

Wide band directional coupler with ISO port

Datasheet - production data

Features

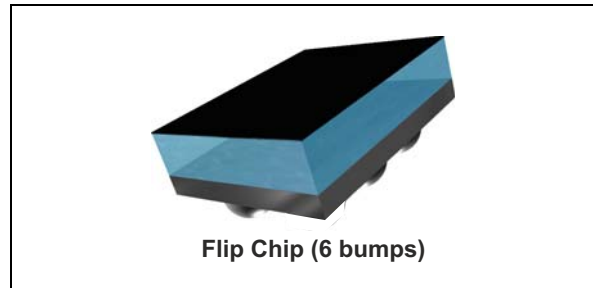
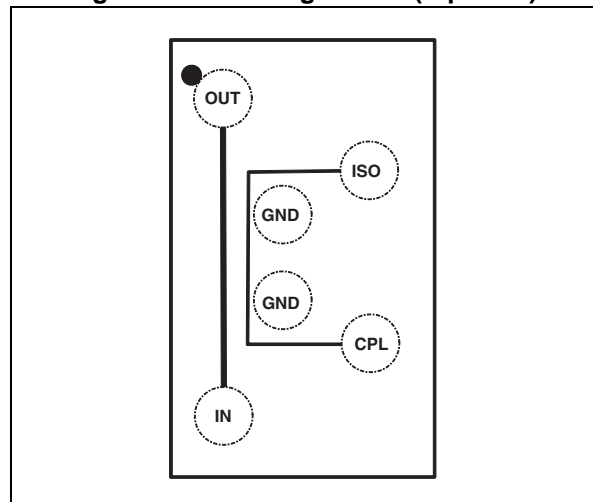
- 50 Ω nominal input / output impedance
- Wide operating frequency range (698 MHz to 2700 MHz)
- Low insertion loss
- 30 dB coupling factor with high flatness
- High directivity
- High ESD robustness (IEC 61000-4-2 level 4)
- Flip Chip package
- Small footprint

Benefits

- Very low profile (< 560 μm thickness after reflow)
- Lead-free package
- High RF performance
- RF module size reduction
- 50 Ω nominal input / output impedance
- Fully symmetrical design

Applications

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

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

Description

The CPL-WBF-00D3 is a wide-band directional coupler designed to measure RF antenna output power in GSM / WCDMA / TD-SCDMA / LTE applications. This coupler has been customized for wide band operating frequencies (EGSM, CELL, PCS, DCS, TD-SCDMA, WCDMA and LTE) with less than 0.30 dB insertion losses in the bandwidth (698 MHz to 2700 MHz).

The CPL-WBF-00D3 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	Frequency band	Test condition	Value			Unit
				Min.	Typ.	Max.	
P_{IN}	Input power RF_{IN}	CW	698-880			30	dBm
		DC 50% CW	880-915			35 30	
		CW	1428-1661			30	
		DC 50% CW	1710-1910			33 30	
		CW	1920-2170			27	
		CW	1920-2025			30	
		CW	2500-2700			30	
V_{ESD}	ESD ratings IEC61000-4-2 (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	$^{\circ}\text{C}$

Table 2. Electrical characteristics ($T_{amb} = 25^{\circ}\text{C}$) - 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 isolated port impedance		50		Ω

Table 3. Electrical characteristics ($T_{amb} = 25\text{ }^{\circ}\text{C}$) - RF performance

Symbol	Parameter	Test condition	Value			Unit
			Min.	Typ.	Max.	
F	Frequency range (bandwidth)		698		2700	MHz
I_L	Insertion loss in bandwidth	From 698 MHz to 2700 MHz		0.15	0.3	dB
R_L	Return loss in bandwidth		15			dB
CPLD	Coupling factor		29		33	dB
DIR	Coupler directivity		20			dB

