TruSight Oncology DNA Control v2

illumina®

Package Insert

FOR IN VITRO DIAGNOSTIC USE.

Intended Use

The TruSight™ Oncology DNA Control v2 is intended for qualitative *in vitro* diagnostic use as a quality control to monitor analytical performance of the library preparation, sequencing, and analysis steps of Next Generation Sequencing (NGS) based molecular diagnostic assays used for the detection of select DNA variants. This product is also intended to help monitor performance of an NGS test system by detecting analytical deviations such as those that may arise from reagent or instrument variation in genetic testing.

Product Description

The TruSight Oncology (TSO) DNA Control v2 is a multiplexed blend of biosynthetic DNA in a background of genomic DNA from the GM24385 cell line. It contains 60 variants across 34 genes representing single nucleotide variants (SNV), multinucleotide variants (MNV), insertions, deletions, gene rearrangements, gene amplifications and MSI signatures (Table 1).

Table 1 Variants Present in TSO DNA Control v2

COSMIC ID	Gene	Nucleotide Change	Amino Acid Change	Variant Type
COSM33765	AKT1	c.49G>A	p.E17K	SNV
COSM13127	APC	c.4348C>T	p.R1450*	SNV
COSM18561	APC	c.4666dup	p.T1556Nfs*3	INSERTION
COSM21924	ATM	c.1058_1059del	p.C353Sfs*5	DELETION
COSM476	BRAF	c.1799T>A	p.V600E	SNV
COSM1383519	BRCA1	c.1961del	p.K654Sfs*47	DELETION
COSM979730	BRCA1	c.4327C>T	p.R1443*	SNV
COSM35891	BRCA1	c.5266dup	p.Q1756Pfs*74	INSERTION
COSM147663	BRCA2	c.1114A>C	p.N372H	SNV
COSM1738241	BRCA2	c.7934del	p.R2645Nfs*3	DELETION
COSM2071555	BRCA2	c.9097dup	p.T3033Nfs*11	INSERTION
COSM5664	CTNNB1	c.121A>G	p.T41A	SNV

COSMIC ID	Gene	Nucleotide Change	Amino Acid Change	Variant Type
COSM12378	EGFR	c.2310_2311insGGT	p.D770_N771insG	INSERTION
COSM6225	EGFR	c.2236_2250del	p.E746_A750del	DELETION
COSM6224	EGFR	c.2573T>G	p.L858R	SNV
COSM6240	EGFR	c.2369C>T	p.T790M	SNV
COSM683	ERBB2	c.2263_2264delinsCC	p.L755P	MNV
COSM20959	ERBB2	c.2313_2324dup	p.Y772_A775dup	INSERTION
COSM48358	ERBB2	c.929C>T	p.S310F	SNV
COSM715	FGFR3	c.746C>G	p.S249C	SNV
COSM783	FLT3	c.2503G>T	p.D835Y	SNV
COSM33661	FOXL2	c.402C>G	p.C134W	SNV
COSM52969	GNA11	c.626A>T	p.Q209L	SNV
COSM28758	GNAQ	c.626A>C	p.Q209P	SNV
COSM27887	GNAS	c.2530C>T	p.R844C	SNV
COSM501	HRAS	c.182_183delinsGT	p.Q61R	MNV
COSM486	HRAS	c.37G>C	p.G13R	SNV
COSM28747	IDH1	c.394C>T	p.R132C	SNV
COSM41590	IDH2	c.419G>A	p.R140Q	SNV
COSM256046	IDH2	c.515_516delinsAT	p.R172N	MNV
COSM12600	JAK2	c.1849G>T	p.V617F	SNV
COSM1314	KIT	c.2447A>T	p.D816V	SNV
COSM521	KRAS	c.35G>A	p.G12D	SNV
COSM18918	MPL	c.1544G>T	p.W515L	SNV
COSM17559	NPM1	c.860_863dup	p.W288Cfs*12	INSERTION
COSM584	NRAS	c.182A>G	p.Q61R	SNV
COSM736	PDGFRA	c.2525A>T	p.D842V	SNV
COSM28053	PDGFRA	c.1694_1695insA	p.S566Qfs*6	INSERTION

