BF1118; BF1118R; BF1118W; BF1118WR

Silicon RF switches

Rev. 3 — 14 November 2014 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. The BF1118, BF1118R, BF1118W and BF1118WR are encapsulated in the SOT143B, SOT143R, SOT343N and SOT343R respectively. 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.

1.2 Features and benefits

- 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

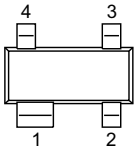
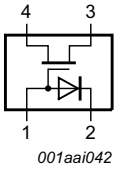
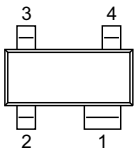
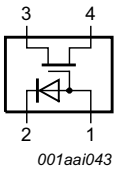
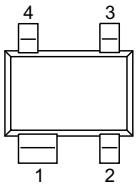
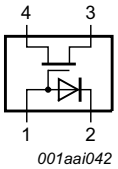
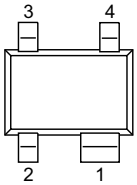
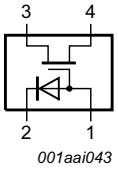
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$L_{ins(on)}$	on-state insertion loss	$R_S = R_L = 50\ \Omega$; $f \leq 1$ GHz; $V_{SK} = V_{DK} = 0$ V; $I_F = 0$ mA [1]	-	-	2.5	dB
ISL_{off}	off-state isolation	$R_S = R_L = 50\ \Omega$; $f \leq 1$ GHz; $V_{SK} = V_{DK} = 3.3$ V; $I_F = 1$ mA	30	-	-	dB
R_{DSon}	drain-source on-state resistance	$V_{KS} = 0$ V; $I_D = 1$ mA	-	15	23.3	Ω
$V_{GS(p)}$	gate-source pinch-off voltage	$V_{DS} = 1$ V; $I_D = 20\ \mu$A	-	–2	–2.44	V

[1] I_F = diode forward current.

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
BF1118 (SOT143B)			
1	FET gate; diode anode		
2	diode cathode		
3	source [1]		
4	drain [1]		
BF1118R (SOT143R)			
1	FET gate; diode anode		
2	diode cathode		
3	source [1]		
4	drain [1]		
BF1118W (SOT343N)			
1	FET gate; diode anode		
2	diode cathode		
3	source [1]		
4	drain [1]		
BF1118WR (SOT343R)			
1	FET gate; diode anode		
2	diode cathode		
3	source [1]		
4	drain [1]		

[1] Drain and source are interchangeable.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BF1118	-	plastic surface-mounted package; 4 leads	SOT143B
BF1118R	-	plastic surface-mounted package; reverse pinning; 4 leads	SOT143R
BF1118W	-	plastic surface-mounted package; 4 leads	SOT343N
BF1118WR	-	plastic surface-mounted package; reverse pinning; 4 leads	SOT343R

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4. Marking

Table 4. Marking

Type number	Marking code
BF1118	VC%
BF1118R	VD%
BF1118W	VB
BF1118WR	VC

5. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
FET					
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
Diode					
V_R	reverse voltage		-	35	V
I_F	forward current		-	100	mA
FET and diode					
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
$R_{th(j\text{-}sp)}$	thermal resistance from junction to solder point	[1]	250	K/W

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

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7. Static characteristics

Table 7. Static characteristics

T_j = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
FET						
$V_{(BR)GSS}$	gate-source breakdown voltage	V_{DS} = 0 V; I_{GS} = 0.1 mA	-	-	−7	V
$V_{GS(p)}$	gate-source pinch-off voltage	V_{DS} = 1 V; I_D = 20 μA	-	−2	−2.44	V
I_{DSX}	drain cut-off current	V_{GS} = −3.3 V; V_{DS} = −1 V	-	-	16	μA
I_{GSS}	gate leakage current	V_{GS} = −3.3 V; V_{DS} = 0 V	-	-	100	nA
R_{DSon}	drain-source on-state resistance	V_{GS} = 0 V; I_D = 1 mA	-	15	23.3	Ω
Diode						
V_F	forward voltage	I_F = 10 mA	-	-	1	V
I_R	reverse current	V_R = 25 V	-	-	50	nA
		V_R = 20 V; T_{amb} = 75 °C	-	-	1	μA

