

food safety



# Test with confidence

Solutions for GMO screening and quantification

**ThermoFisher**  
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# Solutions for GMO screening and quantification

On-going public demand for more information about food safety, authenticity and origins continues to drive tighter regulations around the use, supply and labelling of specific foods and ingredients. In many countries food manufacturers must provide clear labelling when specific ingredients are present including certain allergenic materials and genetically modified organisms (GMO). The need for reliable and affordable tests to enable accurate analysis and provision of information has never been greater.

Find GMO real-time PCR testing solutions for your complete workflow with Applied Biosystems™ TaqMan™ GMO Detection and Quantification Kits, supplied in partnership with Imegen™. Choose from nucleic acid extraction, GMO screening and quantification solutions that can detect the presence of GMO-specific DNA events in soy, corn, and downstream processed products. We also offer a universal assay that detects and quantifies all approved GMOs in Europe and the vast majority of GMOs approved in other countries.

Like all of our real-time PCR food safety and authenticity tests, TaqMan GMO Detection and Quantification Kits are designed to run on our world-class real-time PCR instrument, the Applied Biosystems™ 7500 Fast, enabling you to expand your testing capability across a single platform.



# GMO Extraction Kit

GMO Extraction Kit provides a fast and easy silica-based DNA purification method to obtain DNA from a wide variety of food samples, such as raw materials, processed food and feed.

**High sample input:** Test up to 20 g of sample for increased sensitivity

**Fast total assay time:** Two hour turnaround time enables faster reporting

**Safe:** No toxic reagents for safer handling

**Reliable:** Removal of inhibitors, isolation of high purity DNA

**Easy to use:** Minimal handling steps for a simple workflow

**Choice of protocols:** Low and high throughput options to fit your needs



Manual sample preparation for lower throughput (throughput dependent on centrifuge capacity), semi-automated sample preparation processing with Applied Biosystems™ BeadRetriever™ Instrument (suitable for processing 15 samples per run) and Thermo Scientific™ KingFisher™ Flex Instrument (suitable for processing up to 96 samples per run).



**KingFisher Flex Purification Instrument**

Product				
Baguette	Corn	Lard	Pate	Stir-fried mushrooms
Beef and vegetable baby food	Corn starch	Lemon slush	Peach juice	Strawberry ice lollipop
Beer	Crackers	Macaroni	Potato omelette	Sugar
Breakfast cereals	Egg custard	Mandarin orange sorbet	Potatoes	Surimi
Brown sugar	Eggs	Mayonnaise	Powdered milk	Sweets
Butter	Follow-on infant formula	Meatballs	Rich tea biscuits	Wheat flour
Chicken soup	Fresh pineapple	Minced meat	Shrimps	Yogurt with cereals
Chocolate milkshake	Fried maize	Mixed vegetables	Soy beans	
Chocolate spread (Nutella™)	Hake	Nesquik™ milkshake	Soy lecithin	
Coffee	Honey	Oil	Spinach lasagna	
Cooked rice	Japanese appetizer	Oregano	Starter infant formula	

**Table 1:** Products tested using GMO Extraction Kit all giving high purity DNA (A260/A280 > 1.8).

# TaqMan GMO Screening Kit

Detects all GMO events approved by the EU, as well as the majority of those described in international databases.

The TaqMan GMO Screening Kit simultaneously detects regions P35S & CaMV, TNOS & *A. tumefaciens* and P34S & FMV using the three GMO event master mixes. supplied in kit for highly accurate determination of the presence of genetically modified material and the natural presence of these organisms/viruses used for initial modification. In addition, the kit contains master mixes for the multiplex amplification of an Endogenous Vegetal Control (EVC) and Internal Positive Control (IPC). Results are obtained in under three hours.

**Easy to use:** Real-Time PCR, no post run electrophoresis required

**Reliable:** IPC allows verification of the PCR process in the presence of inhibitors

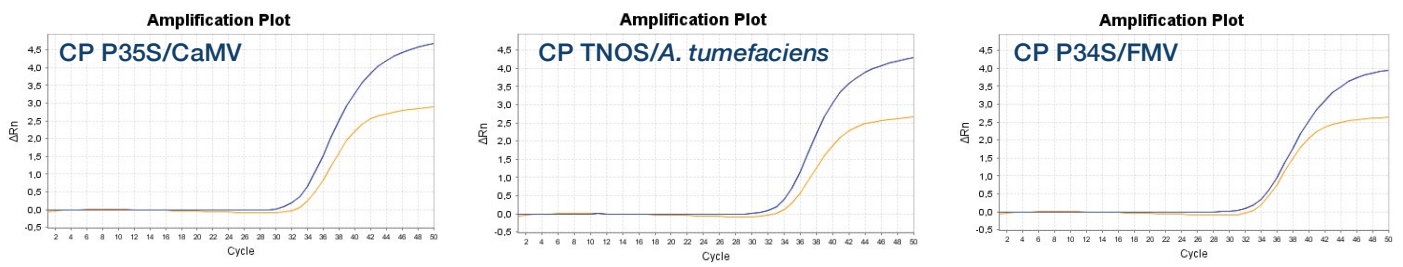
**Unique specificity:** Excludes presence of CaMV, *A. tumefaciens* and FMV

**High sensitivity:** Detects down to levels of three DNA copies (equivalent to 0.01%) for screening and down to 20 DNA copies for quantification



Description	Target
P35S Master Mix	Detection of P35S and CaMV virus promoters
TNOS Master Mix	Detection of TNOS and <i>A. tumefaciens</i> terminators
P34S Master Mix	Detection of P34S and FMV virus promoter
Vegetal Master Mix	Endogenous Positive Control and Inhibition Control
General Master Mix	Amplification reagents
Positive Control	Positive Control for the assay

