
# 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

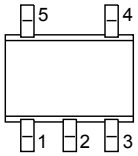
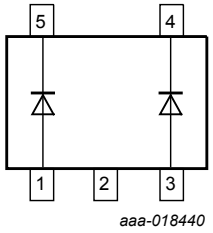
## 4. Quick reference data

**Table 1. Quick reference data**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| **Per diode** | | | | | | | |
| $I_F$ | forward current | $T_j$ = 25 °C; single diode loaded | | - | - | 225 | mA |
| $V_R$ | reverse voltage | $T_j$ = 25 °C | | - | - | 250 | V |
| **Per diode** | | | | | | | |
| $I_R$ | 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 Ω; $T_j$ = 25 °C | | - | - | 50 | ns |

## 5. Pinning information

**Table 2. Pinning information**

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|---|---|---|---|---|
| 1 | A1 | anode diode 1 |   TSSOP5 (SOT353) |   aaa-018440 |
| 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 |
|---|---|---|---|---|---|---|
| **Per diode** | | | | | | |
| $V_R$ | reverse voltage | $T_j$ = 25 °C | | - | 250 | V |
| $I_F$ | forward current | $T_j$ = 25 °C; single diode loaded | | - | 225 | mA |
| | | $T_j$ = 25 °C; double diode loaded | | - | 125 | mA |
| $I_{FRM}$ | repetitive peak forward current | $t_p \leq 1$ ms; δ = 25 %; $T_j$ = 25 °C | | - | 625 | mA |
| $I_{FSM}$ | non-repetitive peak forward current | $t_p$ = 1 µs; $T_{j(init)}$ = 25 °C; square wave | | - | 9 | A |
| | | $t_p$ = 100 µs; $T_{j(init)}$ = 25 °C; square wave | | - | 3 | A |
| | | $t_p$ = 10 ms; $T_{j(init)}$ = 25 °C; square wave | | - | 1.7 | A |
| **Per device; one diode loaded** | | | | | | |
| $P_{tot}$ | total power dissipation | $T_{amb} \leq 25$ °C | [1] | - | 255 | mW |
| | | | [2] | - | 290 | mW |
| $T_j$ | junction temperature | | | - | 150 | °C |
| $T_{amb}$ | ambient temperature | | | -55 | 150 | °C |
| $T_{stg}$ | storage temperature | | | -65 | 150 | °C |

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

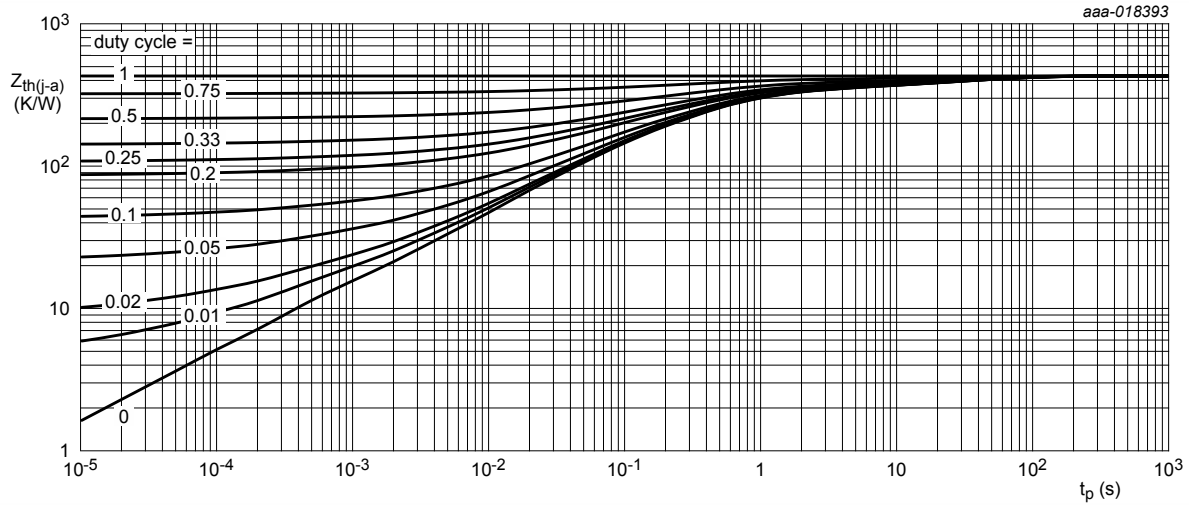
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².

