

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

CCEM.RF-K5.b.CL

PARAMETER : Complex-valued S-parameter S_{21}

ATTENUATION : 3 dB

FREQUENCY : 2 GHz

For each laboratory i , the result is supplied in complex form $S_{21 i} = x_i + j y_i$
 $u(x_i)$ and $u(y_i)$ are the combined standard uncertainties of x_i and y_i , respectively

Lab i	x_i	$u(x_i)$	y_i	$u(y_i)$
NPL	-0.6431	0.0002	-0.3010	0.0002
PTB	-0.6426	0.0021	-0.3021	0.0021
VSL	-0.6436	0.0016	-0.3020	0.0016
INRIM	-0.6434	0.0003	-0.3009	0.0003
METAS	-0.6429	0.0019	-0.3019	0.0019
*CMI	-0.6430	0.0009	-0.3022	0.0011
*UME	-0.6436	0.0014	-0.3027	0.0014
NMIA	-0.6428	0.0008	-0.3042	0.0008
A*STAR	-0.6428	0.0018	-0.3045	0.0037
*SCL	-0.6430	0.0044	-0.3041	0.0078
SNIIM	-0.6425	0.0043	-0.2993	0.0043
NIM	-0.6437	0.0015	-0.3069	0.0015
NRC	-0.6426	0.0010	-0.3053	0.0010
NIST	-0.6436	0.0010	-0.3031	0.0017
NMISA	-0.6433	0.0008	-0.3045	0.0008
NPLI	-0.6440	0.0011	-0.3047	0.0011
NMIJ	-0.6427	0.0018	-0.3047	0.0018
SP	-0.6429	0.0019	-0.3048	0.0019
LNE	-0.6428	0.0004	-0.3053	0.0004
<i>NPL</i>	-0.6427	0.0002	-0.3055	0.0002

Measurements obtained with 3 dB attenuator before July 2004

A step change was observed in the measurements of the 3 dB attenuator after the measurements were made at UME (July 2004), the cause of which is unclear. However, the device subsequently remained stable during the rest of the comparison. The loss of the continuity of this device has an effect on the intercomparison but it is not disastrous and some benefit can still be gained through the NPL measurements of both states of the device.

Measurements obtained with 3 dB attenuator after July 2004

* Participant who is not a member of the CCEM (data not used for the computation of the key comparison reference value)

italics: Participant who has provided data found to be inconsistent (data not used for the computation of the key comparison reference value)

From Tables 3a and 3b on pages 21 and 22 of the CCEM.RF-K5.b.CL Final Report
 All numbers are given here with four digits.

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

SIM.EM.RF-K5.b.CL

PARAMETER : Complex-valued S-parameter S_{21}

ATTENUATION : 3 dB

FREQUENCY : 2 GHz

For each laboratory i , the result is supplied in complex form $S_{21 i} = x_i + j y_i$
 $u(x_i)$ and $u(y_i)$ are the combined standard uncertainties of x_i and y_i , respectively

Lab i

	x_i	$u(x_i)$	y_i	$u(y_i)$
INTI	-0.6427	0.0003	-0.2853	0.0003
NIST	-0.6431	0.0019	-0.2858	0.0034
NRC	-0.6450	0.0025	-0.2862	0.0025
CENAM	-0.6426	0.0008	-0.2862	0.0015
NPLI	-0.6446	0.0012	-0.2875	0.0012

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

CCEM.RF-K5.b.CL

PARAMETER : Complex-valued S-parameter S_{21}

ATTENUATION : 3 dB

FREQUENCY : 9 GHz

For each laboratory i , the result is supplied in complex form $S_{21 i} = x_i + j y_i$
 $u(x_i)$ and $u(y_i)$ are the combined standard uncertainties of x_i and y_i , respectively

Lab i ↓

	x_i	$u(x_i)$	y_i	$u(y_i)$
NPL	0.6825	0.0005	0.2238	0.0005
PTB	0.6824	0.0021	0.2261	0.0021
VSL	0.6830	0.0016	0.2250	0.0016
<i>INRIM</i>	0.6839	0.0004	0.2213	0.0005
METAS	0.6830	0.0027	0.2251	0.0027
*CMI	0.6824	0.0016	0.2278	0.0035
*UME	0.6840	0.0014	0.2250	0.0014

NMIA	0.6898	0.0011	0.2276	0.0011
A*STAR	0.6892	0.0035	0.2230	0.0100
*SCL	0.6900	0.0077	0.2280	0.0180
SNIIM	0.6927	0.0047	0.2244	0.0047
NIM	0.6925	0.0019	0.2308	0.0020
NRC	0.6881	0.0010	0.2340	0.0010
NIST	0.6922	0.0020	0.2228	0.0056
NMISA	0.6916	0.0034	0.2278	0.0034
NPLI	0.6933	0.0019	0.2257	0.0018
NMIJ	0.6918	0.0015	0.2288	0.0015
SP	0.6919	0.0032	0.2298	0.0032
LNE	0.6917	0.0008	0.2290	0.0008
NPL	0.6910	0.0003	0.2315	0.0003

Measurements obtained with 3 dB attenuator before July 2004

A step change was observed in the measurements of the 3 dB attenuator after the measurements were made at UME (July 2004), the cause of which is unclear. However, the device subsequently remained stable during the rest of the comparison. The loss of the continuity of this device has an effect on the intercomparison but it is not disastrous and some benefit can still be gained through the NPL measurements of both states of the device.

Measurements obtained with 3 dB attenuator after July 2004

* Participant who is not a member of the CCEM (data not used for the computation of the key comparison reference value)

italics: Participant who has provided data found to be inconsistent (data not used for the computation of the key comparison reference value)

From Tables 4a and 4b on pages 24 and 25 of the CCEM.RF-K5.b.CL Final Report
 All numbers are given here with four digits.

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

SIM.EM.RF-K5.b.CL

PARAMETER : Complex-valued S-parameter S_{21}

ATTENUATION : 3 dB

FREQUENCY : 9 GHz

For each laboratory i , the result is supplied in complex form $S_{21 i} = x_i + j y_i$
 $u(x_i)$ and $u(y_i)$ are the combined standard uncertainties of x_i and y_i , respectively

Lab i

	x_i	$u(x_i)$	y_i	$u(y_i)$
INTI	0.7009	0.0008	0.1479	0.0008
NIST	0.6991	0.0040	0.1503	0.0114
NRC	0.7044	0.0025	0.1476	0.0025
CENAM	0.7033	0.0013	0.1471	0.0038
NPLI	0.7004	0.0023	0.1490	0.0023

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

CCEM.RF-K5.b.CL

PARAMETER : Complex-valued S-parameter S_{21}

ATTENUATION : 3 dB

FREQUENCY : 18 GHz

For each laboratory i , the result is supplied in complex form $S_{21 i} = x_i + j y_i$
 $u(x_i)$ and $u(y_i)$ are the combined standard uncertainties of x_i and y_i , respectively

Lab i

	x_i	$u(x_i)$	y_i	$u(y_i)$
NPL	0.7125	0.0011	0.0397	0.0011
PTB	0.7134	0.0022	0.0409	0.0022
VSL	0.7138	0.0021	0.0408	0.0021
<i>INRIM</i>	0.7137	0.0005	0.0330	0.0012
METAS	0.7141	0.0027	0.0406	0.0027
*CMI	0.7145	0.0020	0.0457	0.0074
*UME	0.7160	0.0018	0.0369	0.0020

<i>NMIA</i>	0.7196	0.0014	0.0332	0.0014
A*STAR	0.7216	0.0014	0.0380	0.0190
*SCL	0.7225	0.0059	0.0330	0.0320
SNIIM	0.7186	0.0051	0.0292	0.0051
<i>NIM</i>	0.7285	0.0021	0.0254	0.0022
<i>NRC</i>	0.7221	0.0010	0.0402	0.0010
NIST	0.7219	0.0016	0.0160	0.0110
NMISA	0.7235	0.0042	0.0260	0.0042
NPLI	0.7227	0.0041	0.0257	0.0041
NMIJ	0.7242	0.0019	0.0275	0.0020
SP	0.7248	0.0049	0.0272	0.0049
LNE	0.7237	0.0007	0.0259	0.0007
NPL	0.7236	0.0008	0.0296	0.0008

Measurements obtained with 3 dB attenuator before July 2004

A step change was observed in the measurements of the 3 dB attenuator after the measurements were made at UME (July 2004), the cause of which is unclear. However, the device subsequently remained stable during the rest of the comparison. The loss of the continuity of this device has an effect on the intercomparison but it is not disastrous and some benefit can still be gained through the NPL measurements of both states of the device.

Measurements obtained with 3 dB attenuator after July 2004

* Participant who is not a member of the CCEM (data not used for the computation of the key comparison reference value)

italics: Participant who has provided data found to be inconsistent (data not used for the computation of the key comparison reference value)

From Tables 5a and 5b on pages 27 and 28 of the CCEM.RF-K5.b.CL Final Report
 All numbers are given here with four digits.

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

SIM.EM.RF-K5.b.CL

PARAMETER : Complex-valued S-parameter S_{21}

ATTENUATION : 3 dB

FREQUENCY : 18 GHz

For each laboratory i , the result is supplied in complex form $S_{21 i} = x_i + j y_i$
 $u(x_i)$ and $u(y_i)$ are the combined standard uncertainties of x_i and y_i , respectively

Lab i

	x_i	$u(x_i)$	y_i	$u(y_i)$
INTI	0.6755	0.0013	-0.2037	0.0013
NIST	0.6783	0.0070	-0.1965	0.0216
NRC	0.6790	0.0025	-0.1990	0.0025
CENAM	0.6827	0.0035	-0.1903	0.0066
NPLI	0.6829	0.0035	-0.1990	0.0035

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

CCEM.RF-K5.b.CL

PARAMETER : Complex-valued S-parameter S_{21}

ATTENUATION : 20 dB

FREQUENCY : 2 GHz

For each laboratory i , the result is supplied in complex form $S_{21 i} = x_i + j y_i$
 $u(x_i)$ and $u(y_i)$ are the combined standard uncertainties of x_i and y_i , respectively

Lab i

	x_i	$u(x_i)$	y_i	$u(y_i)$
NPL	-0.08641	0.00007	-0.05082	0.00007
PTB	-0.08634	0.00030	-0.05084	0.00030
VSL	-0.08644	0.00029	-0.05086	0.00029
INRIM	-0.08641	0.00019	-0.05071	0.00019
METAS	-0.08636	0.00028	-0.05089	0.00028
*CMI	-0.08642	0.00026	-0.05083	0.00029
*UME	-0.08653	0.00042	-0.05096	0.00042
NMIA	-0.08635	0.00015	-0.05091	0.00015
A*STAR	-0.08641	0.00039	-0.05081	0.00054
*SCL	-0.08643	0.00068	-0.05080	0.00110
SNIIM	-0.08668	0.00048	-0.05067	0.00048
NIM	-0.08642	0.00021	-0.05118	0.00021
NRC	-0.08635	0.00020	-0.05102	0.00020
NIST	-0.08648	0.00016	-0.05088	0.00023
NMISA	-0.08650	0.00012	-0.05078	0.00012
NPLI	-0.08680	0.00040	-0.05060	0.00040
NMIJ	-0.08640	0.00026	-0.05080	0.00026
SP	-0.08640	0.00027	-0.05086	0.00027
LNE	-0.08645	0.00025	-0.05078	0.00025

* Participant who is not a member of the CCEM (data not used for the computation of the key comparison reference value)

From Table 6a on page 30 of the CCEM.RF-K5.b.CL Final Report
 All numbers are given here with five digits.

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

SIM.EM.RF-K5.b.CL

PARAMETER : Complex-valued S-parameter S_{21}

ATTENUATION : 20 dB

FREQUENCY : 2 GHz

For each laboratory i , the result is supplied in complex form $S_{21 i} = x_i + j y_i$
 $u(x_i)$ and $u(y_i)$ are the combined standard uncertainties of x_i and y_i , respectively

Lab i

	x_i	$u(x_i)$	y_i	$u(y_i)$
INTI	-0.08619	0.00014	-0.05135	0.00014
NIST	-0.08639	0.00031	-0.05135	0.00046
NRC	-0.08700	0.00250	-0.05141	0.00250
CENAM	-0.08625	0.00013	-0.05133	0.00019
NPLI	-0.08677	0.00037	-0.05159	0.00037

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

CCEM.RF-K5.b.CL

PARAMETER : Complex-valued S-parameter S_{21}

ATTENUATION : 20 dB

FREQUENCY : 9 GHz

For each laboratory i , the result is supplied in complex form $S_{21 i} = x_i + j y_i$
 $u(x_i)$ and $u(y_i)$ are the combined standard uncertainties of x_i and y_i , respectively

Lab i

	x_i	$u(x_i)$	y_i	$u(y_i)$
NPL	0.07067	0.00009	0.06960	0.00009
PTB	0.07062	0.00032	0.06963	0.00032
VSL	0.07071	0.00036	0.06965	0.00036
INRIM	0.07093	0.00019	0.06929	0.00020
METAS	0.07073	0.00037	0.06964	0.00037
*CMI	0.07062	0.00052	0.06970	0.00052
*UME	0.07085	0.00042	0.06950	0.00042
NMIA	0.07070	0.00018	0.06961	0.00018
A*STAR	0.07050	0.00110	0.06980	0.00110
*SCL	0.07090	0.00190	0.06940	0.00190
SNIIM	0.07058	0.00055	0.07009	0.00055
NIM	0.07063	0.00025	0.06988	0.00025
NRC	0.07022	0.00020	0.07037	0.00020
NIST	0.07092	0.00058	0.06979	0.00059
NMISA	0.07091	0.00046	0.06958	0.00046
NPLI	0.07180	0.00110	0.06940	0.00110
NMIJ	0.07080	0.00021	0.06950	0.00021
SP	0.07078	0.00044	0.06969	0.00044
LNE	0.07051	0.00064	0.06895	0.00064

* Participant who is not a member of the CCEM (data not used for the computation of the key comparison reference value)

italics: Participant who has provided data found to be inconsistent (data not used for the computation of the key comparison reference value)

From Table 7a on page 32 of the CCEM.RF-K5.b.CL Final Report

All numbers are given here with five digits.

