

# DATA SHEET

**BYV42E, BYV42EB series**  
Rectifier diodes  
ultrafast, rugged

Product specification

July 1998



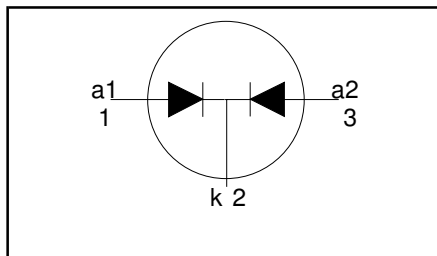
# Rectifier diodes ultrafast, rugged

## BYV42E, BYV42EB 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

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

### GENERAL DESCRIPTION

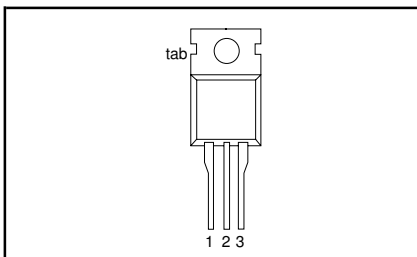
Dual, ultra-fast, epitaxial rectifier diodes intended for use as output rectifiers in high frequency switched mode power supplies.

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

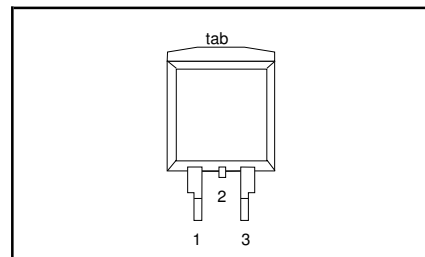
### PINNING

PIN	DESCRIPTION
1	anode 1 (a)
2	cathode (k) <sup>1</sup>
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
				BYV42E / BYV42EB		
$V_{RRM}$	Peak repetitive reverse voltage	$T_{mb} \leq 144^\circ\text{C}$	-	-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	$\mu\text{A}$
$Q_s$	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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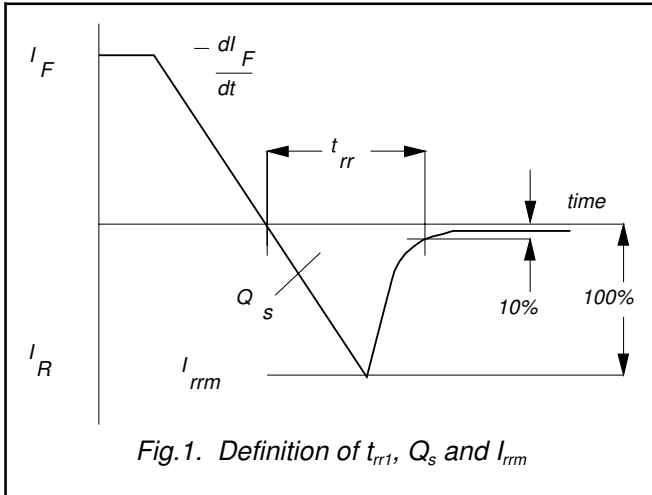


