UNITY INOVA Acceptance Tests Specifications

UNITY INOVA NMR Spectrometer Systems

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varian

nuclear magnetic resonance instruments

3.1 90° Pulse Width Specifications

The 90° pulse width acceptance test specifications for Varian liquids probes are listed in Table 6. Probes are categorized by frequency, and specifications are listed under the appropriate nucleus.

About the 90° Pulse Width Specifications

All 90° pulse width values are in microseconds and are less than or equal to the values listed in the table. Acceptance test specifications are achieved using the Varian UNITY*INOVA Acceptance Test Procedures*.

Blank spaces (shown as "—") in the specifications column indicate that Varian does not specify a value or that it is not applicable to specify a value. Asterisks (*) in the specifications column indicate that the 90° pulse width was determined using the indirect method. For custom specifications that have been purchased, please refer to the Custom Specifications Form for the acceptance test specifications. Refer to the *NMR Probes Installation Manual* for the power-handling capability of your probe.

All specifications for Bioproton•nmr probes are achieved using the Ultra•nmr shims.

About Test Samples

Table 5 lists the samples used to achieve the 90° pulse width specifications. Note that the 4-mm sample tube is used only for Nano•nmr probes. The 4-mm sample tube has a 4-mm outside diameter (O.D.) and a 40-µL sample volume. Note also that doped D_2O can be used for the ^1H pulse width test as an alternative to the sample specified in Table 5.

Table 5. Samples for 90° pulse width tests

Nucleus	*Sample Tube (mm)*	*Test Sample*	*Sample Part Number*
^1H	5	0.1% ethylbenzene in $CDCl_3$	00-968120-70
^1H	10	0.1% ethylbenzene in $CDCl_3$	00-968123-70
^1H	4	0.1% ethylbenzene in $CDCl_3$	00-993143-99
^{19}F	5	0.05% trifluorotoluene in benzene–d_6	00-968120-82
^{31}P	5	0.0485 M triphenylphosphate in $CDCl_3$	00-968120-87
^{31}P	10	0.0485 M triphenylphosphate in $CDCl_3$	00-968123-87
^{13}C	5	40% p-dioxane in benzene–d_6 (ASTM)	00-968120-69
^{13}C (indirect)	5	1% iodomethane–^{13}C in $CDCl_3$	00-968120-96
^{13}C	10	40% p-dioxane in benzene–d_6 (ASTM)	00-968123-69
^{15}N	5	90% formamide in DMSO–d_6	00-968120-83
^{15}N (indirect)	5	2% benzamide–^{15}N in DMSO–d_6	00-968120-97
^{15}N	10	90% formamide in DMSO–d_6	00-968123-83
^{29}Si	5	25% hexamethyldisiloxane in benzene–d_6	00-968120-98

Table 6. 90° pulse width specifications

Probe	*90° Pulse Width Specifications (µs)*						
200 MHz	^{1}H	^{19}F	^{31}P	^{13}C	^{15}N	^{29}Si	^{39}K
5-mm 4-nucleus-$^{1}H/^{19}F/^{13}C/^{31}P$ Auto•nmr	15	25	12	10	—	—	—
5-mm 4-nucleus-$^{1}H/^{19}F/^{13}C/^{15}N$ Auto•nmr	15	25	—	18	43	—	—
5-mm $^{1}H/^{19}F$ proton	10	10	—	—	—	—	—
5-mm $^{1}H/^{19}F/^{15}N$-^{31}P switchable	20	20	—	15	—	—	—
5-mm ^{15}N-^{31}P broadband	—	—	—	15	—	—	—
10-mm ^{15}N-^{31}P broadband	—	—	—	20	—	—	—
10-mm ^{103}Rh-^{9}Be broadband	Available by request.						
300 MHz	^{1}H	^{19}F	^{31}P	^{13}C	^{15}N	^{29}Si	^{39}K
5-mm $^{1}H\{^{15}N$-$^{31}P\}$ indirect detection	12	—	—	—	—	—	—
5-mm 4-nucleus-$^{1}H/^{19}F/^{13}C/^{31}P$ Auto•nmr	15	20	12	10	—	—	—
5-mm 4-nucleus-$^{1}H/^{19}F/^{13}C/^{15}N$ Auto•nmr	15	25	—	15	50	—	—
5-mm 4-nucleus-$^{1}H/^{19}F/^{13}C/^{29}Si$ Auto•nmr	15	20	—	10	—	18	18
4-mm (40 µL) ^{1}H Nano•nmr	Available by request.						
5-mm $^{1}H/^{19}F$ proton	10	10	—	—	—	—	—
5-mm $^{1}H/^{19}F/^{15}N$-^{31}P switchable	20	20	—	15	—	—	—
5-mm ^{15}N-^{31}P broadband	—	—	—	15	—	—	—
10-mm ^{15}N-^{31}P broadband	—	—	—	20	—	—	—
10-mm ^{103}Rh-^{15}N broadband	Available by request.						
400 MHz	^{1}H	^{19}F	^{31}P	^{13}C	^{15}N	^{29}Si	^{39}K
5-mm $^{1}H\{^{15}N$-$^{31}P\}$ Indirect•nmr	10	—	—	12*	25*	—	—
5-mm $^{1}H\{^{15}N$-$^{31}P\}$ PFG Indirect•nmr	10	—	—	12*	25*	—	—
5-mm $^{1}H\{^{13}C/^{15}N\}$ Triple•nmr	10	—	—	15*	45*	—	—
5-mm $^{1}H\{^{13}C/^{15}N\}$ PFG Triple•nmr	10	—	—	15*	45*	—	—
5-mm 4-nucleus-$^{1}H/^{19}F/^{13}C/^{31}P$ Auto•nmr	20	30	20	15	—	—	—
4-mm (40 µL) ^{1}H Nano•nmr	Available by request.						
5-mm $^{1}H/^{19}F$ proton	10	10	—	—	—	—	—
5-mm $^{1}H/^{19}F/^{15}N$-^{31}P switchable	25	25	—	15	—	—	—
5-mm ^{15}N-^{31}P broadband	—	—	—	15	—	—	—
10-mm ^{15}N-^{31}P broadband	—	—	—	20	—	—	—
10-mm ^{103}Rh-^{15}N broadband	Available by request.						
500 MHz	^{1}H	^{19}F	^{31}P	^{13}C	^{15}N	^{29}Si	^{39}K
5-mm $^{1}H\{^{15}N$-$^{31}P\}$ Indirect•nmr	10	—	—	12*	25*	—	—
5-mm $^{1}H\{^{15}N$-$^{31}P\}$ PFG Indirect•nmr	10	—	—	12*	25*	—	—
5-mm $^{1}H\{^{13}C/^{15}N\}$ Triple•nmr	10	—	—	15*	45*	—	—
5-mm $^{1}H\{^{13}C/^{15}N\}$ PFG Triple•nmr	10	—	—	15*	45*	—	—

