

GGTTTTGTCTGCTTCTGGTTCCGGTTCACACGCTGGTGTATTAAAGGGTATCGACTGGTGTGTTACAGACGCTAG
CCAAAACAGACGAAGACCAAGGCCAAGGTTGCGACCACAATAATTCCCATAGCTGACCACACAATGTCTGCGATC

1650

V L S A S G S G S N A G V I K G I D W C V T D A R
SP-PRO-NHSSP-His6

ATCTAAGGGTGCTTTGGGTAAGGCTGCTTTGAACTTGTCTTTGGGTGGTGGTTTCAACCAGGCTACAAACGACGC
TAGATTCACGAAACCCATTCCGACGAAACTTGAACAGAAACCCACCACCAAAGTTGGTCCGATGTTTGCTGCG

1725

S K G A L G K A A L N L S L G G G F N Q A T N D A
SP-PRO-NHSSP-His6

TGTTACTAGAGCTCAGACTGCTGGAATCTTCGTTGCTGTTGCTGCTGGTAACGATAACAAGGACGCTAGAAACTA
ACAATGATCTCGAGTCTGACGACCTTAGAAGCAACGACAACGACGACCATTGCTATTGTTTCTGCGATCTTTGAT

1800

V T R A Q T A G I F V A V A A G N D N K D A R N Y
SP-PRO-NHSSP-His6

CTCTCCAGCTTCTGCTCCAGCTGTTTGTACTGTTGCTTCTCCACTATCGACGACAAAAGTCCTCTTTCTCTAA
GAGAGGTCGAAGACGAGGTCGACAAACATGACAACGAAGGAGGTGATAGCTGCTGGTTTTTCAGGAGAAAGAGATT

1875

S P A S A P A V C T V A S S T I D D Q K S S F S N
SP-PRO-NHSSP-His6

CTGGGGTTCATCGTTGACATCTACGCTCCAGGTTCCAACATTATTTCCGATGCTCCAGGTGGTGGTGTAGAAC
GACCCCAAGGTAGCAACTGTAGATGCGAGGTCCAAGGTTGTAATAAAGGCTACGAGGTCCACCACCACAATCTTG

1950

W G S I V D I Y A P G S N I I S D A P G G G V R T
SP-PRO-NHSSP-His6

TATGTCTGGTACTTCTATGGCTTCCCCACACGTTTGTGGTGCTGGTGTGCTATGTTGGCTCAAGGTGTTCCAGT
ATACAGACCATGAAGATACCGAAGGGGTGTGCAAACACCACGACCACGACGATACAACCGAGTTCACAAAGGTCA

2025

M S G T S M A S P H V C G A G A A M L A Q G V P V
SP-PRO-NHSSP-His6

TGGTCAGGTTTGTGACAGATTGAAGCAGATCGGTAACGCTGTTGTTAGAAACCCAGGTACTTCCACTACAAACAG
ACCAGTCCAAACACTGTCTAACTTCGTCTAGCCATTGCGACAACAATCTTTGGGTCCATGAAGGTGATGTTTGTC

2100

G Q V C D R L K Q I G N A V V R N P G T S T T N R
SP-PRO-NHSSP-His6

ATTGTTGTATAACGGTTCGGTCAGGGTTCATCATCACCATCACCCTAATAGGGTACCGGCCGGCCATTTAA
TAACAACATATTGCCAAGGCCAGTCCAAGAGTAGTAGTGGTAGTGGTATTATCCCATGGCCGGCCGGTAAATT

2175

L L Y N G S G Q G S H H H H H H
SP-PRO-NHSSP-His6

His6 tag

MCS

Acc65I KpnI NgoMIV NaeI FseI SmaI

ATACAGGCCCTTTTCTTTGTCGATATCATGTAATTAGTTATGTCACGCTTACATTCACGCCCTCCTCCACAT
TATGTCCGGGGAAAAGGAAACAGCTATAGTACATTAATCAATACAGTGCGAATGTAAGTGCGGGAGGAGGGTGT

2250

MCS
CYC1 terminator

CCGCTCTAACCGAAAAGGAAGGAGTTAGACAACCTGAAGTCTAGGTCCTATTTATTTTTTTAATAGTTATGTT
GGCGAGATTGGCTTTTCTTCTCAATCTGTTGGACTTCAGATCCAGGGATAAATAAAAAAATTATCAATACAA

2325

CYC1 terminator

BsrGI MluI

AGTATTAAGAACGTTATTTATATTTCAAATTTTTCTTTTTTTCTGTACAAACGCGTGTACGCATGTAACATTAT
 TCATAATTCTTGCAATAAATATAAAGTTTAAAAAGAAAAAAGACATGTTTGCGCACATGCGTACATTGTAATA

2400

CYC1 terminator

BamHI NotI SacII

ACTGAAAACCTTGCTTGAGAAGGTTTTGGGACGCTCGAAGGCTTTAATTTGCAAGCTGGATCCGCGGCCCGCTTC
 TGACTTTTGAACGAACCTTCCAAAACCTGCGAGCTTCCGAAATTAACGTTTCGACCTAGGCGCCGGCGGAAG

