CPL-WB-01D3

Wide-band directional coupler with ISO port

Features

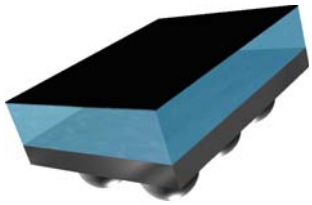
- 50 Ω nominal input / output impedance
- Wide operating frequency range (824 MHz to 2170 MHz)
- Low insertion loss (< 0.2 dB)
- 26 dB coupling factor
- High directivity
- High ESD robustness (IEC 61000-4-2 Level 4)
- Flip-Chip package
- Small footprint

Benefits

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

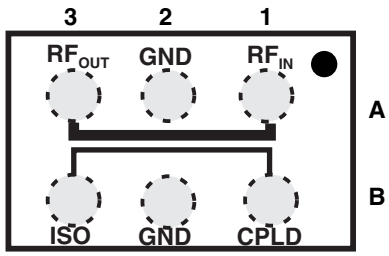
Applications

- Quad-band power amplifier module
- Quad-band front end module
- GSM / WCDMA mobile phone



Flip-Chip package 6 bumps

Figure 1. Pin configuration (top view)



Description

The CPL-WB-01D3 is a wide-band directional coupler designed to measure RF antenna output power in GSM / WCDMA / TD-SCDMA applications. This CPL has been customized for wide band operating frequencies (EGSM and CELL, PCS, DCS, TD-SCDMA, WCDMA Band I) with less than 0.2 dB insertion losses in the transmit bandwidth (824 MHz to 2170 MHz).

The CPL-WB-01D3 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}			35	dBm
$V_{ESD\ (IEC)}$	ESD ratings IEC 61000-4-2 (C = 150 pF, R = 330 Ω, 10 shots with both polarities and each condition, cumulative method) RF_{IN}, RF_{OUT}, air discharge RF_{IN}, RF_{OUT}, contact discharge	 ±15 ±8			 kV kV
$V_{ESD\ (HBM)}$	Human body model, JESD22-A114-B, All I/O	2			kV
$V_{ESD\ (MM)}$	Machine model, JESD22-A115-A, All I/O	100			V
$V_{ESD\ (CDM)}$	Charge device model, JESD22-C101-C, All I/O	500			V
T_{OP}	Operating temperature	-30		+85	ºC

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

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
Z_{OUT}	Nominal output impedance		50		Ω
Z_{IN}	Nominal input impedance		50		Ω
Z_{CPLD}	Nominal coupling impedance		50		Ω
Z_{ISO}	Nominal ISO impedance		50		Ω

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

Symbol	Parameter	Test condition	Value			Unit
			Min.	Typ.	Max.	
T_{OP}	Operating temperature		-30		+85	°C
f	Frequency range (bandwidth)		824		2170	MHz
I_L	Insertion loss in bandwidth	From 824 MHz to 2170 MHz		0.1	0.2	dB
R_L	Return loss in bandwidth	From 824 MHz to 2170 MHz	15			dB
CPLD	Coupling factor	From 824 MHz to 915 MHz	24	26	27	dB
		From 1710 MHz to 2025 MHz	18	19	21	dB
Ripple	Coupling ripple in individual band	(824 to 849 MHz) - (880 to 915 MHz) (1710 to 1785 MHz) - (1850 to 1910 MHz) (1880 to 2025 MHz) - (1920 to 1980 MHz)			0.5	dB
DIR	Coupler directivity	From 824 MHz to 2025 MHz	15	20		dB

