

**CTS** Collaborative Transplant Study

WORKING INSTRUCTION

**HLA- DRB1\*/DQB1\* Low Resolution  
 CTS-PCR-SSP TRAY KITS**

**LOCUS- AND LOT-SPECIFIC MANUAL**

To be applied to the following product:

Product No.	Description	
122	HLA- DRB1*/DQB1* CTS-PCR-SSP TRAY KIT	<b>IVD</b> <b>CE</b> <b>0197</b>

**HLA-DRB1 TYPING**

*Main differences between Lot DR39-2 (the current lot) and Lot DR 39-1:*

- **Mix 1: The alleles amplified by this mix now result in only one PCR fragment (s. Table 1).**
- **An update with the IMGT/HLA Sequence Database of April 2011 was performed; therefore, the mix specificities have been extended by new alleles. Please also note the new HLA nomenclature.**

**HLA-DQB1 TYPING**

*Main differences between Lot DQB1-1 (the current lot) and Lot DQB09-0:*

- **An update with the IMGT/HLA Sequence Database of April 2011 was performed; therefore, the mix specificities have been extended by new alleles. Please also note the new HLA nomenclature.**

**Introduction**

- Intended use: This kit reveals a low/intermediate resolution typing of HLA-DRB1 (besides HLA-DRB3/4/5) and HLA-DQB1 by the PCR-SSP method.
- Allele coverage: IMGT/HLA Sequence Database Release 3.4.0, April 2011, except for HLA-DQB1\*04:02:02 and DQB1\*06:42; DRB1\*01:18/01:22/01:33N, DRB1\*09:09, DRB1\*11:01:11/11:19:03/11:27:03/11:49:02/11:72-11:73/11:74:02/11:86/11:93-11:94, DRB1\*12:20, DRB1\*13:100, DRB1\*14:113, DRB1\*15:34, DRB1\*16:18, DRB3\*02:26-02:27 and DRB4\*01:05. The alleles which are not covered are considered to be rare and can be detected by e. g. sequencing with the CTS-SEQUENCE Kit (you may contact us for further information).
- This manual is only valid for Lot No. **DR39-2 DQB09-1**.
- This manual should be used together with the Main Manual (General Information) 'Working Instruction for the CTS-PCR-SSP TRAY and MINITRAY KITS' (Manual No. 100A).

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## **1. Kit Composition**

- Number of PCR primer mixes per test: 38, of which
  - for HLA-DRB typing: 24 mixes (23 allele-specific mixes + 1 negative control mix)
  - for HLA-DQB typing: 14 mixes (13 allele-specific mixes + 1 negative control mix)
  - Please note: Wells (positions on tray) B5 - A5, H6 - A6, B11 - A11 and H12 - A12 are empty.
- Number of tests per tray: 2
- Number of trays per kit: 10
- The primer mixes are aliquoted and lyophilized in thin-walled, colorless PCR-trays.
- PCR buffer: 3.0 ml of 5.0% Mastermix (without Taq polymerase).

For storage condition, please refer to Section 1 of the 'Working instruction for the CTS-PCR-SSP TRAY and MINITRAY KITS' (Manual No. 100A) supplied along with this product.

## **2. Materials, Reagents and Equipment not supplied**

Please refer to Section 2 of the 'Working instruction for the CTS-PCR-SSP TRAY and MINITRAY KITS' (Manual No. 100A) supplied along with this product.

## **3. Sample Requirements, PCR and Gel Electrophoresis**

Please refer to Section 3 to 6 of the 'Working instruction for the CTS-PCR-SSP TRAY and MINITRAY KITS' (Manual No. 100A) supplied along with this product.

## **4. Result Evaluation**

- 4.1 Check the approximate base pair size(s) of the PCR product(s) against the Primer Mix Specificity Table(s) (Appendix / Table 1 and 2) to confirm the correct product size(s).
- 4.2 Use the Typing Table(s) (Appendix / Table 3 and 4) to make the allele assignments or use the SCORE Software ([www.IHWG.org](http://www.IHWG.org)) for detailed result interpretation.

## **5. Interpretation Hints**

The quality and quantity of DNA as well as of the Taq polymerase are extremely crucial factors. If your bands are too weak, you might try to adjust these two factors until you obtain optimal results.

Please also refer to Section 7 of the 'Working instruction for the CTS-PCR-SSP TRAY and MINITRAY KITS' (Manual No. 100A) supplied along with this product.

### **Special notes**

#### **HLA-DRB1:**

- ❖ Mix 5 may show a dimer formation. The allele-specific PCR amplicons can be clearly distinguished from the dimer band based on their fragment sizes.
- ❖ Mix 6 and mix 7 detect (among other alleles) the most common HLA-DRB1\*03 alleles which correspond either to serological split HLA-DR17 or HLA-DR18, respectively.

#### **HLA-DQB1:**

- ❖ Mix 6 and 7 of DQB1 mainly detect HLA-DQB1\*03 alleles which belong to the serological group of HLA-DQ7(3). Mix 8 and 9 react positively with HLA-DQB1\*03 alleles of the HLA-DQ8(3) serological group, whereas mix 10 amplifies HLA-DQB1\*03 alleles which can serologically be defined as HLA-DQ9(3). Some other less common alleles are amplified by these mixes in addition.

## **6. Troubleshooting**

Please refer to Section 8 of the 'Working instruction for the CTS-PCR-SSP TRAY and MINITRAY KITS' (Manual No. 100A) supplied along with this product.

## **7. Precaution**

Please refer to Material Safety Data Sheet for the CTS-PCR-SSP TRAY and MINITRAY KITS (Manual No. 100B) supplied along with this product.

