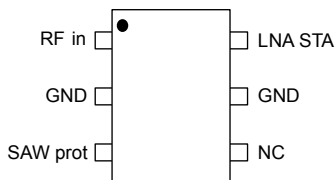


STA8089 / STA8090 LNA impedance matching with ESD protection in SOT23



SOT23-6L



NC: pin internally not connected and not to be connected on PCB

Features

- Companion chip of STA8089 and STA8090 (GNSS receiver)
- Compatible with GPS / Galileo / GLONASS / BeiDou / QZSS
- Designed to match STA8089 and STA8090 LNA to 50 Ω
- Protection of LNA input against ESD on antenna connector
- Lead finishing: NiPdAu

Complies with the following standards

- RoHS device
- UL94, V0
- J-STD-020 MSL level 1
- J-STD-002
- IPC7531 footprint and JEDEC registered package
- MIL STD 883C, C = 100 pF – R = 1.5 k Ω :
 - 2 kV
- IEC 61000-4-2, C = 150 pF, R = 330 Ω , level 4:
 - 8 kV (contact discharge)
 - 15 kV (air discharge)

Applications

- Portable systems such as GPS / Galileo / GLONASS / BeiDou / QZSS receivers.

Description

To be used in GNSS receiver, the **BPF8089-01SC6** is an integrated RF front-end with input impedance matching circuit to be located between STA8089 and STA8090 low noise amplifier input and the antenna. It embeds a matching network associated with an ESD protection to protect STA8089 and STA8090 LNA input according to EOS and ESD standards.

Part of the ASIP product range, this device is packaged in a SOT23-6L and compatible with automatic optical inspection.

Product status link

[BPF8089-01SC6](#)

1 Characteristics

Table 1. Absolute maximum ratings ($T_{amb} = 25\text{ °C}$)

Symbol	Parameter		Value	Unit
P_{IN}	RF input power		0	dBm
V_{PP}	Peak pulse voltage	IEC 61000-4-2 (C = 150 pF, R = 330 Ω)		kV
		Contact discharge	8	
		Air discharge	15	
		MIL STD 883C (C = 100pF, R = 1.5k Ω)	2	
V_{DC}	DC input voltage		0 to +3.3	V
T_j	Operating junction temperature range		-55 to +125	$^{\circ}\text{C}$
T_L	Maximum lead temperature for soldering during 10 s		260	$^{\circ}\text{C}$

Table 2. Electrical characteristics ($T_{amb} = 25\text{ °C}$, refer to recommended land pattern)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Z_{OUT}	Output impedance on LNA STA side		Conjugate match to STA8089 and STA8090 LNA _{IN}			Ω
Z_{IN}	Input impedance on antenna side			50		Ω
F	Frequency range (bandwidth)	Antenna pin loaded with Z_{IN} and LNA STA pin loaded with Z_{OUT}	1559		1610	MHz
I_L	Insertion loss in bandwidth			2.4	5	dB
$R_{L\ OUT}$	Output return loss in bandwidth			13		dB
$R_{L\ IN}$	Input return loss in bandwidth			13		dB