# 9. Thermal characteristics

**Table 6. Thermal characteristics**

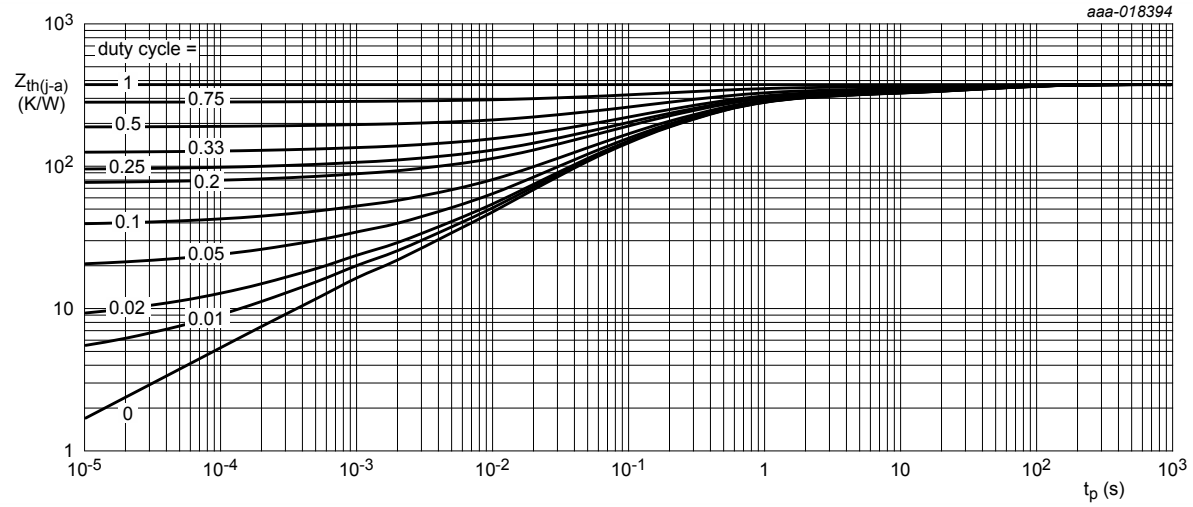
| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | | [1] | - | - | 495 | K/W |
| | | | [2] | - | - | 430 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | [3] | - | - | 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 cm².
[3] Soldering point of cathode tab.




