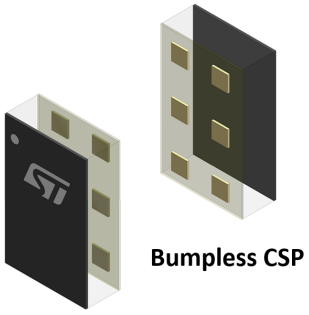
MLPF-WB-01E3

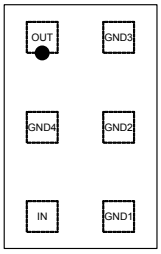
Datasheet

2.4 GHz low pass filter matched to STM32WB55Cx/Rx, STM32WB50Cx, STM32WB35Cx and STM32WB30Cx



Bumpless CSP

Top view (pads down)



Product status link
MLPF-WB-01E3

Features

- Integrated impedance matching to STM32WB55Cx/Rx, STM32WB50Cx, STM32WB35Cx and STM32WB30Cx
- LGA footprint compatible
- 50 Ω nominal impedance on antenna side
- Deep rejection harmonics filter
- Low insertion loss
- Small footprint
- Low thickness ≤ 450 µm
- High RF performance
- RF BOMBER and area reduction
- ECOPACK2 compliant

Applications

- Bluetooth 5
- OpenThread
- Zigbee®
- IEEE 802.15.4
- Optimized for STM32WB55Cx/Rx, STM32WB5, STM32WB50Cx,

Description

The MLPF-WB-01E3 integrates an impedance matching network and harmonics filter. The matching impedance network has been tailored to maximize the RF performance of STM32WB. This device uses STMicroelectronics IPD technology on non-conductive cup of glass substrate which optimizes RF performance.

1 Characteristics

Table 1. Absolute ratings (T_{amb} = 25 °C)

Symbol	Parameter	Value	Unit
P_{IN}	Input power RF_{IN}	10	dBm
V_{ESD}	ESD ratings human body model (JESD22-A114-C), all I/O one at a time while others connected to GND	2000	V
	ESD ratings machine model, all I/O	200	
T_{OP}	Maximum operating temperature	-40 to +105	°C

Table 2. Impedances(T_{amb} = 25 °C)

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
Z_{IN}	STM32WBxx single-ended impedance	-	matched to STM32WB55Cx/Rx, STM32WB50Cx, STM32WB35Cx, and STM32WB30Cx	-	Ω
Z_{OUT}	Antenna impedance	-	50	-	Ω

Table 3. Electrical characteristics and RF performance (T_{amb} = 25 °C)

Symbol	Parameter		Value			Unit
			Min.	Typ.	Max.	
f	Frequency range		2400		2500	MHz
IL	Insertion loss $IS_{21}I$			0.90	1.1	dB
RL_{IN}	Input return loss $IS_{11}I$		14	22		dB
RL_{OUT}	Output return loss $IS_{22}I$		16	24		dB
Att	Harmonic rejection levels $IS_{21}I$	Attenuation at 2fo	38	40		dB
		Attenuation at 3fo	43	45		dB
		Attenuation at 4fo	41	46		dB
		Attenuation at 5fo	35	42		dB

1.1 RF measurement

Figure 1. Transmission (dB)

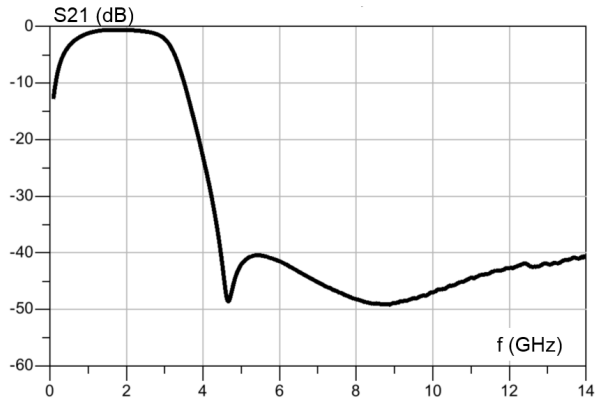


Figure 2. Insertion loss (dB)

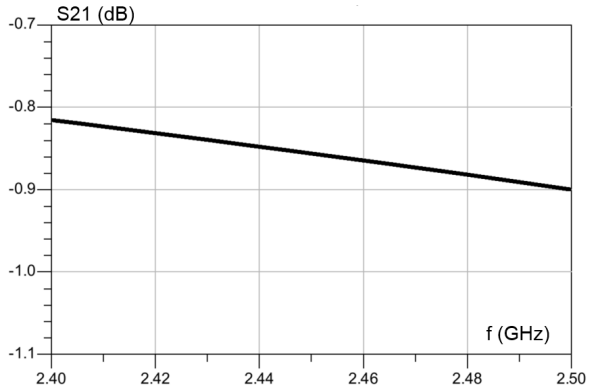


Figure 3. Input return loss (dB)