1.1 Characteristics (curves)

Figure 1. Solution for passive antenna

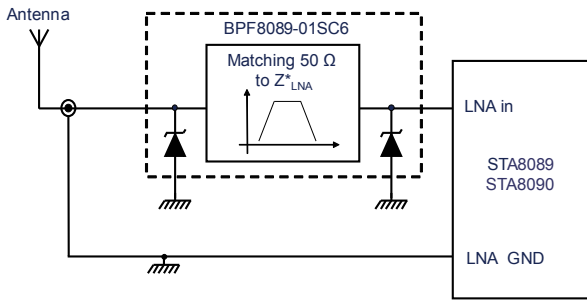


Figure 2. Solution for active antenna

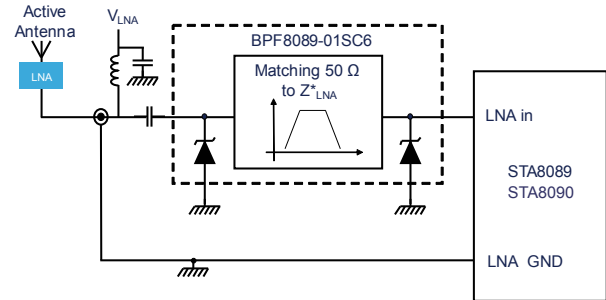


Figure 3. C/N0 before and after ESD test

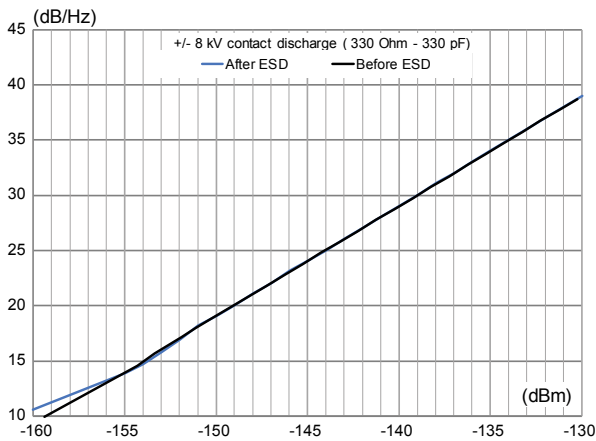


Figure 4. Response to IEC 61000-4-2 (C = 150 pF, R = 330 Ω, -8 kV contact discharge)

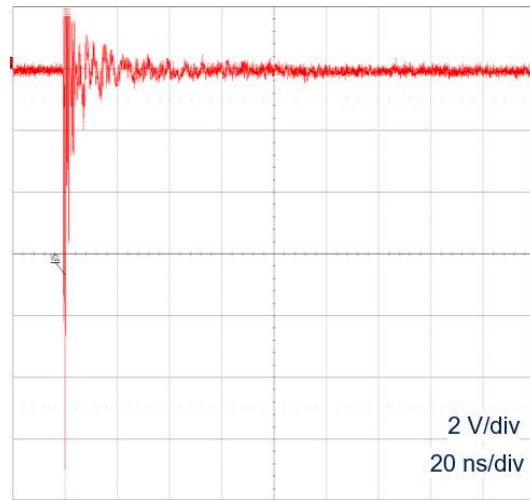
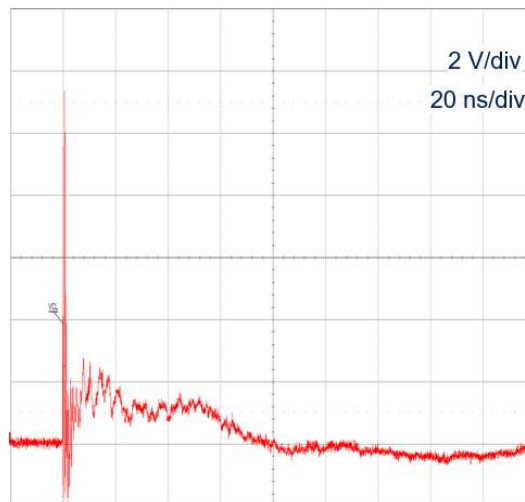
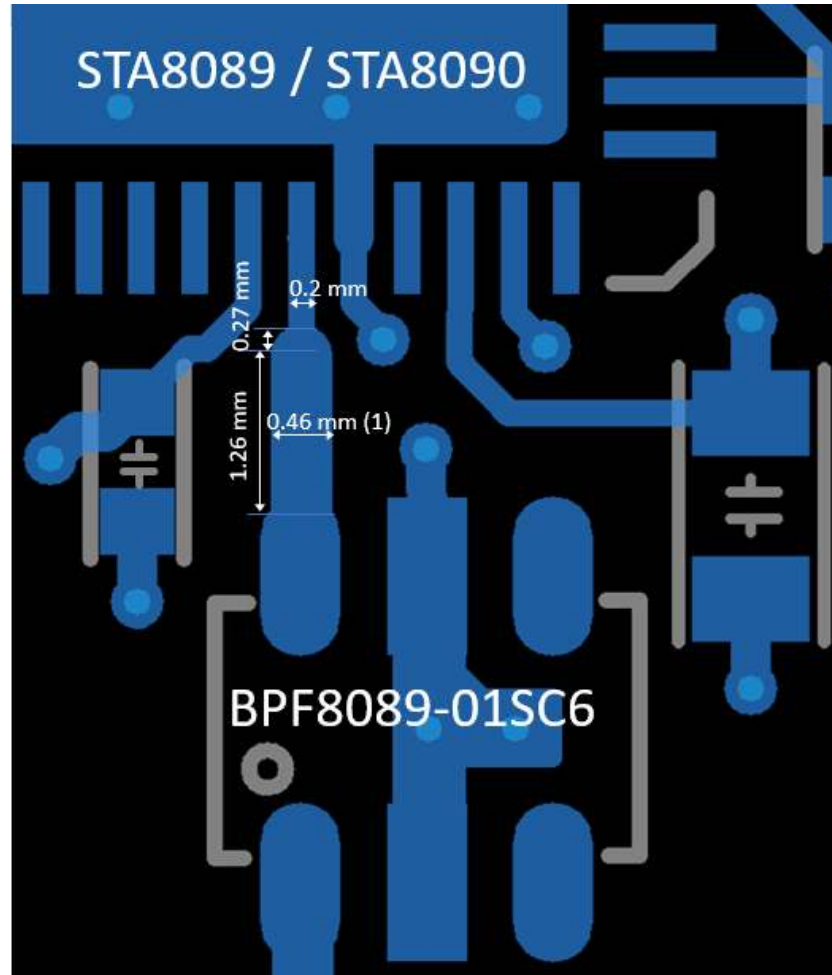