1.1 RF measurement

Figure 2. Insertion loss

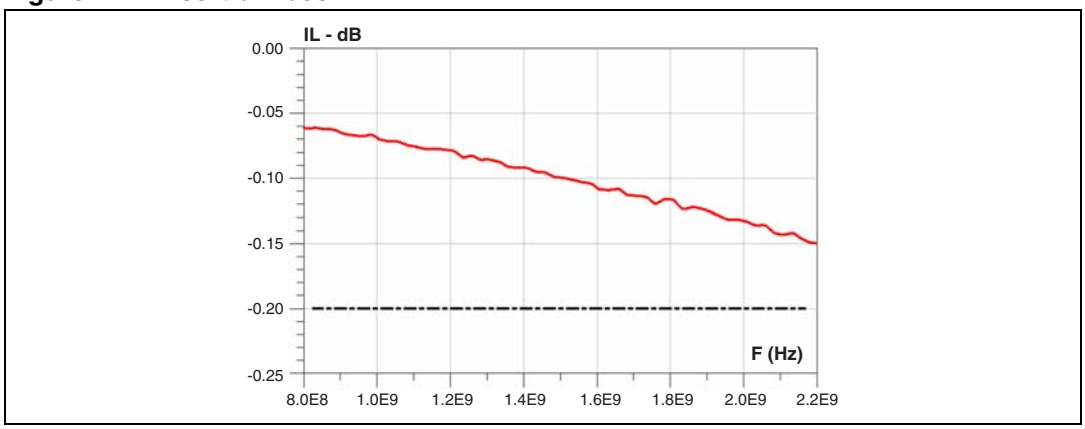


Figure 3. Coupling LB

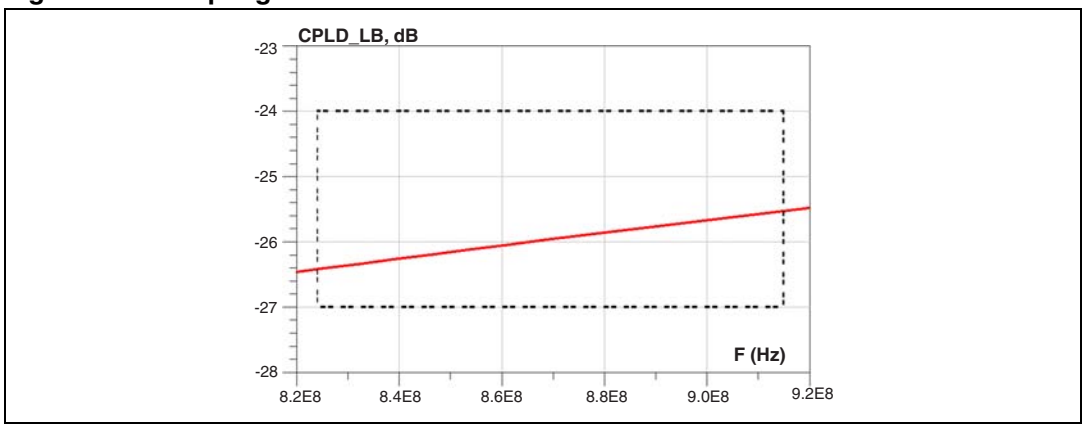


Figure 4. Coupling HB

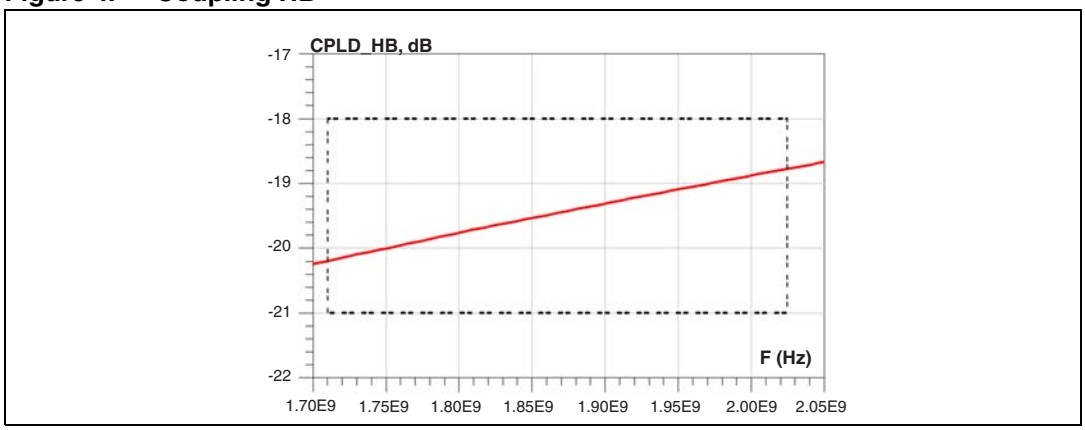
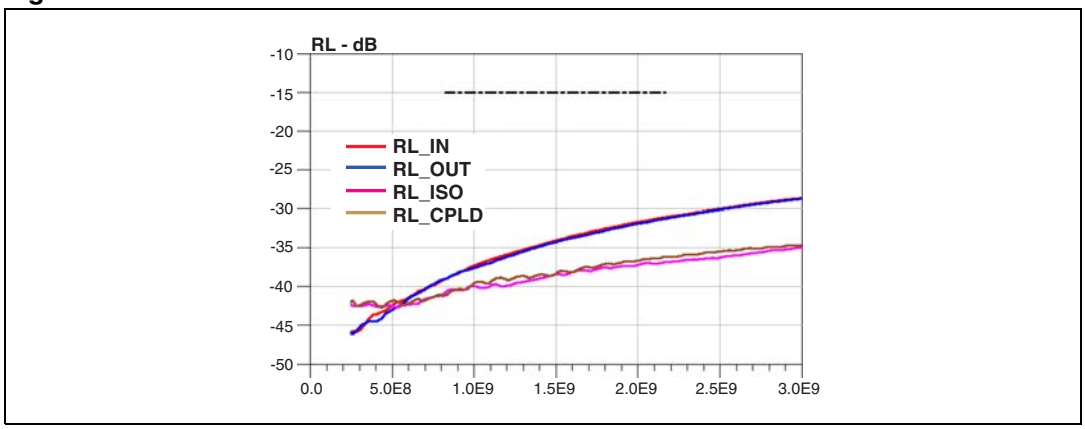
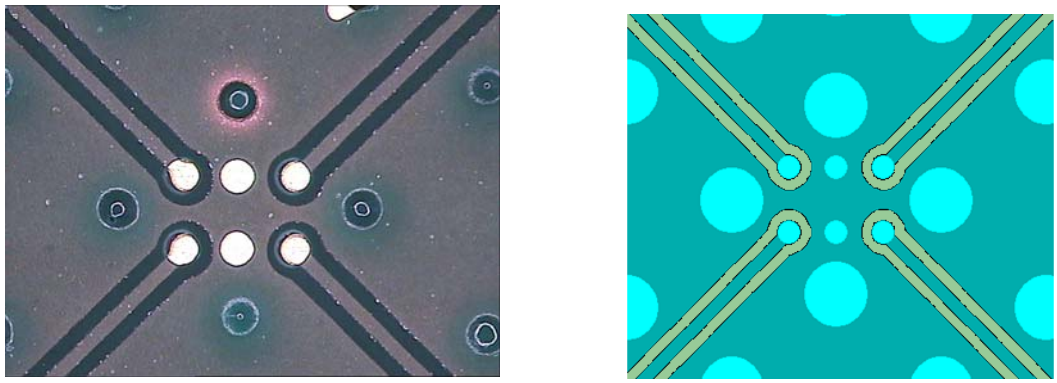


Figure 5. Return losses



2 PCB layout recommendation

Figure 6. Typical PCB layout recommendation



- Material: 4 layers FR4 with solder mask on top and bottom layer
- Substrate thickness: 0.8 mm
- 50 Ω line access
- Ground plane must be on PCB layer 1 as shown in *Figure 6*

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.

