

### M13 Fwd (-20) Primer Binding Site

531 GACGTTGTAA AACGACGGCC AGTCTTAAGC TCGGGCCCCT ACAGGTCACT AATACCATCT  
CTGCAACATT TTGCTGCCGG TCAGAATTCG AGCCCGGGGA TGTCCAGTGA TTATGGTAGA

591 AAGTAGTTGA TTCATAGTGA CTGGATATGT TGTGTTTTAC AGTATTATGT AGTCTGTTTT  
TTCATCAACT AAGTATCACT GACCTATACA ACACAAAATG TCATAATACA TCAGACAAAA

*attR4*

651 TTATGCAAAA TCTAATTTAA TATATTGATA TTTATATCAT TTTACGTTTC TCGTTCAACTT  
AATACGTTTT AGATTAAATT ATATAACTAT AAATATAGTA AAATGCAAAG AGCAAGAAGAA

713

2787

712 TTC TAT ACA AAG TTG NN --- ELEMENT 2 ACA ACT TTG TAT AATAAAGTTG  
AAG ATA TGT TTC AAC NN --- TGT TGA AAC ATA TTATTTCAAC

*attR3*

2801 AACGAGAAAC GTAAAATGAT ATAAATATCA ATATATTTAA TTAGATTTTG CATAAAAAAC  
TTGCTCTTTG CATTTTACTA TATTTATAGT TATATAATTT AATCTAAAAC GTATTTTTTG

2861 AGACTACATA ATACTGTAAA ACACAACATA TCCAGTCACT ATGAATCAAC TACTTAGATG  
TCTGATGTAT TATGACATTT TGTGTTGTAT AGGTCAGTGA TACTTAGTTG ATGAATCTAC

2921 GTATTAGTGA CCTGTACTGC AGGGCGGCCG CGATATCCCC TATAGTGAGT CGTATTACAT  
CATAATCACT GGACATGACG TCCC GCCGGC GCTATAGGGG ATATCACTCA GCATAATGTA

### M13 Reverse Primer Binding Site

2981 GGTTCATAGCT GTTTCCTGGC AGCTCTGGCC  
CCAGTATCGA CAAAGGACCG TCGAGACCGG