## **8. Contact**

If you have any particular questions concerning this kit, which are not answered in this or the Main Manual, please do not hesitate to contact me or my coworkers at:

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**Table1:** Sizes of the PCR products and allele specificities of each HLA-DRB1\* CTS- PCR-SSP Primer Mix (Lot-No DR39-2) based on IMGT/HLA Sequence Database Release 3.4.0, April 2011

**Amplification control (internal positive control): 440 base pairs (bp)**

Position on Tray			Mix	Amplified Alleles	Serology	Product Size (bp)
H1		H7	Mix1	DRB1*01:01:01-01:17/01:19-01:21/01:23-01:32/01:34-01:36	DR1, -, DR103/DR1	140 bp
G1		G7	Mix2	DRB1*01:03	DR103/DR1	200 bp
F1		F7	Mix3	<b>DRB1*15:01:01-01:15-33/15:35-15:57, DRB1*16:09-16:10</b>	DR15, -, DR2, Null, DR16	<b>see below</b>
				DRB1*15:01:01:01-15:05/15:08/15:10/15:12-15:33/15:35-15:46/15:49-15:57, DRB1*16:09-16:10	DR15, -, DR2, Null, DR16	140 bp
				DRB1*15:01:01:01-15:01:06/15:01:08-15:01:13/15:01:15-15:09/15:11-15:20/15:22-15:24/15:26/15:28-15:33/15:35-15:43/15:45/15:47-15:49/15:51-15:53/15:55-15:57	DR15, -, DR2, Null	215 bp
E1		E7	Mix4	DRB1*08:04:02?, DRB1*15:21, DRB1*16:01:01-16:05:02/16:07-16:17	DR8, DR2, DR16, -, Null	210 bp
D1		D7	Mix5	DRB1*03:01:01:01-03:01:03/03:01:05-03:41/03:43-03:49/03:52-03:54/03:56-03:64, DRB1*11:07/11:53/11:103/11:107, DRB3*01:14	DR17, -, DR18, DR3, DR11	225 bp
C1		C7	Mix6	DRB1*03:01:01:01-03:01:10/03:01:12/03:04:01-03:04:02/03:06/03:08/03:10-03:11:02/03:12?/03:13:01-03:13:02/03:15/03:16?/03:18-03:20/03:22-03:23/03:25-03:26/03:28/03:30-03:34/03:36-03:37/03:39/03:42-03:44/03:46-03:48/03:50-03:52/03:55-03:56/03:58-03:62/03:64, DRB1*09:06, DRB1*11:59/11:83, DRB1*13:27/13:71, DRB1*14:82/14:95	DR17, -, DR3, DR9, DR11, DR13	220 bp
B1		B7	Mix7	DRB1*03:02:01-03:02:02/03:05:01-03:05:03/03:09/03:14/03:27/03:29/03:38/03:53, DRB1*11:09/11:20/11:87, DRB1*13:02:01-13:02:03/13:02:05/13:05:01-13:05:02/13:26/13:29/13:31/13:34/13:36/13:39/13:41/13:50:02/13:56/13:63/13:65/13:67/13:73-13:74/13:85/13:96/13:99/13:103-13:104, DRB1*14:02-14:03:02/14:09/14:13/14:19?/14:24/14:27/14:30/14:46-14:48/14:51/14:63/14:67/14:85/14:89/14:98/14:109, DRB1*16:08, DRB3*01:08, DRB3*02:06?/02:20	DR18, DR3, -, DR11, DR13, DR14, DR6, DR1403/DR14, DR16, Undefined, DR52	190 bp
A1		A7	Mix8	<b>DRB1*03:49, DRB1*04:01:01-04:98, DRB1*08:04:02?/08:38, DRB1*11:22/11:102, DRB1*14:10/14:57, DRB4*01:02?</b>	-, DR4, DR4/DR3, Null, DR8, Undefined, DR14, DR4/DR6	<b>see below</b>
				DRB1*04:01:01-04:01:03/04:01:05-04:01:06/04:02:01-04:05:04/04:05:06-04:48/04:50-04:63/04:65/04:67-04:84/04:86-04:98, DRB1*08:04:02?, DRB1*11:22, DRB1*14:10/14:57, DRB4*01:02?	DR4, -, DR4/DR3, Null, DR8, DR14, DR4/DR6, Undefined	145 bp
				DRB1*04:01:01-04:01:07/04:05:01-04:05:10/04:07:01-04:09/04:14/04:16-04:17:02/04:19-04:21/04:24/04:26/04:28-04:31/04:33-04:35/04:38/04:43/04:45/04:47-04:48/04:54/04:57/04:61-04:63/04:69/04:72:01-04:72:02/04:74-04:77/04:80-04:84/04:86-04:87/04:89-04:90/04:92/04:98, DRB1*11:22	DR4, -, Null, Undefined	260 bp
				DRB1*03:49, DRB1*04:01:01-04:01:03/04:01:05-04:01:06/04:02:01-04:05:04/04:05:06-04:62/04:64-04:98, DRB1*08:38, DRB1*11:102	DR4, -, DR4/DR3, Null	85 bp
				DRB1*04:01:01-04:01:07/04:05:01-04:05:10/04:07:01-04:09/04:14/04:16-04:17:02/04:19-04:21/04:24/04:26/04:28-04:31/04:33-04:35/04:38/04:43/04:45/04:47-04:48/04:54/04:57/04:61-04:62/04:64/04:66/04:69/04:72:01-04:72:02/04:74-04:77/04:80-04:84/04:86-04:87/04:89-04:90/04:92/04:98, DRB1*08:38	DR4, -, Null	200 bp

