

DATA SHEET

BYV42E, BYV42EB series
Rectifier diodes
ultrafast, rugged

Product specification

September 2018



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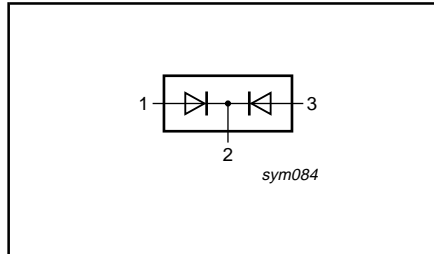
**Rectifier diodes
ultrafast, rugged**

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FEATURES

- Low forward volt drop
- Fast switching
- Soft recovery characteristic
- Reverse surge capability
- High thermal cycling performance
- Low thermal resistance

SYMBOL



QUICK REFERENCE DATA

| |
|---------------------------------------|
| $V_R = 150 \text{ V} / 200 \text{ V}$ |
| $V_F \leq 0.85 \text{ V}$ |
| $I_{O(AV)} = 30 \text{ A}$ |
| $I_{RRM} = 0.2 \text{ A}$ |
| $t_r \leq 28 \text{ ns}$ |

GENERAL DESCRIPTION

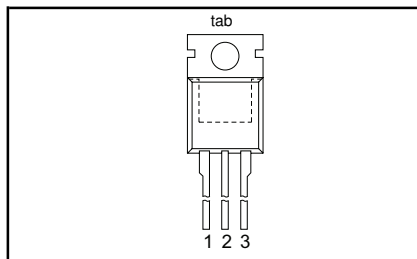
Dual, ultra-fast, epitaxial rectifier diodes intended for use as output rectifiers in high frequency switched mode power supplies.

The BYV42E series is supplied in the SOT78 conventional leaded package.
The BYV42EB series is supplied in the SOT404 surface mounting package.

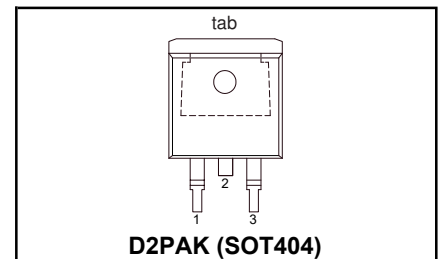
PINNING

| PIN | DESCRIPTION |
|-----|--------------------------|
| 1 | anode 1 (a) |
| 2 | cathode (k) ¹ |
| 3 | anode 2 (a) |
| tab | cathode (k) |

SOT78 (TO220AB)



SOT404



LIMITING VALUES

Limiting values in accordance with the Absolute Maximum System (IEC 134).

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | | UNIT |
|-------------|---|--|------|-------------|-------------|------------------|
| | | | | | | |
| V_{RRM} | Peak repetitive reverse voltage | BYV42E / BYV42EB $T_{mb} \leq 144^\circ\text{C}$ | - | -150 | -200 | V |
| V_{RWM} | Crest working reverse voltage | | - | 150 | 200 | V |
| V_R | Continuous reverse voltage | | - | 150 | 200 | V |
| $I_{O(AV)}$ | Average rectified output current (both diodes conducting) | square wave $\delta = 0.5; T_{mb} \leq 108^\circ\text{C}$ | - | 30 | | A |
| I_{FRM} | Repetitive peak forward current per diode | $t = 25 \mu\text{s}; \delta = 0.5;$ $T_{mb} \leq 108^\circ\text{C}$ | - | 30 | | A |
| I_{FSM} | Non-repetitive peak forward current per diode | $t = 10 \text{ ms}$ | - | 150 | | A |
| | | $t = 8.3 \text{ ms}$ sinusoidal; with reapplied | - | 160 | | A |
| I_{RRM} | Repetitive peak reverse current per diode | $V_{RWM(max)}$ $t_p = 2 \mu\text{s}; \delta = 0.001$ | - | 0.2 | | A |
| I_{RSM} | Non-repetitive peak reverse current per diode | $t_p = 100 \mu\text{s}$ | - | 0.2 | | A |
| T_{stg} | Storage temperature | | -40 | 150 | | $^\circ\text{C}$ |
| T_j | Operating junction temperature | | - | 150 | | $^\circ\text{C}$ |

1. It is not possible to make connection to pin 2 of the SOT404 package
2. SOT78 package, For output currents in excess of 20 A, the cathode connection should be made to the mounting tab.