COSMIC ID	Gene	Nucleotide Change	Amino Acid Change	Variant Type
COSM763	PIK3CA	c.1633G>A	p.E545K	SNV
COSM775	PIK3CA	c.3140A>G	p.H1047R	SNV
COSM12464	PIK3CA	c.3204_3205insA	p.*1069Mext*3	INSERTION
COSM5809	PTEN	c.800del	p.K267Rfs*9	DELETION
COSM4986	PTEN	c.741dup	p.P248Tfs*5	INSERTION
COSM984	RET	c.1834_1860del	p.F612_C620del	DELETION
COSM9213763	RET	c.1900_1908dup	p.C634_T636dup	INSERTION
COSM977	RET	c.2647_2648delinsTT	p.A883F	MNV
COSM965	RET	c.2753T>C	p.M918T	SNV
COSM14105	SMAD4	c.1394dup	p.A466Gfs*28	INSERTION
COSM6530	TP53	c.723del	p.C242Afs*5	DELETION
COSM10648	TP53	c.524G>A	p.R175H	SNV
COSM69195	TP53	c.714dup	p.N239*	INSERTION
COSM10662	TP53	c.743G>A	p.R248Q	SNV
COSM10660	TP53	c.818G>A	p.R273H	SNV
COSM18610	TP53	c.267del	p.S90Pfs*33	DELETION
N/A	NCOA4-RET	N/A	N/A	Gene Rearrangement (Translocation)
N/A	TPR-ALK	N/A	N/A	Gene Rearrangement (Translocation)
N/A	ERBB2	N/A	N/A	Gene Amplification
N/A	MET	N/A	N/A	Gene Amplification
N/A	MYC	N/A	N/A	Gene Amplification
N/A	MSI-H plasmids	N/A	N/A	MSI Signatures

Limitations

For *in vitro* diagnostic use.

- Results presented in the labeling were obtained with representative assays. Performance characteristics are provided for information purposes only. Variant detection results of the TruSight Oncology DNA Control v2 might differ according to the library preparation method, sequencing method, and the bioinformatics pipeline. The end user is responsible for establishing their own performance criteria appropriate for their system.
- Illumina® has not evaluated detection of NCOA4-RET and TPR-ALK in the TruSight Oncology DNA Control v2.

Product Components

TruSight Oncology DNA Control v2, PN 20090155

Box Part Number	Quantity	Volume	Concentration*	Active Ingredients	Storage Temperature
20112821	1	35 µl	20 ng/µL	Synthetic DNA pool	-25°C to -15°C

* Minimum concentration is indicated.

Storage and Handling

- TSO DNA Control v2, when stored at -25°C to -15°C, is stable through the expiration date printed on the tube label and on the kit box. The tube can undergo 10 freeze-thaws from multiple uses of the tube. Use good laboratory practices to avoid contamination.
- Do not aliquot.

Warnings and Precautions

⚠ CAUTION

Federal law restricts this device to sale by or on the order of a physician or other practitioner licensed by the law of the State in which he/she practices, to use or order the use of the device.

