Vertical signal shift when working at different Mark-Space ratios

<table>
<thead>
<tr>
<th>Mark-Space ratio</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>1-to-2 Mark-Space ratio</td>
<td>An AC-coupled signal with a 1-to-2 Mark-Space ratio has a pos-neg Amplitude ratio of 2-to-1</td>
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<tr>
<td>1-to-4 Mark-Space ratio</td>
<td>1-to-4 Mark-Space ratio -&gt; pos-neg Amplitude ratio of 4-to-1</td>
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<tr>
<td>1-to-9 Mark-Space ratio</td>
<td>1-to-9 Mark-Space ratio -&gt; pos-neg Amplitude ratio of 9-to-1</td>
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<tr>
<td>1-to-99 Mark-Space ratio</td>
<td>1-to-99 Mark-Space ratio -&gt; pos-neg Amplitude ratio of 99-to-1</td>
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<tr>
<td>M-S ratio</td>
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</table>
| 1-to-1 | ![Graph 1-to-1](image1.png) | pos swing 3.8 V  
neg swing 3.9 V  
Max output swing 7.7V | pos swing 500 mV  
pp  
pos swing 250 mV  
neg swing 250 mV |
| 1-to-2 | ![Graph 1-to-2](image2.png) | pos swing 81 mV  
neg swing 169 mV  
total 250 mV | pos swing 160 mV  
pos swing 250 mV  
pp  
neg swing 90 mV  
neg swing 250 mV  
total 250 mV  
pp |
| 1-4 | ![Graph 1-4](image3.png) | pos swing 4.9 V  
neg swing 2.5 V  
total 7.4 V  
pp | pos swing 200 mV  
pp  
pos swing 50 mV  
neg swing 250 mV  
total 250 mV  
pp |
| 1-9 | ![Graph 1-9](image4.png) | pos swing 0.9 V  
neg swing 3.8 V  
total 4.7 V  
pp | pos swing 225 mV  
pp  
pos swing 25 mV  
neg swing 250 mV  
total 250 mV  
pp |
| 1-99 | ![Graph 1-99](image5.png) | pos swing 0.02 V  
neg swing 3.8 V  
total 3.8 V  
pp | pos swing 245 mV  
pp  
pos swing 5 mV  
neg swing 250 mV  
total 250 mV  
pp |

In this case, a maximum output swing of 7.7 V is achieved when driving with a square wave or a balanced PRBS signal of 500 mV pp.
If the positive going pulses are getting shorter, the positive going output pulses clip at ~ 4.7 V
If the negative going pulses are getting shorter, the negative going output pulses clip at ~ -3.8 V