

# BF1108; BF1108R

Silicon RF switches

Rev. 04 — 29 May 2008

Product data sheet

## 1. Product profile

### 1.1 General description

These switches are a combination of a depletion type Field-Effect Transistor (FET) and a band-switching diode in an SOT143B (BF1108) or SOT143R (BF1108R) package. The low loss and high isolation capabilities of these devices provide excellent RF switching functions. The gate of the MOSFET can be isolated from ground with the diode, resulting in low losses. Integrated diodes between gate and source and between gate and drain protect against excessive input voltage surges.

#### CAUTION



This device is sensitive to ElectroStatic Discharge (ESD). Therefore care should be taken during transport and handling.

### 1.2 Features

- Specially designed for low loss RF switching up to 1 GHz

### 1.3 Applications

- Various RF switching applications such as:
  - ◆ Passive loop through for VCR tuner
  - ◆ Transceiver switching

### 1.4 Quick reference data

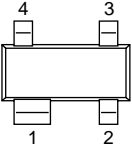
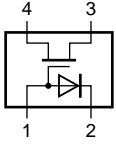
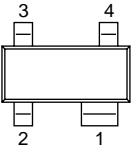
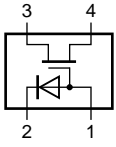
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$L_{ins(on)}$	on-state insertion loss	$R_S = R_L = 50 \Omega$ ; $f \leq 1 \text{ GHz}$ ; $V_{SK} = V_{DK} = 0 \text{ V}$ ; $I_F = 0 \text{ mA}$	-	-	2	dB
$ISL_{off}$	off-state isolation	$R_S = R_L = 50 \Omega$ ; $f \leq 1 \text{ GHz}$ ; $V_{SK} = V_{DK} = 5 \text{ V}$ ; $I_F = 1 \text{ mA}$	30	-	-	dB
$R_{DSon}$	drain-source on-state resistance	$V_{KS} = 0 \text{ V}$ ; $I_D = 1 \text{ mA}$	-	12	20	$\Omega$
$V_{GS(p)}$	gate-source pinch-off voltage	$V_{DS} = 1 \text{ V}$ ; $I_D = 20 \mu\text{A}$	-	-3	-4	V

[1]  $I_F$  = diode forward current.

## 2. Pinning information

**Table 2. Pinning**

Pin	Description	Simplified outline	Graphic symbol
<b>BF1108 (SOT143B)</b>			
1	FET gate; diode anode		 001aai042
2	diode cathode		
3	source <a href="#">[1]</a>		
4	drain <a href="#">[1]</a>		
<b>BF1108R (SOT143R)</b>			
1	FET gate; diode anode		 001aai043
2	diode cathode		
3	source <a href="#">[1]</a>		
4	drain <a href="#">[1]</a>		

[1] Drain and source are interchangeable.

## 3. Ordering information

**Table 3. Ordering information**

Type number	Package		Version
	Name	Description	
BF1108	-	plastic surface-mounted package; 4 leads	SOT143B
BF1108R	-	plastic surface-mounted package; reverse pinning; 4 leads	SOT143R

## 4. Marking

**Table 4. Marking**

Type number	Marking code
BF1108	NGp
BF1108R	NHp

## 5. Limiting values

**Table 5. Limiting values**

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

Symbol	Parameter	Conditions	Min	Max	Unit
<b>FET</b>					
$V_{DS}$	drain-source voltage		-	3	V
$V_{SD}$	source-drain voltage		-	3	V
$V_{DG}$	drain-gate voltage		-	7	V
$V_{SG}$	source-gate voltage		-	7	V
$I_D$	drain current		-	10	mA
<b>Diode</b>					
$V_R$	reverse voltage		-	35	V
$I_F$	forward current		-	100	mA
<b>FET and diode</b>					
$T_{stg}$	storage temperature		-65	+150	°C
$T_j$	junction temperature		-	150	°C

## 6. Thermal characteristics

**Table 6. Thermal characteristics**

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[1] 250	K/W

[1] Soldering point of FET gate and diode anode lead.

