The ALBA Linac is a 100 MeV electron linac supplied by THALES Communications as a turn-key system. It is used as a pre-injector for the ALBA Synchrotron Light Source. The ALBA Linac was commissioned in 2008 and it works in routine operation since 2010. The Linac produces an electron beam up to 4nC in either Single or Multi Bunch modes. The normalized beam emittance is below 30π mm mrad.

<table>
<thead>
<tr>
<th>Parameter at Linac Exit</th>
<th>SINGLE BUNCH MODE</th>
<th>MULTI BUNCH MODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Bunches</td>
<td>1 to 16</td>
<td>[18 ... 512]</td>
</tr>
<tr>
<td>Pulse Length</td>
<td>&lt; 1ns (FWHM)</td>
<td>[36 ... 1024] ns</td>
</tr>
<tr>
<td>Bunch spacing</td>
<td>6 ... 256 ns</td>
<td>2ns</td>
</tr>
<tr>
<td>Charge</td>
<td>Q ≥ 1.5 nC</td>
<td>3 ≤ Q ≤ 4 nC</td>
</tr>
<tr>
<td>Energy</td>
<td>≥ 100 MeV</td>
<td>≥ 100 MeV</td>
</tr>
<tr>
<td>Relative energy spread</td>
<td>≤ 0.5 % (rms)</td>
<td>≤ 0.5 % (rms)</td>
</tr>
<tr>
<td>Norm. Emittance (1σ)</td>
<td>≤ 0.5 % (rms)</td>
<td></td>
</tr>
<tr>
<td>Energy Variation Pulse-to-pulse</td>
<td>0.25% (rms)</td>
<td></td>
</tr>
<tr>
<td>Beam position stability Pulse-to-pulse</td>
<td>&lt;10% of beam size</td>
<td></td>
</tr>
<tr>
<td>Jitter pulse-to-pulse</td>
<td>≤ 100 ps (rms)</td>
<td></td>
</tr>
<tr>
<td>Repetition rate</td>
<td>1 to 5 Hz</td>
<td></td>
</tr>
</tbody>
</table>

**LINAC INJECTION MODES**

**Single Bunch Mode (SBM)**
- Number of bunches per injection: 1-16
- Time interval between bunches: 6-256 ns

**Multi-Bunch Mode (MBM)**
- Number of bunches per injection: 18 - 512
- Time interval between bunches: fixed, 2 ns

**Fast Current Transformer signals**
- E_{kin} = 90 keV
- Pulse length = 1ns FWHM
- Pulse length = 0.22 ns FWHM

**Diagnostic element**
- Fast Current Transformer: 6
- Fluorescence Screen, YAG: 3
- Beam Position Monitor: 1
- Beam Charge Monitor: 1

**RF power to cavities**
- 2 Klystrons TH2100
- Pulsed at 3 GHz
- 37 MW peak

**Beam at Linac exit**
- E = 110 MeV
- ΔE = 0.35 %

**2 Accelerating Sections**
- 96 cell – 2/3 π Travelling Wave.
- Constant gradient: 10-15 MV/m
- Beam at crest
- Energy gain: 55 MeV

**Beam at Linac exit:**
- E = 110 MeV
- ΔE = 0.35 %

**Thermionic cathode**
- 90 keV electrons
- DC-beam

**Buncher**
- 22 cell - standing wave ±2
- Bunch compression
- Energy Gain: 16 MeV

**2 Pre-bunchers:**
- 500 MHz and 3 GHz
- Bunch compression and energy spread reduction