



# IMPORTANT NOTICE

10 December 2015

## 1. Global joint venture starts operations as WeEn Semiconductors

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As from November 9th, 2015 NXP Semiconductors N.V. and Beijing JianGuang Asset Management Co. Ltd established Bipolar Power joint venture (JV), **WeEn Semiconductors**, which will be used in future Bipolar Power documents together with new contact details.

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WeEn Semiconductors





# BYQ28E-200E

## Dual ultrafast power diodes

Rev. 4 — 14 July 2011

Product data sheet

## 1. Product profile

### 1.1 General description

Dual ultrafast power diodes in a SOT78 (TO-220AB) plastic package. These diodes are rugged with a guaranteed electrostatic discharge voltage capability.

### 1.2 Features and benefits

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

### 1.3 Applications

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

### 1.4 Quick reference data

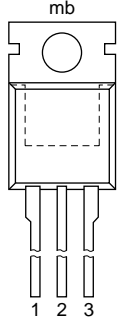
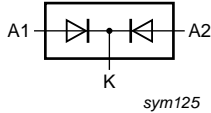
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	-	200	V
$I_{O(AV)}$	average output current	square-wave pulse; $\delta = 0.5$ ; $T_{mb} \leq 119$ °C; both diodes conducting; see <a href="#">Figure 1</a> ; see <a href="#">Figure 2</a>	-	-	10	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25$ $\mu$ s; $T_{mb} \leq 119$ °C; per diode; square-wave pulse	-	-	10	A
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 5$ A; $T_j = 150$ °C; see <a href="#">Figure 4</a>	-	0.8	0.89	V
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $di_F/dt = 100$ A/ $\mu$ s; $T_j = 25$ °C; ramp recovery; see <a href="#">Figure 5</a>	-	15	25	ns
<b>Electrostatic discharge</b>						
$V_{ESD}$	electrostatic discharge voltage	HBM; C = 250 pF; R = 1.5 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	K	mounting base; cathode		

**SOT78 (TO-220AB)**

## 3. Ordering information

**Table 3. Ordering information**

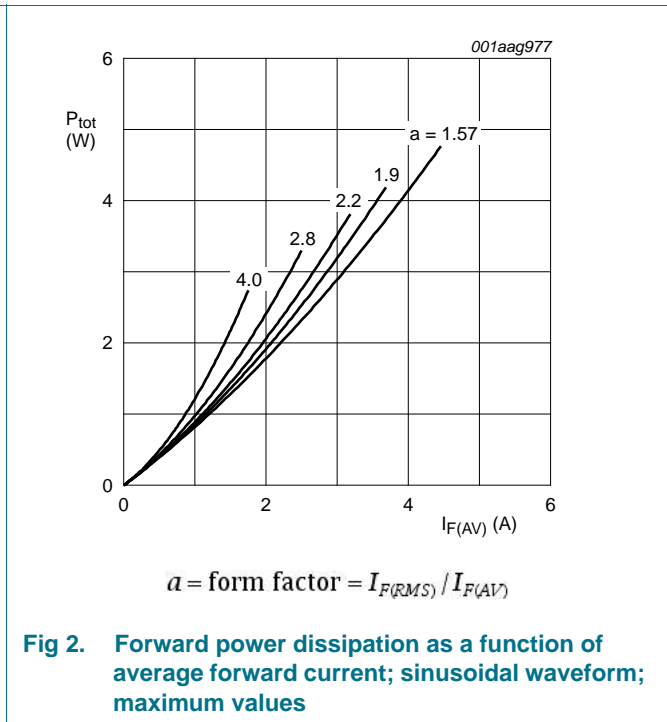
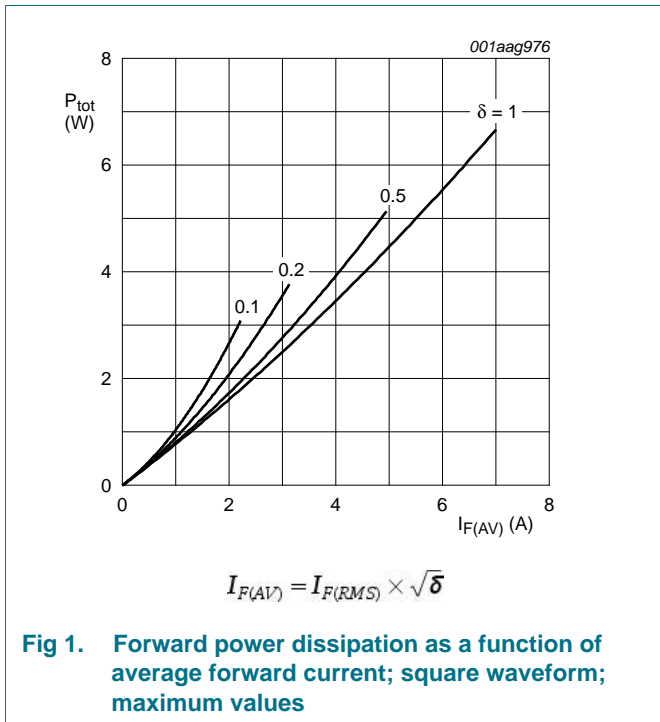
Type number	Package		
	Name	Description	Version
BYQ28E-200E	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78

