



# PESD33VL1BL

Extremely low clamping bidirectional ESD protection diode

30 May 2024

Product data sheet

## 1. General description

ESD protection device in a leadless ultra small DFN1006-2 (SOD882) Surface-Mounted Device (SMD) plastic package, designed to protect one single line from the damage caused by ElectroStatic Discharge (ESD) and other transients.

## 2. Features and benefits

- Reverse stand-off voltage:  $V_{RWM} = 33\text{ V}$
- Low clamping voltage: typical  $V_{CL} = 36\text{ V}$  at  $I_{pp} = 1\text{ A}$
- ESD protection up to 27 kV (IEC 61000-4-2)
- Low capacitance:  $C_d = 11.5\text{ pF}$

## 3. Applications

- Computers and peripherals
- Audio and video equipment
- Cellular handsets and accessories
- Portable electronics

## 4. Quick reference data

Table 1. Quick reference data

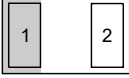
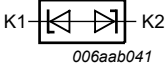
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{RWM}$	reverse standoff voltage	$T_{amb} = 25\text{ °C}$		-	-	33	V
$I_{PPM}$	rated peak pulse current	$t_p = 8/20\text{ }\mu\text{s}$	[1]	-	-	3.6	A
$V_{CL}$	clamping voltage	$I_{PP} = 16\text{ A}$ ; $t_p = 100\text{ ns}$ ; $T_{amb} = 25\text{ °C}$	[2]	-	45	-	V

[1] Device stressed with 8/20  $\mu\text{s}$  exponential decay waveform according to IEC 61000-4-5.

[2] Non-repetitive current pulse, Transmission Line Pulse (TLP); square pulse; ANSI / ESD STM5.5.1-2008

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K1	cathode (diode 1)	 <p>Transparent top view</p> <p><b>DFN1006-2 (SOD882)</b></p>	 <p>006aab041</p>
2	K2	cathode (diode 2)		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PESD33VL1BL	DFN1006-2	plastic, leadless ultra small package; 2 terminals; 0.65 mm pitch; 1 mm x 0.6 mm x 0.48 mm body	SOD882

## 7. Marking

Table 4. Marking codes

Type number	Marking code
PESD33VL1BL	9W

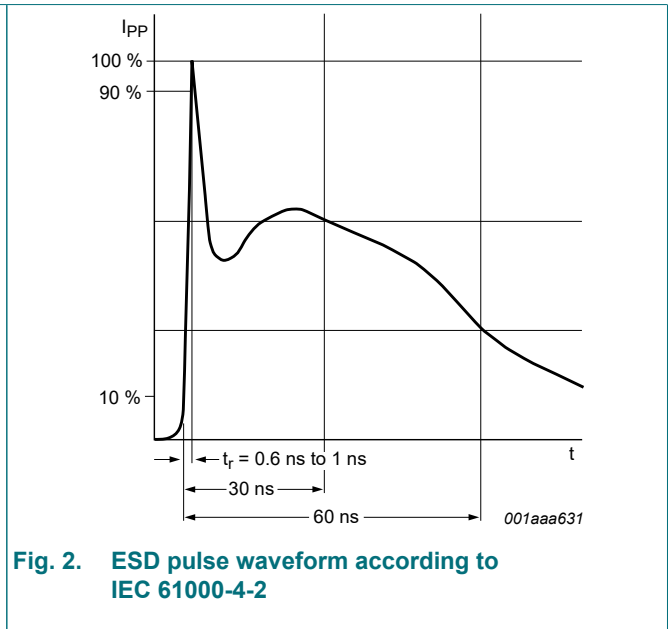
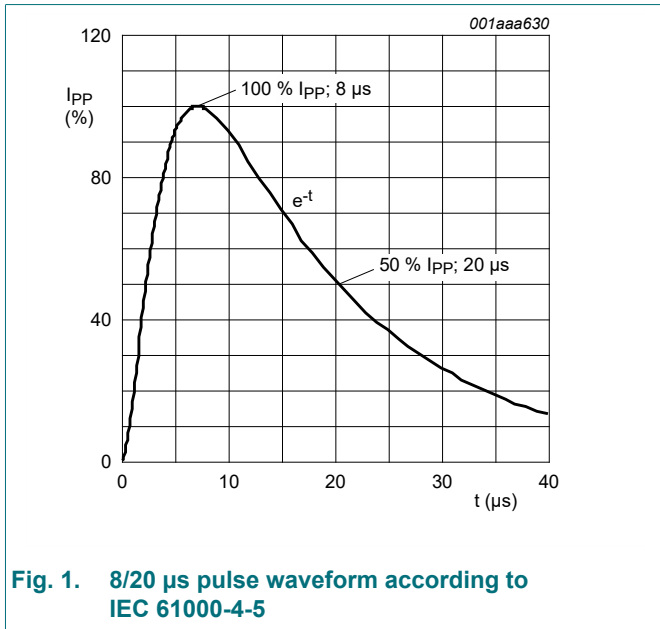
## 8. Limiting values

