

## 1. General description

Ultrafast, dual common cathode, epitaxial rectifier diodes in a TO252 (DPAK) plastic package.

## 2. Features and benefits

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

## 3. Applications

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

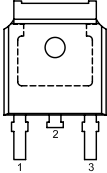
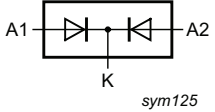
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values			Unit
<b>Absolute maximum rating</b>						
$V_{RRM}$	repetitive peak reverse voltage		200			V
$I_{O(AV)}$	average output current	$\delta = 0.5$ ; square-wave pulse; $T_{mb} \leq 119\text{ °C}$ ; both diodes conducting; <a href="#">Fig. 5</a> ; <a href="#">Fig. 6</a>	10			A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\ \mu\text{s}$ ; $T_{mb} \leq 119\text{ °C}$ ; square-wave pulse; per diode	10			A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10\text{ ms}$ ; sine-wave pulse; per diode	50			A
		$t_p = 8.3\text{ ms}$ ; sine-wave pulse; per diode	55			A
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 5\text{ A}$ ; $T_J = 25\text{ °C}$ ; <a href="#">Fig. 2</a>	-	0.95	1.1	V
		$I_F = 5\text{ A}$ ; $T_J = 150\text{ °C}$ ; <a href="#">Fig. 2</a>	-	0.8	0.895	V
		$I_F = 10\text{ A}$ ; $T_J = 25\text{ °C}$ ; <a href="#">Fig. 2</a>	-	1.1	1.25	V
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	ramp recovery; $I_F = 1\text{ A}$ ; $V_R = 30\text{ V}$ ; $di_F/dt = 100\text{ A}/\mu\text{s}$ ; $T_J = 25\text{ °C}$ ; <a href="#">Fig. 3</a>	-	15	25	ns
		step recovery; when switched from $I_F = 0.5\text{ A}$ to $I_R = 1\text{ A}$ ; measured at $I_R = 0.25\text{ A}$	-	10	20	ns

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode 1		
2	K	cathode [1]		
3	A2	anode 2		
mb	K	mounting base; connected to cathode		

[1] It is not possible to connect to pin 2 of the TO252 package.

## 6. Ordering information

Table 3. Ordering information

Type number	Package Name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
BYQ28ED-200	TO252	BYQ28ED-200, 118	Reel	2500	TO252N	14-Nov-2016

## 7. Marking

Table 4. Marking codes

Type number	Marking codes
BYQ28ED-200	Q28E20

## 8. Limiting values

**Table 5. Limiting values**

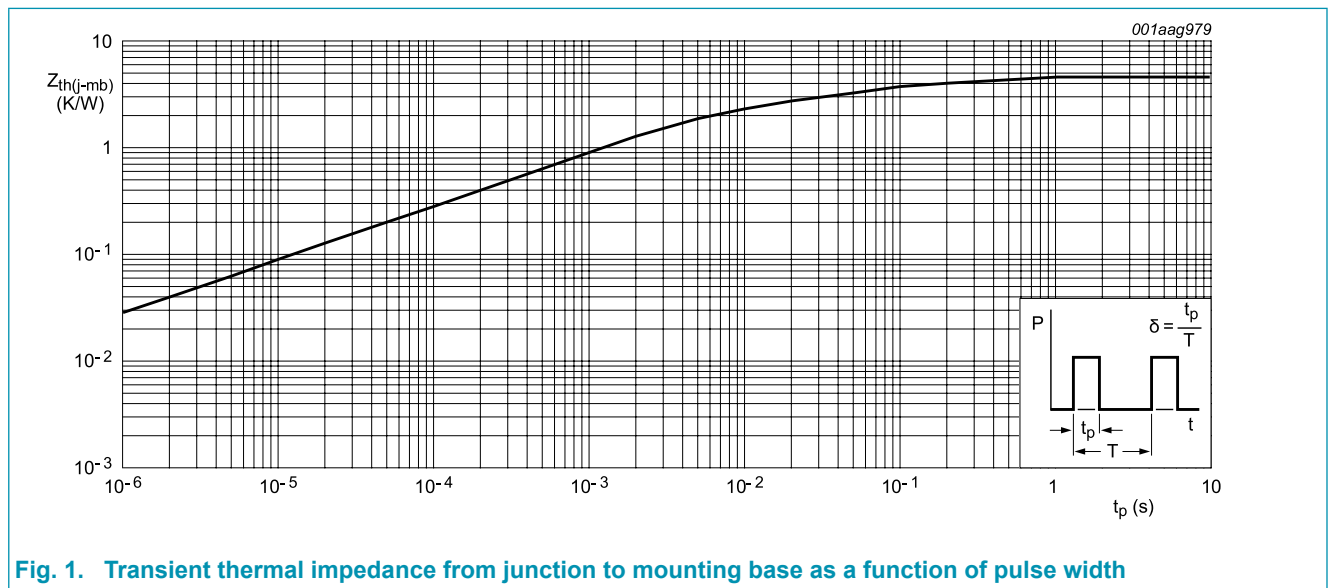
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Values	Unit
$V_{RRM}$	repetitive peak reverse voltage		200	V
$V_{RWM}$	crest working reverse voltage		200	V
$V_R$	reverse voltage	$\delta = 1.0$ ; square-wave pulse;	200	V
$I_{O(AV)}$	average output current	$\delta = 0.5$ ; square-wave pulse; $T_{mb} \leq 119\text{ }^\circ\text{C}$ ; both diodes conducting; <a href="#">Fig. 6</a> ; <a href="#">Fig. 7</a>	10	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_{mb} \leq 119\text{ }^\circ\text{C}$ ; square-wave pulse; per diode	10	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10\text{ ms}$ ; sine-wave pulse; per diode; <a href="#">Fig. 3</a>	50	A
		$t_p = 8.3\text{ ms}$ ; sine-wave pulse; per diode	55	A
$I_{RM}$	peak reverse recovery 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 to 150	$^\circ\text{C}$
$T_j$	junction temperature		150	$^\circ\text{C}$
<b>Electrostatic discharge</b>				
$V_{ESD}$	electrostatic discharge voltage	all pins; human body model; $C = 250\text{ pF}$ ; $R = 1.5\text{ k}\Omega$	8	kV