Table 6. 90° pulse width specifications *(Continued)*

Probe	*90° Pulse Width Specifications (µs)*						
5-mm $^{1}H\{^{13}C/^{31}P\}$ Triple•nmr	10	—	40*	15*	—	—	—
5-mm $^{13}C\{^{1}H/^{15}N\}$ Triple•nmr	30	—	—	9	25	—	—
5-mm Proton•nmr	10	10	—	—	—	—	—
4-mm (40 µL) ^{1}H Nano•nmr	4.5	—	—	—	—	—	—
10-mm Bioproton•nmr	18	—	—	—	—	—	—
5-mm $^{1}H/^{19}F/^{15}N$-^{31}P Switchable•nmr	12	12	18	12	—	—	—
5-mm ^{15}N-^{31}P broadband	—	—	—	15	—	—	—
5-mm ^{15}N-^{13}C broadband	—	—	—	15	—	—	—
10-mm ^{15}N-^{31}P broadband	—	—	—	25	—	—	—
10-mm ^{15}N-^{13}C broadband	—	—	—	20	—	—	—
10-mm ^{103}Rh-^{15}N broadband	—	—	—	—	30	—	—
600 MHz	^{1}H	^{19}F	^{31}P	^{13}C	^{15}N	^{29}Si	^{39}K
5-mm $^{1}H\{^{15}N$-$^{31}P\}$ Indirect•nmr	10	—	—	14*	30*	—	—
5-mm $^{1}H\{^{15}N$-$^{31}P\}$ PFG Indirect•nmr	10	—	—	14*	30*	—	—
5-mm $^{1}H\{^{13}C/^{15}N\}$ Triple•nmr	10	—	—	15*	45*	—	—
5-mm $^{1}H\{^{13}C/^{15}N\}$ PFG Triple•nmr	10	—	—	15*	45*	—	—
5-mm $^{13}C\{^{1}H/^{15}N\}$ Triple•nmr	30	—	—	9	25	—	—
5-mm Proton•nmr	10	10	—	—	—	—	—
10-mm Bioproton•nmr	20	—	—	—	—	—	—
5-mm ^{15}N-^{31}P Broadband•nmr	—	—	15	9	15	—	—
	—	—	—	—	—	—	—
750 MHz	^{1}H	^{19}F	^{31}P	^{13}C	^{15}N	^{29}Si	^{39}K
Available by request.	Available by request.						