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ESD LIMITING VALUE

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|--------|---|---|------|------|------|
| V_C | Electrostatic discharge capacitor voltage | Human body model; $C = 250 \text{ pF}$; $R = 1.5 \text{ k}\Omega$ | - | 8 | kV |

THERMAL RESISTANCES

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|----------------|--|---|------|------|------|------|
| $R_{th\ j-mb}$ | Thermal resistance junction to mounting base | per diode | - | - | 2.4 | K/W |
| | | both diodes | - | - | 1.4 | K/W |
| $R_{th\ j-a}$ | Thermal resistance junction to ambient | SOT78 package, in free air | - | 60 | - | K/W |
| | | SOT404 and SOT428 packages, pcb mounted, minimum footprint, FR4 board | - | 50 | - | K/W |

ELECTRICAL CHARACTERISTICS

 characteristics are per diode at $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise stated

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|-----------|--------------------------|---|------|------|------|---------------|
| V_F | Forward voltage | $I_F = 15 \text{ A}$; $T_j = 150 \text{ }^\circ\text{C}$ | - | 0.78 | 0.85 | V |
| | | $I_F = 15 \text{ A}$ | - | 0.95 | 1.05 | V |
| | | $I_F = 30 \text{ A}$ | - | 1.00 | 1.20 | V |
| I_R | Reverse current | $V_R = V_{RWM}$; $T_j = 100 \text{ }^\circ\text{C}$ | - | 0.5 | 1 | mA |
| | | $V_R = V_{RWM}$ | - | 10 | 100 | μA |
| Q_s | Reverse recovery charge | $I_F = 2 \text{ A}$; $V_R \geq 30 \text{ V}$; $-di_F/dt = 20 \text{ A}/\mu\text{s}$ | - | 6 | 15 | nC |
| t_{rr1} | Reverse recovery time | $I_F = 1 \text{ A}$; $V_R \geq 30 \text{ V}$; $-di_F/dt = 100 \text{ A}/\mu\text{s}$ | - | 20 | 28 | ns |
| t_{rr2} | Reverse recovery time | $I_F = 0.5 \text{ A}$ to $I_R = 1 \text{ A}$; $I_{rec} = 0.25 \text{ A}$ | - | 13 | 22 | ns |
| V_{fr} | Forward recovery voltage | $I_F = 1 \text{ A}$; $di_F/dt = 10 \text{ A}/\mu\text{s}$ | - | 1 | - | V |

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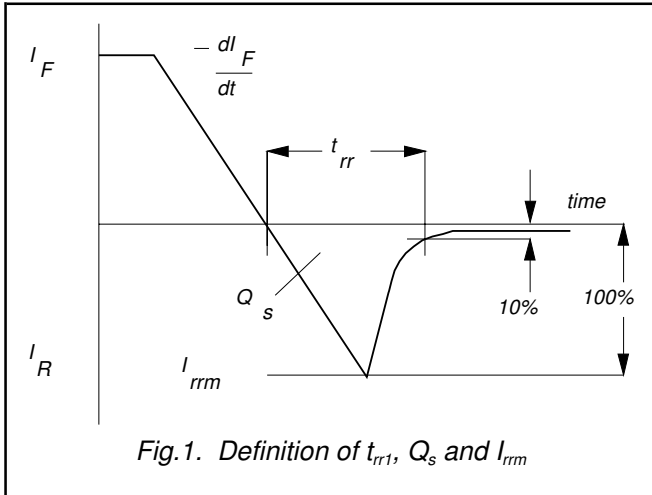


