

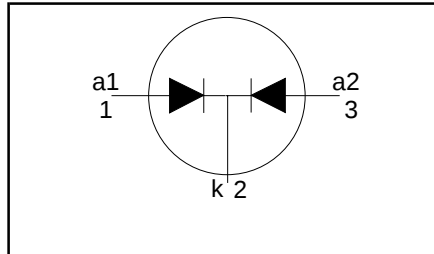
# Rectifier diodes ultrafast, rugged

## BYQ40EW series

### FEATURES

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

### SYMBOL



### QUICK REFERENCE DATA

$$V_R = 150 \text{ V} / 200 \text{ V}$$

$$V_F \leq 0.85 \text{ V}$$

$$I_{O(AV)} = 40 \text{ A}$$

$$I_{RRM} \leq 0.2 \text{ A}$$

$$t_{tr} \leq 30 \text{ ns}$$

### GENERAL DESCRIPTION

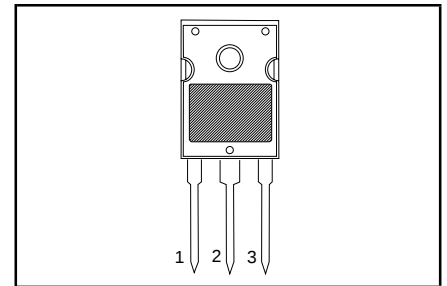
Dual, common cathode, ultra-fast, epitaxial rectifier diodes intended for use as output rectifiers in high frequency switched mode power supplies.

The BYQ40EW series is supplied in the conventional leaded SOT429 (TO247) package.

### PINNING

| PIN | DESCRIPTION |
|-----|-------------|
| 1   | anode 1     |
| 2   | cathode     |
| 3   | anode 2     |
| tab | cathode     |

### SOT429 (TO247)



### 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                           | <b>BYQ40EW</b>                                                                                             | -    | <b>-150</b> | <b>-200</b> | 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) |                                                                                                            | -    | 40          |             | A                |
| $I_{FRM}$   | Repetitive peak forward current per diode                 | square wave<br>$\delta = 0.5$ ; $T_{mb} \leq 110^\circ\text{C}$<br>$t = 25 \mu\text{s}$ ; $\delta = 0.5$ ; | -    | 40          |             | A                |
| $I_{FSM}$   | Non-repetitive peak forward current per diode             | $T_{mb} \leq 110^\circ\text{C}$<br>$t = 10 \text{ ms}$                                                     | -    | 300         |             | A                |
|             |                                                           | $t = 8.3 \text{ ms}$<br>sinusoidal; with reappplied $V_{RWM(max)}$                                         | -    | 325         |             | A                |
| $I_{RRM}$   | Repetitive peak reverse current per diode                 | $t_p = 2 \mu\text{s}$ ; $\delta = 0.001$                                                                   | -    | 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         |             | $^\circ\text{C}$ |

### ESD LIMITING VALUE

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

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### THERMAL RESISTANCES

| SYMBOL         | PARAMETER                                    | CONDITIONS                         | MIN. | TYP. | MAX. | UNIT |
|----------------|----------------------------------------------|------------------------------------|------|------|------|------|
| $R_{th\ j-mb}$ | Thermal resistance junction to mounting base | per diode                          | -    | -    | 1.05 | K/W  |
| $R_{th\ j-a}$  | Thermal resistance junction to ambient       | both diodes conducting in free air | -    | -    | 0.75 | K/W  |
|                |                                              |                                    | -    | 45   | -    | K/W  |