* *90° pulse width determined using the indirect method.*

Table 9. Resolution and lineshape specifications (14-shim and 18-shim)

Probe	*$CHCl_3$ Sample Part No.*	*Resolution and Lineshape (Hz) for Standard Shim Systems (50.0%/0.55%/0.11%)*		
200-MHz		^{1}H Spin ($CHCl_3$)	^{1}H Non-spin ($CHCl_3$)	^{13}C Spin (ASTM)
5-mm 4-nuc-$^{1}H/^{19}F/^{13}C/^{31}P$ Auto•nmr	00-968120-76	0.4/6.0/12.0	—	0.2/3.0/5.0
5-mm 4-nuc-$^{1}H/^{19}F/^{13}C/^{15}N$ Auto•nmr	00-968120-76	0.4/6.0/12.0	—	0.2/3.0/5.0
5-mm $^{1}H/^{19}F$ proton	00-968120-76	0.4/6.0/12.0	—	—
5-mm $^{1}H/^{19}F/^{15}N$-^{31}P switchable	00-968120-76	0.4/6.0/12.0	—	0.2/3.0/5.0
5-mm ^{15}N-^{31}P broadband	—	—	—	0.2/3.0/5.0
10-mm ^{15}N-^{31}P broadband	—	—	—	0.2/3.0/5.0
300-MHz		^{1}H Spin ($CHCl_3$)	^{1}H Non-spin ($CHCl_3$)	^{13}C Spin (ASTM)
5-mm $^{1}H\{^{15}N$-$^{31}P\}$ indirect detection	00-968120-99	0.4/6.0/12.0	—	—
5-mm 4-nuc-$^{1}H/^{19}F/^{13}C/^{31}P$ Auto•nmr	00-968120-99	0.4/6.0/12.0	—	0.2/3.0/5.0
5-mm 4-nuc-$^{1}H/^{19}F/^{13}C/^{15}N$ Auto•nmr	00-968120-99	0.4/6.0/12.0	—	0.2/3.0/5.0
5-mm 4-nuc-$^{1}H/^{19}F/^{13}C/^{29}Si$ Auto•nmr	00-968120-99	0.4/6.0/12.0	—	0.2/3.0/5.0
4-mm (40 µL) ^{1}H Nano•nmr		Available by request.		
5-mm $^{1}H/^{19}F$ proton	00-968120-89	0.4/6.0/12.0	—	—
5-mm $^{1}H/^{19}F/^{15}N$-^{31}P switchable	00-968120-99	0.4/6.0/12.0	—	0.2/3.0/5.0
5-mm ^{15}N-^{31}P broadband	—	—	—	0.2/3.0/5.0
10-mm ^{15}N-^{31}P broadband	—	—	—	0.2/3.0/5.0
400-MHz		^{1}H Spin ($CHCl_3$)	^{1}H Non-spin ($CHCl_3$)	^{13}C Spin (ASTM)
5-mm $^{1}H\{^{15}N$-$^{31}P\}$ Indirect•nmr	00-968120-89	0.45/6.0/12.0	—	—
5-mm $^{1}H\{^{15}N$-$^{31}P\}$ PFG Indirect•nmr	00-968120-89	0.45/6.0/12.0	—	—
5-mm $^{1}H\{^{13}C/^{15}N\}$ Triple•nmr	00-968120-89	0.45/6.0/12.0	—	—
5-mm $^{1}H\{^{13}C/^{15}N\}$ PFG Triple•nmr	00-968120-89	0.45/6.0/12.0	—	—
5-mm 4-nuc-$^{1}H/^{19}F/^{13}C/^{31}P$ Auto•nmr	00-968120-89	0.45/6.0/12.0	—	0.2/3.0/5.0
4-mm (40 µL) ^{1}H Nano•nmr		Available by request.		
5-mm $^{1}H/^{19}F$ proton	00-968120-89	0.45/6.0/12.0	—	—
5-mm $^{1}H/^{19}F/^{15}N$-^{31}P switchable	00-968120-99	0.45/6.0/12.0	—	0.2/3.0/5.0
5-mm ^{15}N-^{31}P broadband	—	—	—	0.2/3.0/5.0
10-mm ^{15}N-^{31}P broadband	—	—	—	0.2/3.0/5.0

Table 10. Resolution and lineshape specifications (23-shim)