Position on Tray			Mix	Amplified Alleles	Serology	Product Size (bp)
H2		H8	Mix9	<b>DRB1*07:01:01:01-07:01:03/07:03-07:21</b>	DR7, Null, –	<b>see below</b>
				DRB1*07:01:01:01-07:01:03/07:03-07:05/07:08-07:11/07:14-07:21	DR7, Null, –	115 bp
				DRB1*07:01:01:01-07:01:03/07:03/07:05-07:10N/07:12-07:21	DR7, Null, –	190 bp
G2		G8	Mix10	<b>DRB1*08:01:01-08:19/08:21-08:30:02/08:32-08:45, DRB1*11:67, DRB1*12:16/12:22, DRB1*14:04/14:15/14:28/14:31/14:50/14:68/14:71/14:73/14:76/14:79/14:93/14:107</b>	DR8, –, Undefined, DR1404/DR14	<b>see below</b>
				DRB1*08:01:01-08:01:05/08:03:02/08:05-08:06/08:08/08:10/08:12/08:14/08:16-08:18/08:22-08:23/08:26-08:27/08:29/08:32-08:33/08:35-08:40/08:43, DRB1*14:04/14:28/14:31/14:50/14:68/14:71/14:73/14:76/14:79/14:93/14:107	DR8, Undefined, –, DR1404/DR14	165 bp
				DRB1*08:01:01-08:04:07/08:06-08:17/08:19/08:21-08:23/08:26-08:28/08:30:01-08:30:02/08:32-08:39/08:42/08:44-08:45, DRB1*11:67, DRB1*14:15	DR8, –, Undefined	215 bp
				DRB1*08:01:01-08:01:03/08:01:05-08:03:02/08:05/08:07-08:09/08:11/08:13-08:19/08:21/08:23-08:27/08:29-08:30:02/08:32-08:38/08:41, DRB1*12:16/12:22, DRB1*14:68/14:93	DR8, Undefined, –, DR14	250 bp
F2		F8	Mix11	DRB1*09:01:02-09:05/09:07-09:08/09:10-09:12	DR9, –	220 bp
E2		E8	Mix12	DRB1*10:01:01-10:03, DRB4*01:03:01:02N?	DR10, –, Null	205 bp
D2		D8	Mix13	DRB1*03:08, DRB1*04:15/04:61, DRB1*08:31/08:41, DRB1*11:01:01-11:01:10/11:01:12-11:19:02/11:20-11:27:02/11:28:01-11:39/11:40?/11:41-11:49:01/11:50-11:70/11:74:01/11:75-11:85/11:87-11:92/11:95-11:108, DRB1*12:04, DRB1*14:11, DRB1*16:16, DRB3*02:18, DRB5*01:13	DR3, DR4, DR8/DR11, –, DR11/DR13, DR14, Undefined, DR12	125 bp
C2		C8	Mix14	<b>DRB1*08:25/08:32, DRB1*12:01:01-12:19/12:21-12:27</b>	DR8, Undefined, DR12, –, Null	<b>see below</b>
				DRB1*08:32, DRB1*12:01:01-12:13/12:15-12:19/12:21-12:27	Undefined, DR12, –, Null	105 bp
				DRB1*08:25, DRB1*12:01:01/12:01:03-12:02:03/12:02:05-12:15/12:17-12:19/12:21/12:23-12:27	DR8, DR12, –, Null	210 bp
B2		B8	Mix15	DRB1*11:09/11:16/11:20/11:40w/11:58:01/11:59w/11:83/11:87, DRB1*13:01:01-13:01:06/13:01:08-13:02:01/13:02:02w/13:02:03-13:02:05/13:05:01-13:06/13:10/13:15-13:16/13:18/13:26-13:28/13:31-13:32/13:34-13:36/13:39-13:42/13:50:02-13:51/13:53/13:59/13:61:01-13:61:02/13:63w/13:65/13:67/13:69/13:73-13:74/13:77w/13:79-13:80/13:85/13:87/13:91-13:93/13:96/13:98-13:99/13:102-13:105/13:109/13:112-13:113N, DRB1*14:27/14:63/14:67/14:78, DRB1*16:08	DR11, DR11/DR13, –, DR14, DR6, Null, DR16	130 bp
A2		A8	Mix16	<b>DRB1*03:12, DRB1*11:03/11:11:01-11:11:02/11:36/11:40-11:41/11:51?/11:55/11:59/11:63/11:68/11:76/11:85, DRB1*13:03:01-13:04/13:12:01-13:13/13:20-13:21:02/13:24/13:29-13:30/13:32-13:33:03/13:38/13:43/13:48-13:49/13:54-13:55/13:58/13:63/13:65-13:66:02/13:71/13:75/13:78/13:81/13:88-13:90/13:93-13:95/13:101/13:108/13:111/13:115, DRB1*14:13/14:63/14:65/14:78/14:85</b>	DR3, DR11, –, DR13, DR13/DR11, Undefined, DR6, DR14	<b>see below</b>
				DRB1*03:12, DRB1*13:03:01-13:04/13:12:01-13:13/13:21:01-13:21:02/13:30/13:32-13:33:03/13:38/13:48-13:49/13:55/13:58/13:65-13:66:02/13:75/13:81/13:88-13:90/13:93-13:95/13:101/13:108/13:115, DRB1*14:13/14:63/14:65/14:78/14:85	DR3, DR13, –, DR13/DR11, Undefined, DR6, DR14	170 bp
				DRB1*03:12, DRB1*11:03/11:11:01-11:02/11:36/11:40-11:41/11:51?/11:55/11:59/11:63/11:68/11:76/11:85, DRB1*13:20-13:21:01/13:24/13:29/13:43/13:49/13:54-13:55/13:63/13:71/13:75/13:78/13:111, DRB1*14:13/14:65	DR3, DR11, –, DR13, DR13/DR11, DR6, DR14, Undefined	200 bp
H3		H9	Mix17	DRB1*11:09/11:40w/11:58:01/11:59w/11:83/11:87, DRB1*13:05:01-13:05:02/13:18/13:26/13:42/13:50:02/13:63w, DRB1*14:27, DRB1*16:08	DR11, –, DR13, DR14, DR6, DR16	130 bp