Fig.1. Definition of t_{rr1} , Q_s and I_{rm}

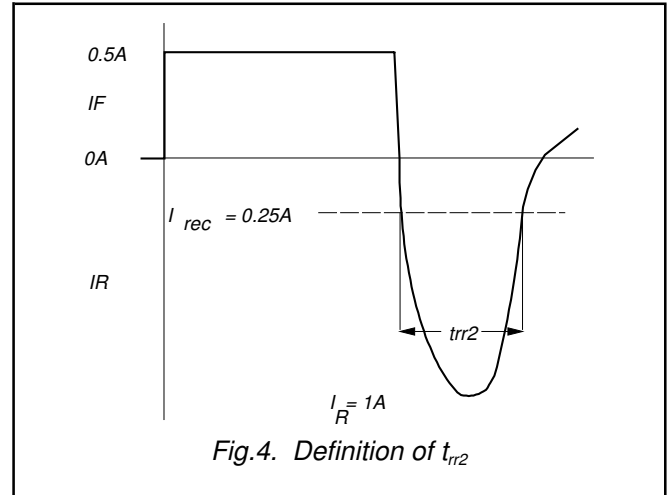


Fig.4. Definition of t_{rr2}

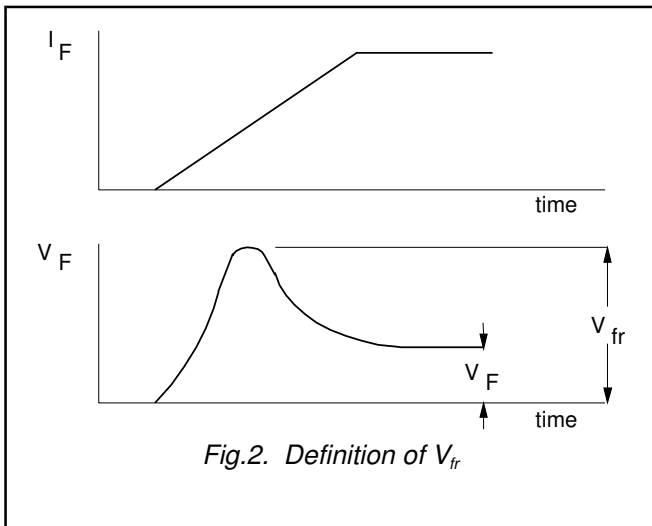


Fig.2. Definition of V_{fr}

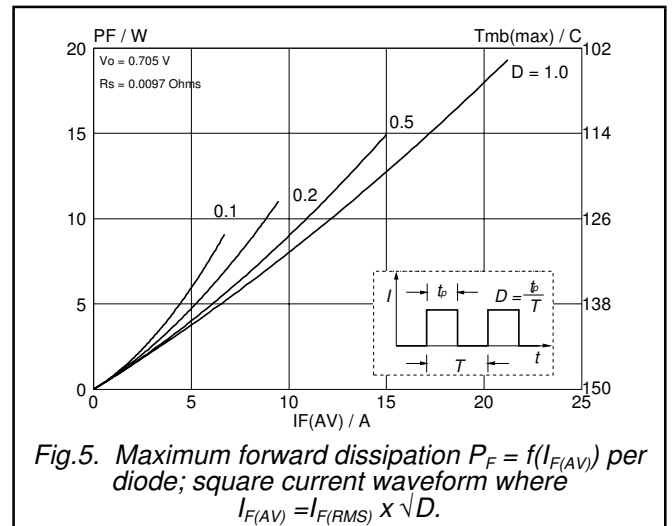


Fig.5. Maximum forward dissipation $P_F = f(I_{F(AV)})$ per diode; square current waveform where $I_{F(AV)} = I_{F(RMS)} \times \sqrt{D}$.

