



# PESD12VS5UD-Q

## Fivefold ESD protection diode array

15 May 2023

Product data sheet

## 1. General description

Fivefold ElectroStatic Discharge (ESD) protection diode array in a SOT457 (SC-74) small Surface-Mounted Device (SMD) plastic package, designed to protect up to five signal lines from the damage caused by ESD and other transients.

## 2. Features and benefits

- ESD protection of up to five lines
- Max peak pulse power:  $P_{PPM} = 200 \text{ W}$
- Ultra low leakage current:  $I_{RM} = 0.05 \text{ nA}$
- Low clamping voltage:  $V_{CL} = 24 \text{ V}$  at  $I_{PPM} = 10 \text{ A}$
- ESD protection up to 30 kV
- IEC 61000-4-2; level 4 (ESD)
- IEC 61000-4-5 (surge);  $I_{PPM} = 10 \text{ A}$
- Qualified according to AEC-Q101 and recommended for use in automotive applications

## 3. Applications

- Computers and peripherals
- Audio and video equipment
- Cellular handsets and accessories
- Communication systems
- Portable electronics
- SIM card protection

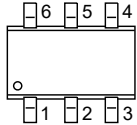
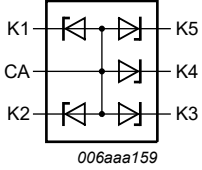
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{RWM}$	reverse standoff voltage	$T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	12	V
$C_d$	diode capacitance	$f = 1 \text{ MHz}; V_R = 0 \text{ V}; T_{amb} = 25 \text{ }^\circ\text{C}$	-	73	100	pF

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K1	cathode 1	 <p>SC-74; TSOP6 (SOT457)</p>	 <p>006aaa159</p>
2	CA	common anode		
3	K2	cathode 2		
4	K3	cathode 3		
5	K4	cathode 4		
6	K5	cathode 5		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PESD12VS5UD-Q	SC-74; TSOP6	plastic, surface-mounted package (SC-74; TSOP6); 6 leads	SOT457

## 7. Marking

Table 4. Marking codes

Type number	Marking code
PESD12VS5UD-Q	E3

## 8. Limiting values

**Table 5. Limiting values**

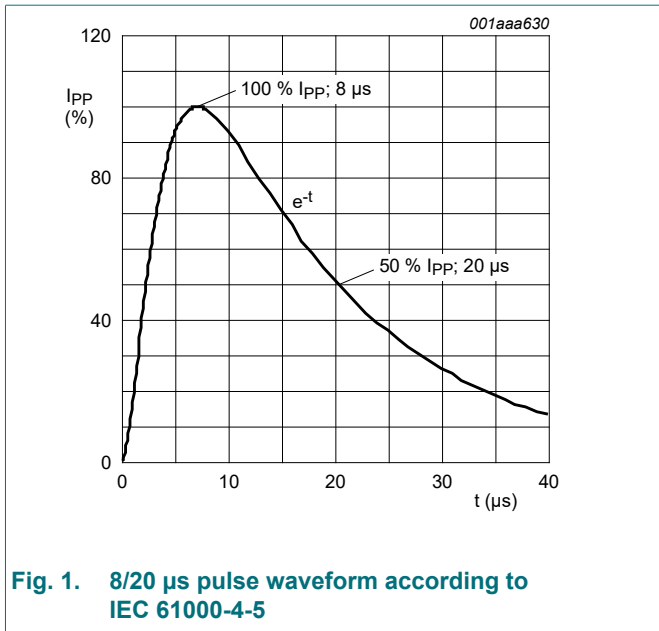
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
$P_{PPM}$	rated peak pulse power	$t_p = 8/20 \mu s$	[1] [2]	-	200	W
$I_{PPM}$	rated peak pulse current		[1] [2]	-	10	A
$T_j$	junction temperature			-	150	°C
$T_{amb}$	ambient temperature			-65	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	[3] [2]	-	30	kV
		IEC 61000-4-2; air discharge		-	15	kV
		MIL-STD-883; human body model (HBM)		-	10	kV