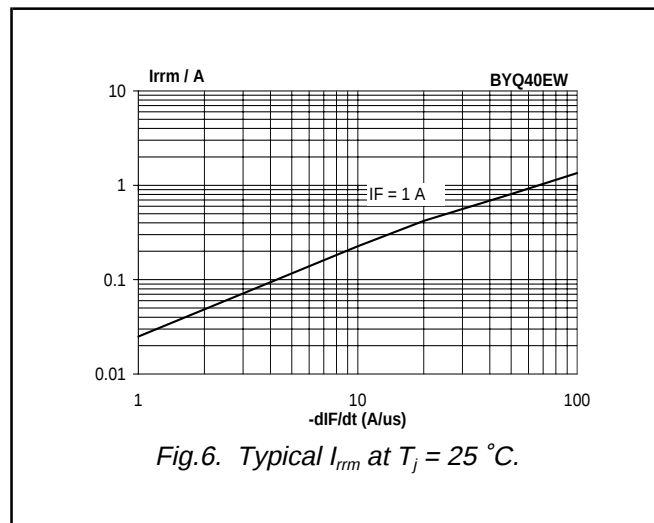
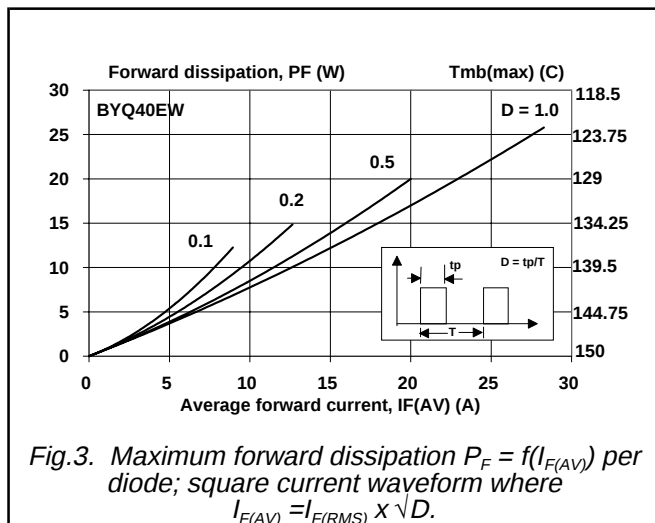
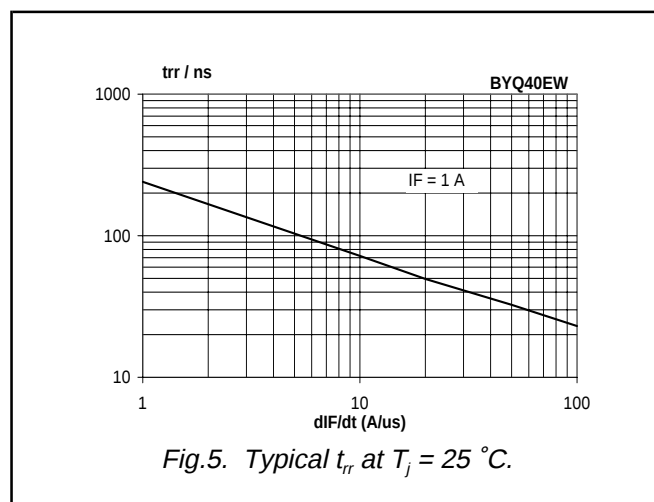
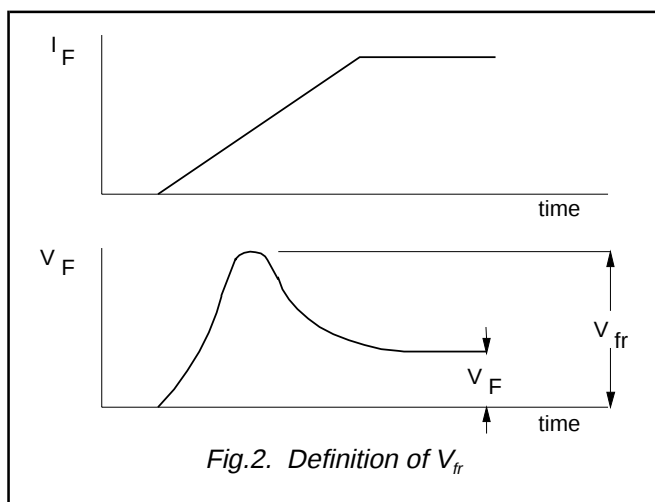
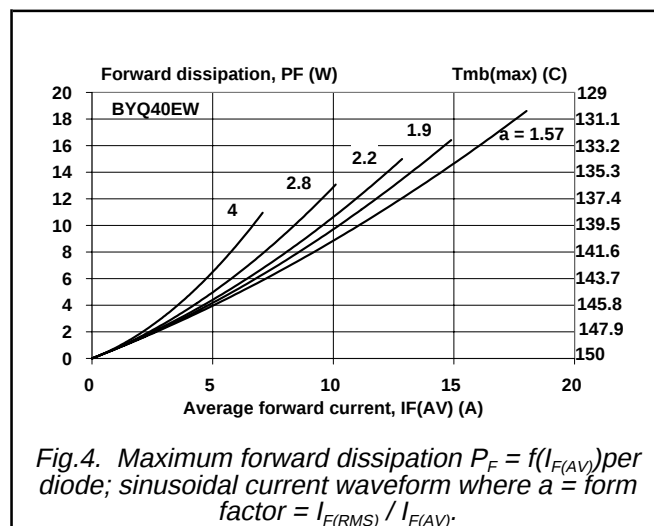
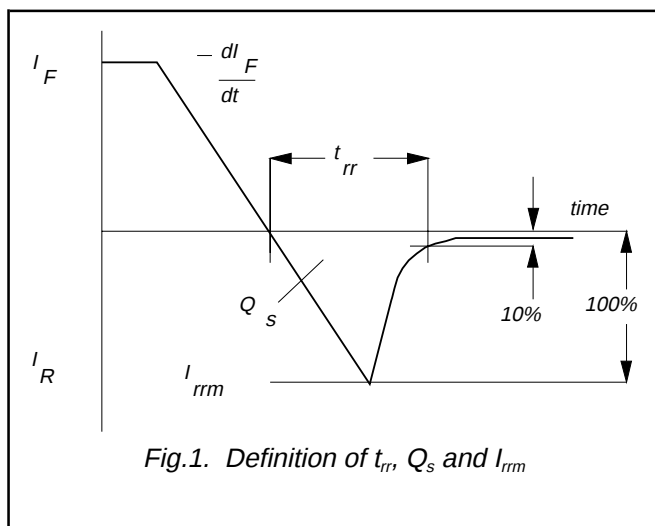
### ELECTRICAL CHARACTERISTICS