- Wear protective equipment, including eye protection, gloves, and laboratory coat appropriate for risk of exposure. Handle used reagents as chemical waste and discard in accordance with applicable regional, national, and local laws and regulations. For environmental, health, and safety information, refer to the safety data sheets (SDS) at support.illumina.com/sds.html.
- Immediately report any serious incidents related to this product to Illumina and the Competent Authority of the Member State in which the user and/or patient is established.
- Changes in the physical appearance of the reagents can indicate deterioration of the materials. If changes in the physical appearance occur (for example, changes in reagent color or cloudiness), do not use the reagents.
- Avoid cross-contamination.
  - Follow proper laboratory practices when handling the product.
  - Use fresh consumable labware and fresh pipette tips between samples and between dispensing controls.
  - Use aerosol resistant tips to reduce the risk of cross-contamination.
- Follow proper assay procedure and note safety, laboratory, and assay warnings and precautions.
- Use routine laboratory precautions. Do not pipette by mouth. Do not eat, drink, or smoke in designated work areas. Wear disposable gloves and laboratory coats when handling the product. Wash hands thoroughly after handling the product.
- Use nuclease-free microcentrifuge tubes, plates, pipette tips, and reservoirs.
- Use precision pipettes to ensure accurate product delivery. Calibrate regularly according to manufacturer specifications.
- Do not use the TSO DNA Control v2 beyond the expiration date on the tube label.

Instructions for Use

NOTE Use QC materials (TSO DNA Control v2) in accordance with local, state, and/or federal regulations or accreditation requirements.

1. Thaw the contents on ice.
2. Gently vortex or invert the tube to mix, then briefly centrifuge the tube to collect the contents to the bottom of the tube.
3. Dilute to the desired concentration in an appropriate diluent. Use the actual concentration on the tube label for a given lot of control when making dilution calculations, if dilutions are needed.
   - A suggested diluent for the TSO DNA Control v2 is Tris-EDTA (10 mM Tris, 1 mM EDTA, pH 8.0).
4. Test the control like a patient sample in the assay workflow.
5. Store at label conditions between uses.

Performance Characteristics

The TSO DNA Control v2 was tested using TruSight Oncology Comprehensive (TSO Comprehensive, hybrid-capture enrichment-based), NYU Langone Genome PACT assay (hybrid-capture enrichment-based), and the Oncomine Focus assay (amplicon-based).

Reproducibility

The TSO DNA Control v2 was tested in a reproducibility study using TSO Comprehensive as a representative assay. The TSO DNA Control v2 at 40 ng was used as sample input. At each of three external sites, two operators per site tested three lots of the TSO DNA Control v2 with three lots of TSO Comprehensive assay kits. Libraries were sequenced on NextSeq 550Dx instruments. In total, 102 sample results were generated for the TSO DNA Control v2. There were 54 small variant calls, MSI biomarkers, and three gene amplification calls per sample for a total of 5508 evaluable expected small variant calls, 102 evaluable expected MSI-H calls, and 306 evaluable expected gene amplification calls.

All variants were selected for evaluation of the variant detection rate in the TSO DNA Control v2 (Table 1). Variants span a range of cancer related genes and encompass multiple variant types and different variant classes.

Small Variant Results

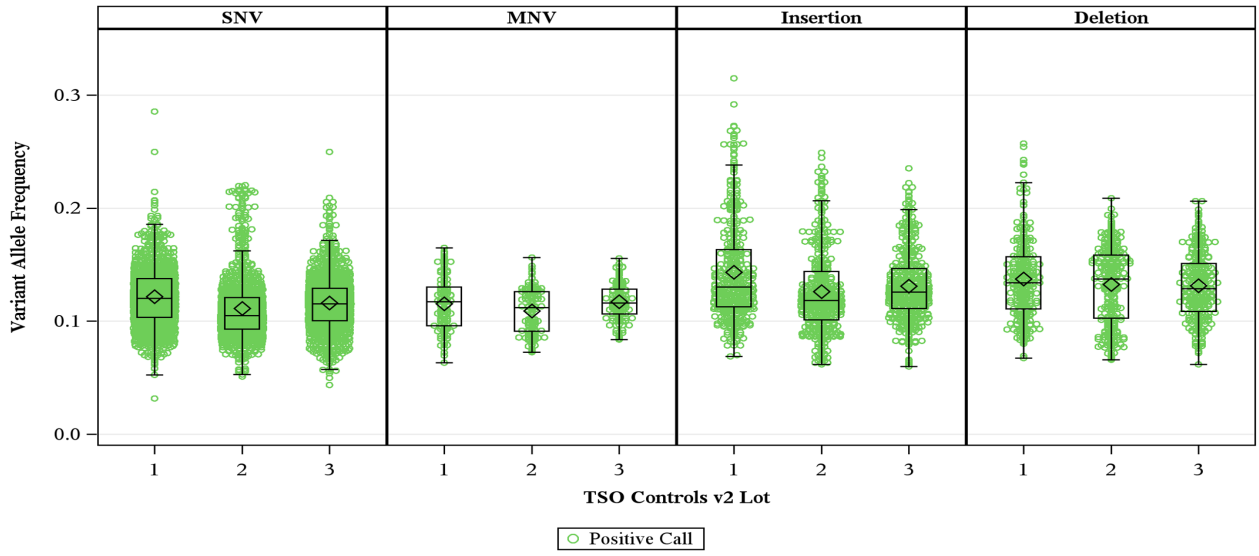
Table 2 summarizes the percentage of observed positive calls for small variants. Correct calls were based on detection of the 54 variants in Table 1. Figure 1 demonstrates the lot-to-lot consistency of variant allele frequency by variant class.