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

SIM.EM.RF-K5.b.CL

PARAMETER : Complex-valued S-parameter S_{21}

ATTENUATION : 20 dB

FREQUENCY : 9 GHz

For each laboratory i , the result is supplied in complex form $S_{21 i} = x_i + j y_i$
 $u(x_i)$ and $u(y_i)$ are the combined standard uncertainties of x_i and y_i , respectively

Lab i

	x_i	$u(x_i)$	y_i	$u(y_i)$
INTI	0.06970	0.00015	0.07181	0.00015
NIST	0.06965	0.00122	0.07165	0.00119
NRC	0.07135	0.00250	0.07177	0.00250
CENAM	0.07032	0.00036	0.07154	0.00036
NPLI	0.07032	0.00098	0.07217	0.00098

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

CCEM.RF-K5.b.CL

PARAMETER : Complex-valued S-parameter S_{21}

ATTENUATION : 20 dB

FREQUENCY : 18 GHz

For each laboratory i , the result is supplied in complex form $S_{21 i} = x_i + j y_i$
 $u(x_i)$ and $u(y_i)$ are the combined standard uncertainties of x_i and y_i , respectively

Lab i

	x_i	$u(x_i)$	y_i	$u(y_i)$
NPL	0.02673	0.00016	0.10082	0.00016
PTB	0.02684	0.00038	0.10062	0.00038
VSL	0.02671	0.00039	0.10063	0.00039
<i>INRIM</i>	0.02752	0.00026	0.10030	0.00022
METAS	0.02673	0.00041	0.10067	0.00041
*CMI	0.02640	0.00130	0.10077	0.00049
*UME	0.02720	0.00110	0.10050	0.00110
NMIA	0.02665	0.00022	0.10048	0.00022
A*STAR	0.02600	0.00270	0.10067	0.00075
*SCL	0.02750	0.00450	0.10040	0.00150
SNIIM	0.02577	0.00063	0.10118	0.00063
<i>NIM</i>	0.02739	0.00027	0.10100	0.00027
<i>NRC</i>	0.02531	0.00050	0.10117	0.00050
NIST	0.02710	0.00160	0.10066	0.00049
NMISA	0.02767	0.00060	0.10038	0.00060
NPLI	0.02760	0.00210	0.10060	0.00220
NMIJ	0.02670	0.00028	0.10060	0.00028
SP	0.02660	0.00071	0.10055	0.00071
LNE	0.02671	0.00043	0.10015	0.00043

* Participant who is not a member of the CCEM (data not used for the computation of the key comparison reference value)

italics: Participant who has provided data found to be inconsistent (data not used for the computation of the key comparison reference value)

From Table 8a on page 34 of the CCEM.RF-K5.b.CL Final Report

All numbers are given here with five digits.

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

SIM.EM.RF-K5.b.CL

PARAMETER : Complex-valued S-parameter S_{21}

ATTENUATION : 20 dB

FREQUENCY : 18 GHz

For each laboratory i , the result is supplied in complex form $S_{21 i} = x_i + j y_i$
 $u(x_i)$ and $u(y_i)$ are the combined standard uncertainties of x_i and y_i , respectively

Lab i

	x_i	$u(x_i)$	y_i	$u(y_i)$
INTI	0.03707	0.00017	0.09130	0.00017
NIST	0.03670	0.00290	0.09125	0.00125
NRC	0.03688	0.00250	0.09148	0.00250
CENAM	0.03568	0.00085	0.09211	0.00041
NPLI	0.03719	0.00377	0.09308	0.00377

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

CCEM.RF-K5.b.CL

PARAMETER : Complex-valued S-parameter S_{21}

ATTENUATION : 50 dB

FREQUENCY : 2 GHz

For each laboratory i , the result is supplied in complex form $S_{21 i} = x_i + j y_i$
 $u(x_i)$ and $u(y_i)$ are the combined standard uncertainties of x_i and y_i , respectively

Lab i

	x_i	$u(x_i)$	y_i	$u(y_i)$
NPL	-0.002169	0.000009	-0.002163	0.000009
PTB	-0.002168	0.000009	-0.002169	0.000009
VSL	-0.002176	0.000023	-0.002170	0.000023
INRIM	-0.002170	0.000019	-0.002165	0.000019
METAS	-0.002169	0.000012	-0.002166	0.000012
*CMI	-0.002166	0.000021	-0.002171	0.000021
*UME	-0.002175	0.000038	-0.002171	0.000038
NMIA	-0.002166	0.000012	-0.002177	0.000012
A*STAR	-0.002174	0.000022	-0.002171	0.000022
*SCL	-0.002176	0.000033	-0.002166	0.000033
SNIM	-0.002171	0.000027	-0.002167	0.000027
NIM	-0.002166	0.000006	-0.002179	0.000006
NRC	-0.002190	0.000021	-0.002162	0.000021
NIST	-0.002172	0.000012	-0.002166	0.000012
NMISA	-0.002171	0.000007	-0.002163	0.000007
NPLI	-0.002200	0.000400	-0.002200	0.000400
NMIJ	-0.002170	0.000020	-0.002170	0.000020
SP	-0.002158	0.000021	-0.002156	0.000021
LNE	-0.002170	0.000020	-0.002170	0.000020

* Participant who is not a member of the CCEM (data not used for the computation of the key comparison reference value)

From Table 9a on page 36 of the CCEM.RF-K5.b.CL Final Report
 All numbers are given here with six digits.

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

CCEM.RF-K5.b.CL

PARAMETER : Complex-valued S-parameter S_{21}

ATTENUATION : 50 dB

FREQUENCY : 9 GHz

For each laboratory i , the result is supplied in complex form $S_{21 i} = x_i + j y_i$
 $u(x_i)$ and $u(y_i)$ are the combined standard uncertainties of x_i and y_i , respectively

Lab i

	x_i	$u(x_i)$	y_i	$u(y_i)$
NPL	-0.001182	0.000016	0.002798	0.000016
PTB	-0.001195	0.000011	0.002803	0.000011
VSL	-0.001191	0.000024	0.002804	0.000024
INRIM	-0.001176	0.000020	0.002800	0.000019
METAS	-0.001190	0.000024	0.002801	0.000024
*CMI	-0.001197	0.000026	0.002804	0.000031
*UME	-0.001190	0.000150	0.002810	0.000150
NMIA	-0.001185	0.000013	0.002798	0.000013
A*STAR	-0.001207	0.000043	0.002802	0.000028
*SCL	-0.001184	0.000089	0.002804	0.000058
SNIIM	-0.001218	0.000040	0.002815	0.000040
NIM	-0.001206	0.000008	0.002807	0.000007
NRC	-0.001217	0.000030	0.002800	0.000030
NIST	-0.001196	0.000026	0.002810	0.000016
NMISA	-0.001182	0.000014	0.002803	0.000014
NPLI	-0.001100	0.001600	0.002900	0.001500
NMIJ	-0.001190	0.000020	0.002800	0.000020
SP	-0.001183	0.000042	0.002825	0.000042
LNE	-0.001190	0.000040	0.002800	0.000040

* Participant who is not a member of the CCEM (data not used for the computation of the key comparison reference value)

From Table 10a on page 38 of the CCEM.RF-K5.b.CL Final Report

All numbers are given here with six digits.

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

CCEM.RF-K5.b.CL

PARAMETER : Complex-valued S-parameter S_{21}

ATTENUATION : 50 dB

FREQUENCY : 18 GHz

For each laboratory i , the result is supplied in complex form $S_{21 i} = x_i + j y_i$
 $u(x_i)$ and $u(y_i)$ are the combined standard uncertainties of x_i and y_i , respectively

Lab i

	x_i	$u(x_i)$	y_i	$u(y_i)$
NPL	-0.001949	0.000038	-0.003016	0.000038
PTB	-0.001924	0.000020	-0.002982	0.000020
VSL	-0.001923	0.000027	-0.002976	0.000027
INRIM	-0.001943	0.000022	-0.002960	0.000022
METAS	-0.001936	0.000028	-0.002974	0.000028
*CMI	-0.001922	0.000041	-0.002977	0.000039
*UME	-0.001950	0.000240	-0.002990	0.000240
NMIA	-0.001922	0.000017	-0.002954	0.000017
A*STAR	-0.001899	0.000082	-0.003002	0.000056
*SCL	-0.001960	0.000140	-0.002960	0.000100
SNIIM	-0.001939	0.000046	-0.003004	0.000046
NIM	-0.001948	0.000009	-0.002996	0.000009
NRC	-0.001897	0.000050	-0.003000	0.000050
NIST	-0.001936	0.000051	-0.002984	0.000035
NMISA	-0.001967	0.000021	-0.002959	0.000021
NPLI	-0.001900	0.001000	-0.003000	0.001200
NMIJ	-0.001930	0.000020	-0.002980	0.000020
SP	-0.001970	0.000160	-0.003000	0.000160
LNE	-0.001930	0.000025	-0.002980	0.000025

* Participant who is not a member of the CCEM (data not used for the computation of the key comparison reference value)

From Table 11a on page 40 of the CCEM.RF-K5.b.CL Final Report
 All numbers are given here with six digits.

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

CCEM.RF-K5.b.CL

PARAMETER : Complex-valued voltage reflection coefficient S_{11} (male matched load)

FREQUENCY : 2 GHz

For each laboratory i , the result is supplied in complex form $S_{11 i} = x_i + j y_i$
 $u(x_i)$ and $u(y_i)$ are the combined standard uncertainties of x_i and y_i , respectively

Lab i

	x_i	$u(x_i)$	y_i	$u(y_i)$
NPL	0.0021	0.0011	0.0003	0.0011
PTB	0.0004	0.0013	-0.0002	0.0013
VSL	0.0020	0.0037	0.0027	0.0037
INRIM	0.0030	0.0055	-0.0017	0.0055
METAS	0.0022	0.0020	0.0000	0.0020
*CMI	0.0014	0.0046	0.0001	0.0046
*UME	0.0021	0.0054	-0.0011	0.0054
NMIA	0.0015	0.0014	-0.0004	0.0014
A*STAR	0.0022	0.0066	-0.0011	0.0047
*SCL	0.0013	0.0033	0.0013	0.0033
SNIIM	0.0026	0.0017	0.0019	0.0017
NIM	0.0016	0.0007	0.0005	0.0007
NRC	0.0001	0.0052	-0.0003	0.0052
NIST	0.0012	0.0018	0.0001	0.0008
NMISA	0.0017	0.0025	0.0006	0.0025
NPLI	0.0038	0.0072	-0.0002	0.0072
NMIJ	0.0016	0.0011	0.0006	0.0011
SP	0.0014	0.0022	0.0010	0.0022
LNE	0.0009	0.0043	0.0007	0.0043

* Participant who is not a member of the CCEM (data not used for the computation of the key comparison reference value)

From Table 12a on page 42 of the CCEM.RF-K5.b.CL Final Report
 All numbers are given here with four digits.

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

SIM.EM.RF-K5.b.CL

PARAMETER : Complex-valued voltage reflection coefficient S_{11} (male matched load)

FREQUENCY : 2 GHz

For each laboratory i , the result is supplied in complex form $S_{11 i} = x_i + j y_i$
 $u(x_i)$ and $u(y_i)$ are the combined standard uncertainties of x_i and y_i , respectively

Lab i

	x_i	$u(x_i)$	y_i	$u(y_i)$
INTI	-0.0004	0.0025	-0.0009	0.0025
NIST	-0.0007	0.0023	-0.0013	0.0033
NRC	0.0005	0.0052	-0.0010	0.0052
CENAM	0.0012	0.0009	-0.0011	0.0013
NPLI	0.0028	0.0033	-0.0054	0.0033

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

CCEM.RF-K5.b.CL

PARAMETER : Complex-valued voltage reflection coefficient S_{11} (male matched load)

FREQUENCY : 9 GHz

For each laboratory i , the result is supplied in complex form $S_{11 i} = x_i + j y_i$
 $u(x_i)$ and $u(y_i)$ are the combined standard uncertainties of x_i and y_i , respectively

Lab i

	x_i	$u(x_i)$	y_i	$u(y_i)$
NPL	-0.0020	0.0011	0.0061	0.0011
PTB	-0.0024	0.0013	0.0099	0.0013
VSL	-0.0036	0.0086	0.0077	0.0086
INRIM	-0.0048	0.0055	0.0084	0.0055
METAS	-0.0052	0.0040	0.0084	0.0040
*CMI	-0.0050	0.0047	0.0086	0.0047
*UME	-0.0051	0.0059	0.0075	0.0059
NMIA	-0.0043	0.0022	0.0083	0.0022
A*STAR	-0.0039	0.0048	0.0067	0.0064
*SCL	-0.0050	0.0100	0.0070	0.0100
SNIIM	0.0013	0.0019	0.0058	0.0019
<i>NIM</i>	0.0027	0.0017	0.0049	0.0017
NRC	0.0000	0.0054	0.0075	0.0054
NIST	-0.0018	0.0017	0.0072	0.0022
NMISA	-0.0034	0.0025	0.0068	0.0025
NPLI	0.0000	0.0140	0.0100	0.0140
<i>NMIJ</i>	0.0011	0.0011	0.0043	0.0011
SP	0.0015	0.0033	0.0040	0.0033
LNE	-0.0007	0.0050	0.0052	0.0050

* Participant who is not a member of the CCEM (data not used for the computation of the key comparison reference value)

italics: Participant who has provided data found to be inconsistent (data not used for the computation of the key comparison reference value)

From Table 13a on page 44 of the CCEM.RF-K5.b.CL Final Report

All numbers are given here with four digits.