2475

CYC1 terminator

PpADE2 HC promoter

NheI

CAAACCTCATGGATTCTCAGGTAATAGGTATTCTAGGAGGAGGCCAGCTAGGCCGAATGATTGTTGAGGCCGCT
 GTTTGAGAGTACCTAAGAGTCCATTATCCATAAGATCCTCCTCCGGTCGATCCGGCTTACTAACAACCTCCGGCGA

2550

1 5 10 15 20
 M D S Q V I G I L G G G Q L G R M I V E A A

PpADE2

PpADE2 HC promoter

BmtI

AGCAGGCTCAATATCAAGACCGTGATTCTTGATGATGGTTTTTACCTGCTAAGCACATTAATGCTGCGCAAGAC
 TCGTCCGAGTTATAGTTCTGGCACTAAGAACTACTACCAAAAAGTGGACGATTCGTGTAATTACGACGCGTTCTG

2625

25 30 35 40 45
 S R L N I K T V I L D D G F S P A K H I N A A Q D

PpADE2

CACATCGACGGATCATTCAAAGATGAGGAGGCTATCGCCAAGTTAGCTGCCAAATGTGATGTTCTCACTGTAGAG
 GTGTAGCTGCCTAGTAAGTTTCTACTCCTCCGATAGCGGTTCAATCGACGGTTTACTACTACAAGAGTGACATCTC

2700

50 55 60 65 70
 H I D G S F K D E E A I A K L A A K C D V L T V E

PpADE2

ATTGAGCATGTCAACACAGATGCTCTAAAGAGAGTTCAAGACAGAACTGGAATCAAGATATATCCTTTACCAGAG
 TAACTCGTACAGTTGTGTCTACGAGATTTCTCTCAAGTTCTGTCTTGACCTTAGTTCTATATAGGAAATGGTCTC

2775

75 80 85 90 95
 I E H V N T D A L K R V Q D R T G I K I Y P L P E

PpADE2

ACAATCGAACTAATCAAGGATAAGTACTTGCAAAAGGAACATTTGATCAAGCACAAACATTTCCGGTGACAAAGTCT
 TGTTAGCTTGATTAGTTCCCTATTCATGAACGTTTTCTTGTAACACTAGTTTCGTGTTGTAAAGCCACTGTTTCAGA

2850

100 105 110 115 120
 T I E L I K D K Y L Q K E H L I K H N I S V T K S

PpADE2

CAGGGTATAGAATCTAATGAAAAGGCGCTGCTTTTTGTTTGGAGAAGAGAATGGATTTCCATATCTGTTGAAGTCC
 GTCCCATATCTTAGATTACTTTTCCGCGACGAAAACAAACCTCTTCTTACCTAAAGGTATAGACAACCTTCAGG

2925

125 130 135 140 145
 Q G I E S N E K A L L L F G E E N G F P Y L L K S

PpADE2

CGGACTATGGCTTATGATGGAAGAGGCAATTTTGTAGTGGAGTCTAAAGAGGACATCAGTAAGGCATTAGAGTTC
 GCCTGATACCGAATACTACCTTCTCCGTTAAAACATCACCTCAGATTTCTCCTGTAGTCATTCCGTAATCTCAAG

3000

150 155 160 165 170
 R T M A Y D G R G N F V V E S K E D I S K A L E F

PpADE2

TTGAAAGATCGTCCATTGTATGCCGAGAAGTTTGCTCCTTTTGTAAAGAATTAGCGGTAATGGTTGTGAGATCA
AACTTTCTAGCAGGTAACATACGGCTCTTCAAACGAGGAAAACAATTTCTTAATCGCCATTACCAACACTCTAGT

3075

L K D R P L Y A E K F A P F V K E L A V M V V R S
PpADE2

CTGGAAGGCGAAGTATTCTCTACCCAACCGTAGAACTGTGCACAAGGACAATATCTGTCATATTGTGTATGCT
GACCTTCCGCTTCATAAGAGGATGGGTTGGCATCTTTGACACGTGTTCTGTTATAGACAGTATAACACATACGA

3150

L E G E V F S Y P T V E T V H K D N I C H I V Y A
PpADE2

CCGGCCAGAGTTAATGACACCATCCAAAAGAAAGCTCAAATATTAGCTGAAAACACTGTGAAGACTTTCCAGGC
GGCCGGTCTCAATTACTGTGGTAGGTTTTCTTTCGAGTTTATAATCGACTTTTGTGACACTTCTGAAAGGGTCCG

3225

P A R V N D T I Q K K A Q I L A E N T V K T F P G
PpADE2

BbsI

GCTGGAATCTTCGGAGTTGAGATGTTCTATTGTCTGATGGAGAACTTCTTGTAATGAGATTGCTCCAAGGCC
CGACCTTAGAAGCCTCAACTCTACAAGGATAACAGACTACCTCTTGAAGAACATTTACTCTAACGAGGTTCCGGG