Position on Tray			Mix	Amplified Alleles	Serology	Product Size (bp)
G3	G9	Mix18	DRB1*03:01:01:01-03:01:06/03:01:08/03:01:10-03:07/03:09-03:13:01/03:14-03:37/03:38w/03:39-03:41/03:43-03:45/03:47-03:49/03:51-03:58/03:60-03:63, DRB1*04:14?, DRB1*08:01:01-08:24/08:25w/08:26-08:30/02/08:32-08:33/08:34w/08:35-08:40/08:42-08:45, DRB1*11:31?/11:52?, DRB1*12:01:01w-12:01:02w/12:02:01w-12:02:04w/12:03:02w/12:05w-12:08w/12:09/12:10w-12:17w, DRB1*13:01:01-13:53/13:54w/13:55-13:66:02/13:68-13:76/13:77w/13:78-13:99/13:101-13:102/13:104-13:111/13:113N-13:116, DRB1*14:01:01-14:09/14:12:01-14:38/14:40-14:45/14:47/14:48w/14:49-14:56/14:58-14:60/14:62-14:65/14:67-14:100/14:102-14:108/14:110-14:112, DRB4*01:02?	DR17, -, DR18, DR3, DR4, DR8, undefined, DR11, DR12, DR13, DR13/DR11, DR14, DR6, Null, DR1403/DR14, DR1404/DR14, DR13/14	see below	
			DRB1*03:01:01:01-03:01:05/03:01:08/03:01:10-03:07/03:09-03:13:01/03:14-03:37/03:38w/03:39-03:41/03:43-03:45/03:47-03:49/03:51-03:58/03:60-03:63, DRB1*04:14?, DRB1*08:20, DRB1*13:01:01-13:16/13:18-13:53/13:54w/13:55-13:66:02/13:68-13:76/13:77w/13:78-13:99/13:101-13:102/13:104-13:111/13:113N-13:115, DRB1*14:01:01-14:01:03/14:02-14:03:02/14:05:01-14:06:02/14:07:01-14:07:02/14:09/14:12:01-14:14/14:16/14:23:01/14:23:03-14:27/14:29-14:30/14:32:01-14:33/14:35-14:38/14:40-14:45/14:47/14:48w/14:49/14:51/14:53-14:56/14:58-14:60/14:62-14:65/14:67/14:69-14:70/14:72/14:74-14:75/14:77-14:78/14:80-14:92N/14:94-14:100/14:102-14:106/14:108/14:110-14:112, DRB4*01:02?	DR17, -, DR18, DR3, DR4, undefined, DR13, DR13/DR11, DR13/14, DR14, DR6, Null, DR1403/DR14	175 bp	
			DRB1*08:08/08:15/08:21 DRB1*14:04/14:28/14:31/14:50/14:68/14:71/14:73/14:76/14:79/14:93/14:107	DR8, DR1404/DR14, -	165 bp	
			DRB1*03:01:06/03:13:01, DRB1*04:14?, DRB1*08:01:01-08:07/08:09-08:14/08:16-08:19/08:21-08:24/08:25w/08:26-08:30/02/08:32-08:33/08:34w/08:35-08:40/08:42-08:45, DRB1*11:31?/11:52?, DRB1*12:01:01w-12:01:02w/12:02:01w-12:02:04w/12:03:02w/12:05w-12:08w/12:09/12:10w-12:17w, DRB1*13:17/13:39/13:78-13:79,13:116, DRB1*14:08/14:15/14:23:02/14:34/14:52/14:64/14:72, DRB4*01:02?	DR17, DR3, DR4, DR8, DR11, -, Undefined, DR12, DR13, DR14	170 bp	
F3	F9	Mix19	DRB1*03:10/03:11:01w, DRB1*08:08?/08:29, DRB1*11:17/11:52-11:54:02, DRB1*13:43/13:45?/13:76, DRB1*14:01:01-14:01:03/14:04-14:05:03/14:07:01-14:08/14:11/14:14/14:16/14:18/14:22-14:23:03/14:25-14:26/14:28/14:31-14:33/14:35-14:36/14:38-14:39/14:42-14:45/14:49-14:51/14:53-14:56/14:58-14:62/14:64/14:68-14:76/14:79/14:82/14:86-14:88/14:90-14:93/14:95-14:97/14:99/14:101/14:104-14:105/14:107/14:110-14:112	DR3, DR8, DR14, DR11, DR13, DR1404/DR14, DR6, Undefined, DR13/14, -, Null	see below	
			DRB1*03:10, DRB1*08:08?, DRB1*13:43/13:45?, DRB1*14:01:01-14:01:03/14:04/14:07:01-14:07:02/14:16/14:22/14:25-14:26/14:28/14:31-14:32:02/14:35/14:38-14:39/14:49-14:50/14:53-14:55/14:58/14:60-14:62/14:68-14:71/14:73-14:76/14:79/14:82/14:86-14:88/14:90/14:92N/14:93/14:97/14:99/14:104-14:105/14:107/14:110-14:112	DR3, DR8, DR13, DR1404/DR14, DR6, DR13/14, -, Null	175 bp	
			DRB1*03:11:01w, DRB1*08:29, DRB1*11:17/11:52-11:54:02, DRB1*13:76, DRB1*14:01:01-14:01:03/14:04/14:05:01-14:05:03/14:07:01-14:08/14:11/14:14/14:18/14:23:01-14:23:03/14:26/14:28/14:33/14:35-14:36/14:38-14:39/14:42-14:45/14:50-14:51/14:54/14:56/14:58-14:62/14:64/14:68/14:70-14:73/14:75/14:82/14:86/14:88/14:90-14:92N/14:95-14:97/14:99/14:101/14:110/14:112	DR3, DR8, DR1404/DR14, DR11, DR13, DR6, Undefined, -, Null	225 bp	
E3	E9	Mix20	DRB1*11:09/11:28:02w/11:58:01w/11:83/11:87, DRB1*13:05:01-13:06/13:18/13:26/13:42/13:50:02w/13:56/13:77, DRB1*14:02-14:03:02/14:06:01-14:06:02/14:09/14:12:01-14:13/14:17-14:18/14:27/14:29-14:30/14:33/14:46-14:48/14:51-14:52/14:59/14:63-14:64/14:67/14:78/14:80-14:81/14:83/14:85/14:89/14:95/14:98w/14:106/14:108, DRB1*16:08w	DR11, -, DR13, DR14, DR6, DR1403/DR14, DR16	see below	
			DRB1*11:09/11:28:02w/11:58:01w/11:83/11:87, DRB1*13:05:01-13:06/13:26/13:42/13:50:02w/13:56/13:77, DRB1*14:02/14:06:01-14:06:02/14:09/14:13/14:17-14:18/14:29-14:30/14:33/14:46-14:48/14:51-14:52/14:59/14:64/14:80-14:81/14:83/14:95/14:98w/14:106/14:108, DRB1*16:08w	DR11, -, DR13, DR14, DR6, DR16	145 bp	
			DRB1*13:18, DRB1*14:03:01-14:03:02/14:12:01-14:12:02/14:27/14:63/14:67/14:78/14:85/14:89/14:98w	DR13, DR1403/DR14, -, DR6	150 bp	