Table 2 External Site Evaluation of TSO DNA Control v2 with TSO Comprehensive Assay: Small Variants

Site	Operator	Number of Runs	Total Expected Calls	Observed Positive Calls	Positive Call %
1	1	3	972	972	100%
1	2	3	972	972	100%
2	3	3	972	972	100%
2	4	3	972	972	100%
3	5	3	972	963	99.1%
3	6	2*	648	603	93.1%
Total	All	17	5508	5454	99.0%

* One run failed run QC specifications and is invalid.

Figure 1 TSO DNA Control v2 Small Variants Lot-to-Lot Consistency Across Three Sites



MSI Results

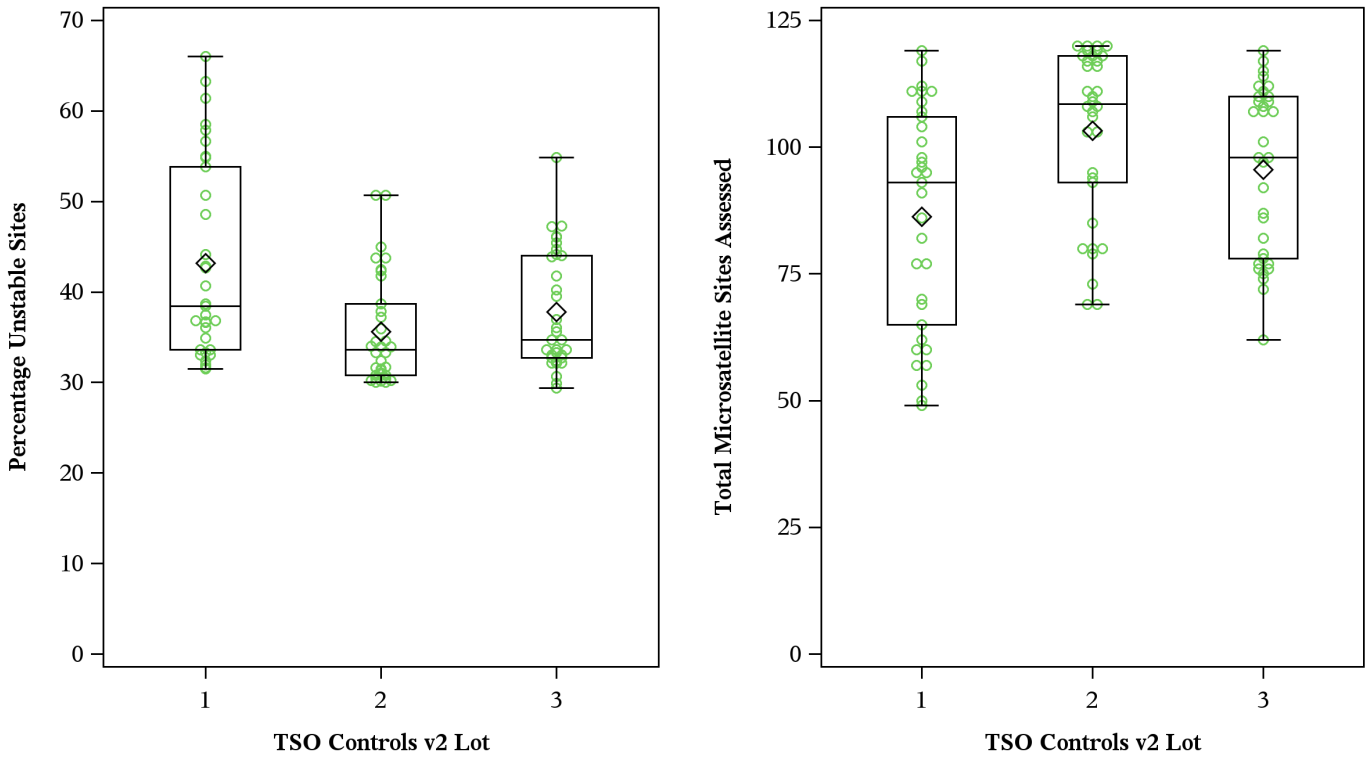
Table 3 summarizes the percentage of observed positive calls for MSI biomarkers. Correct calls were based on detection of the MSI-H in Table 1. Figure 2 demonstrates the lot-to-lot consistency of total microsatellite sites assessed and percent unstable sites.