3300

A G I F G V E M F L L S D G E L L V N E I A P R P
PpADE2

CACAATTCTGGTCACTATAACAATCGATGCATGTGTAACATCTCAGTTCGAAGCACATGTAAGAGCCATAACTGGT
GTGTTAAGACCAGTGATATGTTAGCTACGTACACATTGTAGAGTCAAGCTTCGTGTACATTCTCGGTATTGACCA

3375

H N S G H Y T I D A C V T S Q F E A H V R A I T G
PpADE2

CTGCCAATGCCACTAGATTTACCAAACCTATCTACTTCCAACACCAACGCTATTATGCTCAATGTTTTGGGTGCT
GACGGTTACGGTGATCTAAAGTGGTTTGATAGATGAAGGTTGTGGTTGCGATAATACGAGTTACAAAACCCACGA

3450

L P M P L D F T K L S T S N T N A I M L N V L G A
PpADE2

GAAAAATCTCACGGGGAATTAGAGTTTTGTAGAAGAGCCTTAGAAACACCCGGTGCTTCTGTATATCTGTACGGA
CTTTTATAGAGTGCCCTTAATCTCAAACATCTTCTCGGAATCTTTGTGGGCCACGAAGACATATAGACATGCCT

3525

E K S H G E L F C R R A L E T P G A S V Y L Y G
PpADE2

DraIII

AAGACCACCCGATTGGCTCGTAAGATGGGTCATATCAACATAATAGGATCTTCCATGTTGGAAGCAGAACAAAAG
TTCTGGTGGGCTAACCGAGCATTCTACCCAGTATAGTTGTATTATCCTAGAAGGTACAACCTTCGTCTTGTTTTC

3600

K T T R L A R K M G H I N I I G S S M L E A E Q K
PpADE2

TTAGAGTACATTCTAGAAGAATCAACCCACTTACCATCCAGTACTGTATCAGCTGACACTAAACCGTTGGTTGGA
AATCTCATGTAAGATCTTCTTAGTTGGGTGAATGGTAGGTCATGACATAGTCGACTGTGATTTGGCAACCAACCT

3675

L E Y I L E E S T H L P S S T V S A D T K P L V G
PpADE2

GTTATCATGGGTTTCAGACTCTGATCTACCTGTGATTTTCGAAAGGTTGCGATATTTTAAAACAGTTTGGTGTTC
CAATAGTACCCAAGTCTGAGACTAGATGGACACTAAAGCTTTCCAACGCTATAAAAATTTGTCAAACCACAAGGT

3750

V I M G S D S D L P V I S K G C D I L K Q F G V P
PpADE2

TTCGAAGTTACTATTGTCTCTGCTCATAGAACACCACAGAGAATGACCAGATATGCCTTTGAAGCCGCTAGTAGA
 AAGCTTCAATGATAACAGAGACGAGTATCTTGTGGTGTCTCTTACTGGTCTATACGGAACTTCGGCGATCATCT

3825

F E V T I V S A H R T P Q R M T R Y A F E A A S R

PpADE2

GGTATCAAGGCTATCATTGCAGGTGCTGGTGGTGTCTCATCTTCCAGGAATGGTTGCTGCCATGACTCCGTTG
 CCATAGTTCGATAGTAACGTCCACGACCACCACGACGAGTAGAAGGTCCTTACCAACGACGGTACTGAGGCAAC

3900

G I K A I I A G A G G A A H L P G M V A A M T P L

PpADE2

CCAGTCATTGGTGTTCCTGTCAAGGGCTCTACGTTGGATGGTGTAGACTCGCTACACTCGATTGTCCAAATGCCT
 GGTCAGTAACCACAAGGACAGTTCCTCCGAGATGCAACCTACCACATCTGAGCGATGTGAGCTAACAGTTTACGGA

3975

P V I G V P V K G S T L D G V D S L H S I V Q M P

PpADE2

AGAGGTGTTCTGTGGCTACGGTTGCTATCAACAACGCCACCAATGCCGCTCTGTTGGCCATCAGGATTTAGGT
 TCTCCACAAGGACACCGATGCCAACGATAGTTGTTGCGGTGGTTACGGCGAGACAACCGGTAGTCCTAAAATCCA

4050

R G V P V A T V A I N N A T N A A L L A I R I L G

PpADE2

ACAATTGACCACAAATGGCAAAGGAAATGTCCAAGTATATGAATGCAATGGAGACCGAAGTGTGGGGAAGGCA
 TGTTAACTGGTGTTCACGTTTTCTTTACAGGTTTCATATACTTACGTTACCTCTGGCTTACAACCCCTTCCGT

4125

T I D H K W Q K E M S K Y M N A M E T E V L G K A

PpADE2

TCCAACCTTGAATCTGAAGGGTATGAATCCTATTTGAAGAATCGTCTTTGAATTTAGTATTGTTTTTAATAGAT
 AGGTTGAACCTTAGACTTCCCATACTTAGGATAAACTTCTTAGCAGAACTTAAATCATAACAAAAAATTATCTA