Probe	*$CHCl_3$ Sample Part No.*	*Resolution and Lineshape (Hz) for Enhanced Shim Systems (50.0%/0.55%/0.11%)*		
400-MHz		^{1}H Spin ($CHCl_3$)	^{1}H Non-spin ($CHCl_3$)	^{13}C Spin (ASTM)
5-mm $^{1}H\{^{15}N$-$^{31}P\}$ Indirect•nmr	00-968120-89	0.45/6.0/12.0	0.65/8/16	—
5-mm $^{1}H\{^{15}N$-$^{31}P\}$ PFG Indirect•nmr	00-968120-89	0.45/6.0/12.0	0.65/8/16	—
5-mm $^{1}H\{^{13}C/^{15}N\}$ Triple•nmr	00-968120-89	0.45/6.0/12.0	0.65/8/16	—
5-mm $^{1}H\{^{13}C/^{15}N\}$ PFG Triple•nmr	00-968120-89	0.45/6.0/12.0	0.65/8/16	—
5-mm 4-nuc-$^{1}H/^{19}F/^{13}C/^{31}P$ Auto•nmr	00-968120-89	0.45/6.0/12.0	—	0.2/3.0/5.0
4-mm (40 µL) ^{1}H Nano•nmr		Available by request.		
5-mm $^{1}H/^{19}F$ proton	00-968120-89	0.45/6.0/12.0	—	—
5-mm $^{1}H/^{19}F/^{15}N$-^{31}P switchable	00-968120-99	0.45/6.0/12.0	—	0.2/3.0/5.0
5-mm ^{15}N-^{31}P broadband	—	—	—	0.2/3.0/5.0
10-mm ^{15}N-^{31}P broadband	—	—	—	0.2/3.0/5.0
500-MHz		^{1}H Spin ($CHCl_3$)	^{1}H Non-spin ($CHCl_3$)	^{13}C Spin (ASTM)
5-mm $^{1}H\{^{15}N$-$^{31}P\}$ Indirect•nmr	00-968120-89	0.45/6.0/12.0	0.65/10/20	—
5-mm $^{1}H\{^{15}N$-$^{31}P\}$ PFG Indirect•nmr	00-968120-89	0.45/6.0/12.0	0.65/10/20	—
5-mm $^{1}H\{^{13}C/^{15}N\}$ Triple•nmr	00-968120-89	0.45/6.0/12.0	0.65/10/20	—
5-mm $^{1}H\{^{13}C/^{15}N\}$ PFG Triple•nmr	00-968120-89	0.45/6.0/12.0	0.65/10/20	—
5-mm $^{1}H\{^{13}C/^{31}P\}$ Triple•nmr	00-968120-89	0.45/6.0/12.0	0.65/10/20	—
5-mm $^{13}C\{^{1}H/^{15}N\}$ Triple•nmr	—	—	—	0.2/3.0/5.0
5-mm Proton•nmr	00-968120-89	0.45/6.0/12.0	—	—
4-mm (40 µL) ^{1}H Nano•nmr	00-993143-99	0.6/8.0/13.0	—	—
10-mm Bioproton•nmr	00-968123-89	—	—	—
5-mm $^{1}H/^{19}F/^{15}N$-^{31}P Switchable•nmr	00-968120-89	0.45/6.0/12.0	—	0.2/3.0/5.0
5-mm ^{15}N-^{31}P broadband	00-968120-89	—	—	0.2/3.0/5.0
5-mm ^{15}N-^{13}C broadband	00-968120-89	—	—	0.2/3.0/5.0
10-mm ^{15}N-^{31}P broadband	00-968120-89	—	—	0.2/3.0/5.0
10-mm ^{15}N-^{13}C broadband	00-968120-89	—	—	0.2/3.0/5.0
600-MHz		^{1}H Spin ($CHCl_3$)	^{1}H Non-spin ($CHCl_3$)	^{13}C Spin (ASTM)
5-mm $^{1}H\{^{15}N$-$^{31}P\}$ Indirect•nmr	00-968120-89	0.45/6.0/12.0	0.65/10/20	—
5-mm $^{1}H\{^{15}N$-$^{31}P\}$ PFG Indirect•nmr	00-968120-89	0.45/6.0/12.0	0.65/10/20	—
5-mm $^{1}H\{^{13}C/^{15}N\}$ Triple•nmr	00-968120-89	0.45/6.0/12.0	0.65/10/20	—
5-mm $^{1}H\{^{13}C/^{15}N\}$ PFG Triple•nmr	00-968120-89	0.45/6.0/12.0	0.65/10/20	—
5-mm $^{13}C\{^{1}H/^{15}N\}$ Triple•nmr	—	—	—	0.2/3.0/5.0
5-mm Proton•nmr	00-968120-89	0.45/6.0/12.0	—	—
10-mm Bioproton•nmr	00-968123-89	—	—	—
5-mm ^{15}N-^{31}P Broadband•nmr	—	—	—	0.2/3.0/5.0
750-MHz				
Available by request.		Available by request.		

