



# BAS21PG

## Dual isolated high-voltage switching diode

9 June 2015

Product data sheet

### 1. General description

Dual high-voltage switching diode encapsulated in a very small SOT353 (SC-88A) Surface-Mounted Device (SMD) plastic package.

### 2. Features and benefits

- High switching speed:  $t_{rr} \leq 50$  ns
- Low leakage current
- Reverse voltage  $V_R \leq 250$  V
- Low capacitance:  $C_d \leq 2$  pF
- Very small SMD plastic package
- AEC-Q101 qualified

### 3. Applications

- High-speed switching at high voltage
- High-voltage general-purpose switching
- Voltage clamping
- Reverse polarity protection

### 4. Quick reference data

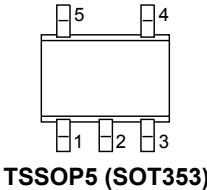
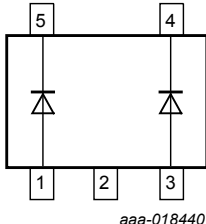
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per diode</b>						
$I_F$	forward current	$T_j = 25$ °C; single diode loaded	-	-	225	mA
$V_R$	reverse voltage	$T_j = 25$ °C	-	-	250	V
<b>Per diode</b>						
$I_R$	reverse current	$V_R = 200$ V; $T_j = 25$ °C	-	25	100	nA
$t_{rr}$	reverse recovery time	$I_F = 10$ mA; $I_R = 10$ mA; $I_{R(meas)} = 1$ mA; $R_L = 100$ $\Omega$ ; $T_j = 25$ °C	-	-	50	ns



## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode diode 1	 <p><b>TSSOP5 (SOT353)</b></p>	 <p>aaa-018440</p>
2	n.c.	not connected		
3	A2	anode diode 2		
4	K2	cathode diode 2		
5	K1	cathode diode 1		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BAS21PG	TSSOP5	plastic surface-mounted package; 5 leads	SOT353

## 7. Marking

Table 4. Marking codes

Type number	Marking code
BAS21PG	PG

## 8. Limiting values

**Table 5. Limiting values**

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

Symbol	Parameter	Conditions		Min	Max	Unit
<b>Per diode</b>						
$V_R$	reverse voltage	$T_j = 25\text{ °C}$		-	250	V
$I_F$	forward current	$T_j = 25\text{ °C}$ ; single diode loaded		-	225	mA
		$T_j = 25\text{ °C}$ ; double diode loaded		-	125	mA
$I_{FRM}$	repetitive peak forward current	$t_p \leq 1\text{ ms}$ ; $\delta = 25\%$ ; $T_j = 25\text{ °C}$		-	625	mA
$I_{FSM}$	non-repetitive peak forward current	$t_p = 1\text{ }\mu\text{s}$ ; $T_{j(\text{init})} = 25\text{ °C}$ ; square wave		-	9	A
		$t_p = 100\text{ }\mu\text{s}$ ; $T_{j(\text{init})} = 25\text{ °C}$ ; square wave		-	3	A
		$t_p = 10\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ °C}$ ; square wave		-	1.7	A
<b>Per device; one diode loaded</b>						
$P_{\text{tot}}$	total power dissipation	$T_{\text{amb}} \leq 25\text{ °C}$	[1]	-	255	mW
			[2]	-	290	mW
$T_j$	junction temperature			-	150	°C
$T_{\text{amb}}$	ambient temperature			-55	150	°C
$T_{\text{stg}}$	storage temperature			-65	150	°C

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.

### 9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient	[1]	-	-	495	K/W
		[2]	-	-	430	K/W
R <sub>th(j-sp)</sub>	thermal resistance from junction to solder point	[3]	-	-	95	K/W

- [1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.
- [3] Soldering point of cathode tab.