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

SIM.EM.RF-K5.b.CL

PARAMETER : Complex-valued voltage reflection coefficient S_{11} (male matched load)

FREQUENCY : 9 GHz

For each laboratory i , the result is supplied in complex form $S_{11 i} = x_i + j y_i$
 $u(x_i)$ and $u(y_i)$ are the combined standard uncertainties of x_i and y_i , respectively

Lab i

	x_i	$u(x_i)$	y_i	$u(y_i)$
INTI	-0.0040	0.0028	0.0155	0.0028
NIST	-0.0026	0.0035	0.0177	0.0044
NRC	-0.0012	0.0060	0.0234	0.0060
CENAM	-0.0040	0.0022	0.0164	0.0015
NPLI	-0.0144	0.0055	0.0227	0.0055

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

CCEM.RF-K5.b.CL

PARAMETER : Complex-valued voltage reflection coefficient S_{11} (mal matched load)

FREQUENCY : 18 GHz

For each laboratory i , the result is supplied in complex form $S_{11 i} = x_i + j y_i$
 $u(x_i)$ and $u(y_i)$ are the combined standard uncertainties of x_i and y_i , respectively

Lab i

	x_i	$u(x_i)$	y_i	$u(y_i)$
NPL	-0.0016	0.0019	0.0553	0.0019
PTB	-0.0015	0.0014	0.0565	0.0014
VSL	-0.0028	0.0087	0.0563	0.0087
INRIM	-0.0012	0.0055	0.0588	0.0055
METAS	0.0004	0.0040	0.0585	0.0040
*CMI	0.0013	0.0048	0.0584	0.0048
*UME	0.0005	0.0073	0.0592	0.0073
NMIA	0.0023	0.0031	0.0569	0.0031
A*STAR	0.0023	0.0016	0.0575	0.0072
*SCL	0.0000	0.0100	0.0570	0.0100
SNIIM	-0.0034	0.0023	0.0534	0.0023
NIM	-0.0037	0.0019	0.0564	0.0019
NRC	0.0034	0.0080	0.0609	0.0080
NIST	0.0029	0.0019	0.0553	0.0037
NMISA	0.0030	0.0030	0.0629	0.0035
NPLI	-0.0090	0.0100	0.0560	0.0100
<i>NMIJ</i>	0.0038	0.0013	0.0522	0.0014
SP	0.0027	0.0047	0.0536	0.0047
LNE	0.0053	0.0063	0.0554	0.0063

* Participant who is not a member of the CCEM (data not used for the computation of the key comparison reference value)

italics: Participant who has provided data found to be inconsistent (data not used for the computation of the key comparison reference value)

From Table 14a on page 46 of the CCEM.RF-K5.b.CL Final Report

All numbers are given here with four digits.

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

SIM.EM.RF-K5.b.CL

PARAMETER : Complex-valued voltage reflection coefficient S_{11} (male matched load)

FREQUENCY : 18 GHz

For each laboratory i , the result is supplied in complex form $S_{11 i} = x_i + j y_i$
 $u(x_i)$ and $u(y_i)$ are the combined standard uncertainties of x_i and y_i , respectively

Lab i

	x_i	$u(x_i)$	y_i	$u(y_i)$
INTI	0.0269	0.0034	0.0568	0.0034
NIST	0.0262	0.0047	0.0533	0.0069
NRC	0.0326	0.0080	0.0646	0.0080
CENAM	0.0284	0.0026	0.0567	0.0017
NPLI	0.0134	0.0060	0.0660	0.0060

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

CCEM.RF-K5.b.CL

PARAMETER : Complex-valued voltage reflection coefficient S_{11} (female mismatched load)

FREQUENCY : 2 GHz

For each laboratory i , the result is supplied in complex form $S_{11 i} = x_i + j y_i$
 $u(x_i)$ and $u(y_i)$ are the combined standard uncertainties of x_i and y_i , respectively

Lab i

	x_i	$u(x_i)$	y_i	$u(y_i)$
NPL	0.2463	0.0012	0.2276	0.0012
PTB	0.2441	0.0021	0.2296	0.0021
VSL	0.2482	0.0046	0.2279	0.0046
INRIM	0.2205	0.0164	0.1404	0.0622
METAS	0.2464	0.0021	0.2278	0.0021
*CMI	0.2449	0.0050	0.2276	0.0050
*UME	0.2464	0.0048	0.2278	0.0048
NMIA	0.2440	0.0019	0.2289	0.0019
A*STAR	0.2473	0.0065	0.2267	0.0064
*SCL	0.2509	0.0048	0.2264	0.0049
SNIIM	0.2453	0.0020	0.2267	0.0020
<i>NIM</i>	0.2445	0.0006	0.2284	0.0006
NRC	0.2461	0.0100	0.2248	0.0100
NIST	0.2454	0.0018	0.2272	0.0018
NMISA	0.2464	0.0057	0.2275	0.0081
NPLI	0.2497	0.0032	0.2296	0.0032
NMIJ	0.2464	0.0026	0.2260	0.0026
SP	0.2450	0.0025	0.2272	0.0025
LNE	0.2461	0.0047	0.2269	0.0047

* Participant who is not a member of the CCEM (data not used for the computation of the key comparison reference value)

italics: Participant who has provided data found to be inconsistent (data not used for the computation of the key comparison reference value)

From Table 15a on page 48 of the CCEM.RF-K5.b.CL Final Report

All numbers are given here with four digits.

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

SIM.EM.RF-K5.b.CL

PARAMETER : Complex-valued voltage reflection coefficient S_{11} (male mismatched load)

FREQUENCY : 2 GHz

For each laboratory i , the result is supplied in complex form $S_{11 i} = x_i + j y_i$
 $u(x_i)$ and $u(y_i)$ are the combined standard uncertainties of x_i and y_i , respectively

Lab i

	x_i	$u(x_i)$	y_i	$u(y_i)$
INTI	0.3184	0.0030	0.0836	0.0030
NIST	0.3161	0.0036	0.0848	0.0034
NRC	0.3192	0.0052	0.0850	0.0052
CENAM	0.3177	0.0011	0.0862	0.0016
NPLI	0.3244	0.0058	0.0847	0.0058

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

CCEM.RF-K5.b.CL

PARAMETER : Complex-valued voltage reflection coefficient S_{11} (female mismatched load)

FREQUENCY : 9 GHz

For each laboratory i , the result is supplied in complex form $S_{11 i} = x_i + j y_i$
 $u(x_i)$ and $u(y_i)$ are the combined standard uncertainties of x_i and y_i , respectively

Lab i

	x_i	$u(x_i)$	y_i	$u(y_i)$
<i>NPL</i>	0.0288	0.0016	-0.3343	0.0016
<i>PTB</i>	0.0281	0.0021	-0.3348	0.0021
<i>VSL</i>	0.0320	0.0120	-0.3320	0.0120
<i>INRIM</i>	0.0050	0.0220	-0.2270	0.0710
<i>METAS</i>	0.0312	0.0043	-0.3321	0.0043
* <i>CMI</i>	0.0327	0.0060	-0.3325	0.0050
* <i>UME</i>	0.0320	0.0110	-0.3330	0.0120
<i>NMIA</i>	0.0330	0.0025	-0.3338	0.0025
<i>A*STAR</i>	0.0362	0.0050	-0.3314	0.0071
* <i>SCL</i>	0.0380	0.0140	-0.3330	0.0120
<i>SNIIM</i>	0.0376	0.0022	-0.3341	0.0022
<i>NIM</i>	0.0434	0.0017	-0.3321	0.0017
<i>NRC</i>	0.0470	0.0100	-0.3300	0.0100
<i>NIST</i>	0.0309	0.0020	-0.3339	0.0022
<i>NMISA</i>	0.0322	0.0037	-0.3335	0.0037
<i>NPLI</i>	0.0322	0.0062	-0.3331	0.0062
<i>NMIJ</i>	0.0325	0.0026	-0.3330	0.0026
<i>SP</i>	0.0320	0.0037	-0.3321	0.0037
<i>LNE</i>	0.0340	0.0055	-0.3310	0.0055

* Participant who is not a member of the CCEM (data not used for the computation of the key comparison reference value)

italics: Participant who has provided data found to be inconsistent (data not used for the computation of the key comparison reference value)

From Table 16a on page 50 of the CCEM.RF-K5.b.CL Final Report

All numbers are given here with four digits.

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

SIM.EM.RF-K5.b.CL

PARAMETER : Complex-valued voltage reflection coefficient S_{11} (male mismatched load)

FREQUENCY : 9 GHz

For each laboratory i , the result is supplied in complex form $S_{11 i} = x_i + j y_i$
 $u(x_i)$ and $u(y_i)$ are the combined standard uncertainties of x_i and y_i , respectively

Lab i

	x_i	$u(x_i)$	y_i	$u(y_i)$
INTI	-0.3130	0.0046	0.1573	0.0046
NIST	-0.3149	0.0043	0.1550	0.0042
NRC	-0.3173	0.0080	0.1685	0.0080
CENAM	-0.3146	0.0027	0.1557	0.0015
NPLI	-0.3292	0.0088	0.1625	0.0088

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

CCEM.RF-K5.b.CL

PARAMETER : Complex-valued voltage reflection coefficient S_{11} (female mismatched load)

FREQUENCY : 18 GHz

For each laboratory i , the result is supplied in complex form $S_{11 i} = x_i + j y_i$
 $u(x_i)$ and $u(y_i)$ are the combined standard uncertainties of x_i and y_i , respectively

Lab i

	x_i	$u(x_i)$	y_i	$u(y_i)$
NPL	0.3024	0.0040	-0.1867	0.0040
<i>PTB</i>	0.3011	0.0022	-0.1914	0.0022
VSL	0.3010	0.0120	-0.1850	0.0120
INRIM	0.3123	0.0076	-0.1357	0.0288
METAS	0.3026	0.0044	-0.1810	0.0044
*CMI	0.3004	0.0061	-0.1798	0.0072
*UME	0.2990	0.0130	-0.1830	0.0120
NMIA	0.3052	0.0033	-0.1824	0.0033
A*STAR	0.3047	0.0085	-0.1790	0.0100
*SCL	0.2960	0.0140	-0.1790	0.0160
SNIIM	0.3054	0.0025	-0.1800	0.0025
NIM	0.3058	0.0017	-0.1699	0.0017
NRC	0.3100	0.0100	-0.1590	0.0100
NIST	0.3094	0.0036	-0.1759	0.0031
NMISA	0.3070	0.0042	-0.1759	0.0039
<i>NPLI</i>	0.3197	0.0069	-0.1527	0.0069
NMIJ	0.3090	0.0027	-0.1765	0.0027
SP	0.3080	0.0054	-0.1797	0.0054
LNE	0.3081	0.0066	-0.1758	0.0066

* Participant who is not a member of the CCEM (data not used for the computation of the key comparison reference value)

italics: Participant who has provided data found to be inconsistent (data not used for the computation of the key comparison reference value)

From Table 17a on page 52 of the CCEM.RF-K5.b.CL Final Report

All numbers are given here with four digits.

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

SIM.EM.RF-K5.b.CL

PARAMETER : Complex-valued voltage reflection coefficient S_{11} (male mismatched load)

FREQUENCY : 18 GHz

For each laboratory i , the result is supplied in complex form $S_{11 i} = x_i + j y_i$
 $u(x_i)$ and $u(y_i)$ are the combined standard uncertainties of x_i and y_i , respectively

Lab i

	x_i	$u(x_i)$	y_i	$u(y_i)$
INTI	0.0009	0.0066	0.2950	0.0066
NIST	-0.0021	0.0052	0.2955	0.0074
NRC	0.0041	0.0100	0.3061	0.0100
CENAM	-0.0033	0.0026	0.2960	0.0024
NPLI	-0.0160	0.0088	0.3102	0.0088

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

CCEM.RF-K5.b.CL

The treatment in terms of equivalence of the results obtained in this key comparison is detailed in the Appendix A of the CCEM.RF-K5.b.CL Final Report.

In each case, the key comparison reference value is determined from an arithmetic mean of the participant results, with some values excluded (data from laboratories indicated with a * and in italics in the measurement tables). It is a complex quantity ($x_R + j y_R$); $u(x_R)$ and $u(y_R)$ are the combined standard uncertainties of x_R and y_R , respectively.

	x_R	$u(x_R)$	y_R	$u(y_R)$
S ₂₁ , 3 dB, 2 GHz, before July 2004	-0.64312	0.00019	-0.30158	0.00026
S ₂₁ , 3 dB, 2 GHz, after July 2004	-0.64305	0.00016	-0.30430	0.00057
S ₂₁ , 3 dB, 9 GHz, before July 2004	0.68274	0.00016	0.22499	0.00047
S ₂₁ , 3 dB, 9 GHz, after July 2004	0.69194	0.00033	0.22739	0.00087
S ₂₁ , 3 dB, 18 GHz, before July 2004	0.71341	0.00035	0.04049	0.00026
S ₂₁ , 3 dB, 18 GHz, after July 2004	0.72273	0.00062	0.0273	0.0019
S ₂₁ , 20 dB, 2 GHz	-0.086449	0.000031	-0.050838	0.000033
S ₂₁ , 20 dB, 9 GHz	0.070784	0.000081	0.069605	0.000068
S ₂₁ , 20 dB, 18 GHz	0.02676	0.00014	0.100615	0.000065
S ₂₁ , 50 dB, 2 GHz	-0.0021725	0.0000025	-0.0021696	0.0000025
S ₂₁ , 50 dB, 9 GHz	-0.0011881	0.0000066	0.0028104	0.0000062
S ₂₁ , 50 dB, 18 GHz	-0.0019323	0.0000055	-0.0029854	0.0000045
S ₁₁ , male matched load, 2 GHz	0.00176	0.00023	0.00028	0.00027
S ₁₁ , male matched load, 9 GHz	-0.00208	0.00059	0.00725	0.00044
S ₁₁ , male matched load, 18 GHz	-0.00007	0.00097	0.05695	0.00065
S ₁₁ , female mismatched load, 2 GHz	0.2445	0.0018	0.2216	0.0058
S ₁₁ , female mismatched load, 9 GHz	0.0319	0.0025	-0.3244	0.0081
S ₁₁ , female mismatched load, 18 GHz	0.30649	0.00087	-0.1745	0.0035

Reduced dimension degrees of equivalence relative to the key comparison reference value, D_i , and by pairs of laboratories, D_{ij} , together with their respective 95% confidence indicators, U_i , and U_{ij} , are computed as explained in Appendix A of the Final Report. The D_i 's and D_{ij} 's represent magnitudes of complex quantities and are thus always positive.