### 4. Limiting values

**Table 4. Limiting values**

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

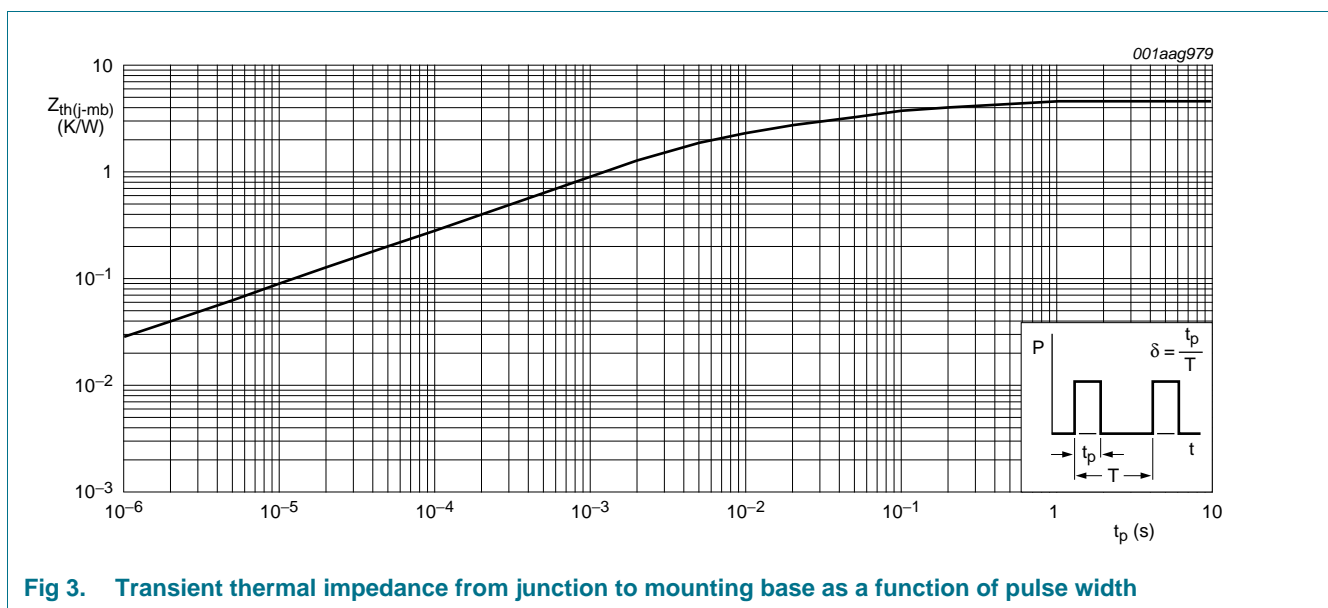
Symbol	Parameter	Conditions	Min	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	200	V
$V_{RWM}$	crest working reverse voltage		-	200	V
$V_R$	reverse voltage	DC	-	200	V
$I_{O(AV)}$	average output current	square-wave pulse; $\delta = 0.5$ ; $T_{mb} \leq 119\text{ }^\circ\text{C}$ ; both diodes conducting; see <a href="#">Figure 1</a> ; see <a href="#">Figure 2</a>	-	10	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_{mb} \leq 119\text{ }^\circ\text{C}$ ; per diode; square-wave pulse	-	10	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 8.3\text{ ms}$ ; sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; per diode	-	55	A
		$t_p = 10\text{ ms}$ ; sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; per diode	-	50	A
$I_{RRM}$	repetitive peak reverse current	$\delta = 0.001$ ; $t_p = 2\text{ }\mu\text{s}$	-	0.2	A
$I_{RSM}$	non-repetitive peak reverse current	$t_p = 100\text{ }\mu\text{s}$	-	0.2	A
$T_{stg}$	storage temperature		-40	150	$^\circ\text{C}$
$T_j$	junction temperature		-	150	$^\circ\text{C}$
<b>Electrostatic discharge</b>					
$V_{ESD}$	electrostatic discharge voltage	HBM; C = 250 pF; R = 1.5 k $\Omega$ ; all pins	-	8	kV