1.1 RF measurements

Figure 2. Insertion loss



Figure 3. Coupling factor

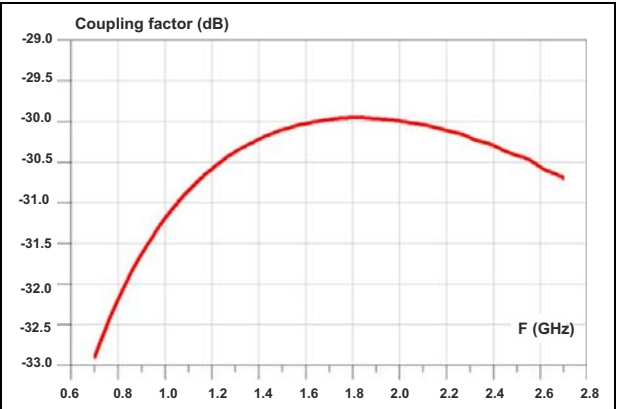


Figure 4. Directivity

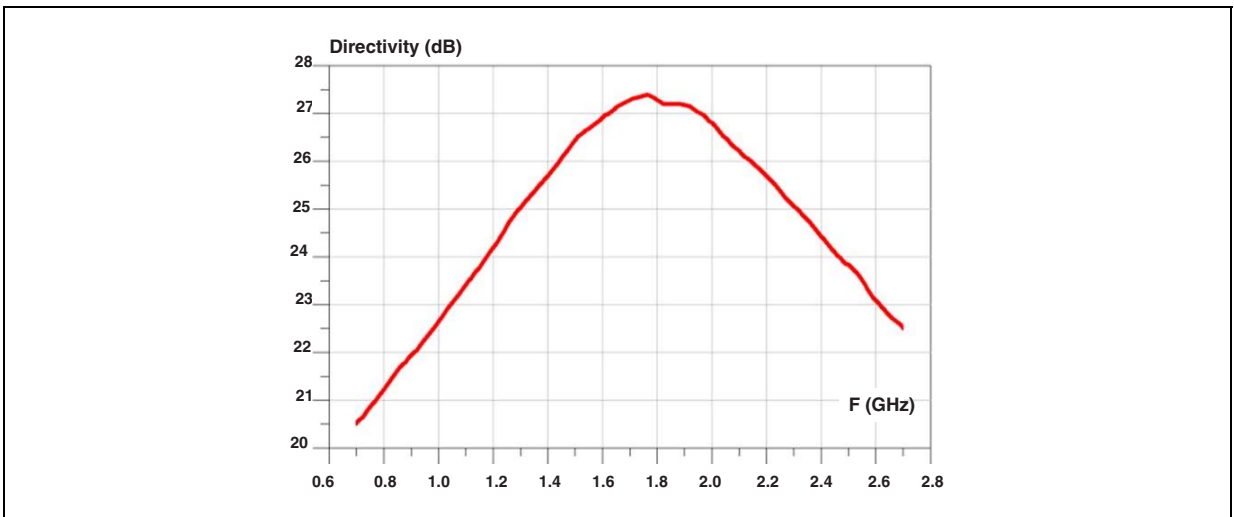


Figure 5. RL IN

