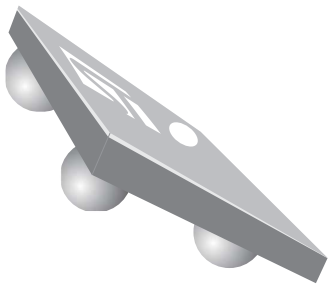
BALF-CC25-02D3

50 ohm, conjugate match to CC2541 transformer balun

Datasheet – production data



Flip-Chip package
4 bumps

Features

- 2.45 GHz balun with integrated matching network
- Matching optimized for following CC2541
- Low insertion loss
- Low amplitude imbalance
- Low phase imbalance
- Coated Flip-Chip on glass
- Small footprint: < 0.88 mm²

Benefits

- Very low profile
- High RF performance
- PCB space saving versus discrete solution
- BOM count reduction
- Efficient manufacturability

Description

STMicroelectronics BAL-CC25-02D3 is an ultra miniature balun which integrates a matching network in a monolithic glass substrate. This has been customized for the CC2541 RF transceivers.

It's a design using STMicroelectronics IPD (integrated passive device) technology on non-conductive glass substrate to optimize RF performance.

Figure 1. Pin configuration (top view)

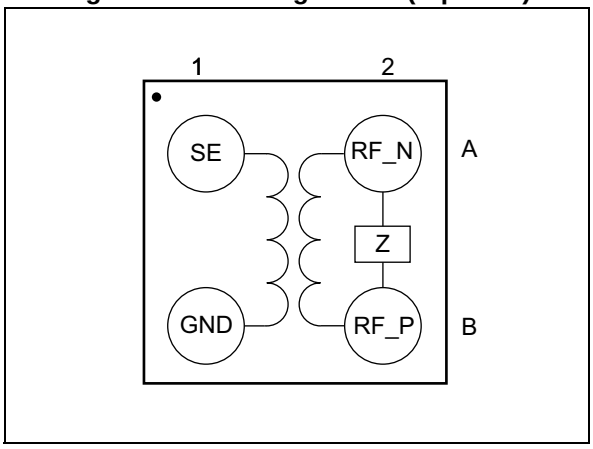
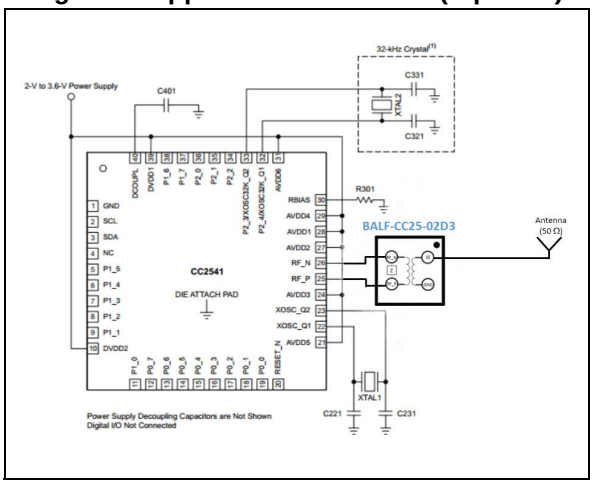


Figure 2. Application schematic (top view)



1 Characteristics

Table 1. Absolute maximum rating (limiting values)

Symbol	Parameter	Value	Unit
P_{IN}	Input power RF_{IN}	20	dBm
V_{ESD}	ESD ratings MIL STD883C (HBM: C = 100 pF, R = 1.5 Ω, air discharge)	2000	V
	ESD ratings machine model (MM: C = 200 pF, R = 25 Ω, L = 500 nH)	500	
	ESD ratings charged device model (CDM, JESD22-C101D)	500	
T_{OP}	Operating temperature	-40 to + 105	°C