## 7. Static characteristics

**Table 7. Static characteristics**

$T_j = 25\text{ °C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>FET</b>						
$V_{(BR)GSS}$	gate-source breakdown voltage	$V_{DS} = 0\text{ V}; I_{GS} = 0.1\text{ mA}$	7	-	-	V
$V_{GS(p)}$	gate-source pinch-off voltage	$V_{DS} = 1\text{ V}; I_D = 20\text{ }\mu\text{A}$	-	-3	-4	V
$I_{DSX}$	drain cut-off current	$V_{GS} = -5\text{ V}; V_{DS} = 2\text{ V}$	-	-	10	$\mu\text{A}$
$I_{GSS}$	gate leakage current	$V_{GS} = -5\text{ V}; V_{DS} = 0\text{ V}$	-	-	100	nA
$R_{DSon}$	drain-source on-state resistance	$V_{GS} = 0\text{ V}; I_D = 1\text{ mA}$	-	12	20	$\Omega$
<b>Diode</b>						
$V_F$	forward voltage	$I_F = 10\text{ mA}$	-	-	1	V
$I_R$	reverse current	$V_R = 25\text{ V}$	-	-	50	nA
		$V_R = 20\text{ V}; T_{amb} = 75\text{ °C}$	-	-	1	$\mu\text{A}$

**8. Dynamic characteristics**

**Table 8. Dynamic characteristics**

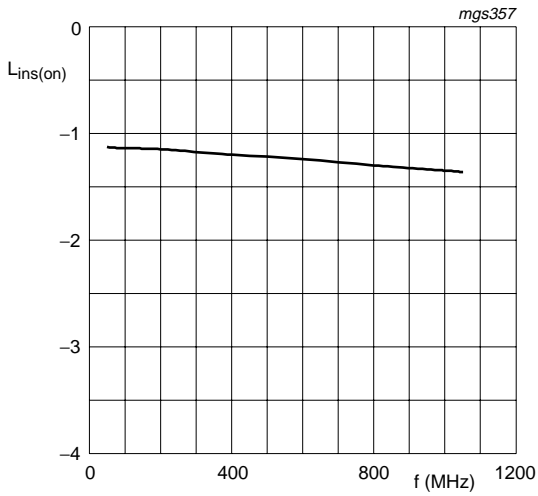
Common cathode;  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>FET and diode</b>						
$L_{ins(on)}$	on-state insertion loss	$V_{SK} = V_{DK} = 0\text{ V}; I_F = 0\text{ mA}$ <a href="#">[1]</a>				
		$R_S = R_L = 50\text{ }\Omega; f \leq 1\text{ GHz}$	-	-	2	dB
		$R_S = R_L = 50\text{ }\Omega; f = 1\text{ GHz}$	-	1.3	-	dB
		$R_S = R_L = 75\text{ }\Omega; f \leq 1\text{ GHz}$	-	-	3	dB
$ISL_{off}$	off-state isolation	$V_{SK} = V_{DK} = 5\text{ V}; I_F = 1\text{ mA}$				
		$R_S = R_L = 50\text{ }\Omega; f \leq 1\text{ GHz}$	30	-	-	dB
		$R_S = R_L = 50\text{ }\Omega; f = 1\text{ GHz}$	-	38	-	dB
		$R_S = R_L = 75\text{ }\Omega; f \leq 1\text{ GHz}$	30	-	-	dB
$R_{Dson}$	drain-source on-state resistance	$V_{KS} = 0\text{ V}; I_D = 1\text{ mA}$	-	12	20	$\Omega$
$C_i$	input capacitance	$f = 1\text{ MHz}$ <a href="#">[2]</a>				
		$V_{SK} = V_{DK} = 5\text{ V}; I_F = 1\text{ mA}$	-	1	-	pF
		$V_{SK} = V_{DK} = 0\text{ V}; I_F = 0\text{ mA}$	-	0.65	0.9	pF
$C_o$	output capacitance	$f = 1\text{ MHz}$ <a href="#">[2]</a>				
		$V_{SK} = V_{DK} = 5\text{ V}; I_F = 1\text{ mA}$	-	1	-	pF
		$V_{SK} = V_{DK} = 0\text{ V}; I_F = 0\text{ mA}$	-	0.65	0.9	pF
<b>Diode</b>						
$C_d$	diode capacitance	$f = 1\text{ MHz}; V_R = 0\text{ V}$	-	1.1	-	pF
$r_D$	diode forward resistance	$I_F = 2\text{ mA}; f = 100\text{ MHz}$ <a href="#">[3]</a>	-	-	0.7	$\Omega$

[1]  $I_F$  = diode forward current.

