

## Wide-band, directional coupler with integrated 50 ohm loaded isolated port

Datasheet – production data

### Features

- 50  $\Omega$  nominal input / output impedance
- Wide operating frequency range (2400 MHz to 5850 MHz)
- Low insertion loss
- Coupling factor:
  - 18 dB at 2.4 GHz
  - 12 dB at 5 GHz
- High ESD robustness
- Packaged in Flip Chip
- Package thickness: < 595  $\mu\text{m}$  after reflow
- Small footprint

### Benefits

- Very low profile
- Lead-free package
- High RF performance
- RF module size reduction

### Applications

- Quad-band power amplifier module
- Quad-band front end module
- WLAN

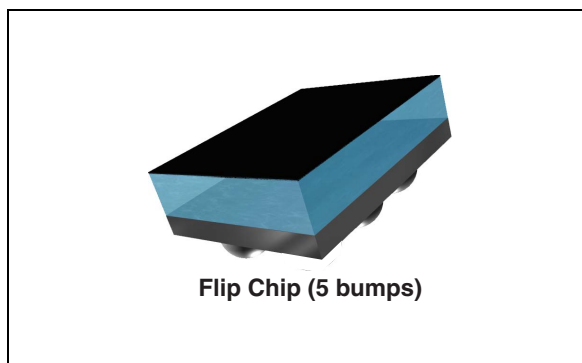
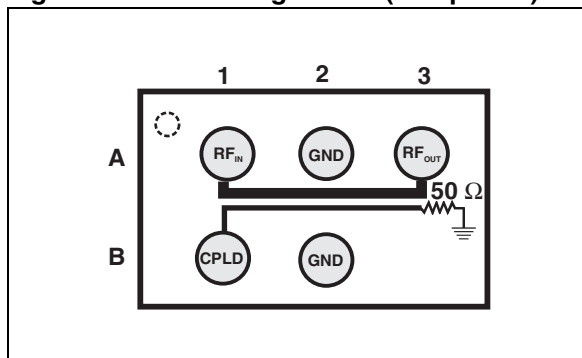


Figure 1. Pin configuration (bump view)



### Description

The CPL-WB-02D3 is a wide-band directional coupler designed to measure RF antenna output power. This CPL has been customized for wide band operating frequencies (2G/5G WLAN) with low insertion losses in the transmit bandwidth (2400 MHz to 5850 MHz).

The CPL-WB-02D3 has been designed using STMicroelectronics IPD (integrated passive device) technology on non-conductive glass substrate to optimize RF performance. The device is delivered 100% tested in tape and reel.

# 1 Characteristics

**Table 1. Absolute maximum rating (limiting values)**

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
P <sub>IN</sub>	Input power RF <sub>IN</sub>			25	dBm
V <sub>ESD (HBM)</sub>	Human body model, JESD22-A114-B, All I/O	2			kV
V <sub>ESD (MM)</sub>	Machine model, JESD22-A115-A, All I/O	100			V
V <sub>ESD (CDM)</sub>	Charge device model, JESD22-C101-C, All I/O	500			V
T <sub>OP</sub>	Operating temperature	-30		+85	°C

