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Low capacitance, low series inductance and resistance Schottky diodes

Features

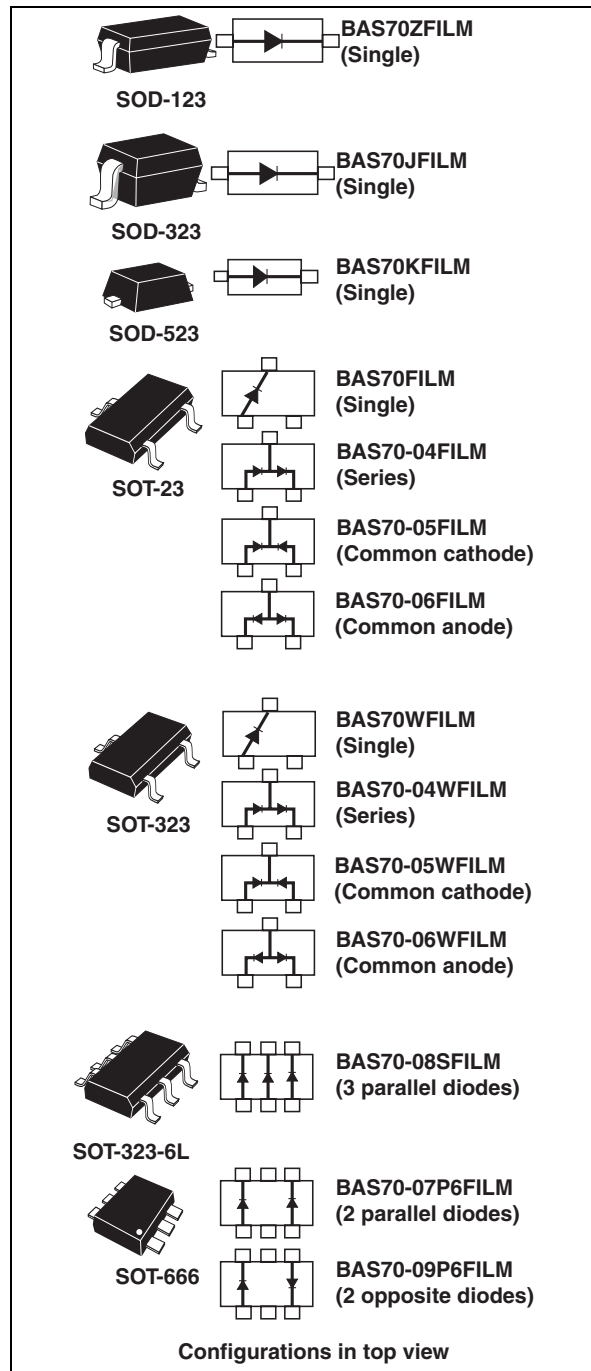
- Very low conduction losses
- Negligible switching losses
- Low forward and reverse recovery times
- Surface mount device
- Low capacitance diode
- Low resistance and inductance

Description

The BAS70 series uses 70 V Schottky barrier diodes packaged in SOD-123, SOD-323, SOD-523, SOT-23, SOT-323, SOT-323-6L or SOT-666. These diodes are specially suited for signal detection and temperature compensation in RF applications.

Table 1. Device summary

| Symbol | Value |
|-------------|--------|
| I_F | 70 mA |
| V_{RRM} | 70 V |
| C (max) | 2 pF |
| T_j (max) | 150 °C |



1 Characteristics

Table 2. Absolute ratings (limiting values at $T_j = 25\text{ °C}$, unless otherwise specified)

| Symbol | Parameter | Value | Unit |
|-----------|--|--------------|------|
| V_{RRM} | Repetitive peak reverse voltage | 70 | V |
| I_F | Continuous forward current | 70 | mA |
| I_{FSM} | Surge non repetitive forward current $t_p = 10\text{ ms}$ Sinusoidal | 1 | A |
| T_{stg} | Storage temperature range | - 65 to +150 | °C |
| T_j | Maximum operating junction temperature | 150 | °C |
| T_L | Maximum soldering temperature | 260 | °C |

Table 3. Thermal parameters

| Symbol | Parameter | Value | Unit |
|---------------|------------------------------------|------------------|------|
| $R_{th(j-a)}$ | Junction to ambient ⁽¹⁾ | SOD-123, SOT-23 | 500 |
| | | SOT-323, SOD-323 | 550 |
| | | SOD-523, SOT-666 | 600 |
| | | | °C/W |

1. Epoxy printed circuit board with recommended pad layout

Table 4. Static electrical characteristics

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|-------------|-------------------------|----------------------|----------------------|------|------|------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ °C}$ | $V_R = 50\text{ V}$ | | 100 | nA |
| | | | $V_R = 70\text{ V}$ | | 10 | μA |
| $V_F^{(2)}$ | Forward voltage drop | $T_j = 25\text{ °C}$ | $I_F = 1\text{ mA}$ | | 410 | mV |
| | | | $I_F = 10\text{ mA}$ | | 750 | |
| | | | $I_F = 15\text{ mA}$ | | 1000 | |