Table 14. Spinning sidebands specifications

Probe	*Spinning Sidebands*	
200 MHz	^{1}H	^{13}C
5-mm 4-nucleus-$^{1}H/^{19}F/^{13}C/^{31}P$ Auto•nmr	1%	1%
5-mm 4-nucleus-$^{1}H/^{19}F/^{13}C/^{15}N$ Auto•nmr	1%	1%
5-mm $^{1}H/^{19}F$ proton	1%	—
5-mm $^{1}H/^{19}F/^{15}N$-^{31}P switchable	1%	1%
5-mm ^{15}N-^{31}P broadband	—	1%
10-mm ^{15}N-^{31}P broadband	—	1%
300 MHz	^{1}H	^{13}C
5-mm $^{1}H\{^{15}N$-$^{31}P\}$ indirect detection	1%	1%
5-mm 4-nucleus-$^{1}H/^{19}F/^{13}C/^{31}P$ Auto•nmr	1%	1%
5-mm 4-nucleus-$^{1}H/^{19}F/^{13}C/^{15}N$ Auto•nmr	1%	1%
5-mm 4-nucleus-$^{1}H/^{19}F/^{13}C/^{29}Si$ Auto•nmr	1%	1%
4-mm (40 µL) ^{1}H Nano•nmr	1%	—
5-mm $^{1}H/^{19}F$ proton	1%	—
5-mm $^{1}H/^{19}F/^{15}N$-^{31}P switchable	1%	1%
5-mm ^{15}N-^{31}P broadband	—	1%
10-mm ^{15}N-^{31}P broadband	—	1%
400 MHz	^{1}H	^{13}C
5-mm $^{1}H\{^{15}N$-$^{31}P\}$ Indirect•nmr	1%	—
5-mm $^{1}H\{^{15}N$-$^{31}P\}$ PFG Indirect•nmr	1%	—
5-mm $^{1}H\{^{13}C/^{15}N\}$ Triple•nmr	1%	—
5-mm $^{1}H\{^{13}C/^{15}N\}$ PFG Triple•nmr	1%	—
5-mm 4-nucleus-$^{1}H/^{19}F/^{13}C/^{31}P$ Auto•nmr	1%	1%
4-mm (40 µL) ^{1}H Nano•nmr	1%	—
5-mm $^{1}H/^{19}F$ proton	1%	—
5-mm $^{1}H/^{19}F/^{15}N$-^{31}P switchable	1%	1%
5-mm ^{15}N-^{31}P broadband	—	1%
10-mm ^{15}N-^{31}P broadband	—	1%
500 MHz	^{1}H	^{13}C
5-mm $^{1}H\{^{15}N$-$^{31}P\}$ Indirect•nmr	1%	—
5-mm $^{1}H\{^{15}N$-$^{31}P\}$ PFG Indirect•nmr	1%	—
5-mm $^{1}H\{^{13}C/^{15}N\}$ Triple•nmr	1%	—
5-mm $^{1}H\{^{13}C/^{15}N\}$ PFG Triple•nmr	1%	—
5-mm $^{1}H\{^{13}C/^{31}P\}$ Triple•nmr	1%	—
5-mm $^{13}C\{^{1}H/^{15}N\}$ Triple•nmr	—	1%
5-mm Proton•nmr	1%	—

Table 16. Sensitivity (S/N) specifications

Probe	*Sensitivity (S/N) Specifications*						
200 MHz	^{1}H	^{19}F	^{31}P	^{13}C	^{15}N	^{29}Si	^{39}K
5-mm 4-nucleus-$^{1}H/^{19}F/^{13}C/^{31}P$ Auto•nmr	50:1	50:1	30:1	40:1	—	—	—
5-mm 4-nucleus-$^{1}H/^{19}F/^{13}C/^{15}N$ Auto•nmr	50:1	50:1	—	30:1	6:1	—	—
5-mm $^{1}H/^{19}F$ proton	85:1	85:1	—	—	—	—	—
5-mm $^{1}H/^{19}F/^{15}N$-^{31}P switchable	35:1	35:1	35:1	40:1	6:1	—	—
5-mm ^{15}N-^{31}P broadband	—	—	45:1	50:1	7:1	—	—
10-mm ^{15}N-^{31}P broadband	—	—	135:1	150:1	20:1	—	—
10-mm ^{103}Rh-^{9}Be broadband	Available by request.						
300 MHz	^{1}H	^{19}F	^{31}P	^{13}C	^{15}N	^{29}Si	^{39}K
5-mm $^{1}H\{^{15}N$-$^{31}P\}$ indirect detection	135:1	—	—	—	—	—	—
5-mm 4-nucleus-$^{1}H/^{19}F/^{13}C/^{31}P$ Auto•nmr	100:1	90:1	50:1	80:1	—	—	—
5-mm 4-nucleus-$^{1}H/^{19}F/^{13}C/^{15}N$ Auto•nmr	90:1	90:1	—	70:1	8:1	—	—
5-mm 4-nucleus-$^{1}H/^{19}F/^{13}C/^{29}Si$ Auto•nmr	100:1	90:1	—	80:1	—	80:1	80:1
4-mm (40 µL) ^{1}H Nano•nmr	Available by request.						
5-mm $^{1}H/^{19}F$ proton	175:1	175:1	—	—	—	—	—
5-mm $^{1}H/^{19}F/^{15}N$-^{31}P switchable	80:1	80:1	70:1	80:1	12:1	—	—
5-mm ^{15}N-^{31}P broadband	—	—	90:1	100:1	15:1	—	—
10-mm ^{15}N-^{31}P broadband	—	—	280:1	300:1	40:1	—	—
10-mm ^{103}Rh-^{15}N broadband	Available by request.						
400 MHz	^{1}H	^{19}F	^{31}P	^{13}C	^{15}N	^{29}Si	^{39}K
5-mm $^{1}H\{^{15}N$-$^{31}P\}$ Indirect•nmr	350:1	—	—	—	—	—	—
5-mm $^{1}H\{^{15}N$-$^{31}P\}$ PFG Indirect•nmr	350:1	—	—	—	—	—	—
5-mm $^{1}H\{^{13}C/^{15}N\}$ Triple•nmr	350:1	—	—	—	—	—	—
5-mm $^{1}H\{^{13}C/^{15}N\}$ PFG Triple•nmr	350:1	—	—	—	—	—	—
5-mm 4-nucleus-$^{1}H/^{19}F/^{13}C/^{31}P$ Auto•nmr	135:1	135:1	60:1	100:1	—	—	—
4-mm (40 µL) ^{1}H Nano•nmr	Available by request.						
5-mm $^{1}H/^{19}F$ proton	250:1	250:1	—	—	—	—	—
5-mm $^{1}H/^{19}F/^{15}N$-^{31}P switchable	100:1	100:1	100:1	120:1	15:1	—	—
5-mm ^{15}N-^{31}P broadband	—	—	110:1	150:1	20:1	—	—
10-mm ^{15}N-^{31}P broadband	—	—	350:1	450:1	60:1	—	—
10-mm ^{103}Rh-^{15}N broadband	Available by request.						
500 MHz	^{1}H	^{19}F	^{31}P	^{13}C	^{15}N	^{29}Si	^{39}K
5-mm $^{1}H\{^{15}N$-$^{31}P\}$ Indirect•nmr	450:1	T	—	—	—	—	—
5-mm $^{1}H\{^{15}N$-$^{31}P\}$ PFG Indirect•nmr	450:1	T	—	—	—	—	—
5-mm $^{1}H\{^{13}C/^{15}N\}$ Triple•nmr	450:1	T	—	—	—	—	—
5-mm $^{1}H\{^{13}C/^{15}N\}$ PFG Triple•nmr	450:1	T	—	—	—	—	—