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

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
Z_{OUT}	Nominal differential output impedance	Conjugate match to CC2541			Ω
Z_{IN}	Nominal input impedance		50		
F	Frequency range (bandwidth)	2379		2507	
I_L	Insertion loss in bandwidth		1.6	1.8	dB
R_{L_SE}	Single ended return loss in bandwidth	9	10		dB
R_{L_DIFF}	Differential ended return loss in bandwidth	9	17		dB
Φ_{imb}	Phase imbalance		7		°
A_{imb}	Amplitude imbalance		0.6		dB

Figure 3. Balun transmission (T_{amb} = 25 °C)

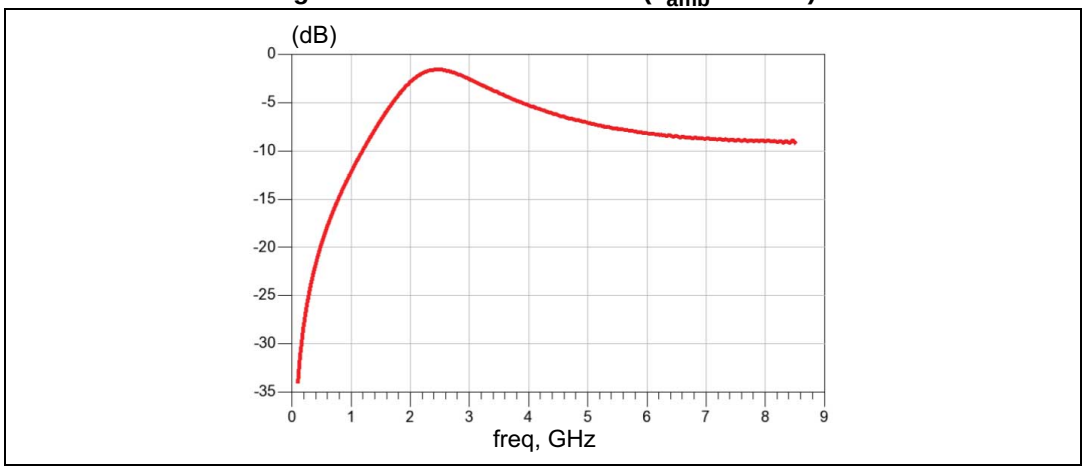


Figure 4. Insertion loss (T_{amb} = 25 °C)

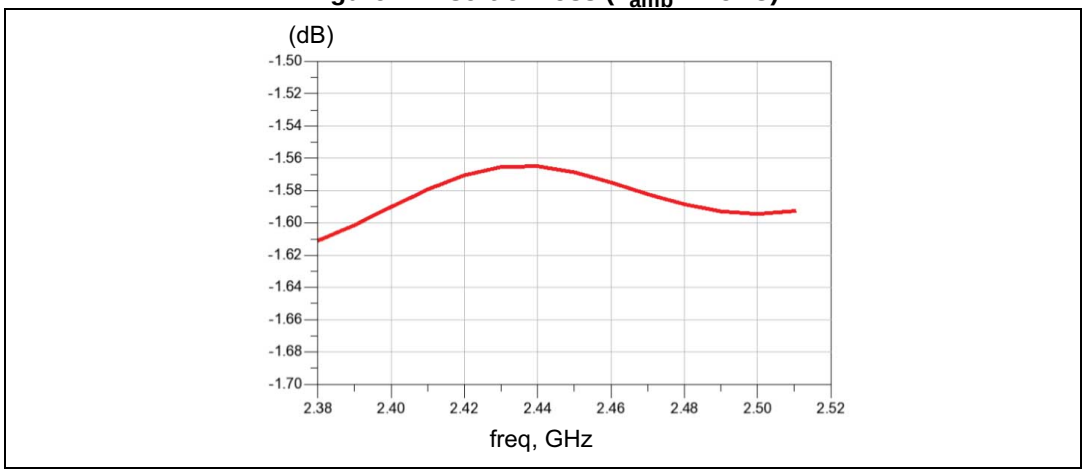


Figure 5. Return loss on SE port (T_{amb} = 25 °C)