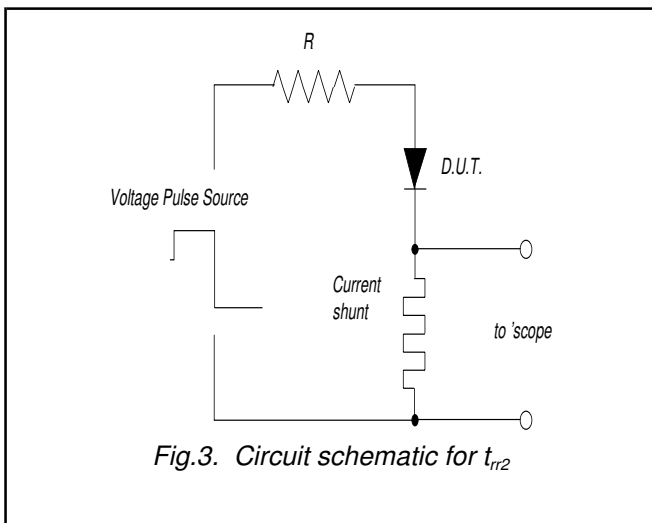


Fig.3. Circuit schematic for t_{rr2}

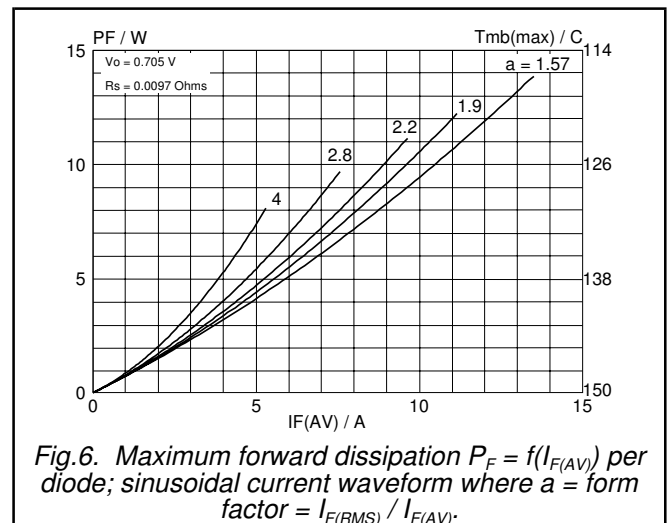


Fig.6. Maximum forward dissipation $P_F = f(I_{F(AV)})$ per diode; sinusoidal current waveform where $a = \text{form factor} = I_{F(RMS)} / I_{F(AV)}$.

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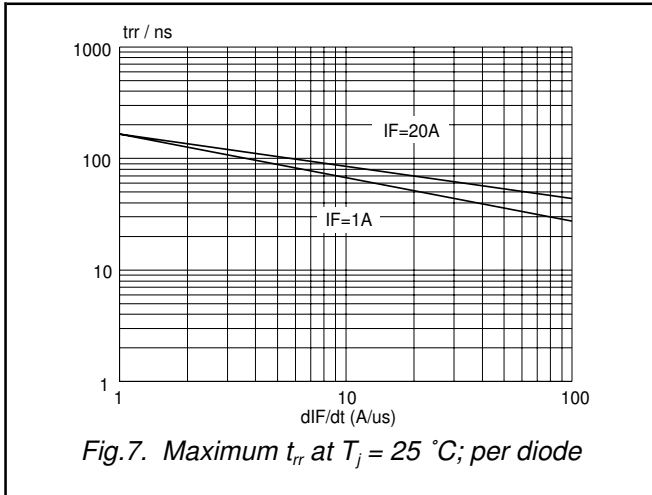