8. Dynamic characteristics

Table 8. Dynamic characteristics

Common cathode; T_{amb} = 25 °C.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
FET and diode						
$L_{ins(on)}$	on-state insertion loss	V_{SK} = V_{DK} = 0 V; I_F = 0 mA [1]				
		R_S = R_L = 50 Ω; f ≤ 1 GHz	-	-	2.5	dB
		R_S = R_L = 50 Ω; f = 1 GHz	-	1.5	-	dB
		R_S = R_L = 75 Ω; f ≤ 1 GHz	-	-	2.5	dB
ISL_{off}	off-state isolation	V_{SK} = V_{DK} = 3.3 V; I_F = 1 mA				
		R_S = R_L = 50 Ω; f ≤ 1 GHz	30	-	-	dB
		R_S = R_L = 50 Ω; f = 1 GHz	-	35	-	dB
		R_S = R_L = 75 Ω; f ≤ 1 GHz	30	-	-	dB
R_{DSon}	drain-source on-state resistance	V_{KS} = 0 V; I_D = 1 mA	-	15	23.3	Ω
C_i	input capacitance	f = 1 MHz [2]				
		V_{SK} = V_{DK} = 3.3 V; I_F = 1 mA	-	1	-	pF
		V_{SK} = V_{DK} = 0 V; I_F = 0 mA	-	0.65	0.9	pF
C_o	output capacitance	f = 1 MHz [2]				
		V_{SK} = V_{DK} = 3.3 V; I_F = 1 mA	-	1	-	pF
		V_{SK} = V_{DK} = 0 V; I_F = 0 mA	-	0.65	0.9	pF
Diode						
C_d	diode capacitance	f = 1 MHz; V_R = 0 V	-	1.1	-	pF
r_D	diode forward resistance	I_F = 2 mA; f = 100 MHz [3]	-	-	0.9	Ω

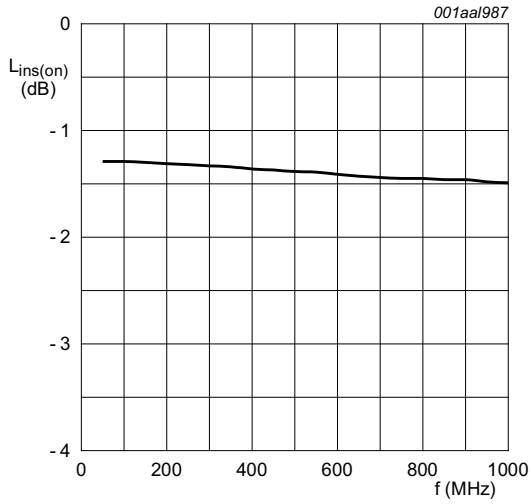
[1] I_F = diode forward current.

[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.

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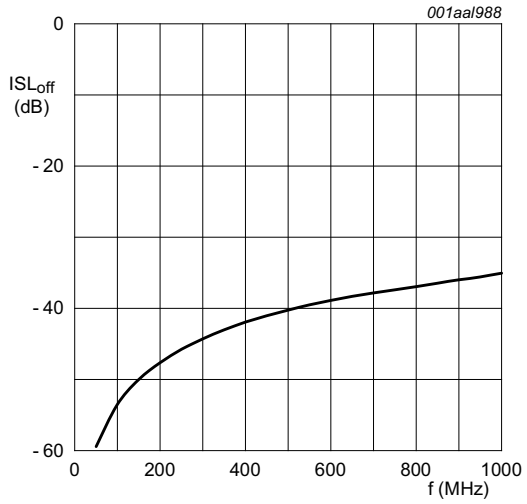
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$V_{SK} = V_{DK} = 0$ V; $R_S = R_L = 50\ \Omega$; $I_F = 0$ mA (diode forward current).

Measured in test circuit; see Figure 3.

