

# RFID Tech Insights

Antenna  
Polarisations

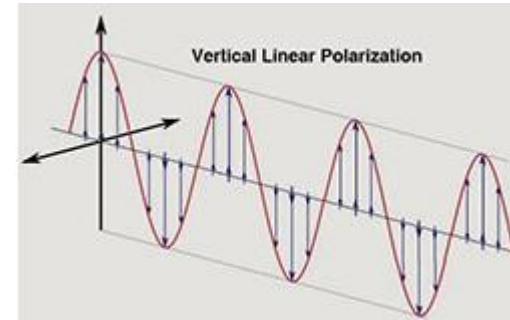
pow·luh·rai·zei·shn

...What does it  
mean?

- ▶ Polarisation refers to the type of RF field emission
- ▶ Antennas resonate in different ways to produce different polarisations
- ▶ There are four types of antenna emissions
  - a) Up and down swinging fields
  - b) Left and right swinging fields
  - c) Left & right, up & down swinging fields
  - d) Spinning fields

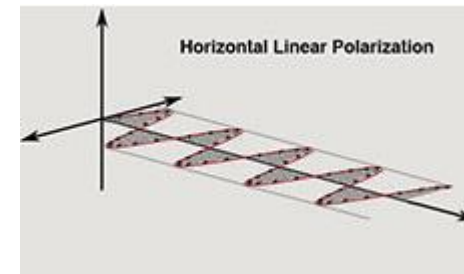
# Vertical linear polarisation

- ▶ Up and down swinging fields are vertical to the ground. Thus they are called vertical linear polarisation
- ▶ Antennas creating these fields are vertically polarised antennas



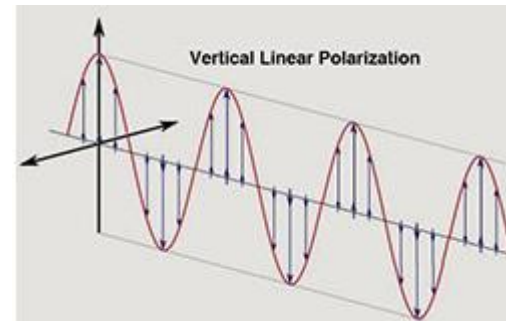
# Horizontal linear polarisation

- ▶ Left and right swinging fields are horizontal to the ground. Thus they are called horizontal linear polarisation
- ▶ Antennas creating these fields are horizontally polarised antennas
- ▶ When a vertically polarised antenna is rotated  $90^\circ$  (physically rotated), the realised emissions are horizontally polarised

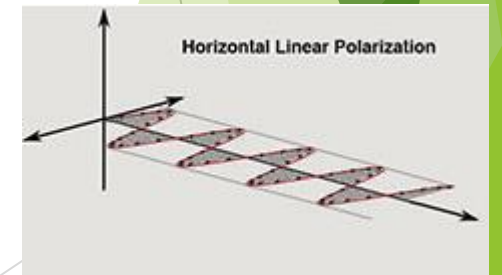


# Dual linear polarisation

- ▶ Dual linear fields are a combination of both horizontal and vertical at different times
- ▶ Antennas creating these fields are dual-linearly polarised antennas
- ▶ Dual polarised antennas will have two connections

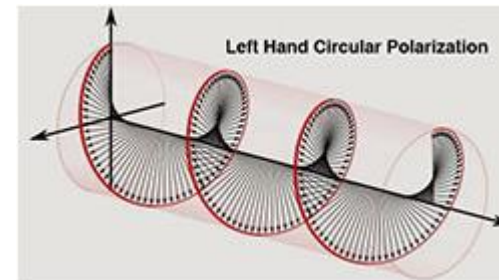


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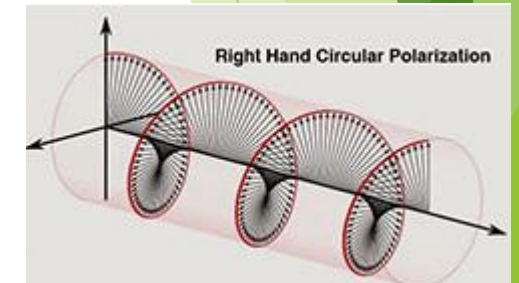


# Circular polarisation

- ▶ Spinning fields are called circular polarisation
- ▶ Antennas creating these fields are circularly polarised antennas
- ▶ Depending on the rotation, it is further classified as right hand and left hand circular polarisations
- ▶ ALL Times-7 circularly polarised antennas are right hand circular



OR



# Is one polarisation better than the other ?

- ▶ Circularly polarised reader antennas are pragmatic and often preferred because they can detect tagged assets in various orientations.
- ▶ Linearly polarised antennas are preferred in places where the tag's orientation is controlled or stray reads need to be avoided
- ▶ Linearly polarised antennas are also preferred in long-distance tag reading as they are often more powerful than circular antennas

Did you  
know that  
some  
antennas are  
not polarised  
at all ?