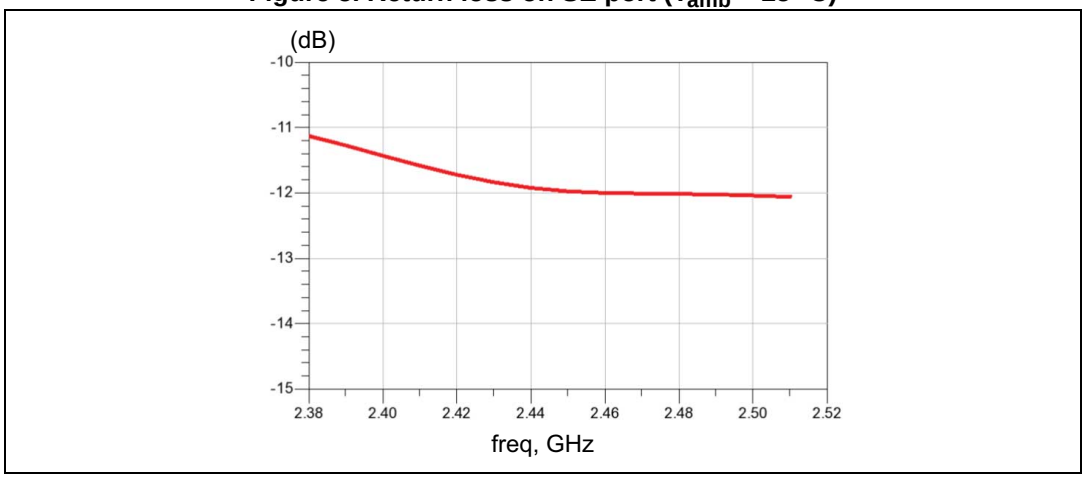


Figure 6. Return loss on DIFF port (T_{amb} = 25 °C)

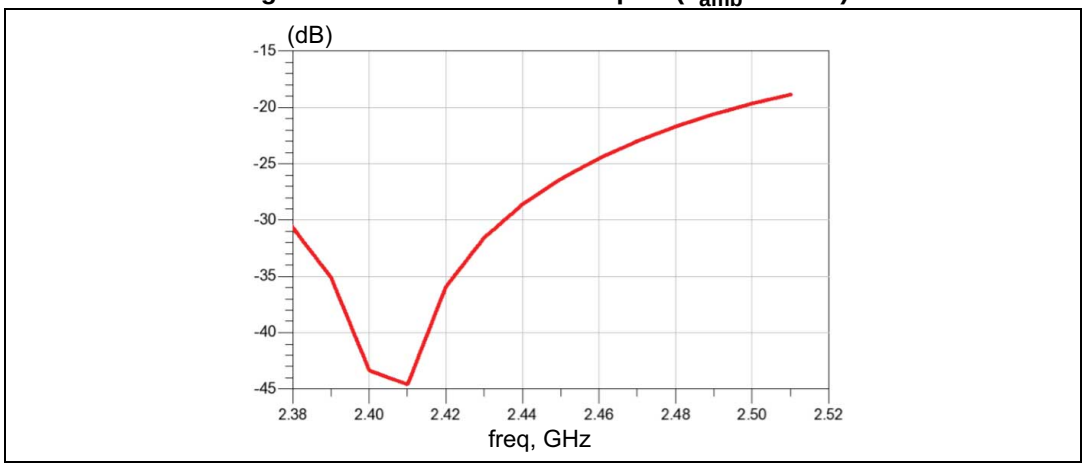


Figure 7. Amplitude imbalance (T_{amb} = 25 °C)

