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## Wide-band, dual-path 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-5850 MHz
- Low insertion loss
- High ESD ruggedness
- Lead-free CSP
- Small footprint: 1670 x 1440  $\mu\text{m}$
- Very low profile (< 600  $\mu\text{m}$  after reflow)

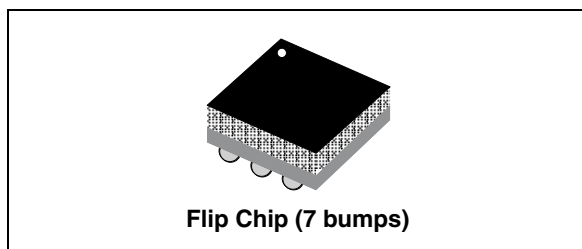
### Benefits

- High RF performance
- RF module size reduction

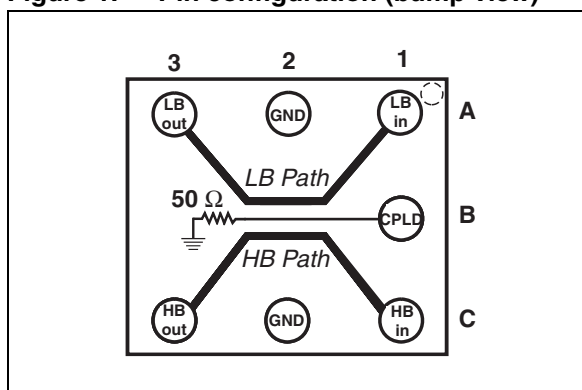
### Applications

Multi-band equipment such as:

- Power amplifier module
- Front end module
- WLAN



**Figure 1. Pin configuration (bump view)**



### Description

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

This device is built with two different RF couplers (one dedicated to LB, the other dedicated to HB) sharing the same coupled ports. Isolated port is loaded with an integrated 50  $\Omega$  resistor.

The DCPL-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.	
$P_{IN}$	Input Power $RF_{IN}$ (CW mode)			25	dBm
$V_{ESD}$ (HBM)	Human body model, JESD 22-A114F, all I/O	2			kV
$V_{ESD}$ (MM)	Machine model, JESD 22-A115-A, all I/O	100			V
$V_{ESD}$ (CDM)	Charge device model, JESD 22-C101-C, all I/O	500			V
$T_{OP}$	Operating temperature	-30		+85	°C

**Table 2. Electrical characteristics - impedances ( $T_{amb} = 25\text{ °C}$ )**

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
$Z_{OUT}$	Nominal output impedance (LB and HB paths)		50		$\Omega$
$Z_{IN}$	Nominal input impedance (LB and HB paths)		50		$\Omega$
$Z_{CPL}$	Nominal coupled port impedance		50		$\Omega$

**Table 3. Electrical characteristics - LB WLAN path RF performance ( $T_{amb} = 25\text{ °C}$ )**

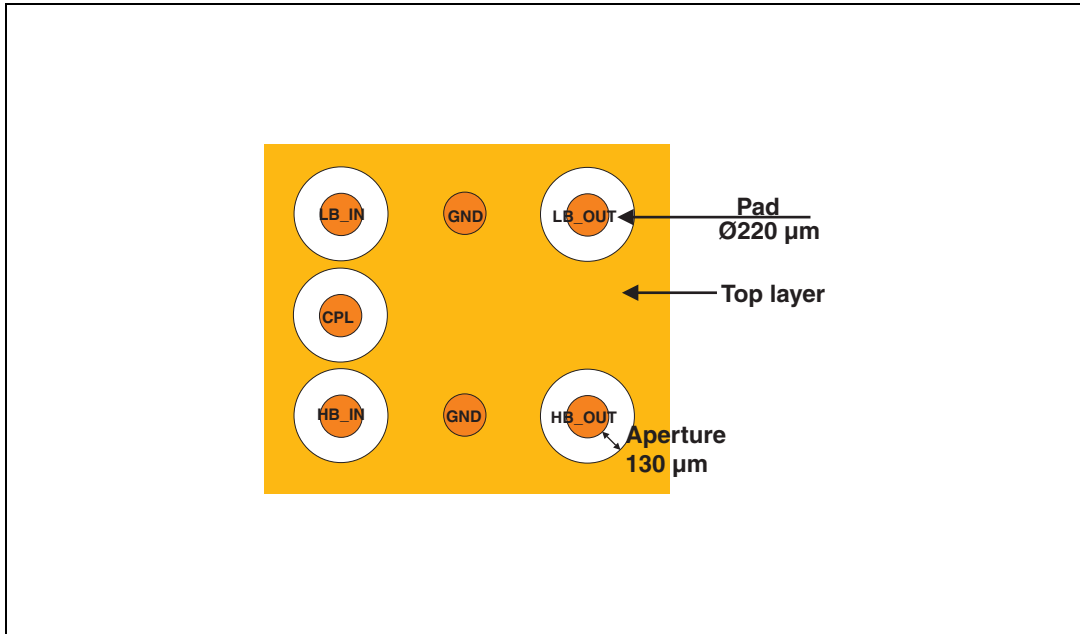
Symbol	Parameter	Test condition	Value			Unit
			Min.	Typ.	Max.	
f	Frequency range (bandwidth)		2400	2450	2500	MHz
$IL_{LB}$	LB path insertion loss	From 2400 MHz to 2500 MHz			0.2	dB
$RL_{LB}$	LB path return loss (IN, OUT pins)	From 2400 MHz to 2500 MHz	15			dB
$CPLD_{LB}$	LB path coupling factor	at 2.45 GHz	17	18	19	dB
$Ripple_{LB}$	Coupling ripple in LB	From 2400 MHz to 2500 MHz			0.5	dB