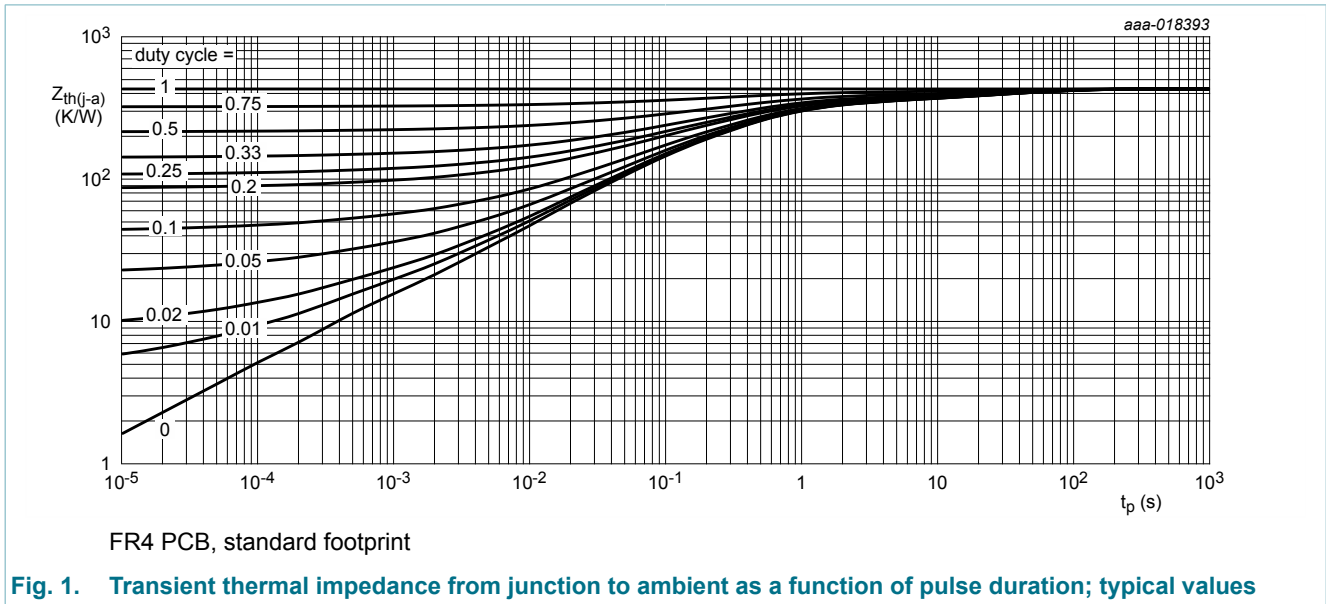
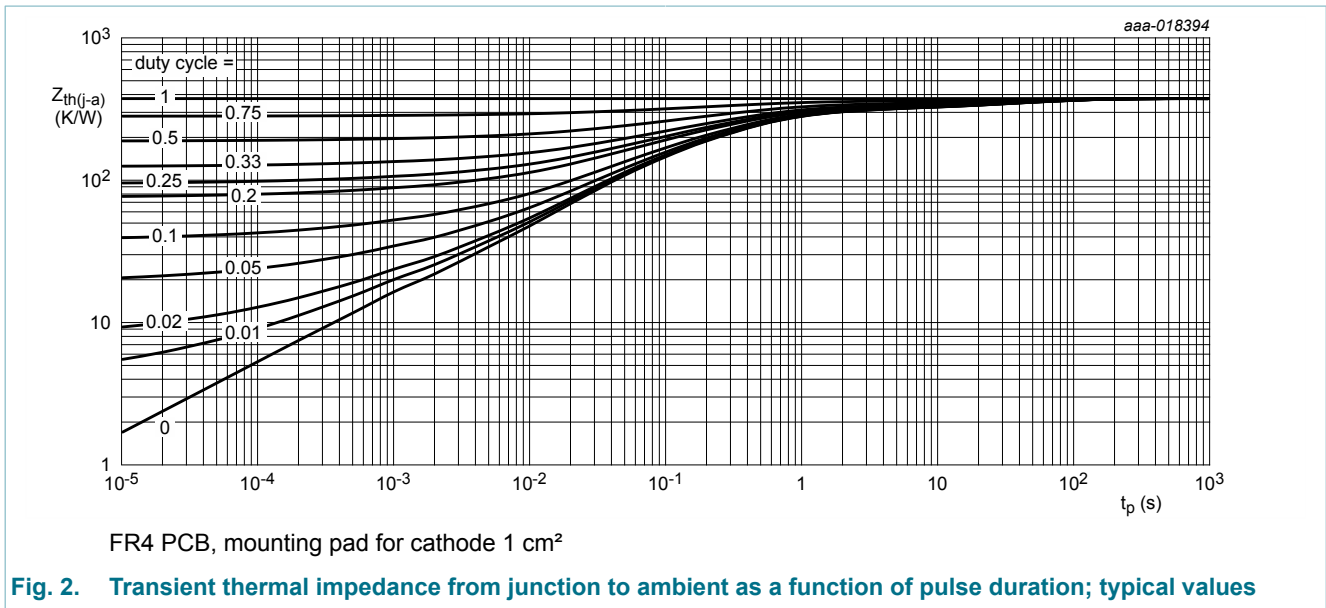