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          | $I_F = 20\text{ A}$ ; $T_j = 150\text{ }^{\circ}\text{C}$                           | -    | 0.8  | 0.85 | V             |
|          |                          | $I_F = 20\text{ A}$                                                                 | -    | 0.97 | 1.05 | V             |
|          |                          | $I_F = 40\text{ A}$                                                                 | -    | 1.06 | 1.20 | V             |
| $I_R$    | Reverse current          | $V_R = V_{RWM}$                                                                     | -    | 6    | 100  | $\mu\text{A}$ |
|          |                          | $V_R = V_{RWM}$ ; $T_j = 100\text{ }^{\circ}\text{C}$                               | -    | 0.7  | 1    | mA            |
| $Q_s$    | Reverse recovery charge  | $I_F = 2\text{ A}$ ; $V_R \geq 30\text{ V}$ ; $-dI_F/dt = 20\text{ A}/\mu\text{s}$  | -    | 8    | 18   | nC            |
| $t_{rr}$ | Reverse recovery time    | $I_F = 1\text{ A}$ ; $V_R \geq 30\text{ V}$ ; $-dI_F/dt = 100\text{ A}/\mu\text{s}$ | -    | 23   | 30   | ns            |
| $V_{fr}$ | Forward recovery voltage | $I_F = 1\text{ A}$ ; $dI_F/dt = 10\text{ A}/\mu\text{s}$                            | -    | 0.7  | -    | V             |

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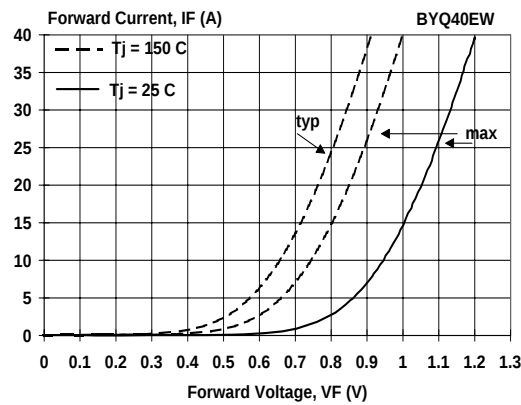


Fig.7. Typical and maximum forward characteristic  $I_F = f(V_F)$ ; parameter  $T_j$

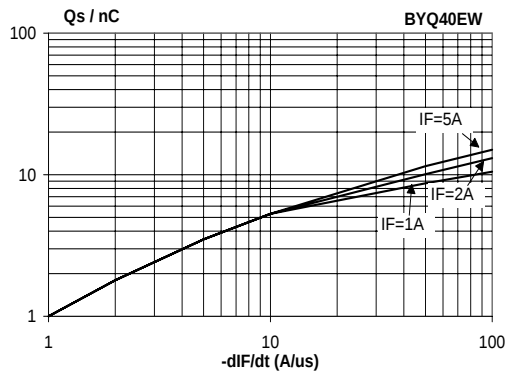


Fig.8. Typical  $Q_s$  at  $T_j = 25^\circ\text{C}$ .