**Table 5. Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
$I_{PPM}$	rated peak pulse current	$t_p = 8/20 \mu s$	[1]	-	3.6	A
$T_j$	junction temperature			-	150	°C
$T_{amb}$	ambient temperature			-55	150	°C
$T_{stg}$	storage temperature			-65	150	°C
<b>ESD maximum ratings</b>						
$V_{ESD}$	electrostatic discharge voltage	IEC 61000-4-2; contact discharge	[2]	-	27	kV

- [1] Device stressed with 8/20  $\mu s$  exponential decay waveform according to IEC 61000-4-5.
- [2] Device stressed with ten non-repetitive ESD pulses.



### 9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$V_{RWM}$	reverse standoff voltage	$T_{amb} = 25\text{ }^{\circ}\text{C}$	-	-	33	V	
$V_{BR}$	breakdown voltage	$I_R = 10\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$	34	-	44	V	
$I_{RM}$	reverse leakage current	$V_{RWM} = 33\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$	-	1	50	nA	
$C_d$	diode capacitance	$f = 1\text{ MHz}; V_R = 0\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$	-	9.5	11.5	pF	
$V_{CL}$	clamping voltage	$I_{PP} = 1\text{ A}; t_p = 8/20\text{ }\mu\text{s}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	-	36	-	V
		$I_{PP} = 16\text{ A}; t_p = 100\text{ ns}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[2]	-	45	-	V
$R_{dyn}$	dynamic resistance	$I_R = 10\text{ A}; t_p = 100\text{ ns}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[2]	-	0.7	$\Omega$	

- [1] Device stressed with 8/20  $\mu\text{s}$  exponential decay waveform according to IEC 61000-4-5.
- [2] Non-repetitive current pulse, Transmission Line Pulse (TLP); square pulse; ANSI / ESD STM5.5.1-2008