Position on Tray			Mix	Amplified Alleles	Serology	Product Size (bp)
D3		D9	Mix21	<b>DRB1*04:17:01?, DRB1*09:07, DRB4*01:02?, DRB5*01:01:01-01:14, DRB5*02:02-02:05</b>	DR4, -, Undefined, DR51, Null	<b>see below</b>
				DRB1*04:17:01?, DRB4*01:02?, DRB5*01:01:01-01:11/01:14, DRB5*01:13, DRB5*02:02-02:05	DR4, Undefined, DR51, Null, -	175 bp
				DRB1*09:07, DRB4*01:02?, DRB5*01:12	-, Undefined	210 bp
C3		C9	Mix22	DRB1*03:42, DRB3*01:01:02:01-01:13/01:15, DRB3*02:01-02:25/02:28, DRB3*03:01:01-03:03	-, DR52, Undefined	215 bp
B3		B9	Mix23	<b>DRB4*01:01:01-01:01-01:04/01:05?/01:06-01:08, DRB4*02:01N, DRB4*03:01N</b>	DR53, Undefined, Null, -	<b>see below</b>
				DRB4*01:01:01-01:01-01:04/01:05?/01:06-01:07, DRB4*02:01N	DR53, Undefined, Null, -	215 bp
				DRB4*01:01:01-01:01-01:04/01:05?/01:06-01:08, DRB4*02:01N	DR53, Undefined, Null, -	695 bp
				DRB4*01:01:01-01:01-01:04/01:05?/01:06-01:08, DRB4*02:01N, DRB4*03:01N	DR53, Undefined, Null, -	250 bp
A3		A9	Mix24	Negative Control	-	None (440 bp)

w = weak

? = nucleotide sequence information not available for the primer matching sequence

**bold:** mixes which result in PCR fragments of different sizes (the specificities are first indicated all in one row, then split into groups in the following rows depending on the fragment size)

Wells (positions on tray) B5 - A5, H6 - A6, B11 - A11 and H12 - A12 are empty.

**Table 2:** Sizes of the PCR products and allele specificities of each HLA-DQB1\* Low Resolution CTS-PCR-SSP primer mix (**Lot No. DQB09-1**) based on the IMGT/HLA Sequence Database Release 3.4.0, April 2011.