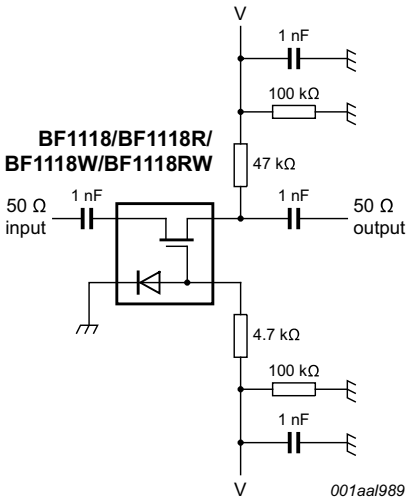
Fig 1. On-state insertion loss as a function of frequency; typical values



$V_{SK} = V_{DK} = 3.3$ V; $R_S = R_L = 50\ \Omega$; $I_F = 1$ 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 V.

Off-state: V = 3.3 V.

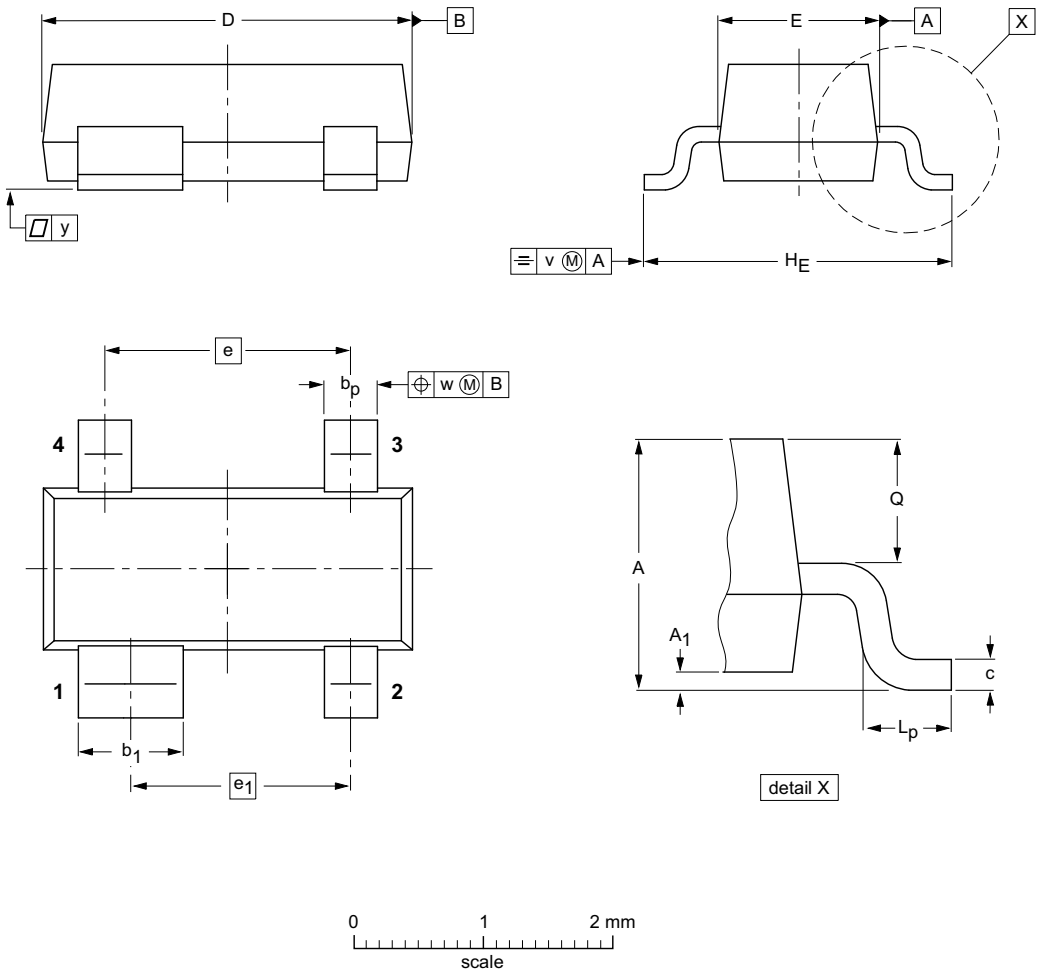
Fig 3. Test circuit

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9. Package outline

Plastic surface-mounted package; 4 leads **SOT143B**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1 max	b_p	b_1	c	D	E	e	e_1	H_E	L_p	Q	v	w	y
mm	1.1 0.9	0.1	0.48 0.38	0.88 0.78	0.15 0.09	3.0 2.8	1.4 1.2	1.9	1.7	2.5 2.1	0.45 0.15	0.55 0.45	0.2	0.1	0.1