Fig.7. Maximum t_{rr} at $T_j = 25^\circ C$; per diode

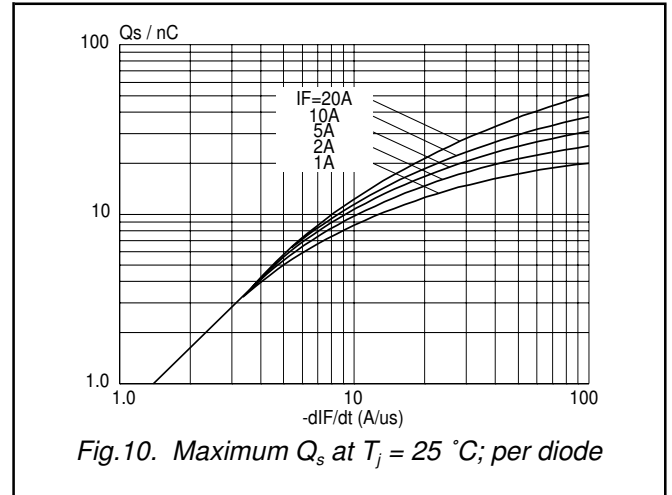


Fig.10. Maximum Q_s at $T_j = 25^\circ C$; per diode

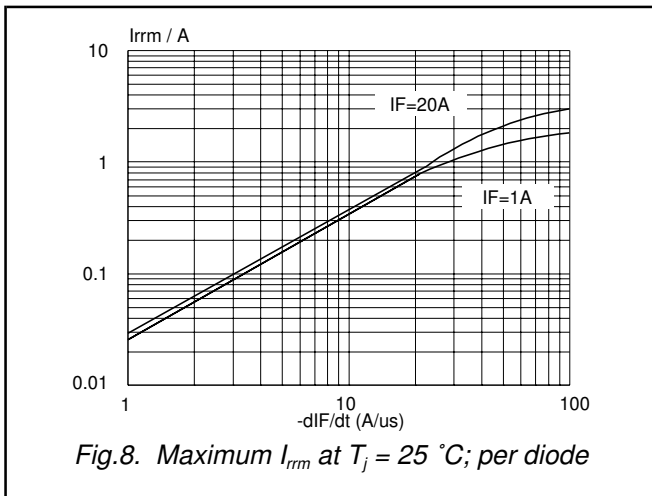


Fig.8. Maximum I_{rrm} at $T_j = 25^\circ C$; per diode

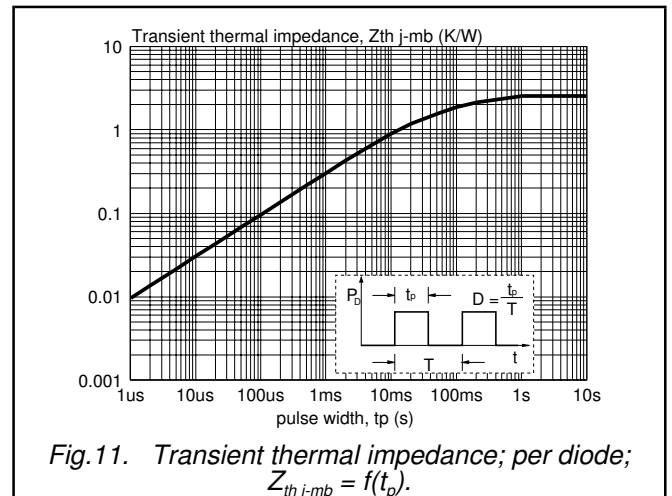


Fig.11. Transient thermal impedance; per diode;
 $Z_{th\ j-mb} = f(t_p)$.