**Table 2. Electrical characteristics (T<sub>amb</sub> = 25 °C) - impedances**

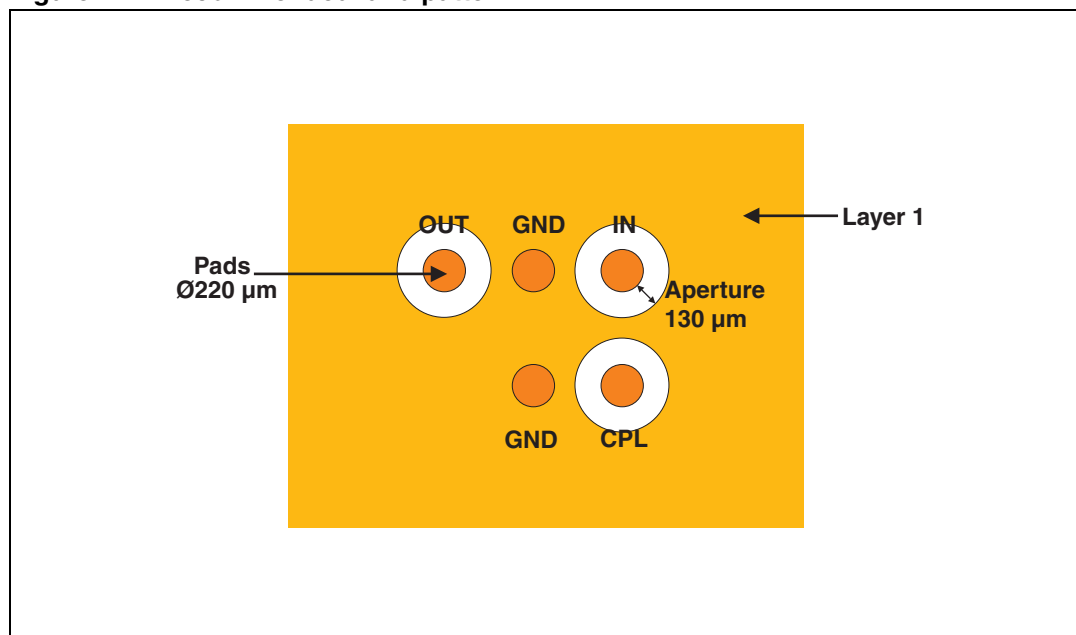
Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
Z <sub>OUT</sub>	Nominal output impedance		50		Ω
Z <sub>IN</sub>	Nominal input impedance		50		Ω
Z <sub>CPLD</sub>	Nominal coupling impedance		50		Ω

**Table 3. Electrical characteristics (T<sub>amb</sub> = 25 °C) - RF performance**

Symbol	Parameter	Test condition	Value			Unit
			Min.	Typ.	Max.	
T <sub>OP</sub>	Operating temperature		-30		+85	°C
f	Frequency range (bandwidth)		2400		5850	MHz
I <sub>L</sub>	Insertion loss in bandwidth	From 2400 MHz to 2500 MHz			0.2	dB
		From 4900 MHz to 5850 MHz			0.5	
R <sub>L</sub>	Return loss in bandwidth (IN, OUT pins)	From 2400 MHz to 5850 MHz	15			dB
CPLD	Coupling factor	From 2400 MHz to 2500 MHz	17	18	19	dB
		From 4900 MHz to 5850 MHz	11	12	13	dB