### 9. Thermal characteristics

Table 6. Thermal characteristics

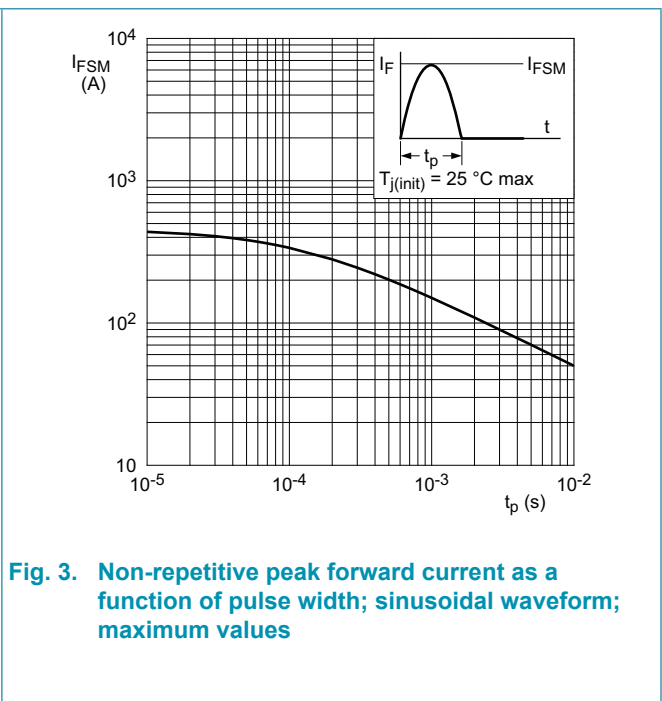
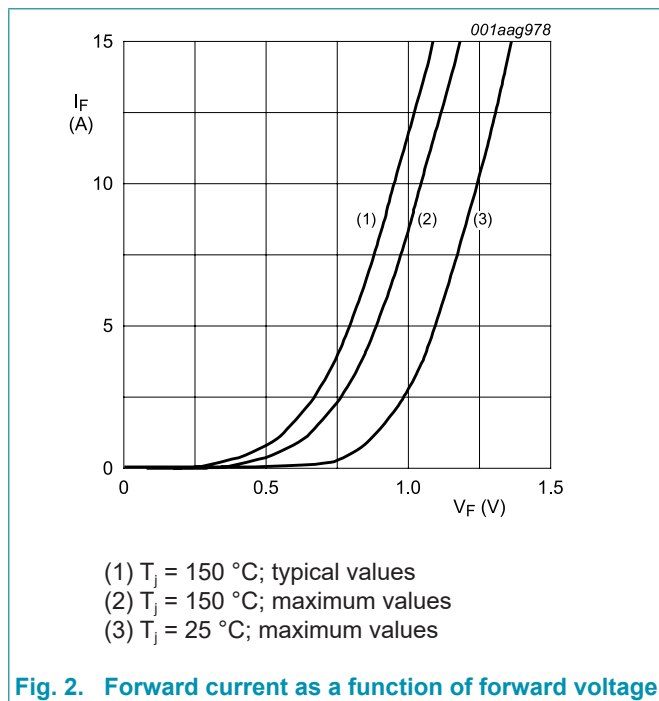
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	with heatsink compound; both diodes conducting	-	-	3	K/W
		with heatsink compound; per diode; <a href="#">Fig 1</a>	-	-	4.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W