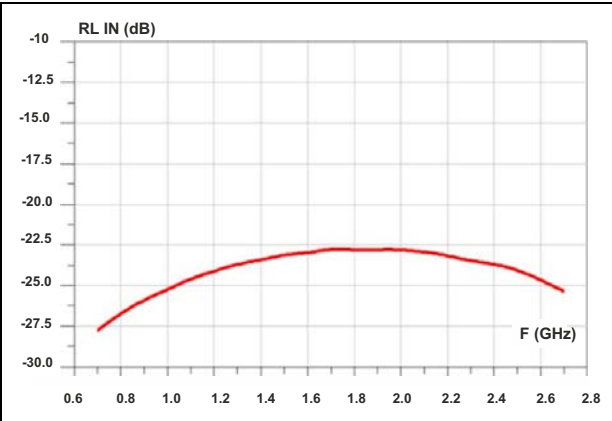


Figure 6. RL OUT

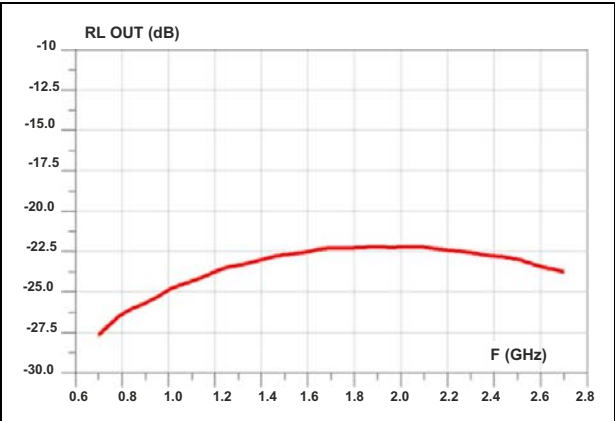


Figure 7. RL CPL

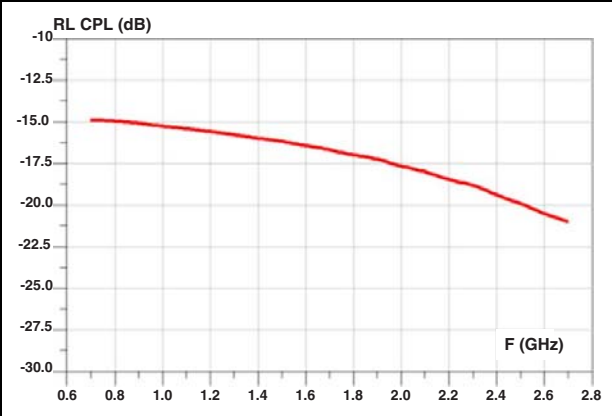
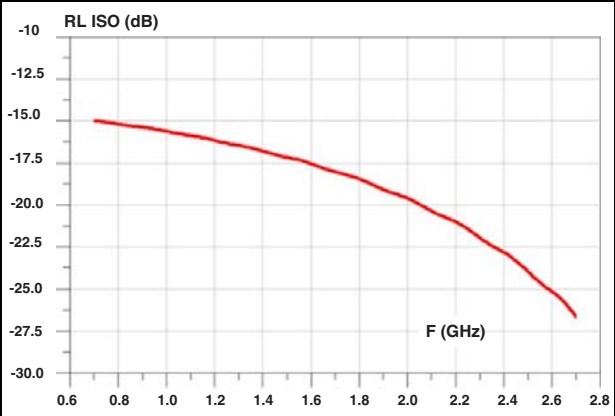