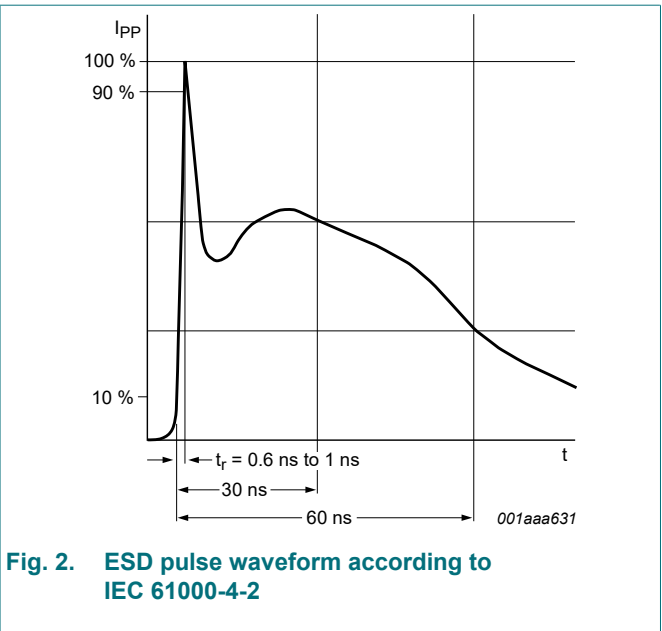
[1] Non-repetitive current pulse 8/20  $\mu s$  exponential decay waveform according to IEC 61000-4-5.

[2] Measured from pin 1,3,4,5 or 6 to pin 2.

[3] Device stressed with ten non-repetitive ESD pulses.



**Fig. 1. 8/20  $\mu s$  pulse waveform according to IEC 61000-4-5**



**Fig. 2. ESD pulse waveform according to IEC 61000-4-2**

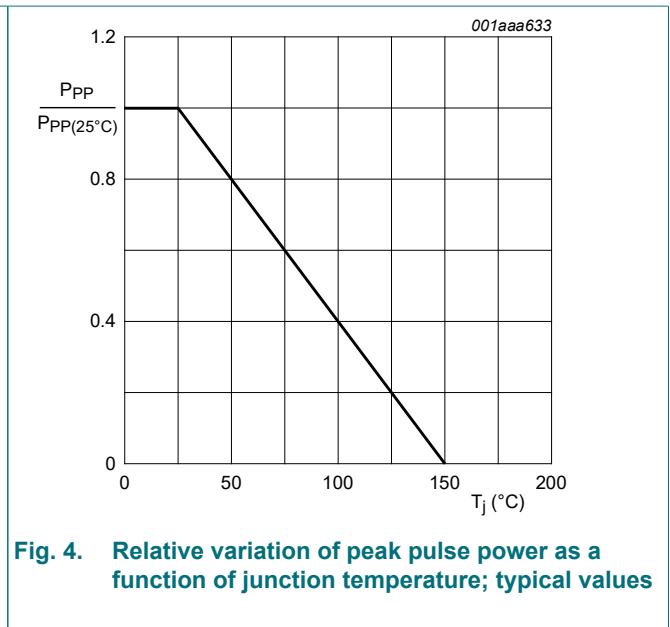
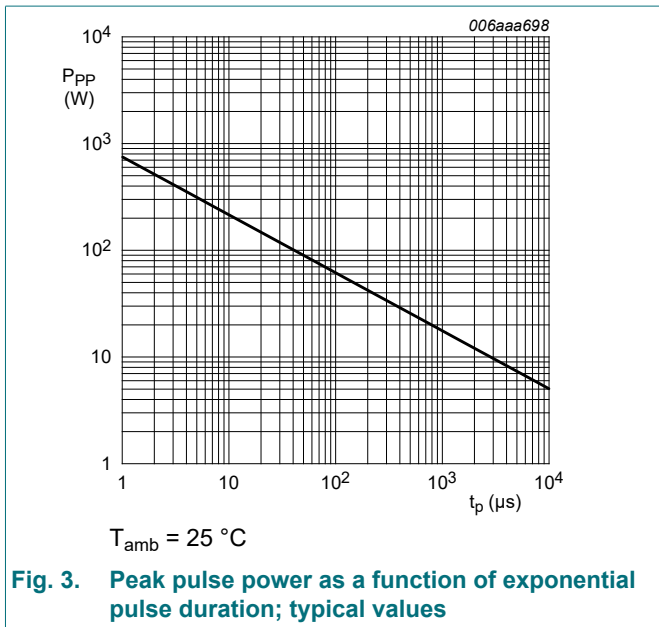
## 9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{RWM}$	reverse standoff voltage	$T_{amb} = 25\text{ }^{\circ}\text{C}$	-	-	12	V
$V_{BR}$	breakdown voltage	$I_R = 1\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$	12.5	14.5	16	V
$I_{RM}$	reverse leakage current	$V_{RWM} = 12\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$	-	0.05	15	nA
$C_d$	diode capacitance	$f = 1\text{ MHz}; V_R = 0\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$	-	73	100	pF
$V_{CL}$	clamping voltage	$I_{PP} = 1\text{ A}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[1] [2]	-	17	V
		$I_{PPM} = 10\text{ A}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[1] [2]	-	24	V
$R_{diff}$	differential resistance	$I_R = 5\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$	-	-	25	$\Omega$