SIM.EM.RF-K5.b.CL

The treatment in terms of equivalence of the results obtained in this key comparison is detailed on pp. 9-14 of the SIM.EM.RF-K5.b.CL Final Report.

The linking to CCEM.RF-K5.b.CL was calculated using combinations of NIST, NPL and NRC for

S_{21} , 3 dB, 2 GHz
S_{21} , 3 dB, 9 GHz
S_{21} , 3 dB, 18 GHz
S_{21} , 20 dB, 2 GHz
S_{21} , 20 dB, 9 GHz
S_{21} , 20 dB, 18 GHz

S_{11} , male matched load, 2 GHz
S_{11} , male matched load, 9 GHz
S_{11} , male matched load, 18 GHz

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

Reduced dimension degrees of equivalence relative to the key comparison reference value, D_i , and their respective 95% confidence indicators, U_i . The D_i 's represent magnitudes of complex quantities and are thus always positive.

S_{21} , 3 dB, 2 GHz, before July 2004

Lab i	D_i	U_i
NPL	0.0006	0.0007
PTB	0.0007	0.0040
VSL	0.0007	0.0035
INRIM	0.0007	0.0008
METAS	0.0004	0.0036
CMI	0.0007	0.0029
UME	0.0012	0.0033

S_{21} , 3 dB, 9 GHz, before July 2004

Lab i	D_i	U_i
NPL	0.0012	0.0014
PTB	0.0011	0.0039
VSL	0.0003	0.0029
INRIM	0.0038	0.0016
METAS	0.0003	0.0047
CMI	0.0028	0.0077
UME	0.0012	0.0033

S_{21} , 3 dB, 18 GHz, before July 2004

Lab i	D_i	U_i
NPL	0.0012	0.0021
PTB	0.0004	0.0039
VSL	0.0005	0.0029
INRIM	0.0075	0.0030
METAS	0.0006	0.0047
CMI	0.0050	0.0130
UME	0.0044	0.0051

S_{21} , 3 dB, 2 GHz, after July 2004

	D_i	U_i
NPL	0.0012	0.0011
NMIA	0.0003	0.0020
A*STAR	0.0003	0.0019
SCL	0.0000	0.0190
SNIIM	0.0051	0.0096
NIM	0.0026	0.0036
NRC	0.0010	0.0025
NIST	0.0014	0.0034
NMISA	0.0003	0.0019
NPLI	0.0010	0.0021
NMIJ	0.0004	0.0041
SP	0.0005	0.0044
LNE	0.0009	0.0015
INTI	0.0018	0.0032
CENAM	0.0012	0.0031

S_{21} , 3 dB, 9 GHz, after July 2004

	D_i	U_i
NPL	0.0042	0.0022
NMIA	0.0022	0.0025
A*STAR	0.0036	0.0035
SCL	0.0020	0.0200
SNIIM	0.0030	0.0100
NIM	0.0034	0.0047
NRC	0.0076	0.0031
NIST	0.0050	0.0120
NMISA	0.0005	0.0075
NPLI	0.0022	0.0055
NMIJ	0.0014	0.0039
SP	0.0024	0.0073
LNE	0.0016	0.0027
INTI	0.0035	0.0055
CENAM	0.0057	0.0072

S_{21} , 3 dB, 18 GHz, after July 2004

	D_i	U_i
NPL	0.0025	0.0042
NMIA	0.0067	0.0049
A*STAR	0.0110	0.0310
SCL	0.0060	0.0770
SNIIM	0.0050	0.0110
NIM	0.0061	0.0049
NRC	0.0130	0.0051
NIST	0.0110	0.0230
NMISA	0.0015	0.0098
NPLI	0.0016	0.0097
NMIJ	0.0015	0.0044
SP	0.0020	0.0110
LNE	0.0017	0.0033
INTI	0.0093	0.0092
CENAM	0.0068	0.0175

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

Reduced dimension degrees of equivalence relative to the key comparison reference value, D_i , and their respective 95% confidence indicators, U_i . The D_i 's represent magnitudes of complex quantities and are thus always positive. (Continued)

S_{21} , 20 dB, 2 GHz

Lab i ↓	D_i	U_i
NPL	0.00004	0.00018
PTB	0.00011	0.00068
VSL	0.00002	0.00064
INRIM	0.00013	0.00044
METAS	0.00010	0.00065
CMI	0.00003	0.00058
UME	0.00014	0.00086
NMIA	0.00012	0.00036
A*STAR	0.00004	0.00062
SCL	0.00000	0.00220
SNIIM	0.00030	0.00120
NIM	0.00034	0.00048
NRC	0.00021	0.00050
NIST	0.00005	0.00048
NMISA	0.00008	0.00030
NPLI	0.00042	0.00073
NMIJ	0.00006	0.00064
SP	0.00006	0.00063
LNE	0.00006	0.00061
INTI	0.0002	0.0008
CENAM	0.0001	0.0008

S_{21} , 20 dB, 9 GHz

Lab i ↓	D_i	U_i
NPL	0.00011	0.00029
PTB	0.00017	0.00075
VSL	0.00009	0.00083
INRIM	0.00034	0.00049
METAS	0.00007	0.00086
CMI	0.00020	0.00130
UME	0.00010	0.00110
NMIA	0.00008	0.00046
A*STAR	0.00030	0.00230
SCL	0.00020	0.00430
SNIIM	0.00050	0.00140
NIM	0.00032	0.00059
NRC	0.00095	0.00053
NIST	0.00020	0.00140
NMISA	0.00010	0.00110
NPLI	0.00100	0.00240
NMIJ	0.00011	0.00054
SP	0.00010	0.00100
LNE	0.00070	0.00150
INTI	0.0005	0.0027
CENAM	0.0004	0.0027

S_{21} , 20 dB, 18 GHz

Lab i ↓	D_i	U_i
NPL	0.00021	0.00043
PTB	0.00008	0.00092
VSL	0.00005	0.00053
INRIM	0.00082	0.00066
METAS	0.00006	0.00096
CMI	0.00040	0.00280
UME	0.00040	0.00260
NMIA	0.00017	0.00053
A*STAR	0.00070	0.00330
SCL	0.00080	0.00800
SNIIM	0.00110	0.00160
NIM	0.00074	0.00066
NRC	0.00150	0.00130
NIST	0.00040	0.00370
NMISA	0.00090	0.00150
NPLI	0.00080	0.00350
NMIJ	0.00006	0.00075
SP	0.00020	0.00160
LNE	0.00050	0.00110
INTI	0.0004	0.0042
CENAM	0.0021	0.0045

Key comparison CCEM.RF-K5.b.CL

Reduced dimension degrees of equivalence relative to the key comparison reference value, D_i , and their respective 95% confidence indicators, U_i . The D_i 's represent magnitudes of complex quantities and are thus always positive. (Continued)

S_{21} , 50 dB, 2 GHz

Lab i	D_i	U_i
NPL	0.000008	0.000023
PTB	0.000005	0.000022
VSL	0.000004	0.000050
INRIM	0.000005	0.000045
METAS	0.000005	0.000029
CMI	0.000007	0.000049
UME	0.000003	0.000084
NMIA	0.000010	0.000028
A*STAR	0.000002	0.000056
SCL	0.000005	0.000076
SNIIM	0.000003	0.000067
NIM	0.000011	0.000015
NRC	0.000019	0.000052
NIST	0.000003	0.000028
NMISA	0.000007	0.000019
NPLI	0.000000	0.001300
NMIJ	0.000003	0.000049
SP	0.000020	0.000049
LNE	0.000003	0.000049

S_{21} , 50 dB, 9 GHz

Lab i	D_i	U_i
NPL	0.000014	0.000039
PTB	0.000011	0.000033
VSL	0.000007	0.000063
INRIM	0.000016	0.000045
METAS	0.000009	0.000058
CMI	0.000011	0.000062
UME	0.000000	0.000330
NMIA	0.000013	0.000032
A*STAR	0.000020	0.000110
SCL	0.000010	0.000150
SNIIM	0.000030	0.000099
NIM	0.000018	0.000023
NRC	0.000031	0.000076
NIST	0.000008	0.000065
NMISA	0.000010	0.000035
NPLI	0.000100	0.003500
NMIJ	0.000011	0.000052
SP	0.000015	0.000098
LNE	0.000011	0.000052

S_{21} , 50 dB, 18 GHz

Lab i	D_i	U_i
NPL	0.000034	0.000093
PTB	0.000009	0.000047
VSL	0.000013	0.000039
INRIM	0.000028	0.000052
METAS	0.000012	0.000065
CMI	0.000013	0.000086
UME	0.000020	0.000540
NMIA	0.000033	0.000040
A*STAR	0.000040	0.000180
SCL	0.000040	0.000270
SNIIM	0.000020	0.000110
NIM	0.000019	0.000024
NRC	0.000040	0.000120
NIST	0.000000	0.000120
NMISA	0.000044	0.000052
NPLI	0.000000	0.002100
NMIJ	0.000006	0.000050
SP	0.000040	0.000360
LNE	0.000006	0.000062

Key comparisons CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL

Reduced dimension degrees of equivalence relative to the key comparison reference value, D_i , and their respective 95% confidence indicators, U_i . The D_i 's represent magnitudes of complex quantities and are thus always positive. (Continued)

S_{11} , male matched load, 2 GHz

Lab <i>i</i>	D_i	U_i
NPL	0.0003	0.0028
PTB	0.0014	0.0031
VSL	0.0024	0.0056
INRIM	0.0020	0.0130
METAS	0.0005	0.0046
CMI	0.0000	0.0110
UME	0.0010	0.0120
NMIA	0.0007	0.0033
A*STAR	0.0010	0.0110
SCL	0.0011	0.0076
SNIIM	0.0018	0.0042
NIM	0.0003	0.0016
NRC	0.0020	0.0130
NIST	0.0006	0.0040
NMISA	0.0003	0.0062
NPLI	0.0020	0.0120
NMIJ	0.0004	0.0028
SP	0.0008	0.0051
LNE	0.0010	0.0100
INTI	0.0006	0.0080
CENAM	0.0009	0.0057

S_{11} , male matched load, 9 GHz

Lab <i>i</i>	D_i	U_i
NPL	0.0011	0.0028
PTB	0.0027	0.0032
VSL	0.0020	0.0200
INRIM	0.0030	0.0120
METAS	0.0033	0.0092
CMI	0.0030	0.0110
UME	0.0030	0.0080
NMIA	0.0025	0.0052
A*STAR	0.0019	0.0077
SCL	0.0030	0.0230
SNIIM	0.0037	0.0049
NIM	0.0053	0.0042
NRC	0.0020	0.0130
NIST	0.0003	0.0045
NMISA	0.0013	0.0063
NPLI	0.0030	0.0410
NMIJ	0.0043	0.0031
SP	0.0049	0.0077
LNE	0.0020	0.0120
INTI	0.0042	0.0111
CENAM	0.0034	0.0089

S_{11} , male matched load, 18 GHz

Lab <i>i</i>	D_i	U_i
NPL	0.0023	0.0051
PTB	0.0015	0.0040
VSL	0.0029	0.0089
INRIM	0.0020	0.0130
METAS	0.0017	0.0093
CMI	0.0020	0.0110
UME	0.0020	0.0170
NMIA	0.0024	0.0074
A*STAR	0.0024	0.0041
SCL	0.0000	0.0230
SNIIM	0.0049	0.0060
NIM	0.0036	0.0049
NRC	0.0050	0.0200
NIST	0.0034	0.0057
NMISA	0.0067	0.0084
NPLI	0.0090	0.0220
NMIJ	0.0061	0.0037
SP	0.0040	0.0110
LNE	0.0060	0.0160
INTI	0.0022	0.0133
CENAM	0.0037	0.0120

Key comparison CCEM.RF-K5.b.CL

Reduced dimension degrees of equivalence relative to the key comparison reference value, D_i , and their respective 95% confidence indicators, U_i . The D_i 's represent magnitudes of complex quantities and are thus always positive. (Continued)

S_{11} , female mismatched load, 2 GHz

Lab <i>i</i>	D_i	U_i
NPL	0.0060	0.0150
PTB	0.0080	0.0110
VSL	0.0070	0.0200
INRIM	0.0800	0.1200
METAS	0.0060	0.0160
CMI	0.0060	0.0180
UME	0.0070	0.0180
NMIA	0.0070	0.0100
A*STAR	0.0060	0.0160
SCL	0.0080	0.0140
SNIIM	0.0050	0.0150
NIM	0.0067	0.0056
NRC	0.0040	0.0280
NIST	0.0060	0.0140
NMISA	0.0060	0.0240
NPLI	0.0100	0.0160
NMIJ	0.0050	0.0160
SP	0.0060	0.0140
LNE	0.0050	0.0190