Table 3 External Site Evaluation of TSO DNA Control v2 with TSO Comprehensive Assay: MSI Biomarker

Site	Operator	Number of Runs	Total Expected Calls	Observed Positive Calls	Positive Call %
1	1	3	18	18	100%
1	2	3	18	18	100%
2	3	3	18	18	100%
2	4	3	18	18	100%
3	5	3	18	17	94.4%
3	6	2*	12	11	91.7%
Total	All	17	102	100	98.0%

* One run failed run QC specifications and is invalid.

Figure 2 TSO DNA Control v2 MSI Biomarker Lot-to-Lot Consistency Across Three Sites



Gene Amplification Results

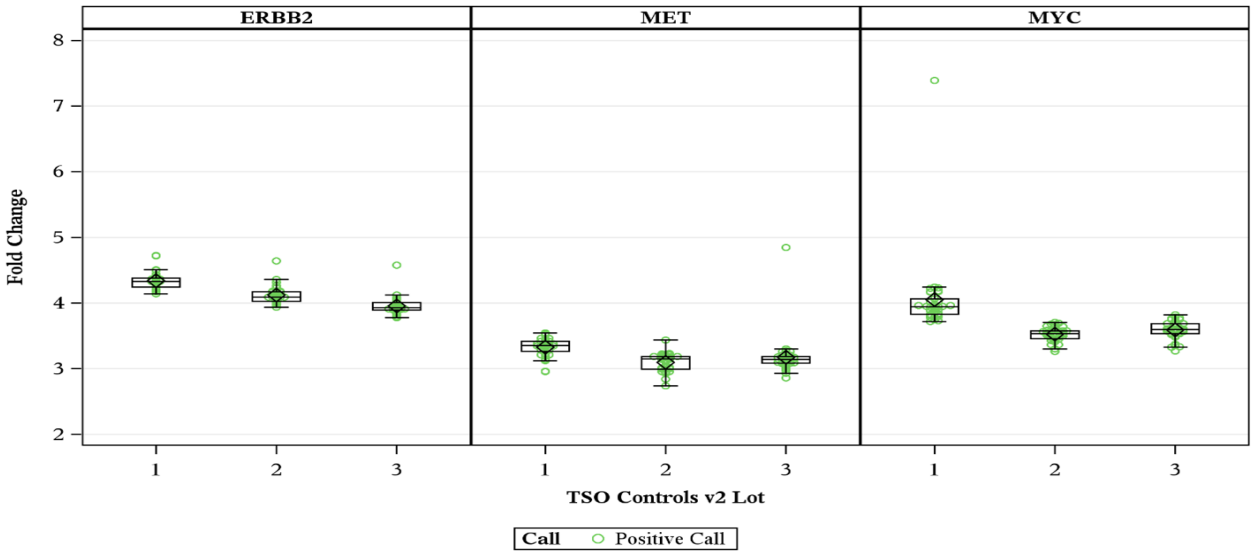
Table 4 summarizes the percentage of observed positive calls for gene amplifications. Correct calls were based on detection of the gene amplifications in Table 1. Figure 3 demonstrates the lot-to-lot consistency of gene amplification fold change.