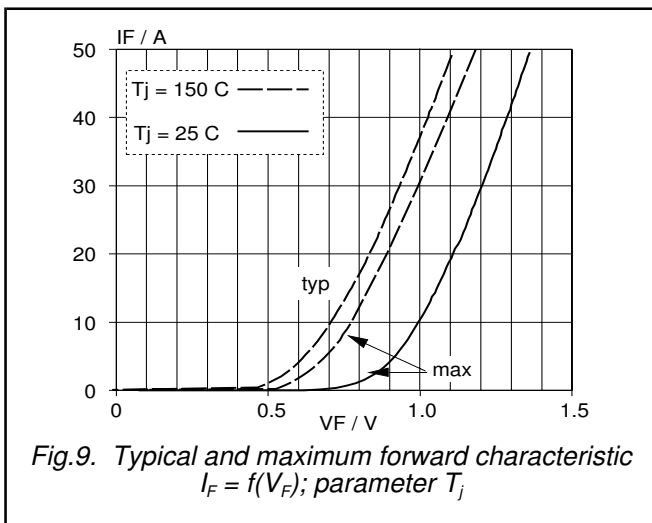


Fig.9. Typical and maximum forward characteristic $I_F = f(V_F)$; parameter T_j

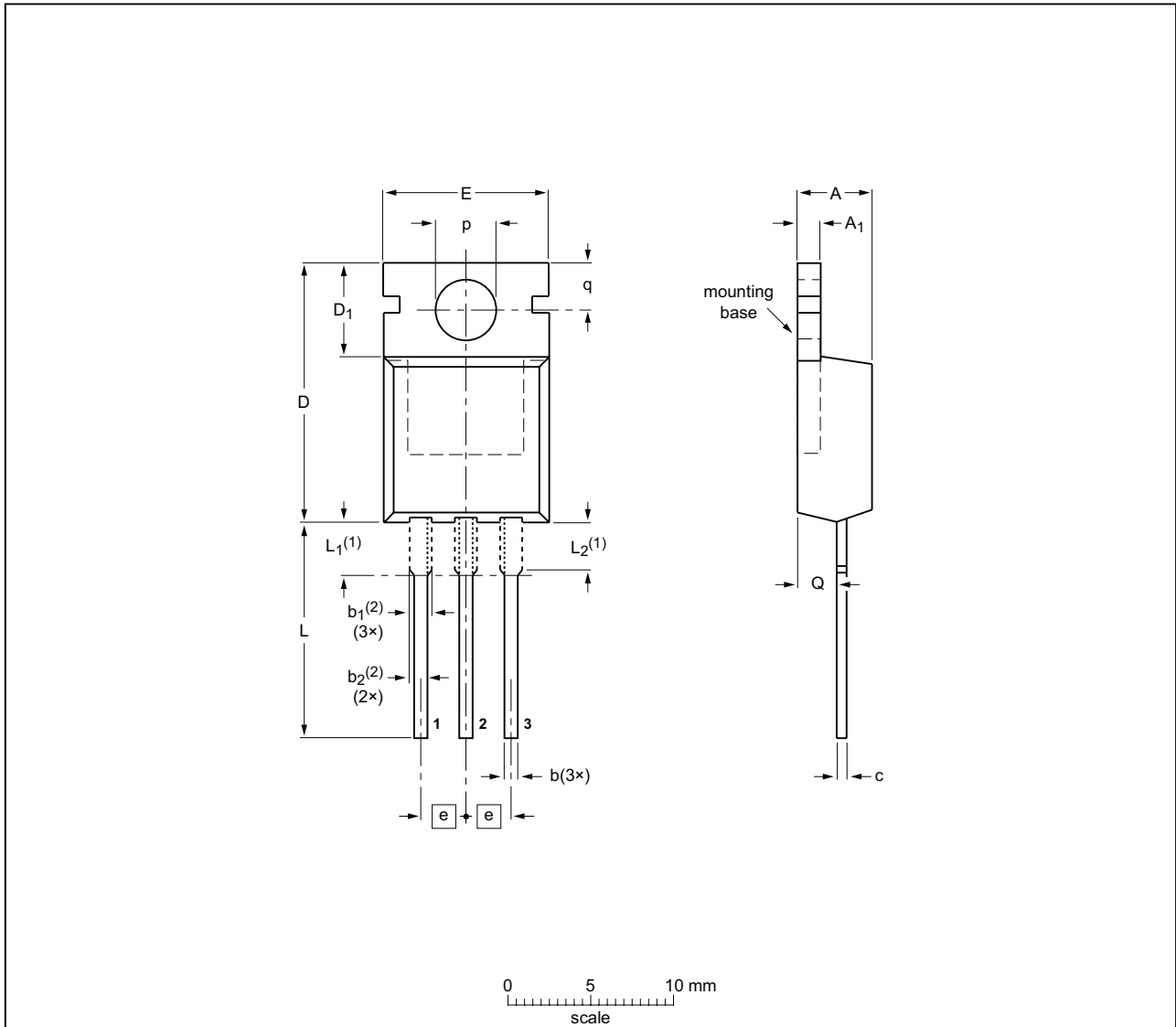
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MECHANICAL DATA

Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB

SOT78



DIMENSIONS (mm are the original dimensions)

| UNIT | A | A ₁ | b | b ₁ (²) | b ₂ (²) | c | D | D ₁ | E | e | L | L ₁ (¹) | L ₂ (¹) max. | p | q | Q |
|------|------------|----------------|------------|---------------------------------|---------------------------------|------------|--------------|----------------|-------------|------|--------------|---------------------------------|---|------------|------------|------------|
| mm | 4.7 4.1 | 1.40 1.25 | 0.9 0.6 | 1.6 1.0 | 1.3 1.0 | 0.7 0.4 | 16.0 15.2 | 6.6 5.9 | 10.3 9.7 | 2.54 | 15.0 12.8 | 3.30 2.79 | 3.0 | 3.8 3.5 | 3.0 2.7 | 2.6 2.2 |

