

**Supplemental Table 1. Description of primers used for cloning, sequencing, conventional, and real time PCR**

Oligo Name	*S or AS	Clone Names	Sequence	**Nucleotide Position (nt)	Virus & Gene (or plasmid)
OTR 249	S	Universal Outer Primers	5' cc gct agc CTT CGC GAT GTA CGG GCC AGA 3'	204-224	pcDNA3
OTR 552	AS		5' cg act agt gat atc GTT CCC CTG GTC CCA T 3'	1885-1867	HYB MTV Gag
OTR 984	S	*** Primers for <i>in vitro</i> transcription	5' cccaagcttAATACGACTCACTATAGGGCA ACA GTC CTA ATA TTC ACG 3'	1173-1193	HYBMTV R (+1) start
OTR 985	AS		5' aaaccgggTTCCCCTGGTCCCATAAG 3'	1885-1867	HYBMTV Gag
OTR 875	S	SL4-01	5' GGA GAA GAG ATG GGG GTC TCG GGC 3'	1452-1490	HYBMTV U5 region
OTR 876	AS		5' GAC CCC CAT CTC TTC TCC GTA GGC 3'	1460-1446	HYBMTV U5 region
OTR 877	S	SL4-02	5' GGA GAA GAG GAG CCA TTG GAA ATG GGG 3'	1452-1490	HYBMTV U5 region
OTR 878	AS		5' CCA ATG GCT CCT CTT CTC CGT AGG CGG 3'	1482-1447	HYBMTV U5 region
OTR 879	S	SL4-03	5' GTT ACG GTA TGG GGG TCT CGG GCT CA 3'	1465-1502	HYBMTV U5 region
OTR 880	AS		5' GAC CCC CAT ACC GTA ACC TAC CTC TTC 3'	1493-1455	HYBMTV U5 region
OTR 881	S	SL4-04	5' GAC AAG AGT ACG GTG AGC CAT TGG 3'	1453-1482	HYBMTV U5 region
OTR 882	AS		5' CAC CGT ACT CTT CTC CGT AGG CGG GAC 3'	1473-1445	HYBMTV U5 region
OTR 883	S	SL4-05	5' GTA GGT CCA TTG GAA ATG GGG GTC 3'	1461-1493	HYBMTV U5 region
OTR 884	AS		5' CCA ATG GAC CTA CCT CTT CTC CGT AGG C 3'	1482-1446	HYBMTV U5 region
OTR 889	S	SL4-06	5' GTT AAC GCT AGC ATG GGG GTC TCG GGC TCA AAA GG 3'	1485-1508	HYBMTV U5 region
OTR 890	AS		5' CCC CAT GCT AGC GTT AAC ACC GTA ACC TAC CTC TTC TC 3'	1466-1453	HYBMTV U5 region
OTR 891	S	SL4-07	5' GTT AAC TAC GGT GAG CCA TTG GAA ATG GGG 3'	1467-1490	HYBMTV U5 region
OTR 892	AS		5' ACC GTA GTT AAC CTC TTC TCC GTA GGC GGG 3'	1459-1443	HYBMTV U5 region
OTR 893	S	SL4-08	5' GTT AAC AAC CCA TTG GAA ATG GGG GTC TCG 3'	1476-1496	HYBMTV U5 region

OTR 894	AS		5' CAA TGG GTT GTT AAC ACC TAC CTC TTC TCC GTA GGC 3'	1466-1446	HYBMTV U5 region
OTR 1247	S	SL4-09	5'GAG CCA TTG GAA ATG GGG 3'	1473-1490	HYBMTV UTR region
OTR 1248	AS		5' CCC ATT TCC AAT GGC TCG TAA CCT ACC TCT TCT CC 3'	1489-1473, deletion, 1469-1452	HYBMTV UTR region
OTR 1249	S	SL4-10	5' GGG AGC TGC AGT CCC G 3'	1431-1446	HYBMTV UTR region
OTR 1250	AS		5' GGG ACT GCA GCT CCC GGT GAG TCC GTT CCG C 3'	1445-1431, deletion , 1427-1412	HYBMTV UTR region
OTR 1251	S	SL4-11	5' TCT GGG AGC TGC AGT CCC G 3'	substitution, 1431-1446	HYBMTV UTR region
OTR 1252	AS		5' GGG ACT GCA GCT CCC AGA GGT GAG TCC GTT CCG C 3'	1445-1431, substitution, 1427-1412	HYBMTV UTR region
OTR 1274	S	SL4-12	5' TCC CGC CTA CGG AGA A 3'	1441-1457	HYBMTV UTR region
OTR 1275	AS		5' TCT CCG TAG GCG GGA CTC CCT ATG GTG AGT CC3'	1456-1441, deletion, 1435-1419	HYBMTV UTR region
OTR 1030	S	SL4-13	5' CCC GCC TAC GTA GGT TAC GGT GAG CCA TTG G 3'	1443-1451, Deletion, 1461-1482	HYBMTV U5 region
OTR 1031	AS		5' CCG TAA CCT ACG TAG GCG GGA CTG CAG CTC C 3'	1471-1461, Deletion, 1451-1432	HYBMTV U5 region
OTR 1034	S	SL4-14	5' CCT CTT CTC GTA GGT TAC GGT GAG CCA TTG G 3'	Substitution, 1461-1482	HYBMTV U5 region
OTR 1035	AS		5' CCG TAA CCT ACG AGA AGA GGG TAG GCG GGA CTG CAG CTC C 3'	1471-1461, Substitution, 1451-1432	HYBMTV U5 region
OTR 1253	S	SL4-15	5' GAG TGG CCA TTG GAA ATG GGG GTC 3'	substitution, 1476-1493	HYBMTV UTR region
OTR 1254	AS		5' CCC CCA TTT CCA ATG GCC ACT CGT AAC CTA CCT CTT CTC C 3'	1491-1476, substitution, 1469-1452	HYBMTV UTR region