Table 4 External Site Evaluation of TSO DNA Control v2 with TSO Comprehensive Assay: Gene Amplifications

Site	Operator	Number of Runs	Total Expected Calls	Observed Positive Calls	Positive Call %
1	1	3	54	54	100%
1	2	3	54	54	100%
2	3	3	54	54	100%
2	4	3	54	54	100%
3	5	3	54	54	100%
3	6	2*	36	36	100%
Total	All	17	306	306	100%

* One run failed run QC specifications and is invalid.

Figure 3 TSO DNA Control v2 Gene Amplification Variants Lot-to-Lot Consistency Across Three Sites



Evaluation by NYU Langone Genome PACT and Oncomine Focus

The TSO DNA Control v2 was tested with the NYU Langone Genome PACT (NYU PACT) assay and the Oncomine Focus assay at a single site. The TSO DNA Control v2 was used as sample input (100 ng for NYU PACT assay, 20 ng for Oncomine Focus assay). Three lots of the TSO DNA Control v2 were tested in duplicate or in triplicate in four sequencing runs. Libraries were sequenced on the Illumina NextSeq or the Ion GeneStudio System. In total, 27 sample results were generated for the TSO DNA Control v2 for each assay.

The expected results as a detection rate (%) of small variants and gene amplifications in the TSO DNA Control v2 are summarized in Table 5. MSI is not evaluated by NYU Langone Genome PACT or Oncomine Focus. Table 5 also includes data from the reproducibility study using TSO Comprehensive.

Table 5 Detection Rate (%) of TSO DNA Control v2 Small Variants and Gene Amplifications (NE: Not Evaluated by the Assay)