Figure 8. RL ISO



2 Package information

- Epoxy meets UL94, V0
- Lead-free package

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 9. Package dimensions

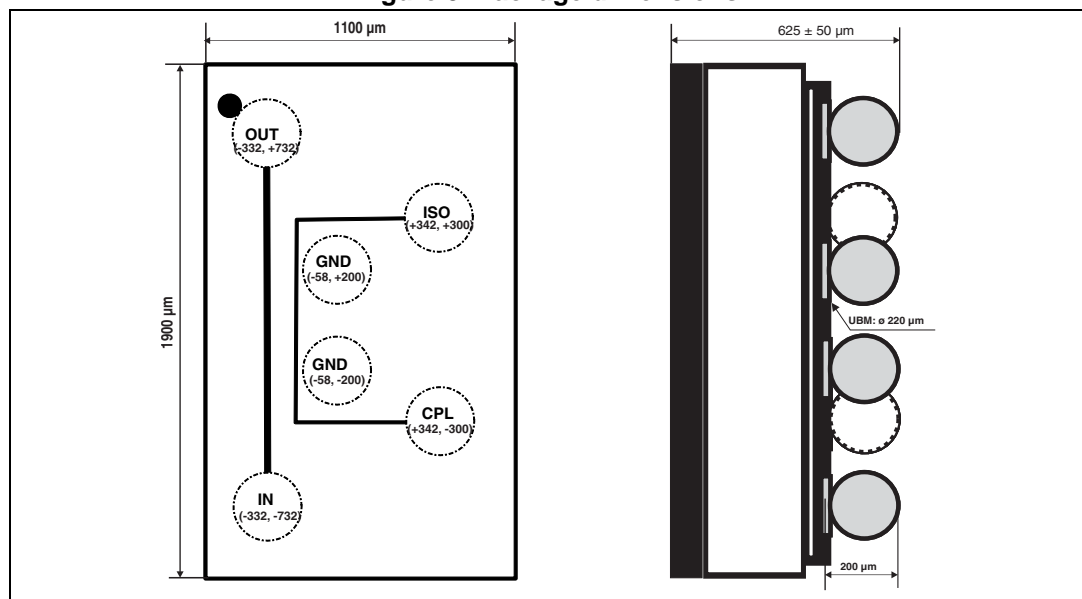


Figure 10. Footprint - non solder mask defined

Figure 11. Footprint - solder mask defined

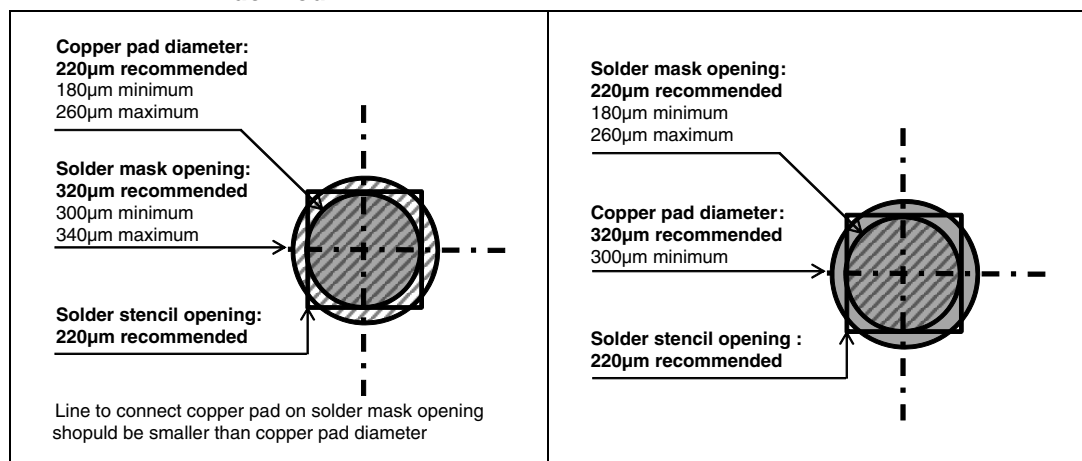


Figure 12. Marking

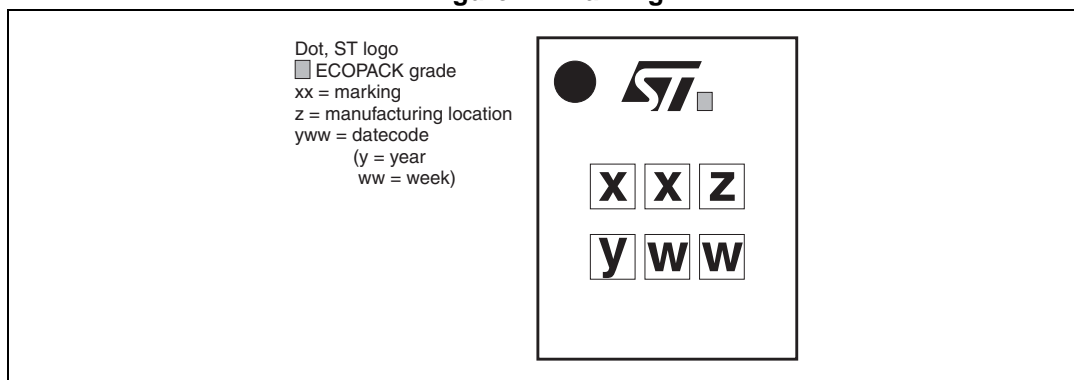


Figure 13. Land pattern recommendations

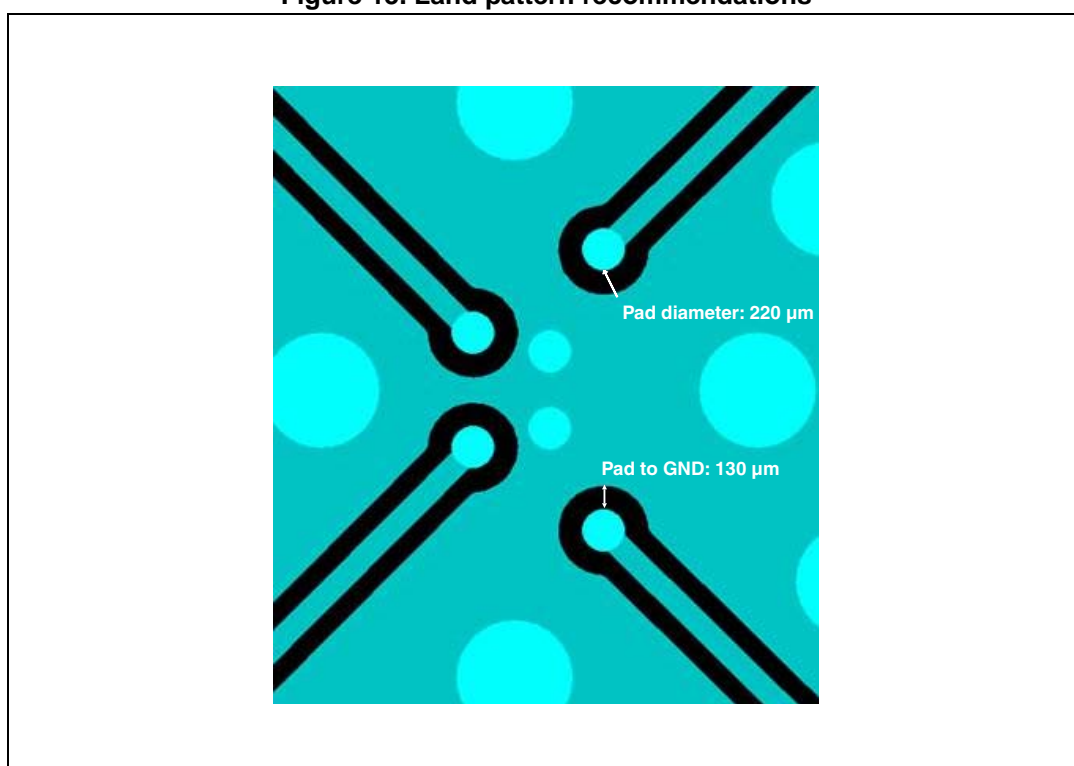