1. Pulse test: $t_p = 5\text{ ms}$, $\delta < 2\%$

2. Pulse test: $t_p = 380\text{ μs}$, $\delta < 2\%$

Table 5. Dynamic characteristics

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------|---------------------------------|---|------|------|------|------|
| C | Diode capacitance | $V_R = 0\text{ V}$, $F = 1\text{ MHz}$ | | | 2 | pF |
| R_F | Differential forward resistance | $I_F = 10\text{ mA}$, $F = 100\text{ MHz}$ | | 30 | | Ω |
| L_S | Series inductance | | | 1.5 | | nH |

Figure 1. Average forward power dissipation versus average forward current

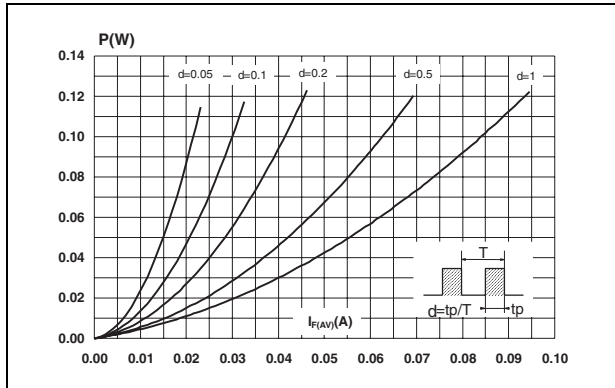


Figure 2. Average forward current $I_{F(AV)}$ versus ambient temperature ($\delta = 1$)

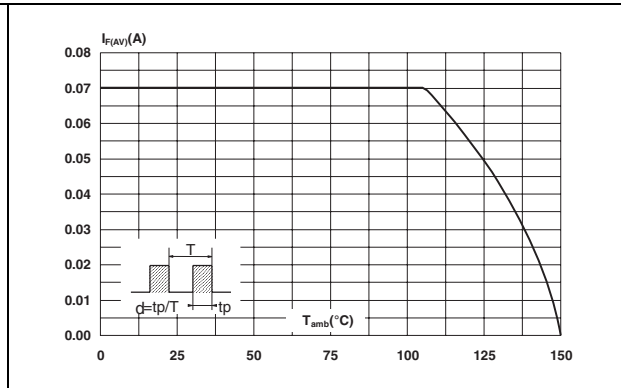


Figure 3. Reverse leakage current versus reverse applied voltage (typical values)

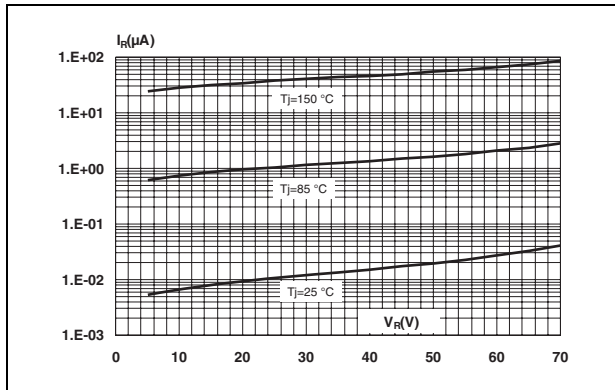


Figure 4. Reverse leakage current versus junction temperature (typical values)

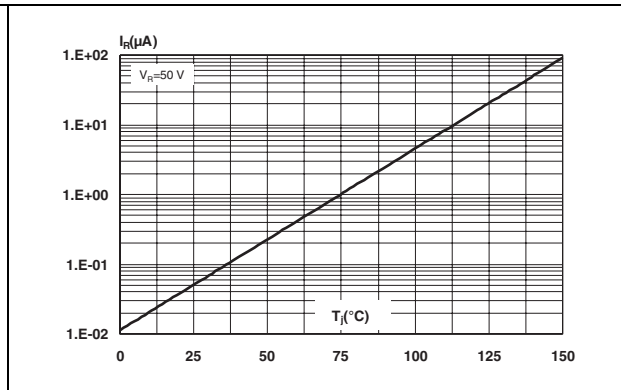


Figure 5. Junction capacitance versus reverse applied voltage (typical values)

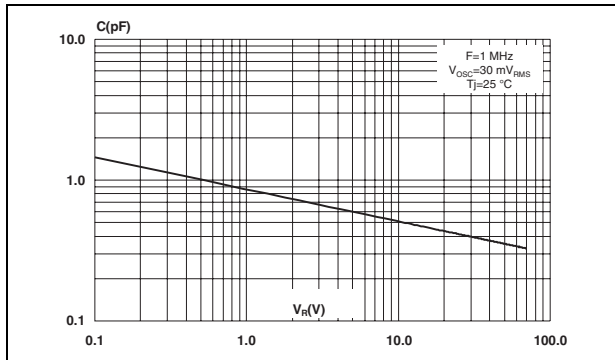


Figure 6. Forward voltage drop versus forward current (typical values)