4200

S N L E S E G Y E S Y L K N R L *

PpADE2

BsaAI

GTATATATAATAGTACACGTAACCTTATCTATTCCATTCATAATTTTATTTTAAAGGTTTCGGTAGAAATTTGTCCT
 CATATATATTATCATGTGCATTGAATAGATAAGGTAAGTATTTAAATAAAATTTCCAAGCCATCTTTAAACAGGA

4275

BsgI

CCAAAAGTTGGTTAGAGCCTGGCAGTTTTGATAGGCATTATTATAGATTGGGTAATATTTACCCTGCACCTGGA
 GGTTTTTCAACCAATCTCGGACCGTCAAACCTATCCGTAATAATATCTAACCCATTATAAATGGGACGTGGACCT

4350

AscI
 BssHII

GGAACCTTGC AAAGAGCCTCATGTGCGGCGCGCCAGGCCATAATGGCCAAACGGTTTCTCAATTACTATATACTA
 CCTTGAAACGTTTCTCGGAGTACACGCCGCGCGGTCCGGTATTACCGGTTTGCCAAAGAGTTAATGATATATGAT

4425

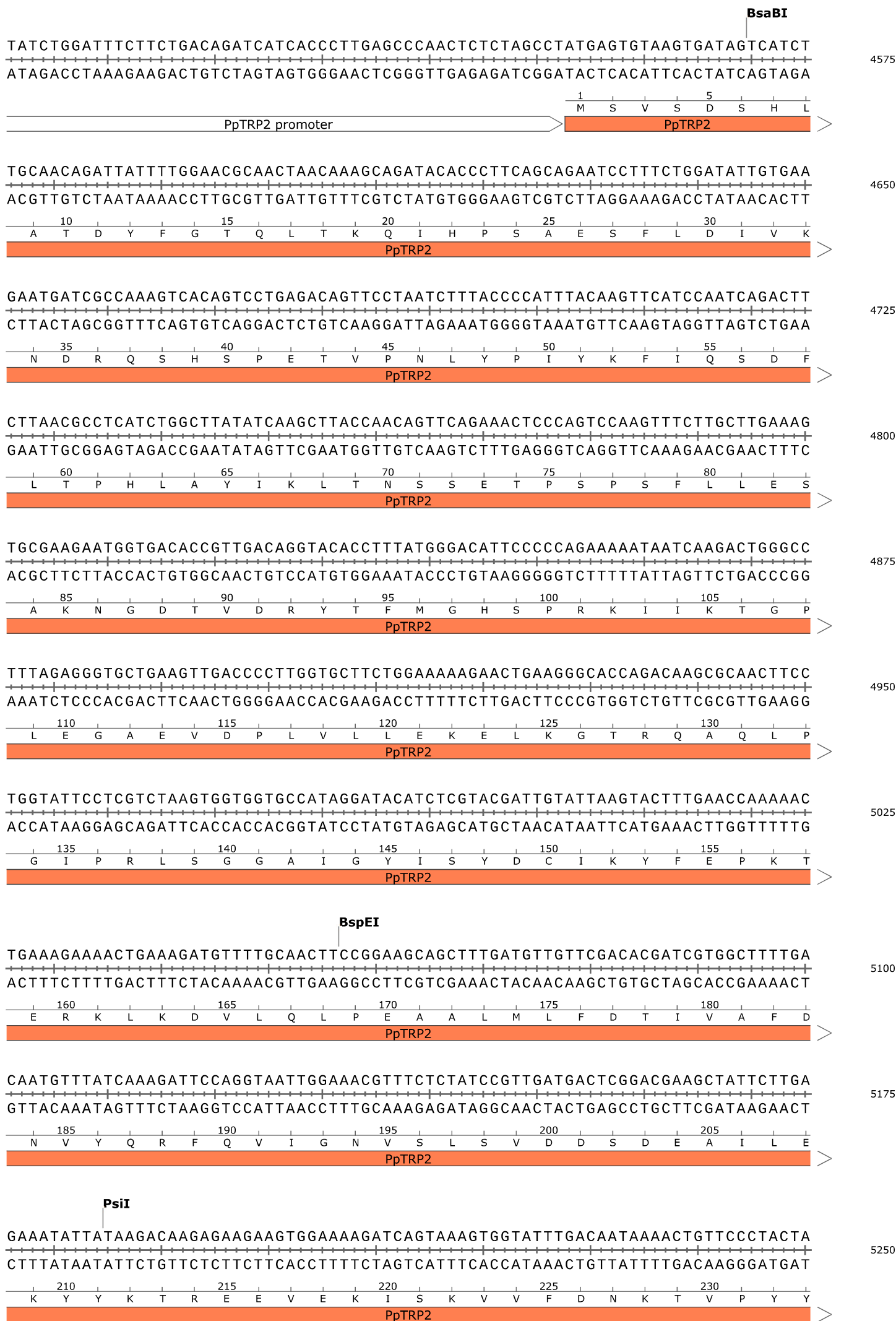
PpTRP2 promoter

NruI

CTAACCTTACCTGTAGCGTATTTCTTTTCCCTCTTCGCGAAAGCTCAAGGGCATCTTCTTGACTCATGAAAAA
 GATTGGTAAATGGACATCGCATAAAGAAAAGGGAGAAGCGCTTTCGAGTTCCCGTAGAAGAACTGAGTACTTTTT