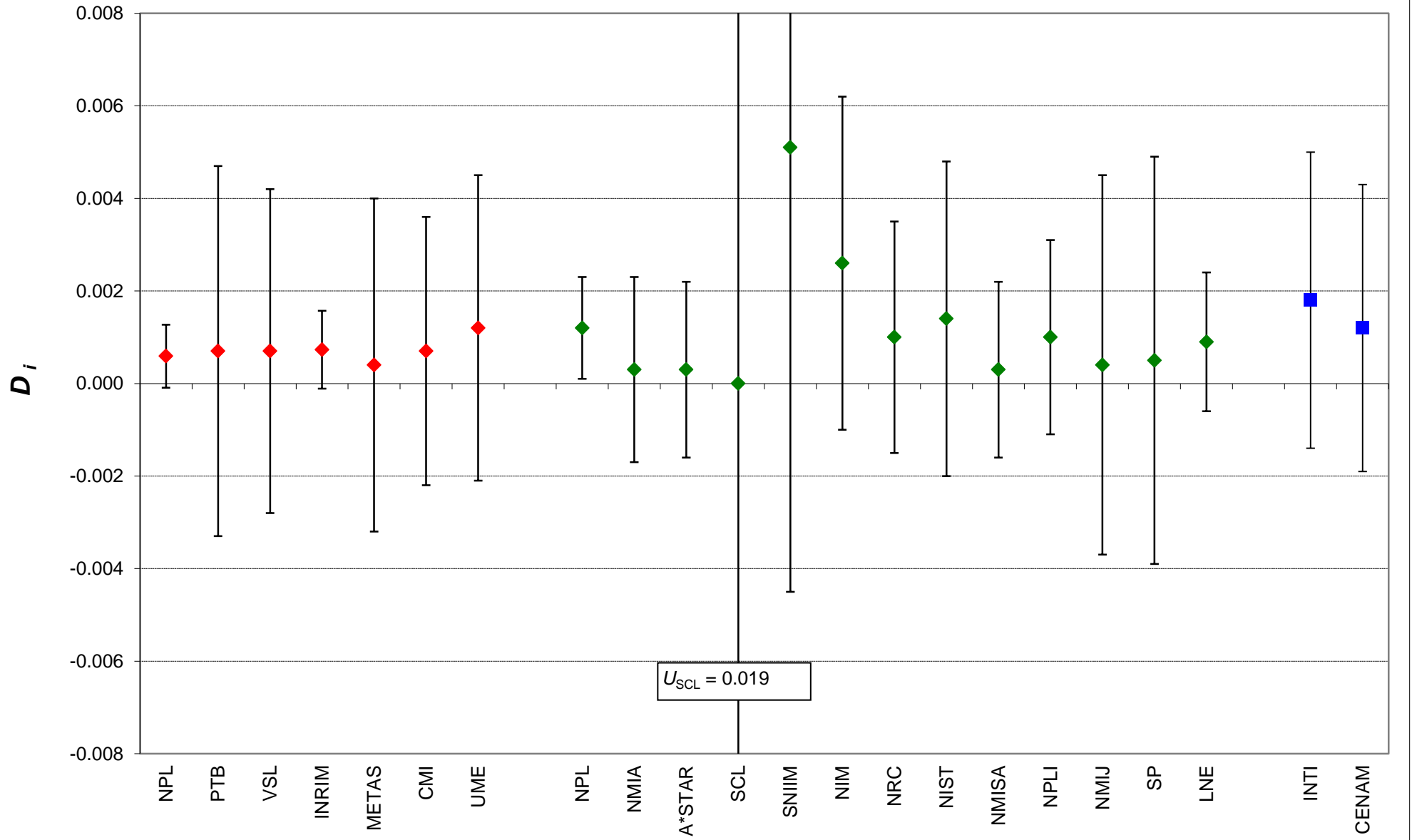
S_{11} , female mismatched load, 9 GHz

Lab <i>i</i>	D_i	U_i
NPL	0.0104	0.0084
PTB	0.0111	0.0089
VSL	0.0080	0.0320
INRIM	0.1000	0.1500
METAS	0.0080	0.0190
CMI	0.0080	0.0230
UME	0.0090	0.0320
NMIA	0.0090	0.0190
A*STAR	0.0080	0.0220
SCL	0.0110	0.0350
SNIIM	0.0110	0.0160
NIM	0.0138	0.0071
NRC	0.0160	0.0270
NIST	0.0100	0.0130
NMISA	0.0090	0.0200
NPLI	0.0090	0.0230
NMIJ	0.0090	0.0180
SP	0.0080	0.0190
LNE	0.0070	0.0250

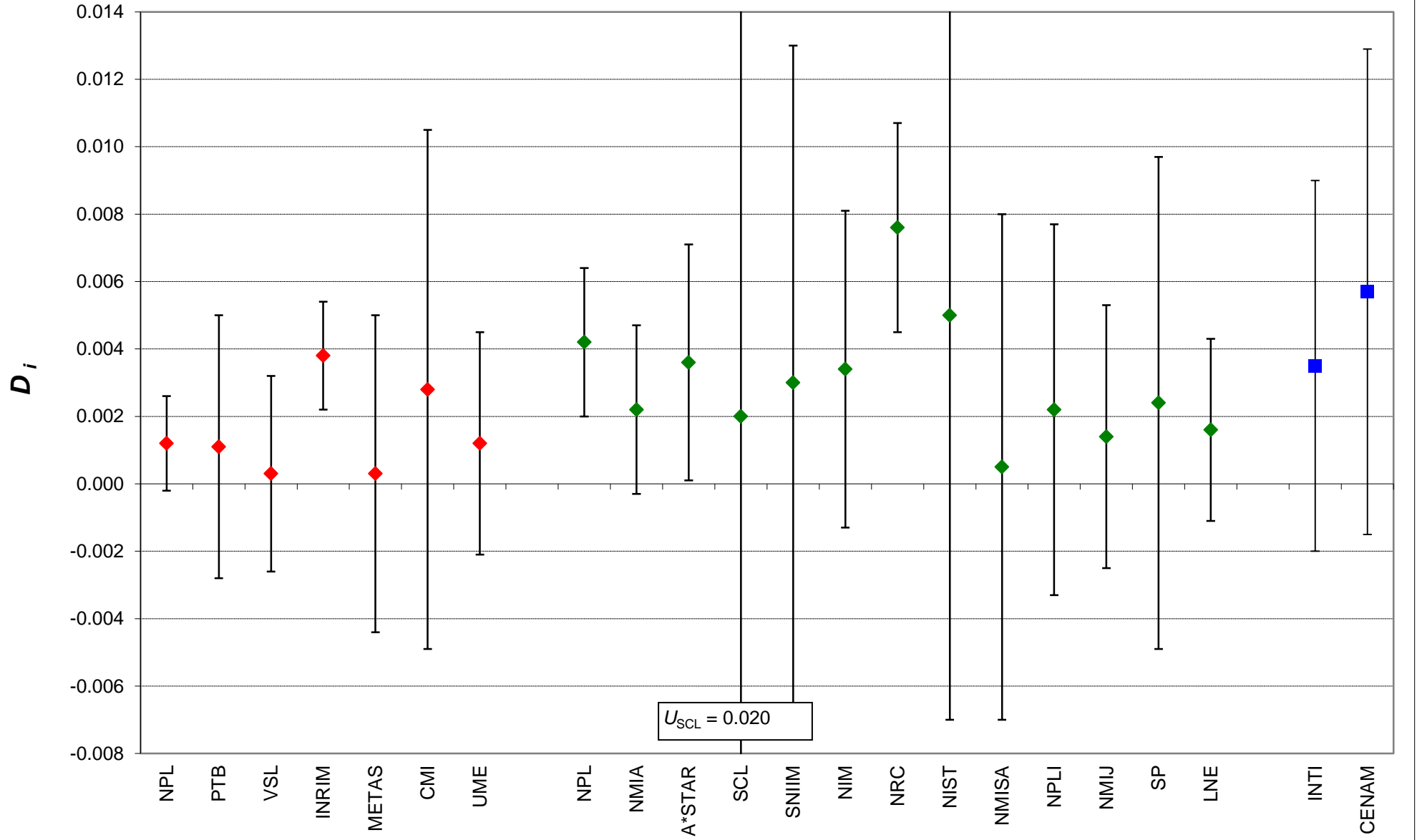
S_{11} , female mismatched load, 18 GHz

Lab <i>i</i>	D_i	U_i
NPL	0.0130	0.0130
PTB	0.0178	0.0098
VSL	0.0120	0.0330
INRIM	0.0390	0.0610
METAS	0.0080	0.0130
CMI	0.0080	0.0170
UME	0.0110	0.0330
NMIA	0.0080	0.0110
A*STAR	0.0050	0.0270
SCL	0.0110	0.0330
SNIIM	0.0060	0.0110
NIM	0.0047	0.0078
NRC	0.0160	0.0260
NIST	0.0032	0.0089
NMISA	0.0020	0.0120
NPLI	0.0250	0.0220
NMIJ	0.0032	0.0073
SP	0.0050	0.0140
LNE	0.0020	0.0170

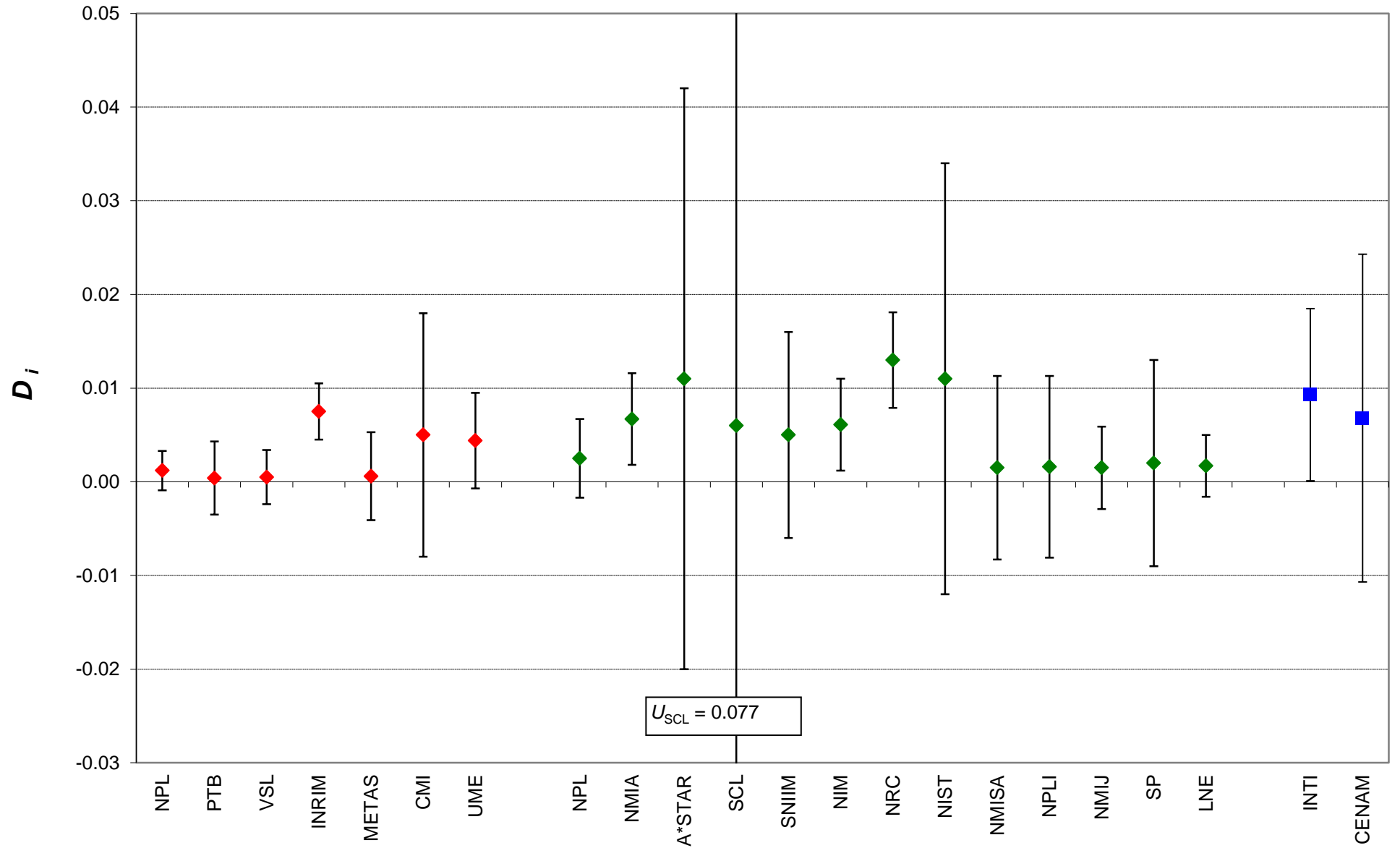
CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL S_{21} 3 dB 2 GHz



