

1. Product profile

1.1 General description

Dual ultrafast epitaxial rectifier diodes in a SOT186A (TO-220F) isolated plastic package.

1.2 Features and benefits

- Fast switching
- Guaranteed ESD capability
- High thermal cycling performance
- Low on-state losses
- Soft recovery minimizes power-consuming oscillations

1.3 Applications

- Output rectifiers in high-frequency switched-mode power supplies

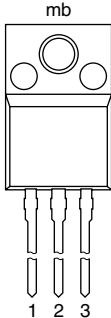
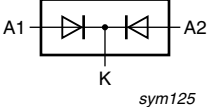
1.4 Quick reference data

Table 1. Quick reference

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	-	200	V
$I_{O(AV)}$	average output current	SQW; $\delta = 0.5$; $T_h \leq 92\text{ °C}$; both diodes conducting; see Figure 1 ; see Figure 2	-	-	10	A
I_{FRM}	repetitive peak forward current	SQW; $\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_h \leq 92\text{ °C}$; per diode	-	-	10	A
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1\text{ A}$; $V_R = 30\text{ V}$; $dI_F/dt = 100\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$; ramp recovery; see Figure 5	-	15	25	ns
Static characteristics						
V_F	forward voltage	$I_F = 5\text{ A}$; $T_j = 150\text{ °C}$; see Figure 4	-	0.8	0.895	V
Electrostatic discharge						
V_{ESD}	electrostatic discharge voltage	HBM; $C = 250\text{ pF}$; $R = 1.5\text{ k}\Omega$; all pins	-	-	8	kV

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode 1		
2	K	cathode		
3	A2	anode 2		
mb	n.c.	mounting base; isolated		

SOT186A
(TO-220F)

3. Ordering information

Table 3. Ordering information

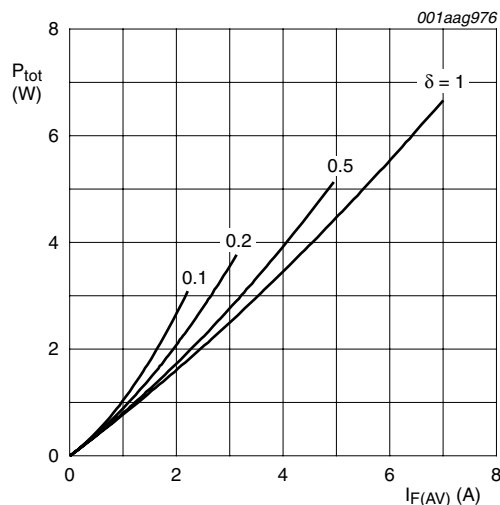
Type number	Package		Version
	Name	Description	
BYQ28X-200	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 3-lead TO-220 "full pack"	SOT186A

4. Limiting values

Table 4. Limiting values

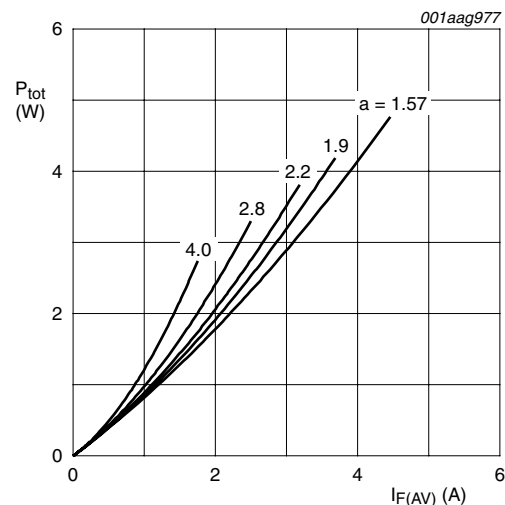
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	200	V
V_{RWM}	crest working reverse voltage		-	200	V
V_R	reverse voltage	DC	-	200	V
$I_{O(AV)}$	average output current	SQW; $\delta = 0.5$; $T_h \leq 92^\circ\text{C}$; both diodes conducting; see Figure 1 ; see Figure 2	-	10	A
I_{FRM}	repetitive peak forward current	SQW; $\delta = 0.5$; $t_p = 25\ \mu\text{s}$; $T_h \leq 92^\circ\text{C}$; per diode	-	10	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\ \text{ms}$; SIN; $T_{j(\text{init})} = 25^\circ\text{C}$; per diode	-	50	A
		$t_p = 8.3\ \text{ms}$; SIN; $T_{j(\text{init})} = 25^\circ\text{C}$; per diode	-	55	A
I_{RRM}	repetitive peak reverse current	$t_p = 2\ \mu\text{s}$; $\delta = 0.001$	-	0.2	A
I_{RSM}	non-repetitive peak reverse current	$t_p = 100\ \mu\text{s}$	-	0.2	A
T_{stg}	storage temperature		-40	150	$^\circ\text{C}$
T_j	junction temperature		-	150	$^\circ\text{C}$
Electrostatic discharge					
V_{ESD}	electrostatic discharge voltage	HBM; $C = 250\ \text{pF}$; $R = 1.5\ \text{k}\Omega$; all pins	-	8	kV