**Amplification Control (Internal Positive Control):** Product size 440 base pairs (bp)

Position on tray		Mix	Allele Specificity	Serology	Product sizes (bp)
H4	H10	Mix 1	<b>DQB1*05:01:01:01-05:12, DQB1*06:23</b>	<b>DQ5, -, DQ6</b>	<b>see below</b>
			DQB1*05:03:02, DQB1*06:23	DQ5, DQ6	135
			DQB1*05:01:01:01-05:12	DQ5, -	225
G4	G10	Mix 2	<b>DQB1*06:01:01-06:01:06/06:03:01-06:03:02/06:08:01-06:08:02/06:11:02-06:12/06:14:01/06:17/06:21/06:26N/06:28/06:30-06:31/06:35/06:40-06:41/06:43-06:44</b>	<b>DQ6, -, DQ1, Null</b>	<b>see below</b>
			DQB1*06:01:01-06:01:06/06:35/06:43	DQ6, -	160/170
			DQB1*06:03:01-06:03:02/06:08:01-06:08:02/06:11:02-06:12/06:14:01/06:17/06:21/06:26N/06:28/06:30-06:31/06:40-06:41/06:44	DQ6, DQ1, Null, -	170
F4	F10	Mix 3	<b>DQB1*03:08, DQB1*06:02:01-06:03:02/06:08:01/06:10-06:11:02/06:13-06:14:02/06:16/06:19-06:20/06:23-06:24/06:26N/06:28-06:31/06:33/06:40-06:41/06:44</b>	<b>DQ8, DQ6, DQ1, Null, -</b>	<b>see below</b>
			DQB1*03:08, DQB1*06:02:01-06:02:02/06:10-06:11:01/06:13/06:14:02/06:16/06:19-06:20/06:24/06:29/06:33	DQ8, DQ6, DQ1	165
			DQB1*06:02:01-06:03:02/06:08:01/06:10-06:11:02/06:13-06:14:02/06:16/06:20/06:23-06:24/06:26N/06:28-06:31/06:33/06:40-06:41/06:44	DQ6, DQ1, Null, -	105
E4	E10	Mix 4	DQB1*06:04:01-06:07:02/06:09/06:18/06:25/06:27/06:32/06:34/06:36/06:38-06:39	DQ6, -	170
D4	D10	Mix 5	DQB1*02:01:01-02:06	DQ2, -	200
C4	C10	Mix 6	DQB1*03:01:01:01-03:01:06/03:04/03:09/03:13-03:14/03:16/03:19/03:21-03:22/03:24/03:27-03:29/03:35, DQB1*06:35	DQ7, -, DQ3	105
B4	B10	Mix 7	DQB1*03:04/03:14	DQ7, DQ3	175
A4	A10	Mix 8	<b>DQB1*03:02:01-03:02:05/03:07-03:08/03:11/03:32/03:37, DQB1*06:29/06:37</b>	<b>DQ8, -, DQ6</b>	<b>see below</b>
			DQB1*03:02:01-03:02:05/03:07-03:08/03:11/03:32/03:37, DQB1*06:29	DQ8, -, DQ6	130
			DQB1*06:37	-	145
H5	H11	Mix 9	DQB1*03:05:01-03:05:04	DQ8	135
G5	G11	Mix 10	<b>DQB1*03:03:02:01-03:03:03/03:06/03:12/03:15/03:20/03:25-03:26/03:30-03:31/03:33-03:34, DQB1*04:03:01-04:03:02, DQB1*06:15/06:22</b>	<b>DQ9, -, DQ3, DQ6</b>	<b>see below</b>
			DQB1*03:03:02:01-03:03:03/03:06/03:12/03:15/03:20/03:25-03:26/03:30-03:31/03:33-03:34, DQB1*04:03:01-04:03:02,	DQ9, -, DQ3	130
			DQB1*06:15/06:22	DQ6	215
F5	F11	Mix 11	DQB1*03:23, DQB1*05:03:02?	-, DQ5	120
E5	E11	Mix 12	DQB1*03:01:01:01-03:01:01:03/03:01:03-03:01:05/03:02:01-03:02:02/03:02:04w/03:02:05-03:03:02:03/03:04/03:05:03-03:05:04/03:07-03:19/03:21-03:22/03:24/03:26/03:28-03:36, DQB1*06:02:02/06:03:02	DQ7, -, DQ8, DQ9, DQ3, DQ6	160
D5	D11	Mix 13	DQB1*04:01:01-04:02:01/04:03:01/04:04-04:08	DQ4, -	210
C5	C11	Mix 14	Negative control	-	None (440 bp)

w = weak

? = nucleotide sequence information not available for the primer matching sequence

**bold**: mixes which result in PCR fragments of different sizes (the specificities are first indicated all in one row, then split into groups in the following rows depending on the fragment size)

Wells (positions on tray) B5 - A5, H6 - A6, B11 - A11 and H12 - A12 are empty.

**Table 3:** Amplification patterns of HLA-**DRB** alleles detected by the HLA-DRB1\* CTS-PCR-SSP primer mixes (**Lot-No DR39-2**) based on IMGT/HLA Sequence Database Release 3.4.0, April 2011

Alleles	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
DRB1*01:01:01-01:02:05/01:04-01:17/01:19-01:21/01:23-01:32/01:34-01:36	DR1, -	1																						
DRB1*01:03	DR103/DR1	1	2																					
DRB1*03:01:01:01-03:01:03/03:01:05-03:01:06/03:01:08/03:01:10/03:01:12/03:04:01-03:04:02/03:06/03:11:02/03:13:01/03:15/03:18-03:20/03:22-03:23/03:25-03:26/03:28/03:30-03:34/03:36-03:37/03:39/03:43-03:44/03:47-03:48/03:52/03:56/03:58/03:60-03:62	DR17, -, DR3					5	6												18					
DRB1*03:01:04/03:51/03:55	DR17, -						6												18					
DRB1*03:01:07/03:01:09/03:13:02/03:46/03:59/03:64	DR17, -, DR3					5	6																	
DRB1*03:01:11/03:01:13/03:03/03:07/03:17/03:21/03:24/03:35/03:40-03:41/03:45/03:54/03:57/03:63	-, DR18, DR3					5													18					
DRB1*03:02:01-03:02:02/03:05:01-03:05:03/03:09/03:14/03:27/03:29/03:53	DR18, DR3, -					5		7											18					
DRB1*03:08	DR3					5	6							13										
DRB1*03:10	DR3					5	6												18	19				
DRB1*03:11:01	DR3					5	6												18	w				
DRB1*03:12	DR3					5	?										16		18					
DRB1*03:16	DR3					5	?												18					
DRB1*03:38	-					5		7											w					
DRB1*03:42	-						6																22	
DRB1*03:49	-					5			8										18					
DRB1*03:50, DRB1*09:06	-, DR9						6																	
DRB1*04:01:01-04:13/04:16/04:17:02-04:60/04:62-04:98, DRB1*14:10/14:57	DR4, -, DR4/DR3, Null, DR14, DR4/DR6								8															
DRB1*04:14	DR4								8										?					
DRB1*04:15/04:61, DRB1*11:22/11:102	DR4, Undefined, -								8					13										
DRB1*04:17:01	DR4								8													?		
DRB1*07:01:01:01-07:01:03/07:03-07:21	DR7, Null, -									9														
DRB1*08:01:01-08:04:01/08:04:03-08:07/08:09-08:19/08:21-08:24/08:26-08:28/08:30:01-08:30:02/08:33/08:35-08:37/08:39-08:40/08:42-08:45, DRB1*14:15	DR8, -										10								18					
DRB1*08:04:02	DR8				?			?			10								18					
DRB1*08:08	DR8										10								18	?				
DRB1*08:20, DRB1*13:01:07/13:07:01-13:09/13:11:01-13:11:02/13:14:01-13:14:03/13:17/13:19/13:22-13:23:02/13:25/13:37/13:44/13:46-13:47/13:50:01/13:52/13:57/13:60/13:62/13:64/13:68/13:70/13:72/13:82-13:84/13:86/13:97/13:106-13:107/13:110/13:114/13:116, DRB1*14:20-14:21/14:34/14:37/14:40-14:41/14:77/14:84/14:94/14:100/14:102-14:103	undefined, -, DR13, DR11, DR6, DR14																		18					
DRB1*08:25, DRB1*12:16	DR8, -										10				14				w					
DRB1*08:29, DRB1*14:04/14:28/14:31/14:50/14:68/14:71/14:73/14:76/14:79/14:93/14:107	DR8, DR1404/DR14, -										10								18	19				