[2]  $C_i$  is the series connection of  $C_{GS}$  and  $C_{GK}$ ;  $C_o$  is the series connection of  $C_{GD}$  and  $C_{GK}$ .

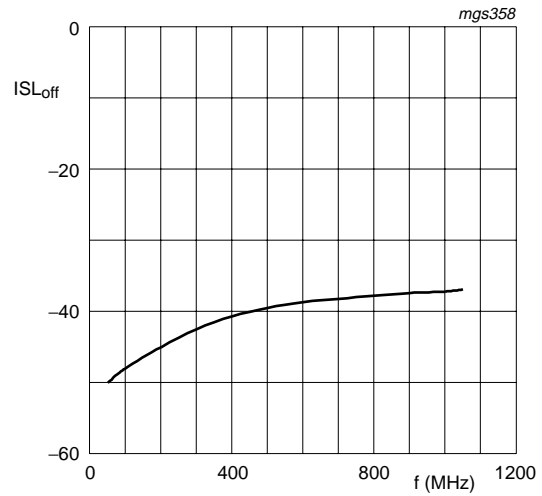
[3] Guaranteed on AQL basis; inspection level S4, AQL 1.0.



$V_{SK} = V_{DK} = 0 \text{ V}$ ;  $R_S = R_L = 50 \text{ } \Omega$ ;  $I_F = 0 \text{ mA}$  (diode forward current).

Measured in test circuit see [Figure 3](#).

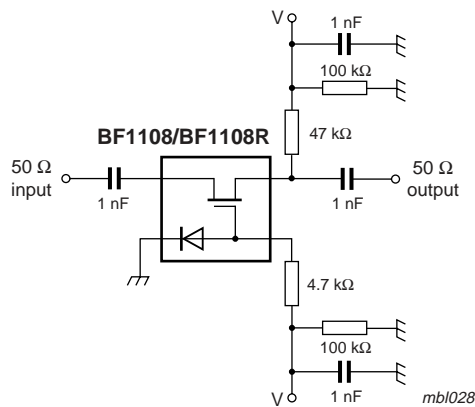
**Fig 1. On-state insertion loss as a function of frequency; typical values**



$V_{SK} = V_{DK} = 5 \text{ V}$ ;  $R_S = R_L = 50 \text{ } \Omega$ ;  $I_F = 1 \text{ mA}$  (diode forward current).

Measured in test circuit see [Figure 3](#).

**Fig 2. Off-state isolation as a function of frequency; typical values**



On-state:  $V = 0 \text{ V}$ .

Off-state:  $V = 5 \text{ V}$ .

