



RFID Inlay Placement/Power Guidelines

www.zebra.com/transponders

Zebra R110Xi/R170Xi UHF -R0

Model Number: RXX-7XX-XXXX

Revision Date: 23-Apr-14

This document defines the optimal encode position for RFID inlays when used with Zebra Printer/Encoders. These guidelines are provided for two purposes.

1. To define the optimal inlay position (x), minimum inlay pitch (y), and encoder power setting for RFID media **without use of the program position command**. Media converted to these guidelines require **no RFID calibration step**, and no extra media movement for RFID encoding. This is the optimal method to print and encode RFID media.
2. For media converted to a compatible inlay pitch (y), but different inlay position (x), these guidelines should be used to determine the required inlay program position. Program position is set by parameter "p" of the ^RS command. This can be useful for encoding directly to wet inlays, or for using media converted to a different inlay position.

Three critical dimensions define transponder placement and pitch, as shown in the schematic to the right and explained below.

Parameter	Name	Definition	Explanation
a (mm)	Inlay Center	Left liner edge to inlay center Viewed from facestock side, feed direction down	RF coupling with the inlay can change horizontally across the width of the label. This dimension is relative to the inlay <i>antenna center</i> , which is not always the same as the chip location. "a" is typically defined with a $\pm 3\text{mm}$ tolerance.
x (mm)	Inlay Position	Label Start to inlay antenna leading edge	This dimension ensures proper RF coupling with the inlay in the current label. It is relative to the inlay <i>antenna leading edge</i> . This is also the optimal distance from the printline to inlay antenna during encoding. "x" is generally given with a $\pm 3\text{mm}$ tolerance.
y (mm)	Inlay Pitch	Distance from inlay antenna leading edge to inlay antenna leading edge.	If Inlays are spaced too close together, coupling to multiple inlays can sometimes occur. This dimension ensures coupling with only the inlay in the current label. "y" defines the <i>minimum pitch</i> required to avoid multiple coupling.

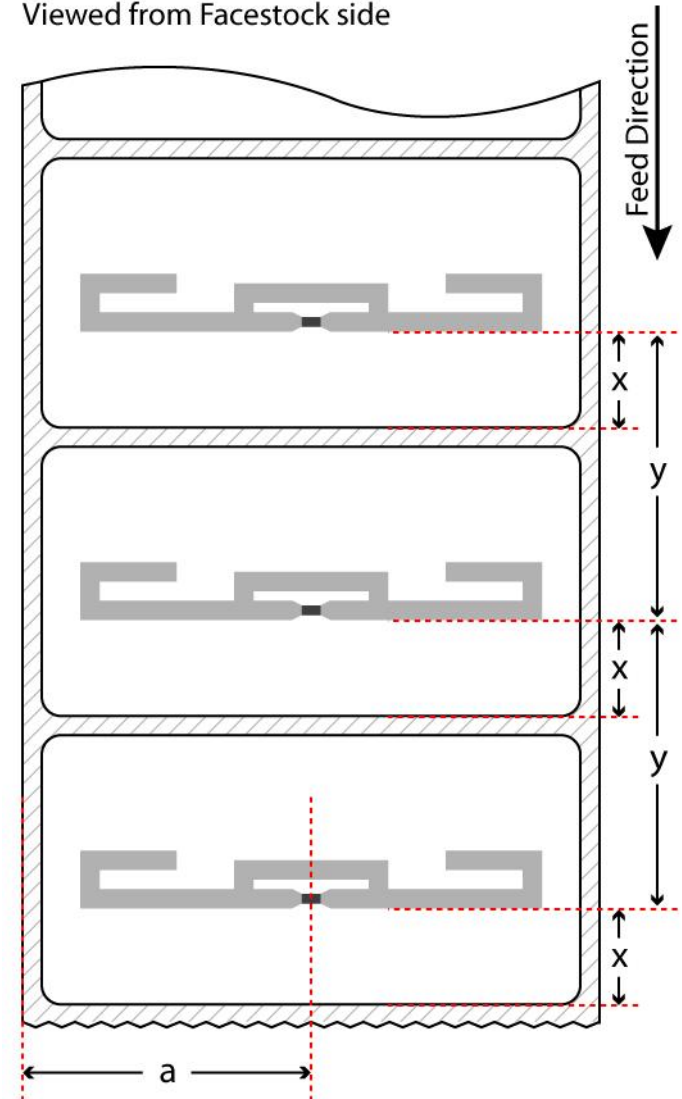
Example 1: Determine the optimal converting position for an Avery AD-223 Inlay in a 4"x2" label with 1/8" gap for the R110Xi UHF to be used in Region 0. The guideline specifies a=51mm, x=34mm, y 51mm. Since the label + gap length, 2.125", is greater than "y", inlay pitch is compatible with the guideline. The leading edge of the inlay antenna should be placed 34mm from the "Label Start". In this case, "Label Start" is the leading edge of the label.