Figure 7. Package dimensions

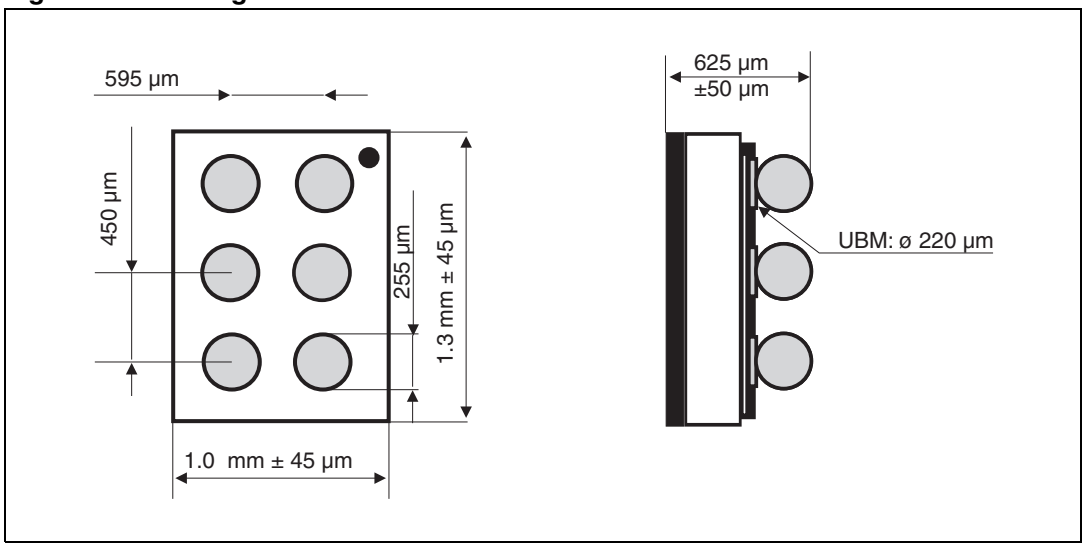


Figure 8. Footpr

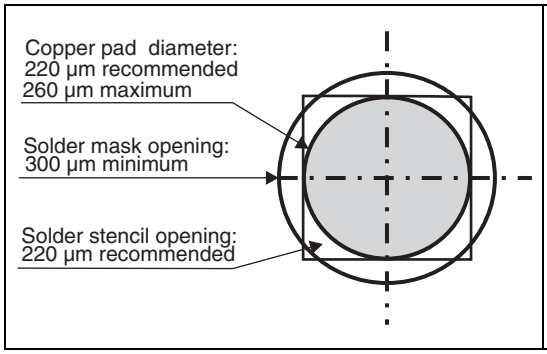


Figure 9. Marking

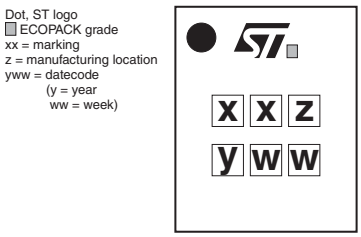
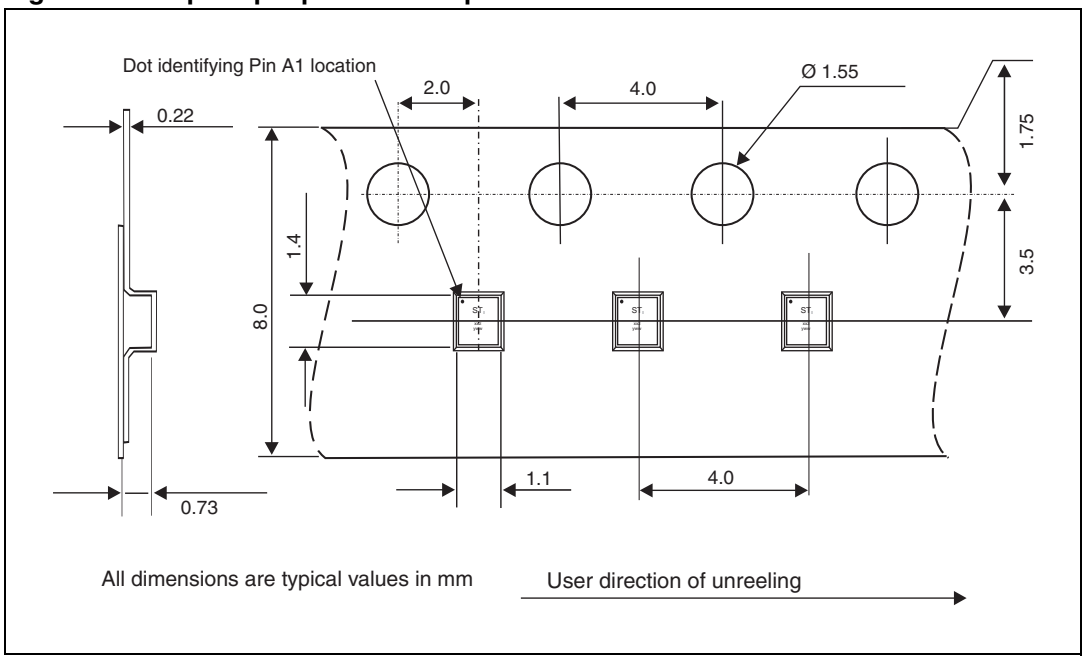


Figure 10. Flip Chip tape and reel specifications



Note: More information is available in the application note:

AN2348: "Flip Chip: package description and recommendations for use"

4 Ordering information

Table 4. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
CPL-WB-01D3	RV	Flip Chip	1.61 mg	5000	Tape and reel

5 Revision history

Table 5. Document revision history

Date	Revision	Changes
08-Jul-2011	1	Initial release
12-Sep-2011	2	Updated *Figure 2*, *Figure 3*, and *Figure 4*.
14-Feb-2012	3	Updated *Figure 8*.

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