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

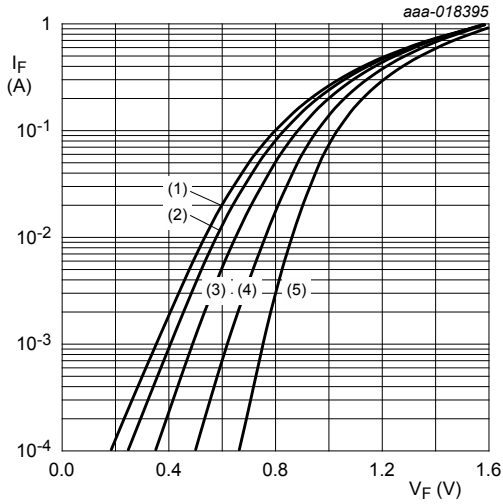


## 10. Characteristics

Table 7. Characteristics

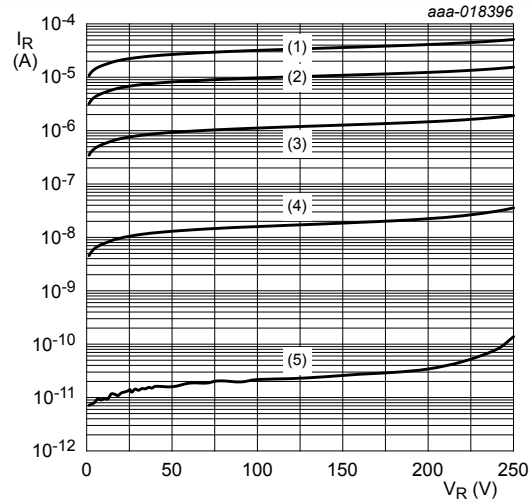
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per diode</b>						
$V_{(BR)R}$	reverse breakdown voltage	$I_R = 100 \mu A; T_j = 25 \text{ }^\circ C$	250	-	-	V
$V_F$	forward voltage	$I_F = 100 \text{ mA}; T_j = 25 \text{ }^\circ C$	-	-	1	V
		$I_F = 200 \text{ mA}; T_j = 25 \text{ }^\circ C$	-	-	1.25	V
$I_R$	reverse current	$V_R = 200 \text{ V}; T_j = 25 \text{ }^\circ C$	-	25	100	nA
		$V_R = 200 \text{ V}; T_j = 150 \text{ }^\circ C$	-	40	-	$\mu A$
$C_d$	diode capacitance	$V_R = 0 \text{ V}; f = 1 \text{ MHz}; T_j = 25 \text{ }^\circ C$	-	0.8	2	pF
$t_{rr}$	reverse recovery time	$I_F = 10 \text{ mA}; I_R = 10 \text{ mA}; I_{R(meas)} = 1 \text{ mA}; R_L = 100 \Omega; T_j = 25 \text{ }^\circ C$	-	-	50	ns

Dual isolated high-voltage switching diode



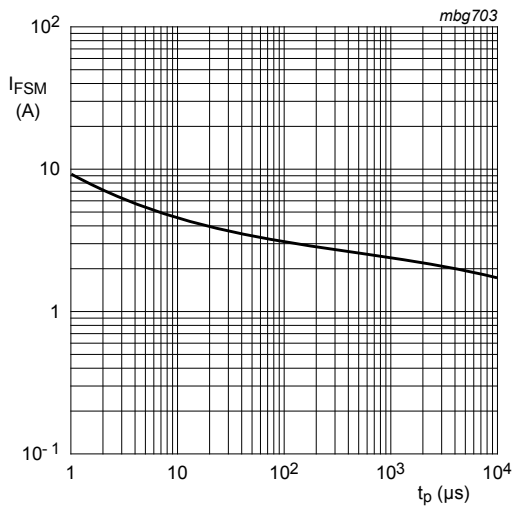
- (1)  $T_j = 150^\circ\text{C}$
- (2)  $T_j = 125^\circ\text{C}$
- (3)  $T_j = 85^\circ\text{C}$
- (4)  $T_j = 25^\circ\text{C}$
- (5)  $T_j = -40^\circ\text{C}$