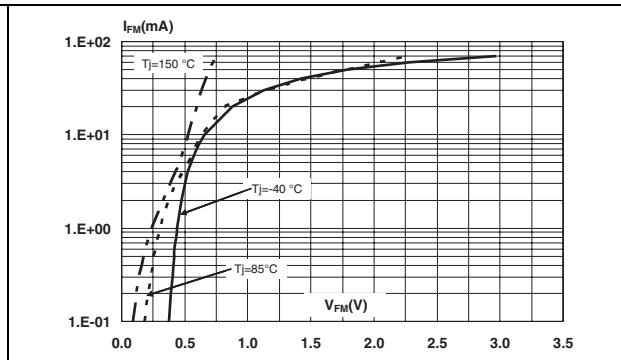


Figure 7. Forward voltage drop versus forward current (typical values)

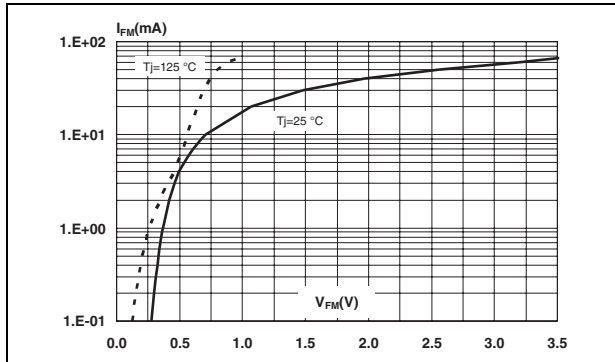


Figure 8. Differential forward resistance versus forward current (typical values)

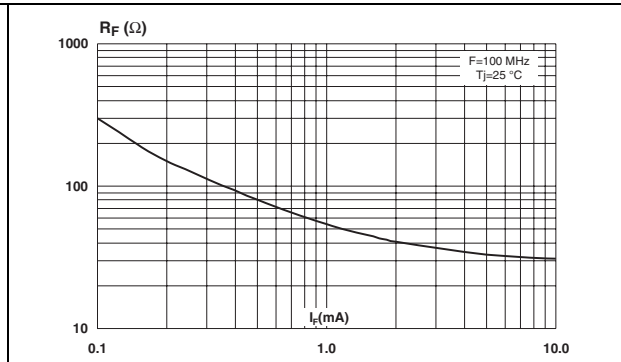


Figure 9. Relative variation of thermal impedance junction to ambient versus pulse duration

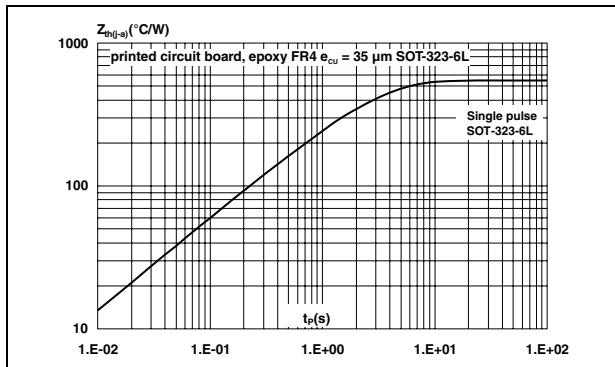


Figure 10. Relative variation of thermal impedance junction to ambient versus pulse duration

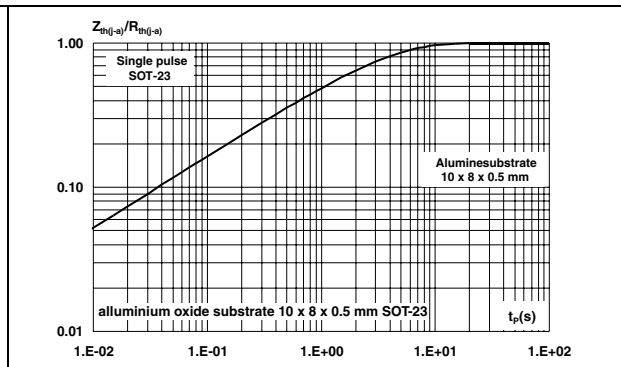


Figure 11. Relative variation of thermal impedance junction to ambient versus pulse duration

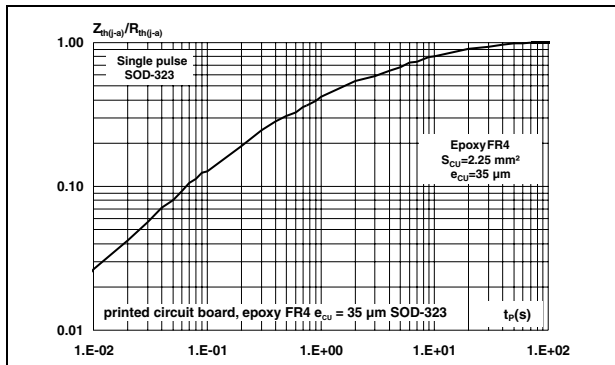


Figure 12. Relative variation of thermal impedance junction to ambient versus pulse duration