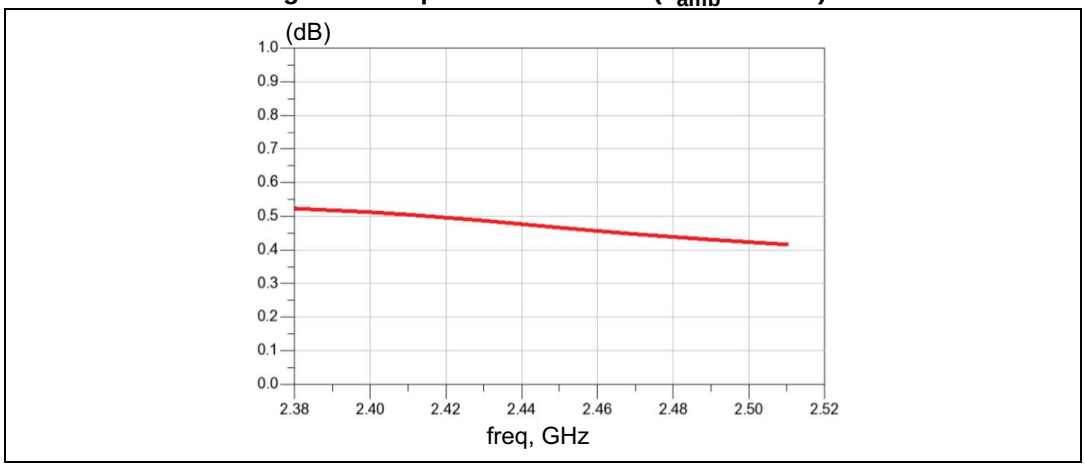
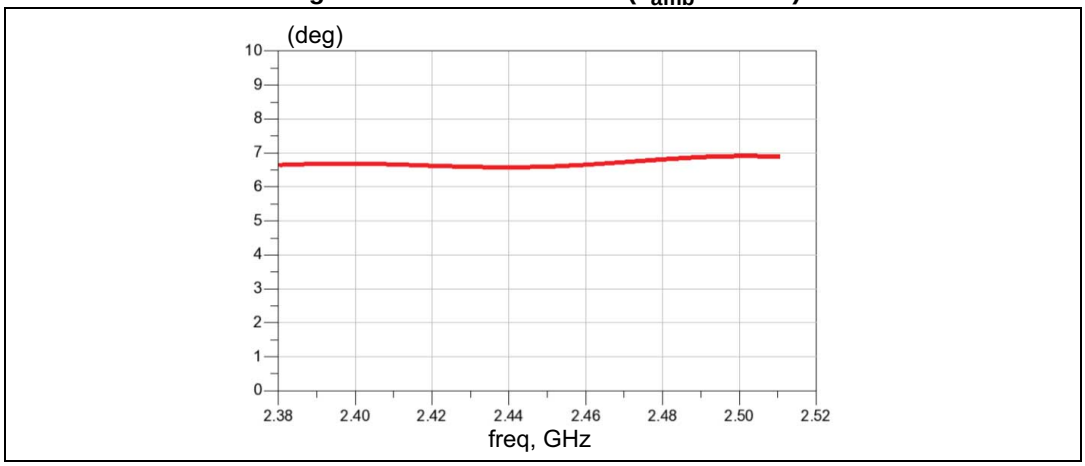


Figure 8. Phase imbalance (T_{amb} = 25 °C)



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.