**Table 4. Electrical characteristics - HB WLAN path RF performance ( $T_{amb} = 25\text{ °C}$ )**

Symbol	Parameter	Test condition	Value			Unit
			Min.	Typ.	Max.	
f	Frequency range (bandwidth)		4900	5375	5850	MHz
$IL_{HB}$	HB path insertion loss	From 4900 MHz to 5850 MHz			0.5	dB
$RL_{HB}$	HB path return loss (IN, OUT pins)	From 4900 MHz to 5850 MHz	15			dB
$CPLD_{HB}$	HB path coupling factor	at 5.375 GHz	11	12	13	dB
$Ripple_{HB}$	Coupling ripple in HB	From 4900 MHz to 5850 MHz			1.2	dB

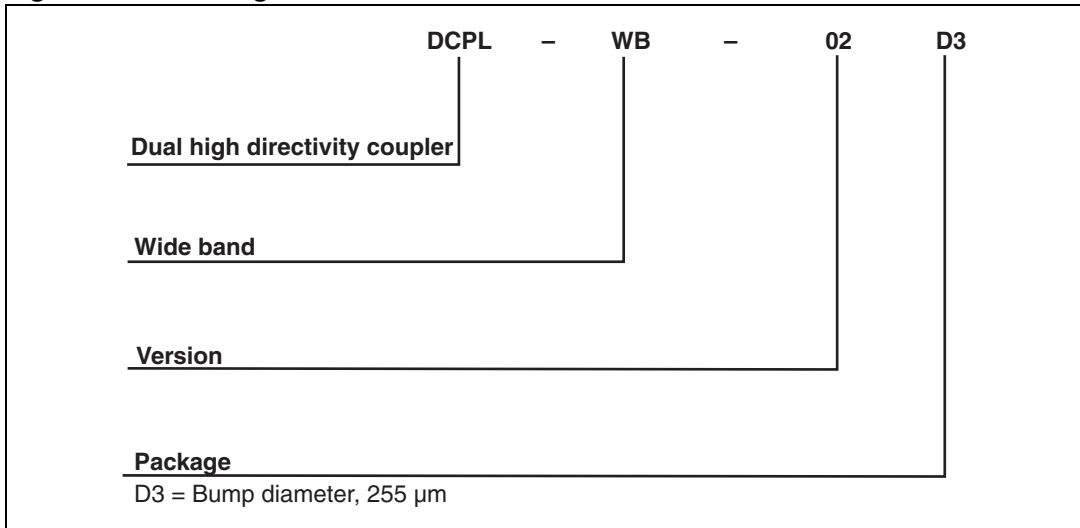
## 2 PCB recommendation

Figure 2. Recommended land pattern



## 3 Ordering information scheme

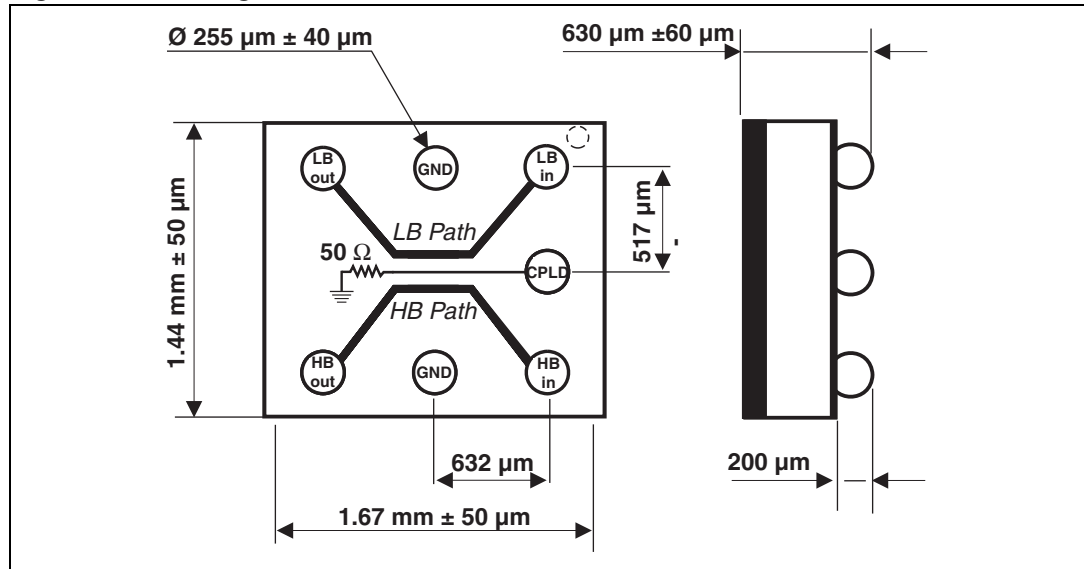
Figure 3. Ordering information scheme