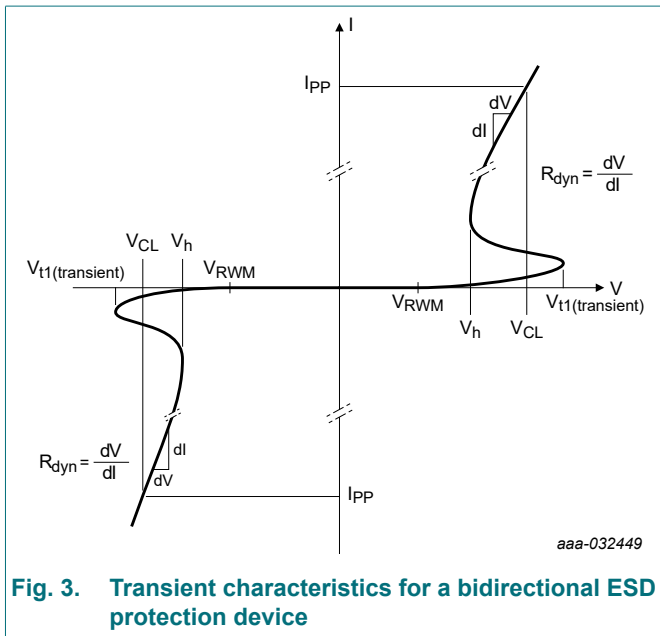


Fig. 3. Transient characteristics for a bidirectional ESD protection device

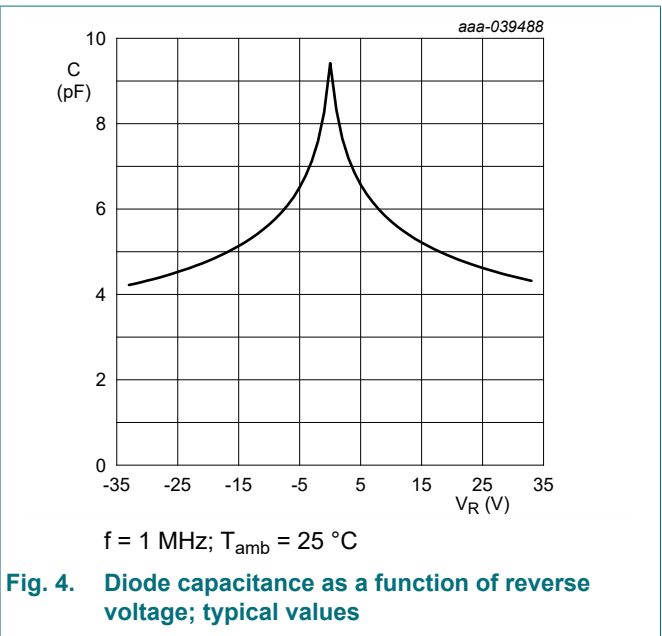
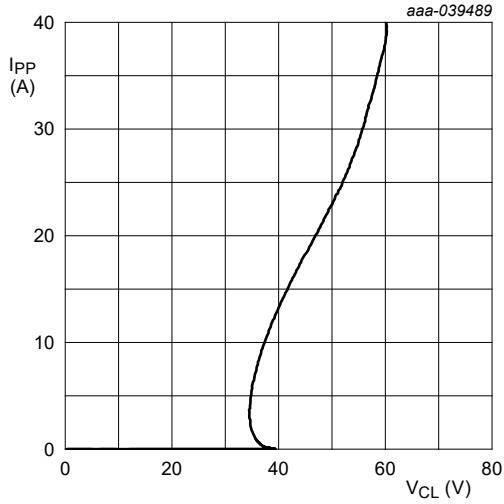


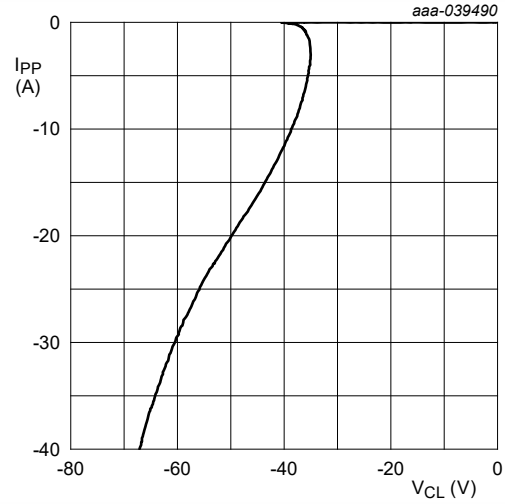
Fig. 4. Diode capacitance as a function of reverse voltage; typical values