FR4 PCB, standard footprint

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



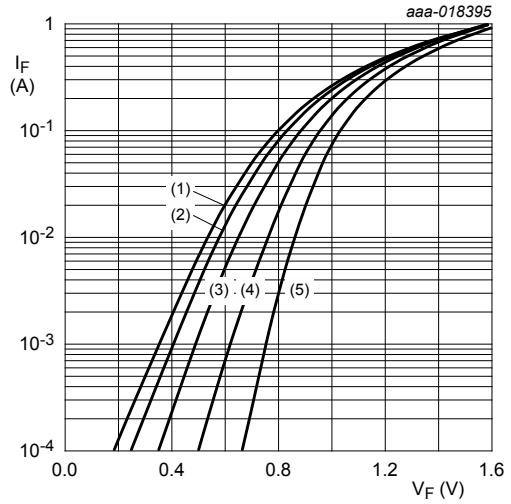

FR4 PCB, mounting pad for cathode 1 cm²

**Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values**

## 10. Characteristics

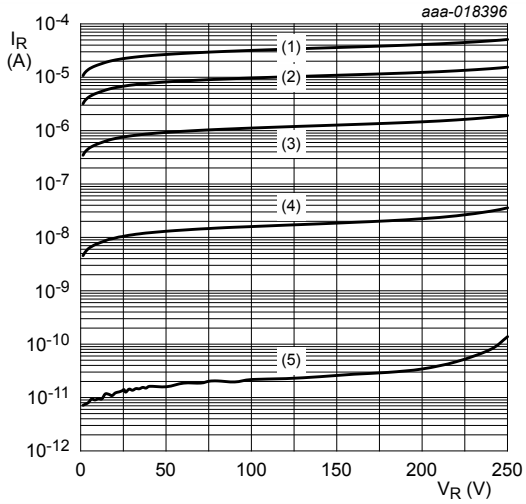
**Table 7. Characteristics**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| **Per diode** | | | | | | | |
| $V_{(BR)R}$ | reverse breakdown voltage | $I_R$ = 100 µA; $T_j$ = 25 °C | | 250 | - | - | V |
| $V_F$ | forward voltage | $I_F$ = 100 mA; $T_j$ = 25 °C | | - | - | 1 | V |
| | | $I_F$ = 200 mA; $T_j$ = 25 °C | | - | - | 1.25 | V |
| $I_R$ | reverse current | $V_R$ = 200 V; $T_j$ = 25 °C | | - | 25 | 100 | nA |
| | | $V_R$ = 200 V; $T_j$ = 150 °C | | - | 40 | - | µA |
| $C_d$ | diode capacitance | $V_R$ = 0 V; f = 1 MHz; $T_j$ = 25 °C | | - | 0.8 | 2 | pF |
| $t_{rr}$ | reverse recovery time | $I_F$ = 10 mA; $I_R$ = 10 mA; $I_{R(meas)}$ = 1 mA; $R_L$ = 100 Ω; $T_j$ = 25 °C | | - | - | 50 | ns |



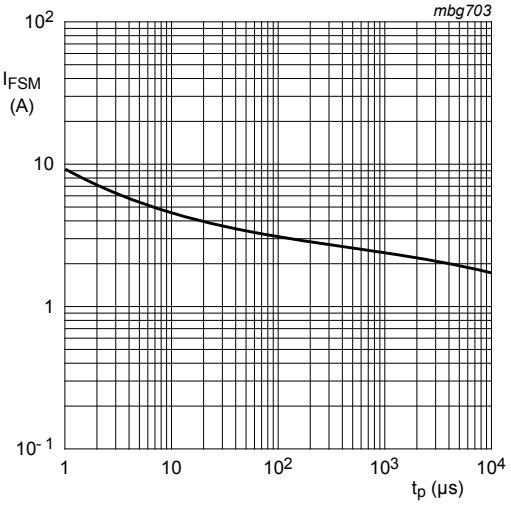

(1) $T_j$ = 150 °C
(2) $T_j$ = 125 °C
(3) $T_j$ = 85 °C
(4) $T_j$ = 25 °C
(5) $T_j$ = −40 °C

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



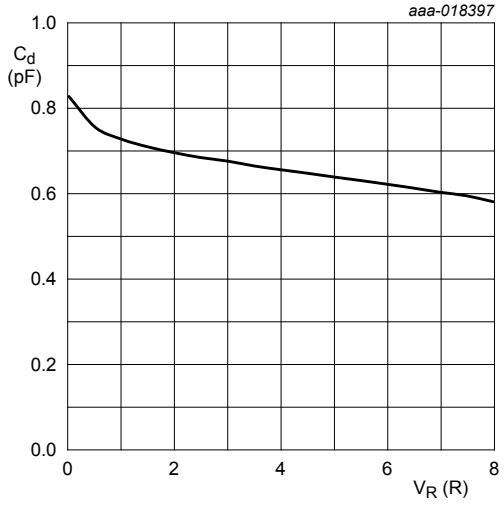

(1) $T_j$ = 150 °C
(2) $T_j$ = 125 °C
(3) $T_j$ = 85 °C
(4) $T_j$ = 25 °C
(5) $T_j$ = −40 °C