2.1 Flip-Chip package information

Figure 9. Flip-Chip package outline

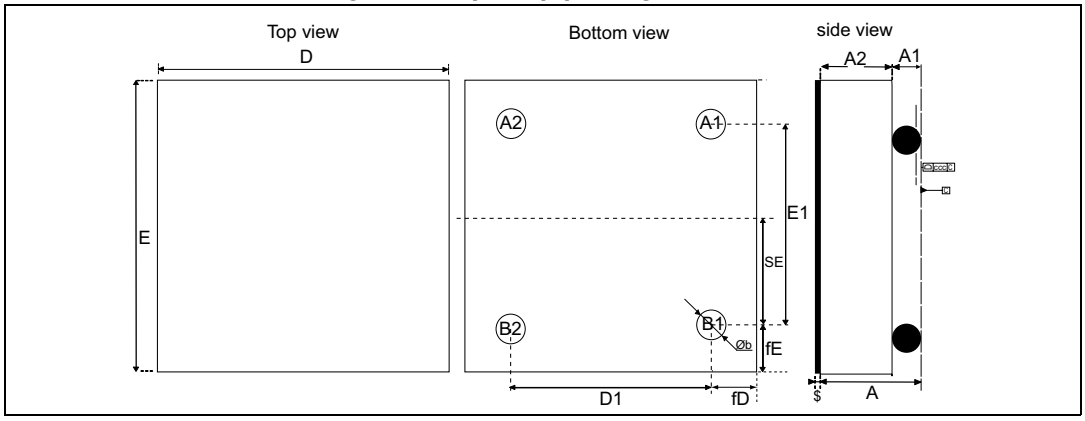


Table 3. Flip-Chip package mechanical data

Parameter	Description	Min.	Typ.	Max.	Unit
A	Bump height + substrate thickness	0.570	0.630	0.690	mm
A1	Bump height	0.155	0.205	0.255	mm
A2	Substrate thickness		0.400		mm
b	Bump diameter	0.215	0.255	0.295	mm