### 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 5 A; T <sub>J</sub> = 150 °C; <a href="#">Fig. 2</a>	-	0.8	0.895	V
		I <sub>F</sub> = 5 A; T <sub>J</sub> = 25 °C; <a href="#">Fig. 2</a>	-	0.95	1.1	V
		I <sub>F</sub> = 10 A; T <sub>J</sub> = 25 °C; <a href="#">Fig. 2</a>	-	1.1	1.25	V
I <sub>R</sub>	reverse current	V <sub>R</sub> = 200 V; T <sub>J</sub> = 25 °C	-	2	10	µA
		V <sub>R</sub> = 200 V; T <sub>J</sub> = 100 °C	-	0.1	0.2	mA
<b>Dynamic characteristics</b>						
Q <sub>r</sub>	recovered charge	I <sub>F</sub> = 2 A; V <sub>R</sub> = 30 V; di <sub>F</sub> /dt = 20 A/µs; T <sub>J</sub> = 25 °C; <a href="#">Fig. 4</a>	-	4	9	nC
t <sub>rr</sub>	reverse recovery time	ramp recovery; I <sub>F</sub> = 1 A; V <sub>R</sub> = 30 V; di <sub>F</sub> /dt = 100 A/µs; T <sub>J</sub> = 25 °C; <a href="#">Fig. 4</a>	-	15	25	ns
		step recovery; when switched from I <sub>F</sub> = 0.5 A to I <sub>R</sub> = 1 A; measured at I <sub>R</sub> = 0.25 A	-	10	20	ns
I <sub>RM</sub>	peak reverse recovery current	I <sub>F</sub> = 5 A; V <sub>R</sub> = 30 V; di <sub>F</sub> /dt = 50 A/µs; T <sub>J</sub> = 25 °C; <a href="#">Fig. 4</a>	-	0.5	0.7	A
V <sub>FR</sub>	forward recovery voltage	I <sub>F</sub> = 1 A; di <sub>F</sub> /dt = 10 A/µs; T <sub>J</sub> = 25 °C; <a href="#">Fig. 5</a>	-	1	-	V