Fig.1. Definition of  $t_{rr1}$ ,  $Q_s$  and  $I_{rm}$

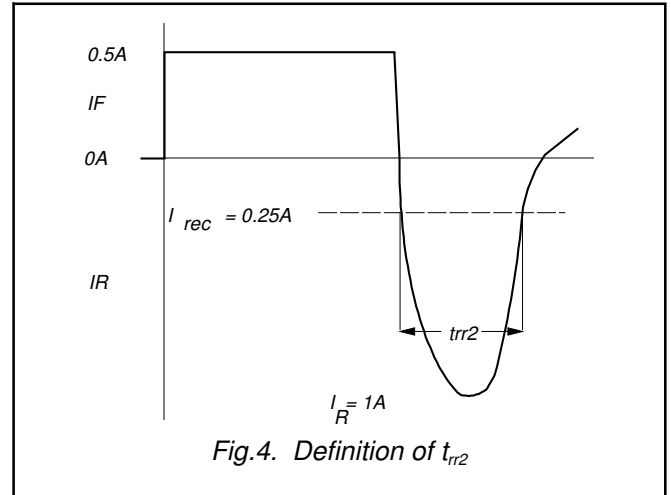


Fig.4. Definition of  $t_{rr2}$

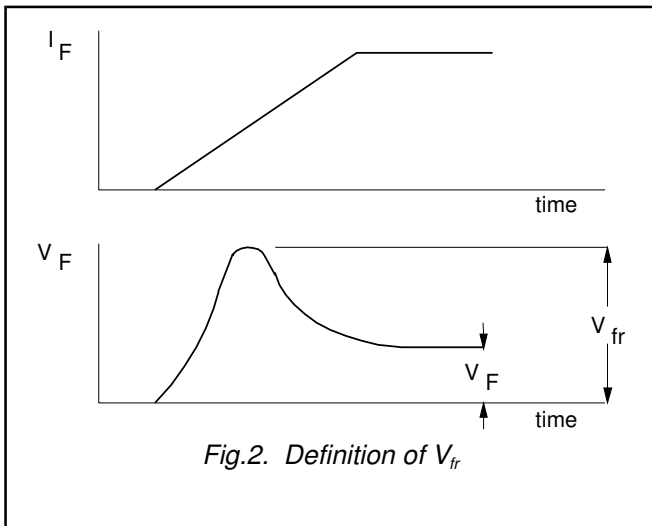


Fig.2. Definition of  $V_{fr}$

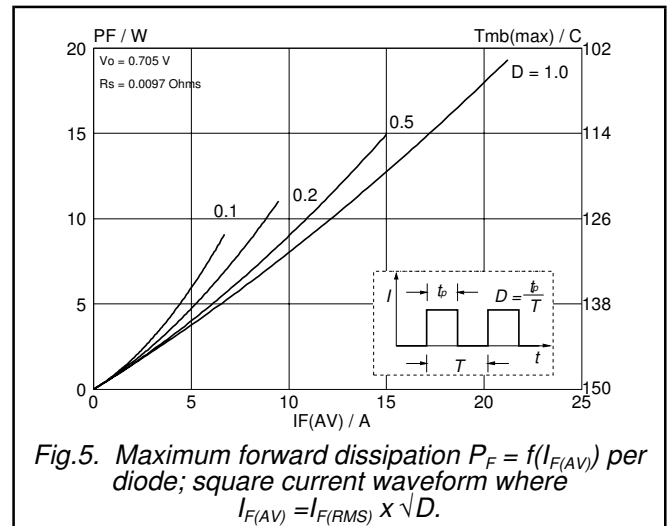


Fig.5. Maximum forward dissipation  $P_F = f(I_{F(AV)})$  per diode; square current waveform where  $I_{F(AV)} = I_{F(RMS)} \times \sqrt{D}$ .