D	Y dimension of the die	0.890	0.940	0.990	mm
D1	Y pitch		0.500		mm
E	X dimension of the die	0.890	0.940	0.990	mm
E1	X pitch		0.500		mm
SE			0.250		mm
fD	Distance from bump to edge of die on Y axis		0.220		mm
fE	Distance from bump to edge of die on X axis		0.220		mm
ccc				0.05	mm
$			0.025		mm

Figure 10. Footprint

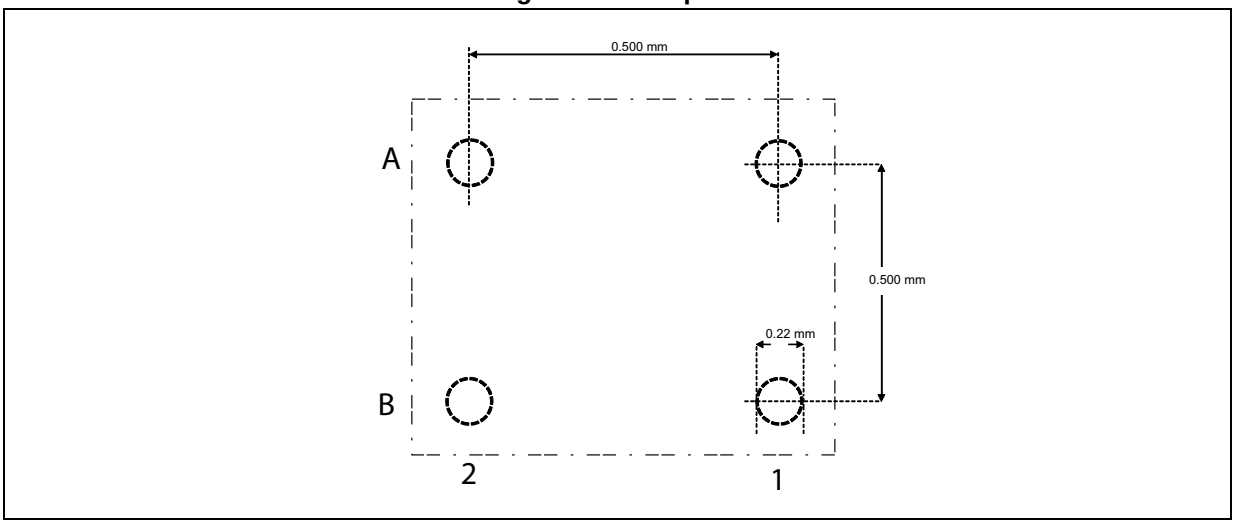
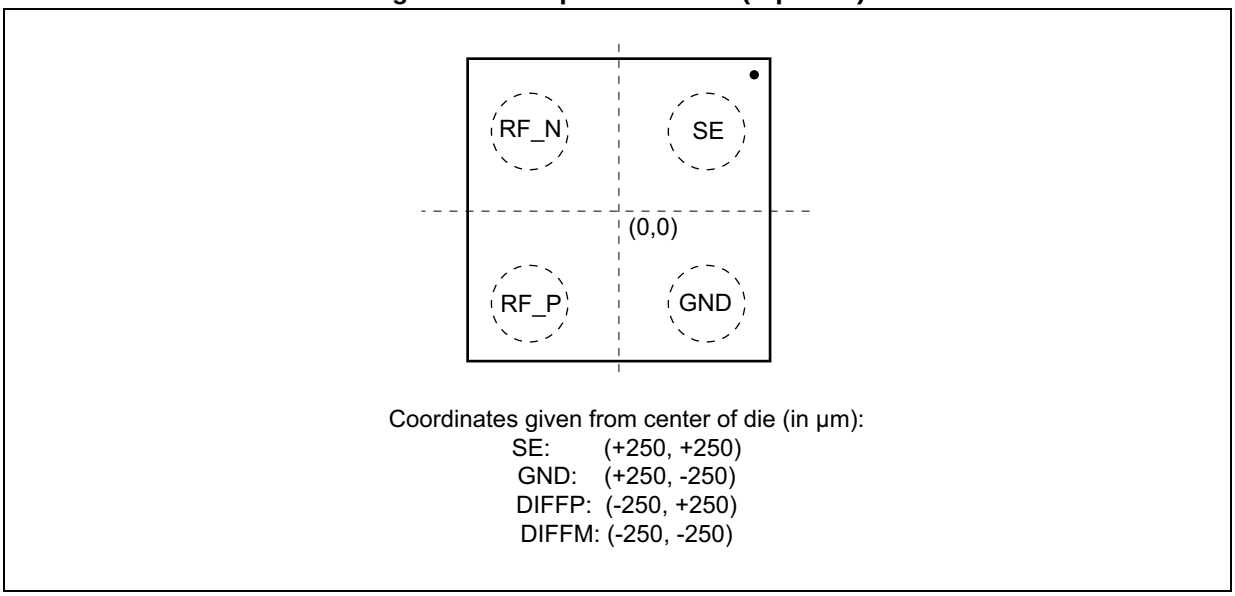