Extremely low clamping bidirectional ESD protection diode



Transmission Line Pulse (TLP);  
 $t_p = 100 \text{ ns}$ ;  $t_r = 1 \text{ ns}$

Fig. 5. Positive clamping voltage (TLP); typical values

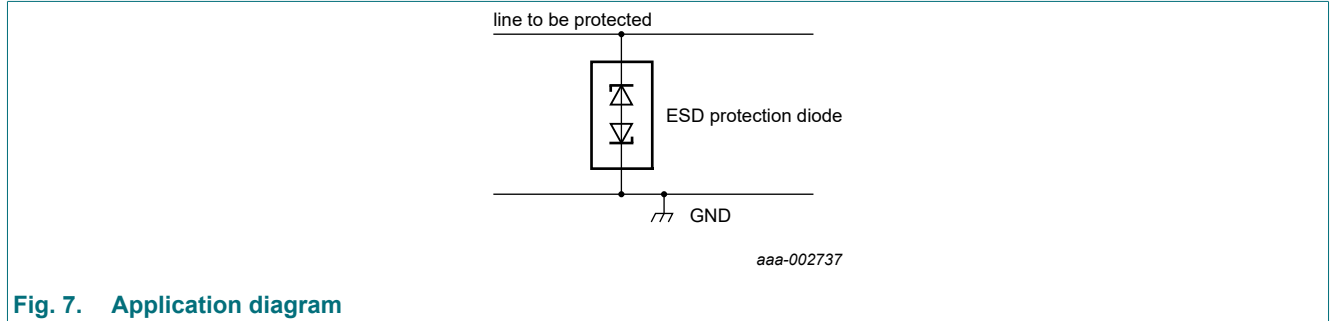


Transmission Line Pulse (TLP);  
 $t_p = 100 \text{ ns}$ ;  $t_r = 1 \text{ ns}$

Fig. 6. Negative clamping voltage (TLP); typical values

## 10. Application information

The device is designed for the protection of one bidirectional data line from surge pulses and ESD damage. The device is suitable on lines where the signal polarities are both positive and negative with respect to ground.