Figure 5. Response to IEC 61000-4-2 (C = 150 pF, R = 330 Ω , +8 kV contact discharge)



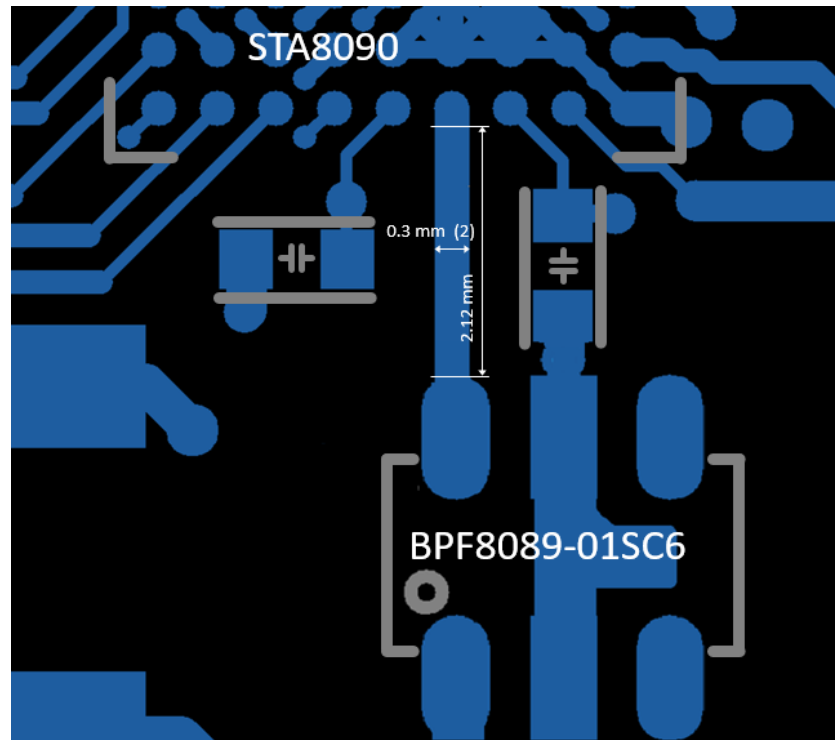
2 Recommendation on PCB assembly

Figure 6. Recommended layout for STA8089FG, STA8089FGA, STA8089G, STA8089GA, STA8089GAT, STA8090GA and STA8090GAT



