Multilayer Ceramic BALUN Transformer (2012)
Bluetooth & WLAN IEEE 802.11b/g
2.45GHz ISM Band Working Frequency

WPSMLBLN001/2/3

Explanation of Part Number

WPSMLBLN 00□ □ □
(1) (2) (3) (4)

(1) **Product Series** WPSMLBLN: BALUN
(2) **Product No.**
001: 50Ω Balanced Impedance
002: 100Ω Balanced Impedance
003: 200Ω Balanced Impedance
(3) **Revision Code** C or B
(4) **Packaging Code**
Blank: Bulk
K: 7" Reel, 2000 pieces per reel
G: 13" Reel (Specifications available upon request)
X: SFC Product (Specifications available upon request)

Features

- Multilayer LTCC (Low Temperature Co-Fired Ceramics) technology
- Miniature size 2.00 x 1.25 x 0.95mm^3
- Low insertion loss reduces power consumption
- Low inband amplitude and phase imbalance enable high performance wireless system operation
- Enable for DC Biasing of PA or Mixer
- Suitable for 2.45GHz working frequency operation
- Special balance/unbalance impedance upon request

Applications

- 2.4GHz ISM Band RF Application
- Bluetooth, Wireless LAN, HomeRF

Construction

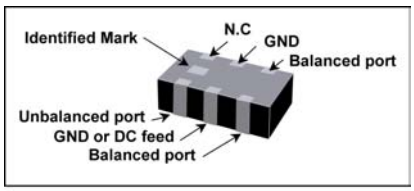


Fig 1. Outline of 2.4GHz Balun

Description

WPI is introducing this new ceramic BALUN transformer specifically designed for 2.45GHz ISM Band application, as show in Fig 1. This BALUN is applicable for Wireless LAN IEE802.11b and Bluetooth™ typically located on this unlicensed frequency band which range covers from 2.4GHz to 2.4835GHz. To fulfill the in-band and out-band frequency requirements, this ceramic BALUN has been designed to a low amplitude imbalance and phase imbalance, wide bandwidth (-10dB) as well as low insertion loss characteristics through our advanced LTCC (Low Temperature Co-Fired Ceramic) technology and superior product design via 3D EM Simulation skill. This ceramic BALUN has a rectangular ceramic body with very small dimensions (2.00 x 1.25 x 0.95mm^3) which meet the SMT automation and miniaturization requirements on modern portable devices.

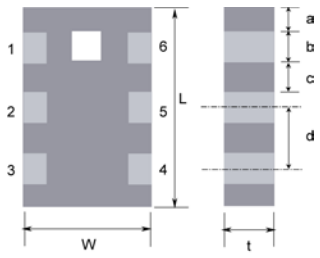
Marking

There is no marking. The white block means right side up and unbalanced input.

Electrical Characteristics

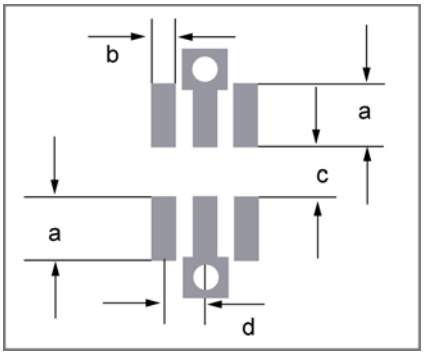
P/N	Frequency (MHz)	Impedance (Ω)		Max Return Loss (dB)	Inband Amplitude imbalance (dB) max.	Inband Phas imbalance (degree)	Min. Insertion Loss (dB)
		Unbalanced	Balanced				
WPSMLBLN001C	2450 ± 50	50	50	-10	2.0	180 ± 10	-1.2
WPSMLBLN002C	2450 ± 50	50	100	-10	2.0	180 ± 10	-1.0
WPSMLBLN003B	2450 ± 50	50	200	-10	2.0	180 ± 10	-1.0

Dimensions and Port Configurations



Symbol	Dimension	Terminals	Connection
L	2.00 ± 0.15mm	1	Unbalanced port
W	1.25 ± 0.15mm	2	Ground or DC feed
T	0.95 ± 0.10mm	3	Balanced port
A	0.20 ± 0.20mm	4	Balanced port
B	0.30 ± 0.20mm	5	Ground
C	0.35 ± 0.20mm	6	Non Connection
D	0.65 ± 0.20mm		