Variant Class	Gene	Nucleotide Change	Amino Acid Change	TSO Comprehensive Site 1			TSO Comprehensive Site 2			TSO Comprehensive Site 3			NYU Langone Genome PACT			Oncomine Focus		
				Lot 1	Lot 2	Lot 3	Lot 1	Lot 2	Lot 3	Lot 1	Lot 2	Lot 3	Lot 1	Lot 2	Lot 3	Lot 1	Lot 2	Lot 3
	Total Number of Samples Tested			12	12	12	12	12	12	*10	*10	*10	9	9	9	9	9	9
Deletion	ATM	c.1058_1059del	p.C353Sfs*5	100	100	100	100	100	100	90	100	90	100	100	100	NE	NE	NE
	BRCA1	c.1961del	p.K654Sfs*47	100	100	100	100	100	100	90	100	100	100	100	100	NE	NE	NE
	BRCA2	c.7934del	p.R2645Nfs*3	100	100	100	100	100	100	90	100	90	100	100	100	NE	NE	NE
	EGFR	c.2236_2250del	p.E746_A750del	100	100	100	100	100	100	90	100	100	100	100	100	100	100	89
	PTEN	c.800del	p.K267Rfs*9	100	100	100	100	100	100	90	100	90	100	100	100	NE	NE	NE
	RET	c.1834_1860del	p.F612_C620del	100	100	100	100	100	100	90	100	90	100	100	100	100	100	100
	TP53	c.723del	p.C242Afs*5	100	100	100	100	100	100	90	100	100	100	100	100	NE	NE	NE
	TP53	c.267del	p.S90Pfs*33	100	100	100	100	100	100	90	100	100	100	100	100	NE	NE	NE
Insertion	APC	c.4666dup	p.T1556Nfs*3	100	100	100	100	100	100	90	100	90	100	100	100	NE	NE	NE
	BRCA1	c.5266dup	p.Q1756Pfs*74	100	100	100	100	100	100	90	100	100	100	100	100	NE	NE	NE
	BRCA2	c.9097dup	p.T3033Nfs*11	100	100	100	100	100	100	90	100	90	100	100	100	NE	NE	NE
	EGFR	c.2310_2311insGGT	p.D770_N771insG	100	100	100	100	100	100	90	100	100	100	100	100	100	100	100
	ERBB2	c.2313_2324dup	p.Y772_A775dup	100	100	100	100	100	100	90	100	100	100	100	100	100	100	100
	NPM1	c.860_863dup	p.W288Cfs*12	100	100	100	100	100	100	90	100	100	100	100	100	NE	NE	NE
	PDGFRA	c.1694_1695insA	p.S566Qfs*6	100	100	100	100	100	100	90	100	90	100	100	100	100	100	89
	PIK3CA	c.3204_3205insA	p.*1069Mext*3	100	100	100	100	100	100	90	100	100	100	100	100	NE	NE	NE
	PTEN	c.741dup	p.P248Tfs*5	100	100	100	100	100	100	90	100	100	100	100	100	NE	NE	NE
	RET	c.1900_1908dup	p.C634_T636dup	100	100	100	100	100	100	90	100	100	100	100	100	100	100	100
	SMAD4	c.1394dup	p.A466Gfs*28	100	100	100	100	100	100	90	100	100	100	100	100	NE	NE	NE
	TP53	c.714dup	p.N239*	100	100	100	100	100	100	90	100	100	100	100	100	NE	NE	NE
MNV	ERBB2	c.2263_2264delinsCC	p.L755P	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
	HRAS	c.182_183delinsGT	p.Q61R	100	100	100	100	100	100	90	100	100	100	100	100	100	100	100
	IDH2	c.515_516delinsAT	p.R172N	100	100	100	100	100	100	90	100	100	100	100	100	100	100	100
	RET	c.2647_2648delinsTT	p.A883F	100	100	100	100	100	100	90	100	100	100	100	100	100	100	100

Table 6 Detection Rate (%) of TSO DNA Control v2 Small Variants and Gene Amplifications (NE: Not Evaluated by the Assay) (Continued)

Variant Class	Gene	Nucleotide Change	Amino Acid Change	TSO Comprehensive Site 1			TSO Comprehensive Site 2			TSO Comprehensive Site 3			NYU Langone Genome PACT			Oncomine Focus		
				Lot 1	Lot 2	Lot 3	Lot 1	Lot 2	Lot 3	Lot 1	Lot 2	Lot 3	Lot 1	Lot 2	Lot 3	Lot 1	Lot 2	Lot 3
SNV	AKT1	c.49G>A	p.E17K	100	100	100	100	100	100	90	100	100	100	100	100	100	100	100
	APC	c.4348C>T	p.R1450*	100	100	100	100	100	100	100	100	100	100	100	100	NE	NE	NE
	BRAF	c.1799T>A	p.V600E	100	100	100	100	100	100	90	100	100	100	100	100	100	89	78
	BRCA1	c.4327C>T	p.R1443*	100	100	100	100	100	100	90	100	100	100	100	100	NE	NE	NE
	BRCA2	c.1114A>C	p.N372H	100	100	100	100	100	100	90	100	90	100	100	100	NE	NE	NE
	CTNNB1	c.121A>G	p.T41A	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
	EGFR	c.2573T>G	p.L858R	100	100	100	100	100	100	90	100	100	100	100	100	100	100	100
	EGFR	c.2369C>T	p.T790M	100	100	100	100	100	100	90	100	100	100	100	100	100	100	100
	ERBB2	c.929C>T	p.S310F	100	100	100	100	100	100	90	100	100	100	100	100	100	100	100
	FGFR3	c.746C>G	p.S249C	100	100	100	100	100	100	90	100	100	100	100	100	100	100	100
	FLT3	c.2503G>T	p.D835Y	100	100	100	100	100	100	90	100	100	100	100	100	NE	NE	NE
	FOXL2	c.402C>G	p.C134W	100	100	100	100	100	100	100	100	100	100	100	100	NE	NE	NE
	GNA11	c.626A>T	p.Q209L	100	100	100	100	100	100	90	100	100	100	100	100	100	100	100
	GNAQ	c.626A>C	p.Q209P	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
	GNAS	c.2530C>T	p.R844C	100	100	100	100	100	100	90	100	100	100	100	100	NE	NE	NE