**Fig. 3. Forward current as a function of forward voltage; typical values**



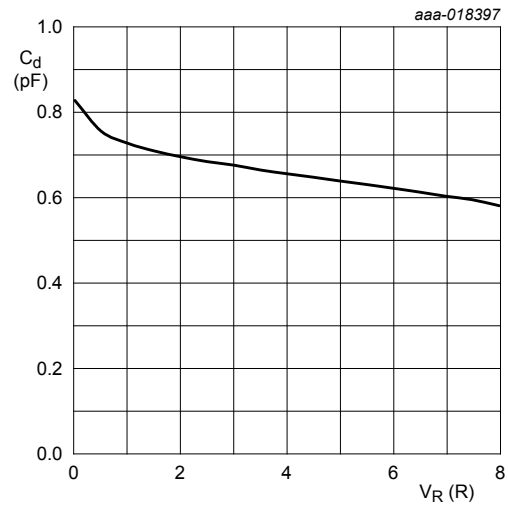
- (1)  $T_j = 150^\circ\text{C}$
- (2)  $T_j = 125^\circ\text{C}$
- (3)  $T_j = 85^\circ\text{C}$
- (4)  $T_j = 25^\circ\text{C}$
- (5)  $T_j = -40^\circ\text{C}$

**Fig. 4. Reverse current as a function of reverse voltage; typical values**



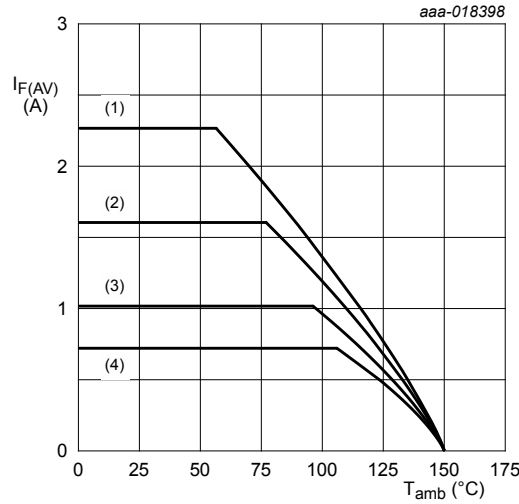
Based on square wave currents.  
 $T_{j(\text{init})} = 25^\circ\text{C}$

**Fig. 5. Non-repetitive peak forward current as a function of pulse duration; maximum values**



$f = 1\text{MHz}$ ;  $T_{\text{amb}} = 25^\circ\text{C}$

**Fig. 6. Diode capacitance as a function of reverse voltage; typical values**



FR4 PCB, standard footprint; one diode loaded

- (1)  $\delta = 1$
- (2)  $\delta = 0.5$
- (3)  $\delta = 0.2$
- (4)  $\delta = 0.1$

Fig. 7. Average forward current as a function of ambient temperature; typical values