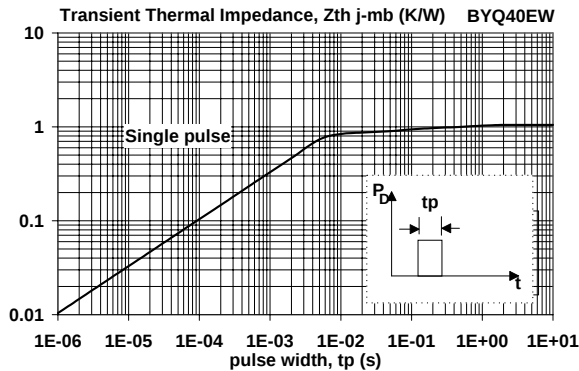
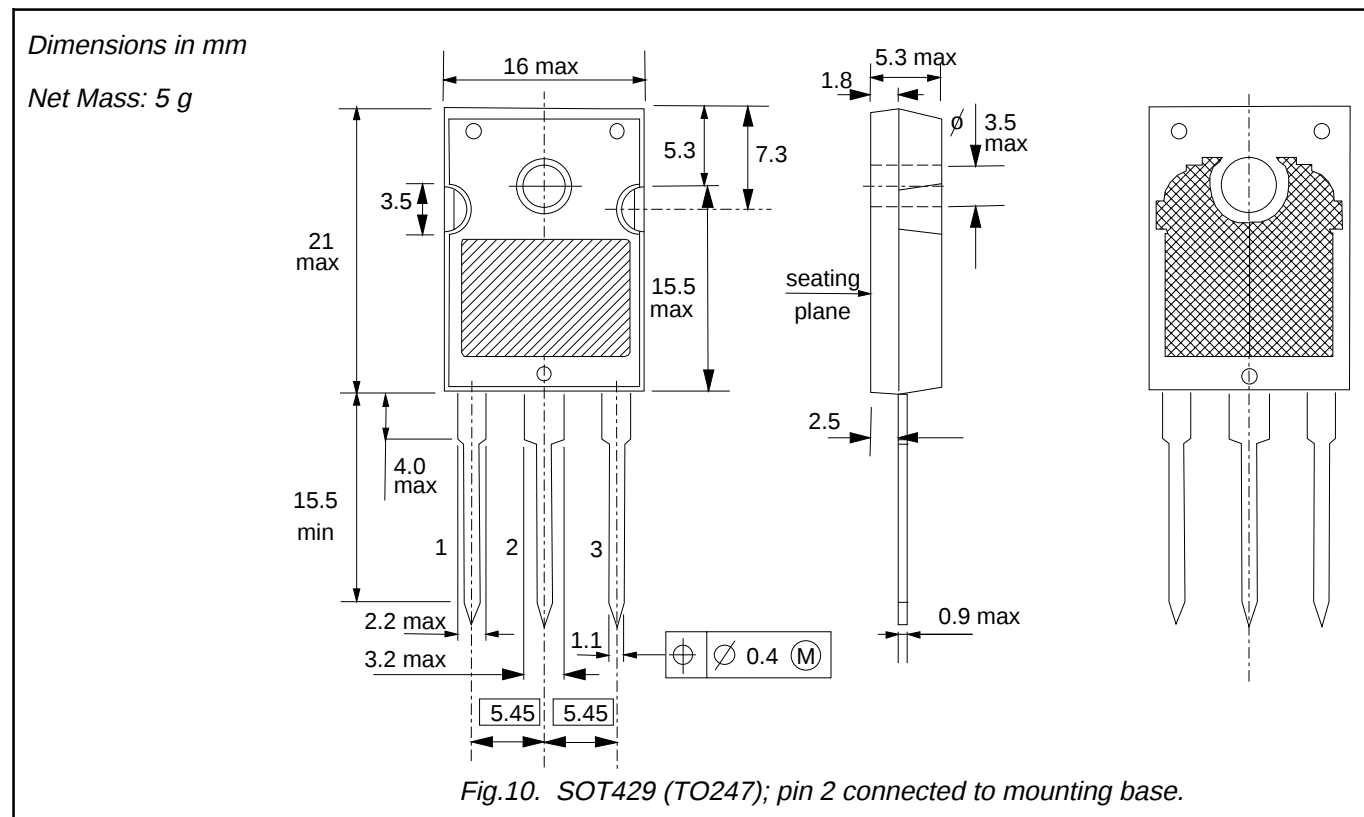


Fig.9. Transient thermal impedance;  $Z_{th\ j-hs} = f(t_p)$ .

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### MECHANICAL DATA



#### Notes

1. Refer to mounting instructions for SOT429 envelope.
2. Epoxy meets UL94 V0 at 1/8".

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### DEFINITIONS

|                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| <b>Data sheet status</b>                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                       |
| Objective specification                                                                                                                                                                                                                                                                                                                                                                                                                                    | This data sheet contains target or goal specifications for product development.       |
| Preliminary specification                                                                                                                                                                                                                                                                                                                                                                                                                                  | This data sheet contains preliminary data; supplementary data may be published later. |
| Product specification                                                                                                                                                                                                                                                                                                                                                                                                                                      | This data sheet contains final product specifications.                                |
| <b>Limiting values</b>                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                       |
| Limiting values are given in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of this specification is not implied. Exposure to limiting values for extended periods may affect device reliability. |                                                                                       |
| <b>Application information</b>                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                       |
| Where application information is given, it is advisory and does not form part of the specification.                                                                                                                                                                                                                                                                                                                                                        |                                                                                       |
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