Alleles	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
DRB1*08:31, DRB1*11:01:01-11:01:10/11:01:12-11:02:02/11:04:01-11:06:02/11:08:01-11:08:02/11:10:01-11:10:02/11:12:01-11:15:11:18-11:19:02/11:21/11:23-11:27:02/11:28:01/11:29-11:30/11:32-11:35/11:37-11:39/11:42-11:49:01/11:50/11:56-11:57/11:58:02/11:60-11:62/11:64-11:66/11:69-11:70/11:74:01/11:75/11:77-11:82/11:84/11:88-11:92/11:95-11:101/11:104-11:106/11:108	DR8/DR11, -													13										
DRB1*08:32	Undefined										10				14				18					
DRB1*08:34	-										10								w					
DRB1*08:38	-								8		10								18					
DRB1*08:41, DRB1*11:67	-										10			13										
DRB1*09:01:02-09:05/09:08/09:10-09:12	DR9, -											11												
DRB1*09:07	-											11										21		
DRB1*10:01:01-10:03	DR10, -												12											
DRB1*11:03/11:11:01-11:11:02/11:36/11:41/11:55/11:63/11:68/11:76/11:85	DR11, -													13		16								
DRB1*11:07/11:103/11:107	DR11, -				5									13										
DRB1*11:09/11:87	DR11, -							7						13	15		17				20			
DRB1*11:16	DR11/DR13													13	15									
DRB1*11:17/11:54:01-11:54:02, DRB1*14:11	DR14, DR11													13						19				
DRB1*11:20	DR11							7						13	15									
DRB1*11:28:02	DR11													13							w			
DRB1*11:31	DR11													13					?					
DRB1*11:40	DR11													?	w	16	w							
DRB1*11:51	DR11													13		?								
DRB1*11:52	DR11													13				?	19					
DRB1*11:53	DR11				5									13						19				
DRB1*11:58:01	DR11													13	15		17				w			
DRB1*11:59	DR11						6							13	w	16	w							
DRB1*11:83	-						6							13	15		17				20			
DRB1*12:01:01-12:01:02/12:02:01-12:02:04/12:03:02/12:05-12:08/12:10-12:15/12:17	DR12, -														14				w					
DRB1*12:01:03/12:02:05/12:18-12:19/12:21/12:23-12:27	DR12, -, Null														14									
DRB1*12:04	DR12													13	14									
DRB1*12:09	DR12														14				18					
DRB1*12:22	-										10				14									
DRB1*13:01:01-13:01:06/13:01:08-13:01:09/13:02:04/13:10/13:15-13:16/13:28/13:35/13:40/13:51/13:53/13:59/13:61:01-13:61:02/13:69/13:79-13:80/13:87/13:91-13:92/13:98/13:102/13:105/13:109/13:113N	DR13, -, Null															15			18					
DRB1*13:02:01/13:02:03/13:02:05/13:31/13:34/13:36/13:39/13:41/13:73-13:74/13:85/13:96/13:99/13:104	DR13, -							7								15			18					
DRB1*13:02:02	DR13							7							w				18					
DRB1*13:03:01-13:04/13:12:01-13:13/13:20-13:21:02/13:24/13:30/13:33:01-13:33:03/13:38/13:48-13:49/13:55/13:58/13:66:01-13:66:02/13:75/13:78/13:81/13:88-13:90/13:94-13:95/13:101/13:108/13:111/13:115, DRB1*14:65	DR13, -, DR13/DR11, Undefined, DR6															16			18					
DRB1*13:05:01-13:05:02/13:26, DRB1*14:27	DR13, DR14							7								15		17	18		20			
DRB1*13:06	DR13															15			18		20			
DRB1*13:18/13:42	DR13, DR6															15		17	18		20			
DRB1*13:27	DR13						6									15			18					