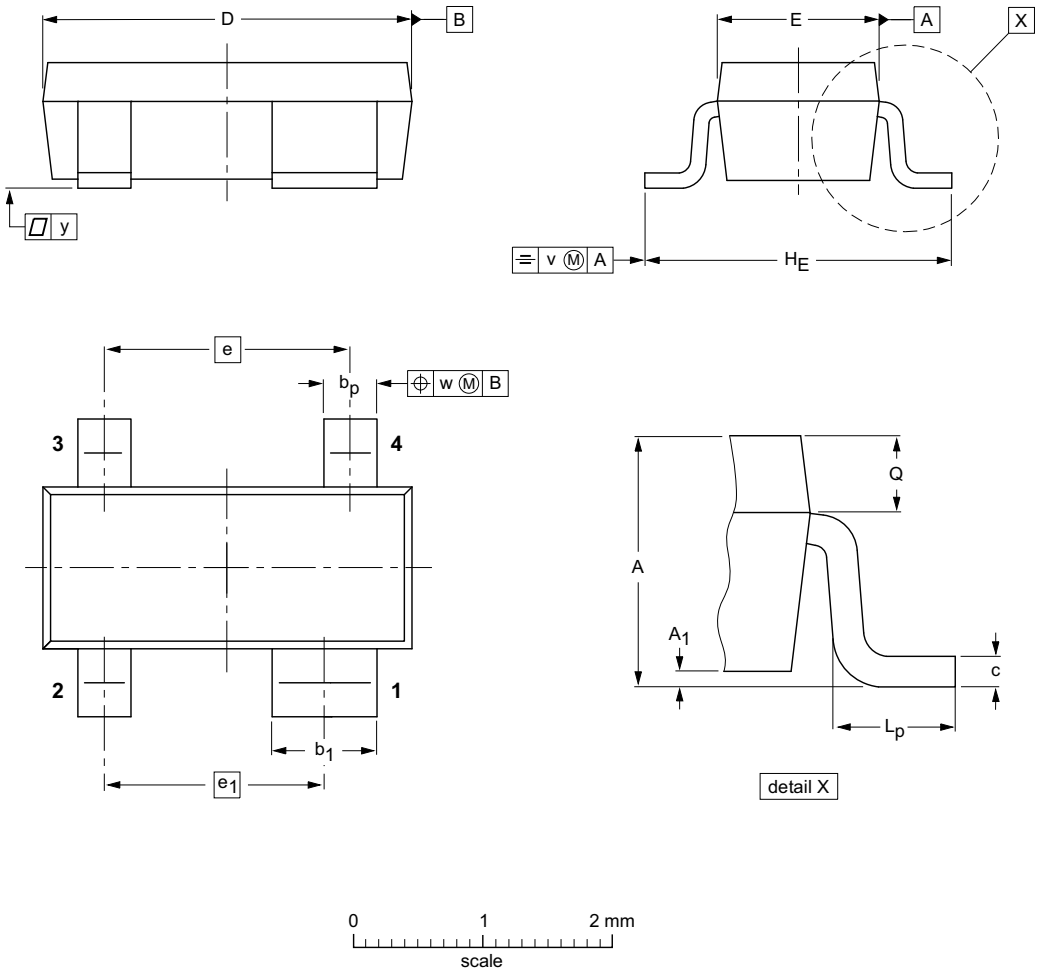
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT143B						~~04-11-16~~ 06-03-16

Fig 4. Package outline SOT143B

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Plastic surface-mounted package; reverse pinning; 4 leads **SOT143R**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1 max	b_p	b_1	c	D	E	e	e_1	H_E	L_p	Q	v	w	y
mm	1.1 0.9	0.1	0.48 0.38	0.88 0.78	0.15 0.09	3.0 2.8	1.4 1.2	1.9	1.7	2.5 2.1	0.55 0.25	0.45 0.25	0.2	0.1	0.1