$$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$$

Fig 1. Forward power dissipation as a function of average forward current; square waveform; maximum values



$$a = \text{form factor} = I_{F(RMS)} / I_{F(AV)}$$

Fig 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	with heatsink compound; see Figure 3	-	-	5.7	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air		-	55	-	K/W

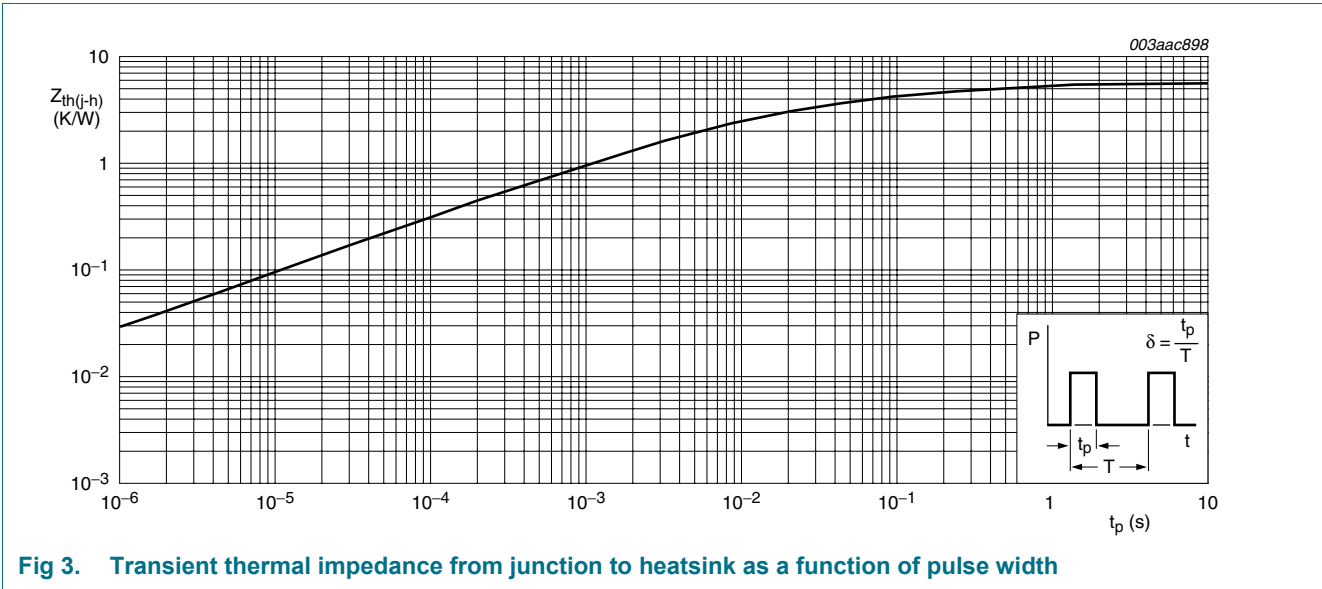


Fig 3. Transient thermal impedance from junction to heatsink as a function of pulse width