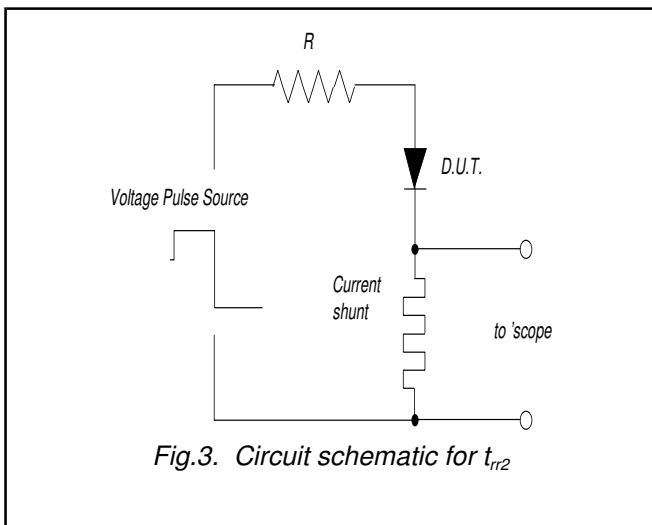


Fig.3. Circuit schematic for  $t_{rr2}$

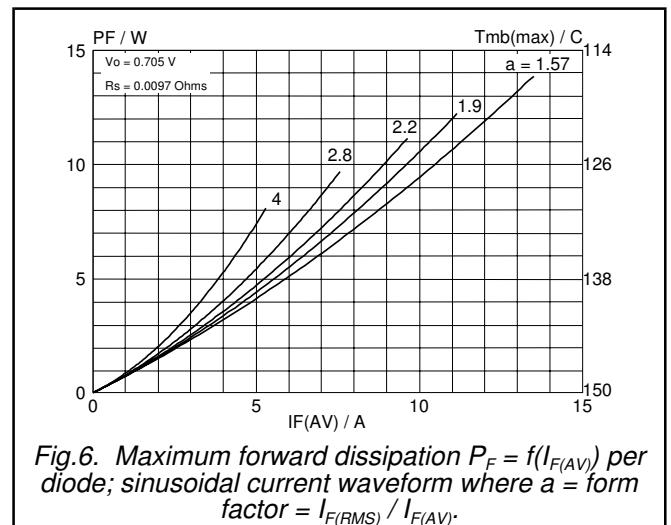


Fig.6. Maximum forward dissipation  $P_F = f(I_{F(AV)})$  per diode; sinusoidal current waveform where  $a = \text{form factor} = I_{F(RMS)} / I_{F(AV)}$ .

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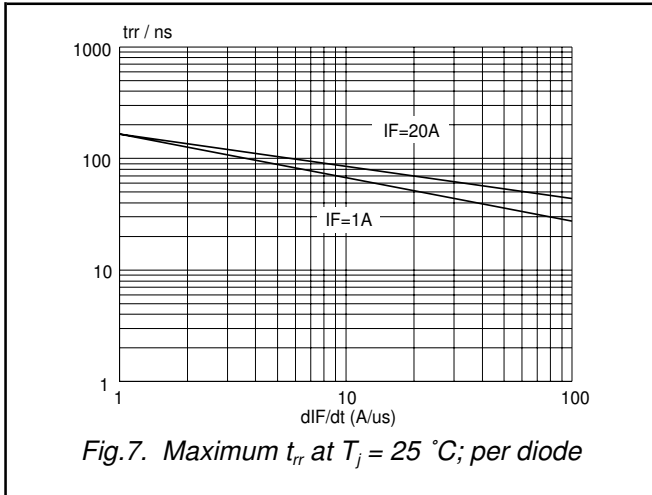