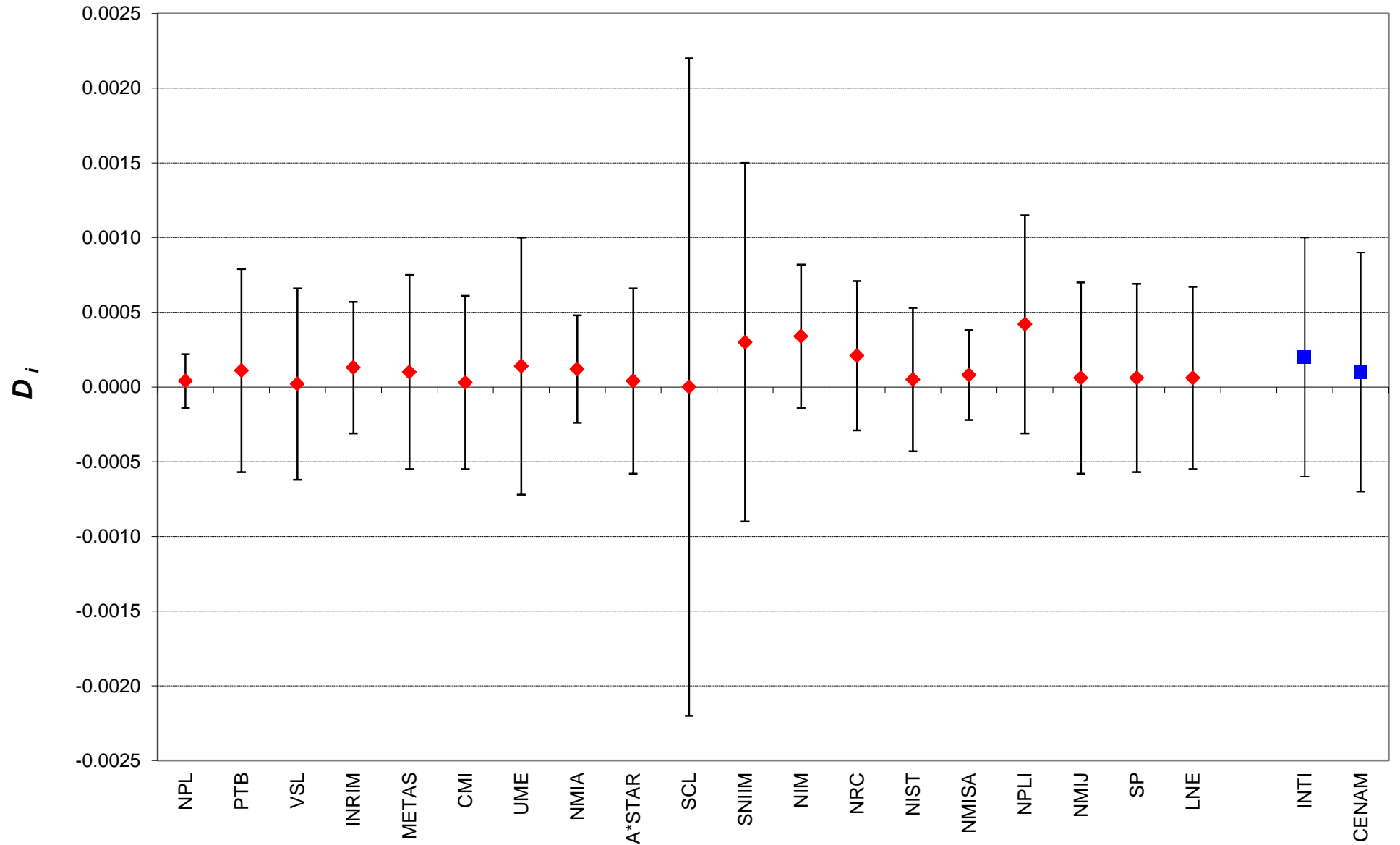
CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL S_{21} 3 dB 9 GHz



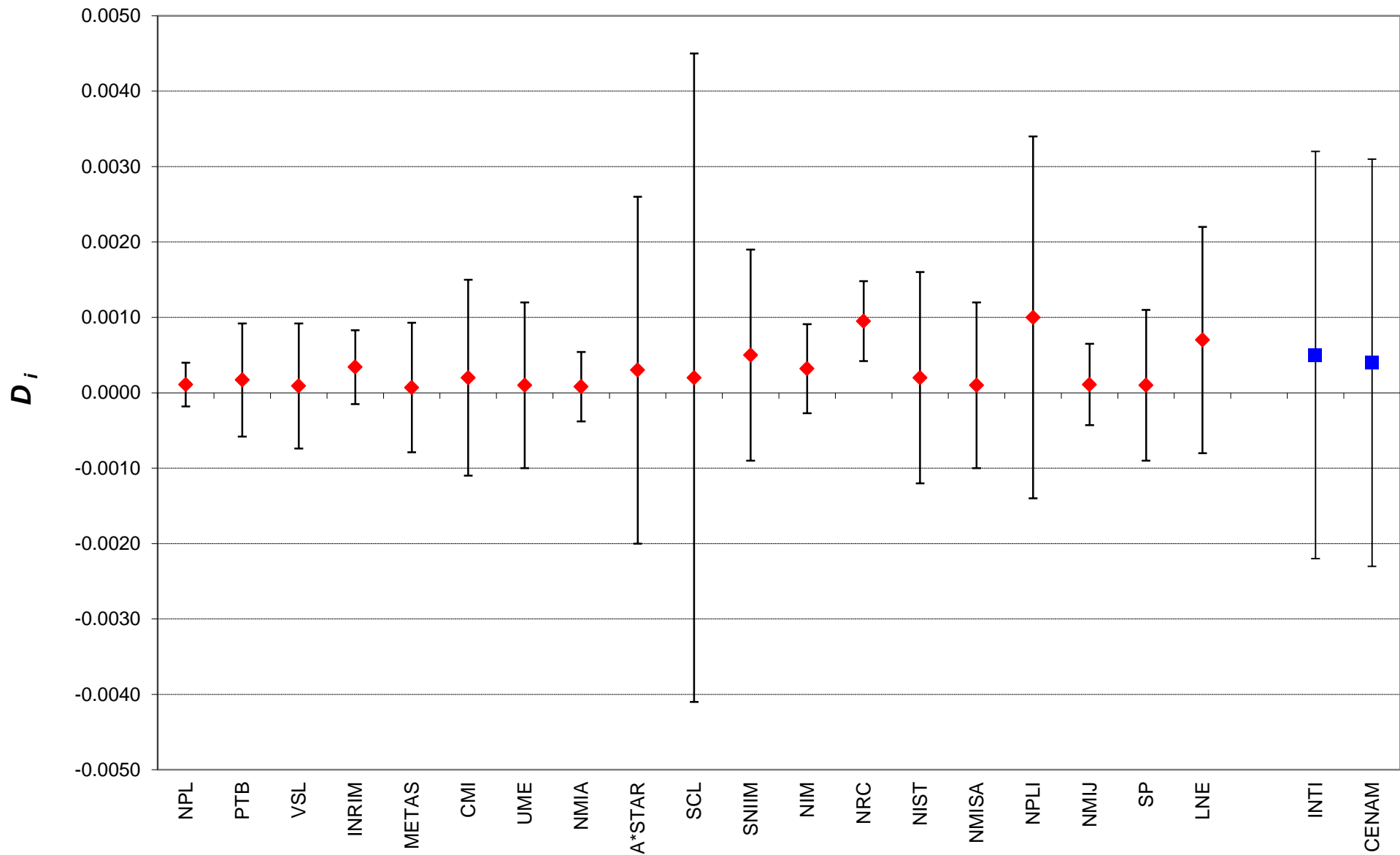
CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL S_{21} 3 dB 18 GHz



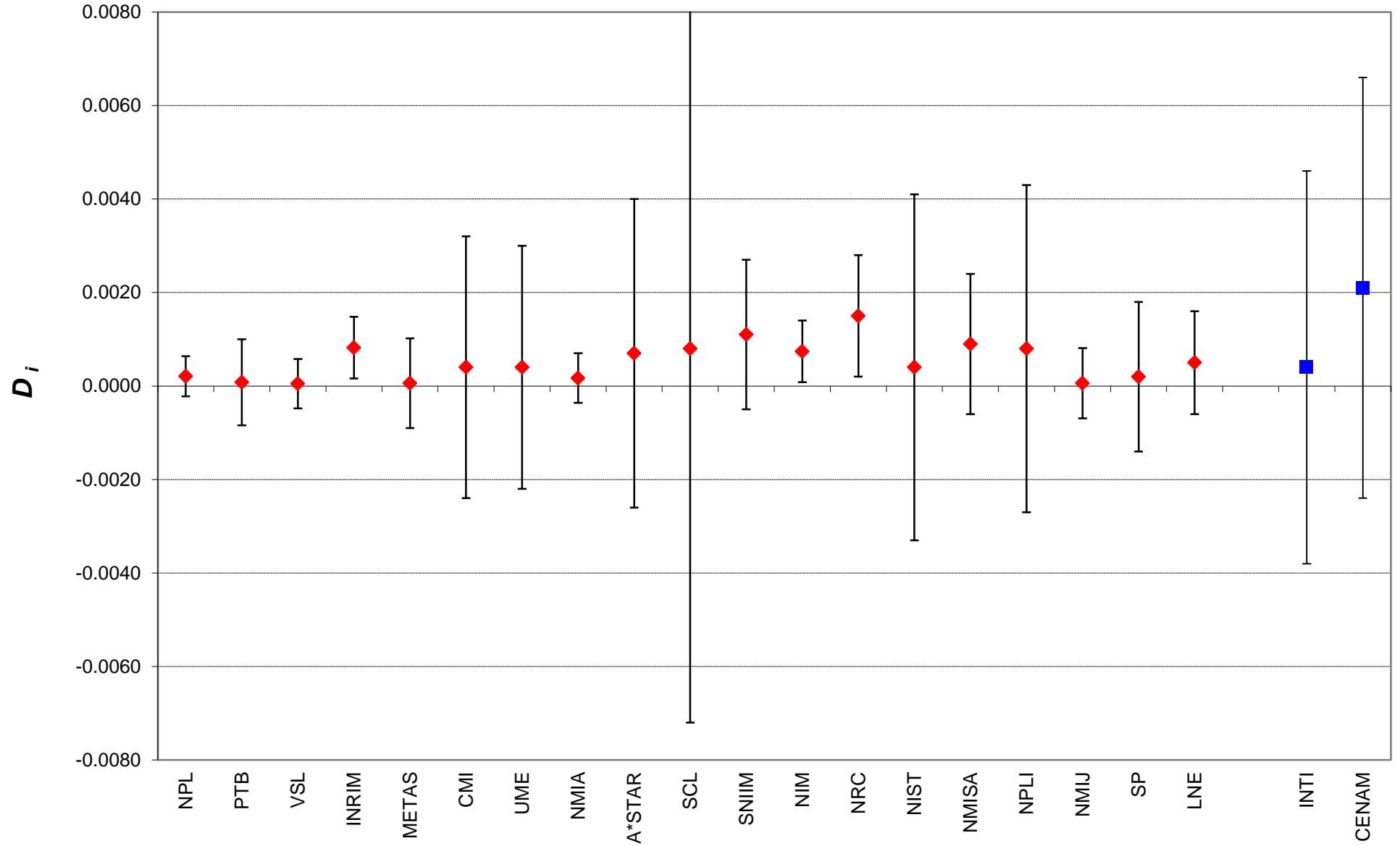
CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL S_{21} 20 dB 2 GHz



CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL S_{21} 20 dB 9 GHz

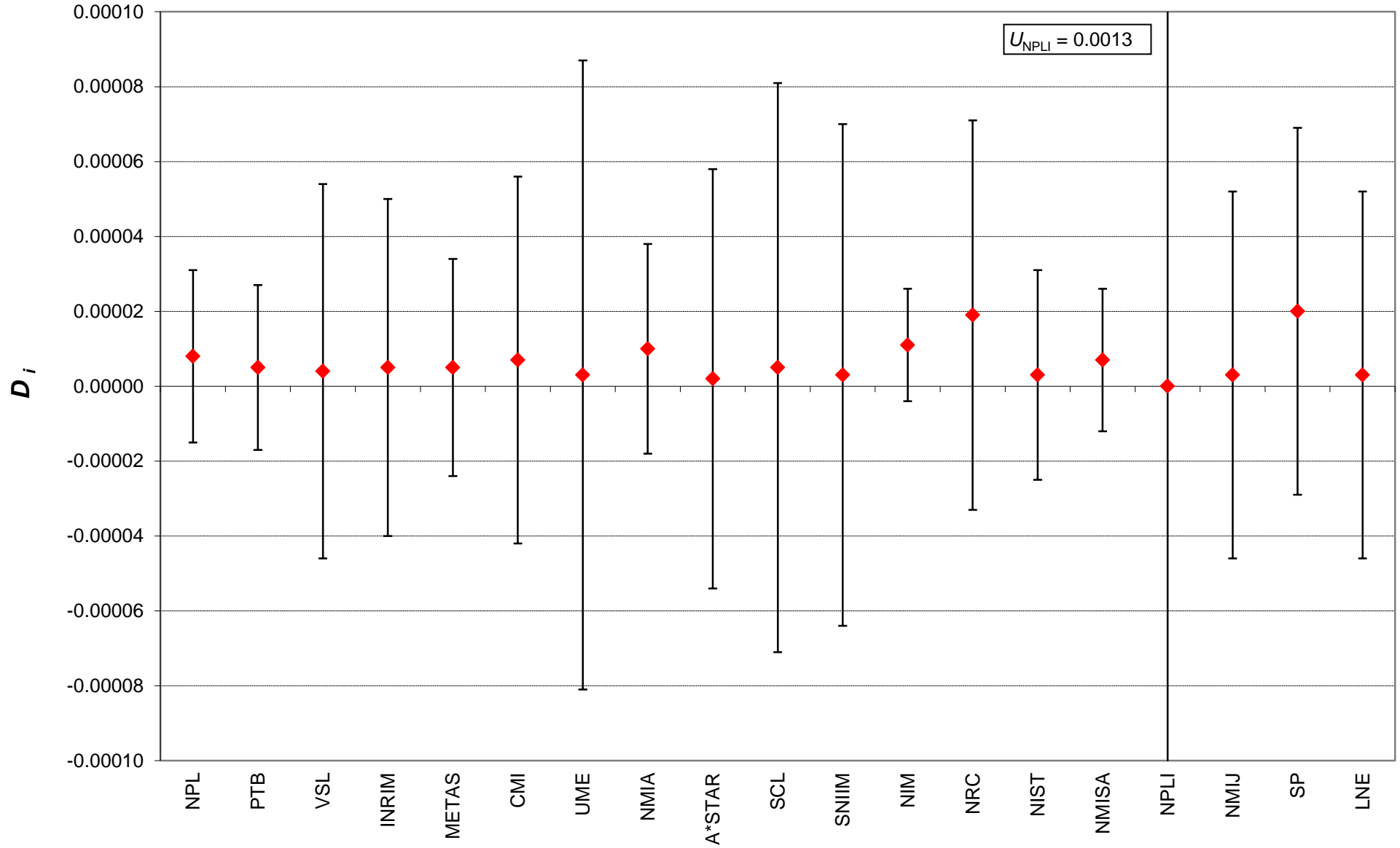


CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL S_{21} 20 dB 18 GHz

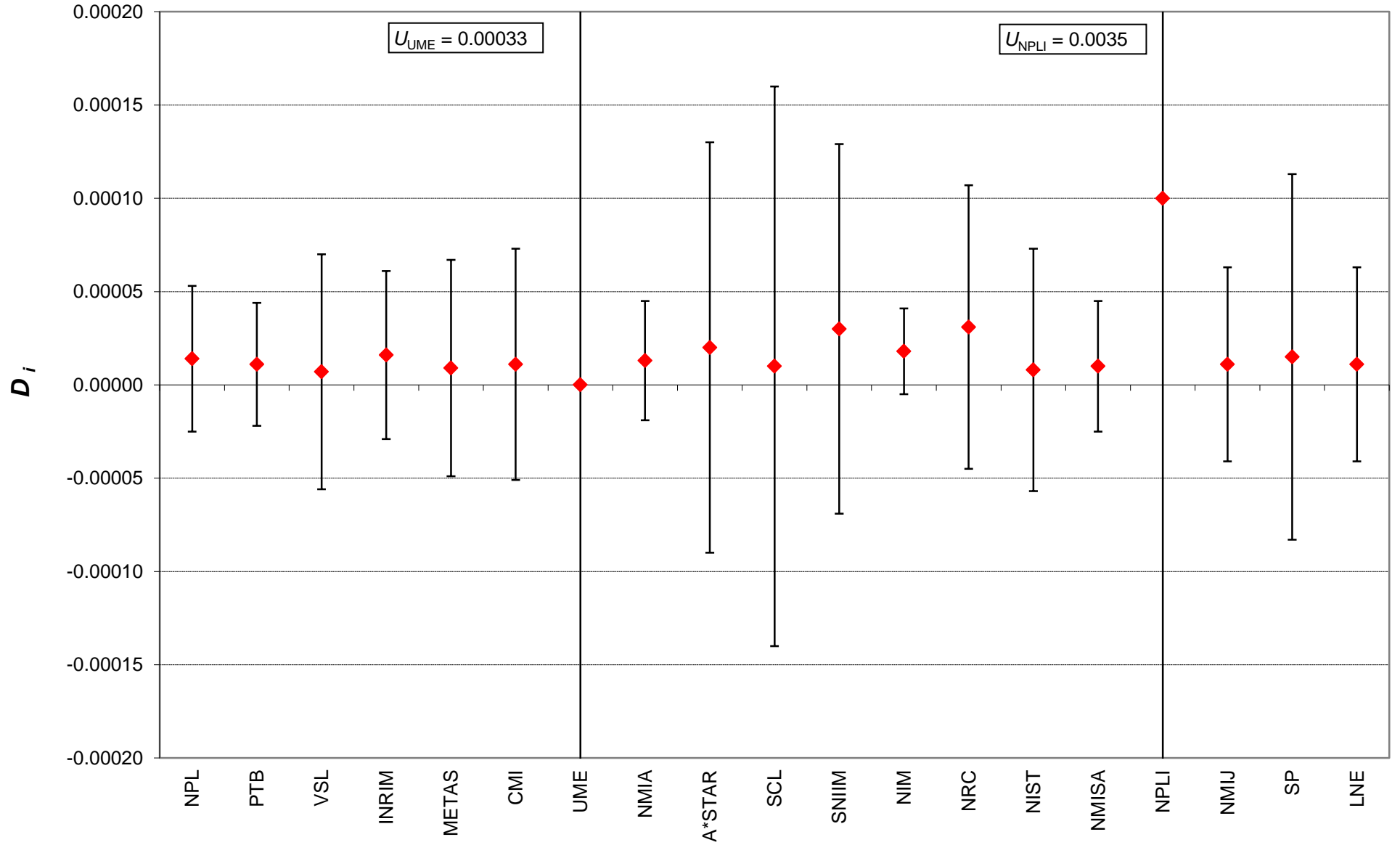


CCEM.RF-K5.b.CL S_{21} 50 dB 2 GHz

$U_{NPLI} = 0.0013$

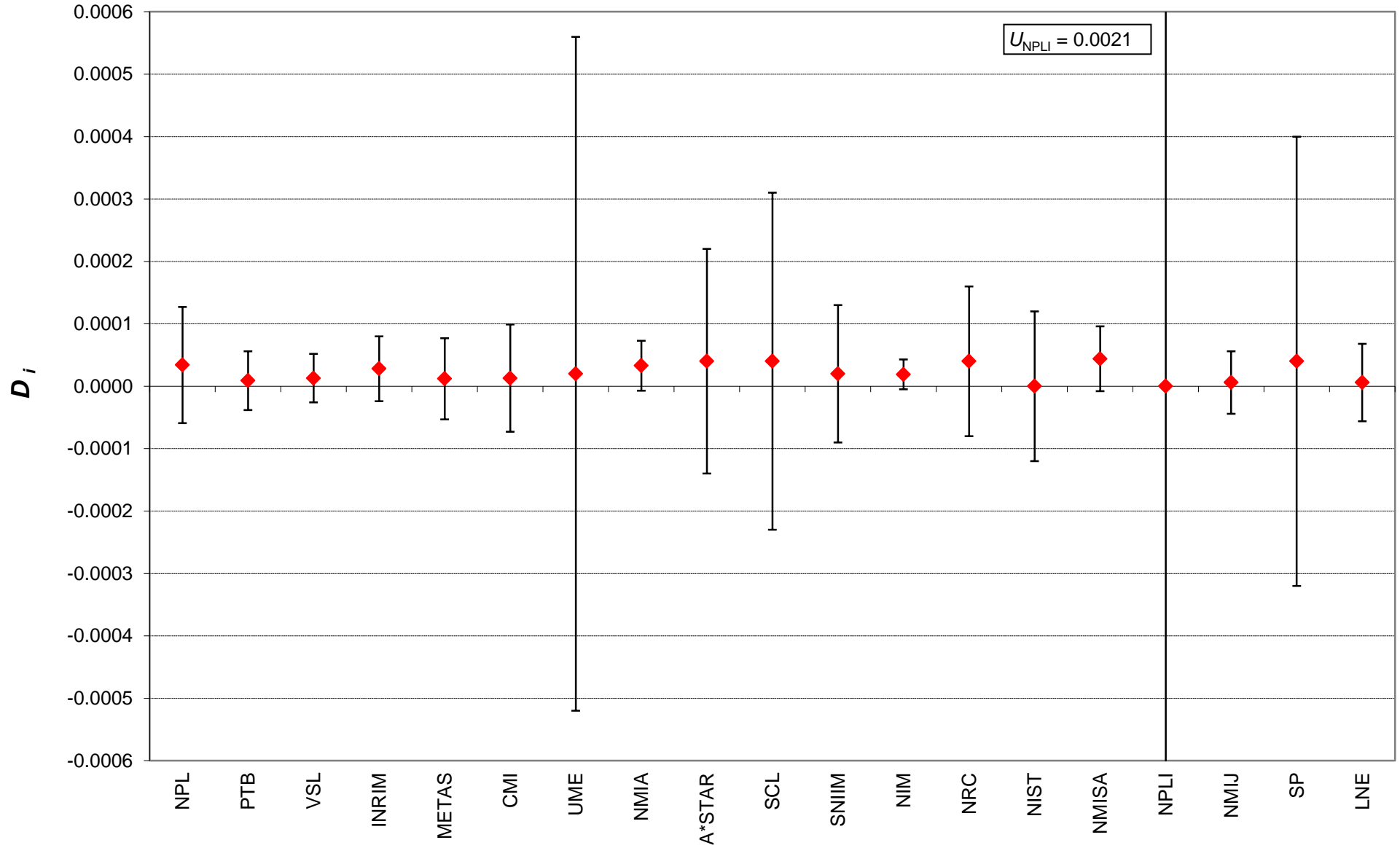


CCEM.RF-K5.b.CL S_{21} 50 dB 9 GHz

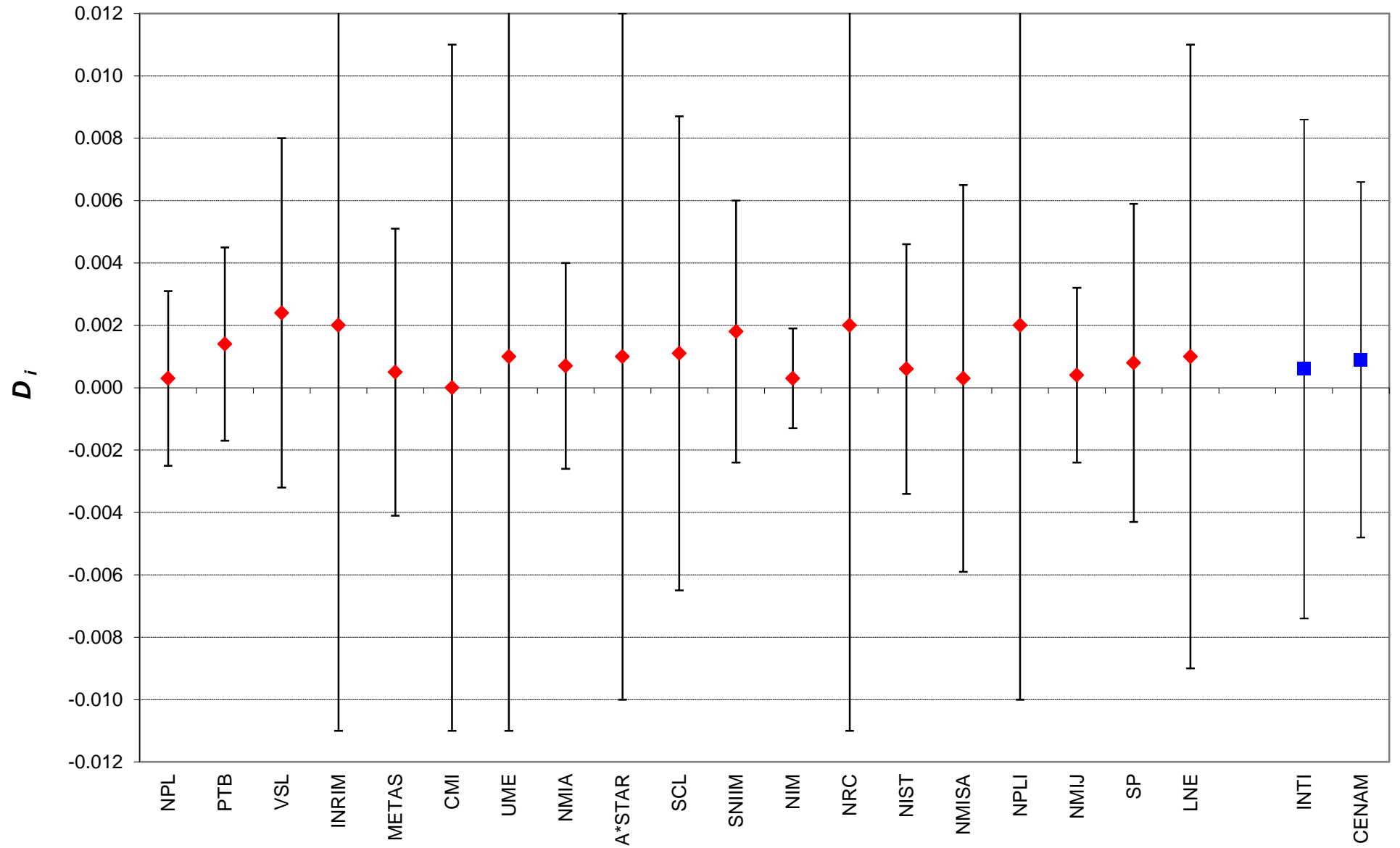


CCEM.RF-K5.b.CL S_{21} 50 dB 18 GHz

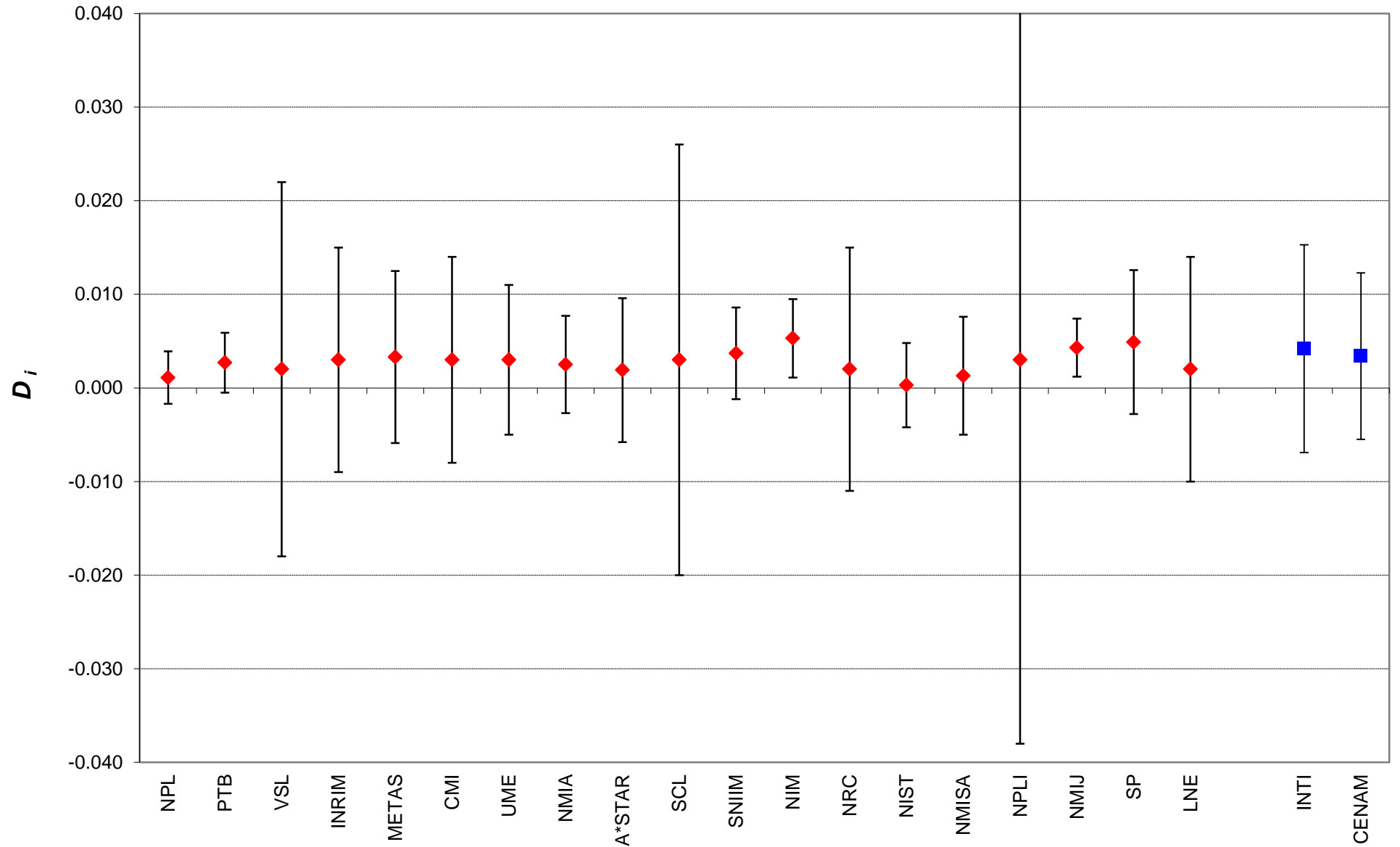
$U_{NPLI} = 0.0021$