Alleles	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
DRB1*13:29	DR13							7									16		18					
DRB1*13:32/13:93	DR13, -															15	16		18					
DRB1*13:43	DR13																16		18	19				
DRB1*13:45	DR13																		18	?				
DRB1*13:50:02	DR11							7								15		17	18		w			
DRB1*13:54	DR14																16		w					
DRB1*13:56, DRB1*14:02-14:03:02/14:09/14:30/14:47/14:89	DR6, DR14, DR1403/DR14, -							7											18		20			
DRB1*13:63	DR13							7								w	16	w	18					
DRB1*13:65	DR13							7								15	16		18					
DRB1*13:67/13:103	DR13, -							7								15								
DRB1*13:71	DR13						6										16		18					
DRB1*13:76, DRB1*14:01:01-14:01:03/14:05:01-14:05:03/14:07:01-14:08/14:14/14:16/14:22-14:23:03/14:25-14:26/14:32:01-14:32:02/14:35-14:36/14:38/14:42-14:45/14:49/14:53-14:56/14:58/14:60/14:62/14:69-14:70/14:72/14:74-14:75/14:86-14:88/14:90-14:92N/14:96-14:97/14:99/14:104-14:105/14:110-14:112	DR13, DR14, DR6, Undefined, DR13/14, -, Null																		18	19				
DRB1*13:77	-															w			w		20			
DRB1*13:112	-															15								
DRB1*14:06:01-14:06:02/14:12:01-14:12:02/14:17/14:29/14:52/14:80-14:81/14:83/14:106/14:108	DR14, -, DR6																		18		20			
DRB1*14:13/14:85	DR14, -							7									16		18		20			
DRB1*14:18/14:33/14:59/14:64	DR14, DR6																		18	19	20			
DRB1*14:19	DR14							?											18					
DRB1*14:24	DR14							7											18					
DRB1*14:39/14:61/14:101	DR14, -																				19			
DRB1*14:46	DR14							7														20		
DRB1*14:48	DR14							7											w		20			
DRB1*14:51	DR14							7											18	19	20			
DRB1*14:63	DR6							7								15	16		18		20			
DRB1*14:67	DR6							7								15			18		20			
DRB1*14:78	-															15	16		18		20			
DRB1*14:82	-						6												18	19				
DRB1*14:95	-						6												18	19	20			
DRB1*14:98	-							7											18		w			
DRB1*14:109	-							7																
DRB1*15:01:01-15:20/15:22-15:33/15:35-15:57	DR15, -, DR2, Null			3																				
DRB1*15:21, DRB1*16:09-16:10	DR2, DR16			3	4																			
DRB1*16:01:01-16:05:02/16:07/16:11-16:15/16:17	DR16, -, Null				4																			
DRB1*16:08	DR16				4			7								15		17			w			
DRB1*16:16	-				4									13										
DRB3*01:01:02:01-01:07/01:09-01:13/01:15, DRB3*02:01-02:05/02:07-02:17/02:19/02:21-02:25/02:28, DRB3*03:01:01-03:03	DR52, Undefined, -																						22	
DRB3*01:08, DRB3*02:20	Undefined							7															22	
DRB3*01:14	-					5																		

Alleles	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
DRB3*02:06	DR52							?															22	
DRB3*02:18	Undefined													13									22	
DRB4*01:01:01:01/01:03:01:01/01:03:01:03-01:04/01:06-01:08, DRB4*02:01N, DRB4*03:01N	DR53, -, Undefined, Null																							23
DRB4*01:02	Undefined								?										?			?		23
DRB4*01:03:01:02N	Null												?											23
DRB4*01:05	DR53																							?
DRB5*01:01:01-01:12/01:14, DRB5*02:02-02:05	DR51, Undefined, Null, -																					21		
DRB5*01:13	Undefined													13								21		

w = weak

? = nucleotide sequence information not available for the primer matching sequence

**Table 4:** Amplification patterns of HLA-DQB1\* alleles detected by the HLA-DQB1\* Low Resolution CTS-PCR-SSP primer mixes (Lot No. DQB09-1) based on the IMGT/HLA Sequence Database Release 3.4.0, April 2011.

Allele	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13
DQB1*02:01:01-02:06	DQ2, –					5								
DQB1*03:01:01:01-03:01:01:03/03:01:03-03:01:05/03:09/03:13/03:16/03:19/03:21-03:22/03:24/03:28-03:29/03:35	DQ7, –						6						12	
DQB1*03:01:02/03:01:06/03:27	DQ7, –						6							
DQB1*03:02:01-03:02:02/03:02:05/03:07/03:11/03:32	DQ8, –								8				12	
DQB1*03:02:03/03:37, DQB1*06:37	DQ8, –								8					
DQB1*03:02:04	DQ8								8				w	
DQB1*03:03:02:01-03:03:02:03/03:12/03:15/03:26/03:30-03:31/03:33-03:34	DQ9, –										10		12	
DQB1*03:03:03/03:06/03:20/03:25, DQB1*04:03:02, DQB1*06:15/06:22	DQ9, DQ3, –, DQ6										10			
DQB1*03:04/03:14	DQ7, DQ3						6	7					12	
DQB1*03:05:01-03:05:02	DQ8									9				
DQB1*03:05:03-03:05:04	DQ8									9			12	
DQB1*03:08	DQ8			3					8				12	
DQB1*03:10/03:17-03:18/03:36	DQ3, DQ9, DQ8, –												12	
DQB1*03:23	–											11		
DQB1*04:01:01-04:02:01/04:04-04:08	DQ4, –													13
DQB1*04:03:01	–										10			13
DQB1*05:01:01:01-05:03:01:02/05:03:03-05:12	DQ5, –	1												
DQB1*05:03:02	DQ5	1										?		
DQB1*06:01:01-06:01:06/06:08:02/06:12/06:17/06:21/06:43	DQ6, –, DQ1		2											
DQB1*06:02:01/06:10-06:11:01/06:13/06:14:02/06:16/06:19-06:20/06:24/06:33	DQ6, DQ1			3										
DQB1*06:02:02	DQ6			3									12	
DQB1*06:03:01/06:08:01/06:11:02/06:14:01/06:26N/06:28/06:30-06:31/06:40-06:41/06:44	DQ6, DQ1, Null, –		2	3										
DQB1*06:03:02	DQ6		2	3									12	
DQB1*06:04:01-06:07:02/06:09/06:18/06:25/06:27/06:32/06:34/06:36/06:38-06:39	DQ6, –				4									
DQB1*06:23	DQ6	1		3										
DQB1*06:29	DQ6			3					8					
DQB1*06:35	–		2				6							

w = weak

? = nucleotide sequence information not available for the primer matching sequence