## 5. Thermal characteristics

**Table 5. Thermal characteristics**

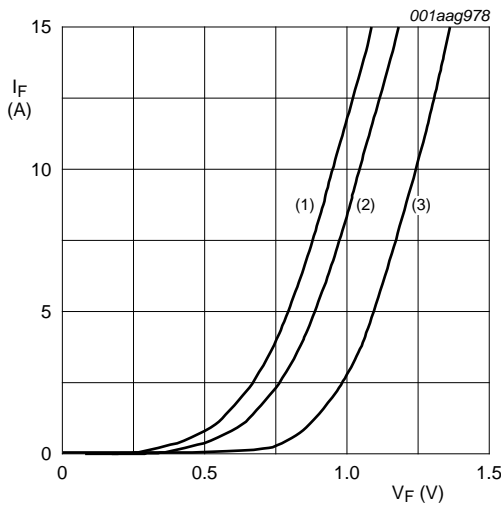
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	with heatsink compound; both diodes conducting	-	-	3	K/W
		with heatsink compound; per diode; see <a href="#">Figure 3</a>	-	-	4.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient		-	60	-	K/W



## 6. Characteristics

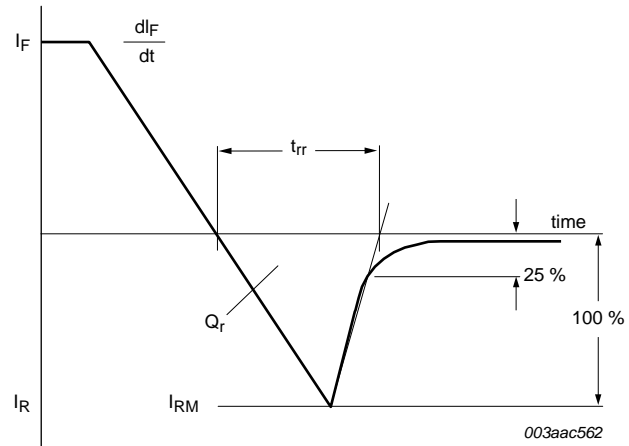
**Table 6. Characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 5 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 4</a>	-	0.95	1.1	V
		$I_F = 5 \text{ A}; T_j = 150 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 4</a>	-	0.8	0.895	V
		$I_F = 10 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 4</a>	-	1.1	1.25	V
$I_R$	reverse current	$V_R = 200 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	2	10	$\mu\text{A}$
		$V_R = 200 \text{ V}; T_j = 100 \text{ }^\circ\text{C}$	-	0.1	0.2	mA
<b>Dynamic characteristics</b>						
$Q_r$	recovered charge	$I_F = 2 \text{ A}; V_R \geq 30 \text{ V}; dI_F/dt = 20 \text{ A}/\mu\text{s}$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 5</a>	-	4	9	nC
$t_{rr}$	reverse recovery time	$I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 100 \text{ A}/\mu\text{s}$ ; ramp recovery; $T_j = 25 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 5</a>	-	15	25	ns
		$I_F = 0.5 \text{ A}; I_R = 1 \text{ A}$ ; step recovery; $T_j = 25 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 6</a>	-	10	20	ns
$I_{RM}$	peak reverse recovery current	$I_F = 2 \text{ A}; V_R \geq 30 \text{ V}; dI_F/dt = 20 \text{ A}/\mu\text{s}$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 5</a>	-	0.4	0.7	A
$V_{FR}$	forward recovery voltage	$I_F = 1 \text{ A}; dI_F/dt = 10 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 7</a>	-	1	-	V