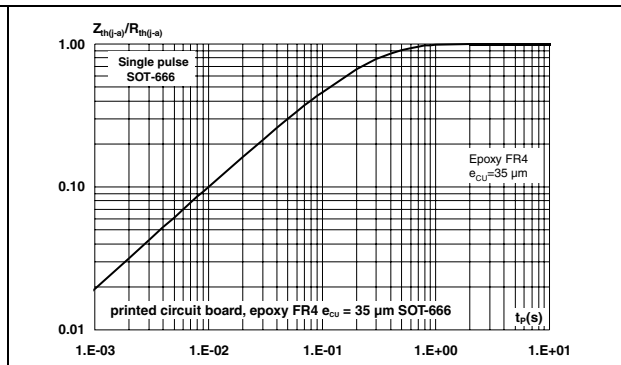


Figure 13. Relative variation of thermal impedance junction to ambient versus pulse duration

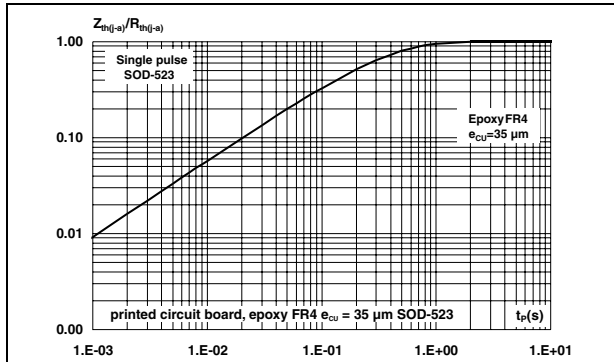
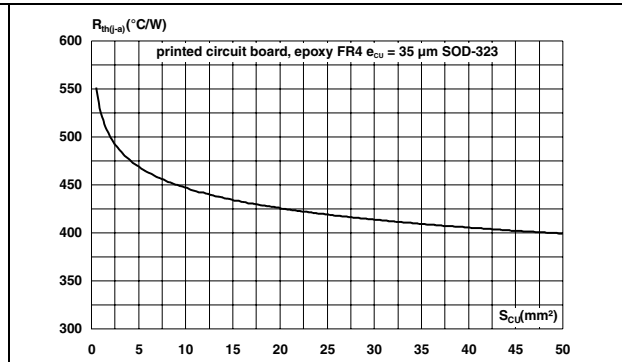
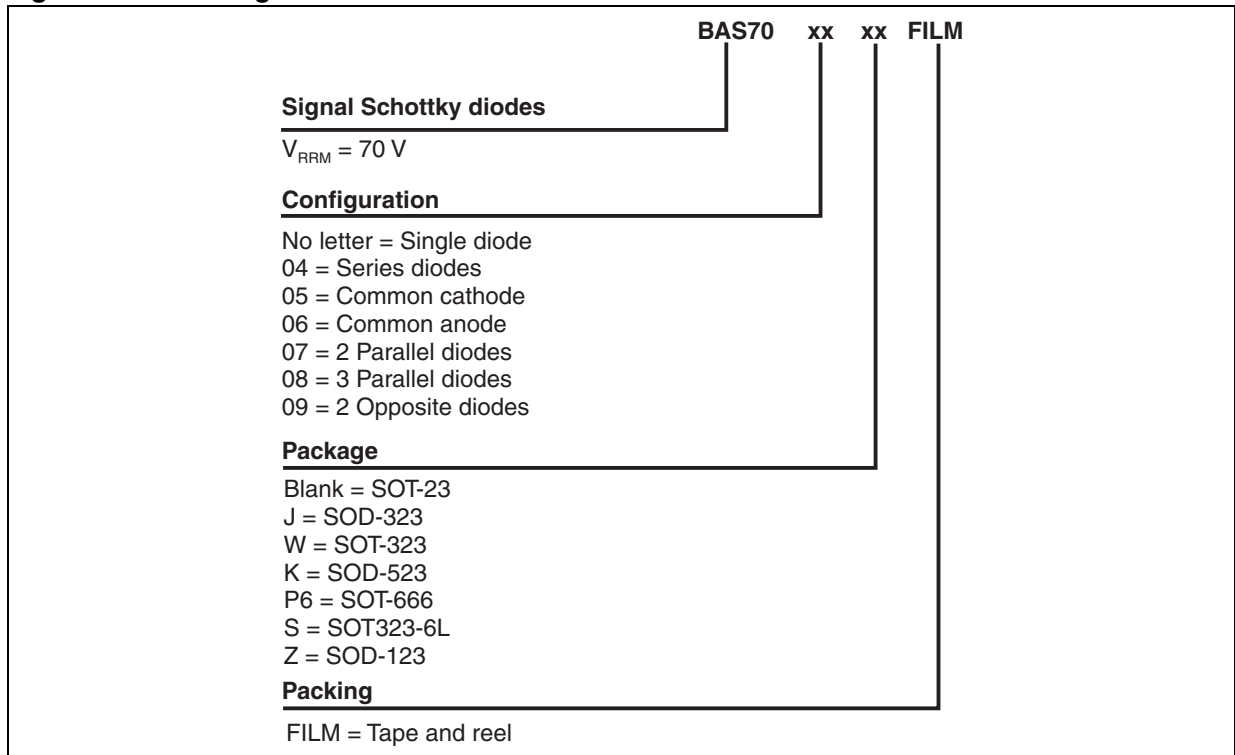