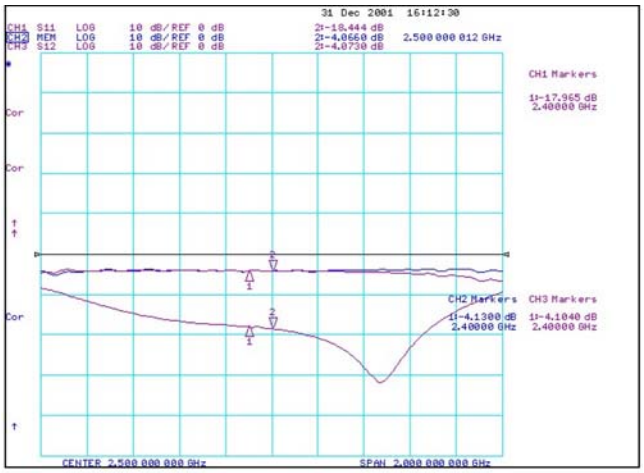
Solder Land Pattern



Dimension	
a	1.00 ± 0.1mm
b	0.35 ± 0.1mm
c	0.80 ± 0.1mm
d	0.65 ± 0.1mm
Line width designed to match 50Ω characteristic impedance, depending on PCB material and thickness.	

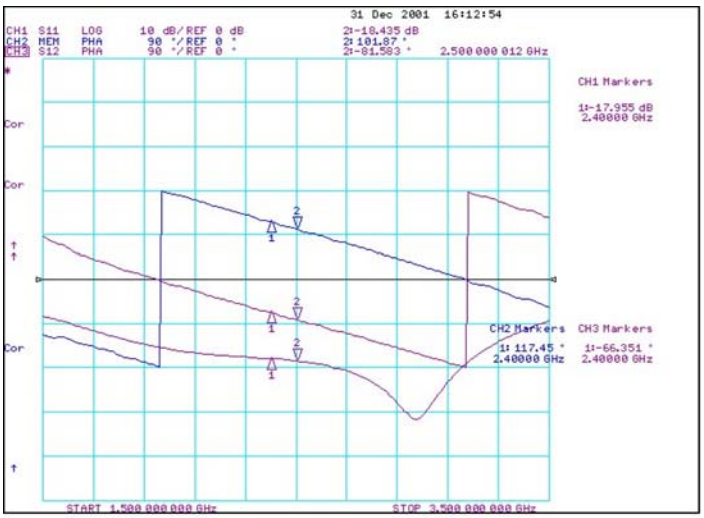
Typical Frequency Characteristics

Amplitude balance (WPSMLBLN002C)



Note: -4.1dB should include 0.4dB microstrip line loss

Phase balance (WPSMLBLN002C)



Reliability Test

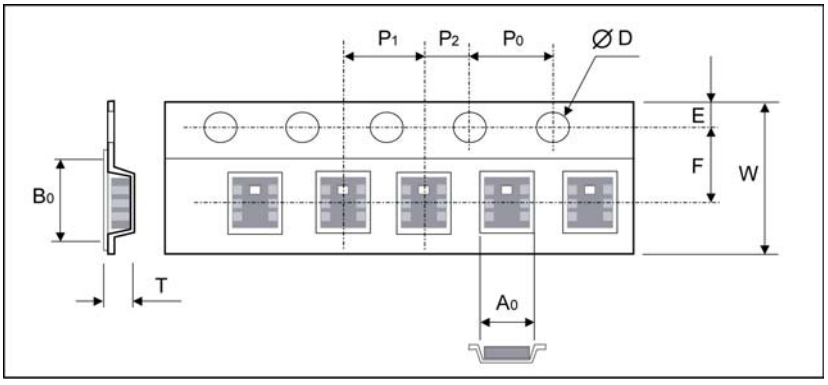
Mechanical Performance

Test item	Test condition/Test method	Specification
Solderability	Solder temp.: 235 ± 5°C Immersion time: 2 ± 1 sec. Solder: SN63	At least 80% of a surface of each terminal electrode must be covered by fresh solder.
Resistance to soldering heat	Solder: SN63 Preheating temp.: 150 ± 10°C Solder temp: 260 ± 5°C Immersion time: 10 ± 1 sec. Measurement to be made after keeping at room temp. for 24 ± 2 hours.	No mechanical damage. Ceramic surface shall not be exposed in the middle of the termination or on the terminated product edge by leaching.
Drop Test	Height: 75cm Direction: 3 directions Times: 3 times for each direction	No mechanical damage. Samples shall satisfy electrical specification after test.