OTR 1255	S	SL4-16	5' CCA CTC ATA GGG AGC TGC AGT CC 3'	1428-1444	HYBMTV UTR region
OTR 1256	AS		5' GGA CTG CAG CTC CCT ATG AGT GGT CCG TTC CGC TCT TGT G 3'	1444-1428, substitution, 1421-1404	HYBMTV UTR region
OTR 1257	S	SL4-17	5' TTT GAG CCA TTG GAA ATG GG 3'	1472-1489	HYBMTV UTR region
OTR 1258	AS		5' CCA TTT CCA ATG GCT CAA AGT AAC CTA CCT CTT CTC C 3'	1488-1472, substitution, 1469-1452	HYBMTV UTR region
OTR 1259	S	SL4-18	5' AA ATA GGG AGC TGC AGT CC 3'	1428-1444	HYBMTV UTR region
OTR 1260	AS		5' GGA CTG CAG CTC CCT ATT TTG AGT CCG TTC CGC TCT T 3'	1444-1428, substitution, 1425-1408	HYBMTV UTR region
OTR 1261	S	SL4-19	5' ATG AGC CAT TGG AAA TGG G 3'	1472-1489	HYBMTV UTR region
OTR 1262	AS		5' CCA TTT CCA ATG GCT CAT CGT AAC CTA CCT CTT CTC 3'	1488-1472, substitution, 1470-1451	HYBMTV UTR region
OTR 1263	S	SL4-20	5' TCA ATA GGG AGC TGC AGT C 3'	1427-1443	HYBMTV UTR region
OTR 1264	AS		5' GAC TGC AGC TCC CTA TGA TGA GTC CGT TCC GCT CTT 3'	1444-1427, substitution, 1425-1408	HYBMTV UTR region
OTR 930	S	Used for sequencing	5' GCT TGT GTG TTG GAG GTC GCT GAG 3'	90-113	pcDNA3
OTR 725	S		5' aaaaa agc ggc cgc CCC TCG GAT AAG TGA CCC TTG TC 3'	1325-1347	HYBMTV UTR region
OTR 580	S	$\beta$ -actin	5' TGA GCT GCG TGT GGC TCC 3'	Tan <i>et al.</i> , J. Virol. 1995 69:5607-5620.	Actin Spliced
OTR 581	AS	$\beta$ -actin	5' GGC ATG GGG GAG GGC ATA CC 3'	Tan <i>et al.</i> , J. Virol. 1995 69:5607-5620.	Actin Spliced or unspliced mRNA

OTR 582	S	$\beta$ -actin	5' CCA GTG GCT TCC CCA GTG 3'	Tan <i>et al.</i> , J. Virol. 1995 69:5607-5620.	Actin S-1. Unspliced mRNA
OTR 671	S	Vector specific	5' GTC CTA ATA TTC ACG TCT CGT GTG 3'	1179-1202	HYBMTV R region
OTR 672	AS	Vector specific	5' CTG TTC GGG CGC CAG CTG CCG CAG 3'	1321-1298	HYBMTV PBS region
MTV-1LTR - SITEM1 FAM	Probe	qPCR probe	5' TCG CCA TCC CGT CTC C 3'	1214-1229	HYBMTV U5 region
MTV-1LTR -SITEF	S	qPCR Forward primer	5' CGT CTC GTG TGT TTG TGT TTG TGT CTG T 3'	1192-1213	HYBMTV U5 region
MTV-1LTR -SITER	AS	qPCR Reverse Primer	5' CCT CTG GAA AGT GAA GGA TAA GTG A 3'	1259-1235	HYBMTV U5 region

Underlined sequence: T7 promoter.

Sequence in lower case: artificial and restriction enzyme sequences that were introduced in the oligos.

\*S, sense; AS, antisense.

\*\*The MMTV nucleotide numbering system refers to the nucleotide positions refer to HYBMTV a molecular clone created by Shackleford and Varmus (62).

\*\*\*Primers used for amplifying wild type and mutant clones encompassing SL4 region with T7 promoter for *in vitro* transcription of RNA for hSHAPE.