4500

PpTRP2 promoter



TGAACAGAAAGATATTATTCAAGGCCAAACGTTACCTCTAATATTGGTCAGGAAGGGTATGAAAACCATGTTTCG
 ACTTGTCTTTCTATAATAAGTTCCGGTTTGCAAGTGGAGATTATAACCAGTCCTTCCCATACTTTTGGTACAAGC

5325

E Q K D I I Q G Q T F T S N I G Q E G Y E N H V R
 PpTRP2

EcoNI

CAAGCTGAAAGAACATATTCTGAAAGGAGACATCTTCCAAGCTGTTCCCTCTCAAAGGGTAGCCAGGCCGACCTC
 GTTCGACTTTCTTGTATAAGACTTTCTCTGTAGAAGTTTCGACAAGGGGAGAGTTTCCCATCGGTCCGGCTGGAG

5400

K L K E H I L K G D I F Q A V P S Q R V A R P T S
 PpTRP2

ATTGCACCCTTCAACATCTATCGTCATTTGAGAAGTGTCAATCCTTCTCCATACATGTTCTATATTGACTATCT
 TAACGTGGGAAAGTTGTAGATAGCAGTAAACTCTTGACAGTTAGGAAGAGGTATGTACAAGATATAACTGATAGA

5475

L H P F N I Y R H L R T V N P S P Y M F Y I D Y L
 PpTRP2

SpeI

AGACTTCCAAGTTGTTGGTGCTTACCTGAATTACTAGTTAAATCCGACAACAACAACAAAATCATCACACATCC
 TCTGAAGGTTCAACAACCACGAAGTGGACTTAATGATCAATTTAGGCTGTTGTTGTTTGTAGTAGTGTAGG

5550

D F Q V V G A S P E L L V K S D N N N K I T H P
 PpTRP2

TATTGCTGGAAGTCTTCCCAGAGGTAAAACATCGAAGAGGACGACAATTATGCTAAGCAATTGAAGTCGCTTTT
 ATAACGACCTTGAGAAGGGTCTCCATTTTGATAGCTTCTCCTGCTGTTAATACGATTCGTTAACTTCAGCAGAAA

5625

I A G T L P R G K T I E E D D N Y A K Q L K S S L
 PpTRP2

BmgBI

GAAAGACAGGGCCGAGCACGTCATGCTGGTAGATTTGGCCAGAAATGATATTAACCCTGTGTGTGAGCCCACCAG
 CTTTCTGTCCCGGCTCGTGCAGTACGACCATCTAAACCGGTCTTACTATAATTGGCACACACACTCGGGTGGTC

5700

K D R A E H V M L V D L A R N D I N R V C E P T S
 PpTRP2

TACCACGGTTGATCGTTTATTGACTGTGGAGAGATTTTCTCATGTGATGCATCTTGTGTCAGAAGTCAGTGGAAAC
 ATGGTGCCAACTAGCAAATAACTGACACCTCTCTAAAAGAGTACACTACGTAGAACACAGTCTTTCAGTCACCTTG

5775

T T V D R L L T V E R F S H V M H L V S E V S G T
 PpTRP2

ATTGAGACCAAACAAGACTCGCTTCGATGCTTTCAGATCCATTTTCCCAGCAGGAACCGTCTCCGGTGCTCCGAA
 TAACTCTGGTTTGTCTGAGCGAAGCTACGAAAGTCTAGGTAAAAGGGTCTGCTTGGCAGAGGCCACGAGGCTT

5850

L R P N K T R F D A F R S I F P A G T V S G A P K
 PpTRP2

PshAI

GGTAAGAGCAATGCAACTCATAGGAGAATTGGAAGGAGAAAAGAGAGGTGTTTATGCGGGGGCCGTAGGACACTG
 CCATTCTCGTTACGTTGAGTATCCTCTTAACCTTCTCTTTTCTCTCCACAAATACGCCCCCGGCATCCTGTGAC

5925

V R A M Q L I G E L E G E K R G V Y A G A V G H W
 PpTRP2

AflII

GTCGTACGATGGAAAATCGATGGACACATGTATTGCCTTAAGAACAATGGTCGTCAAGGACGGTGTTCGCTTACCT
 CAGCATGCTACCTTTTAGCTACCTGTGTACATAACGGAATTCTTGTACCAGCAGTTCCTGCCACAGCGAATGGA
 460 465 470 475 480
 S Y D G K S M D T C I A L R T M V V K D G V A Y L
 PpTRP2