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



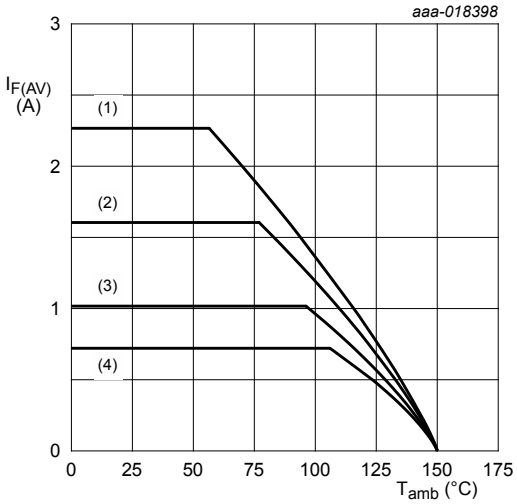

Based on square wave currents.
$T_{j(init)}$ = 25 °C

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




f = 1MHz; $T_{amb}$ = 25 °C

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




FR4 PCB, standard footprint; one diode loaded

(1) δ = 1

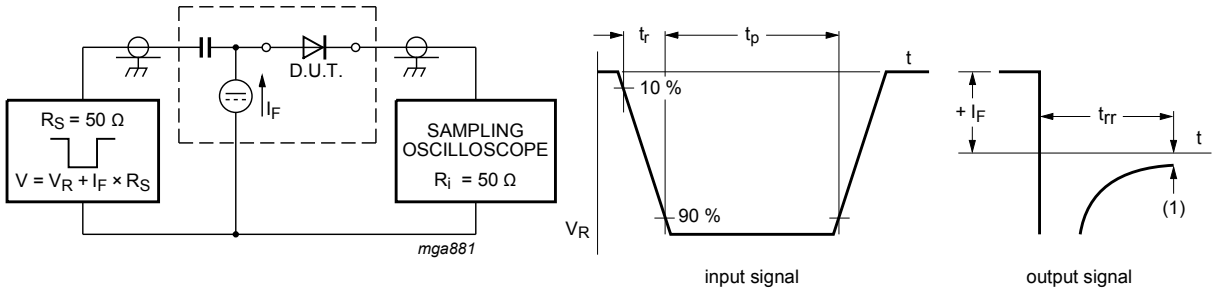
(2) δ = 0.5

(3) δ = 0.2

(4) δ = 0.1

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

## 11. Test information




(1) $I_R$ = 1 mA

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

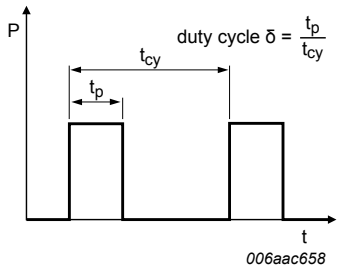