Figure 11. Bump coordinates (top view)



Coordinates given from center of die (in µm):
SE: (+250, +250)
GND: (+250, -250)
DIFFP: (-250, +250)
DIFFM: (-250, -250)

Figure 12. Footprint - 3 mils stencil -non solder mask defined

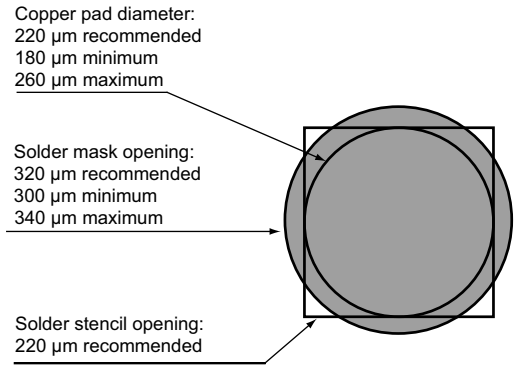


Figure 13. Footprint - 3 mils stencil - solder mask defined

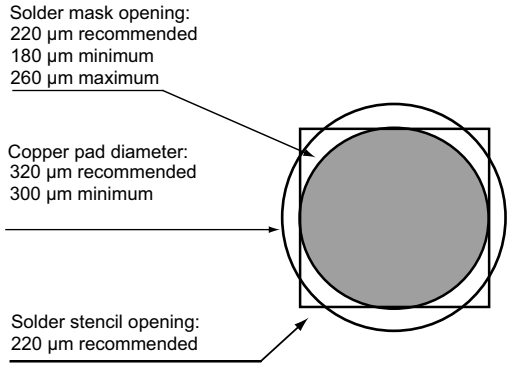


Figure 14. Footprint - 5 mils stencil -non solder mask defined

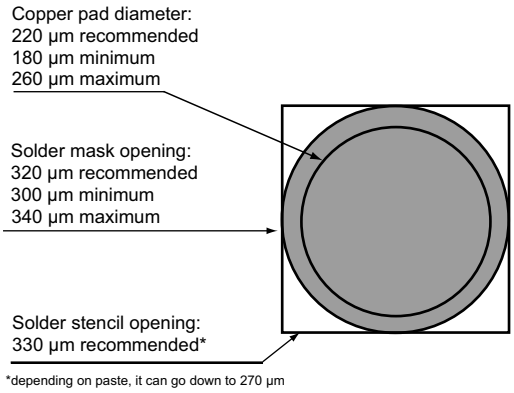


Figure 15. Footprint - 5 mils stencil - solder mask defined

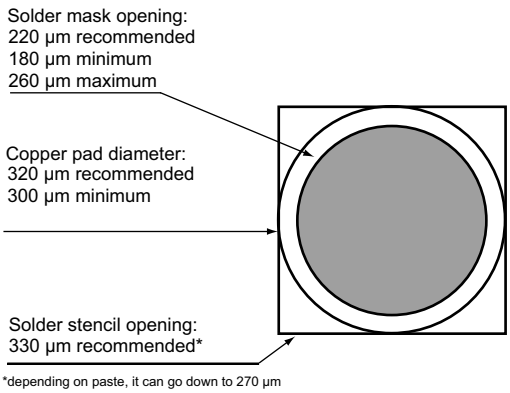


Figure 16. PCB layout recommendation

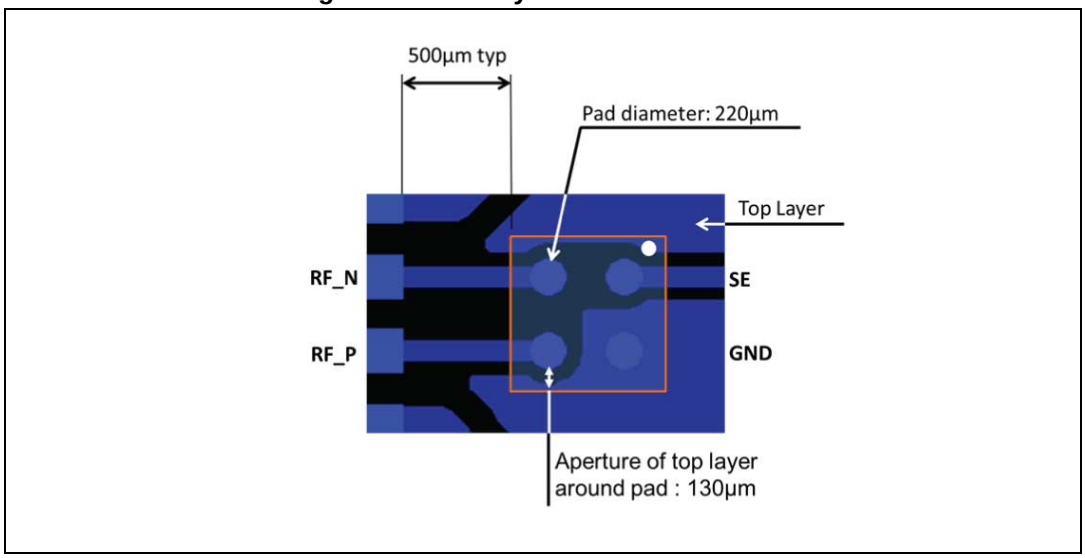