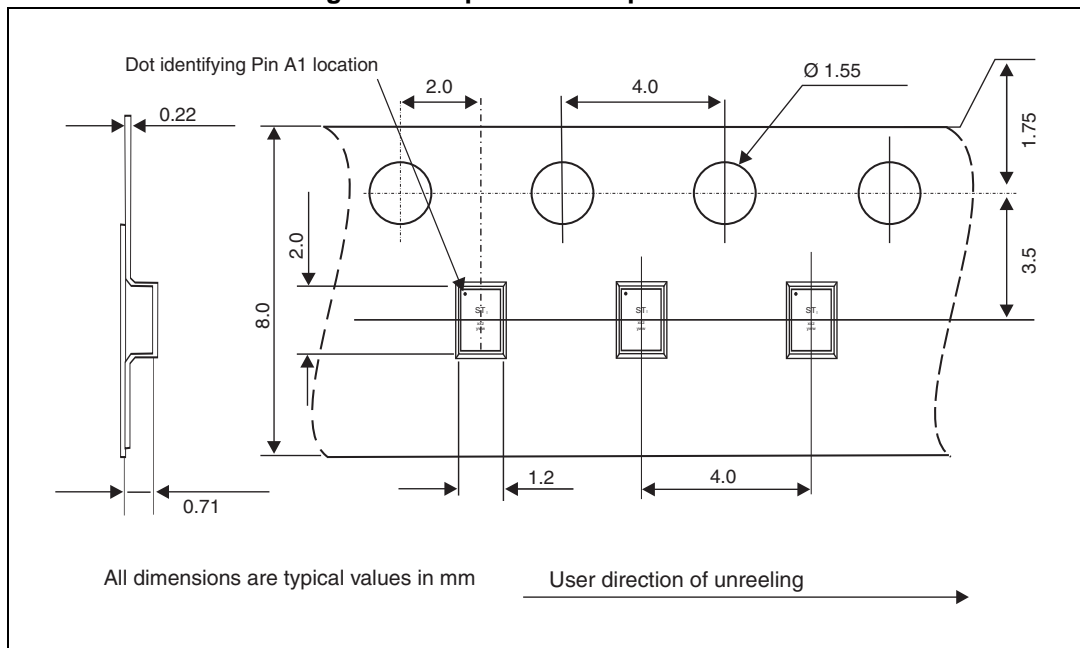


Figure 14. Tape and reel specifications



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

3 Ordering information

Table 4. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
CPL-WBF-00D3	SD	Flip Chip	2.35 mg	5000	Tape and reel (7")

4 Revision history

Table 5. Document revision history

Date	Revision	Changes
09-Jan-2013	1	Initial release
09-Aug-2013	2	Updated footprint graphics.

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