Fig.7. Maximum  $t_{rr}$  at  $T_j = 25^\circ C$ ; per diode

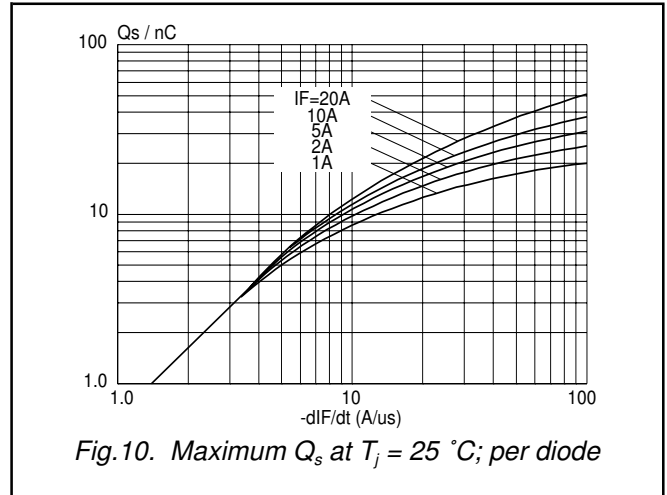


Fig.10. Maximum  $Q_s$  at  $T_j = 25^\circ C$ ; per diode

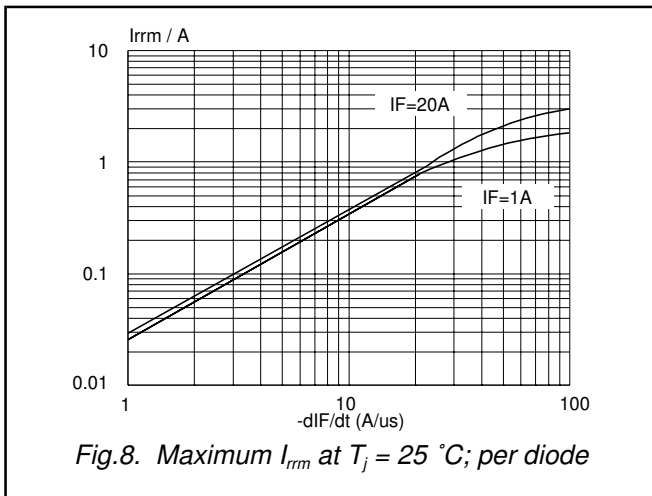