Environmental characteristics

Test item	Test condition/Test method	Specification
Humidity (steady conditions)	Humidity: 90% to 95% R.H. Temperature: 40 ± 2°C Time: 500 ± 24 hours Measurement: After placing for 24 hours minimum.	No mechanical damage. Samples shall satisfy electrical specification after test.
Temperature cycle	30 ± 3 minutes at –40 ± 3°C 10 –15 minutes at room temperature 30 ± 3 minutes at +85 ±3°C 10 –15 minutes at room temperature Total 100 continuous cycles Measurement after placing for 48 ± 2 hours min.	No mechanical damage. Samples shall satisfy electrical specification after test.
High temperature	Temperature: +85 ± 2°C Test duration: 24 hours Measurement must be taken after subjection to the above conditions, followed by exposure in room environment for 1 to 2 hours.	No mechanical damage. Samples shall satisfy electrical specification after test.
Low Temperature	Temperature: -40 ± 3°C Test duration: 24 hours Measurement must be taken after subjection to the above conditions, followed by exposure in room environment for 1 to 2 hours.	No mechanical damage. Samples shall satisfy electrical specification after test.

Packaging

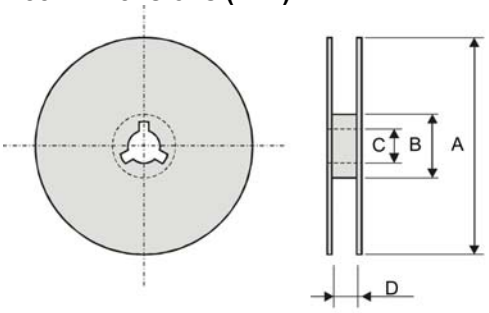


Plastic Tape specifications

(unit: mm)

Index	Dimension (mm)
A_0	1.40 ± 0.10
B_0	2.25 ± 0.10
Ø D	1.55 ± 0.10
T	1.35 ± 0.10
W	8.00 ± 0.30
E	1.75 ± 0.10
F	3.50 ± 0.05
P_0	4.00 ± 0.10
P_1	8.00 ± 0.10
P_2	2.00 ± 0.10

Reel Dimensions (mm)



Index Dimension (mm)	A	B	C	D
7" reel 2000 pieces per	∅178	∅60.0	∅13.5	10.0 ± 1.0

Soldering Condition

Typical examples of soldering processes that provide reliable joints without any damage are given in Fig 2.

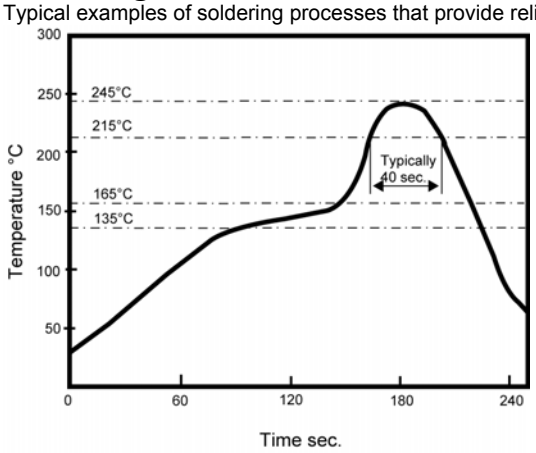


Fig. 2 Infrared soldering profile

Caution of Handling

Limitation of Applications

Please contact us before using our products for the applications listed below which require especially high reliability for the prevention of defects, which might directly cause damage to the third party's life, body or property.

Aircraft equipment, Aerospace equipment, Undersea equipment, Medical equipment, Disaster prevention/crime prevention equipment, Traffic signal equipment, Transportation equipment (vehicles, trains, ships, etc.), Applications of similar complexity and/or reliability requirements to the applications listed above.

Storage conditions

Products should be used in 6 months from the day of shipment from our factory location, which can be confirmed. Products should be stored in the warehouse on the following conditions.

Temperature: -10 - +40°C
Humidity: 30 to 70% relative humidity

- Don't keep products in corrosive gases such as sulfur. Chlorine gas or acid may cause oxidation of electrode, resulting in poor solderability.
- Products should be stored on the palette for the prevention of humidity, dust and etc.
- Products should be stored in the warehouse without heat shock, vibration, direct sunlight and so on.
- Products should be stored under the airtight packed conditions.