Notes

1. Lead shoulder designs may vary.
2. Dimension includes excess dambar.

| OUTLINE VERSION | REFERENCES | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|-----------------|-------|---------------------|----------------------|
| | IEC | JEDEC | JEITA | | |
| SOT78 | | 3-lead TO-220AB | SC-46 | | 08-04-23 08-06-13 |

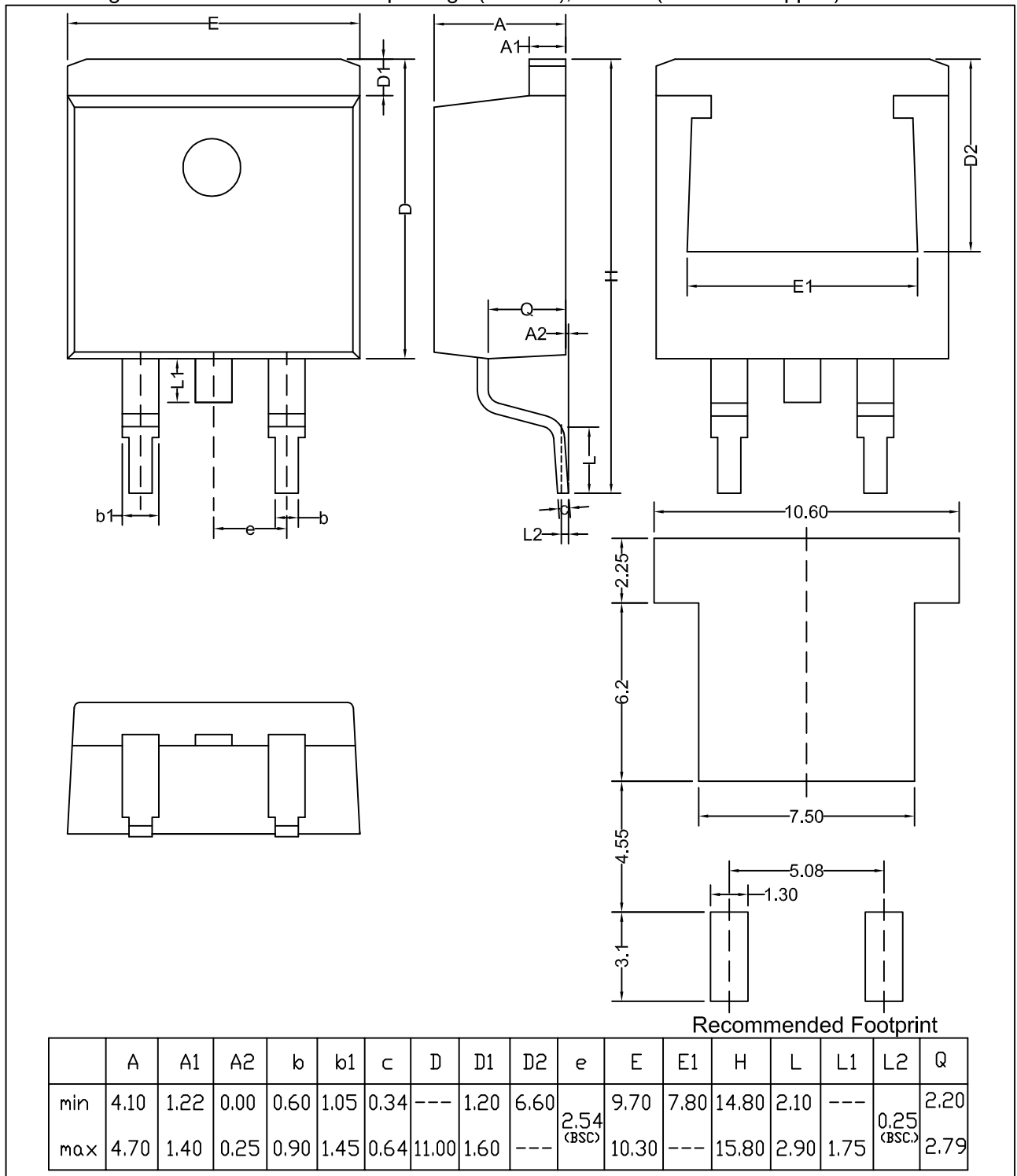
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MECHANICAL DATA

Plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped)

TO263



Legal information

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