[1] Non-repetitive current pulse 8/20  $\mu\text{s}$  exponential decay waveform according to IEC 61000-4-5.

[2] Measured from pin 1,3,4,5 or 6 to pin 2.



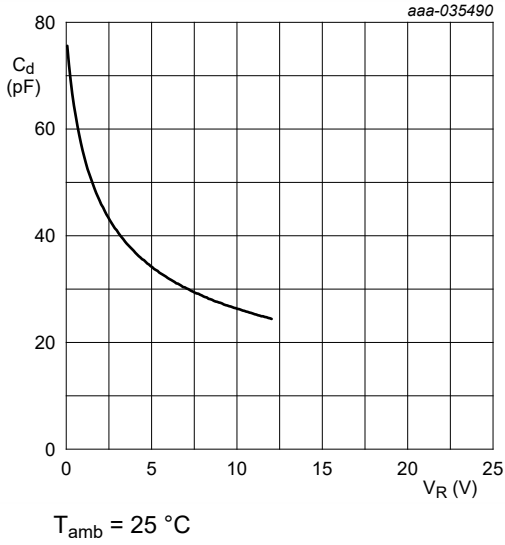


Fig. 5. Diode capacitance as a function of reverse voltage; typical values

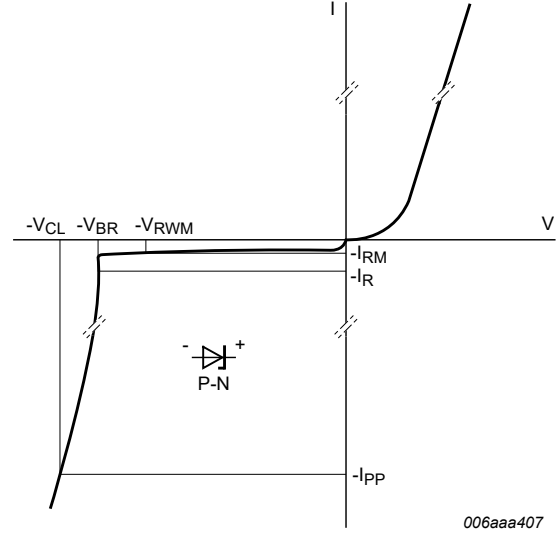


Fig. 6. V-I characteristics for a unidirectional ESD protection diode

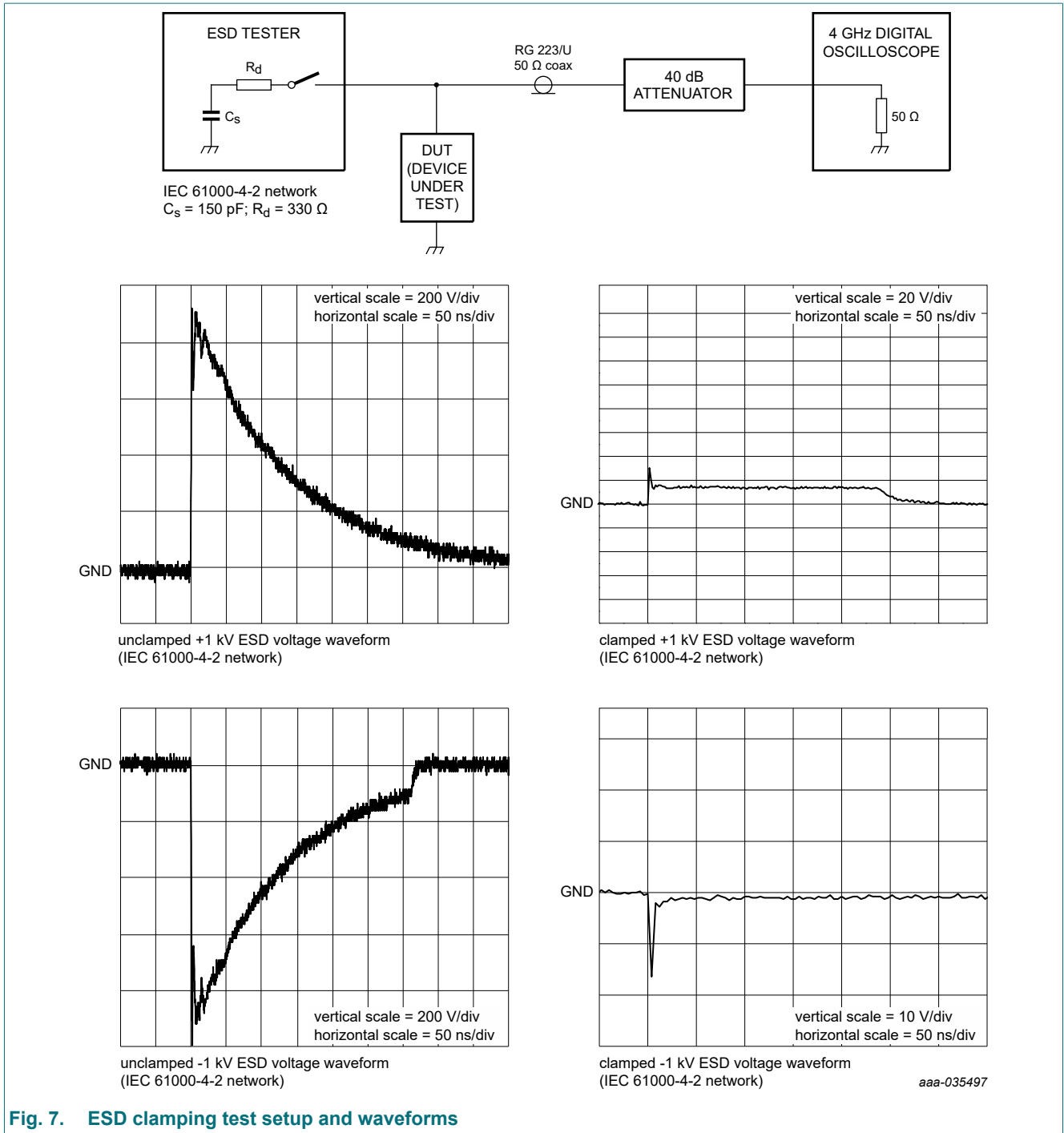
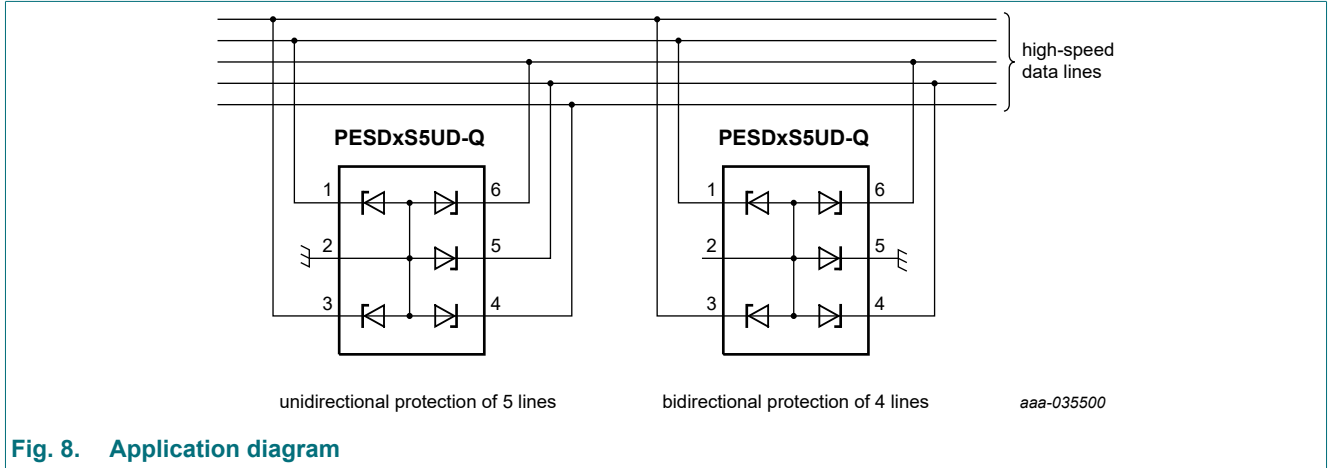