## 2 PCB recommendation

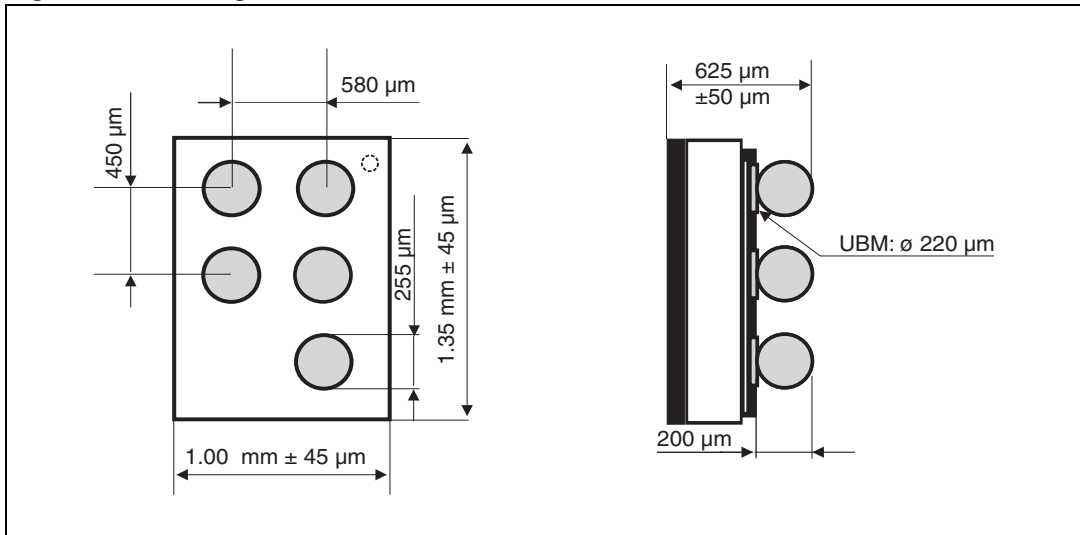
Figure 2. Recommended land pattern



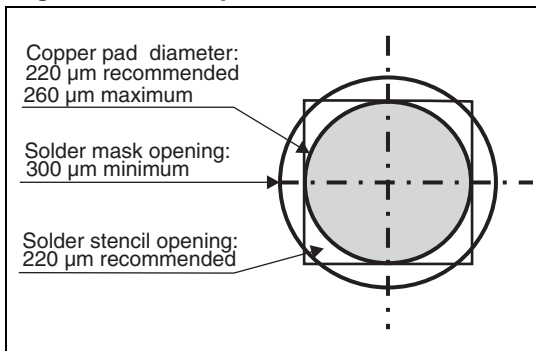
### 3 Package information

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](http://www.st.com). ECOPACK® is an ST trademark.

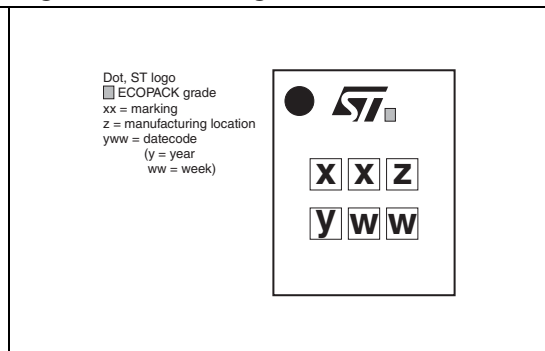
**Figure 3. Package dimensions**



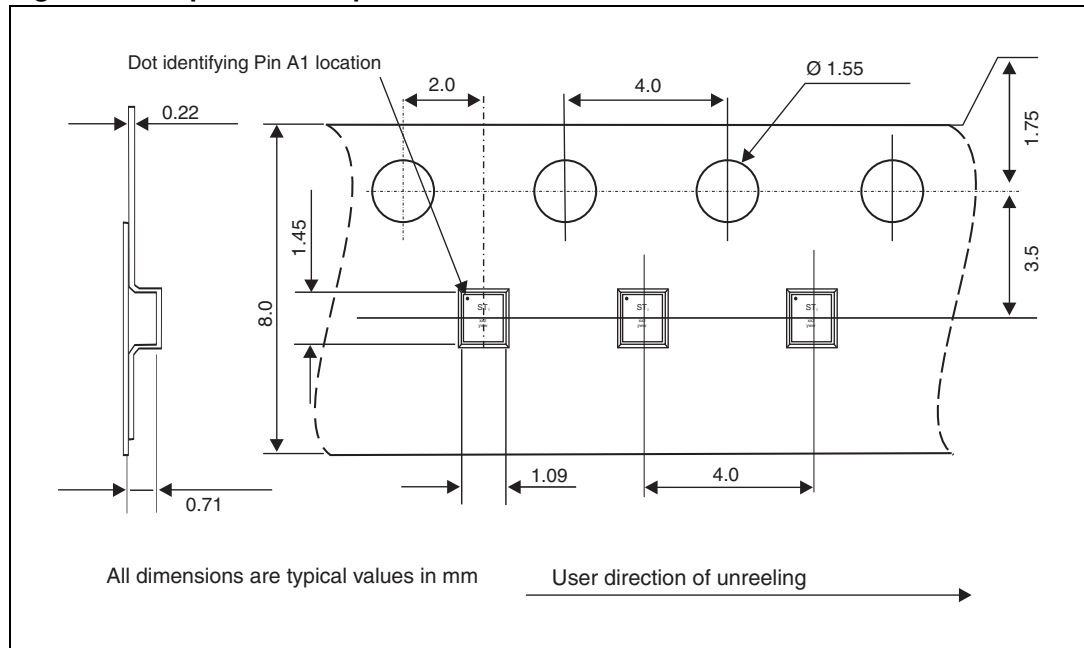
**Figure 4. Footprint**



**Figure 5. Marking**



**Figure 6. Tape and reel specifications**



**Note:** More information is available in the STMicroelectronics Application note:  
 AN2348, "IPAD™ 400 μm Flip Chip: package description and recommendations for use"  
 AN1751: "EMI Filters: recommendations and measurements"

## 4 Ordering information

Table 4. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
CPL-WB-02D3	SE	Flip Chip	1.59 mg	5000	Tape and reel

## 5 Revision history

Table 5. Document revision history

Date	Revision	Changes
18-Jun-2012	1	Initial release

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