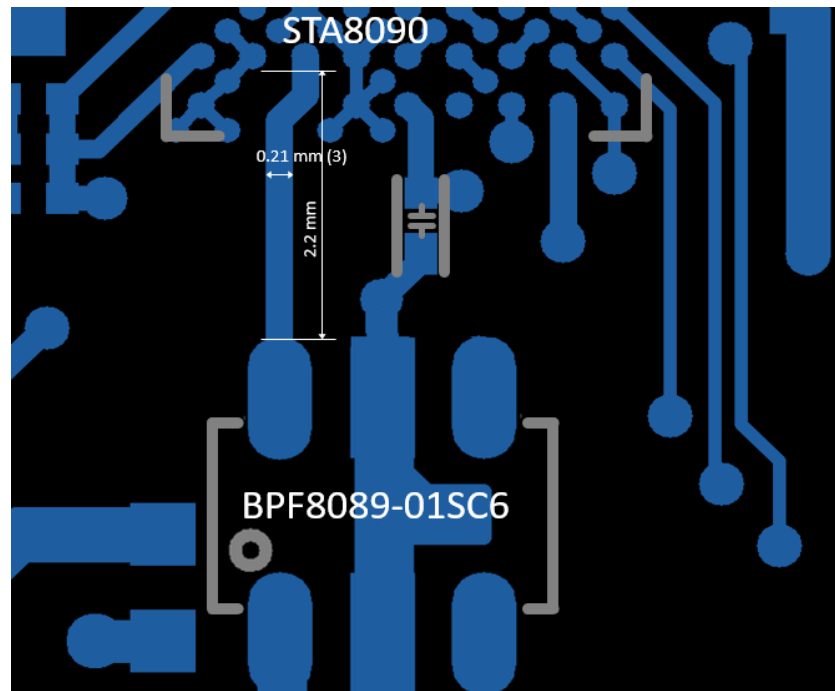
Note: See note (1) dimension of 0.46 mm is valid for the stack-up given in Figure 9. For different stack-up, recalculation of the track width must be done to get $Z_0 = 50 \text{ Ohm}$

Figure 7. Recommended layout for STA8090FG, STA8090EXG and STA8090EXGA



Note: See note (2) dimension of 0.3 mm is valid for the stack-up given in Figure 9. For different stack-up, recalculation of the track width must be done to get $Z_0 = 100 \text{ Ohm}$

Figure 8. Recommended layout for STA8090WG and STA8090WGR

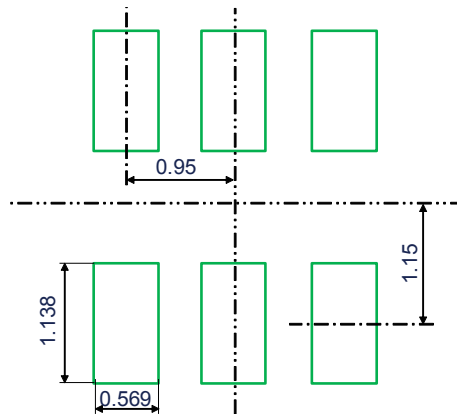


Note: See note (3) dimension of 0.21 mm is valid for the stack-up given in Figure 9. For different stack-up, recalculation of the track width must be done to get $Z_0 = 87 \text{ Ohm}$

Figure 9. Recommended PCB stack-up

Top layer	Cu = 35 μm	1070 μm
FR4 = 254 μm	(Er 4.5)	
GND layer	Cu = 17 μm	
FR4 = 458 μm	(Er 4.5)	
	Cu = 17 μm	
FR4 = 254 μm	(Er 4.5)	
Bottom layer	Cu = 35 μm	

Figure 10. Recommended stencil opening (mm)



2.1 Solder paste

1. Halide-free flux qualification ROL0 according to ANSI/J-STD-004.
2. “No clean” solder paste is recommended.
3. Offers a high tack force to resist component movement during high speed.
4. Use solder paste with fine particles: powder particle size is 20-38 μm .

3 Package information

In order to meet environmental requirements, ST offers these devices in different grades of **ECOPACK** packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions and product status are available at: www.st.com. ECOPACK is an ST trademark.

3.1 SOT23-6L package information

Figure 11. SOT23-6L package outline

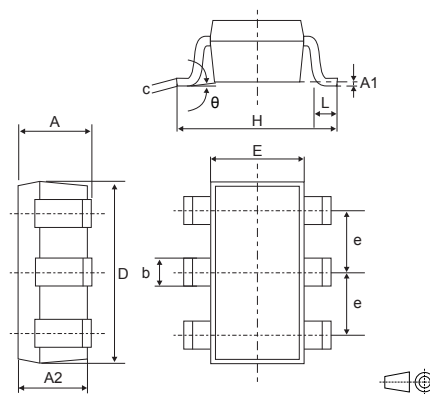


Table 3. SOT23-6L package mechanical data

Ref.	Dimensions					
	Millimeters			Inches ⁽¹⁾		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.9		1.45	0.0354		0.0571
A1	0		0.15	0		0.0059
A2	0.9		1.3	0.0354		0.0512
b	0.30		0.5	0.0118		0.0197
c	0.09		0.2	0.0035		0.0079
D	2.8		3.05	0.1102		0.1201
E	1.5		1.75	0.0591		0.0689
e		0.95			0.0374	
H	2.6		3	0.1024		0.1181
L	0.3		0.6	0.0118		0.0236
θ	0		10	0		0.3937