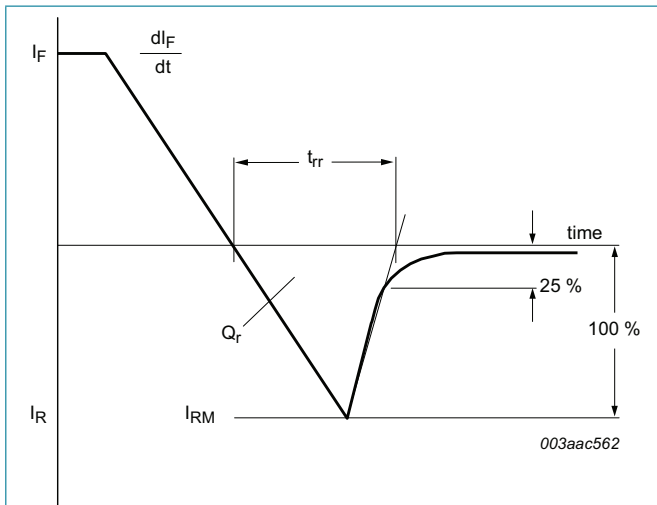


Fig. 4. Reverse recovery definitions; ramp recovery

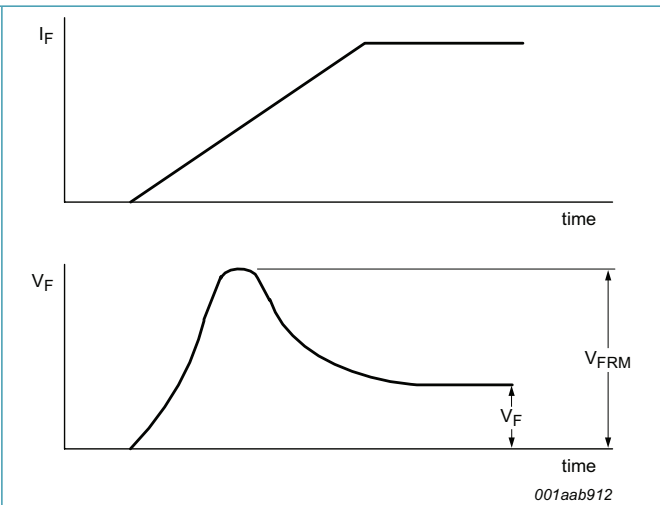
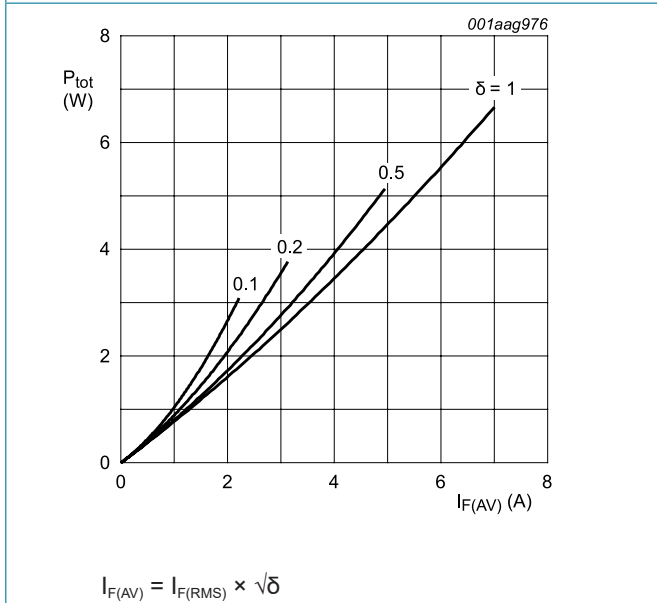
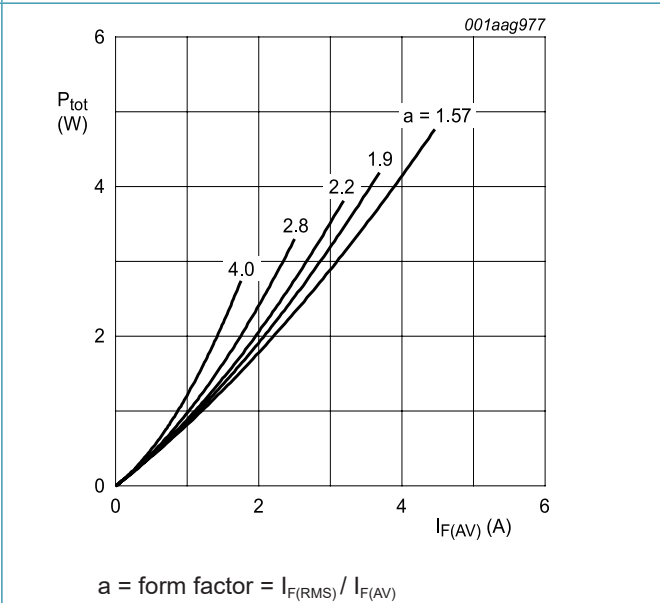


Fig. 5. Forward recovery definitions



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

Fig. 6. Forward power dissipation as a function of average forward current; square waveform; maximum values; per diode