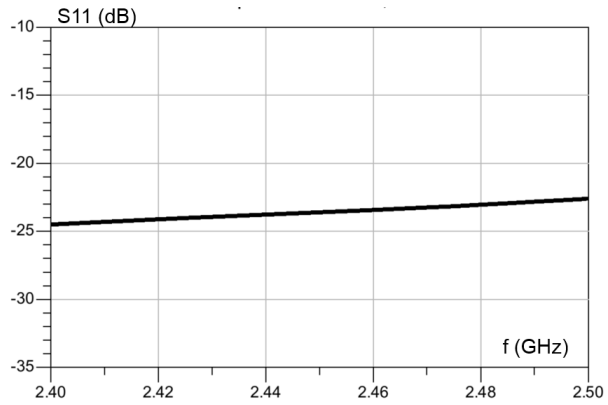


Figure 4. Output return loss (dB)

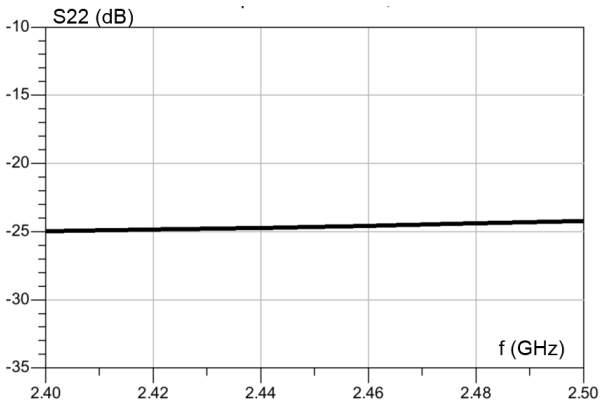


Figure 5. Attenuation 2f0 (dB)

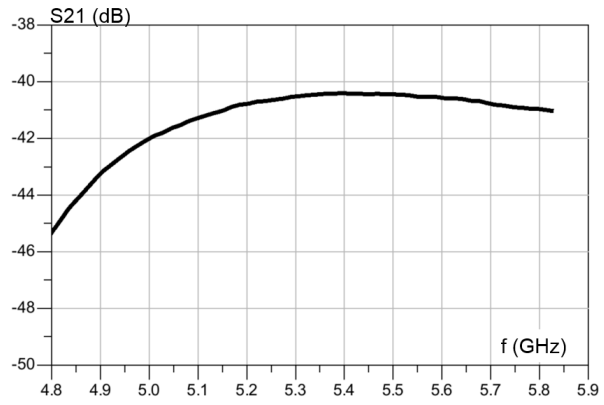


Figure 6. Attenuation 3f0 (dB)