Figure 14. Thermal impedance junction to ambient versus copper surface under each lead



2 Ordering information scheme

Figure 15. Ordering information scheme



3 Package information

- Epoxy meets UL94, V0
- Lead-free packages

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

Table 6. SOD-123 dimensions

| Ref. | Dimensions | | | |
|------|-------------|------|------------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | | 1.45 | | 0.057 |
| A1 | 0 | 0.1 | 0 | 0.004 |
| A2 | 0.85 | 1.35 | 0.033 | 0.053 |
| b | 0.55 Typ. | | 0.022 Typ. | |
| c | 0.15 Typ. | | 0.039 Typ. | |
| D | 2.55 | 2.85 | 0.1 | 0.112 |
| E | 1.4 | 1.7 | 0.055 | 0.067 |
| G | 0.25 | | 0.01 | |
| H | 3.55 | 3.95 | 0.14 | 0.156 |

Figure 16. SOD-123 footprint (dimensions in mm)

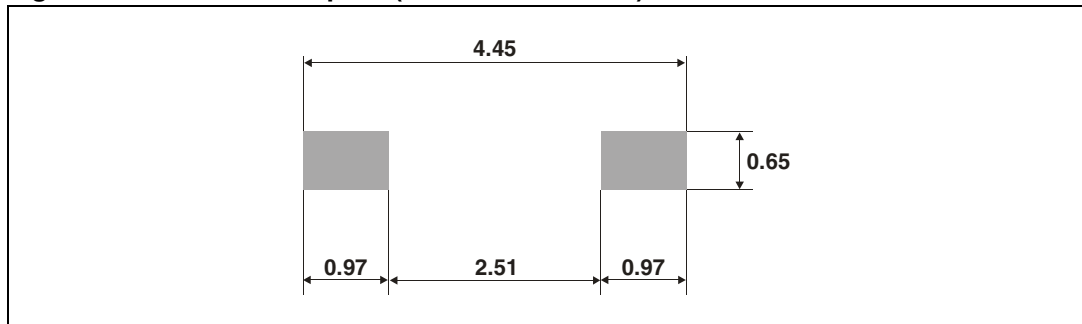


Table 7. SOD-323 dimensions

| Ref. | Dimensions | | | |
|------|-------------|------|--------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | | 1.17 | | 0.046 |
| A1 | 0 | 0.1 | 0 | 0.004 |
| b | 0.25 | 0.44 | 0.01 | 0.017 |
| c | 0.1 | 0.25 | 0.004 | 0.01 |
| D | 1.52 | 1.8 | 0.06 | 0.071 |
| E | 1.11 | 1.45 | 0.044 | 0.057 |
| H | 2.3 | 2.7 | 0.09 | 0.106 |
| L | 0.1 | 0.46 | 0.004 | 0.02 |
| Q1 | 0.1 | 0.41 | 0.004 | 0.016 |

Figure 17. SOD-323 footprint (dimensions in mm)