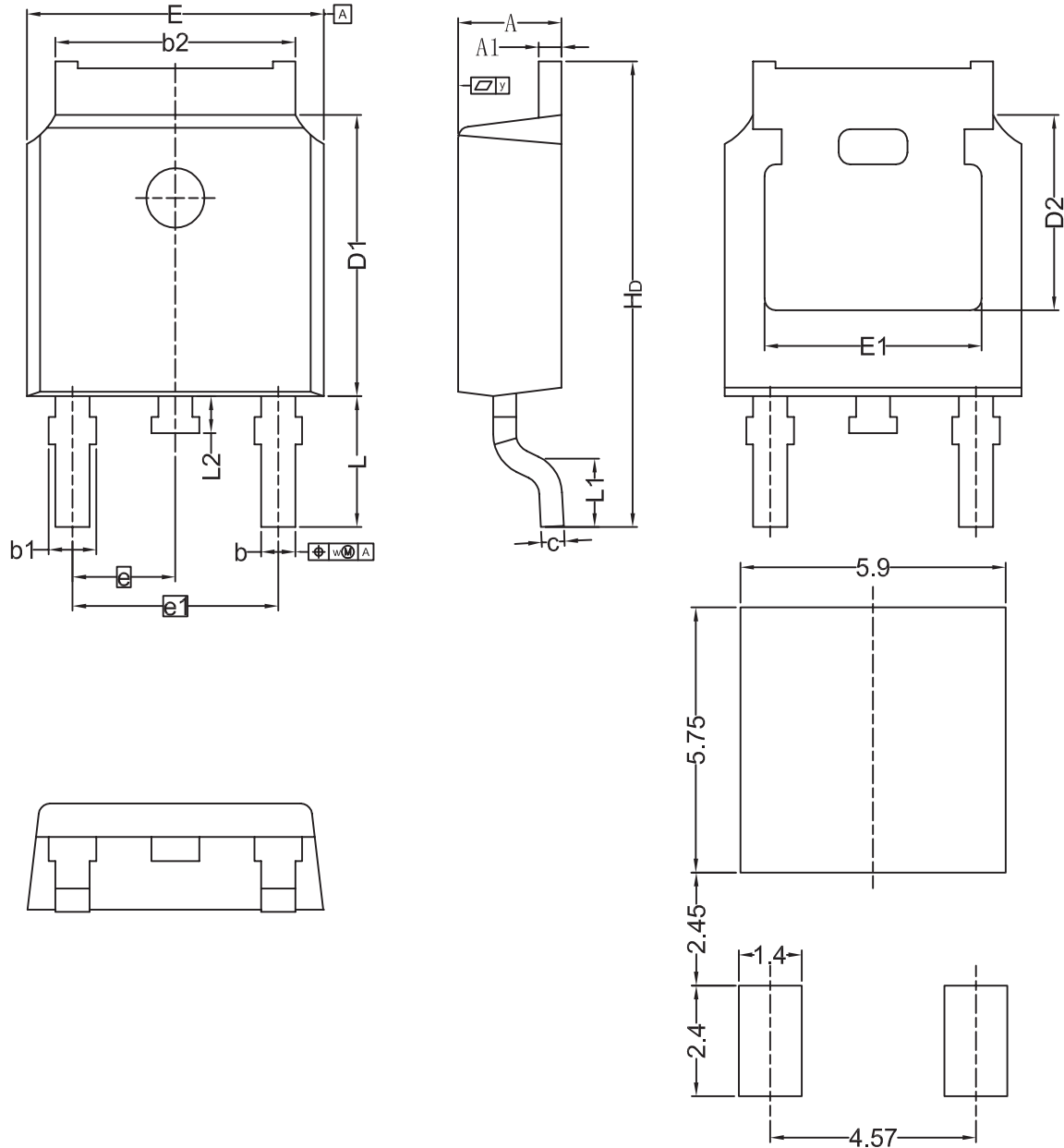
$$a = \text{form factor} = I_{F(RMS)} / I_{F(AV)}$$

Fig. 7. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values; per diode

**11. Package outline**

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

TO252



Recommended Footprint

Unit	A	A1	b	b1	b2	c	D1	D2	E	E1	e	e1	H <sub>D</sub>	L	L1	L2	w	y
min	2.22	0.46	0.71	0.72	5.00	0.20	5.98	4.00	6.47	4.45	2.285	4.57	9.60	2.90 (Ref.)	0.50	0.50	0.20	
nom																		
max	2.38	0.93	0.89	1.10	5.46	0.56	6.22	---	6.73	---			10.40		---	0.90		0.20

## 12. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYQ28ED-200 v.7	20190923	Product data sheet	-	BYQ28ED-200 v.6
Modifications: <ul style="list-style-type: none"> <li>• Update Marking code.</li> <li>• Update ordering information.</li> </ul>				
BYQ28ED-200 v.6	20181218	Product data sheet	-	BYQ28ED-200 v.5
Modifications: Add IFSM figure.				
BYQ28ED-200 v.5	20180224	Product data sheet	-	BYQ28_SER_E_ED_4
Modifications: Change from NXP version to WeEn version				
BYQ28_SER_E_ED_4	20071205	Product data sheet	-	BYQ28E_SERIES_3
Modifications: <ul style="list-style-type: none"> <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> <li>• Limiting values table: some parameter descriptions amended to conform to latest standards; IFRM conditions amended; VESD row added.</li> <li>• Characteristics: Qrr changed to Qr 'recovered charge'; trr1 and trr2 changed to trr with 'ramp recovery' and 'step recovery' added to conditions.</li> </ul>				
BYQ28E_SERIES_3	19981001	Product specification	-	BYQ28E_SERIES_2
BYQ28E_SERIES_2	19980701	Product specification	-	BYQ28E_SERIES_1; BYQ28EB_SERIES_1
BYQ28E_SERIES_1; BYQ28EB_SERIES_1	19960801	Product specification	-	-



## 13. 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.
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