6000

TCAAGCCGGAGGTGGAATTGTCTACGATTCTGACCCCTATGACGAGTACATCGAAACCATGAACAAAATGAGATC
 AGTTCGGCCTCCACCTTAACAGATGCTAAGACTGGGGATACTGCTCATGTAGCTTTGGTACTTGTTTTACTCTAG
 485 490 495 500 505
 Q A G G G I V Y D S D P Y D E Y I E T M N K M R S
 PpTRP2

6075

CAACAATAACACCATCTTGGAGGCTGAGAAAATCTGGACCGATAGGTTGGCCAGAGACGAGAATCAAAGTGAATC
 GTTGTATTGTGGTAGAACCTCCGACTCTTTTAGACCTGGCTATCCAACCGGTCTCTGCTCTTAGTTTCACTTAG
 510 515 520 525 530
 N N N T I L E A E K I W T D R L A R D E N Q S E S
 PpTRP2

6150

CGAAGAAAACGATCAATGAACGGAGGACGTAAGTAGGAATTTATGGTTTGGCCATAATGGCCTAGCTTGGCGTAA
 GCTTCTTTTGTAGTTACTTGCCTCCTGCATTCATCCTTAAATACCAAACCGGTATTACCGGATCGAACCGCATT
 535
 E E N D Q
 PpTRP2

6225

TCATGGTCATAGCTGTTTCTGTGTGAAATTGTTATCCGCTCACAAATCCACACAACATACGAGCCGGAAGCATA
 AGTACCAGTATCGACAAAGGACACACTTTAACAAATAGGCGAGTGTTAAGGTGTGTTGTATGCTCGGCCTTCGTAT
 AAGTGTAAGCCTGGGGTGCCTAATGAGTGAGCTAACTCACATTAATTGCGTTGCGCTCACTGCCGCTTTCCAG
 TTCACATTTTCGACCCACGGATTACTCACTCGATTGAGTGTAATTAACGCAACGCGAGTGACGGGCGAAAGGTC

6300

6375

TCGGGAAACCTGTCGTGCCAGCTGCATTAATGAATCGGCCAACGCGGGGAGAGGGCGTTTTCGCTATTGGGCGC
 AGCCCTTTGGACAGCACGGTCGACGTAATTACTTAGCCGTTGCGCGCCCTCTCCGCCAAACGCATAAACC CGG
 TCTTCCGCTTCTCGCTCACTGACTCGCTGCGCTCGGTCGTTTCGGCTGCGGGGAGCGGTATCAGCTCACTCAAAG
 AGAAGGCGAAGGAGCGAGTGACTGAGCGACGCGAGCCAGCAAGCCGACGCCGCTCGCCATAGTCGAGTGAGTTTC

6450

6525

GCGGTAATACGTTATCCACAGAATCAGGGGATAACGCAGGAAAGAATGTTGAGCAAAGGCCAGCAAAGGCC
 CGCCATTATGCCAATAGGTGTCTTAGTCCCTATTGCGTCTTTCTTGTACACTCGTTTTCCGGTCGTTTTCCGG
 AGGAACCGTAAAAGGCCGCGTTGCTGGCGTTTTTCCATAGGCTCCGCCCCCTGACGAGCATCACAAAATCGA
 TCCTTGGCATTTTTCCGGCGCAACGACCGCAAAAAGGTATCCGAGGCGGGGGACTGCTCGTAGTGTTTTAGCT

6600

6675

ori

CGCTCAAGTCAGAGGTGGCGAAACCCGACAGGACTATAAAGATACCAGGCGTTTCCCCTGGAAGCTCCCTCGTG
 GCGAGTTTCACTCTCCACCGCTTTGGGCTGTCTGATATTTCTATGGTCCGCAAAGGGGGACCTTCGAGGGAGCAC

6750

ori

CGCTCTCCTGTTCCGACCCTGCCGTTACCGGATACCTGTCCGCTTTCTCCCTTCGGGAAGCGTGCGCTTTCT
 GCGAGAGGACAAGGCTGGGACGGCGAATGGCCATGGACAGGCGAAAGAGGGAAAGCCCTTCGCACC GCGAAAGA

6825

ori

CATAGCTCACGCTGTAGGTATCTCAGTTCGGTGTAGGTCGTTTCGCTCCAAGCTGGGCTGTGTGCACGAACCCCC
 GTATCGAGTGCGACATCCATAGAGTCAAGCCACATCCAGCAAGCGAGGTTTCGACCCGACACACGTGCTTGGGGGG

6900

ori

G TTCAGCCCGACCGCTGCGCCTTATCCGGTAACTATCGTCTTGAGTCCAACCCGGTAAGACACGACTTATCGCCA
 CAAGTCGGGCTGGCGACGCGGAATAGGCCATTGATAGCAGAACTCAGGTTGGGCCATTCTGTGCTGAATAGCGGT

6975

ori

CTGGCAGCAGCCACTGGTAACAGGATTAGCAGAGCGAGGTATGTAGGCGGTGCTACAGAGTTCTTGAAGTGGTGG
 GACCGTCGTCGGTGACCATTGTCCTAATCGTCTCGCTCCATACATCCGCCACGATGTCTCAAGAACTTCACCACC