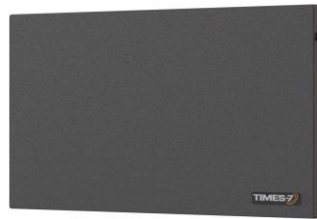
- ▶ Nearfield antennas do not have a polarisation as such
- ▶ These antennas create intense near-zone magnetic fields but are inefficient in radiating
- ▶ A loop like structure in tags is often used to capture the near-zone signals
- ▶ The signal reception sensitivity in one orientation may be higher than the other depending upon the loop's construction
- ▶ Times-7 Nearfield antennas are not loop antennas, therefore they provide an evenly distributed nearfield zone



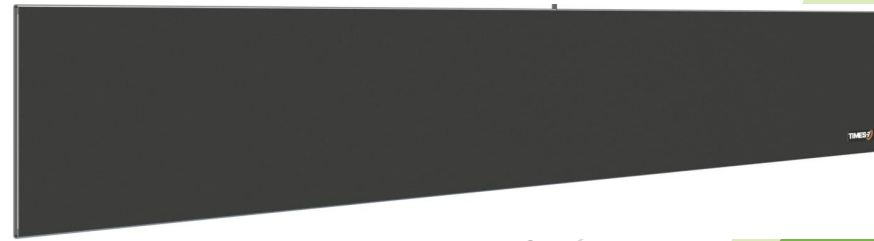
# Times-7's Vertically polarised antennas