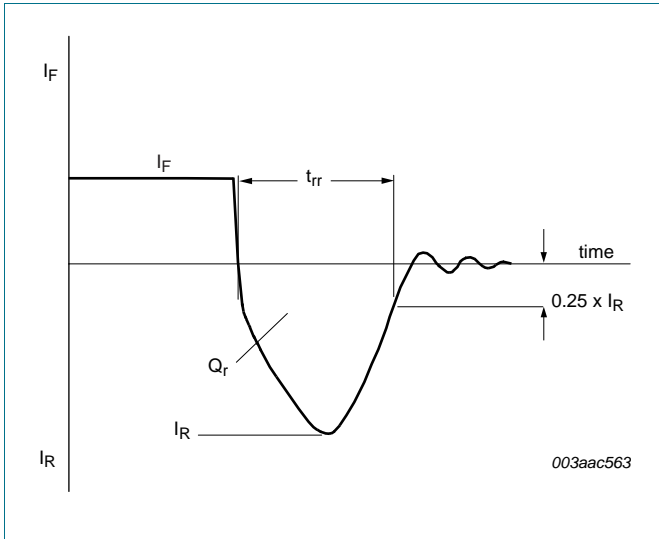


- (1)  $T_j = 150 \text{ }^\circ\text{C}$ ; typical values
- (2)  $T_j = 150 \text{ }^\circ\text{C}$ ; maximum values
- (3)  $T_j = 25 \text{ }^\circ\text{C}$ ; maximum values

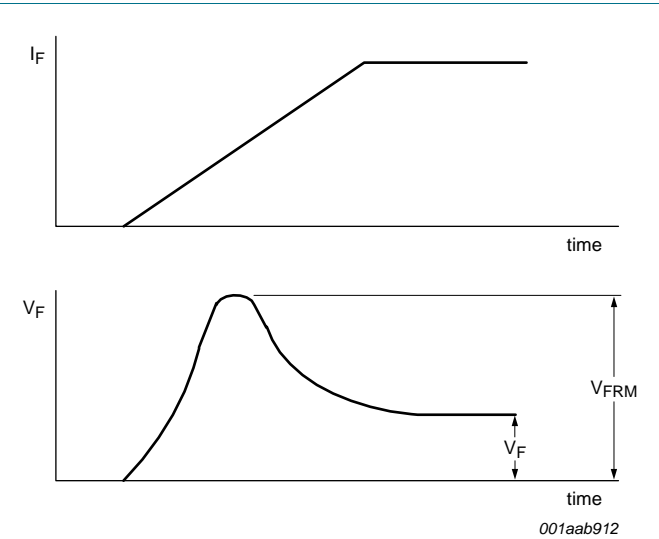
**Fig 4. Forward current as a function of forward voltage**