Example 2: Determine the program position for a Raflatrac Short Dipole #3001490 converted to a=50mm, x=2mm, y=20mm for the RZ400 UHF to be used in Region 0. The guideline specifies a=51mm, x=13mm, y 20mm. In this case, "a" and "y" are compatible with the guideline, but "x" is not. To encode the inlay, the label needs to move *backward* into the printer by a distance of: 13mm - 2mm = 11mm. This can be accomplished by setting parameter "p" of the ^RS command to "B11". Program position capabilities vary by printer model and firmware version. See the Zebra RFID Programming Guide and firmware release notes for more information.











Note:











- Guidelines are only valid for the specified printer model and region.
- Many inlays look similar, but behave very differently. Guidelines are only valid for the specific inlay listed.
- Inlay orientation is critical. Images are shown as viewed through the media facestock, with feed direction down.
- For media compliant to the guidelines below, do not run the printer RFID calibrate procedure.
- "Label Start" is defined by one of three different methods: 1) The leading edge of a label, 2) The leading edge of a black mark, or 3) The leading edge of a notch (See printer specifications for mark and notch requirements).
- Because "y" is defined as a minimum distance, for some inlays "y" can actually be smaller than "x". In this case, a program position is required to run the media at the minimum pitch.
- Inlay pitch, "y", is not always equal to the label length + 1/8" gap. In some cases, labels are converted with a larger gap, to accommodate the minimum pitch requirement.
- Guidelines are established using the latest printer firmware. See www.zebra.com for firmware updates.











Viewed from Facestock side













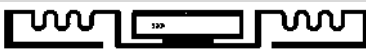
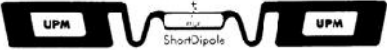

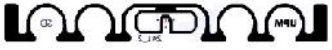






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Date	Manufacturer	Part #	Orientation (Size not to scale)	Region 0 (US/Canada/Mexico)					
				Inlay			Position (mm)		
				a (±3)	x (±3)	y (≥)	Read	Write	
06/01/12	Alien	ALN-9610		28	20	61	Low	High	
06/01/12	Alien	ALN-9610		28	31	51	Low	High	
02/15/10	Alien	ALN-9629		19	28	51	High	High	
11/19/10	Alien	ALN-9630		35	21	51	Low	Med	
09/25/08	Alien	ALN-9640		51	29	51	Low	Med	
12/11/08	Alien	ALN-9654		52	15	54	Low	Low	
09/25/08	Alien	ALN-9662		40	15	51	Low	Med	
01/21/13	Alien	ALN-9710		25	18	64	Med	Med	
04/03/14	Alien	ALN-9720		26	30	51	Med	High	
05/31/13	Alien	ALN-9728		25	9	52	Med	Med	



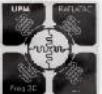







Date	Manufacturer	Part #	Inlay Orientation (Size not to scale)	Region 0 (US/Canada/Mexico)				
				Position (mm)			Power	
				a (±3)	x (±3)	y (≥)	Read	Write
03/25/13	Alien	ALN-9730		38	18	52	Med	High
07/27/12	Alien	ALN-9740		51	22	55	Low	High
11/07/12	Alien	ALN-9762		38	14	51	Low	High
08/29/13	Alien	ALN-9770		44	21	52	Med	High
01/18/13	Avery	AD-171 M5		25	17	64	Med	Med
11/18/08	Avery	AD-223		51	34	51	Low	Low
11/18/08	Avery	AD-223		51	34	51	Low	Low
12/15/08	Avery	AD-224		51	38	51	Low	Low
04/25/11	Avery	AD-226		51	35	52	Low	Low
04/25/11	Avery	AD-226		51	30	52	Low	Low


Date	Manufacturer	Part #	Inlay Orientation (Size not to scale)	Region 0 (US/Canada/Mexico)				
				Position (mm)			Power	
				a (±3)	x (±3)	y (≥)	Read	Write
09/19/12	Avery	AD-227		51	25	48	low	low
08/14/09	Avery	AD-230		38	19	51	Low	Low
10/12/12	Avery	AD-232		38	27	51	Low	High
10/12/12	Avery	AD-232		38	16	51	Low	High
05/31/13	Avery	AD-233m5		38	14	52	Low	Med
12/17/09	Avery	AD-240		51	26	54	Low	Low
06/06/11	Avery	AD-380		38	19	52	Med	High
02/04/10	Avery	AD-641		51	32	102	Low	Low
11/13/13	Avery	AD-806u7		16	17	60	Low	Low
11/11/13	Avery	AD-806u7		16	19	60	Low	Low