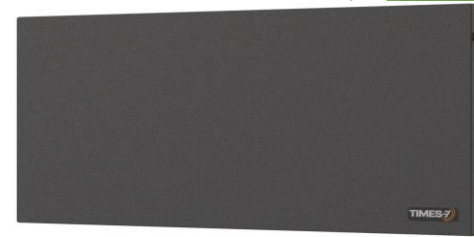
A4030L



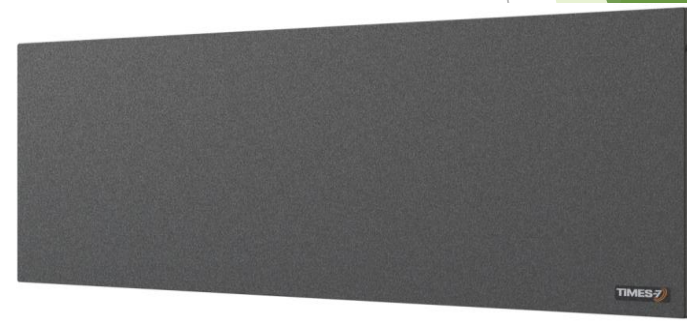
A7040



A5531-V



A7060

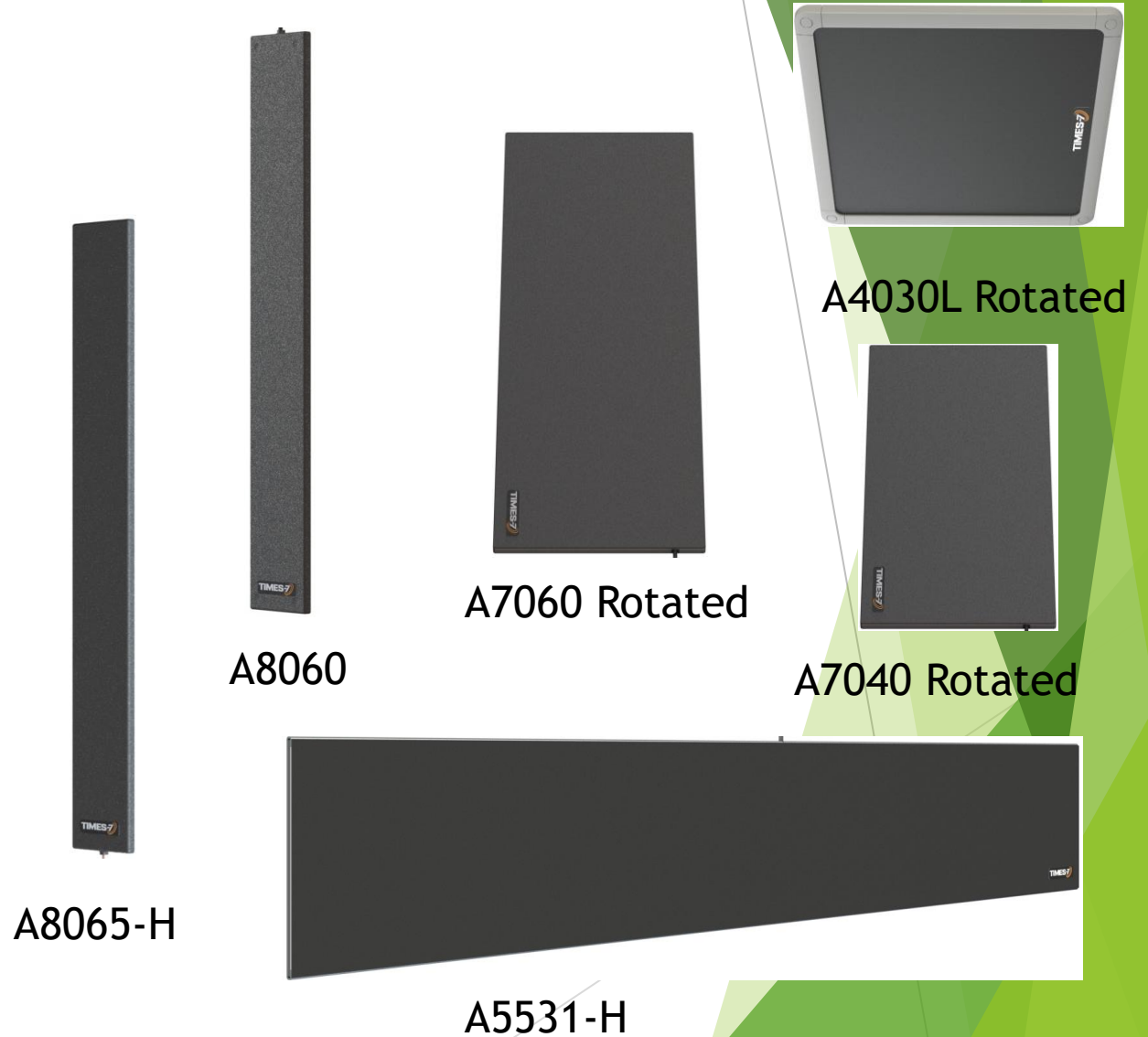


A6590L

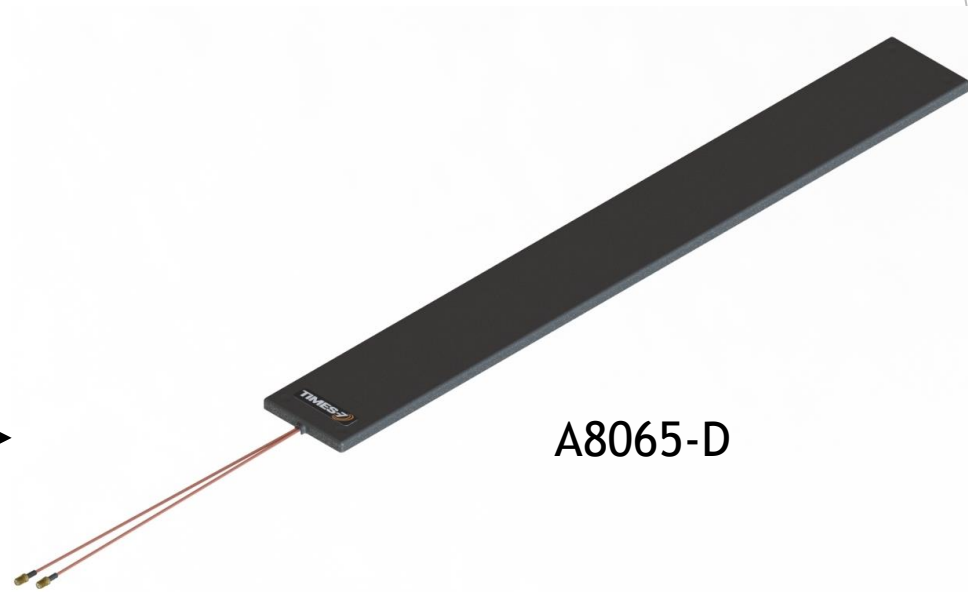
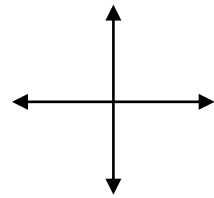