**Fig 5. Reverse recovery definitions; ramp recovery**



**Fig 6. Reverse recovery definitions; step recovery**

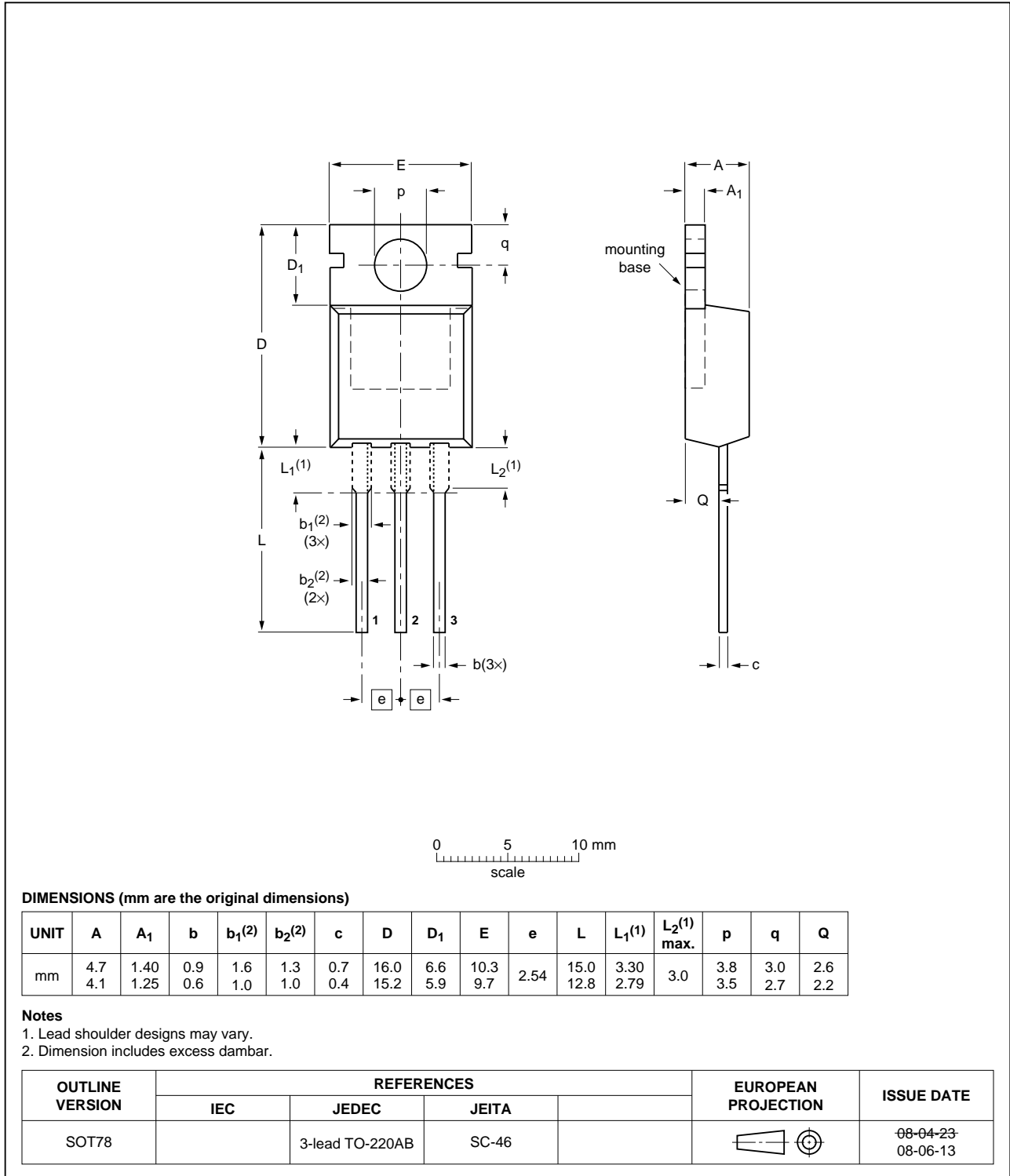


**Fig 7. Forward recovery definitions**

**7. Package outline**

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

SOT78



**Fig 8. Package outline SOT78 (TO-220AB)**



## 8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYQ28E-200E v.4	20110714	Product data sheet	-	BYQ28E_SERIES v.3
Modifications:	<ul style="list-style-type: none"><li>• Type number BYQ28E-200E separated from data sheet BYQ28E_SERIES v.3.</li><li>• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li><li>• Legal texts have been adapted to the new company name where appropriate.</li></ul>			
BYQ28E_SERIES v.3	19981001	Product specification	-	BYQ28E_SERIES v.2

## 9. Legal information

### 9.1 Data sheet status

Document status <sup>[1]</sup> <sup>[2]</sup>	Product status <sup>[3]</sup>	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.

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