### 11. Test information

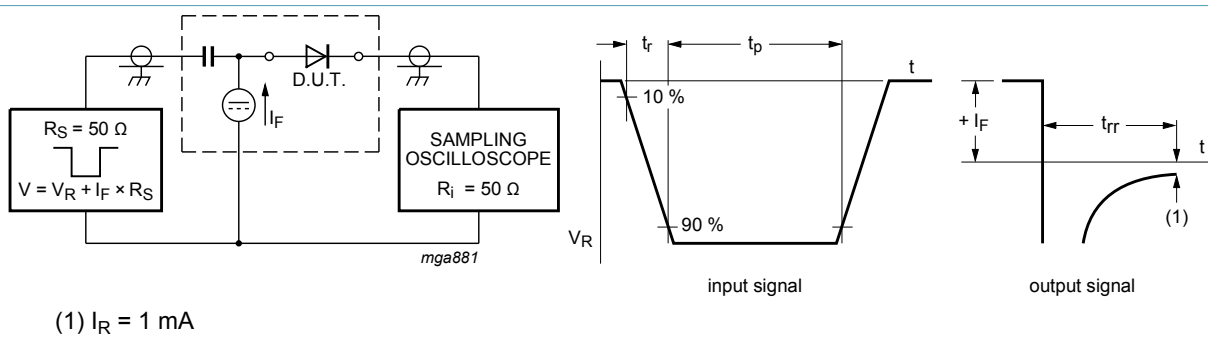


Fig. 8. Reverse recovery time: test circuit and waveforms

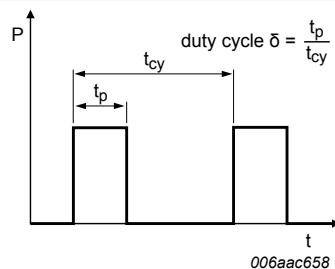


Fig. 9. Duty cycle definition

The current ratings for the typical waveforms are calculated according to the equations:  $I_{F(AV)} = I_M \times \delta$  with  $I_M$  defined as peak current,  $I_{RMS} = I_{F(AV)}$  at DC, and  $I_{RMS} = I_M \times \sqrt{\delta}$  with  $I_{RMS}$  defined as RMS current.

### 11.1 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

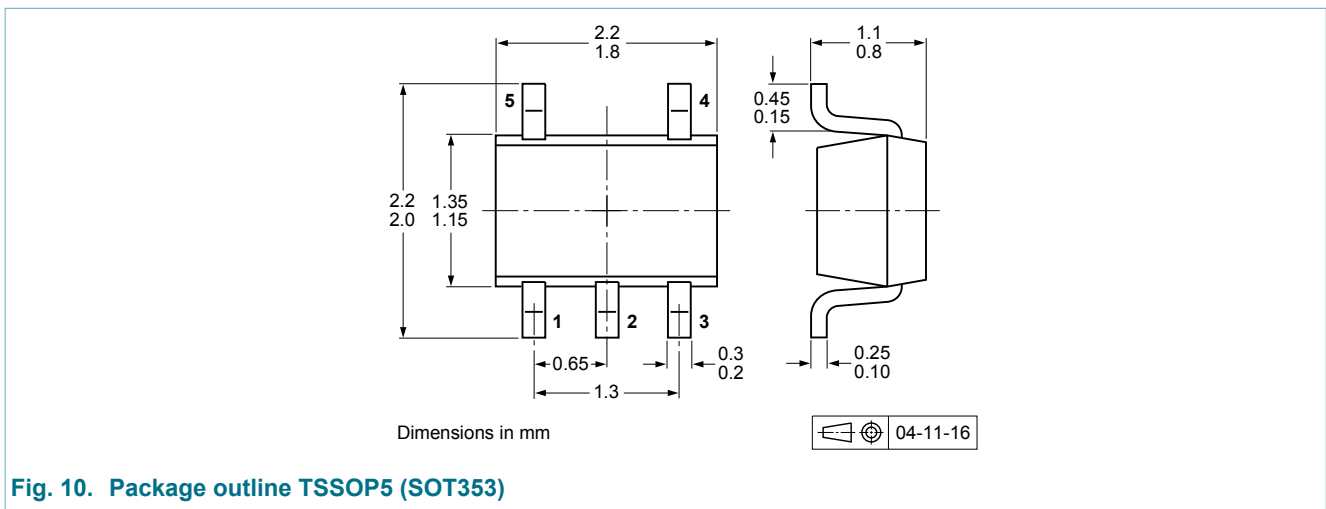


Fig. 10. Package outline TSSOP5 (SOT353)