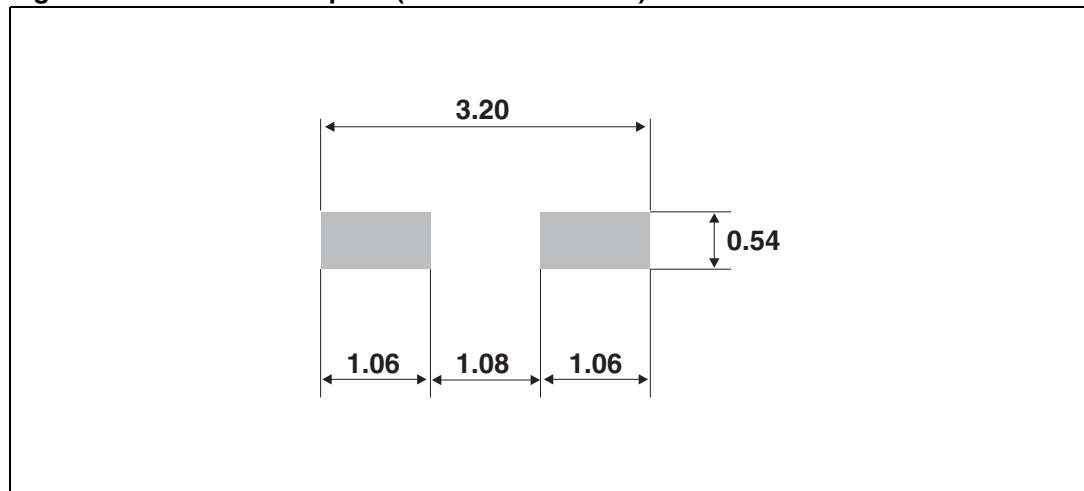


Table 8. SOD-523 dimensions

| Ref. | Dimensions | | | | | |
|------|-------------|------|------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 0.50 | 0.60 | 0.70 | 0.020 | 0.024 | 0.028 |
| E | 1.50 | 1.60 | 1.70 | 0.059 | 0.063 | 0.067 |
| E1 | 1.10 | 1.20 | 1.30 | 0.043 | 0.047 | 0.051 |
| D | 0.70 | 0.80 | 0.90 | 0.028 | 0.031 | 0.035 |
| b | 0.25 | | 0.35 | 0.010 | | 0.014 |
| c | 0.07 | | 0.20 | 0.003 | | 0.008 |
| L | 0.15 | 0.20 | 0.25 | 0.006 | 0.008 | 0.010 |
| L1 | 0.05 | | 0.20 | 0.002 | | 0.008 |

Figure 18. SOD-523 footprint (dimensions in mm)

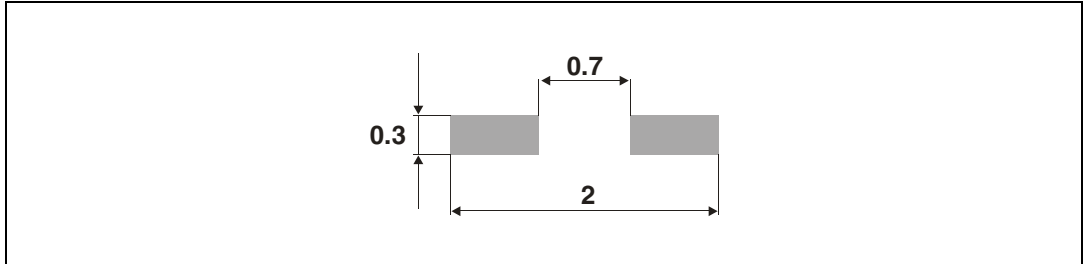


Table 9. SOT-23 dimensions

| Ref. | Dimensions | | | |
|------|-------------|------|------------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 0.89 | 1.4 | 0.035 | 0.055 |
| A1 | 0 | 0.1 | 0 | 0.004 |
| B | 0.3 | 0.51 | 0.012 | 0.02 |
| c | 0.085 | 0.18 | 0.003 | 0.007 |
| D | 2.75 | 3.04 | 0.108 | 0.12 |
| e | 0.85 | 1.05 | 0.033 | 0.041 |
| e1 | 1.7 | 2.1 | 0.067 | 0.083 |
| E | 1.2 | 1.6 | 0.047 | 0.063 |
| H | 2.1 | 2.75 | 0.083 | 0.108 |
| L | 0.6 typ. | | 0.024 typ. | |
| S | 0.35 | 0.65 | 0.014 | 0.026 |

Figure 19. SOT-23 footprint (dimensions in mm)

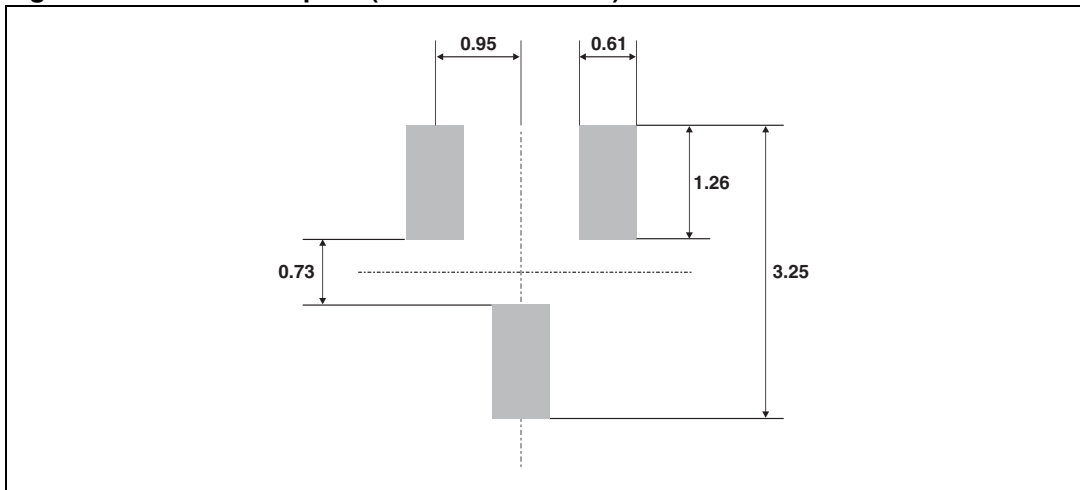


Table 10. SOT-323 dimensions

| Ref. | Dimensions | | | | | |
|------|-------------|------|------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 0.8 | | 1.1 | 0.031 | | 0.043 |
| A1 | 0.0 | | 0.1 | 0.0 | | 0.004 |
| b | 0.25 | | 0.4 | 0.010 | | 0.016 |
| c | 0.1 | | 0.26 | 0.004 | | 0.010 |
| D | 1.8 | 2.0 | 2.2 | 0.071 | 0.079 | 0.086 |
| E | 1.15 | 1.25 | 1.35 | 0.045 | 0.049 | 0.053 |
| e | | 0.65 | | | 0.026 | |
| H | 1.8 | 2.1 | 2.4 | 0.071 | 0.083 | 0.094 |
| L | 0.1 | 0.2 | 0.3 | 0.004 | 0.008 | 0.012 |
| q | 0 | | 30° | 0 | | 30° |