Fig.8. Maximum  $I_{rrm}$  at  $T_j = 25^\circ C$ ; per diode

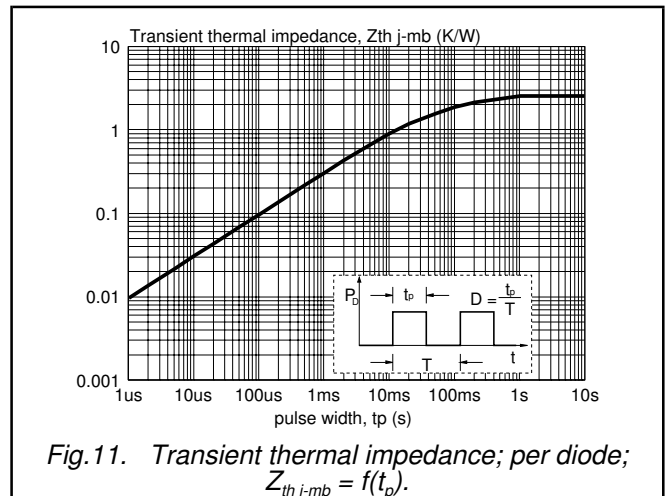


Fig.11. Transient thermal impedance; per diode;  
 $Z_{th\ j-mb} = f(t_p)$ .

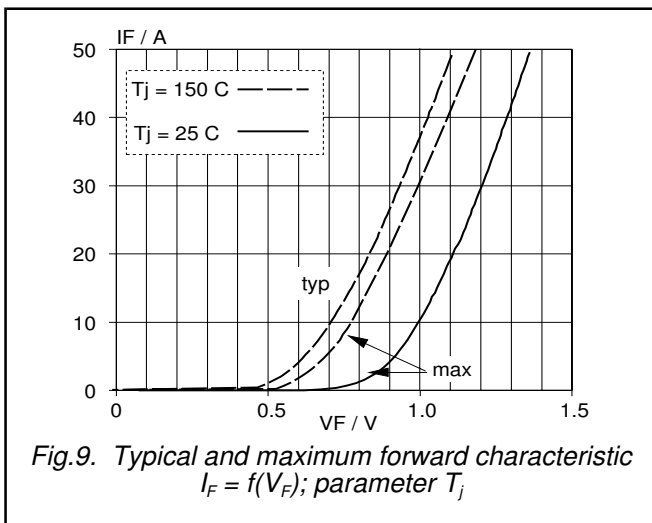
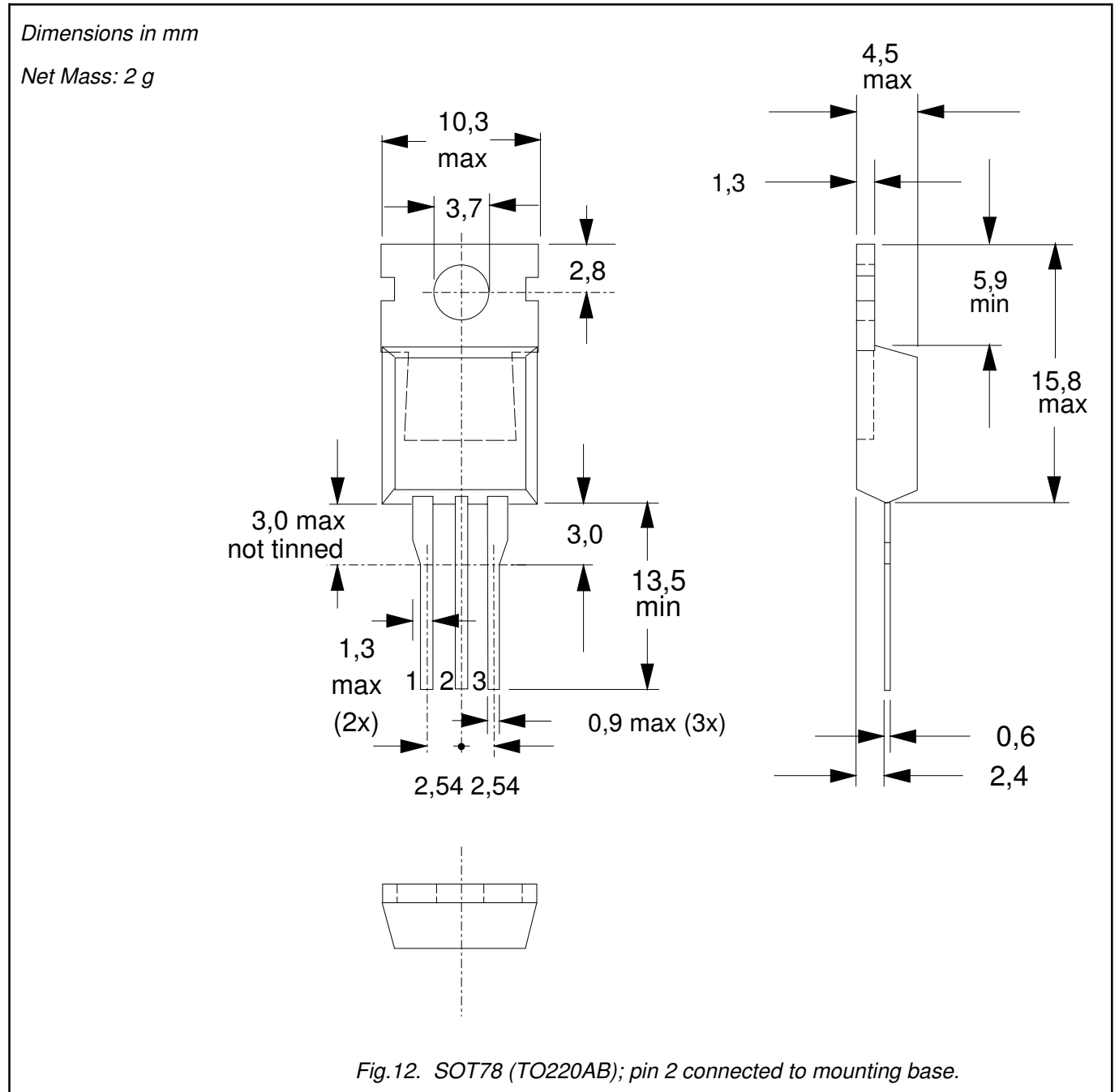