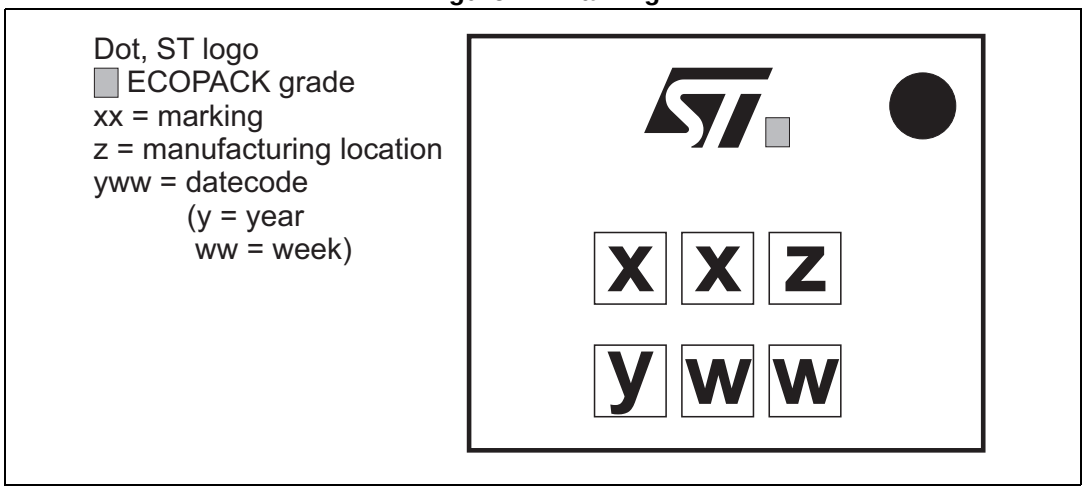
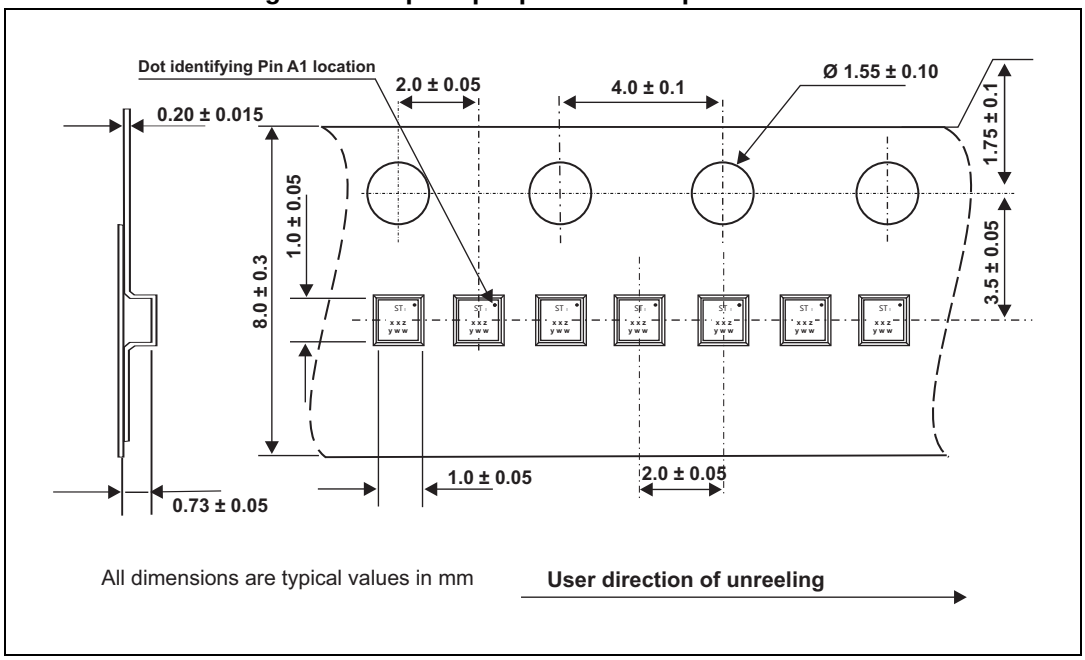


Figure 17. Marking



Note: More information is available in the STMicroelectronics Application note: AN2348 Flip-Chip: "Package description and recommendations for use"

Figure 18. Flip Chip tape and reel specifications



Note: More information is available in the application note:

AN2348: “Flip Chip: package description and recommendations for use”

3 Ordering information

Table 4. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
BAL-CC25-02D3	TE	Flip Chip	1.07 mg	5000	Tape and reel (7”)

4 Revision history

Table 5. Document revision history

Date	Revision	Changes
17-Nov-2015	1	Initial release