1. Value in inches are converted from mm and rounded to 4 decimal digits

Figure 12. Footprint recommendations, dimensions in mm (inches)

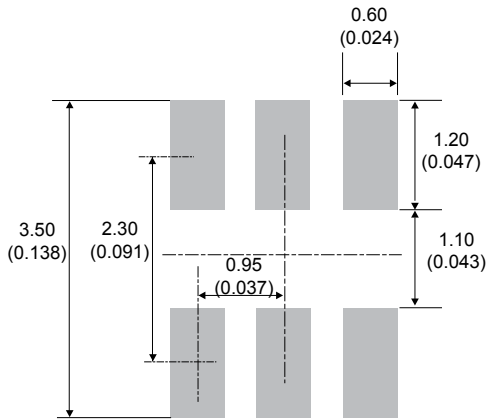


Figure 13. Marking layout (refer to ordering information table for marking)

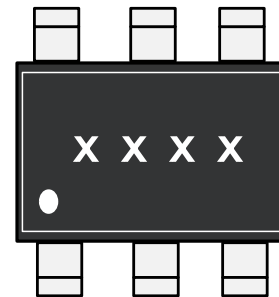
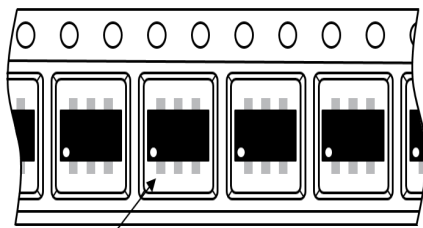


Figure 14. Package orientation in reel



Pin 1 located according to EIA-481

Note: Pocket dimensions are not on scale
Pocket shape may vary depending on package

Figure 15. Tape and reel orientation

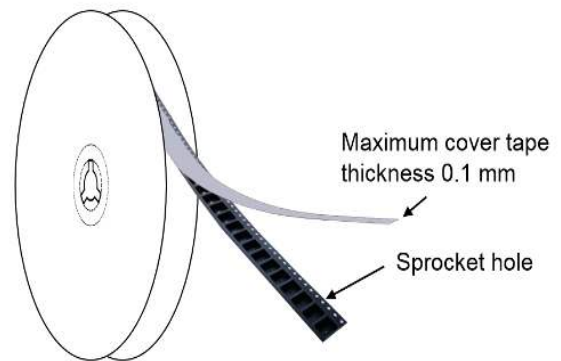


Figure 16. Reel dimensions (mm)

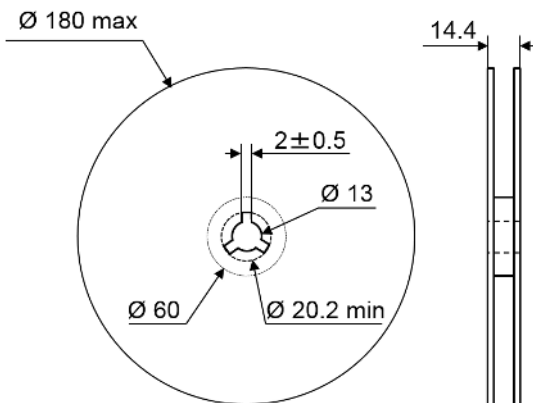


Figure 17. Inner box dimensions (mm)