6. Isolation characteristics

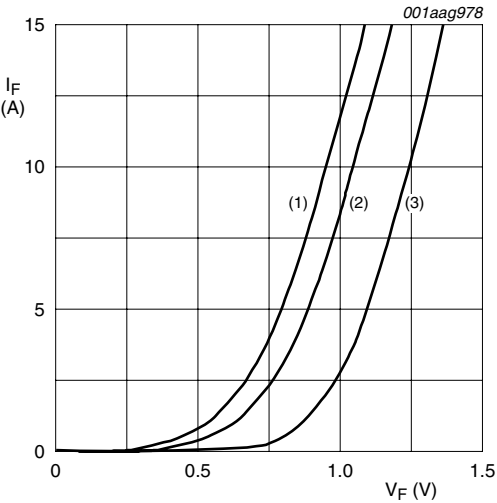
Table 6. Isolation characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	50 Hz < f < 60 Hz; sinusoidal waveform; relative humidity < 65 %; clean and dust free; from all terminals to external heatsink	-	-	2500	V
C_{isol}	isolation capacitance	from cathode to external heatsink; f = 1 MHz	-	10	-	pF

7. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V _F	forward voltage	I _F = 10 A; T _j = 25 °C	-	1.1	1.25	V
		I _F = 5 A; T _j = 150 °C; see Figure 4	-	0.8	0.895	V
		I _F = 5 A; T _j = 25 °C	-	0.95	1.1	V
I _R	reverse current	V _R = 200 V; T _j = 25 °C	-	2	10	μA
		V _R = 200 V; T _j = 100 °C	-	0.1	0.2	mA
Dynamic characteristics						
Q _r	recovered charge	I _F = 2 A; V _R = 30 V; dI _F /dt = 20 A/μs; T _j = 25 °C	-	4	9	μC
t _{rr}	reverse recovery time	I _F = 1 A; V _R = 30 V; dI _F /dt = 100 A/μs; ramp recovery; T _j = 25 °C; see Figure 5	-	15	25	ns
		I _F = 0.5 A; I _R = 1 A; step recovery; measured at I _R = 0.25 A; T _j = 25 °C; see Figure 6	-	-	20	ns
I _{RM}	peak reverse recovery current	I _F = 5 A; V _R ≥ 30 V; dI _F /dt = 50 A/μs; T _j = 25 °C; see Figure 5	-	0.5	0.7	A
V _{FRM}	peak forward recovery voltage	I _F = 1 A; dI _F /dt = 10 A/μs; T _j = 25 °C; see Figure 7	-	1	-	V



- (1) $T_j = 150\text{ }^{\circ}\text{C}$; typical values
- (2) $T_j = 150\text{ }^{\circ}\text{C}$; maximum values
- (3) $T_j = 25\text{ }^{\circ}\text{C}$; maximum values