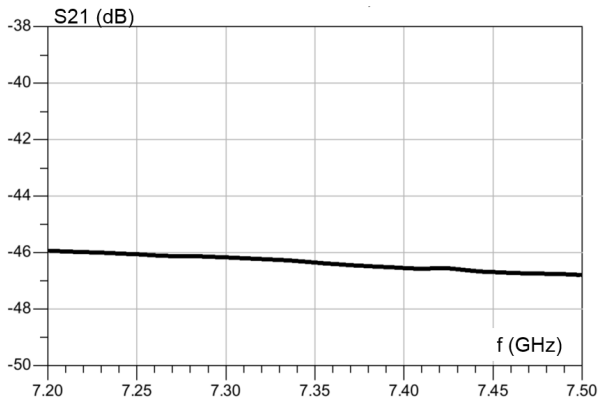


Figure 7. **Attenuation 4f0 (dB)**

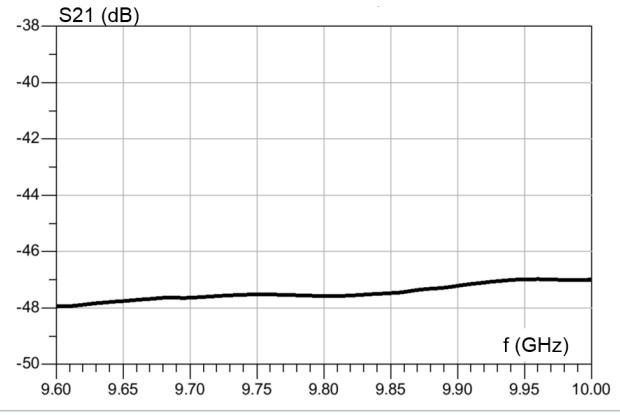
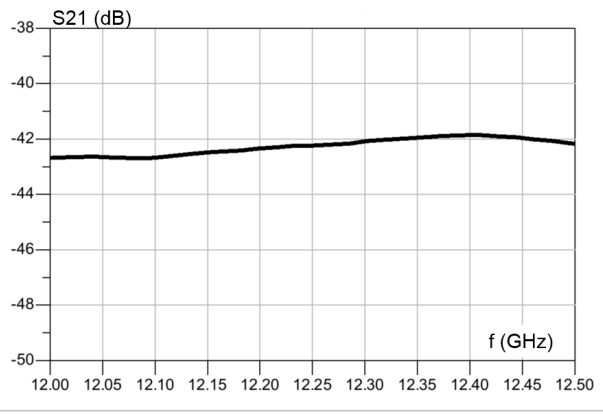


Figure 8. **Attenuation 5f0 (dB)**



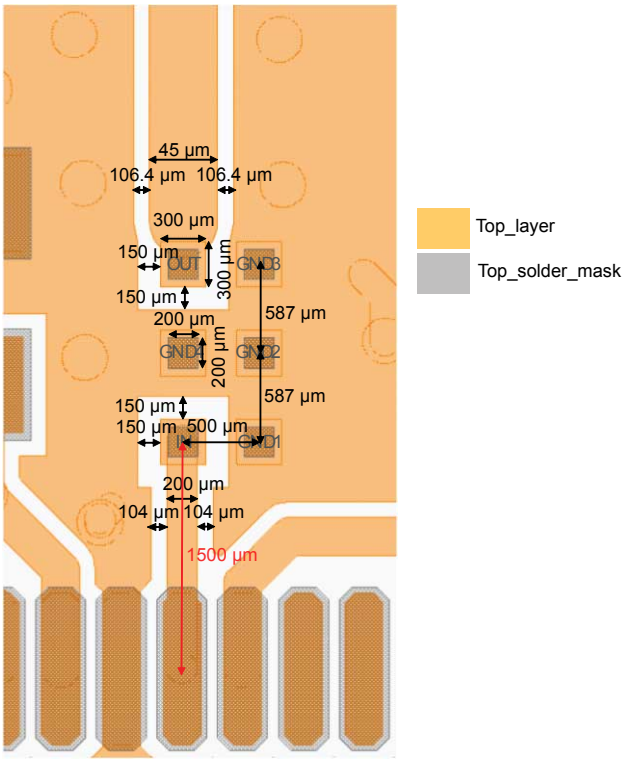
2 Package information

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 Recommendation on PCB assembly

3.1 Land pattern

Figure 9. PCB land pattern recommendations



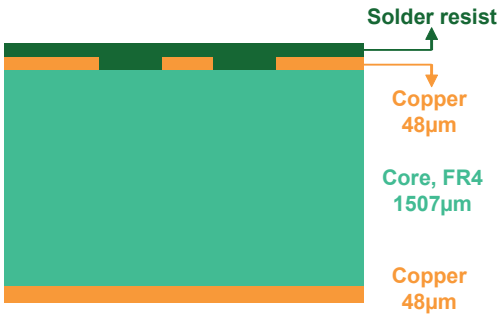
Transmission line between MLPF and antenna is dimensioned to 50 ohms characteristic impedance.

Transmission line between STM32 and MLPF is dimensioned to 62 ohms characteristic impedance.

Theses transmission line characteristics impedances have to be followed as close as possible.