Fig.9. Typical and maximum forward characteristic  $I_F = f(V_F)$ ; parameter  $T_j$

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**MECHANICAL DATA**



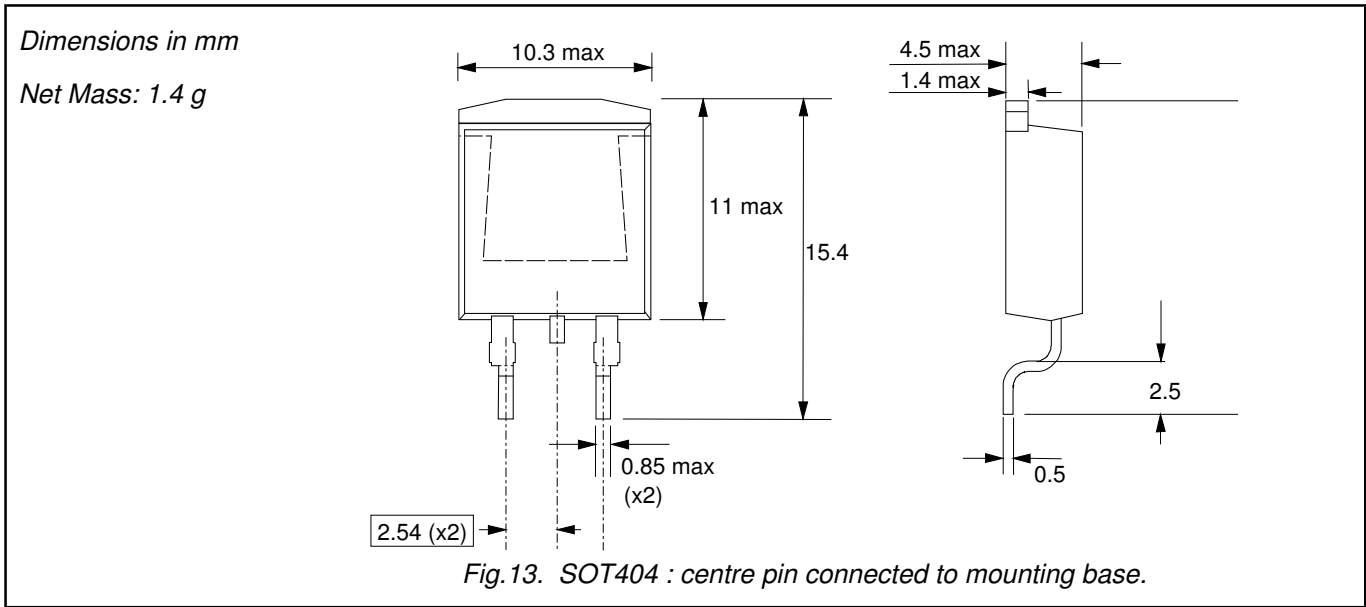
**Notes**

1. Refer to mounting instructions for SOT78 (TO220) envelopes.
2. Epoxy meets UL94 V0 at 1/8".

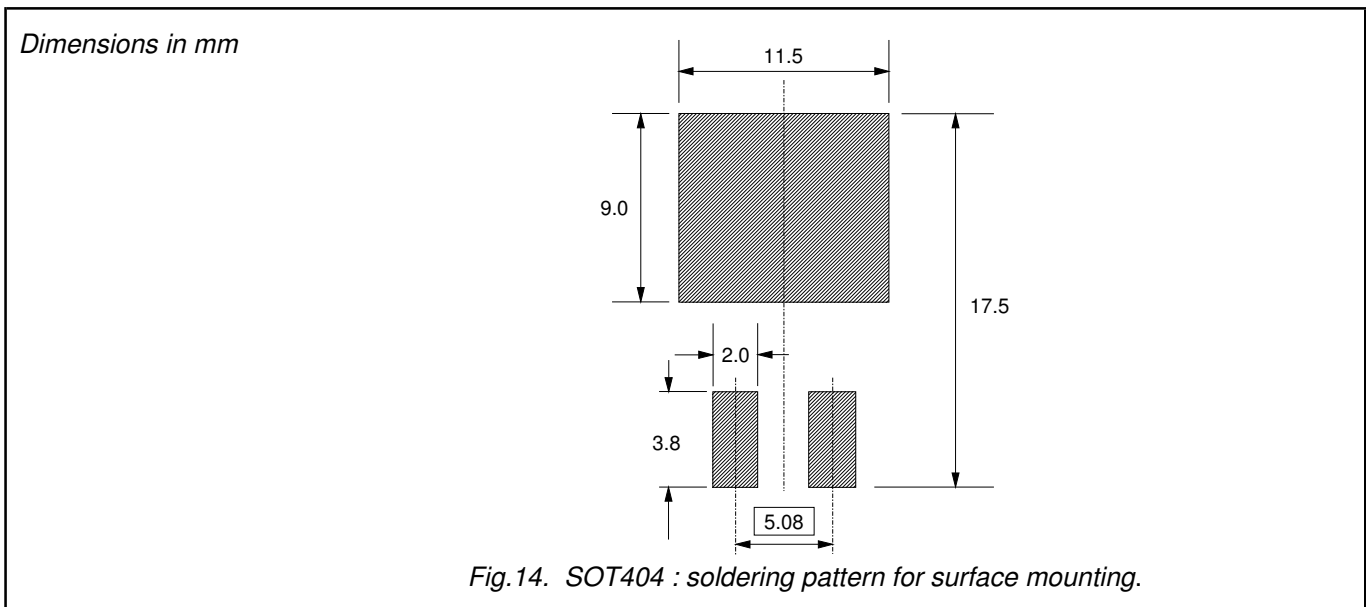
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**MECHANICAL DATA**



**MOUNTING INSTRUCTIONS**



**Notes**

- 1. Epoxy meets UL94 V0 at 1/8".

## Legal information

### DATA SHEET STATUS

DOCUMENT STATUS <sup>(1)</sup>	PRODUCT STATUS <sup>(2)</sup>	DEFINITION
Objective data sheet	Development	This document contains data from the objective specification for product development.
Preliminary data sheet	Qualification	This document contains data from the preliminary specification.
Product data sheet	Production	This document contains the product specification.

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