Variant Class	Gene	Nucleotide Change	Amino Acid Change	TSO Comprehensive Site 1			TSO Comprehensive Site 2			TSO Comprehensive Site 3			NYU Langone Genome PACT			Oncomine Focus		
				Lot 1	Lot 2	Lot 3	Lot 1	Lot 2	Lot 3	Lot 1	Lot 2	Lot 3	Lot 1	Lot 2	Lot 3	Lot 1	Lot 2	Lot 3
	HRAS	c.37G>C	p.G13R	100	100	100	100	100	100	90	100	100	100	100	100	100	100	100
	IDH1	c.394C>T	p.R132C	100	100	100	100	100	100	90	100	100	100	100	100	100	100	100
	IDH2	c.419G>A	p.R140Q	100	100	100	100	100	100	90	100	100	100	100	100	100	100	100
	JAK2	c.1849G>T	p.V617F	100	100	100	100	100	100	90	100	90	100	100	100	100	100	100
	KIT	c.2447A>T	p.D816V	100	100	100	100	100	100	90	100	100	100	100	100	100	100	100
	KRAS	c.35G>A	p.G12D	100	100	100	100	100	100	90	100	100	100	100	100	100	100	100
	MPL	c.1544G>T	p.W515L	100	100	100	100	100	100	100	100	100	100	100	89	NE	NE	NE
	NRAS	c.182A>G	p.Q61R	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
	PDGFRA	c.2525A>T	p.D842V	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
	PIK3CA	c.1633G>A	p.E545K	100	100	100	100	100	100	90	100	100	100	100	100	100	100	100
	PIK3CA	c.3140A>G	p.H1047R	100	100	100	100	100	100	90	100	100	100	100	100	100	100	100
	RET	c.2753T>C	p.M918T	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
	TP53	c.524G>A	p.R175H	100	100	100	100	100	100	90	100	100	100	100	100	NE	NE	NE
	TP53	c.743G>A	p.R248Q	100	100	100	100	100	100	90	100	100	100	100	100	NE	NE	NE
	TP53	c.818G>A	p.R273H	100	100	100	100	100	100	90	100	100	100	100	100	NE	NE	NE
Gene Amplification	ERBB2	N/A	N/A	100	100	100	100	100	100	100	100	100	NE	NE	NE	100	100	100
	MET	N/A	N/A	100	100	100	100	100	100	100	100	100	NE	NE	NE	100	56	89
	MYC	N/A	N/A	100	100	100	100	100	100	100	100	100	NE	NE	NE	100	100	100

* One run failed run QC specifications and is invalid.

Revision History

Document	Date	Description of Change
Document # 200060733 v01	May 2026	Added Box Number to Product Components table.
Document # 200060733 v00	September 2024	Initial release.

Patents and Trademarks

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Product Labeling

For a complete reference of symbols that appear on product packaging and labeling, refer to the symbol key at support.illumina.com on the *Documentation* tab for your kit.