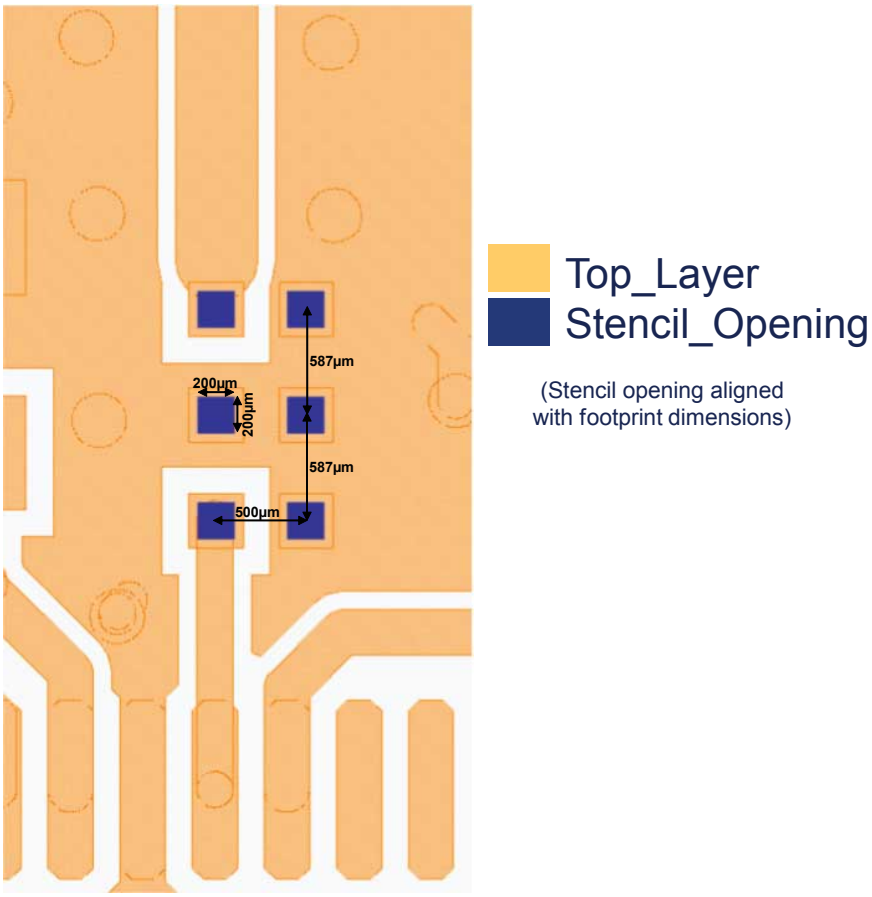
Moreover, lines physical dimensions will have to be tuned according to specific PCB stack up if different from the one presented in datasheet to keep expected characteristic impedance values.

Figure 10. PCB stack-up recommendations



3.2 Stencil opening design

Figure 11. Stencil opening recommendations



3.3 Solder paste

1. 100 µm solder stencil thickness is recommended to be drunk
2. Halide-free flux qualification ROL0 according to ANSI/J-STD-004.
3. “No clean” solder paste is recommended.
4. Offers a high tack force to resist component movement during PCB movement.
5. Solder paste with fine particles: powder particle size is 20-45 µm.

3.4 Placement

1. Manual positioning is not recommended.
2. It is recommended to use the lead recognition capabilities of the placement system, not the outline centering
3. Standard tolerance of ±0.05 mm is recommended.
4. 1.0 N placement force is recommended. Too much placement force can lead to squeezed out solder paste and cause solder joints to short. Too low placement force can lead to insufficient contact between package and solder paste that could cause open solder joints or badly centered packages.
5. To improve the package placement accuracy, a bottom side optical control should be performed with a high resolution tool.
6. For assembly, a perfect supporting of the PCB (all the more on flexible PCB) is recommended during solder paste printing, pick and place and reflow soldering by using optimized tools.

3.5 PCB design preference

1. To control the solder paste amount, the closed via is recommended instead of open vias.
2. The position of tracks and open vias in the solder area should be well balanced. A symmetrical layout is recommended, to avoid any tilt phenomena caused by asymmetrical solder paste due to solder flow away.

4 Ordering information

Figure 12. **Ordering information scheme**

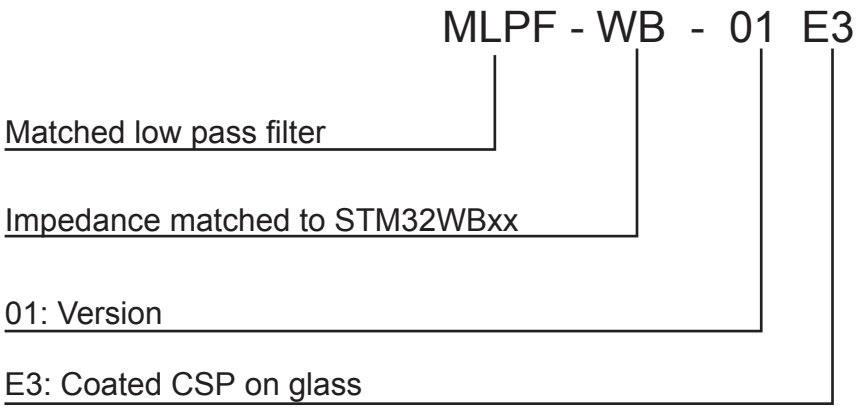


Table 4. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
MLPF-WB-01E3	TS	Bumpless CSP	1.546 mg	5000	Tape and reel (7")

Revision history

Table 5. **Document revision history**

Date	Revision	Changes
20-Oct-2020	1	Initial release.
25-Nov-2022	2	Updated Section 3.1 Land pattern.

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