Fig 4. Forward current as a function of forward voltage

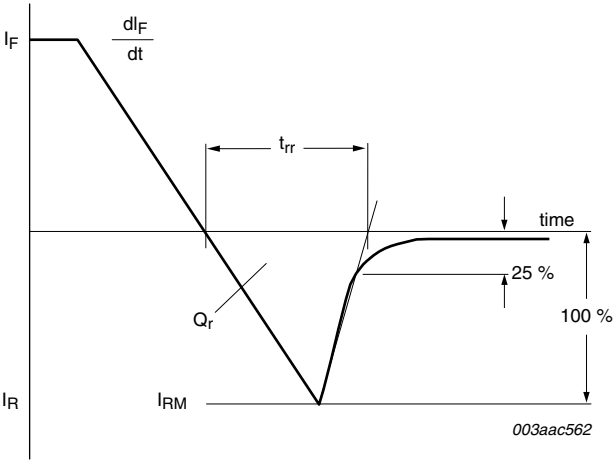
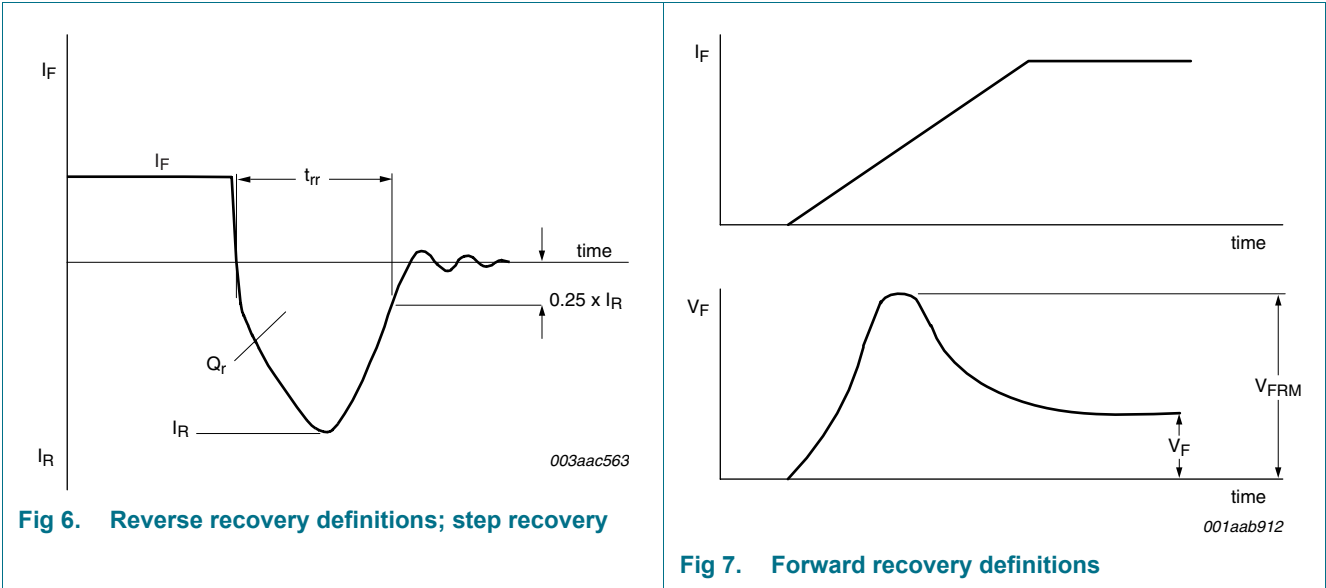
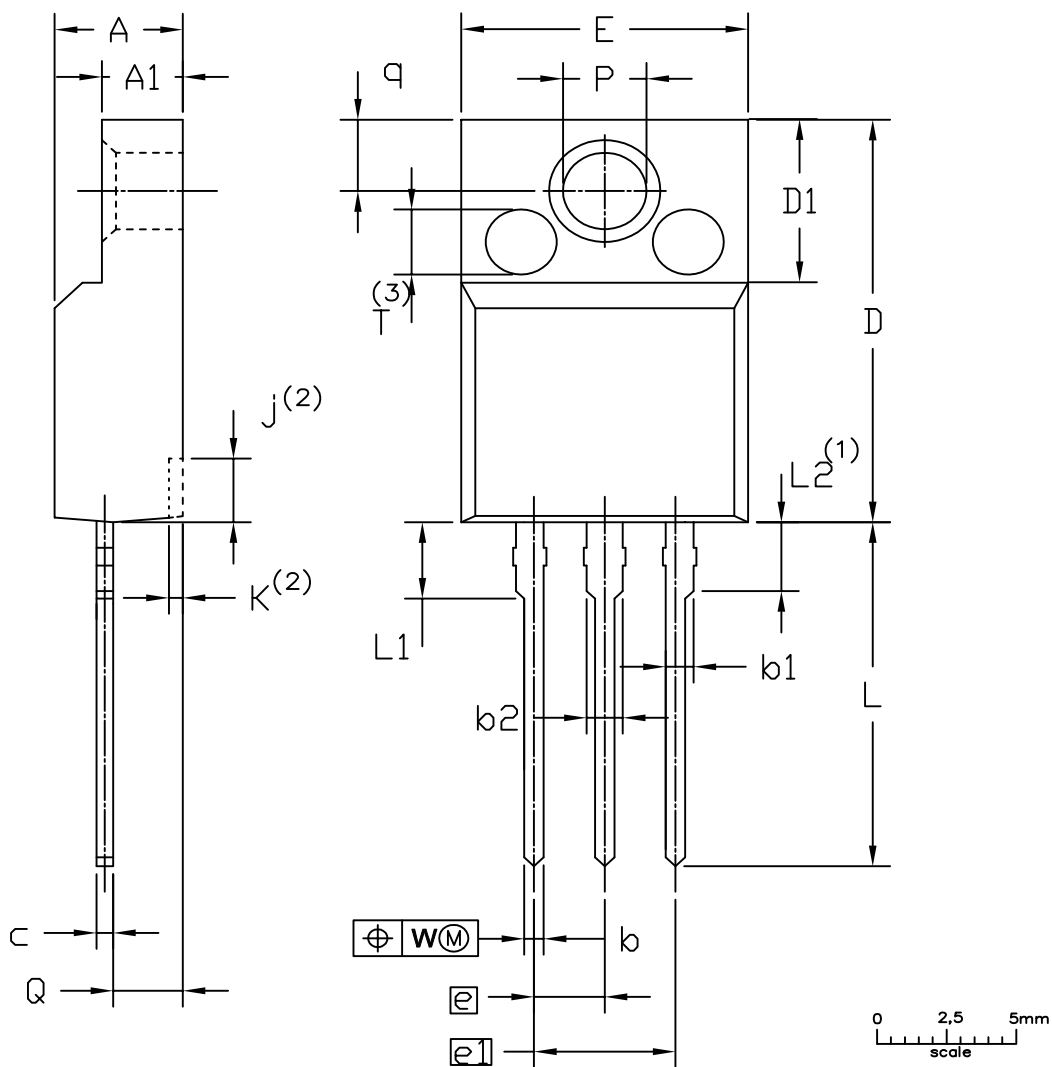