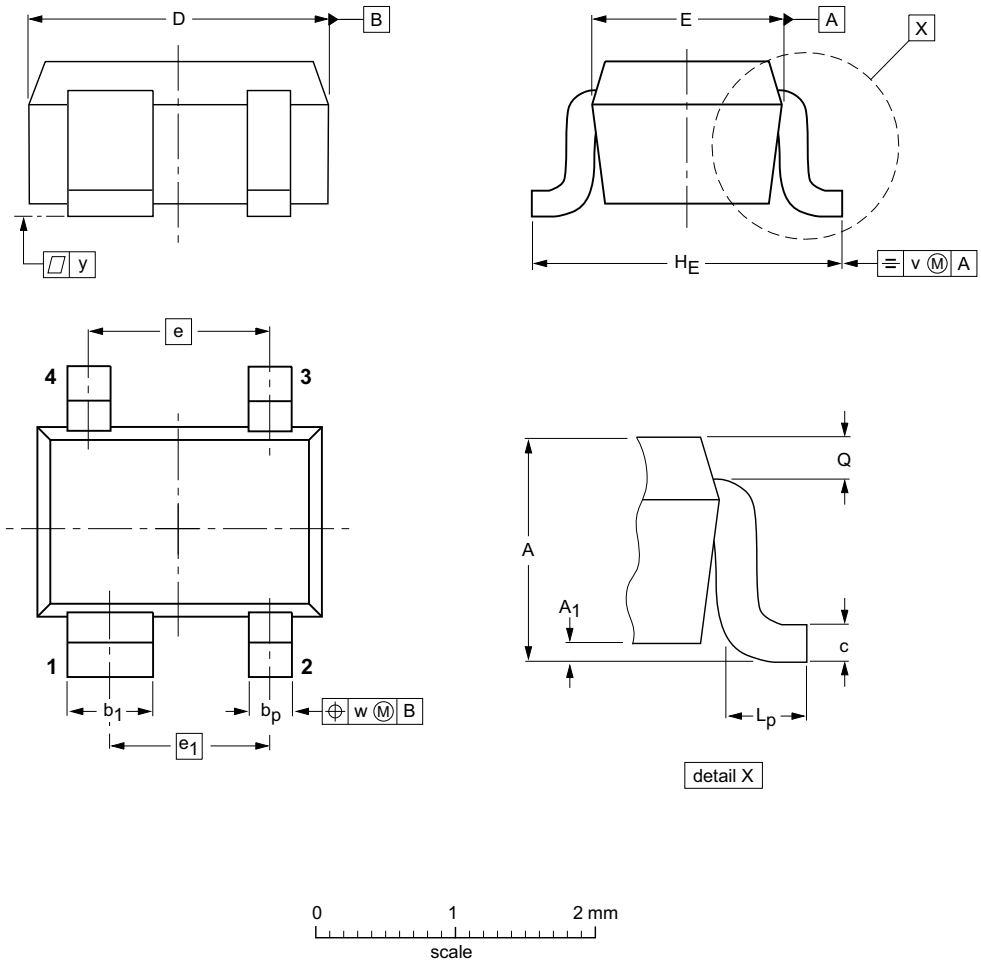
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SOT143R			SC-61AA			~~04-11-16~~ 06-03-16

Fig 5. Package outline SOT143R

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Plastic surface-mounted package; 4 leads **SOT343N**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1 max	b_p	b_1	c	D	E	e	e_1	H_E	L_p	Q	v	w	y
mm	1.1 0.8	0.1	0.4 0.3	0.7 0.5	0.25 0.10	2.2 1.8	1.35 1.15	1.3	1.15	2.2 2.0	0.45 0.15	0.23 0.13	0.2	0.2	0.1