A8065-V

# Times-7's Horizontally polarized antennas



# Times-7's Dual linearly polarised antennas



A8065-D

# Times-7 antennas without polarisation



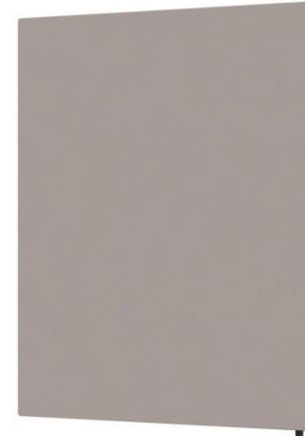
A1001



A1115



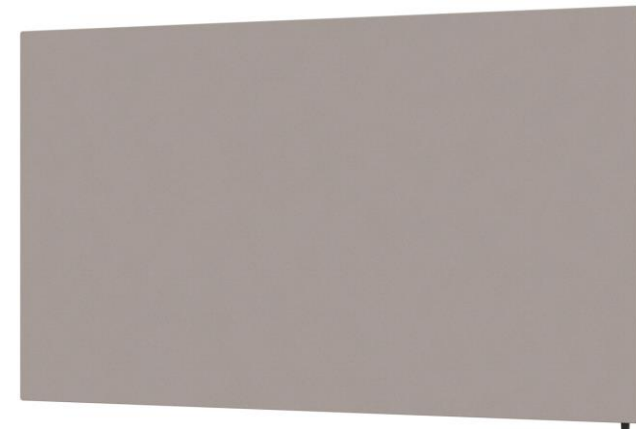
A5020 NF



A1130



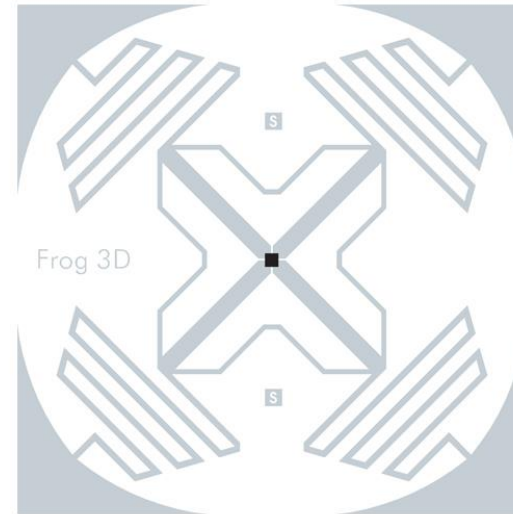
A1030



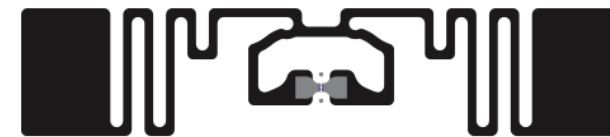
A1163

Did you know that polarisations apply to tags as well ?

Alien SIT tag with no polarisation



Dual linearly polarised Smartrac Frog-3D tag



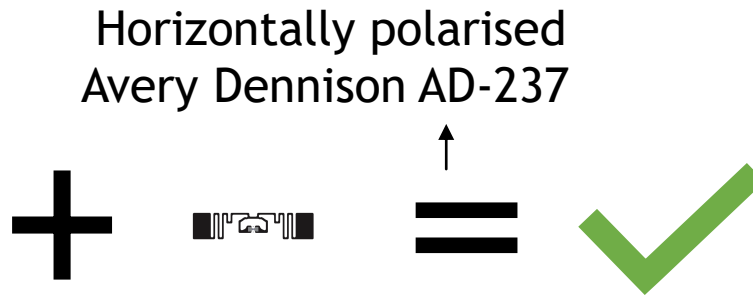
Linearly polarized Avery Dennison AD-237

Linearly polarised Alien Squiggle tag

# Best practices

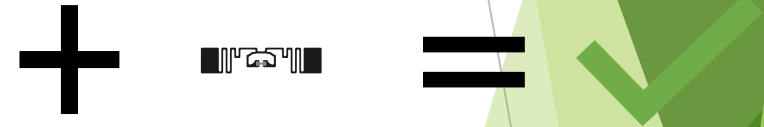


A8060



B6031

Horizontally polarised  
Avery Dennison AD-237



A4030L  
(vertically polarised)



Horizontally polarised  
Avery Dennison AD-237

# Can the antennas' emission cancel each other out?

- ▶ Polarisation cancelling will happen when two or more antennas are energised at the same time
- ▶ In RFID, antennas are not powered at once but the signal is switched between different antennas
- ▶ A 4-port reader with or without a multiplexor connected will switch the signal between the number of antennas connected.