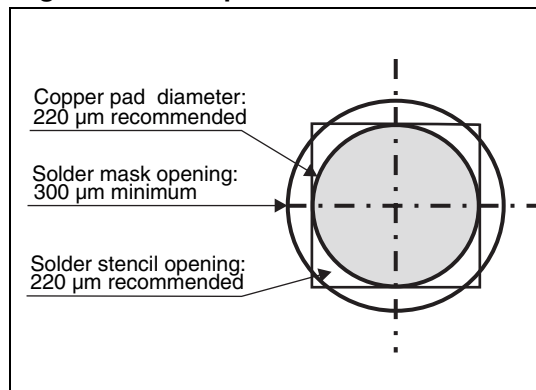
## 4 Package information

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 4. Package dimensions**



**Figure 5. Footprint**



**Figure 6. Marking**

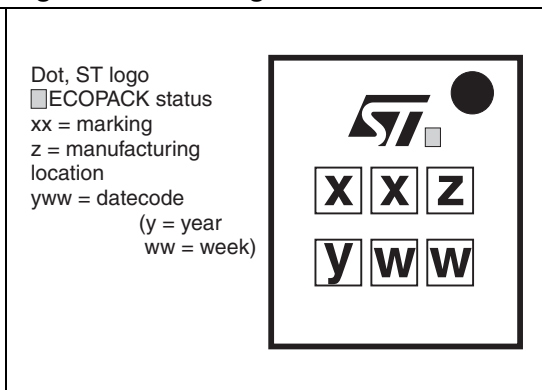
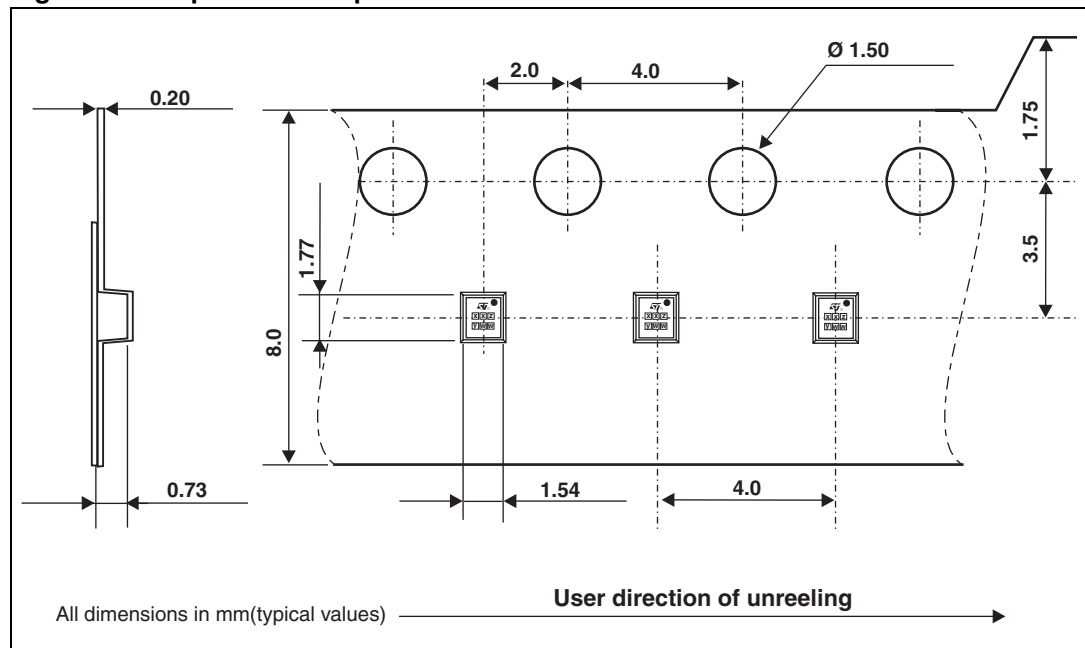


Figure 7. Tape and reel specifications



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

## 5 Ordering information

Table 5. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
DCPL-WB-02D3	SF	Flip Chip	2.5 mg	5000	Tape and reel 7"

## 6 Revision history

Table 6. Document revision history

Date	Revision	Changes
18-Jun-2012	1	Initial release



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