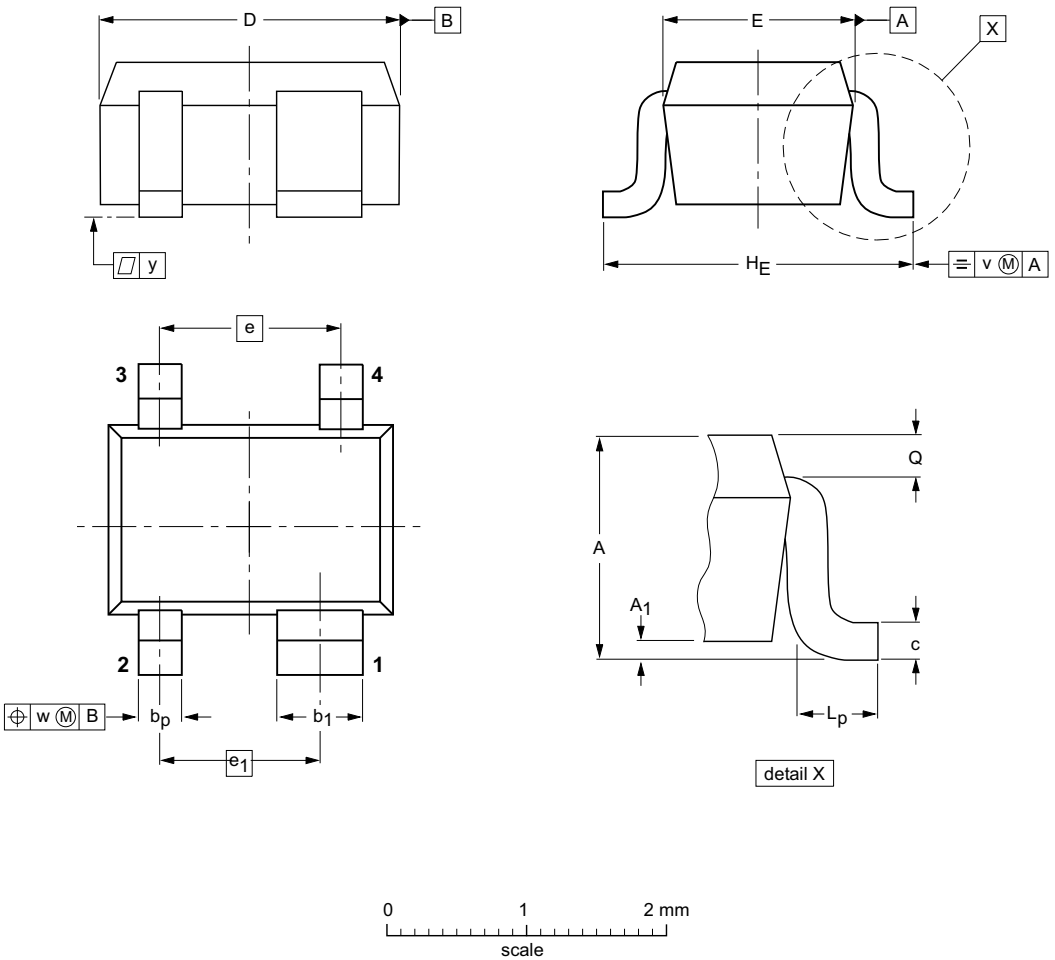
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SOT343N						~~97-05-21~~ 06-03-16

Fig 6. Package outline SOT343N

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Plastic surface-mounted package; reverse pinning; 4 leads **SOT343R**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1 max	b_p	b_1	c	D	E	e	e_1	H_E	L_p	Q	v	w	y
mm	1.1 0.8	0.1	0.4 0.3	0.7 0.5	0.25 0.10	2.2 1.8	1.35 1.15	1.3	1.15	2.2 2.0	0.45 0.15	0.23 0.13	0.2	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
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SOT343R						~~97-05-21~~ 06-03-16

Fig 7. Package outline SOT343R

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10. Handling information

CAUTION



This device is sensitive to ElectroStatic Discharge (ESD). Observe precautions for handling electrostatic sensitive devices.

Such precautions are described in the *ANSI/ESD S20.20*, *IEC/ST 61340-5*, *JESD625-A* or equivalent standards.

11. 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	Video Cassette Recorder

12. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BF1118_1118R_1118W_1118WR v.3	20141114	Product data sheet	-	BF1118_1118R_1118W_1118WR v.2
Modifications:	• Section 10 on page 10: The information has been moved from Section 1.1 to this section. • Table 7 on page 4: The minimum value for $V_{(BR)GSS}$ has been removed and a maximum value has been set instead.			
BF1118_1118R_1118W_1118WR v.2	20120111	Product data sheet	-	BF1118_1118R_1118W_1118WR v.1
BF1118_1118R_1118W_1118WR v.1	20100629	Product data sheet	-	-

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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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For sales office addresses, please send an email to: salesaddresses@nxp.com

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