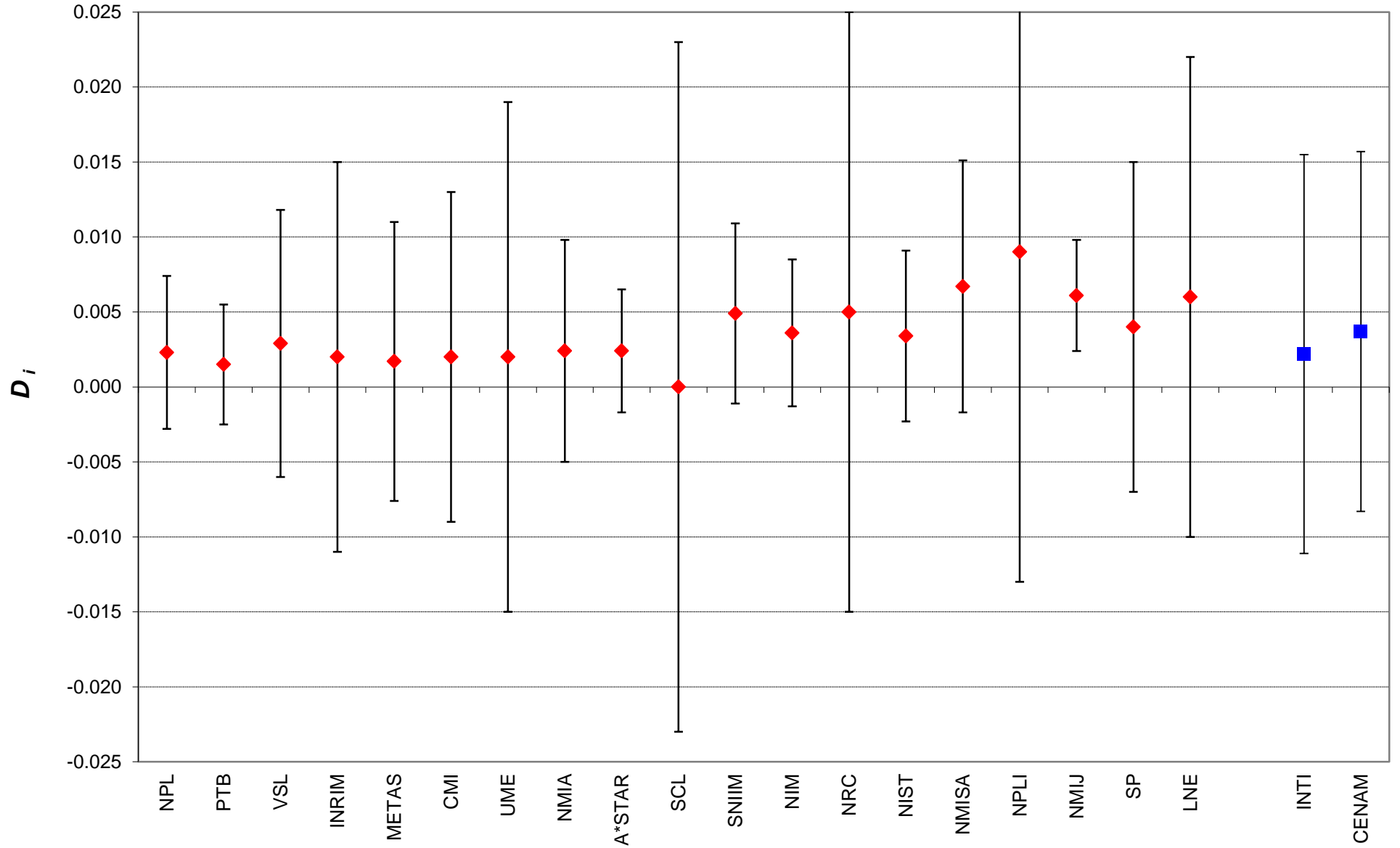
CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL S_{11} male matched load 2 GHz



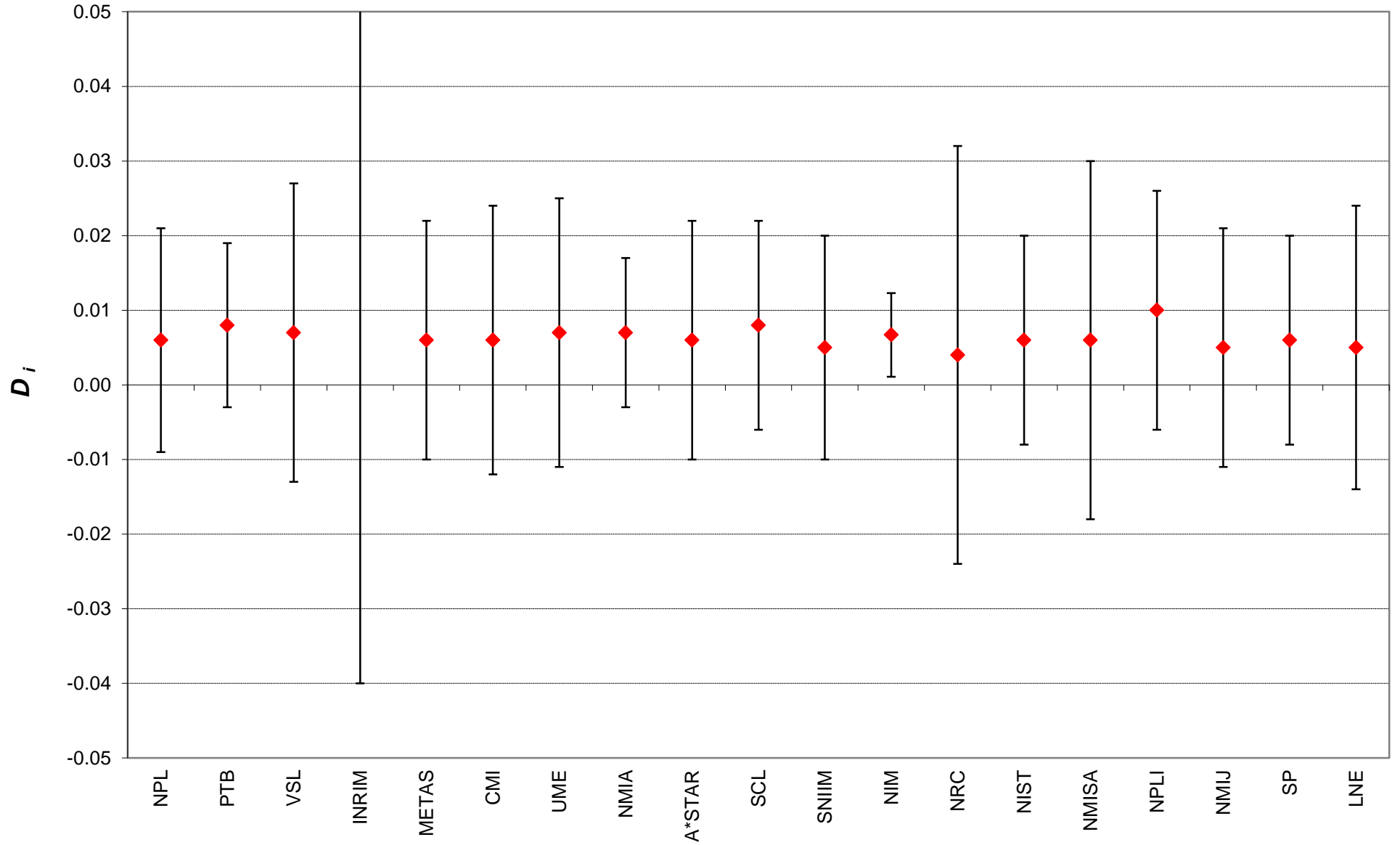
CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL S_{11} male matched load 9 GHz



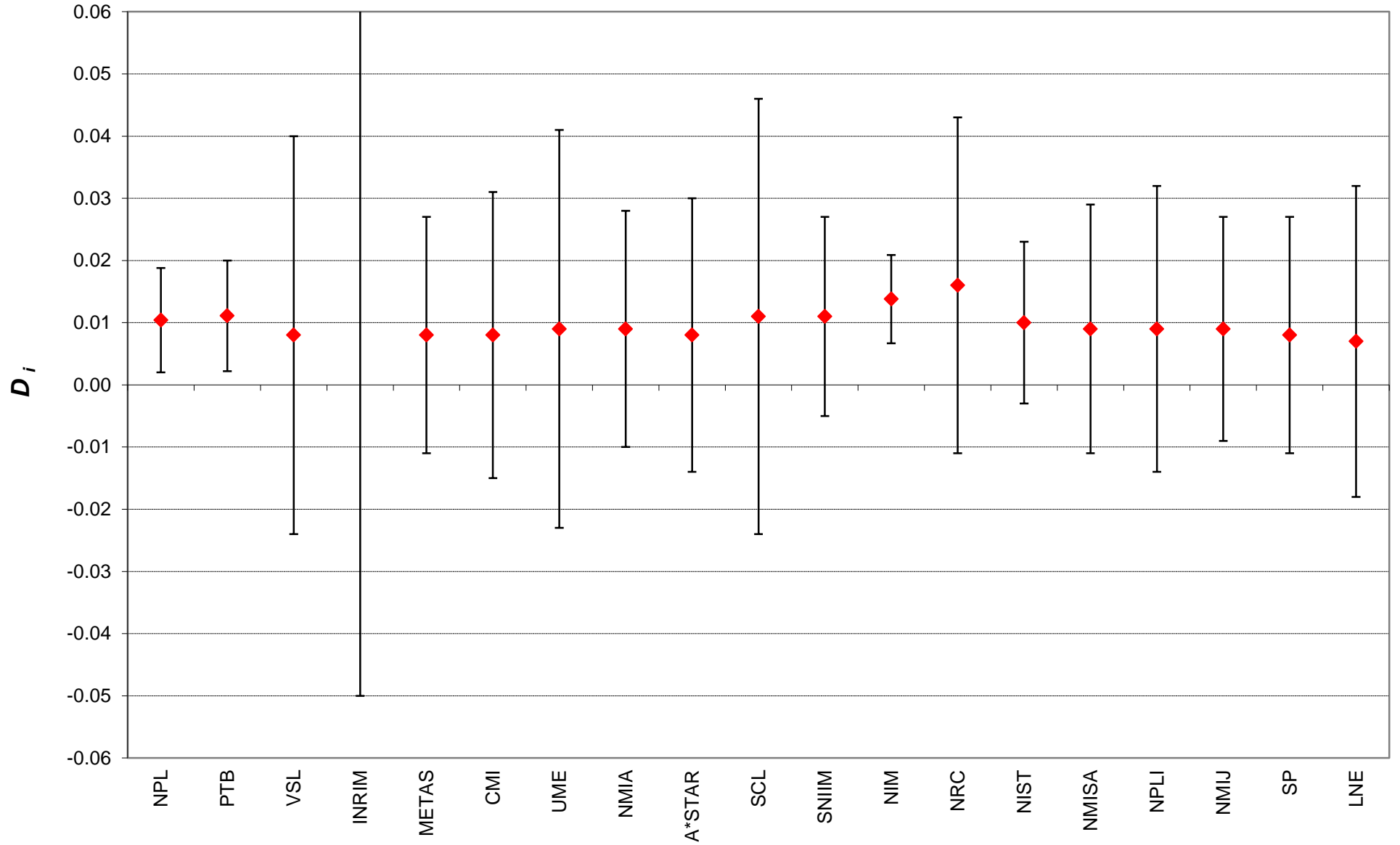
CCEM.RF-K5.b.CL and SIM.EM.RF-K5.b.CL S_{11} male matched load 18 GHz



CCEM.RF-K5.b.CL S_{11} female mismatched load 2 GHz



CCEM.RF-K5.b.CL S_{11} female mismatched load 9 GHz



CCEM.RF-K5.b.CL S_{11} female mismatched load 18 GHz