Fig. 7. ESD clamping test setup and waveforms

## 10. Application information

This device is designed for the protection of up to five unidirectional data lines from the damage caused by ESD and surge pulses. The device may be used on lines where the signal polarities are both, positive and negative with respect to ground.



### 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. Test information

### Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - *Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

## 12. Package outline

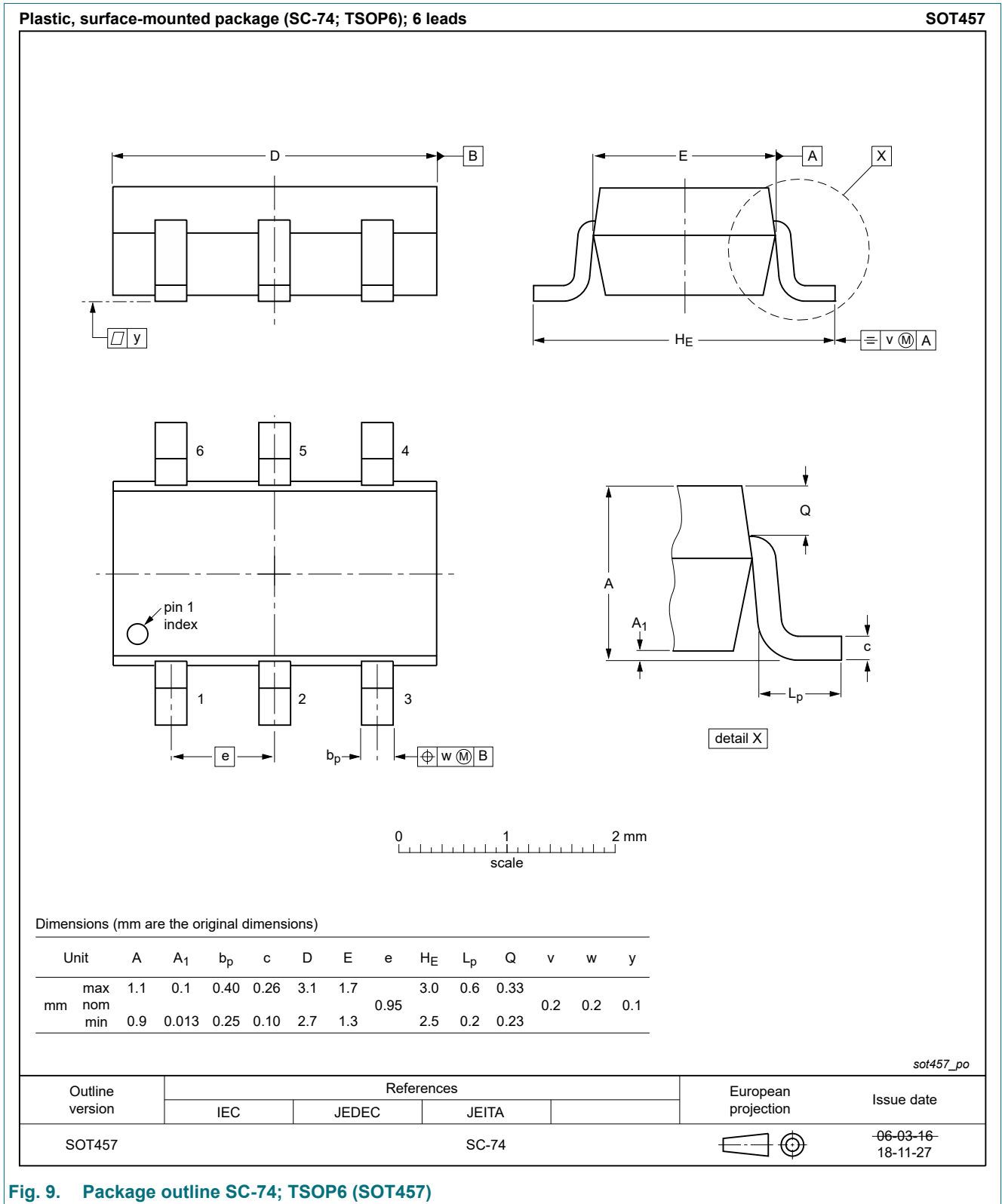


Fig. 9. Package outline SC-74; TSOP6 (SOT457)