**Table 2:** Components of the TaqMan GMO Screening Kit.



**Figure 1:** Amplification plots for cross species reaction CaMV, *A. tumefaciens* and FMV.

Standard transgenic varieties				
Maize Soy	Soy	Oilseed Rape	Cotton	Sugarbeet
GA21	RR	T45	MON1445	H7-1
MON810	A2704 -12	GT63	MON531	
MON863			MON15985	
BT176			LLCotton25	
BT11			MON88913	
NK603				
TC1507				
T25				

**Table 3:** Varieties used during the specificity assay for the TaqMan GMO Screening Kit.

Results for PCR limit	100 copies / reaction	10 copies / reaction	5 copies / reaction	1 copy / reaction
P35S / CaMV	100% (6/6)	100% (12/12)	100% (12/12)	33% (4/6)
TN0S / <i>A. tumefaciens</i>	100% (6/6)	100% (12/12)	> 90% (11/12)	33% (4/6)
P34S / FMV	100% (6/6)	100% (12/12)	> 90% (11/12)	17% (2/6)
Plant / IPC	100% (6/6)	100% (12/12)	> 90% (11/12)	33% (4/6)

**Table 4:** Results of the TaqMan GMO Screening Kit corresponding to the amplification performed to determine the PCR limit.



# TaqMan Roundup Ready Soya Quantification Kit

Uses real-time PCR to detect and quantify the percentage of Roundup Ready (RR) soya (event: MØN-Ø4Ø32-6; GTS 40–3–2) compared to the total soya in any food or animal feed sample.

The kit quantification standard consists of a plasmid containing both an endogenous gene (gene present soybean) and a transgenic sequence (one copy of the specific soybean Roundup Ready fragment).

**Flexible:** Adapted to processed DNA using small TaqMan Minor Groove Binder (MGB™) probes

**Sensitive:** Quantification limit of 20 DNA copies. Detection limit of three DNA copies

**Reliable:** Plasmid based quantification standard with broad dynamic range (200,000 copies–20 DNA copies) equivalent to 0.01%



Reagents	Target
Soybean Master Mix	Soybean quantification
RR Soybean Master Mix	RR Soybean quantification
General Master Mix	Amplification reagents
RR Soya Standard	Determination of quantification (comparison of standard and sample amplification)

**Table 5:** Components of the TaqMan Roundup Ready Soya Quantification Kit.

Reagents	5 copies	2.5 copies	1 copy
Soy	100% (21/21)	> 95% (20/21)	> 85% (18/21)
Roundup Ready Soy	100% (21/21)	100% (21/21)	> 76% (16/21)

**Table 6:** Results for the TaqMan Roundup Ready Soya Quantification kit limit of detection (21 replicates of samples containing different DNA copy numbers).

# TaqMan GMO Maize Quantification Kit

The TaqMan GMO Maize Quantification Kit uses Real-Time PCR to detect and quantify the percentage of P35S compared to the total maize in any food sample or feed sample.

The Kit quantification standard consists of one plasmid containing both an endogenous gene (gene present maize) and a transgenic sequence (one copy of the specific maize fragment).

**Flexible:** Adapted to processed DNAs using small TaqMan MGB probes

**Sensitive:** Quantification limit of 20 DNA copies. Detection limit of three DNA copies

**Reliable:** Plasmid based quantification standard with broad dynamic range (200,000 copies–20 copies)



Reagents	Target
Maize Master Mix	Maize quantification
P35S Maize Master Mix	P35S Maize quantification
General Master Mix	Amplification reagents
P35S Maize Standard	Determination of quantification (comparison of standard and sample amplification)

**Table 7:** Components of the TaqMan GMO Maize Quantification Kit.



## GMO Products Overview

Description	Pack Size	Order Code
<b>Sample preparation</b>		
GMO Extraction Kit (for manual DNA extraction)	48 extractions	4466336
KingFisher Flex Purification System (96 Deep Well Processor)	Instrument	A32681
Thermo Scientific BeadRetriever System	Instrument	15950
Applied Biosystems™ PrepSEQ™ Nucleic Acid Extraction Kit (for use with KingFisher Flex Purification and BeadRetriever Systems)	100 extractions	4480466
PrepSEQ Nucleic Acid Extraction Kit (for use with KingFisher Flex Purification and BeadRetriever Systems)	300 extractions	4428176
<b>Detection &amp; Quantification</b>		
TaqMan GMO Screening Kit	4x48 reactions	4466334
TaqMan Roundup Ready Soya Quantification Kit	2x48 reactions	4466335
TaqMan GMO Maize Quantification Kit	2x48 reactions	4481972
Applied Biosystems 7500 Fast Instrument Package, Laptop*	see below	A30299
Applied Biosystems 7500 Fast Instrument Package, Desktop*	see below	A30304
RapidFinder Express v2.0 and SDS 1.4.2 Software for 7500 Fast Instrument	CD pack	A28811
<b>Service and Support packages</b>		
Contact your local supplier for information on instrument service and support including OQ/IPV services and extended warranty packages		

\*Includes: Applied Biosystems 7500 Fast instrument, Computer, RapidFinder Express v2.0 and SDS 1.4.2 Software, Calibration kits, Capping tool, Precision plate holder and Block balance tubes

To learn more about our solutions for GMO screening and quantification, go to: [thermofisher.com/gmo-testing](http://thermofisher.com/gmo-testing)



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### Contact Information:

microbiology@thermofisher.com  
 USA +1 800 255 6730  
 International +44 (0) 1256 841144

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**ThermoFisher**  
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