Figure 20. SOT-323 footprint (dimensions in mm)

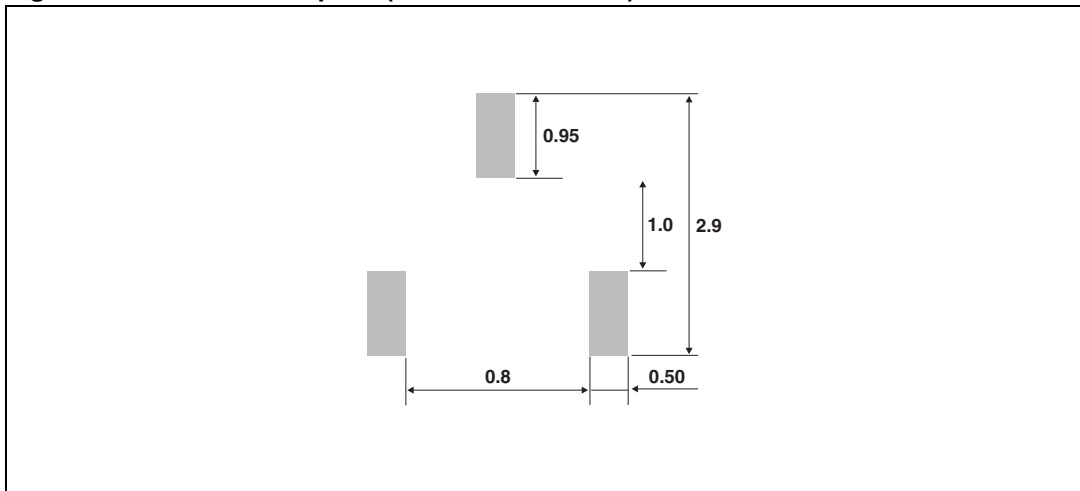
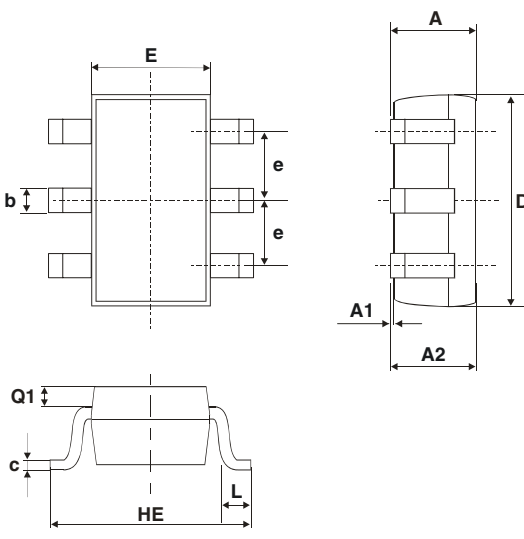


Table 11. SOT323-6L dimensions



| Ref. | Dimensions | | | |
|------|-------------|------|------------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 0.8 | 1.1 | 0.031 | 0.043 |
| A1 | 0 | 0.1 | 0 | 0.004 |
| A2 | 0.8 | 1 | 0.031 | 0.039 |
| b | 0.15 | 0.3 | 0.006 | 0.012 |
| c | 0.1 | 0.18 | 0.004 | 0.007 |
| D | 1.8 | 2.2 | 0.071 | 0.086 |
| E | 1.15 | 1.35 | 0.045 | 0.053 |
| e | 0.65 Typ. | | 0.025 Typ. | |
| H | 1.8 | 2.4 | 0.071 | 0.094 |
| Q | 0.1 | 0.4 | 0.004 | 0.016 |

Figure 21. SOT323-6L footprint (dimensions in mm)