7050

ori

CCTAACTACGGCTACACTAGAAGGACAGTATTTGGTATCTGCGCTCTGCTGAAGCCAGTTACCTTCGGAAAAAGA
 GGATTGATGCCGATGTGATCTTCTGTCTAATAACCATAGACGCGAGACGACTTCGGTCAATGGAAGCCTTTTTCT

7125

ori

GTTGGTAGCTCTTGATCCGGCAAACAAACCACCGCTGGTAGCGGTGGTTTTTTTTGTTTGCAAGCAGCAGATTACG
 CAACCATCGAGAACTAGGCCGTTTGGTTGGTGGCGACCATCGCCACCAAAAAACAAACGTTTCGTCTCTAATGC

7200

ori

CGCAGAAAAAAGGATCTCAAGAAGATCCTTTGATCTTTTCTACGGGGTCTGACGCTCAGTGGAACGAAAACCTCA
 GCGTCTTTTTTCTAGAGTTCTTCTAGGAACTAGAAAAGATGCCCCAGACTGCGAGTCACTTGCTTTTGAGT

7275

ori

CGTTAAGGGATTTTGGTCATGAGATTATCAAAAAGGATCTTACCTAGATCCTTTTAAATTA AAAATGAAGTTTT
 GCAATTCCCTAAAACAGTACTCTAATAGTTTTTCTAGAAAGTGGATCTAGGAAAATTAATTTTTACTTCAAAA

7350

AAATCAATCTAAAGTATATATGAGTAAACTTGGTCTGACAGTTACCAATGCTTAATCAGTGAGGCACCTATCTCA
 TTTAGTTAGATTTTCATATATACTCATTGTAACAGACTGTCAATGGTTACGAATTAGTCACTCCGTGGATAGAGT

7425

285 W H K I L S 280
 A G I E
 AmpR

GCGATCTGTCTATTTTCGTTTCATCCATAGTTGCCTGACTCCCCGTCGTGTAGATAACTACGATACGGGAGGGCTTA
 CGCTAGACAGATAAAGCAAGTAGGTATCAACGGACTGAGGGGCAGCACATCTATTGATGCTATGCCCTCCCGAAT

7500

275 A I Q R N R E D M T A Q S G T T Y I V V I R S P K
 270 265 260 255
 AmpR

CCATCTGGCCCCAGTGCTGCAATGATACCGCGAGACCCACGCTCACCGGCTCCAGATTTATCAGCAATAAACCG
 GGTAGACCGGGGTCACGACGTTACTATGGCGCTCTGGGTGCGAGTGCCGAGGTCTAAATAGTCGTTATTTGGTC

7575

250 G D P G L A A I I G R S G R E G A G S K D A I F W
 245 240 235 230
 AmpR

CCAGCCGGAAGGGCCGAGCGCAGAAGTGGTCTGCAACTTTATCCGCCTCCATCCAGTCTATTAATTGTTGCCGG
 GGTGCGCCTTCCCGGCTCGCGTCTTACCAGGACGTTGAAATAGGCGGAGGTAGGTGAGATAATTAACAACGGCC

7650

225 G A P L A S R L L P G A V K D A E M W D I L Q Q R
 220 215 210 205
 AmpR

GAAGCTAGAGTAAGTAGTTCGCCAGTTAATAGTTTGCGCAACGTTGTTGCCATTGCTACAGGCATCGTGGTGTCA
 CTTGATCTCATTTCATCAAGCGGTCAATTATCAAACGCGTTGCAACAACGGTAACGATGTCCGTAGCACCACAGT

7725

200 S A L T L L E G T L L K R L T T A M A V P M T T D
 195 190 185 180
 AmpR

CGCTCGTCGTTTGGTATGGCTTCATTCAGCTCCGGTCCCAACGATCAAGGCGAGTTACATGATCCCCATGTTG
 GCGAGCAGCAAACCATAACCGAAGTAAGTCGAGGCCAAGGGTTGCTAGTTCCGCTCAATGTACTAGGGGGTACAAC

7800

175 170 165 160 155
 R E D N P I A E N L E P E W R D L R T V H D G M N
 < AmpR

TGCAAAAAGCGGTTAGCTCCTTCGGTCTCCGATCGTTGTCAGAAGTAAGTTGGCCGCAGTGTTATCACTCATG
 ACGTTTTTTCGCCAATCGAGGAAGCCAGGAGGCTAGCAACAGTCTTCATTCAACCGGCGTCACAATAGTGAGTAC

7875

150 145 140 135 130
 H L F A T L E K P G G I T T L L N A A T N D S M
 < AmpR

GTTATGGCAGCACTGCATAATTCTTACTGTCATGCCATCCGTAAGATGCTTTTCTGTGACTGGTGAGTACTCA
 CAATACCGTCGTGACGTATTAAGAGAATGACAGTACGGTAGGCATTCTACGAAAAGACACTGACCACTCATGAGT