## 13. Soldering

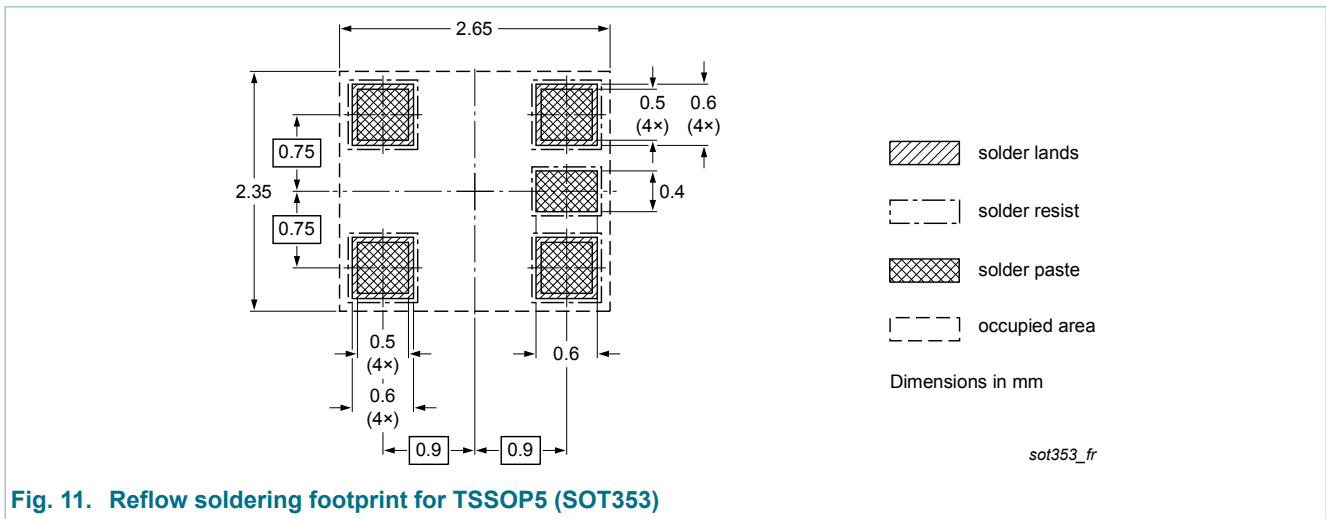


Fig. 11. Reflow soldering footprint for TSSOP5 (SOT353)



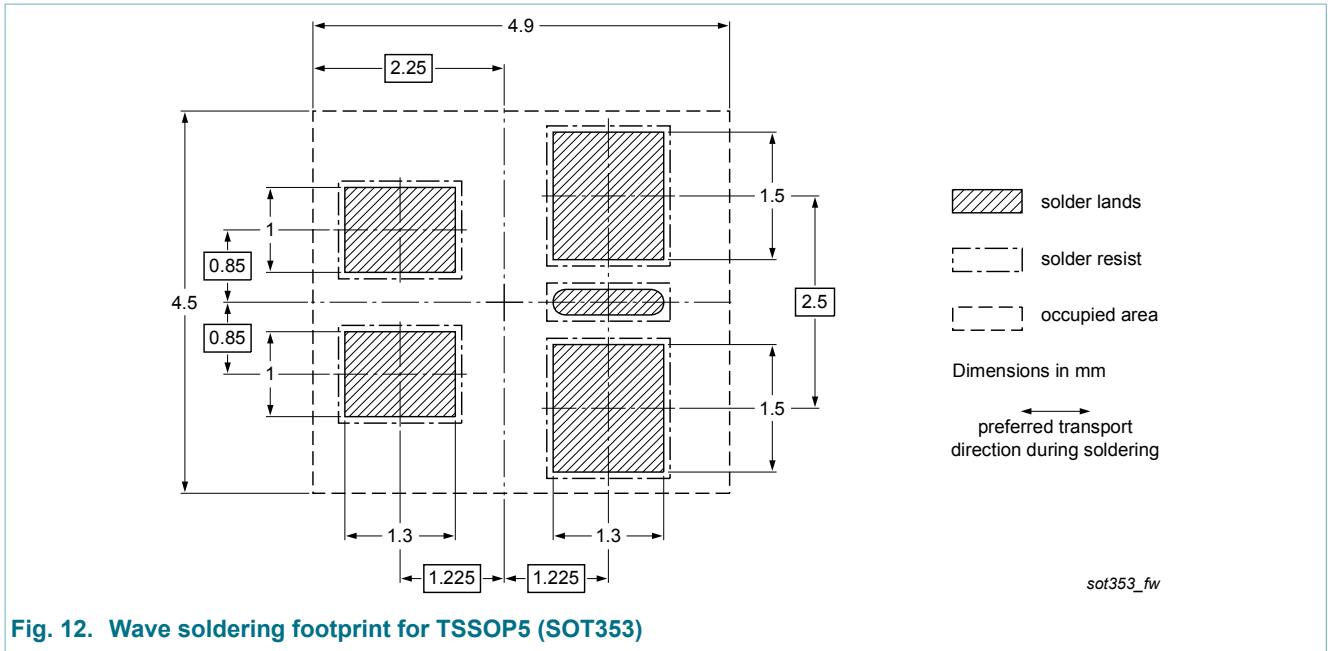


Fig. 12. Wave soldering footprint for TSSOP5 (SOT353)

## 14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BAS21PG v.1	20150609	Product data sheet	-	-

## 15. Legal information

### 15.1 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.
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