Fig 5. Reverse recovery definitions; ramp recovery



8. Package outline

Plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 3-lead TO-220 "full pack" SOT186A



UNIT	A	A ₁	b	b ₁	b ₂	c	D	D ₁	E	e	e ₁	j ⁽²⁾	k ⁽²⁾	L	L ₁	L ₂ ⁽¹⁾ max.	P	Q	q	W	T ⁽³⁾
mm	4.6 4.0	2.9 2.5	0.9 0.7	1.1 0.9	1.4 1.0	0.7 0.4	15.8 15.2	6.5 6.3	10.3 9.7	2.54 2.54	5.08 5.08	2.7 1.7	0.6 0.4	14.4 13.5	3.30 2.79	3 3	3.2 3.0	2.6 2.3	3.0 2.6	0.4 0.4	2.5 2.5

- Notes
- 1. Terminal dimensions within this zone are uncontrolled
 - 2. Dot lines area designs may vary
 - 3. Eject pin mark is for reference only

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT186A		3 LEADS TO220F				2013-11-14

Fig. 8. Package outline TO-220F (SOT186A)

9. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYQ28X-200_3	20180718	Product data sheet	-	BYQ28X-200_2
Modifications:	• Change NXP logo to WeEn logo. • Update POD to combine different assembly plant.			
BYQ28X-200_2	20090205	Product data sheet	-	BYQ28X_SERIES_1
Modifications:	• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate. • Type number BYQ28X-200 separated from data sheet BYQ28X_SERIES_1.			
BYQ28X_SERIES_1	19960801	Product data sheet	-	-

10. Legal information

Data sheet status

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

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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