### 13. Soldering

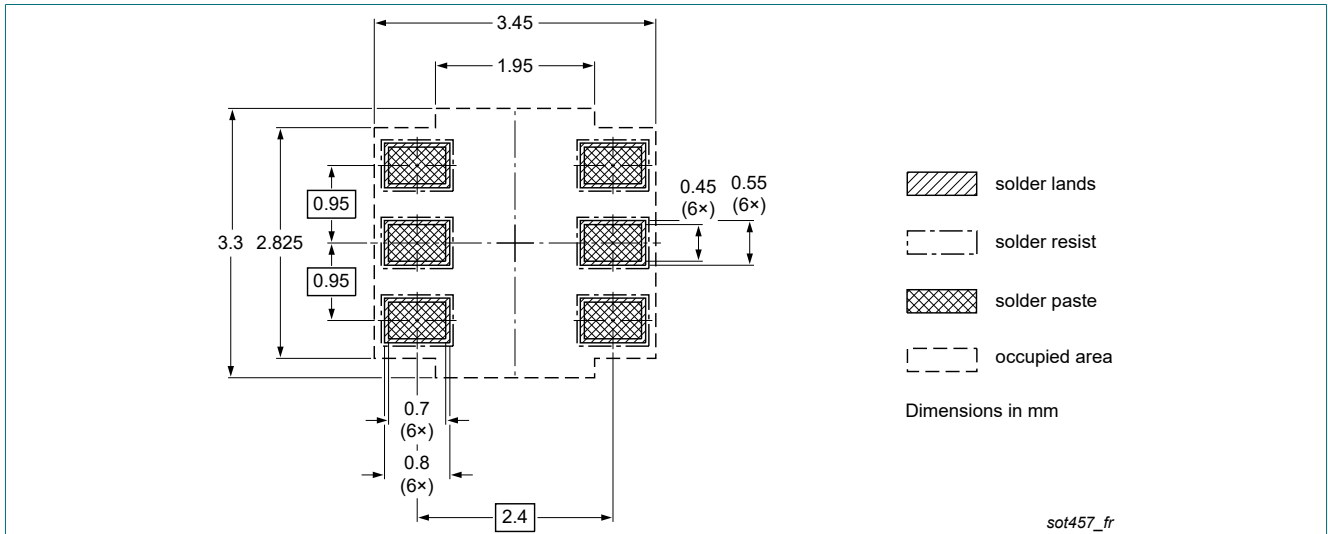


Fig. 10. Reflow soldering footprint for SC-74; TSOP6 (SOT457)

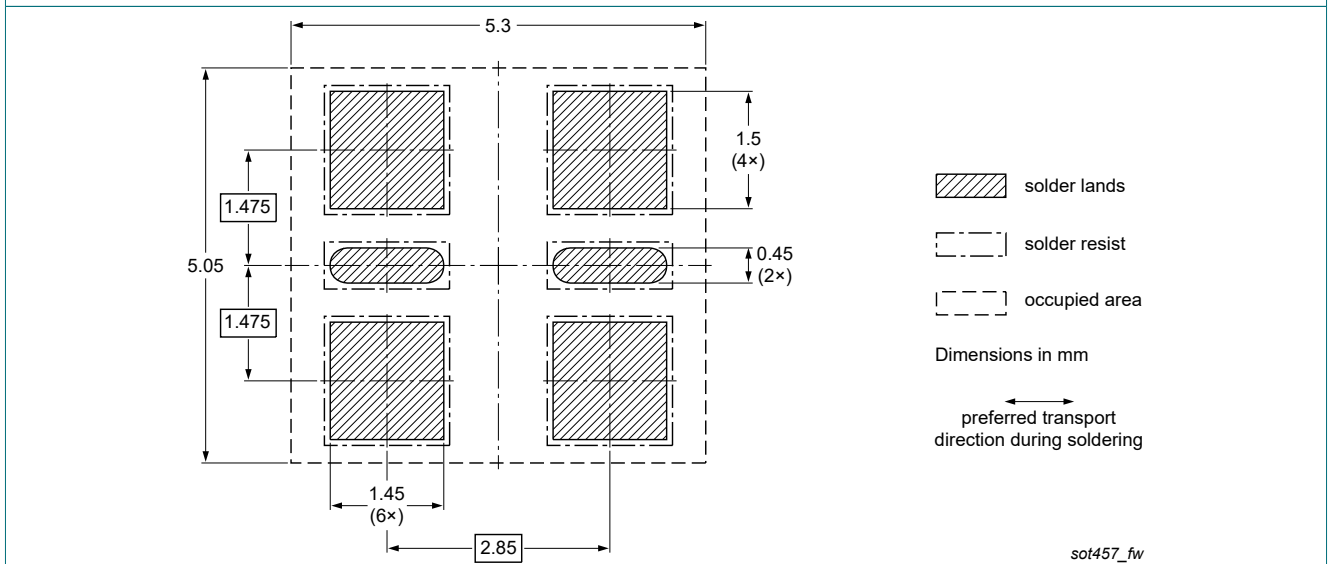


Fig. 11. Wave soldering footprint for SC-74; TSOP6 (SOT457)

## 14. Revision history

Table 7. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PESD12VS5UD-Q v.1	20230515	Product data sheet	-	-

## 15. 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.

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