Table 16. Sensitivity (S/N) specifications *(Continued)*

Probe	*Sensitivity (S/N) Specifications*						
5-mm $^{1}H\{^{13}C/^{31}P\}$ Triple•nmr	450:1	T	—	—	—	—	—
5-mm $^{13}C\{^{1}H/^{15}N\}$ Triple•nmr	—	—	—	250:1	—	—	—
5-mm Proton•nmr	450:1	450:1	—	—	—	—	—
4-mm (40 µL) ^{1}H Nano•nmr	90:1	T	—	—	—	—	—
10-mm Bioproton•nmr	850:1	T	—	—	—	—	—
5-mm $^{1}H/^{19}F/^{15}N$-^{31}P Switchable•nmr	275:1	275:1	90:1	180:1	—	—	—
5-mm ^{15}N-^{31}P broadband	—	—	180:1	190:1	25:1	—	—
5-mm ^{15}N-^{13}C broadband	—	—	—	250:1	35:1	—	—
10-mm ^{15}N-^{31}P broadband	—	—	380:1	380:1	45:1	—	—
10-mm ^{15}N-^{13}C broadband	—	—	—	650:1	85:1	—	—
10-mm ^{103}Rh-^{15}N broadband	—	—	—	—	80:1	—	70:1
600 MHz	^{1}H	^{19}F	^{31}P	^{13}C	^{15}N	^{29}Si	^{39}K
5-mm $^{1}H\{^{15}N$-$^{31}P\}$ Indirect•nmr	575:1	T	—	—	—	—	—
5-mm $^{1}H\{^{15}N$-$^{31}P\}$ PFG Indirect•nmr	625:1	T	—	—	—	—	—
5-mm $^{1}H\{^{13}C/^{15}N\}$ Triple•nmr	575:1	T	—	—	—	—	—
5-mm $^{1}H\{^{13}C/^{15}N\}$ PFG Triple•nmr	625:1	T	—	—	—	—	—
5-mm $^{13}C\{^{1}H/^{15}N\}$ Triple•nmr	—	—	—	340:1	—	—	—
5-mm Proton•nmr	600:1	600:1	—	—	—	—	—
10-mm Bioproton•nmr	1050:1	—	—	—	—	—	—
5-mm ^{15}N-^{31}P Broadband•nmr	—	—	160:1	365:1	35:1	—	—
750 MHz	^{1}H	^{19}F	^{31}P	^{13}C	^{15}N	^{29}Si	^{39}K
Available by request.	Available by request.						