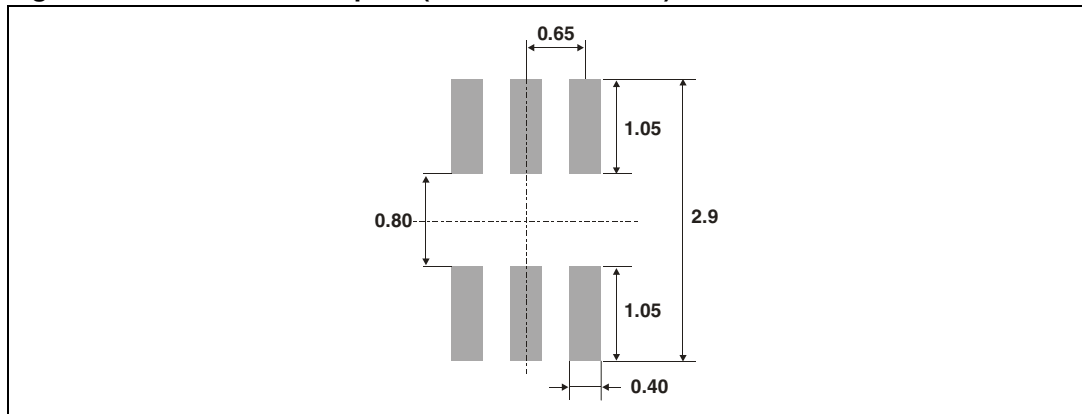
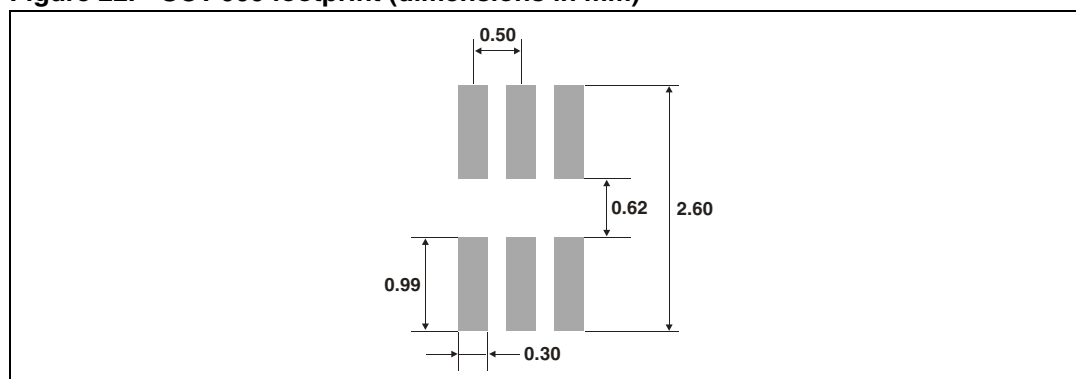


Table 12. SOT-666 dimensions

| Ref. | Dimensions | | | | | |
|------|-------------|------|------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 0.45 | | 0.60 | 0.018 | | 0.024 |
| A3 | 0.08 | | 0.18 | 0.003 | | 0.007 |
| b | 0.17 | | 0.34 | 0.007 | | 0.013 |
| b1 | 0.19 | 0.27 | 0.34 | 0.007 | 0.011 | 0.013 |
| D | 1.50 | | 1.70 | 0.059 | | 0.067 |
| E | 1.50 | | 1.70 | 0.059 | | 0.067 |
| E1 | 1.10 | | 1.30 | 0.043 | | 0.051 |
| e | | 0.50 | | | 0.020 | |
| L1 | | 0.19 | | | 0.007 | |
| L2 | 0.10 | | 0.30 | 0.004 | | 0.012 |
| L3 | | 0.10 | | | 0.004 | |

Figure 22. SOT-666 footprint (dimensions in mm)



4 Ordering information

Table 13. Ordering information

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|----------------|---------|---------------------------|--------|----------|---------------|
| BAS70ZFILM | Z70 | SOD-123 | 10 mg | 3000 | Tape and reel |
| BAS70FILM | D76 | SOT-23 Single | 10 mg | 3000 | Tape and reel |
| BAS70-04FILM | D96 | SOT-23 Series | 10 mg | 3000 | Tape and reel |
| BAS70-05FILM | D97 | SOT-23 Common cathode | 10 mg | 3000 | Tape and reel |
| BAS70-06FILM | D98 | SOT-23 Common anode | 10 mg | 3000 | Tape and reel |
| BAS70WFILM | D28 | SOT-323 Single | 6 mg | 3000 | Tape and reel |
| BAS70-04WFILM | D31 | SOT-323 Series | 6 mg | 3000 | Tape and reel |
| BAS70-05WFILM | D30 | SOT-323 Common cathode | 6 mg | 3000 | Tape and reel |
| BAS70-06WFILM | D29 | SOT-323 Common anode | 6 mg | 3000 | Tape and reel |
| BAS70-08SFILM | D33 | SOT323-6L 3 Parallel | 6 mg | 3000 | Tape and reel |
| BAS70JFILM | 76 | SOD-323 | 5 mg | 3000 | Tape and reel |
| BAS70KFILM | 76 | SOD-523 | 1.4 mg | 3000 | Tape and reel |
| BAS70-07P6FILM | P7 | SOT-666 2 Parallel | 2.9 mg | 3000 | Tape and reel |
| BAS70-09P6FILM | Q7 | SOT-666 2 Opposite | 2.9 mg | 3000 | Tape and reel |

5 Revision history

Table 14. Document revision history

| Date | Revision | Changes |
|-------------|----------|--|
| 24-Jul-2006 | 1 | BAS70J / W datasheets merged. ECOPACK statement added. SOD-523 and SOT-666 packages added. |
| 12-Oct-2009 | 2 | Updated Table 8 quote "L1" from 0.10 to 0.05. |

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