**Fig 3. Test circuit**

**9. Package outline**

Plastic surface-mounted package; 4 leads

SOT143B

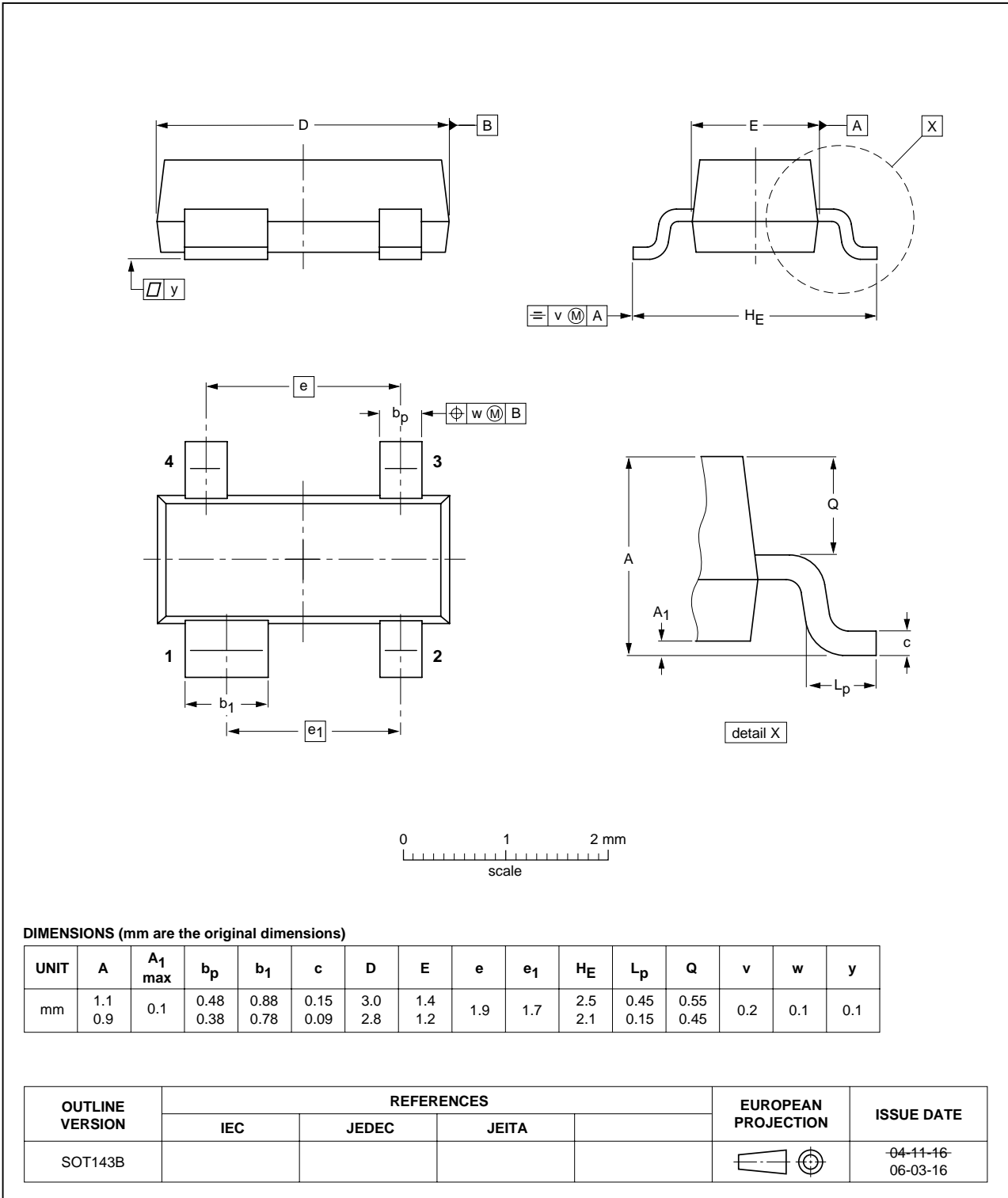


Fig 4. Package outline SOT143B

Plastic surface-mounted package; reverse pinning; 4 leads

SOT143R

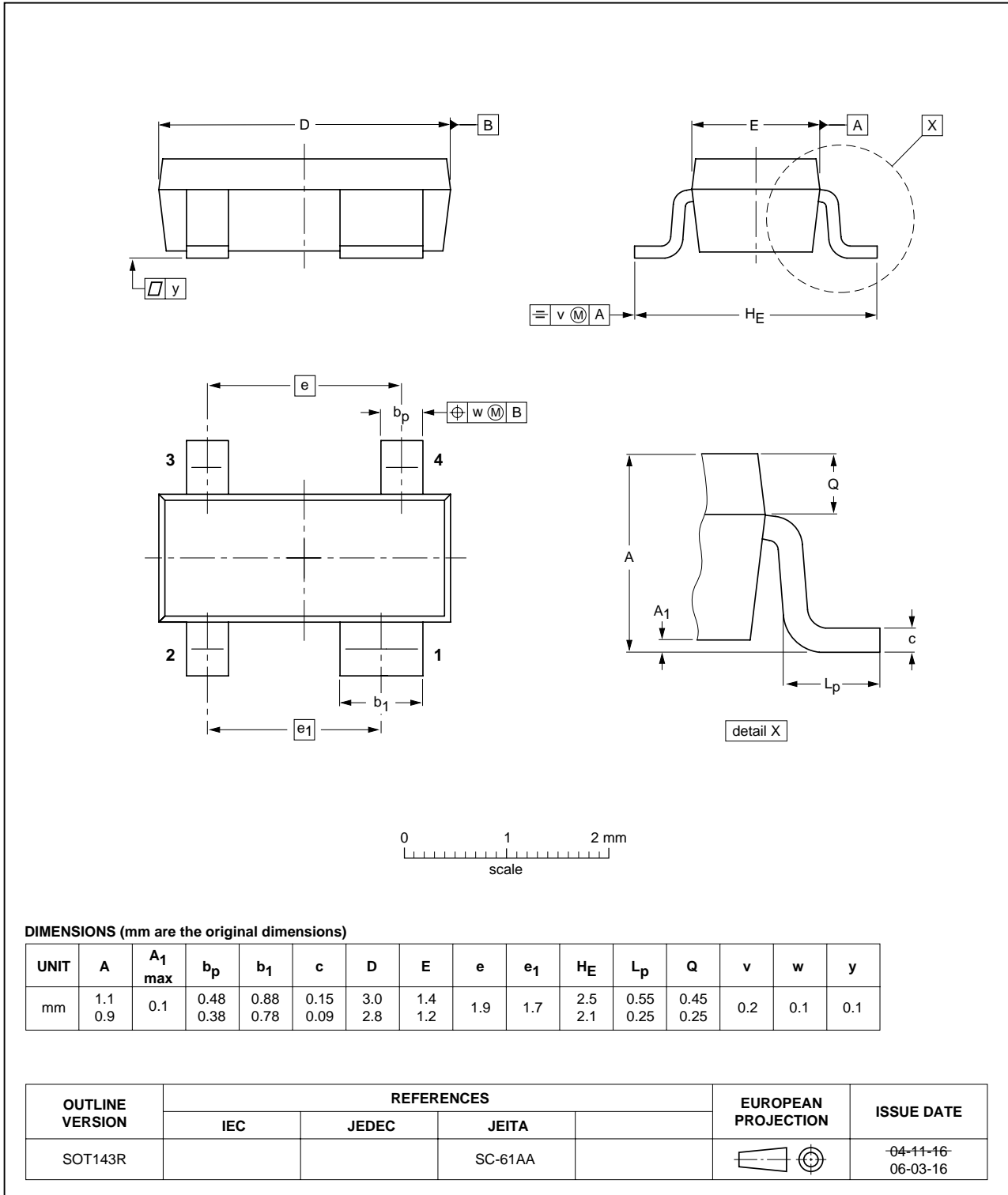


Fig 5. Package outline SOT143R

## 10. Abbreviations

**Table 9. Abbreviations**

Acronym	Description
AQL	Acceptable Quality Level
MOSFET	Metal-Oxide Semiconductor Field-Effect Transistor
RF	Radio Frequency
S4	Special inspection level 4
VCR	VideoCassette Recorder

## 11. Revision history

**Table 10. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
BF1108_BF1108R_4	20080529	Product data sheet	-	BF1108_1108R_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>Symbol notation has been adapted to comply with the current guidelines of NXP Semiconductors.</li> </ul>			
BF1108_1108R_3 (9397 750 06477)	19991118	Product data sheet	-	BF1108_1108R_2
BF1108_1108R_2 (9397 750 06073)	19990819	Product data sheet	-	BF1108_1108R_1
BF1108_1108R_1 (9397 750 05899)	19990517	Preliminary specification	-	-



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### 12.1 Data sheet status

Document status <sup>[1][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.

[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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