Varian Probe Specifications[1, 2] with UNITY*plus*™ NMR Spectrometers

Shaoxiong Wu/2/22/2005

Frequency/Probe Type	Sensitivity (S/N)						90° Pulse Width (μsec)						Resolution and Lineshape (Hz)[3]		Spinning Sidebands		V T Range
200 MHz	^{1}H	^{19}F	^{31}P	^{13}C	^{15}N	^{29}Si	^{1}H	^{19}F	^{31}P	^{13}C	^{15}N	^{29}Si	^{1}H	^{13}C	^{1}H	^{13}C	
5 mm 4-nucleus-$^{1}H/^{19}F/^{13}C/^{31}P$ Auto•nmr™ probe	50:1	50:1	30:1	40:1			15	25	12	10			0.4/6.0/12.0	0.2/3.0/5.0	1%	1%	-150° to +200°C
5 mm 4-nucleus-$^{1}H/^{19}F/^{13}C/^{15}N$ Auto•nmr™ probe	50:1	50:1		30:1	6:1		15	25		18	43		0.4/6.0/12.0	0.2/3.0/5.0	1%	1%	-150° to +200°C
5 mm $^{1}H/^{19}F$ proton probe	85:1	85:1					10	10					0.4/6.0/12.0		1%		-150° to +200°C
5 mm $^{1}H/^{19}F/^{15}N$-^{31}P switchable probe	35:1	35:1	35:1	40:1	6:1		20	20		15			0.4/6.0/12.0	0.2/3.0/5.0	1%	1%	-150° to +200°C
5 mm ^{15}N-^{31}P broadband probe			45:1	50:1	7:1					15				0.2/3.0/5.0		1%	-150° to +200°C
10 mm ^{15}N-^{31}P broadband probe			135:1	150:1	20:1					20				0.2/3.0/5.0		1%	-150° to +200°C
10 mm ^{103}Rh-^{9}Be broadband probe	Available by request.						Available by request.						Available by request.		Available by request.		Available by request.
300 MHz	^{1}H	^{19}F	^{31}P	^{13}C	^{15}N	^{29}Si	^{1}H	^{19}F	^{31}P	^{13}C	^{15}N	^{29}Si	^{1}H	^{13}C	^{1}H	^{13}C	
5 mm $^{1}H\{^{15}N$-$^{31}P\}$ indirect detection probe	135:1						12						0.4/6.0/12.0		1%	1%	-150° to +200°C
5 mm 4-nucleus-$^{1}H/^{19}F/^{13}C/^{31}P$ Auto•nmr™ probe	100:1	90:1	50:1	80:1			15	20	12	10			0.4/6.0/12.0	0.2/3.0/5.0	1%	1%	-150° to +200°C
5 mm 4-nucleus-$^{1}H/^{19}F/^{13}C/^{15}N$ Auto•nmr™ probe	90:1	90:1		70:1	8:1		15	25		15	50		0.4/6.0/12.0	0.2/3.0/5.0	1%	1%	-150° to +200°C
5 mm 4-nucleus-$^{1}H/^{19}F/^{13}C/^{29}Si$ Auto•nmr™ probe	100:1	90:1		80:1		80:1	15	20		10		18	0.4/6.0/12.0	0.2/3.0/5.0	1%	1%	-150° to +200°C
4 mm (40 μl) Nano•nmr™ probe	Available by request.						Available by request.						Available by request.		Available by request.		Available by request.
5 mm $^{1}H/^{19}F$ proton probe	175:1	175:1					10	10					0.4/6.0/12.0		1%		-150° to +200°C
5 mm $^{1}H/^{19}F/^{15}N$-^{31}P switchable probe	80:1	80:1	70:1	80:1	12:1		20	20		15			0.4/6.0/12.0	0.2/3.0/5.0	1%	1%	-150° to +200°C
5 mm ^{15}N-^{31}P broadband probe			90:1	100:1	15:1					15				0.2/3.0/5.0		1%	-150° to +200°C
10 mm ^{15}N-^{31}P broadband probe			280:1	300:1	40:1					20				0.2/3.0/5.0		1%	-150° to +200°C
10 mm ^{103}Rh-^{15}N broadband probe	Available by request.						Available by request.						Available by request.		Available by request.		Available by request.
Pulsed Field Gradient probes	Available by request.						Available by request.						Available by request.		Available by request.		Available by request.
400 MHz	^{1}H	^{19}F	^{31}P	^{13}C	^{15}N	^{29}Si	^{1}H	^{19}F	^{31}P	^{13}C	^{15}N	^{29}Si	^{1}H	^{13}C	^{1}H	^{13}C	
5 mm $^{1}H\{^{15}N$-$^{31}P\}$ Indirect•nmr™ probe[4]	350:1						10			12	25		0.45/6.0/12.0		1%		-100° to +100°C
5 mm PFG $^{1}H\{^{15}N$-$^{31}P\}$ Indirect•nmr™ probe[4]	350:1						10			12	25		0.45/6.0/12.0		1%		0° to +50°C
5 mm $^{1}H\{^{13}C/^{15}N\}$ Triple•nmr™ probe[4]	350:1						10			15	45		0.45/6.0/12.0		1%		-100° to +100°C
5 mm PFG $^{1}H\{^{13}C/^{15}N\}$ Triple•nmr™ probe[4]	350:1						10			15	45		0.45/6.0/12.0		1%		0° to +50°C
5 mm 4-nucleus-$^{1}H/^{19}F/^{13}C/^{31}P$ Auto•nmr™ probe	135:1	135:1	60:1	100:1			20	30	20	15			0.45/6.0/12.0	0.2/3.0/5.0	1%	1%	-150° to +200°C
4 mm (40 μl) Nano•nmr™ probe	Available by request.						Available by request.						Available by request.		Available by request.		Available by request.