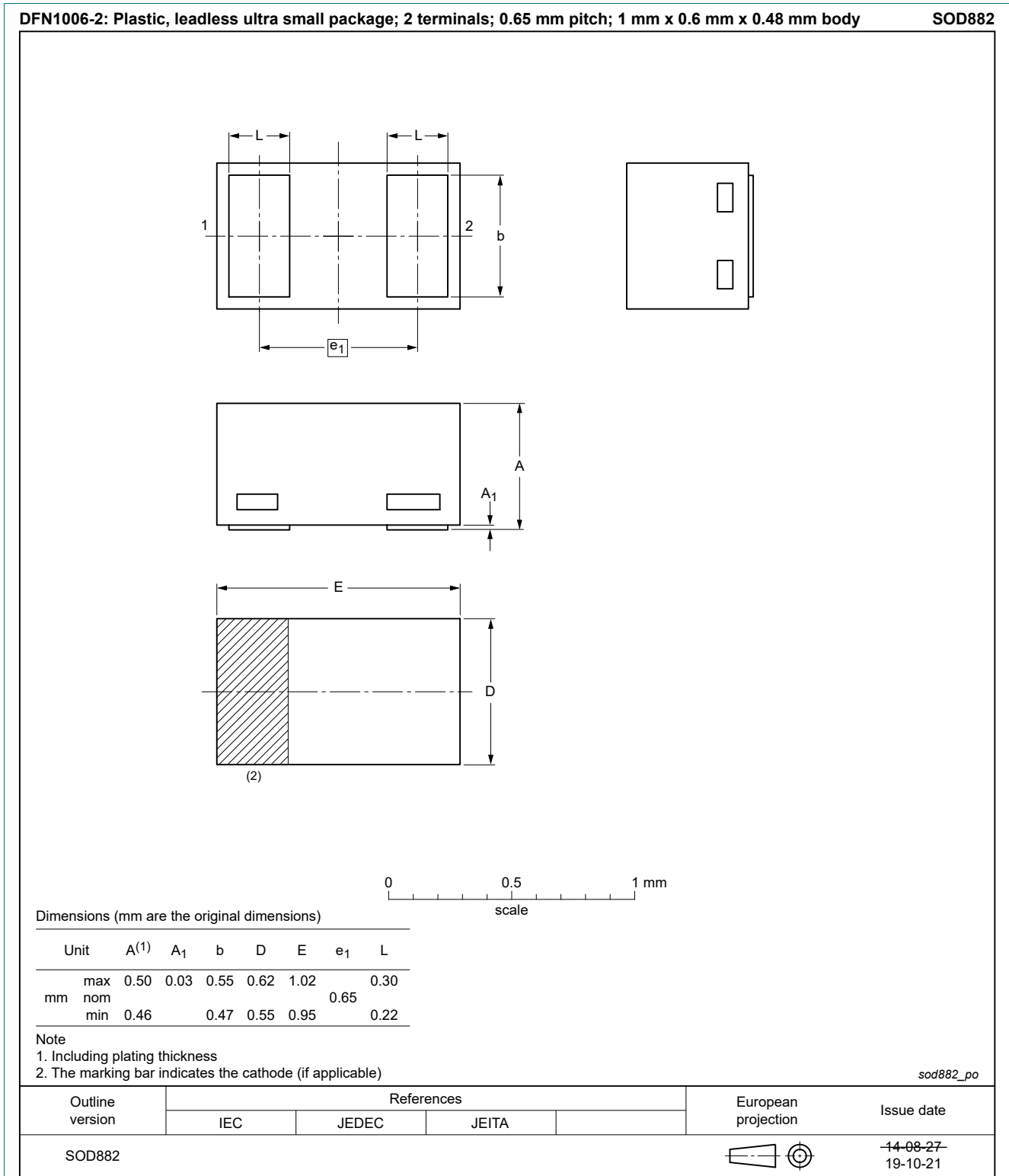
**Fig. 7. Application diagram**

### Circuit board layout and protection device placement

Circuit board layout is critical for the suppression of ESD, Electrical Fast Transient (EFT) and surge transients. The following guidelines are recommended:

1. Place the device as close to the input terminal or connector as possible.
2. Minimize the path length between the device and the protected line.
3. Keep parallel signal paths to a minimum.
4. Avoid running protected conductors in parallel with unprotected conductors.
5. Minimize all Printed-Circuit Board (PCB) conductive loops including power and ground loops.
6. Minimize the length of the transient return path to ground.
7. Avoid using shared transient return paths to a common ground point.
8. Use ground planes whenever possible. For multilayer PCBs, use ground vias.

### 11. Package outline



**Fig. 8. Package outline DFN1006-2 (SOD882)**

## 12. Soldering

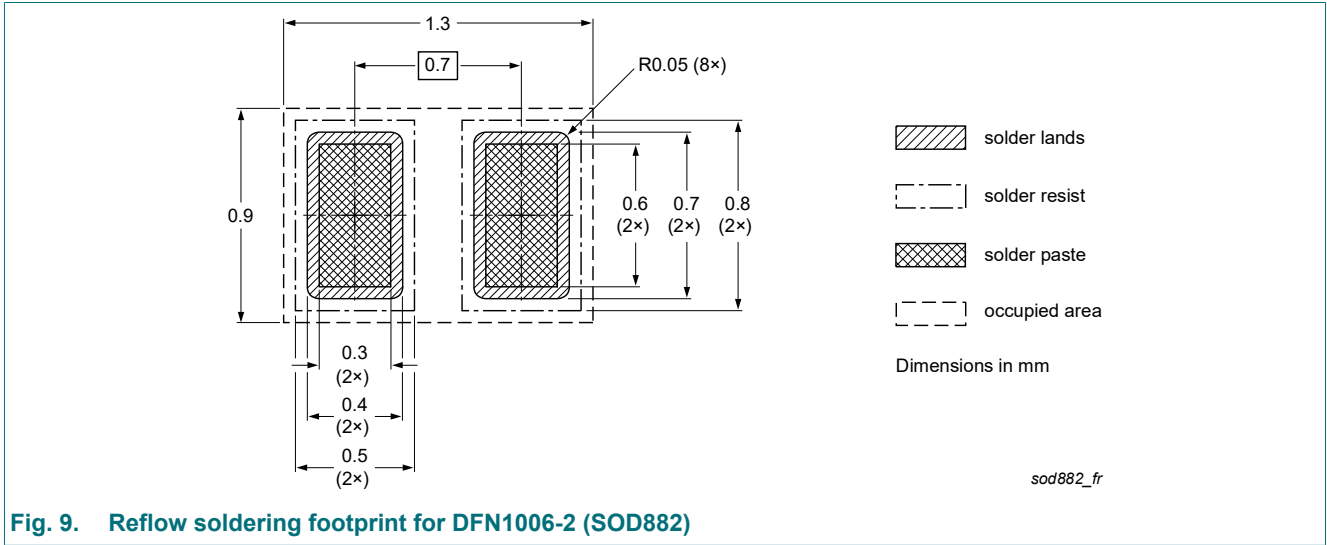


Fig. 9. Reflow soldering footprint for DFN1006-2 (SOD882)



## 13. Revision history

Table 7. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PESD33VL1BL v.2	20240530	Product data sheet	-	PESD33VL1BL v.1
Modifications:	<ul style="list-style-type: none"><li>• Chapter "Features and benefits": update, ISO 10605 topic removed</li><li>• Chapter "Limiting values": update, ISO 10605 topics removed</li></ul>			
PESD33VL1BL v.1	20240524	Product data sheet	-	-

## 14. Legal information

### Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
- [3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at <https://www.nexperia.com>.

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