**Fig. 9. Duty cycle definition**

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

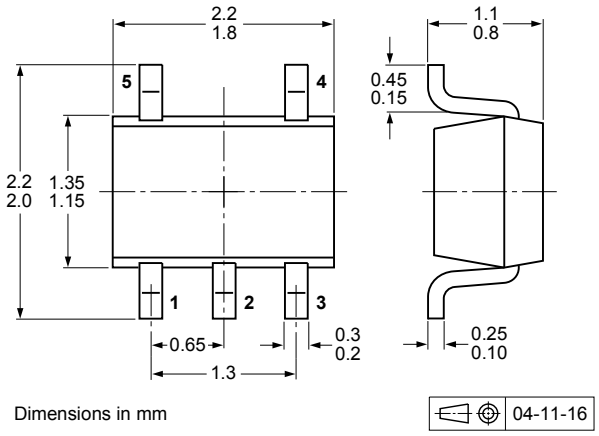



**Fig. 10. Package outline TSSOP5 (SOT353)**

## 13. Soldering

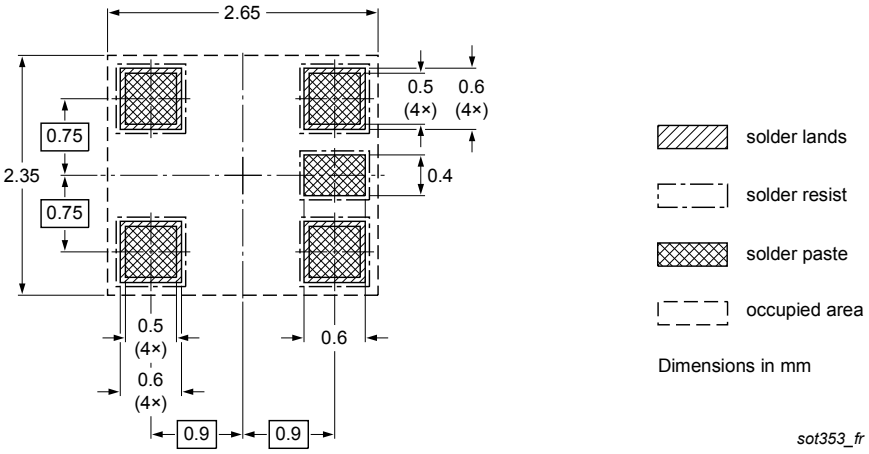



**Fig. 11. Reflow soldering footprint for TSSOP5 (SOT353)**

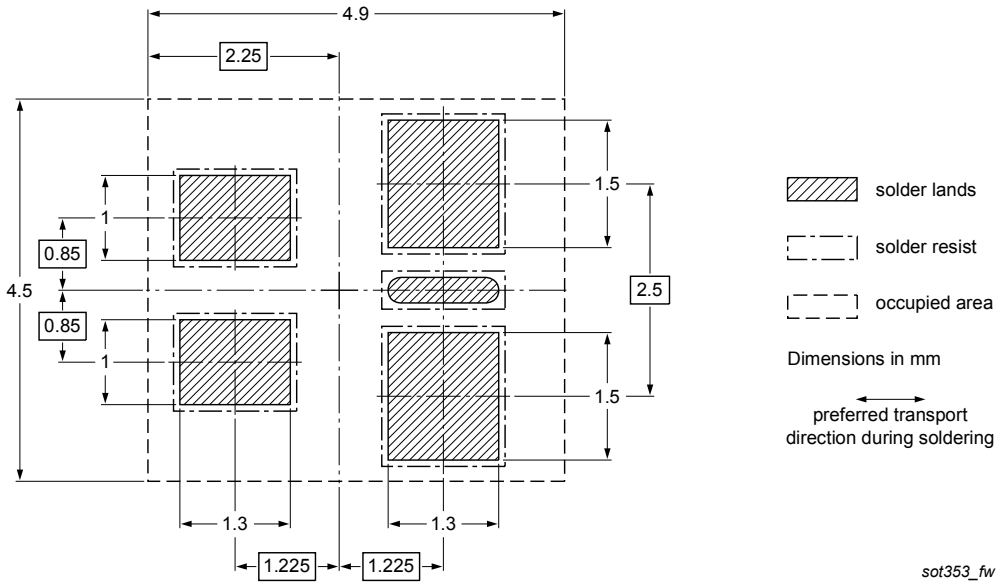



**Fig. 12. Wave soldering footprint for TSSOP5 (SOT353)**

## 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

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|---|---|---|
| Objective [short] data sheet | Development | This document contains data from the objective specification for product development. |
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