Date	Inlay			Region 0 (US/Canada/Mexico)				
				Position (mm)			Power	
				a (±3)	x (±3)	y (≥)	Read	Write
Manufacturer	Part #	Orientation (Size not to scale)						
06/09/09	Avery	AD-814		25	19	70	High	High
12/17/09	Avery	AD-815		13	20	61	Med	Med
08/14/09	Avery	AD-833		25	5	155	Med	Med
03/31/09	Avery	AD-843		51	20	60	Low	Low
11/08/10	Confidex	DS340 (Carrier)		35	31	51	Med	Med
03/13/13	Invengo	8024-C13-FSI Butterfly		30	22	52	Med	Med
05/31/13	Invengo	8029-C13-FPI xWing		38	14	45	Low	Low
03/20/13	Invengo	8030-C13-FSI Great Wall		52	19	52	Med	Med
03/05/09	Invengo	XTCF-8030A		51	24	51	Low	Low
12/22/10	Sirit	RSI-675		30	27	51	Med	Med

Date	Manufacturer	Part #	Inlay Orientation (Size not to scale)	Region 0 (US/Canada/Mexico)				
				Position (mm)			Power	
				a (±3)	x (±3)	y (≥)	Read	Write
03/06/09	Sirit/RSI	ADK-A or ADK-E		51	21	54	Low	Low
06/10/09	Smartrac	3001282		51	23	51	Low	Low
08/14/09	Smartrac	3001593		51	38	51	Low	Low
11/18/08	Smartrac	3001490 M3 SD		51	29	51	Low	Low
11/18/08	Smartrac	3001490 M3 SD		51	29	51	Low	Low
01/09/09	Smartrac	3000820 (Version 2)		51	22	51	Med	Med
03/05/09	Smartrac	3001298 Belt		38	31	51	Med	Med
10/16/09	Smartrac	3001572 M3 Dogbone		52	23	54	Low	Low
08/17/09	Smartrac	3001600 M3 Frog		51	6	155	Low	Low
03/01/10	Smartrac	3001871 M3 Belt		38	31	51	Low	Low

Date	Manufacturer	Part #	Inlay Orientation (Size not to scale)	Region 0 (US/Canada/Mexico)				
				Position (mm)			Power	
				a (±3)	x (±3)	y (≥)	Read	Write
03/01/10	Smartrac	3001871 M3 Belt		38	16	51	Low	Low
04/20/10	Smartrac	3001876 M4 Dogbone		51	19	54	Low	Low
01/31/11	Smartrac	3001885 M4 SD		51	29	51	Low	Low
01/31/11	Smartrac	3001885 M4 SD		51	29	51	Low	Low
02/28/11	Smartrac	3001938 NXP Belt		38	30	48	Low	High
02/28/11	Smartrac	3001938 NXP Belt		38	16	48	Low	High
11/19/12	Smartrac	3001998 M5 SD		52	18	51	Low	Low
01/27/12	Smartrac	3002029 M5 Belt		38	13	48	Low	Low
01/27/12	Smartrac	3002029 M5 Belt		38	31	48	Low	Low
10/10/12	Smartrac	3002090 MiniWEB		25	25	30	High	Low

				Region 0 (US/Canada/Mexico)				
Inlay				Position (mm)			Power	
Date	Manufacturer	Part #	Orientation (Size not to scale)	a (±3)	x (±3)	y (≥)	Read	Write
01/09/12	Smartrac	3002237 G2iM SD		51	19	52	Low	Med
04/03/12	Smartrac	D-41		48	4	88	Low	Low
11/09/10	Smartrac	M4 Frog 3D		28	6	80	Low	Low
04/22/14	SML	MAZE M5		50	18	76	Low	Med
04/22/14	SML	MAZE G2iL		50	18	76	Low	High
04/22/14	SML	GB2U		50	22	52	Med	Med
01/23/13	TAGEOS	EOS-100 H4		52	17	52	Med	Med
10/07/14	TRACE	TE14 Thinpropeller		55	30	70	Low	Low
10/21/13	TRACE	TE65 SHORT- APPAREL		43	16	70	Low	Med
04/22/14	Trace ID	TE15 Thinpropeller		50	29	70	Low	Low

				Region 0 (US/Canada/Mexico)				
Inlay				Position (mm)			Power	
Date	Manufacturer	Part #	Orientation (Size not to scale)	a (±3)	x (±3)	y (≥)	Read	Write
04/10/13	VALID	VLID7014		52	14	52	Med	High