV

Example MMBZ series application



PESD1LIN, PESD1CAN, PESD2CAN, PESD1FLEX

These devices are single-component solutions for the protection of LIN, CAN or FlexRay bus lines, in a small SOD323 (SC-76) or SOT23 SMD plastic package.

Key features PESD1LIN

- ▶ Bidirectional protection of one LIN bus line
- ▶ Max. peak pulse power:  $P_{PP} = 160\text{ W}$  at  $t_p = 8/20\text{ }\mu\text{s}$
- ▶ Low clamping voltage:  $V_{(CL)R} = 40\text{ V}$  at  $I_{PP} = 1\text{ A}$
- ▶ Ultra-low leakage current:  $I_{RM} < 1\text{ nA}$
- ▶ ESD protection of up to 23 kV

Key features PESD1CAN

- ▶ Bidirectional protection of two CAN bus lines
- ▶ Very low capacitance  $C_d = 11\text{ pF}$
- ▶ ESD protection of up to 23 kV

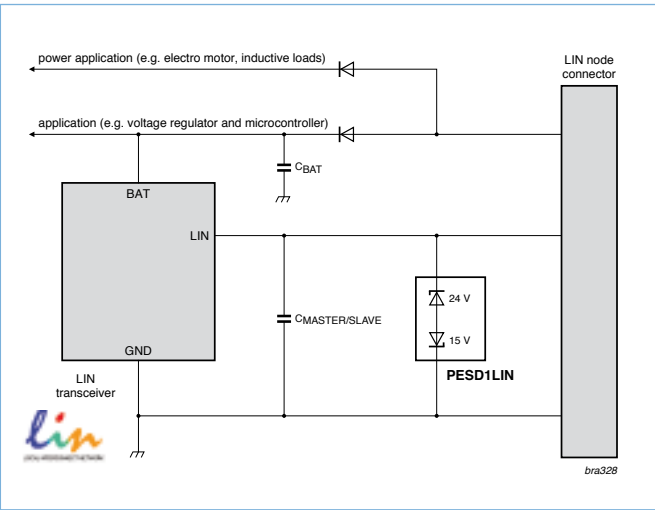
Key features PESD2CAN

- ▶ Bidirectional protection of two CAN bus lines
- ▶ Max. peak pulse power:  $P_{PP} = 230\text{ W}$  at  $t_p = 8/20\text{ }\mu\text{s}$
- ▶ Low clamping voltage:  $V_{(CL)R} = 34\text{ V}$  at  $I_{PP} = 1\text{ A}$
- ▶ ESD protection of up to 30 kV

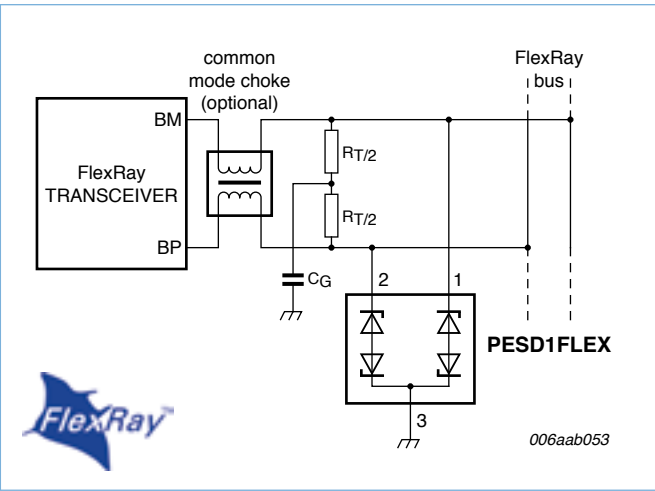
Key features PESD1FLEX

- ▶ Bidirectional protection of two FlexRay bus lines
- ▶ Very low capacitance  $C_d = 11\text{ pF}$  at  $V_R = 0\text{ V}$ ,  $f = 5\text{ MHz}$
- ▶ Optimized diode capacitance matching:  $\Delta C_d/C_d = 0.1\text{ }\%$
- ▶ ESD protection of up to 23 kV

Example LIN bus line application



Example FlexRay application



MMBZ15VDL

$V_{RWM} = 12.8\text{ V}$ , SOT23  
common cathode  
Transient voltage suppressor

MMBZ15VAL

$V_{RWM} = 12\text{ V}$ , SOT23  
common anode  
Transient voltage suppressor

MMBZ27VCL

$V_{RWM} = 22\text{ V}$ , SOT23  
common cathode  
Transient voltage suppressor

MMBZ27VAL

$V_{RWM} = 22\text{ V}$ , SOT23  
common anode  
Transient voltage suppressor

PESD1LIN

$V_{RWM} = 15\text{ V}$  (diode 1) 24V  
(diode 2), SOD323  
LIN bus ESD protection

PESD1FLEX

$V_{RWM} = 24\text{ V}$ , SOT23  
FlexRay bus ESD protection

PESD1CAN

$V_{RWM} = 24\text{ V}$ , SOT23  
CAN bus ESD protection

PESD2CAN

$V_{RWM} = 24\text{ V}$ , SOT23  
CAN bus ESD protection