7950

125 120 115 110 105
 T I A A S C L E R V T M G D T L H K E T V P S Y E
 < AmpR

ACCAAGTCATTCTGAGAATAGTGTATGCGGCGACCGAGTTGCTCTTGCCCGGCGTCAATACGGGATAATACCGCG
 TGGTTCAGTAAGACTCTTATCACATACGCCGCTGGCTCAACGAGAACGGGCGCAGTTATGCCCTATTATGGCGC

8025

100 95 90 85 80
 V L D N Q S Y H I R R G L Q E Q G A D I R S L V A
 < AmpR

CCACATAGCAGAACTTTAAAAGTGCTCATCATTGGAAAACGTTCTTCGGGGCGAAAACCTCTCAAGGATCTTACCG
 GGTGTATCGTCTTGAAATTTTACGAGTAGTAACCTTTTGAAGAAGCCCCGCTTTTGAGAGTTCTTAGAATGGC

8100

75 70 65 60 55
 G C L L V K F T S M M P F R E E P R F S E L I K G
 < AmpR

CTGTTGAGATCCAGTTCGATGTAACCCACTCGTGCACCCAACCTGATCTTCAGCATCTTTTACTTTACCAGCGTT
 GACAACTCTAGGTCAAGCTACATTGGGTGAGCACGTGGGTTGACTAGAAGTCGTAGAAAATGAAAGTGGTCGCAA

8175

50 45 40 35 30
 S N L D L E I Y G V R A G L Q D E A D K V K V L T
 < AmpR

TCTGGGTGAGCAAAAACAGGAAGGCAAATGCCGCAAAAAGGGAATAAGGGCGACACGGAAATGTTGAATACTC
 AGACCCACTCGTTTTTGTCTTCCGTTTTACGGCGTTTTTCCCTTATTCCCGCTGTGCCTTTACAACCTTATGAG

8250

25 20 15 10 5
 E P H A F V P L C F A A F F P I L A V R F H Q I S
 < signal sequence
 < AmpR

ATACTCTTCTTTTTCAATATTATTGAAGCATTATCAGGGTTATTGTCTCATGAGCGGATACATATTTGAATGT
 TATGAGAAGGAAAAAGTTATAATAACTTCGTAAATAGTCCCAATAACAGAGTACTCGCCTATGTATAAACTTACA

8325

1
 M
 < AmpR
 < AmpR promoter

ATTTAGAAAAATAAACAAATAGGGGTTCCGCGCACATTTCCCCGAAAAGTGCCACCTGACGTCTAAGAAACCATT
 TAAATCTTTTTATTTGTTTATCCCAAGGCGCGTGTAAAGGGGCTTTTACGGTGGACTGCAGATTCTTTGGTAA

8400

< AmpR promoter

ZraI AatII

ATTATCATGACATTAACCTATAAAAATAGGCGTATCACGAGGCCCTTTCGTCTCGCGGTTTTCGGTGATGACGGT
 TAATAGTACTGTAATTGGATATTTTTATCCGCATAGTGCTCCGGGAAAGCAGAGCGCGCAAAGCCACTACTGCCA

8475

GAAAACCTCTGACACATGCAGCTCCCGGAGACGGTCACAGCTTGTCTGTAAGCGGATGCCGGGAGCAGACAAGCC
 CTTTTGGAGACTGTGTACGTCGAGGGCCTCTGCCAGTGTCTGAACAGACATTTCGCCTACGGCCCTCGTCTGTTCCG

8550

CGTCAGGGCGCGTCAGCGGGTGTGGCGGGTGTGGGGCTGGCTTAACTATGCGGCATCAGAGCAGATTGTACTG
 GCAGTCCCGCGCAGTCGCCACAACCGCCACAGCCCCGACCGAATTGATACGCCGTAGTCTCGTCTAACATGAC

8625

NdeI **KasI** **NarI** **SfoI** **PvuTI**
 AGAGTGCACCATATGCGGTGTGAAATACCGCACAGATGCGTAAGGAGAAAATACCGCATCAGGGCGCCATTCGCCA
 TCTCACGTGGTATACGCCACACTTTATGGCGTGTCTACGCATTCCTCTTTTATGGCGTAGTCCGCGGTAAGCGGT

8700

TTCAGGCTGCGCAACTGTTGGGAAGGGCGATCGGTGCGGGCCTCTTCGCTATTACGCCAGCTGGCGAAAGGGGGA
 AAGTCCGACGCGTTGACAACCCTTCCCGCTAGCCACGCCCGGAGAAGCGATAATGCGGTCGACCGCTTCCCCCT

8775

TGTGCTGCAAGGCGATTAAGTTGGGTAACGCCAGGGTTTTCCAGTCACGACGTTGTAAAACGACGGCCAGTGAA
 ACACGACGTTCCGCTAATTC AACCCATTGCGGTCCCAAAGGGTCAGTGCTGCAACATTTTGCTGCCGGTCACTT

8850

TTG 3'
 +---+ ... 8853
 AAC 5'