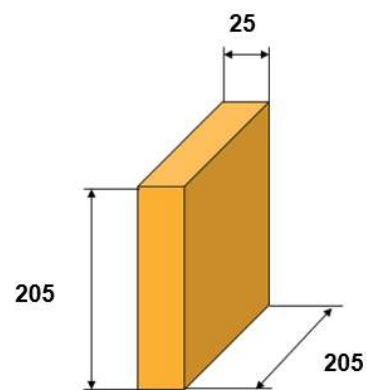
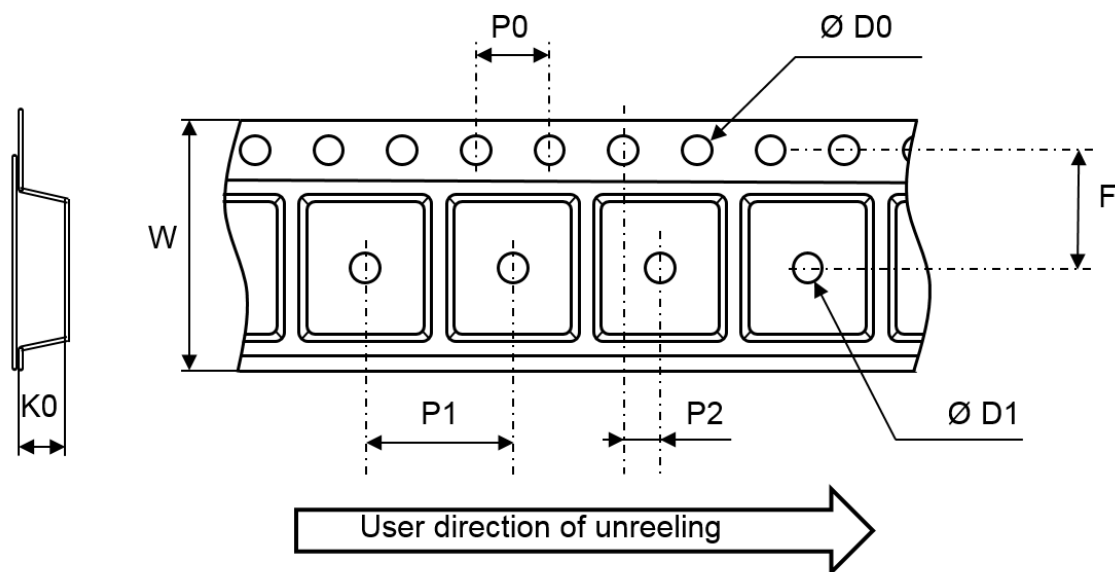


Figure 18. Tape and reel outline



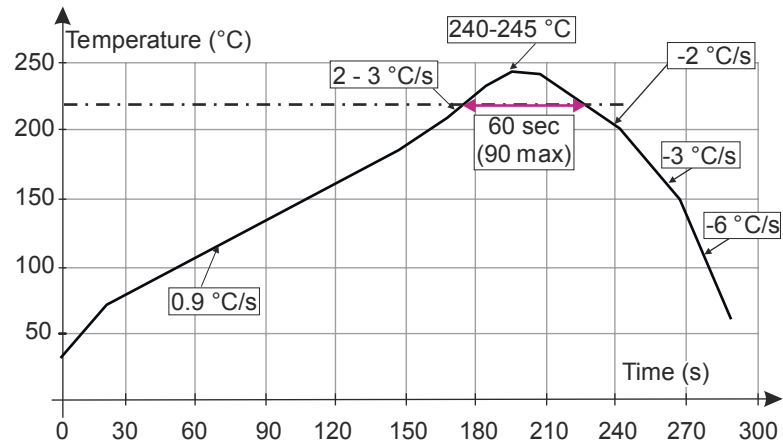
Note: Pocket dimensions are not on scale
Pocket shape may vary depending on package

Table 4. Tape and reel mechanical data

Ref.	Dimensions		
	Millimeters		
	Min.	Typ.	Max.
P1	3.9	4	4.1
P0	3.9	4	4.1
D0	1.45	1.5	1.6
D1	1		
F	3.45	3.5	3.55
K0	1.3	1.4	1.6
P2	1.95	2	2.05
W	7.9	8	8.3

3.2 Reflow profile

Figure 19. ST ECOPACK® recommended soldering reflow profile for PCB mounting



Note: Minimize air convection currents in the reflow oven to avoid component movement.

Note: Maximum soldering profile corresponds to the latest IPC/JEDEC J-STD-020.

4 Ordering information

Table 5. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
BPF8089-01SC6	B89 ⁽¹⁾	SOT23-6L	17.5 mg	3000	Tape and reel

1. The marking can be rotated by 90° to differentiate assembly location

Revision history

Table 6. Document revision history

Date	Version	Changes
24-Sep-2020	1	Initial release.
15-Jul-2021	2	Updated Figure 6 , Figure 7 and Figure 8 .

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