5 mm $^{1}H/^{19}F$ proton probe	250:1	250:1					10	10					0.45/6.0/12.0		1%		-150° to +200°C
5 mm $^{1}H/^{19}F/^{15}N$-^{31}P switchable probe	100:1	100:1	100:1	120:1	15:1		25	25		15			0.45/6.0/12.0	0.2/3.0/5.0	1%	1%	-150° to +200°C
5 mm ^{15}N-^{31}P broadband probe			110:1	150:1	20:1					15				0.2/3.0/5.0		1%	-150° to +200°C
10 mm ^{15}N-^{31}P broadband probe			350:1	450:1	60:1					20				0.2/3.0/5.0		1%	-150° to +200°C
10 mm ^{103}Rh-^{15}N broadband probe	Available by request.						Available by request.						Available by request.		Available by request.		Available by request.
Pulsed Field Gradient probes	Available by request.						Available by request.						Available by request.		Available by request.		Available by request.
500 MHz	^{1}H	^{19}F	^{31}P	^{13}C	^{15}N	^{29}Si	^{1}H	^{19}F	^{31}P	^{13}C	^{15}N	^{29}Si	^{1}H	^{13}C	^{1}H	^{13}C	
5 mm $^{1}H\{^{15}N$-$^{31}P\}$ Indirect•nmr™ probe[4]	450:1	T[5]					10			12	25		0.45/6.0/12.0		1%		-100° to +100°C
5 mm $^{1}H\{^{15}N$-$^{31}P\}$ PFG Indirect•nmr™ probe[4]	450:1	T[5]					10			12	25		0.45/6.0/12.0		1%		0° to +50°C
5 mm $^{1}H\{^{13}C/^{15}N\}$ Triple•nmr™ probe[4]	450:1	T[5]					10			15	45		0.45/6.0/12.0		1%		-100° to +100°C
5 mm $^{1}H\{^{13}C/^{15}N\}$ PFG Triple•nmr™ probe[4]	450:1	T[5]					10			15	45		0.45/6.0/12.0		1%		0° to +50°C
5 mm $^{1}H\{^{13}C/^{31}P\}$ Triple•nmr™ probe[4]	450:1	T[5]					10		40	15			0.45/6.0/12.0		1%		-100° to +100°C
5 mm $^{13}C\{^{1}H/^{15}N\}$ Triple•nmr™ probe				250:1			30			9	25			0.2/3.0/5.0		1%	-100° to +100°C
5 mm Proton•nmr™ probe	450:1	450:1					10	10					0.45/6.0/12.0		1%		-150° to +200°C
4 mm (40 μL) Nano•nmr™ probe	90:1	T[5]					4.5						0.6/8.0/13.0		1%		0° to +50°C
10 mm Bioproton•nmr™ probe[6]	850:1	T[5]					18						0.45/6.0/12.0[6]		2%		-4° to +60°C
5 mm $^{1}H/^{19}F/^{15}N$-^{31}P Switchable•nmr™ probe	Available by request.						Available by request.						Available by request.		Available by request.		Available by request.
5 mm ^{15}N-^{31}P broadband probe			180:1	190:1	25:1					15				0.2/3.0/5.0		1%	-150° to +200°C
5 mm ^{15}N-^{13}C broadband probe				250:1	35:1					15				0.2/3.0/5.0		1%	-150° to +200°C
10 mm ^{15}N-^{31}P broadband probe			380:1	380:1	45:1					25				0.2/3.0/5.0		1%	-150° to +200°C
10 mm ^{15}N-^{13}C broadband probe				650:1	85:1					20				0.2/3.0/5.0		1%	-150° to +200°C
10 mm ^{103}Rh-^{15}N broadband probe	Available by request.						Available by request.						Available by request.		Available by request.		Available by request.
600 MHz	^{1}H	^{19}F	^{31}P	^{13}C	^{15}N	^{29}Si	^{1}H	^{19}F	^{31}P	^{13}C	^{15}N	^{29}Si	^{1}H	^{13}C	^{1}H	^{13}C	
5 mm $^{1}H\{^{15}N$-$^{31}P\}$ Indirect•nmr™ probe[4]	575:1	T[5]					10			14	30		0.45/6.0/12.0		1%		-100° to +100°C
5 mm $^{1}H\{^{15}N$-$^{31}P\}$ PFG Indirect•nmr™ probe[4]	625:1	T[5]					10			14	30		0.45/6.0/12.0		1%		0° to +50°C
5 mm $^{1}H\{^{13}C/^{15}N\}$ Triple•nmr™ probe[4]	575:1	T[5]					10			15	45		0.45/6.0/12.0		1%		-100° to +100°C
5 mm $^{1}H\{^{13}C/^{15}N\}$ PFG Triple•nmr™ probe[4]	625:1	T[5]					10			15	45		0.45/6.0/12.0		1%		0° to +50°C
5 mm $^{13}C\{^{1}H/^{15}N\}$ Triple•nmr™ probe				340:1			30			9	25			0.2/3.0/5.0		1%	-100° to +100°C
5 mm Proton•nmr™ probe	600:1	600:1					10	10					0.45/6.0/12.0		1%		-150° to +200°C
10 mm Bioproton•nmr™ probe[6]	1050:1						20						0.45/6.0/12.0[6]		2%		-4° to +60°C
5 mm ^{15}N-^{31}P Broadband•nmr™ probe			160:1	365:1	35:1				15	9	15			0.2/3.0/5.0		1%	-150° to +200°C
750 MHz																	
Available by request.																	

Notes: