BEILSTEIN JOURNAL OF ORGANIC CHEMISTRY

Supporting Information

for

Diastereoselective synthesis of highly substituted cyclohexanones and tetrahydrochromene-4-ones via conjugate addition of curcumins to arylidenemalonates

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Copies of NMR spectra of all new compounds

INN-DN-349-AS-I-1H

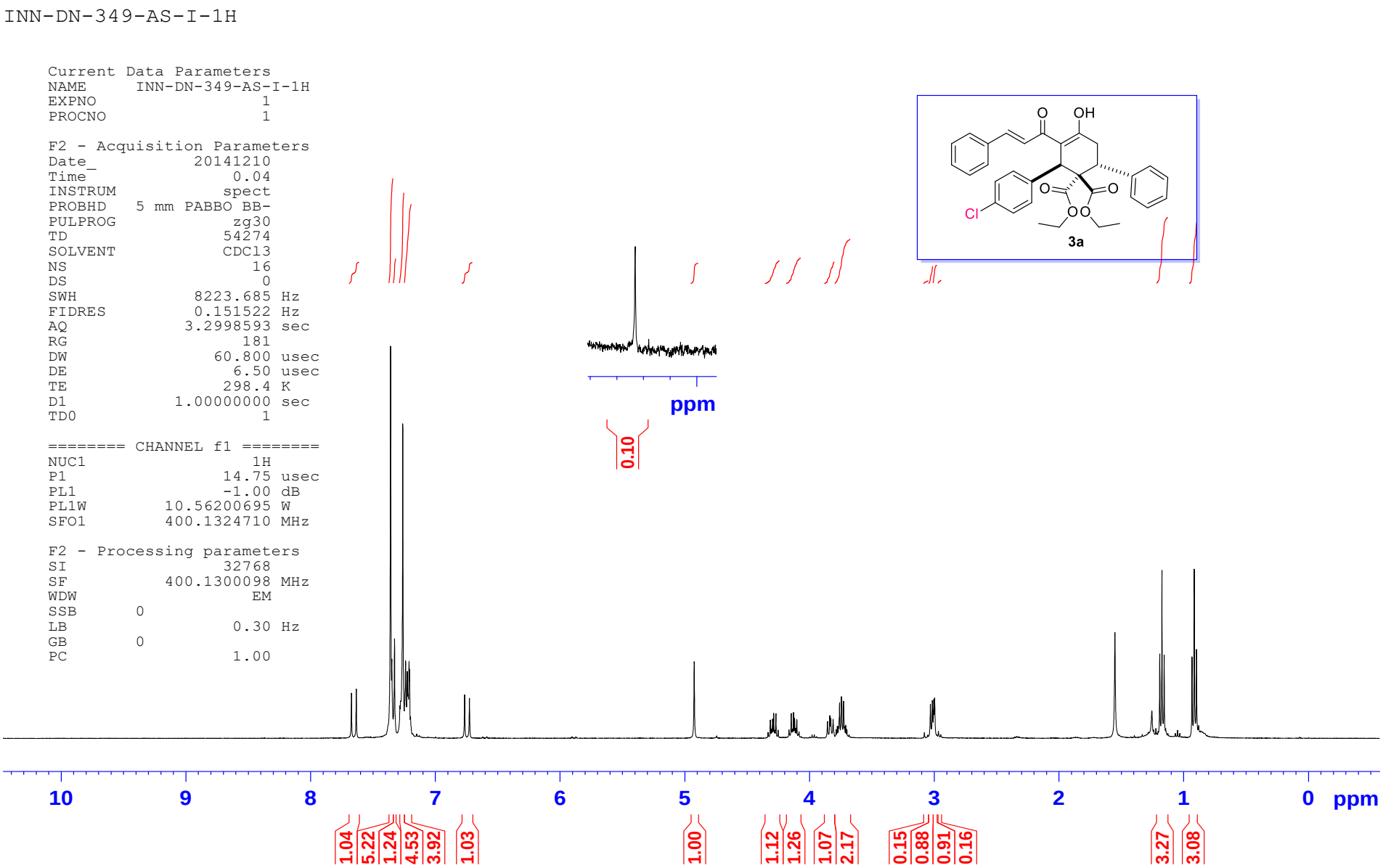

Fig S1. ^{1}H NMR Spectrum of 3a

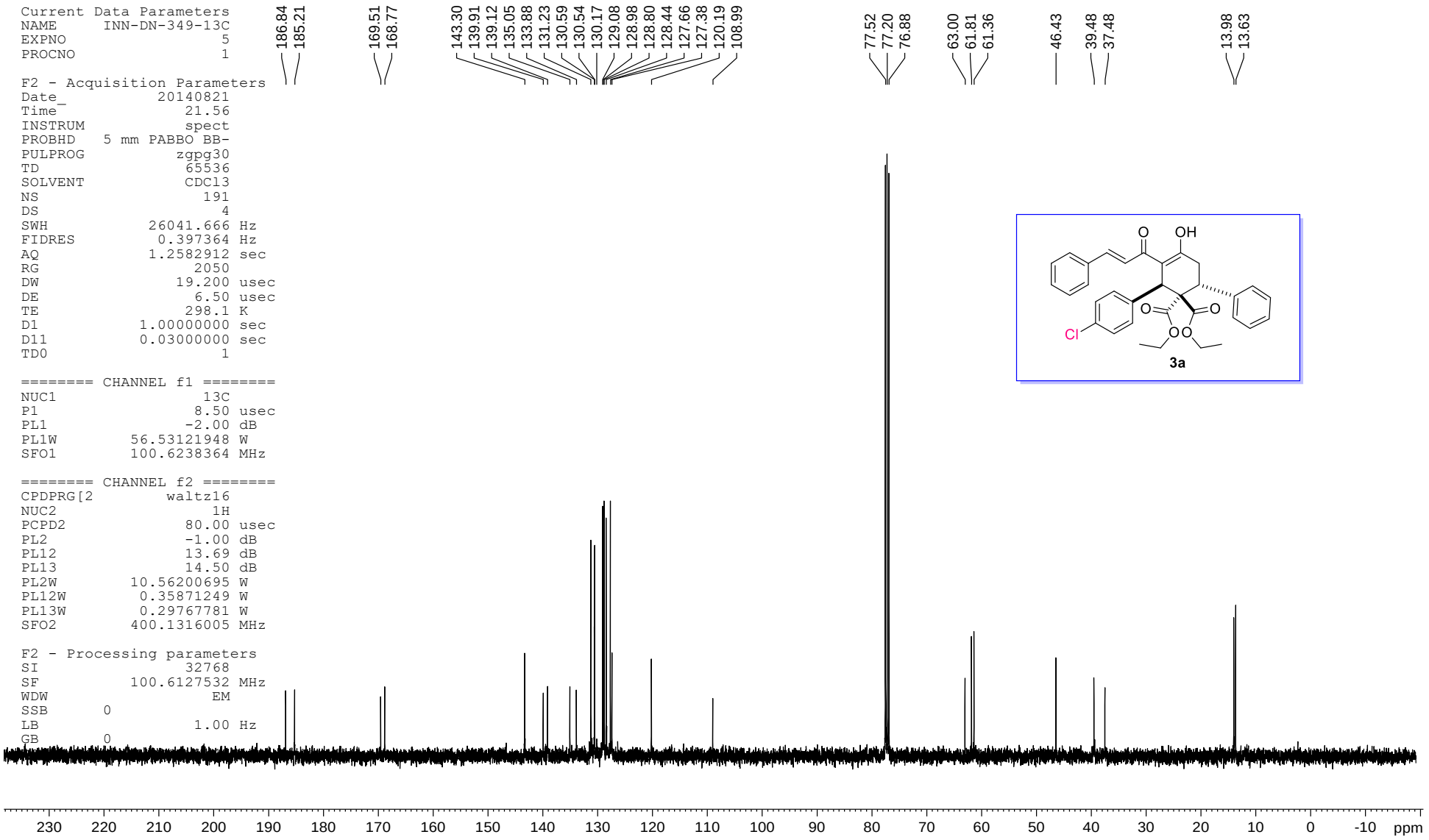

Fig S2. ^{13}C NMR Spectrum of 3a

```
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PROCNO                  1

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Date_            20150211
Time                23.45
INSTRUM             spect
PROBHD   5 mm PABBO BB/
PULPROG              zg30
TD                  65536
SOLVENT             CDCl3
NS                     15
DS                      2
SWH            10000.000 Hz
FIDRES          0.152588 Hz
AQ             3.2767999 sec
RG                  30.72
DW                 50.000 usec
DE                  6.50 usec
TE                 295.6 K
D1            1.00000000 sec
TD0                     1

======== CHANNEL f1 ========
SFO1          500.1330885 MHz
NUC1                   1H
P1                  13.00 usec
PLW1          13.00000000 W

F2 - Processing parameters
SI                  65536
SF            500.1300123 MHz
WDW                    EM
SSB       0
LB                  0.30 Hz
GB        0
PC                  1.00
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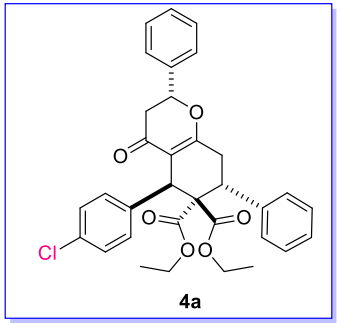


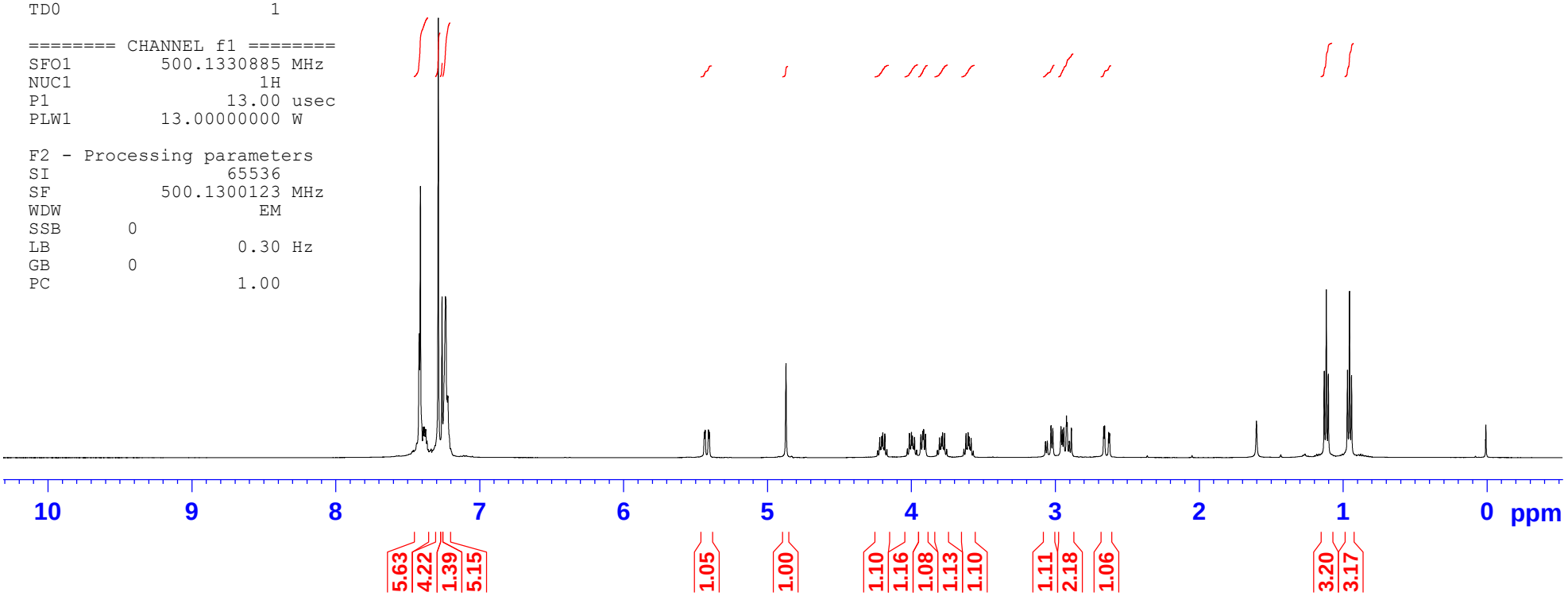


Fig S3. ^{1}H NMR spectrum of 4a

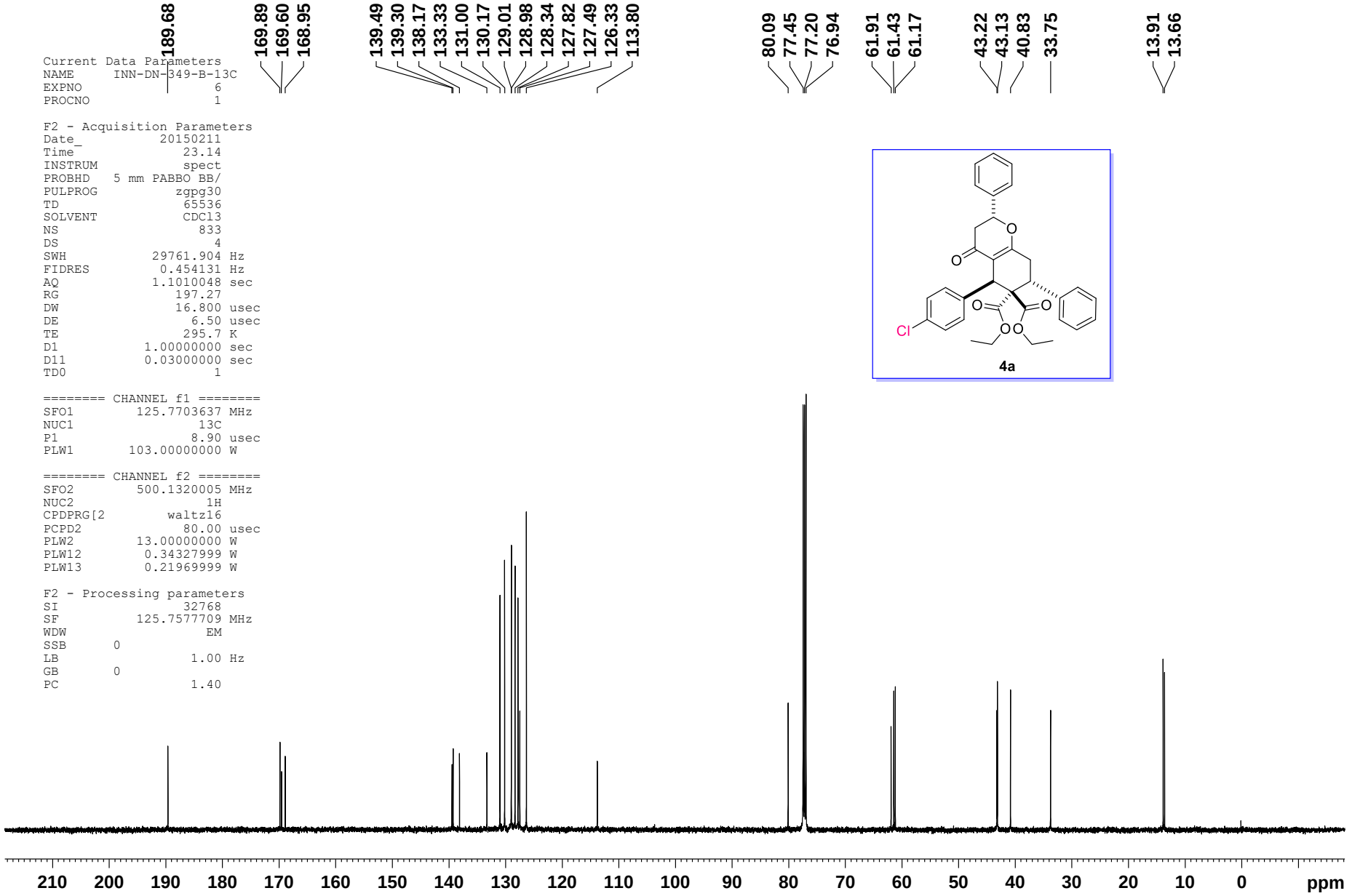
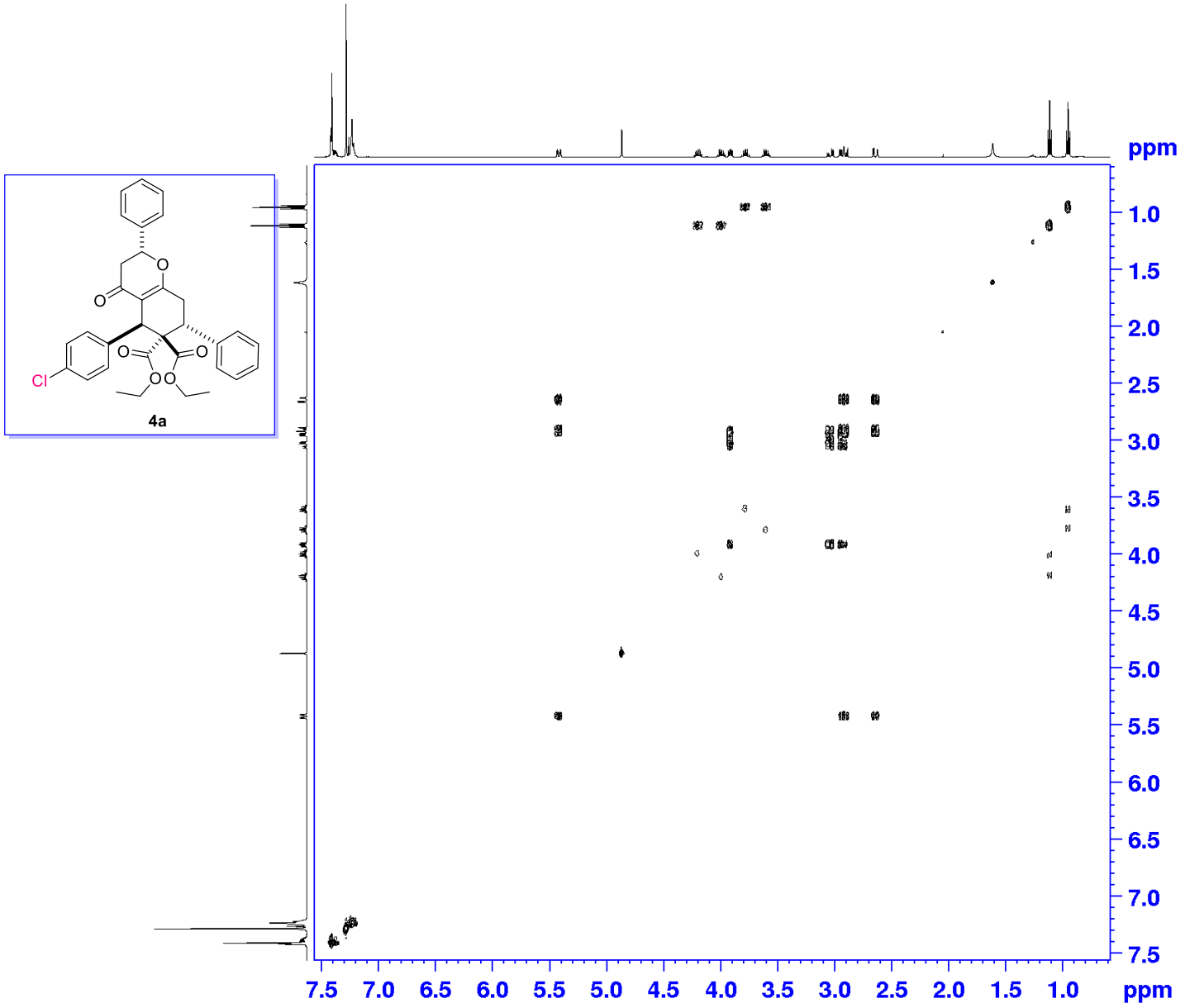


Fig S4. ^{13}C NMR spectrum of 4a

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Current Data Parameters
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EXPNO                       6
PROCNO                      1

F2 - Acquisition Parameters
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Time                 0.11
INSTRUM             spect
PROBHD    5 mm PADUL 13C
PULPROG       cosygpppqf
TD                   2048
SOLVENT             CDCl3
NS                     16
DS                      8
SWH              3491.620 Hz
FIDRES           1.704893 Hz
AQ               0.2932736 sec
RG                 197.27
DW                 143.200 usec
DE                   6.50 usec
TE                  296.9 K
D0               0.00000300 sec
D1               1.00000000 sec
D11              0.03000000 sec
D12              0.00002000 sec
D13              0.00000400 sec
D16              0.00020000 sec
IN0              0.00028640 sec

======== CHANNEL f1 ========
SFO1          500.1320497 MHz
NUC1                    1H
P0                   14.25 usec
P1                   14.25 usec
P17                2500.00 usec
PLW1         15.00000000 W
PLW10         3.38439989 W

====== GRADIENT CHANNEL =====
GPNAM[1]      SMSQ10.100
GPZ1                10.00 %
P16               1000.00 usec

F1 - Acquisition parameters
TD                     256
SFO1             500.132 MHz
FIDRES         27.278282 Hz
SW                 6.981 ppm
FnMODE                QF

F2 - Processing parameters
SI                    1024
SF            500.1300133 MHz
WDW                 QSINE
SSB                     0
LB                      0 Hz
GB                      0
PC                   1.40

F1 - Processing parameters
SI                    1024
MC2                   QF
SF            500.1300133 MHz
WDW                 QSINE
SSB                     0
LB                      0 Hz
GB                      0
```

Fig S5. ^{1}H -^{1}H COSY NMR Spectrum of 4a

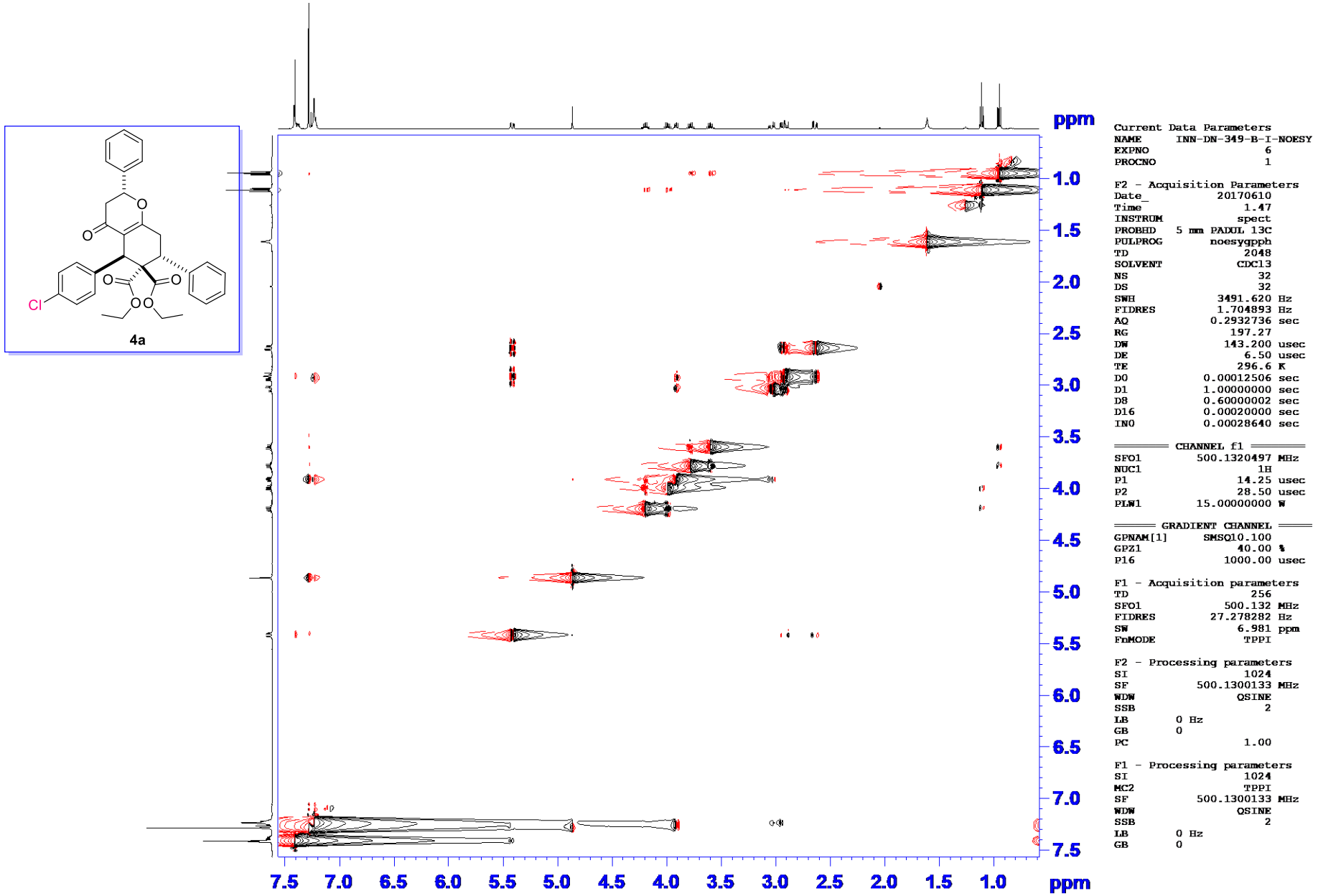


Fig S6. ^{1}H -^{1}H NOESY NMR Spectrum of 4a

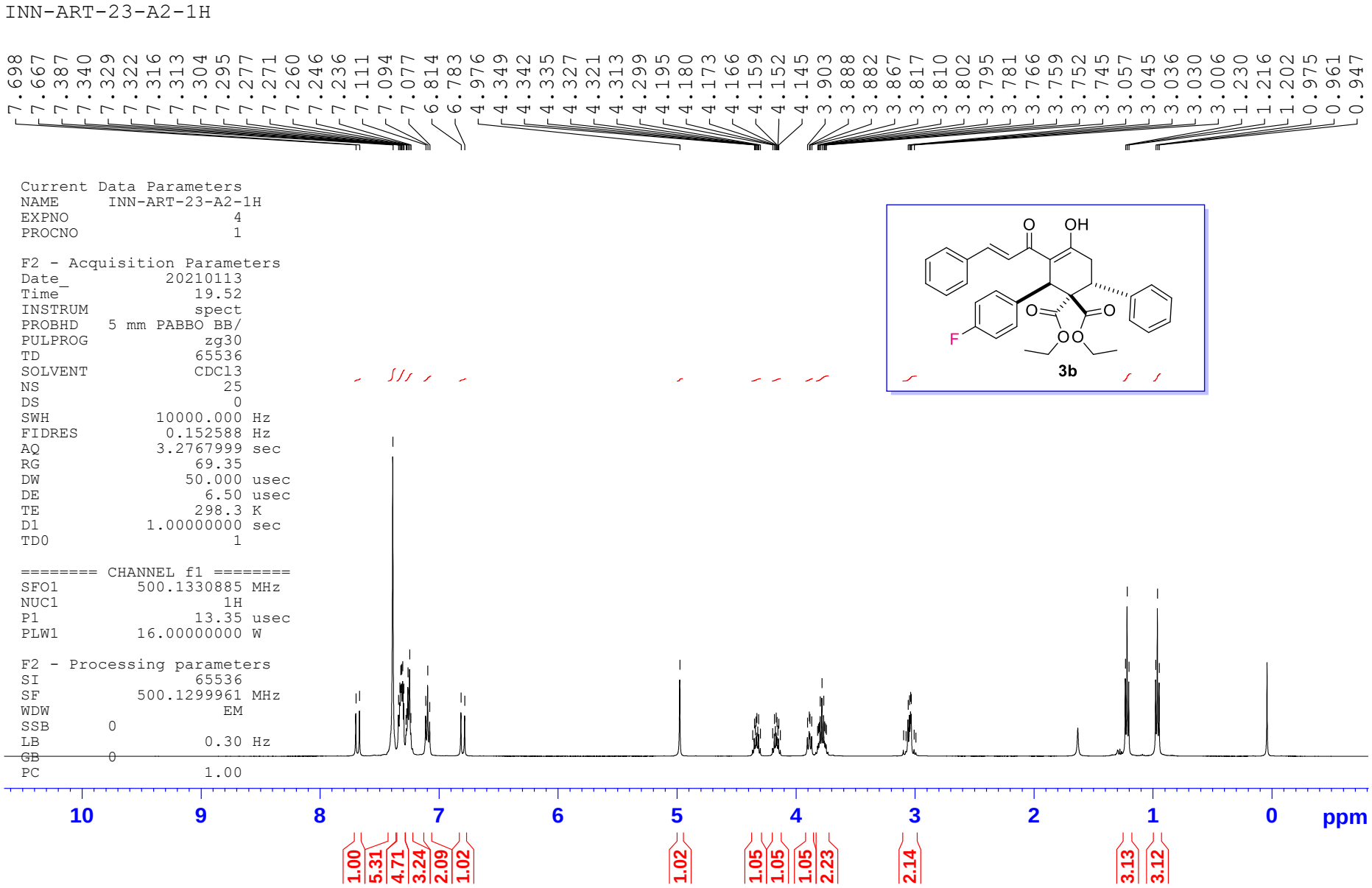
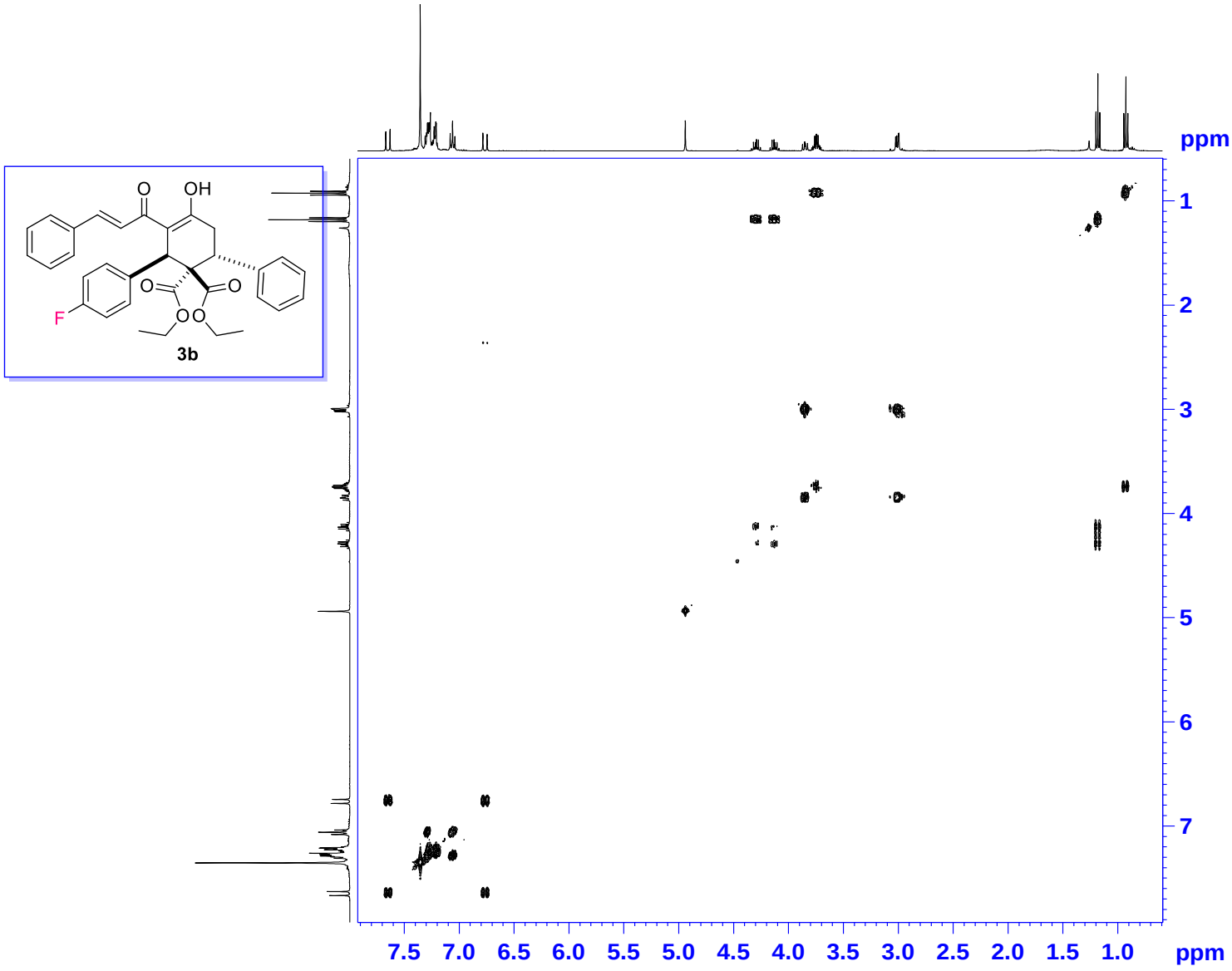


Fig S7. ^{1}H NMR Spectrum of 3b

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Current Data Parameters
NAME      INN-DN-Ph-Ph-F-COSY
EXPNO                   4
PROCNO                  1

F2 - Acquisition Parameters
Date_           20170327
Time               17.50
INSTRUM            spect
PROBHD   5 mm PABBO BB-
PULPROG         cosygpqf
TD                 2048
SOLVENT            CDC13
NS                   16
DS                   16
SWH             2934.272 Hz
FIDRES          1.432750 Hz
AQ              0.3489792 sec
RG                  256
DW               170.400 usec
DE                 6.50 usec
TE                298.2 K
D0           0.00000300 sec
D1           1.00000000 sec
D13          0.00000400 sec
D16          0.00020000 sec
IN0          0.00034080 sec

======== CHANNEL f1 ========
NUC1                 1H
P0                14.75 usec
P1                14.75 usec
PL1               -1.00 dB
PL1W        10.56200695 W
SFO1        400.1317136 MHz

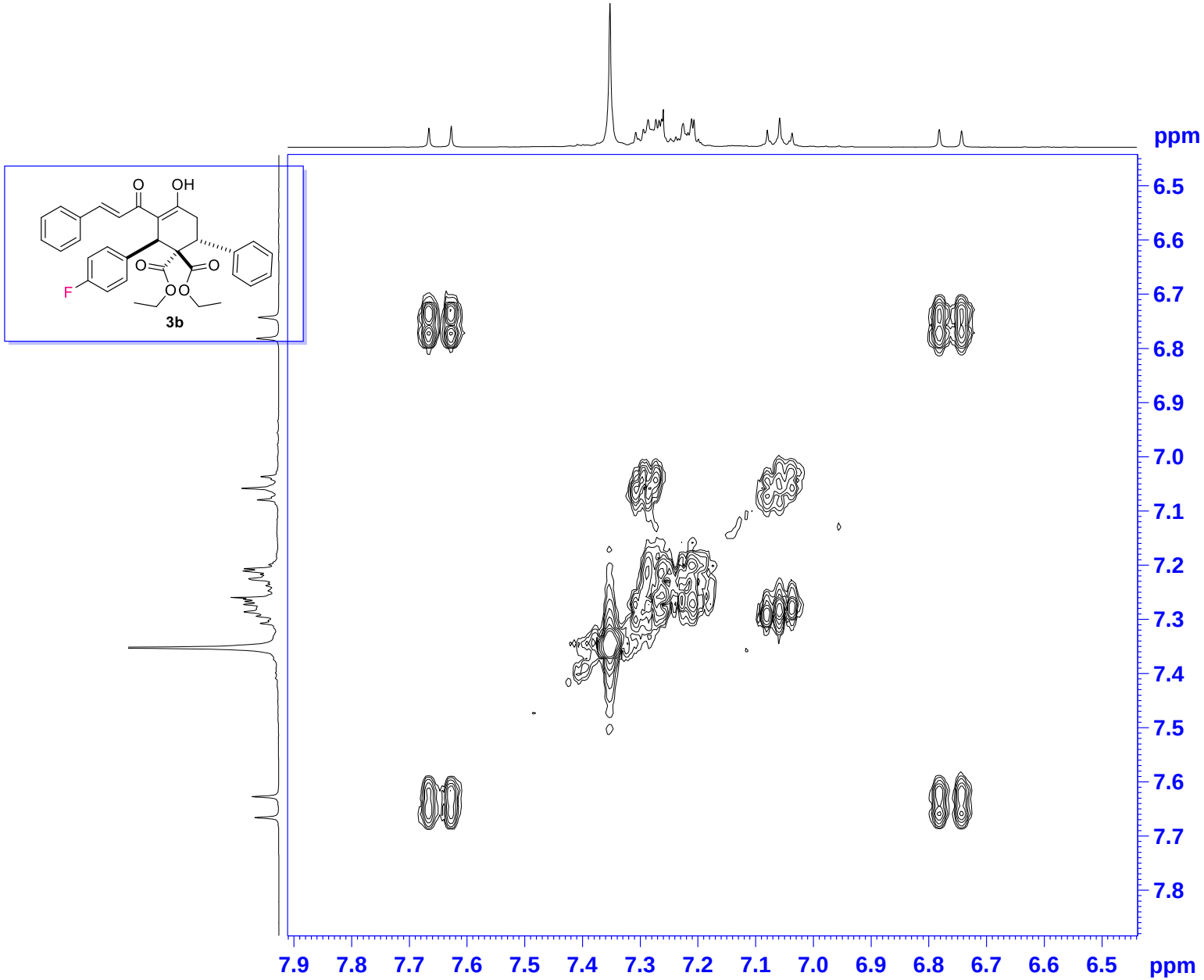
====== GRADIENT CHANNEL =====
GPNAM[1]        SINE.100
GPZ1               10.00 %
P16              1000.00 usec

F1 - Acquisition parameters
TD                  256
SFO1            400.1317 MHz
FIDRES         22.924109 Hz
SW                 7.333 ppm
FnMODE               QF

F2 - Processing parameters
SI                 2048
SF          400.1300100 MHz
WDW                SINE
SSB       0
LB        0 Hz
GB        0
PC                 1.40

F1 - Processing parameters
SI                  512
MC2                  QF
SF          400.1300100 MHz
WDW                SINE
SSB       0
LB        0 Hz
GB        0
```

Fig S8. ^{1}H -^{1}H COSY NMR Spectrum of 3b




```
Current Data Parameters
NAME      INN-DN-Ph-Ph-F-COSY
EXPNO                       4
PROCNO                      1

F2 - Acquisition Parameters
Date_              20170327
Time                  17.50
INSTRUM               spect
PROBHD    5 mm PABBO BB-
PULPROG           cosygpqf
TD                    2048
SOLVENT               CDCl3
NS                      16
DS                      16
SWH                2934.272 Hz
FIDRES             1.432750 Hz
AQ                 0.3489792 sec
RG                      256
DW                   170.400 usec
DE                     6.50 usec
TE                    298.2 K
D0                 0.00000300 sec
D1                 1.00000000 sec
D13                0.00000400 sec
D16                0.00020000 sec
IN0                0.00034080 sec

======== CHANNEL f1 ========
NUC1                       1H
P0                      14.75 usec
P1                      14.75 usec
PL1                     -1.00 dB
PL1W              10.56200695 W
SFO1             400.1317136 MHz

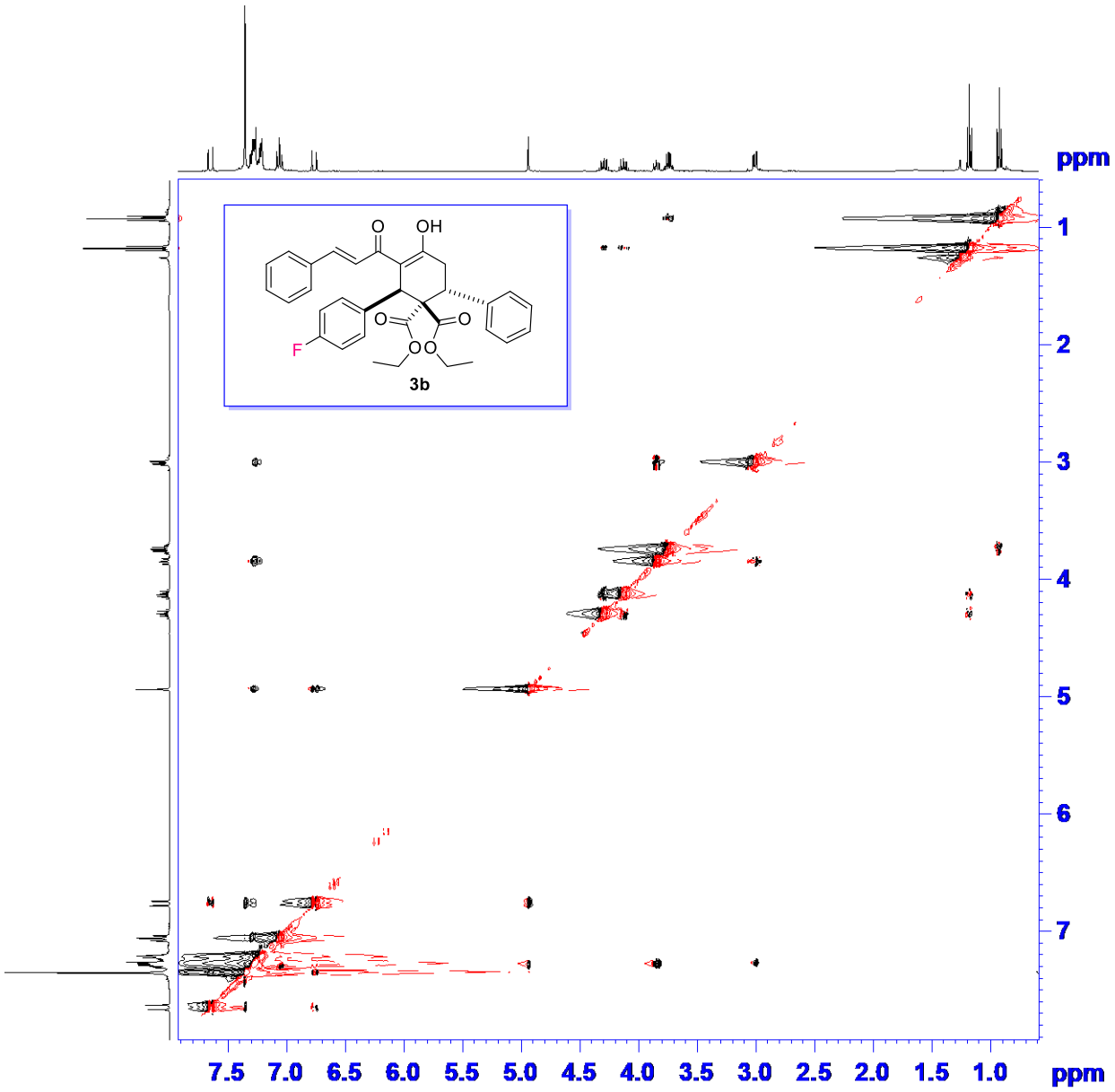
====== GRADIENT CHANNEL =====
GPNAM[1]           SINE.100
GPZ1                  10.00 %
P16                 1000.00 usec

F1 - Acquisition parameters
TD                      256
SFO1               400.1317 MHz
FIDRES            22.924109 Hz
SW                    7.333 ppm
FnMODE                   QF

F2 - Processing parameters
SI                      2048
SF               400.1300100 MHz
WDW                     SINE
SSB          0
LB           0 Hz
GB           0
PC                      1.40

F1 - Processing parameters
SI                       512
MC2                       QF
SF               400.1300100 MHz
WDW                     SINE
SSB          0
LB           0 Hz
GB           0
```

Fig S9. ^{1}H -^{1}H COSY NMR Spectrum (expansion) of 3b




```
Current Data Parameters
NAME      INN-DN-Ph-Ph-F-NOESY
EXPNO                        5
PROCNO                       1

F2 - Acquisition Parameters
Date_              20170327
Time                  19.26
INSTRUM               spect
PROBHD    5 mm PABBO BB-
PULPROG             noesyph
TD                     2048
SOLVENT               CDCl3
NS                        16
DS                        16
SWH                2934.272 Hz
FIDRES             1.432750 Hz
AQ                 0.3489792 sec
RG                        57
DW                   170.400 usec
DE                     6.50 usec
TE                    297.4 K
D0                 0.00015162 sec
D1                 1.00000000 sec
D8                 0.60000002 sec
IN0                0.00034080 sec

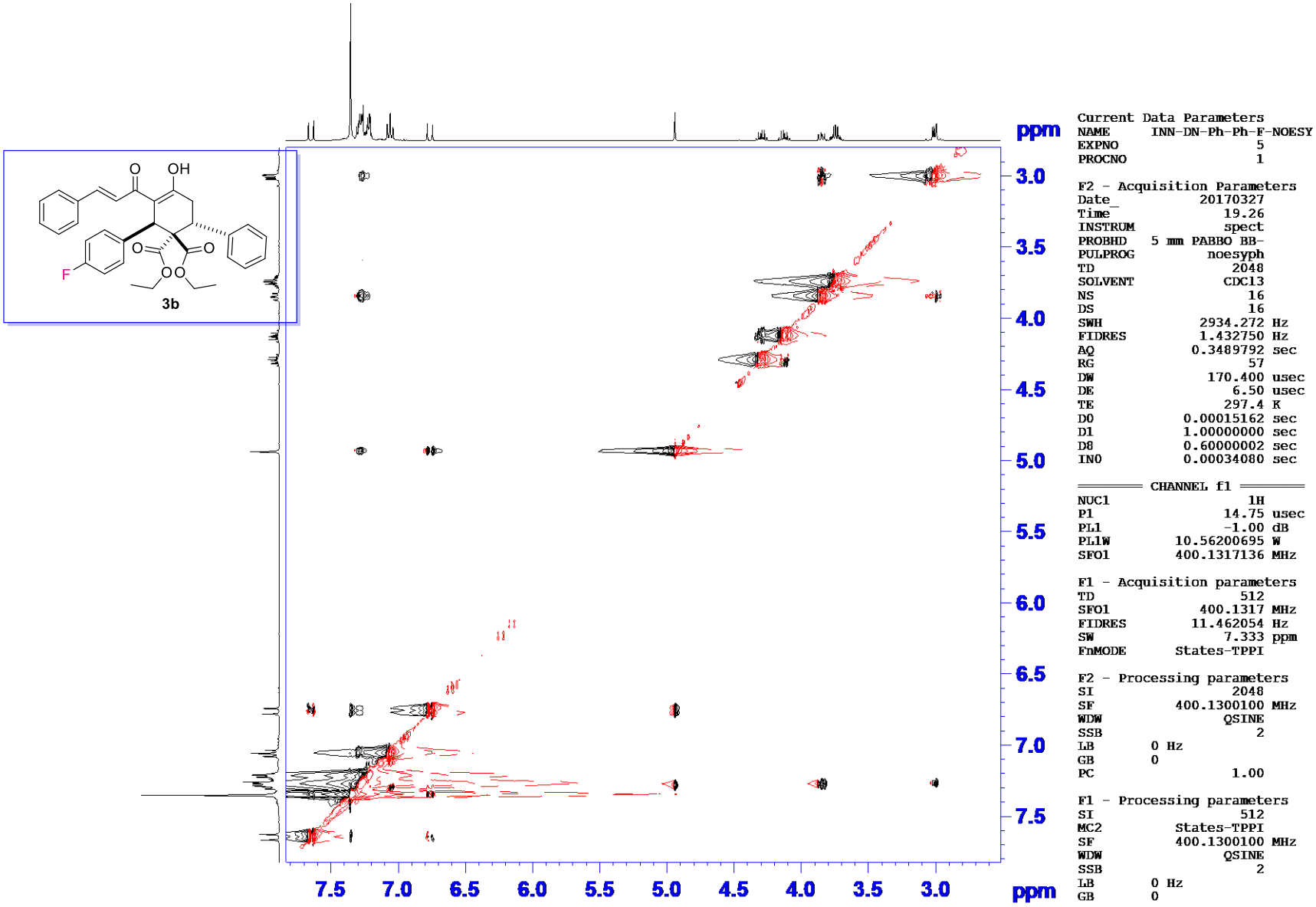
======== CHANNEL f1 ========
NUC1                      1H
P1                     14.75 usec
PL1                    -1.00 dB
PL1W              10.56200695 W
SFO1              400.1317136 MHz

F1 - Acquisition parameters
TD                       512
SFO1                400.1317 MHz
FIDRES             11.462054 Hz
SW                     7.333 ppm
FnMODE           States-TPPI

F2 - Processing parameters
SI                      2048
SF                400.1300100 MHz
WDW                     QSINE
SSB                         2
LB             0 Hz
GB             0
PC                       1.00

F1 - Processing parameters
SI                       512
MC2              States-TPPI
SF                400.1300100 MHz
WDW                     QSINE
SSB                         2
LB             0 Hz
GB             0
```

Fig S10. ^{1}H -^{1}H NOESY NMR Spectrum of 3b




```
Current Data Parameters
NAME      INN-DN-Ph-Ph-F-NOESY
EXPNO                        5
PROCNO                       1

F2 - Acquisition Parameters
Date_              20170327
Time                 19.26
INSTRUM              spect
PROBHD    5 mm PABBO BB-
PULPROG            noesyph
TD                    2048
SOLVENT               CDCl3
NS                       16
DS                       16
SWH                2934.272 Hz
FIDRES             1.432750 Hz
AQ                 0.3489792 sec
RG                       57
DW                  170.400 usec
DE                    6.50 usec
TE                   297.4 K
D0                 0.00015162 sec
D1                 1.00000000 sec
D8                 0.60000002 sec
IN0                0.00034080 sec

======== CHANNEL f1 ========
NUC1                      1H
P1                     14.75 usec
PL1                    -1.00 dB
PL1W              10.56200695 W
SFO1              400.1317136 MHz

F1 - Acquisition parameters
TD                       512
SFO1               400.1317 MHz
FIDRES            11.462054 Hz
SW                     7.333 ppm
FnMODE            States-TPPI

F2 - Processing parameters
SI                      2048
SF                400.1300100 MHz
WDW                     QSINE
SSB                        2
LB          0 Hz
GB          0
PC                      1.00

F1 - Processing parameters
SI                       512
MC2               States-TPPI
SF                400.1300100 MHz
WDW                     QSINE
SSB                        2
LB          0 Hz
GB          0
```

Fig S11. ^{1}H -^{1}H NOESY NMR Spectrum (expansion) of 3b

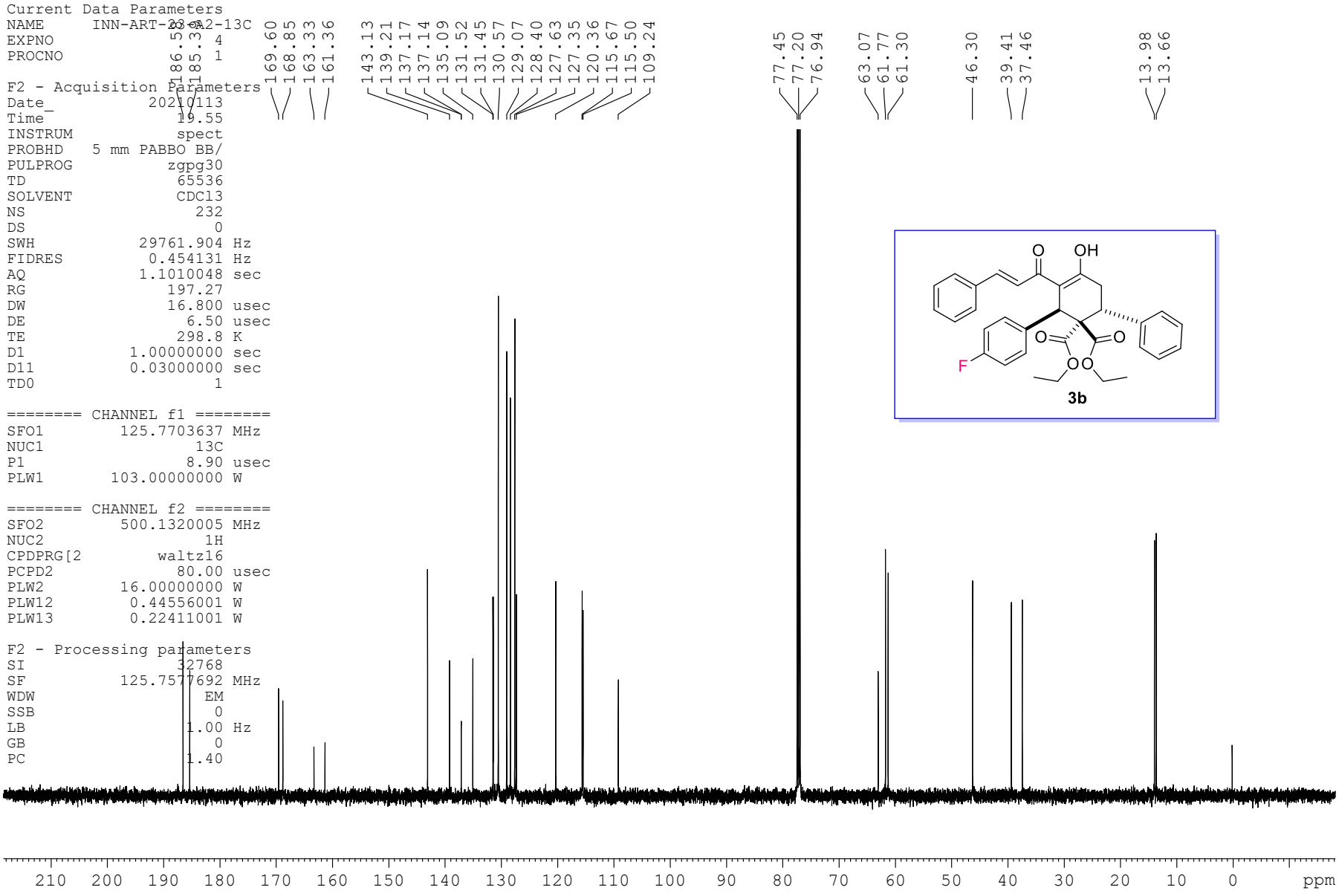


Fig S12. ^{13}C NMR Spectrum of 3b

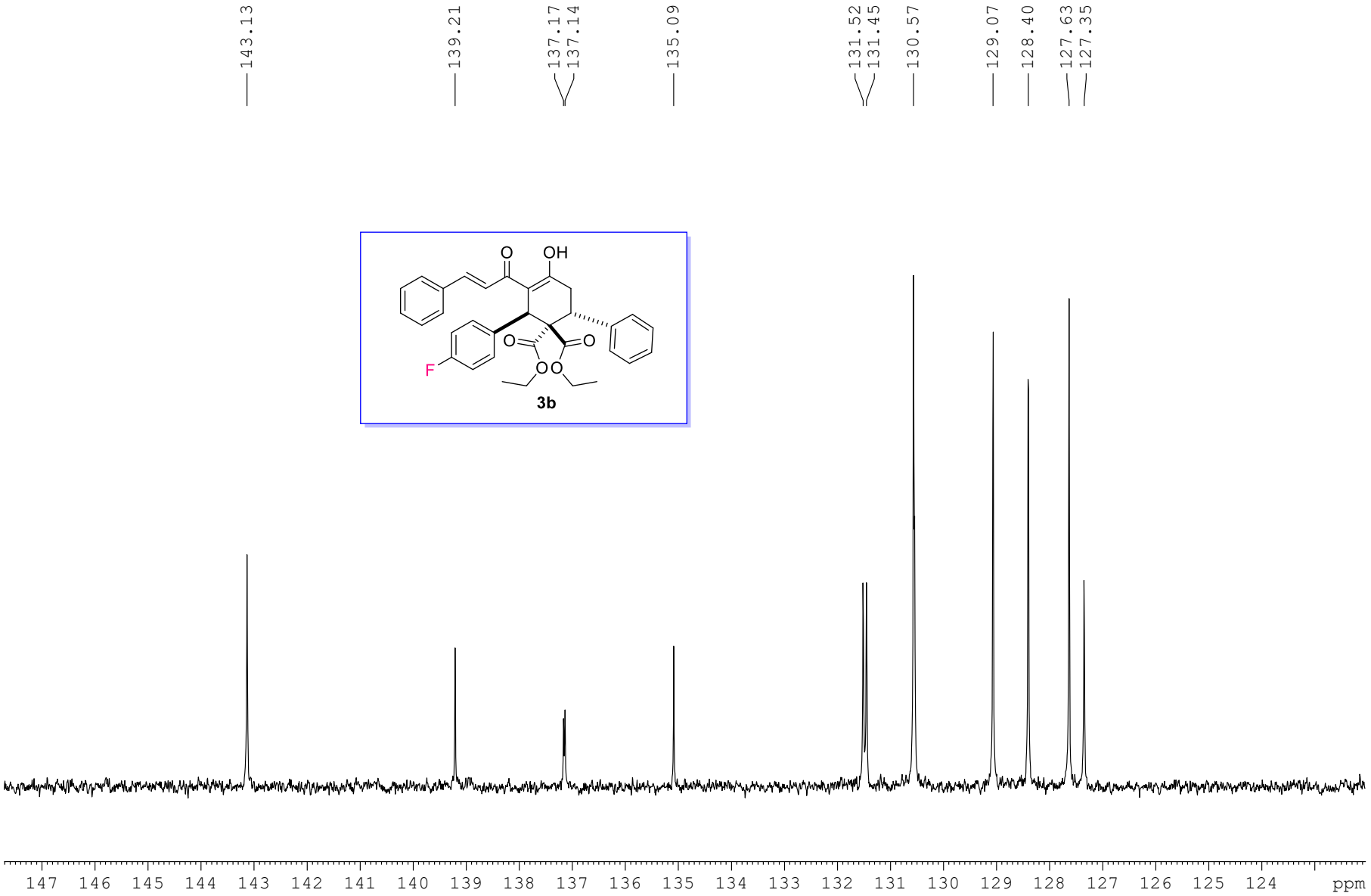


Fig S13. ^{13}C NMR Spectrum (expansion) of 3b

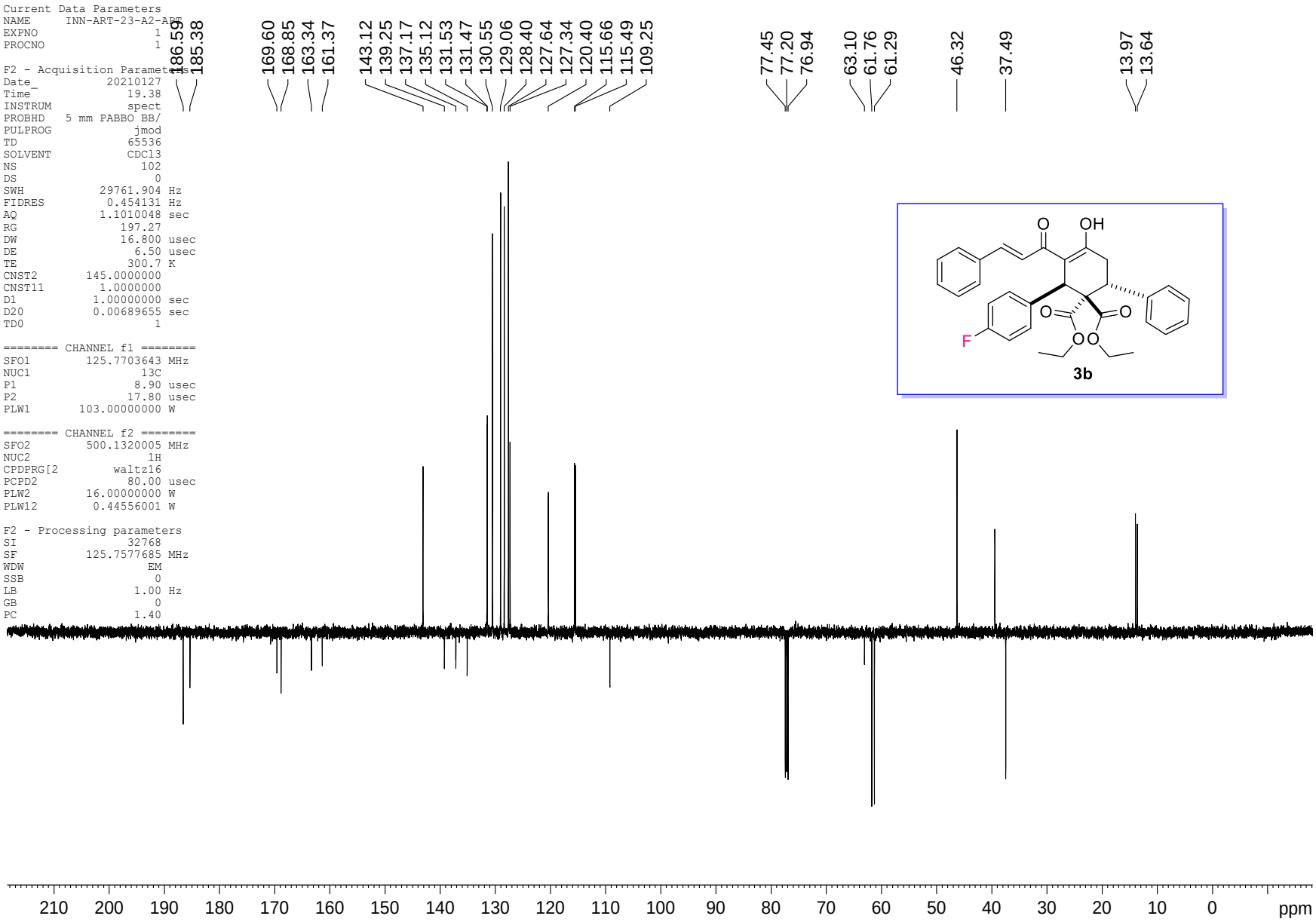


Fig S14. ^{13}C-APT Spectrum of 3b

INN-ART-23-A2--19F

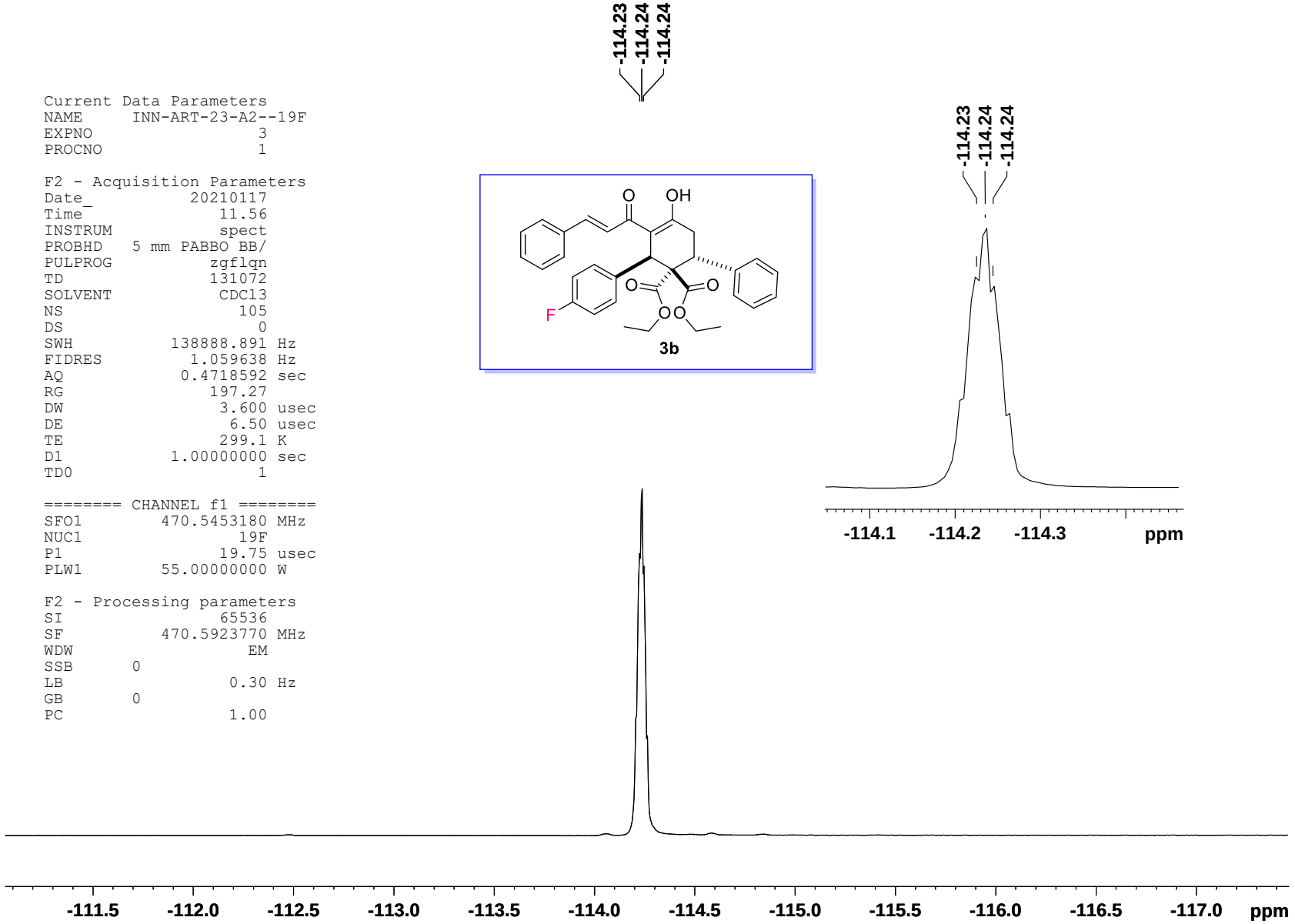


Fig S15. ^{19}F NMR Spectrum of 3b

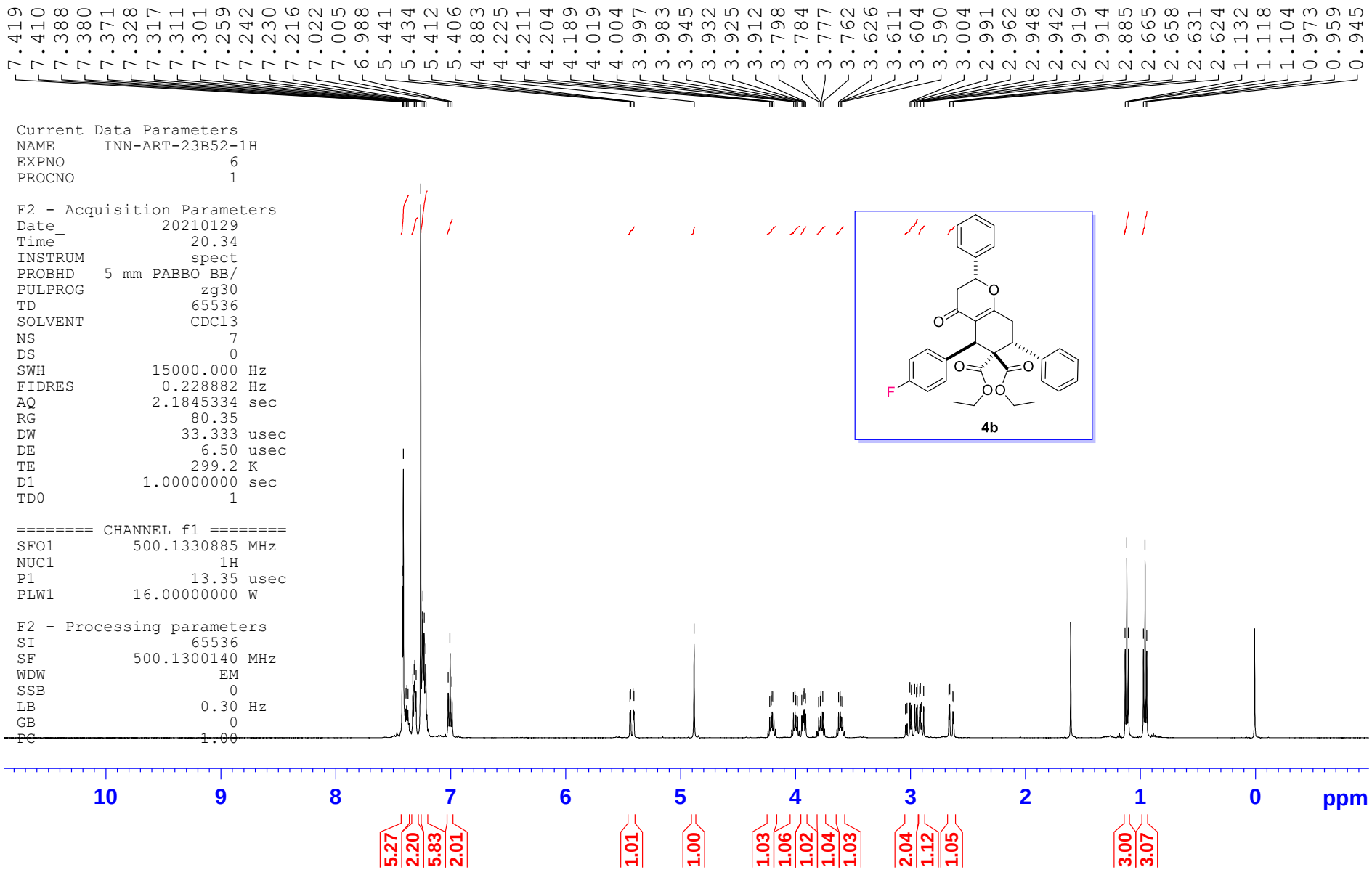


Fig S16. ^{1}H NMR spectrum of 4b

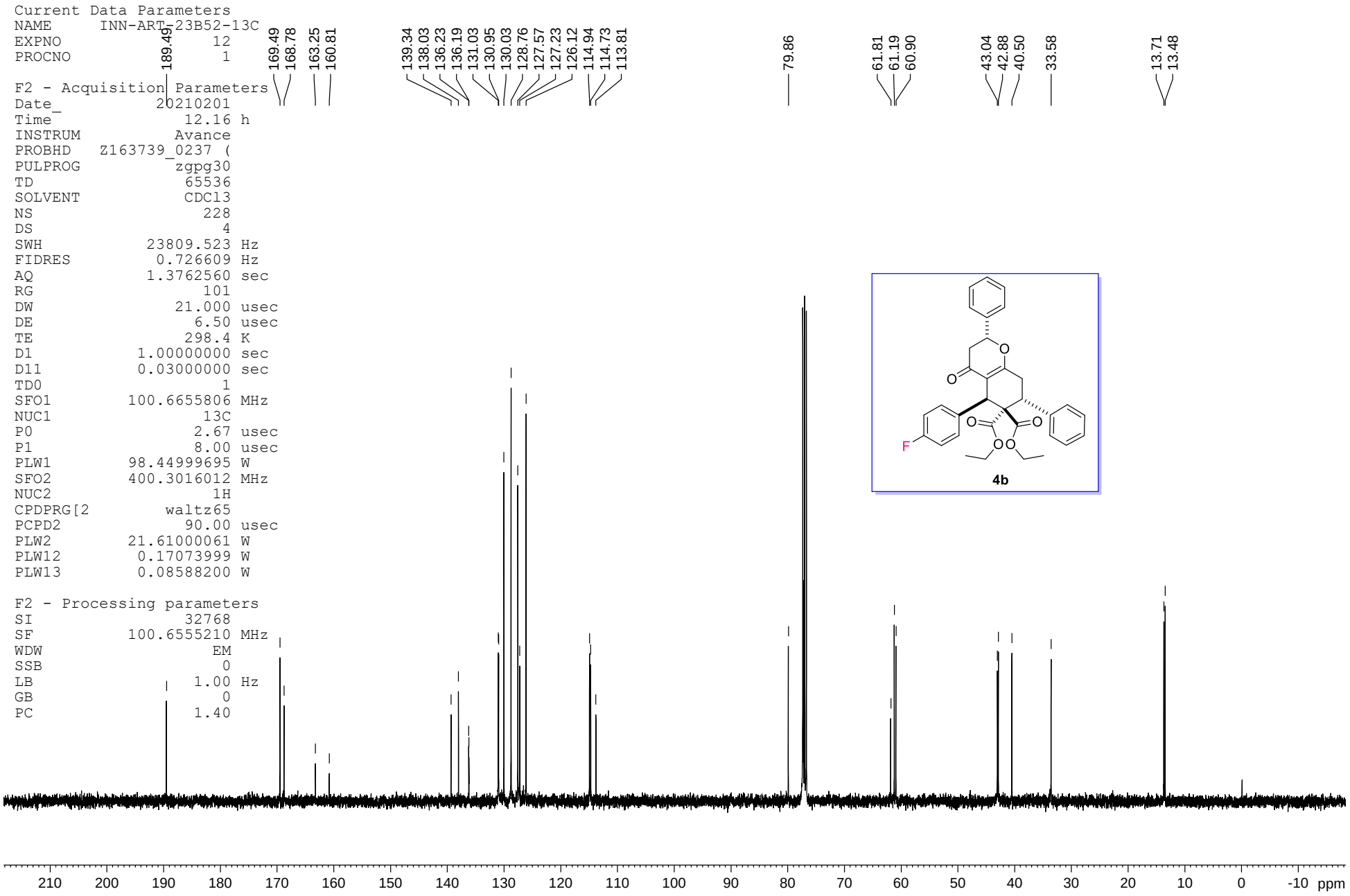


Fig S17. ^{13}C NMR spectrum of 4b

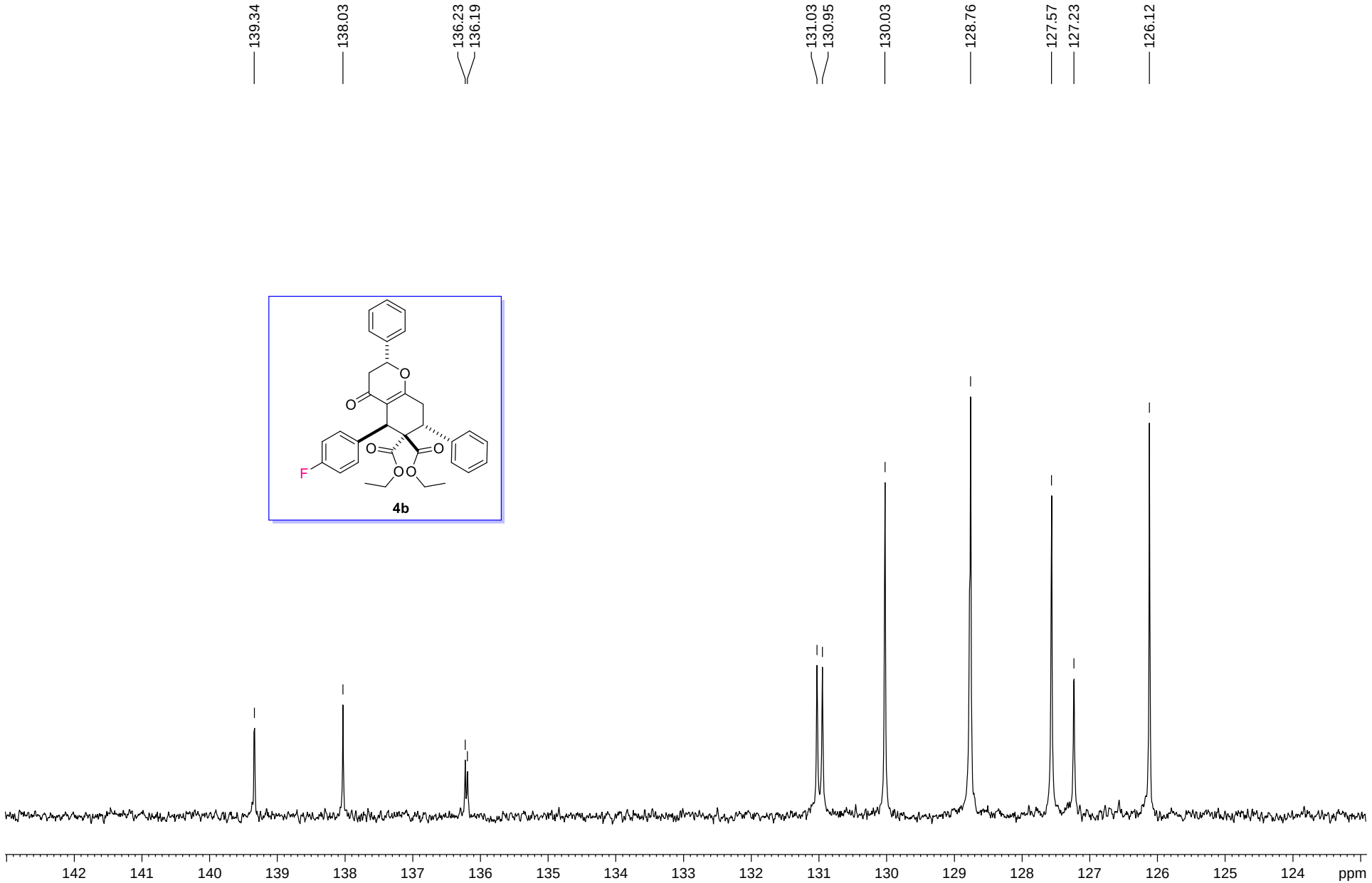


Fig S18. ^{13}C NMR spectrum (expansion) of 4b

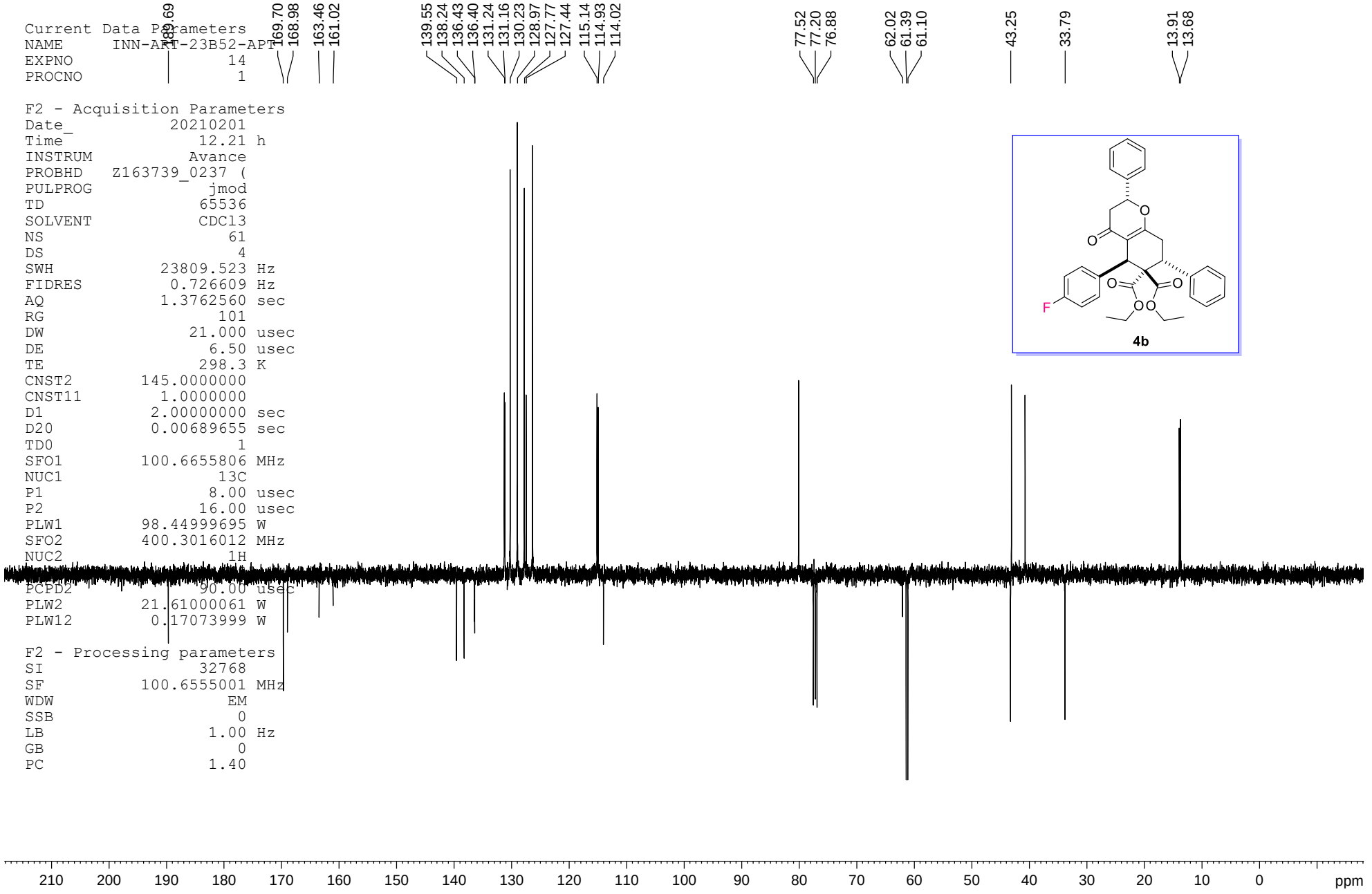


Fig S19. ^{13}C-APT spectrum of 4b

```
Current Data Parameters
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PROCNO                  1

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Date_            20210211
Time                18.06
INSTRUM             spect
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PULPROG           zgflqn
TD                131072
SOLVENT             CDCl3
NS                     16
DS                      0
SWH           113636.367 Hz
FIDRES          0.866977 Hz
AQ             0.5767168 sec
RG                 197.27
DW                  4.400 usec
DE                  6.50 usec
TE                 298.0 K
D1            1.00000000 sec
TD0                     1

======== CHANNEL f1 ========
SFO1         470.5453180 MHz
NUC1                19F
P1                 19.75 usec
PLW1         55.00000000 W

F2 - Processing parameters
SI                  65536
SF           470.5923770 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```

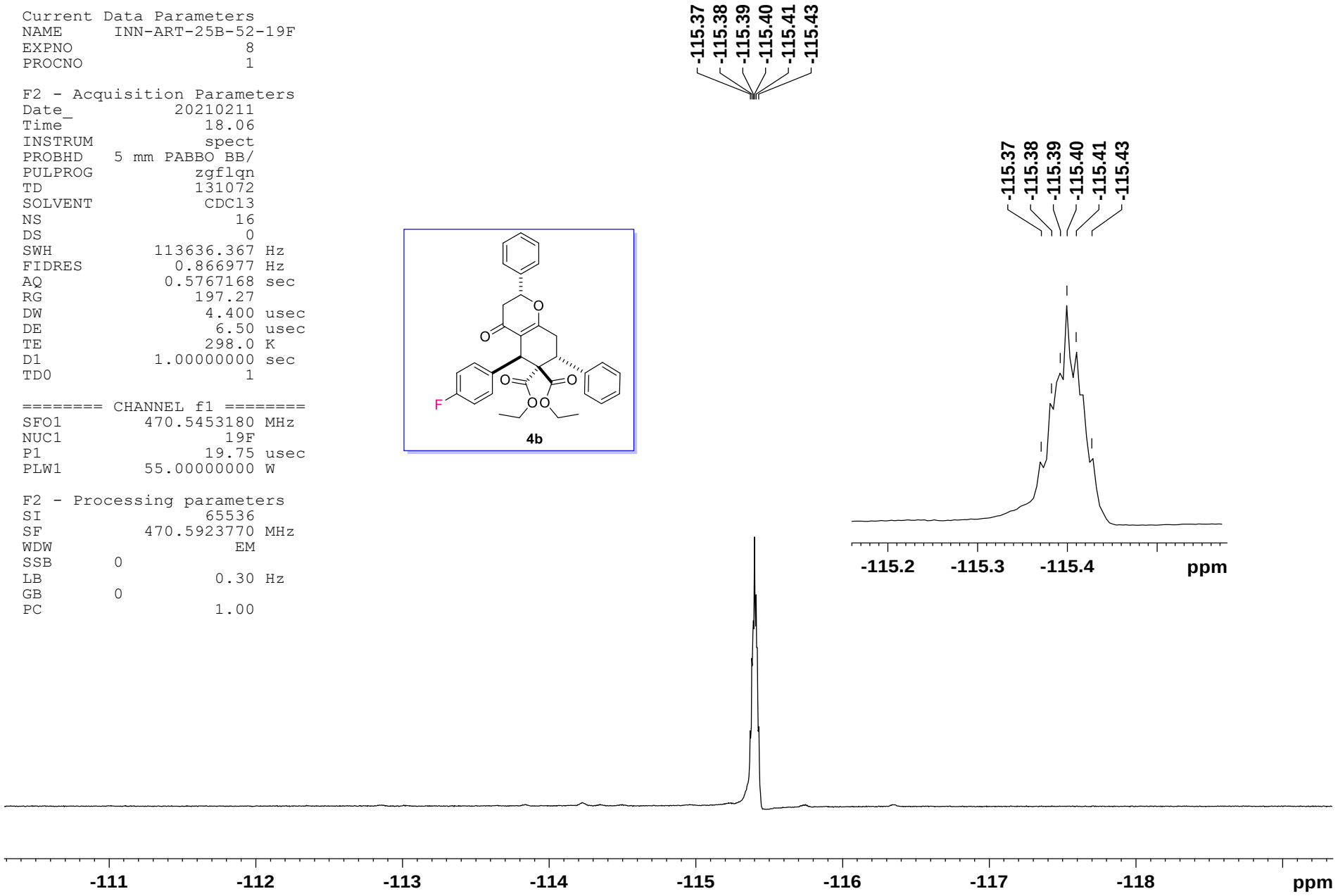


Fig S20. ^{19}F NMR spectrum of 4b

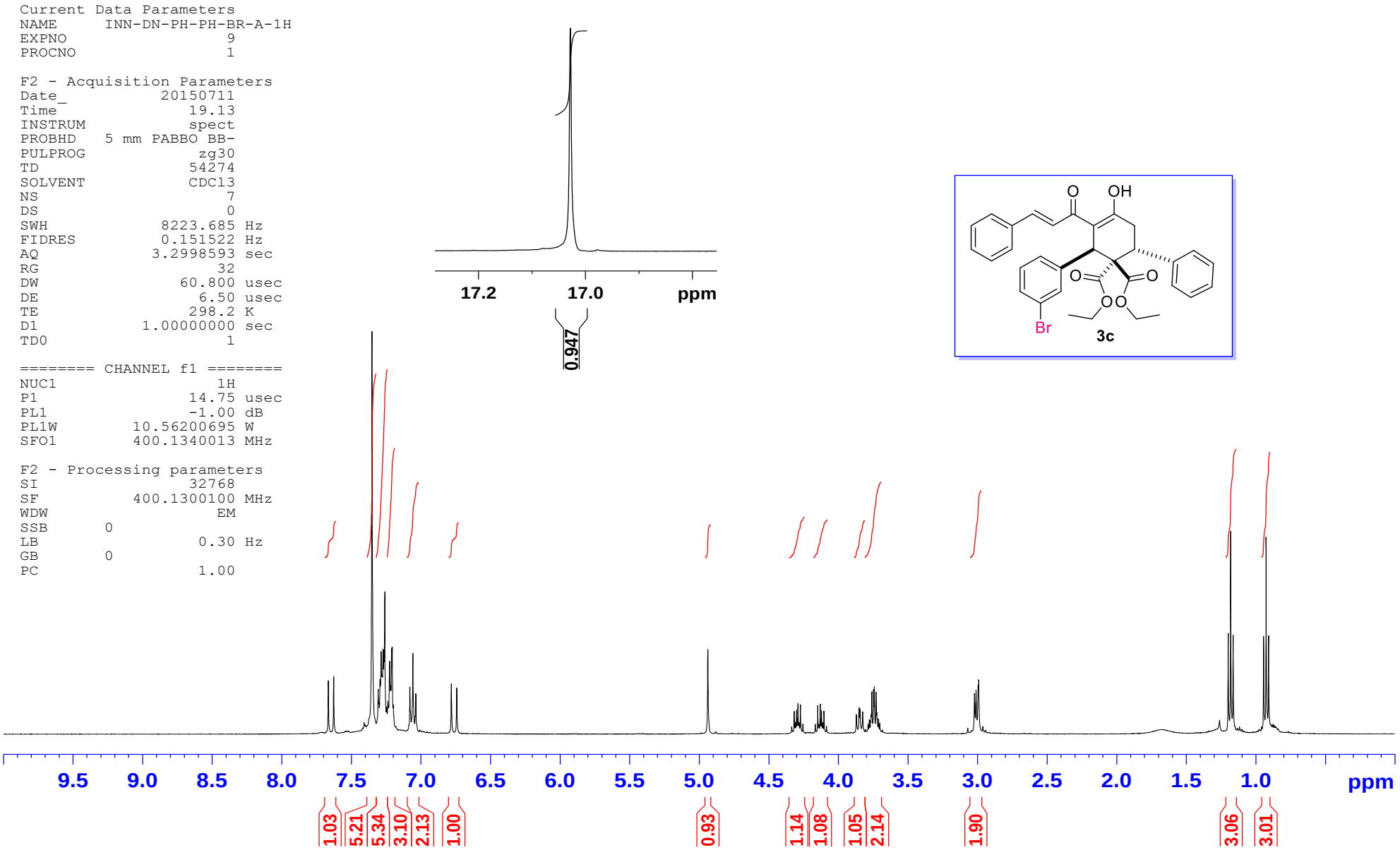


Fig S21. ^{1}H NMR Spectrum of 3c

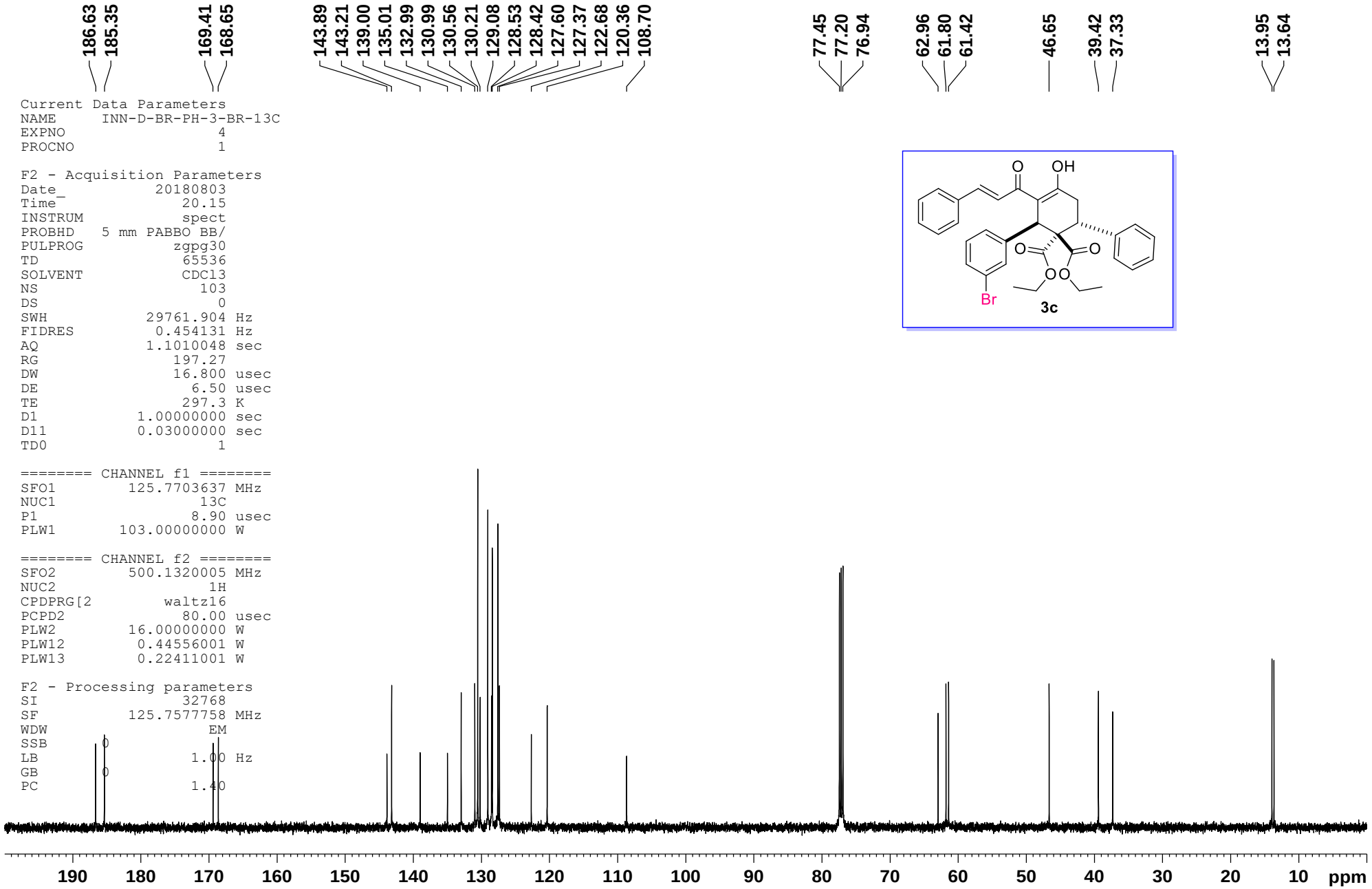


Fig S22. ^{13}C NMR spectrum of 3c

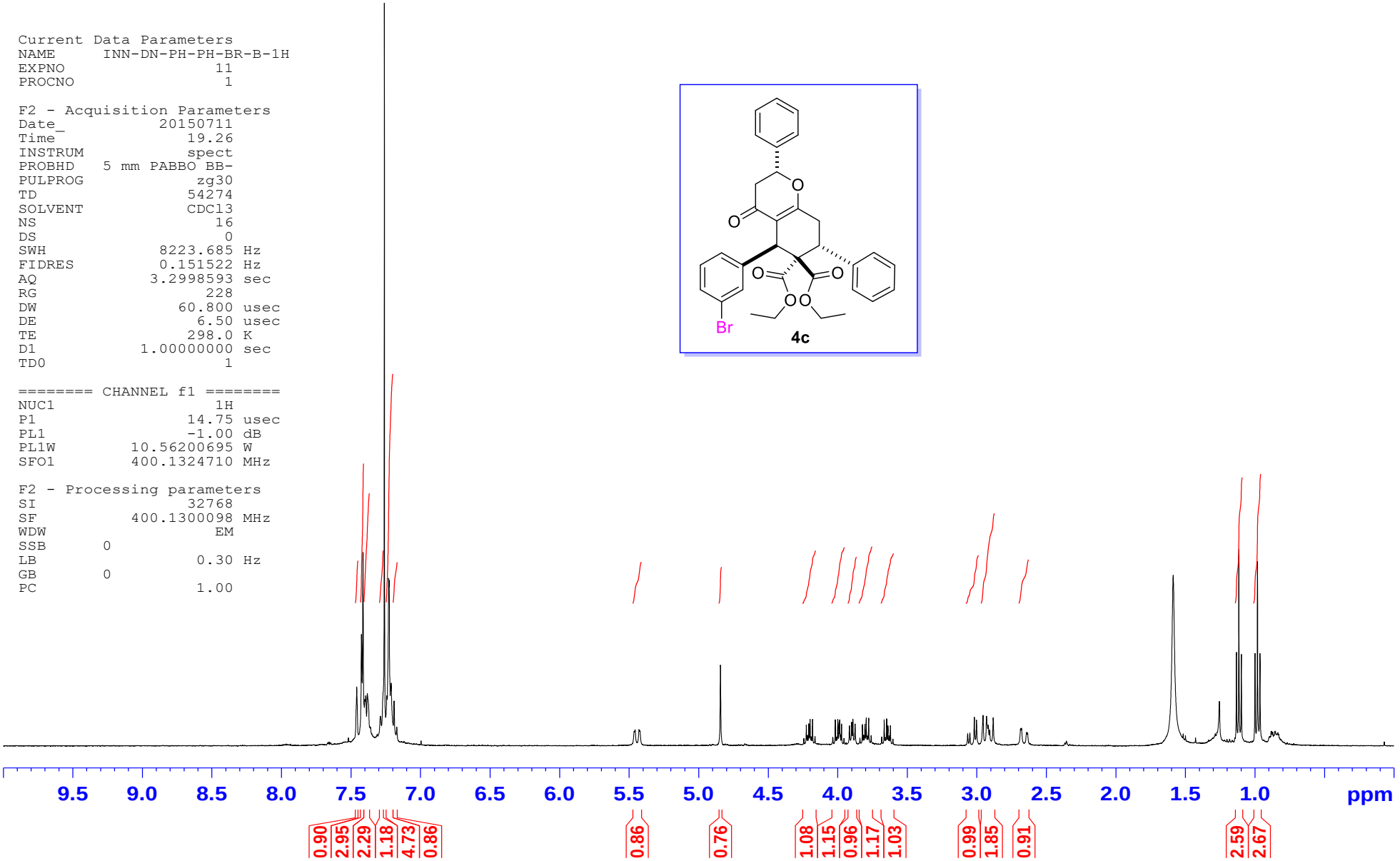
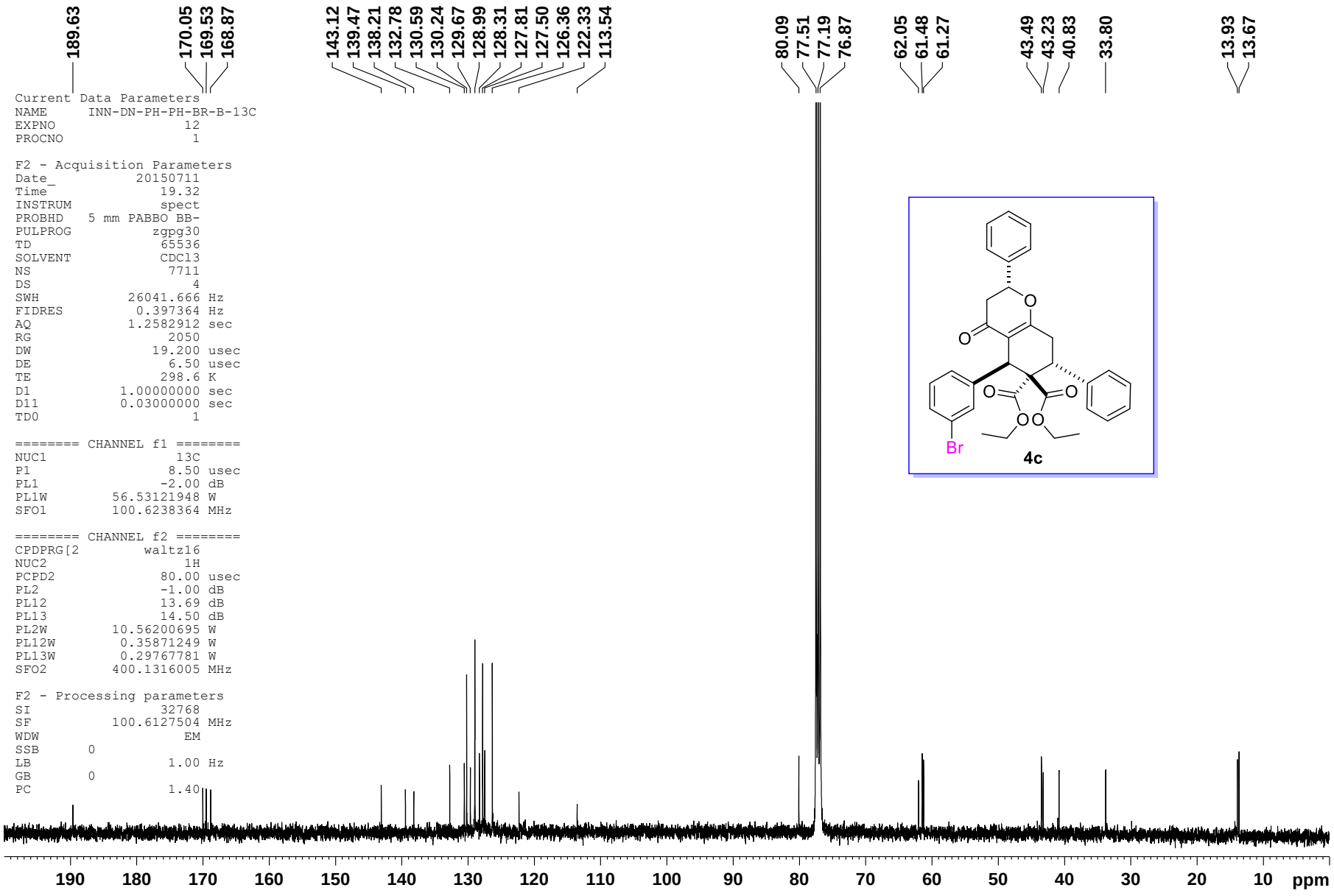


Fig S23. ^{1}H NMR Spectrum of 4c

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EXPNO                    12
PROCNO                    1

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Time                19.32
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PROBHD    5 mm PABBO BB-
PULPROG            zgpg30
TD                  65536
SOLVENT             CDCl3
NS                   7711
DS                      4
SWH             26041.666 Hz
FIDRES          0.397364 Hz
AQ              1.2582912 sec
RG                   2050
DW                 19.200 usec
DE                  6.50 usec
TE                 298.6 K
D1            1.00000000 sec
D11           0.03000000 sec
TD0                     1

======== CHANNEL f1 ========
NUC1                   13C
P1                    8.50 usec
PL1                  -2.00 dB
PL1W         56.53121948 W
SFO1         100.6238364 MHz

======== CHANNEL f2 ========
CPDPRG[2          waltz16
NUC2                   1H
PCPD2                80.00 usec
PL2                  -1.00 dB
PL12                 13.69 dB
PL13                 14.50 dB
PL2W         10.56200695 W
PL12W         0.35871249 W
PL13W         0.29767781 W
SFO2         400.1316005 MHz

F2 - Processing parameters
SI                   32768
SF           100.6127504 MHz
WDW                     EM
SSB       0
LB                    1.00 Hz
GB        0
PC                    1.40
```

Fig S24. ^{13}C NMR Spectrum of 4c

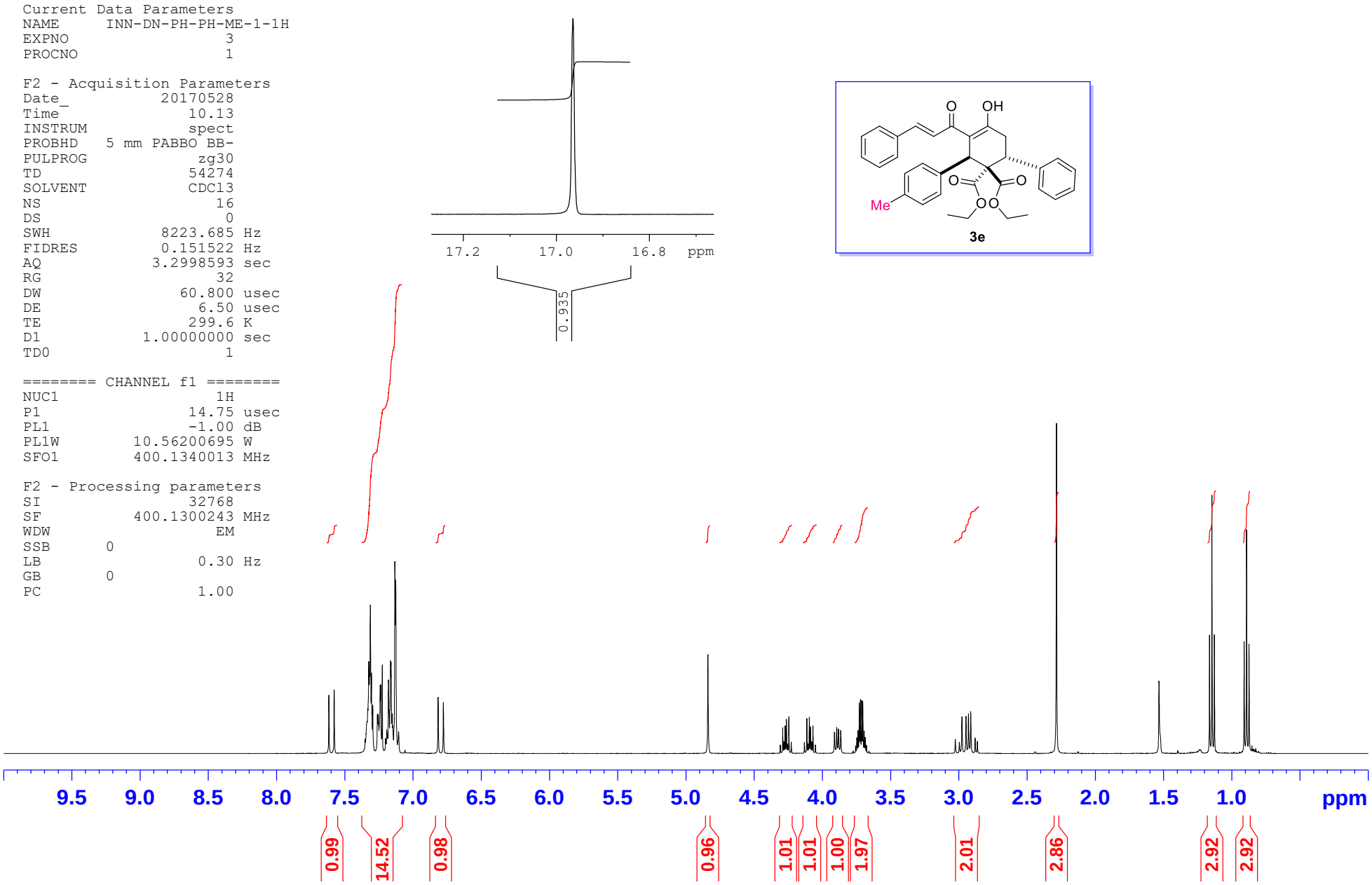

Fig S25. ^{1}H NMR Spectrum of 3e

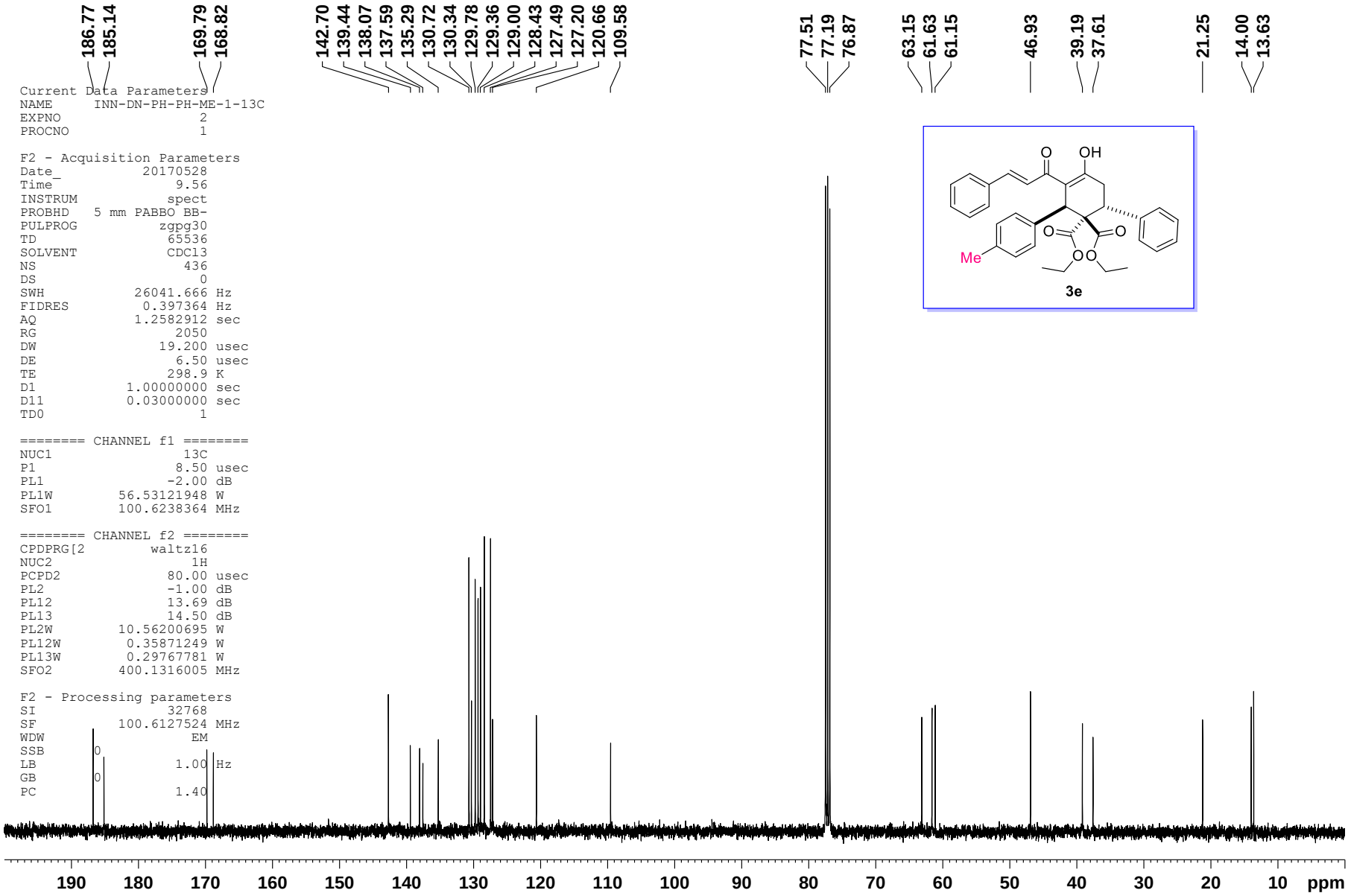

Fig S26. ^{13}C NMR Spectrum of 3e

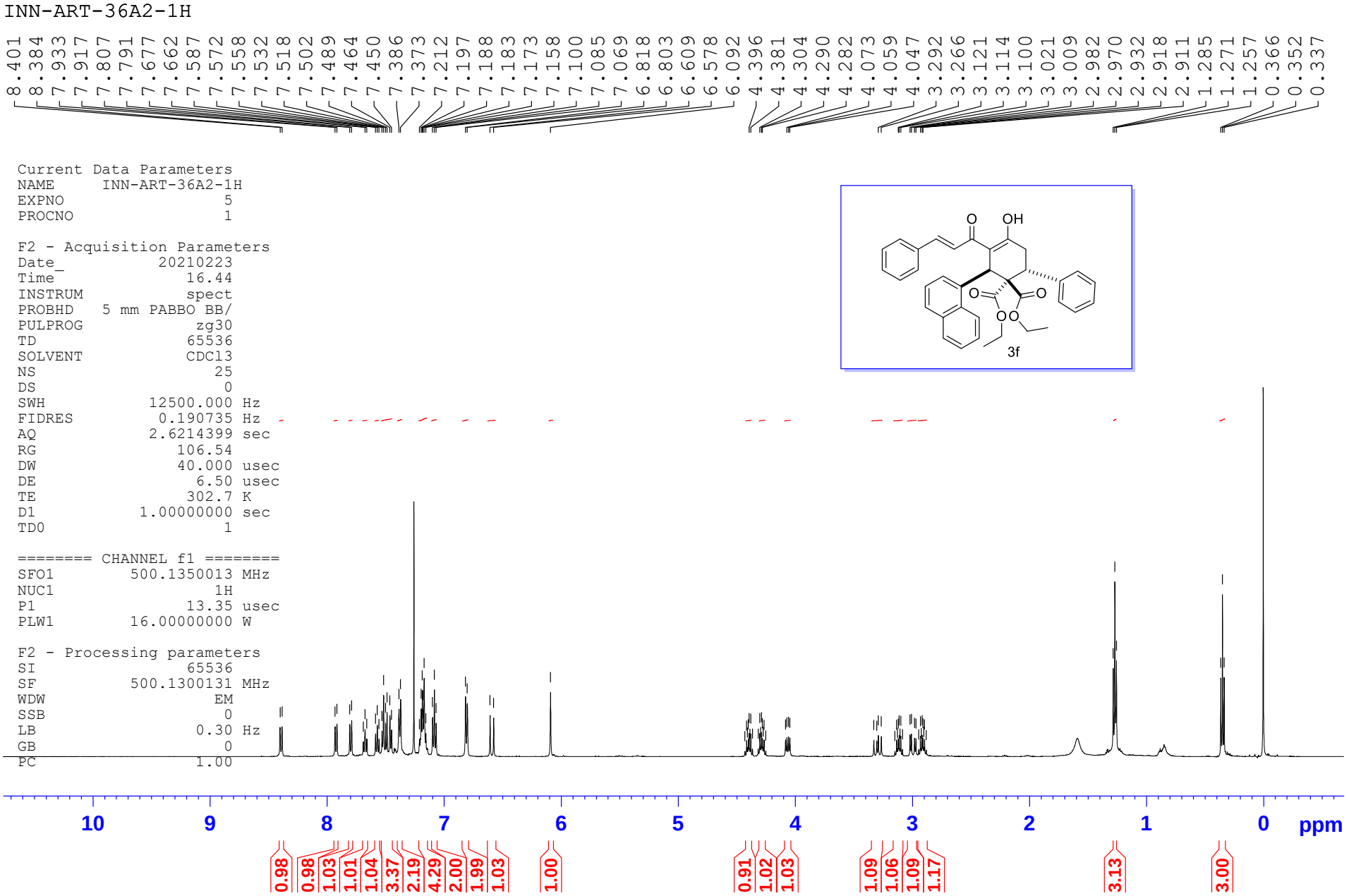

Fig S27. ^{1}H NMR spectrum of 3f

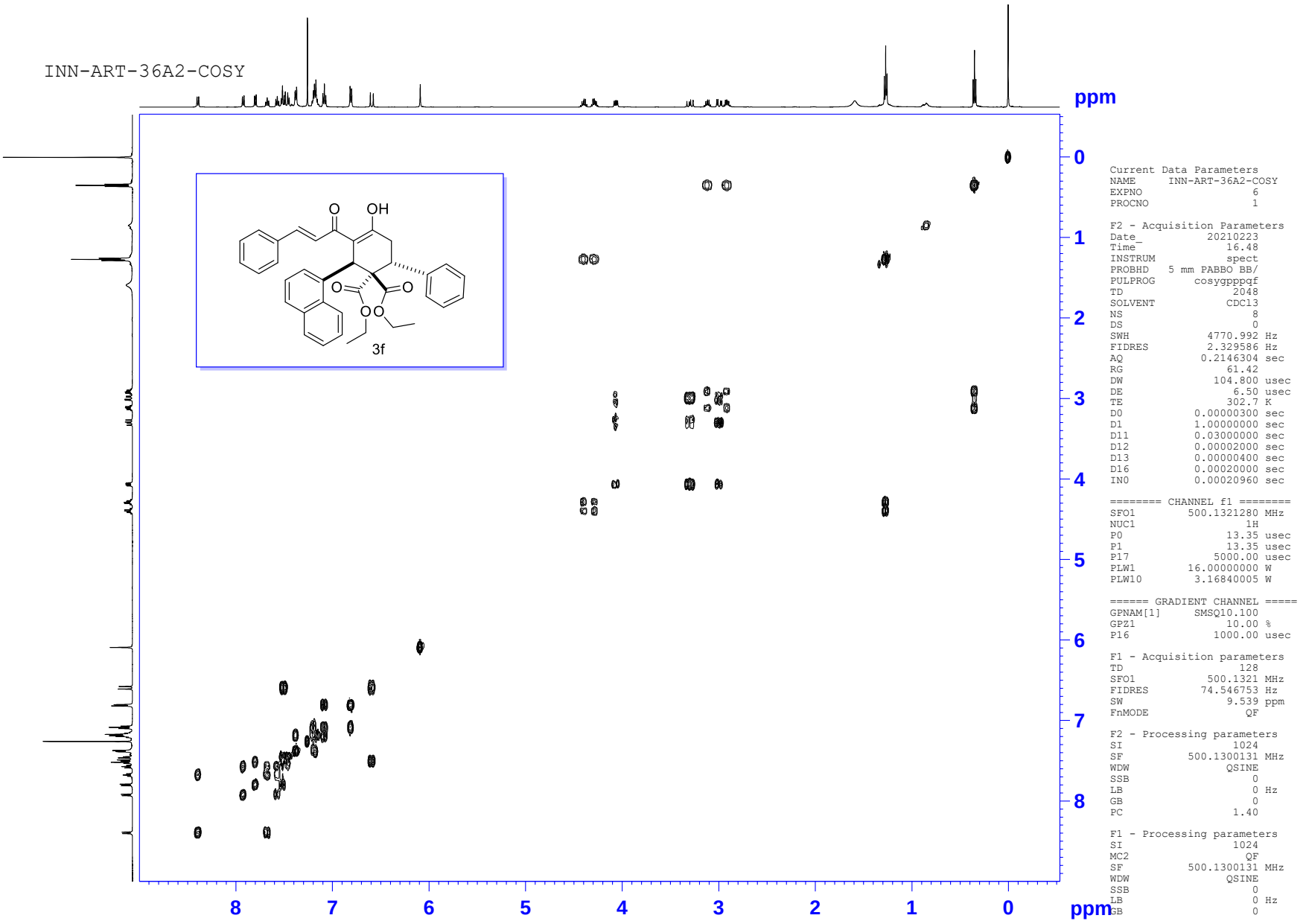

Fig S28. ^{1}H-^{1}H COSY NMR Spectrum of 3f

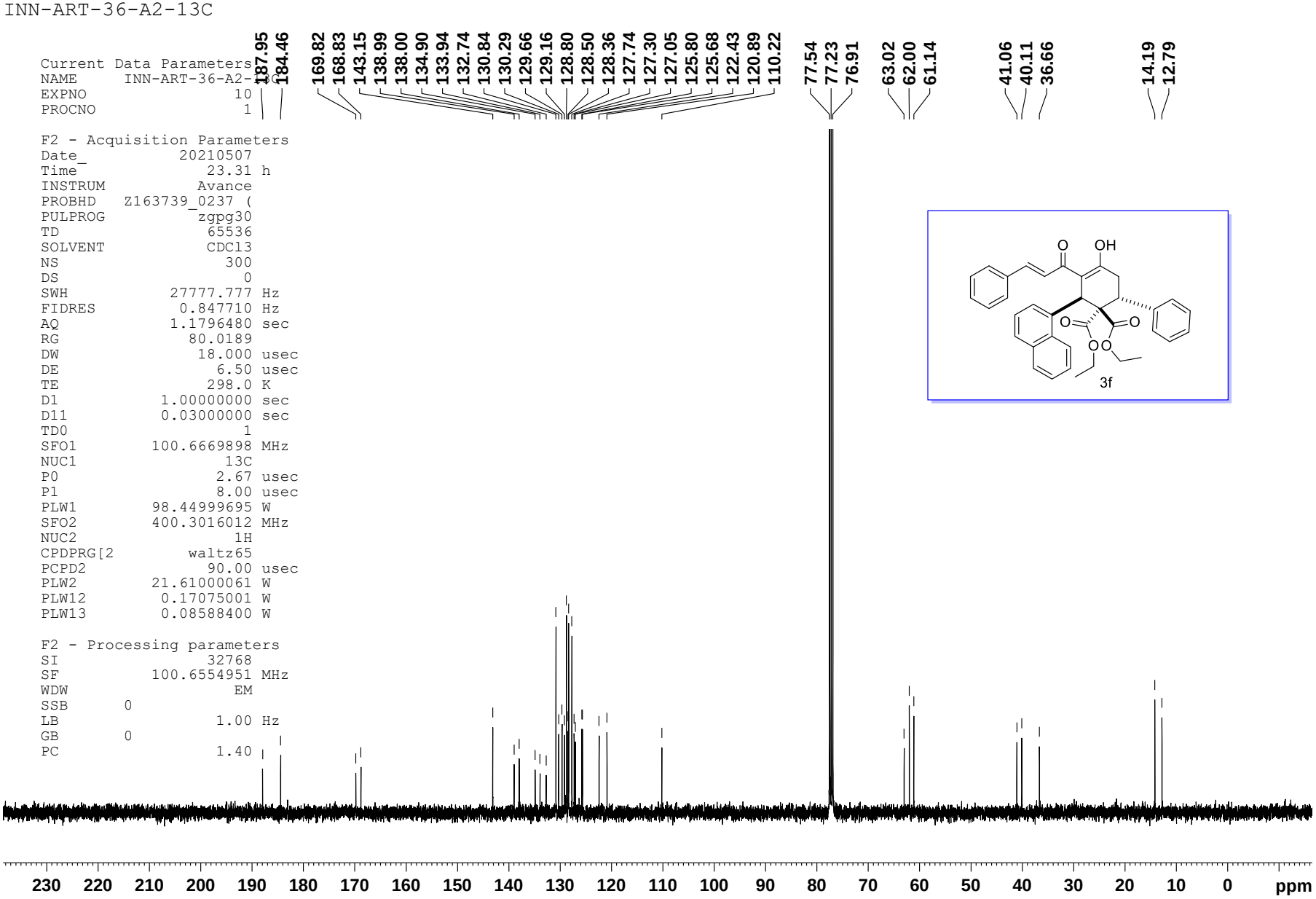

Fig S29. ^{13}C NMR spectrum of 3f

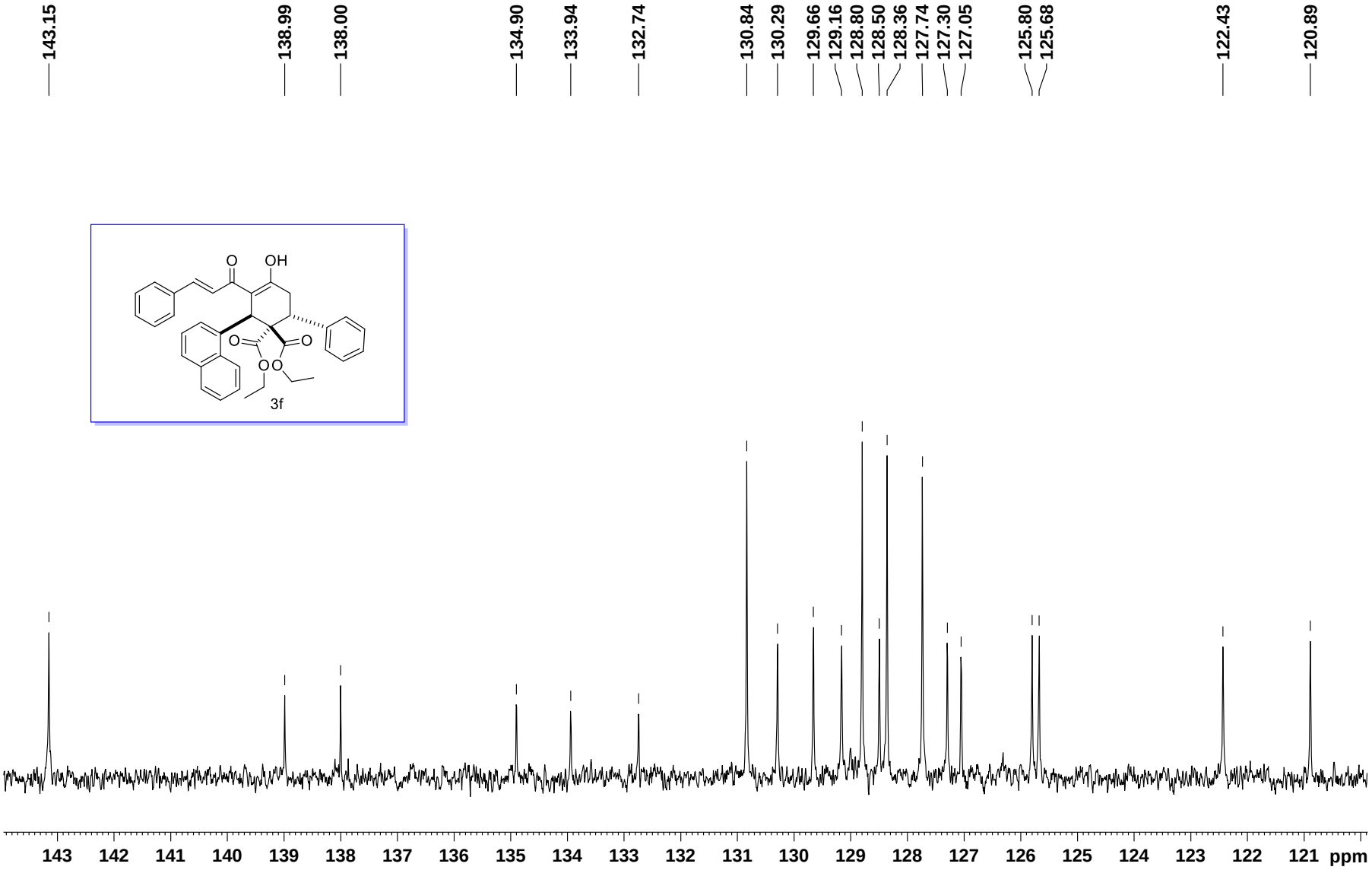

Fig S30. ^{13}C NMR spectrum (exapansion) of 3f

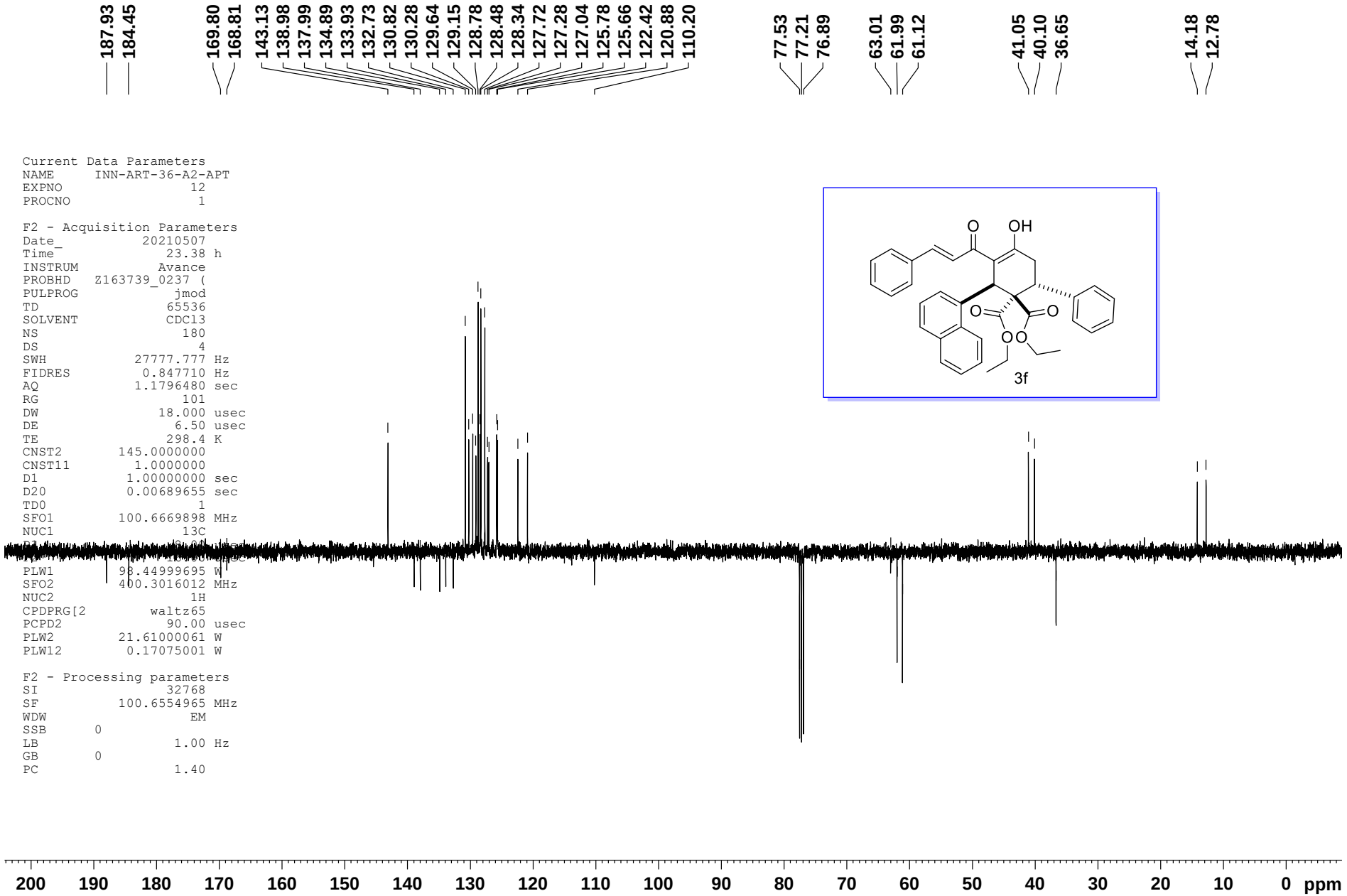

Fig S31. ^{13}C-APT spectrum of 3f

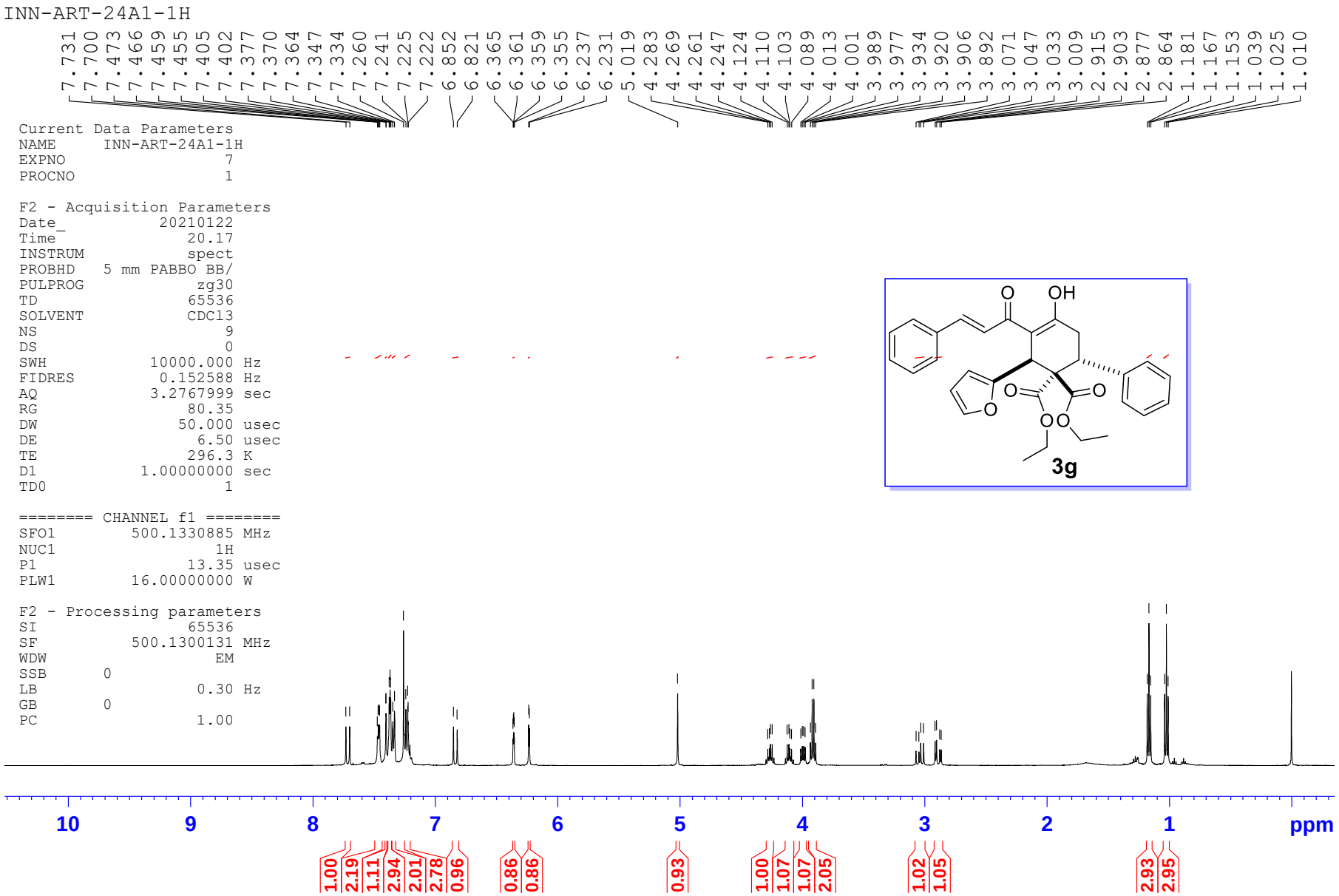

Fig S32. ^{1}H NMR spectrum of 3g

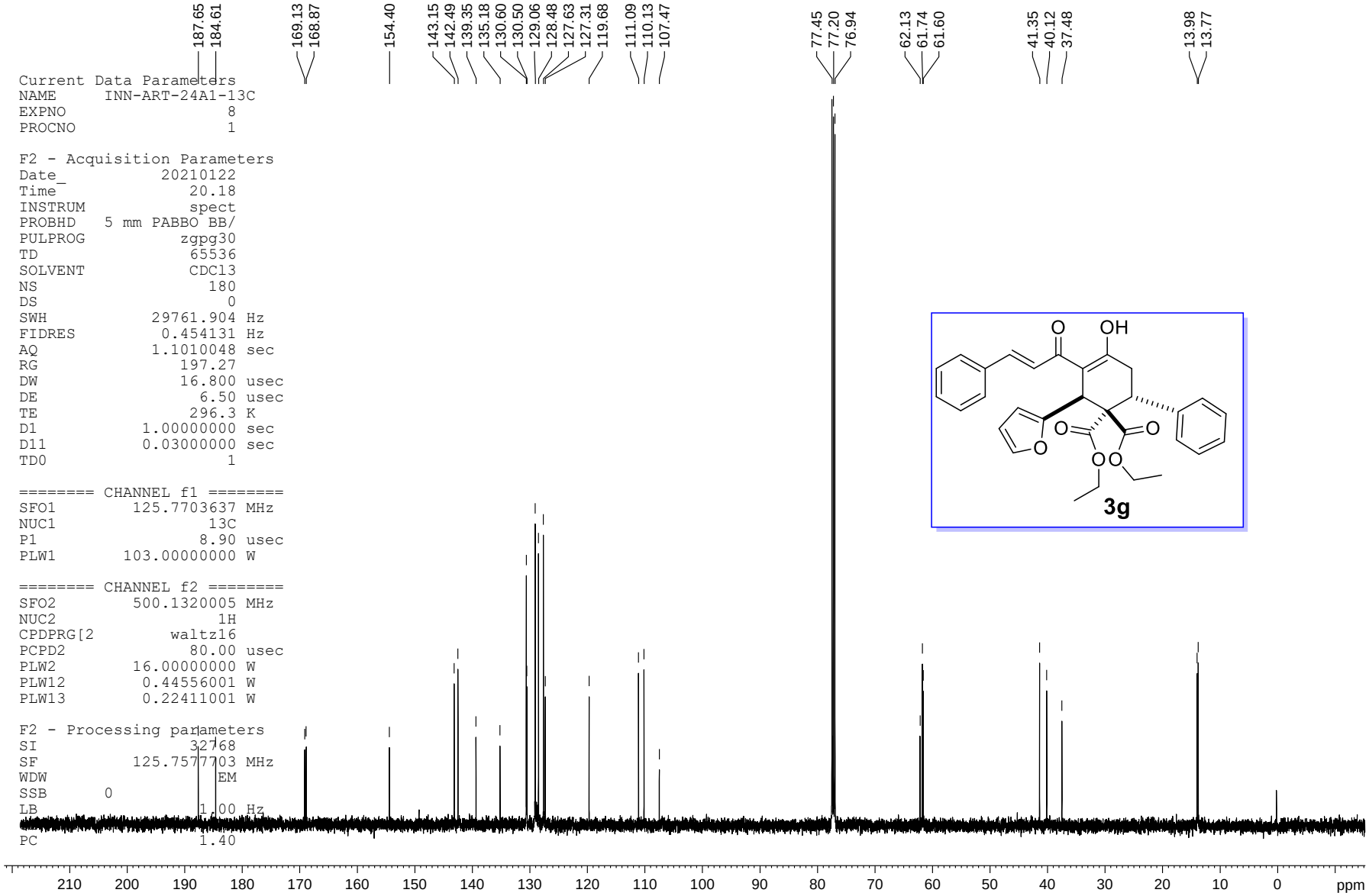

Fig S33. ^{13}C NMR spectrum of 3g

```
Current Data Parameters
NAME      INN-DN-PH-ME-PH-CL-1H
EXPNO                  1
PROCNO                 1

F2 - Acquisition Parameters
Date_           20150711
Time               5.47
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG            zg30
TD                54274
SOLVENT           CDCl3
NS                   19
DS                    0
SWH            8223.685 Hz
FIDRES        0.151522 Hz
AQ            3.2998593 sec
RG                   32
DW               60.800 usec
DE                6.50 usec
TE                299.3 K
D1           1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
NUC1                  1H
P1                14.75 usec
PL1               -1.00 dB
PL1W        10.56200695 W
SFO1        400.1340013 MHz

F2 - Processing parameters
SI                32768
SF          400.1300096 MHz
WDW                  EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
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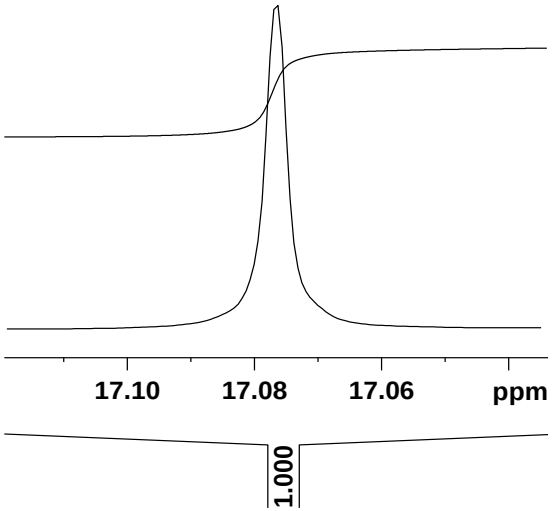

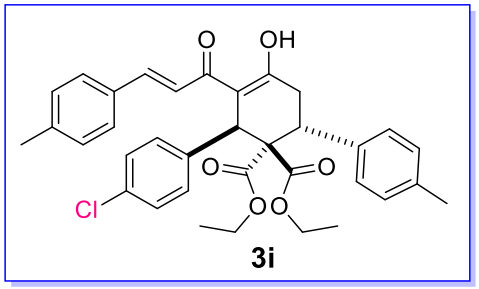

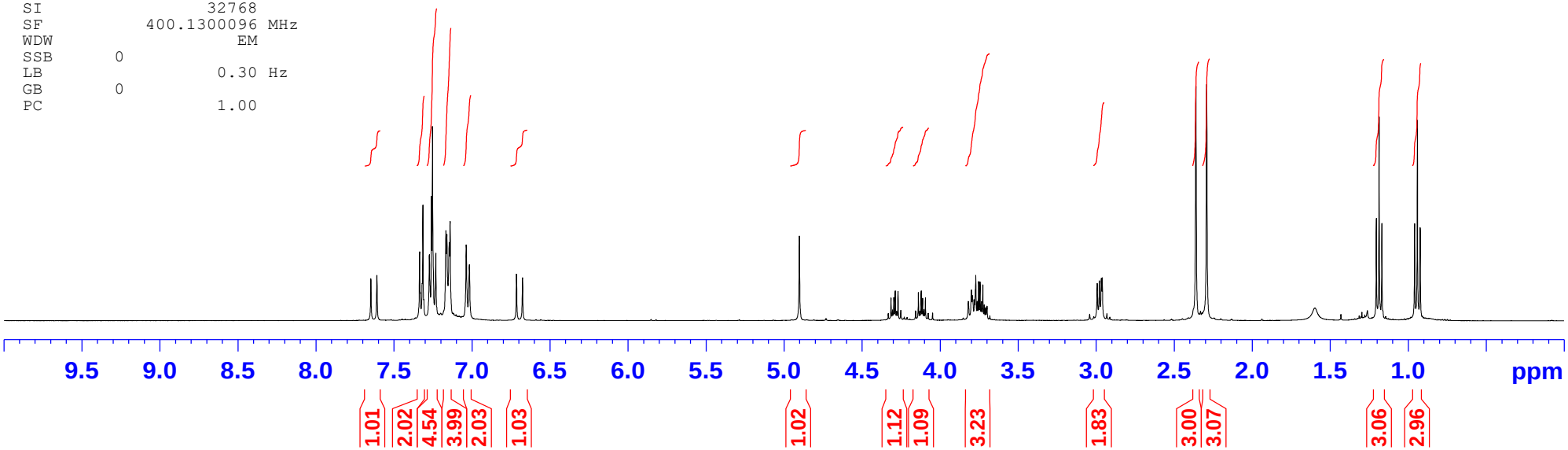

Fig S34. ^{1}H NMR spectrum of 3i

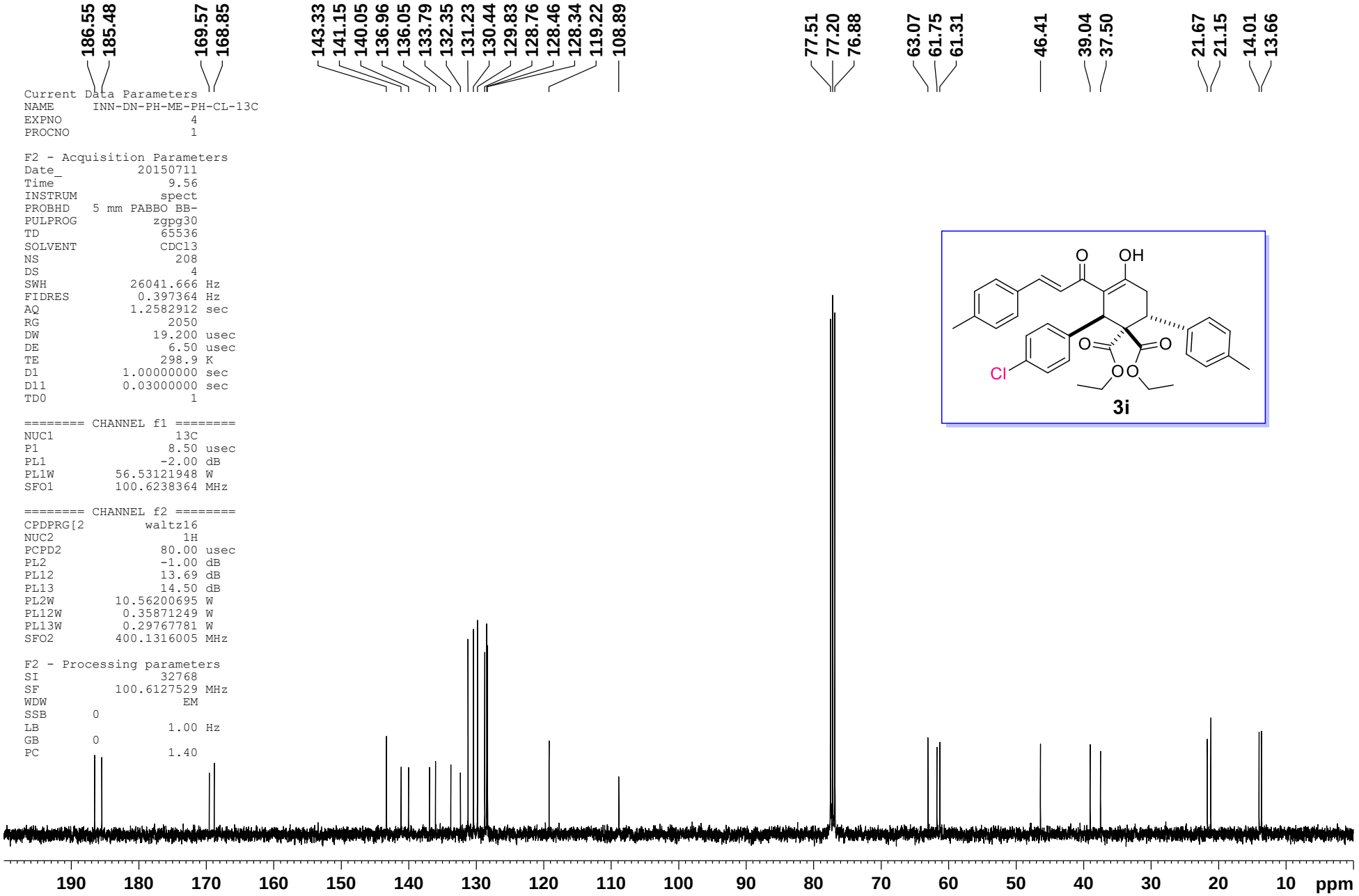

Fig S35. ^{13}C NMR spectrum of 3i

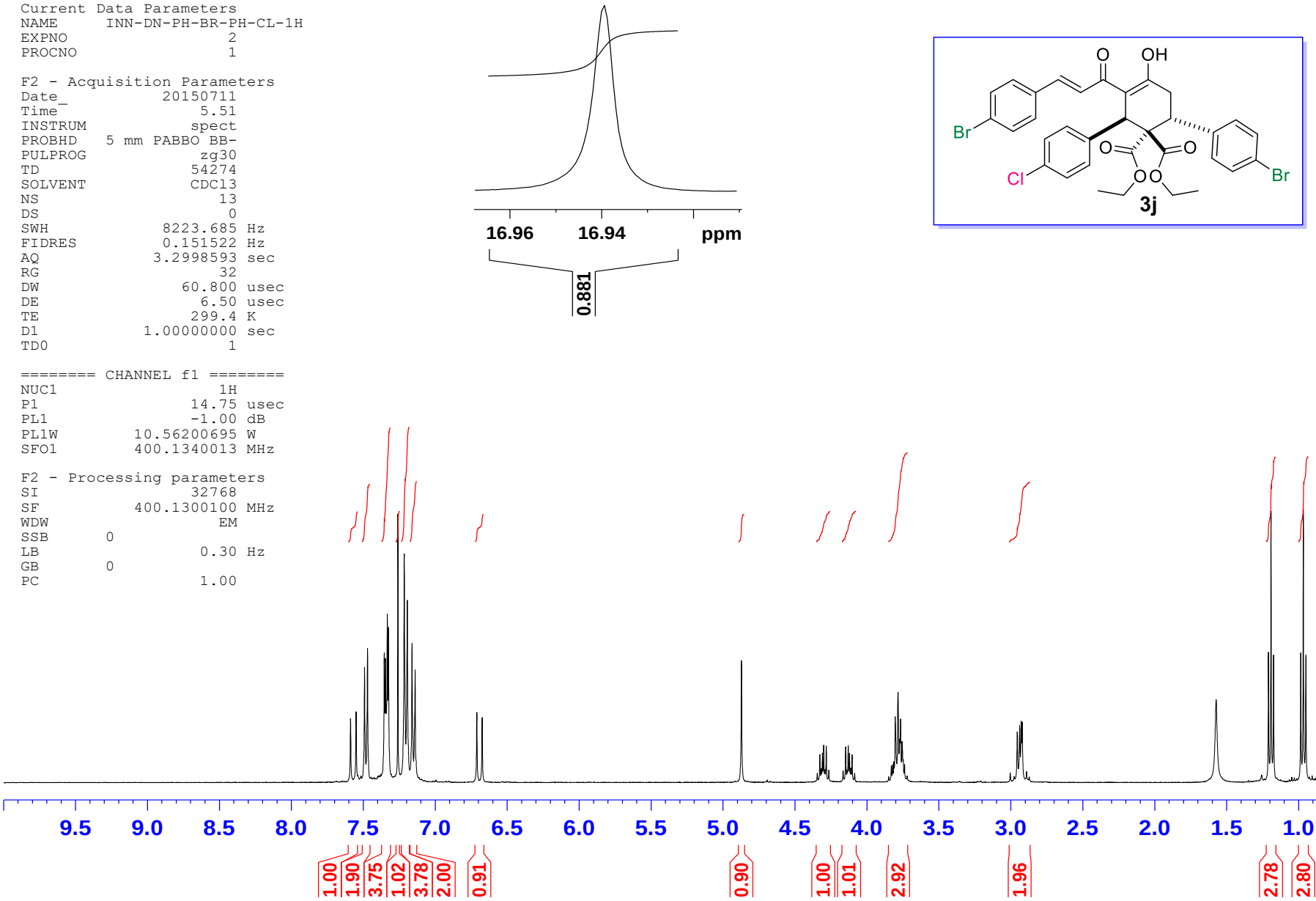

Fig S36. ^{1}H NMR spectrum of 3j

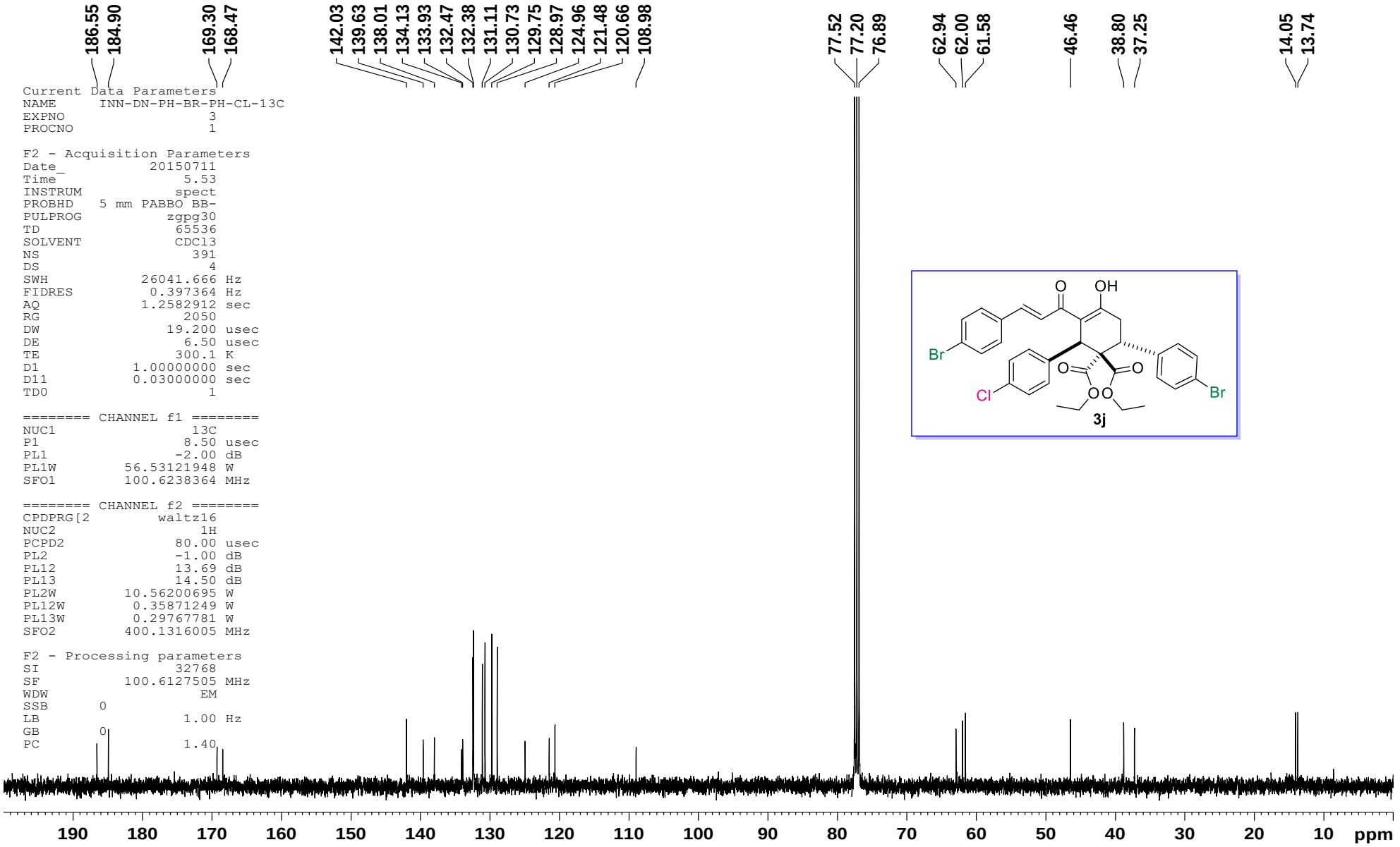

Fig S37. ^{13}C NMR Spectrum of 3j

INN-ART-41A3-1H

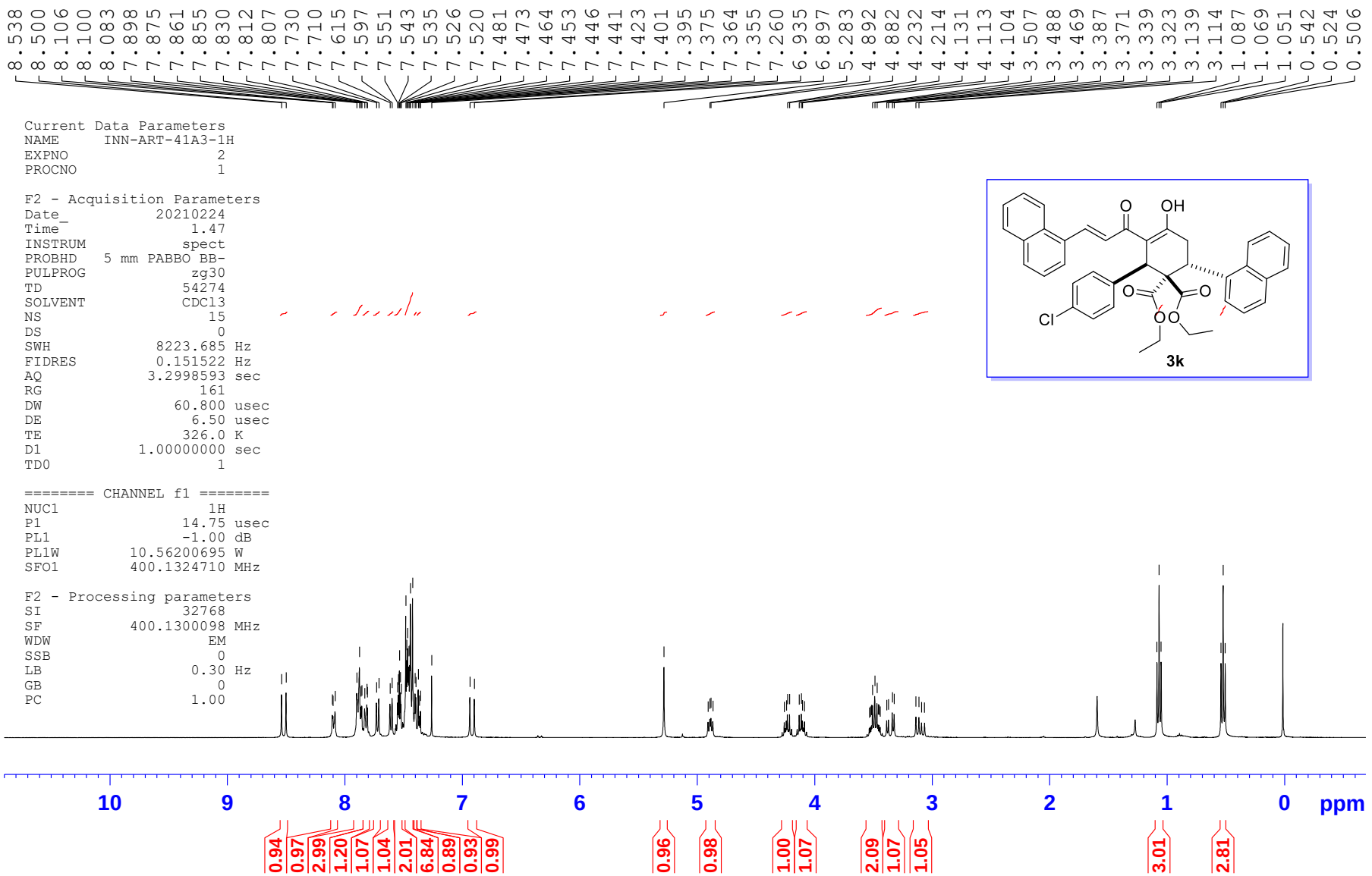

Fig S38. ^{1}H NMR spectrum of 3k

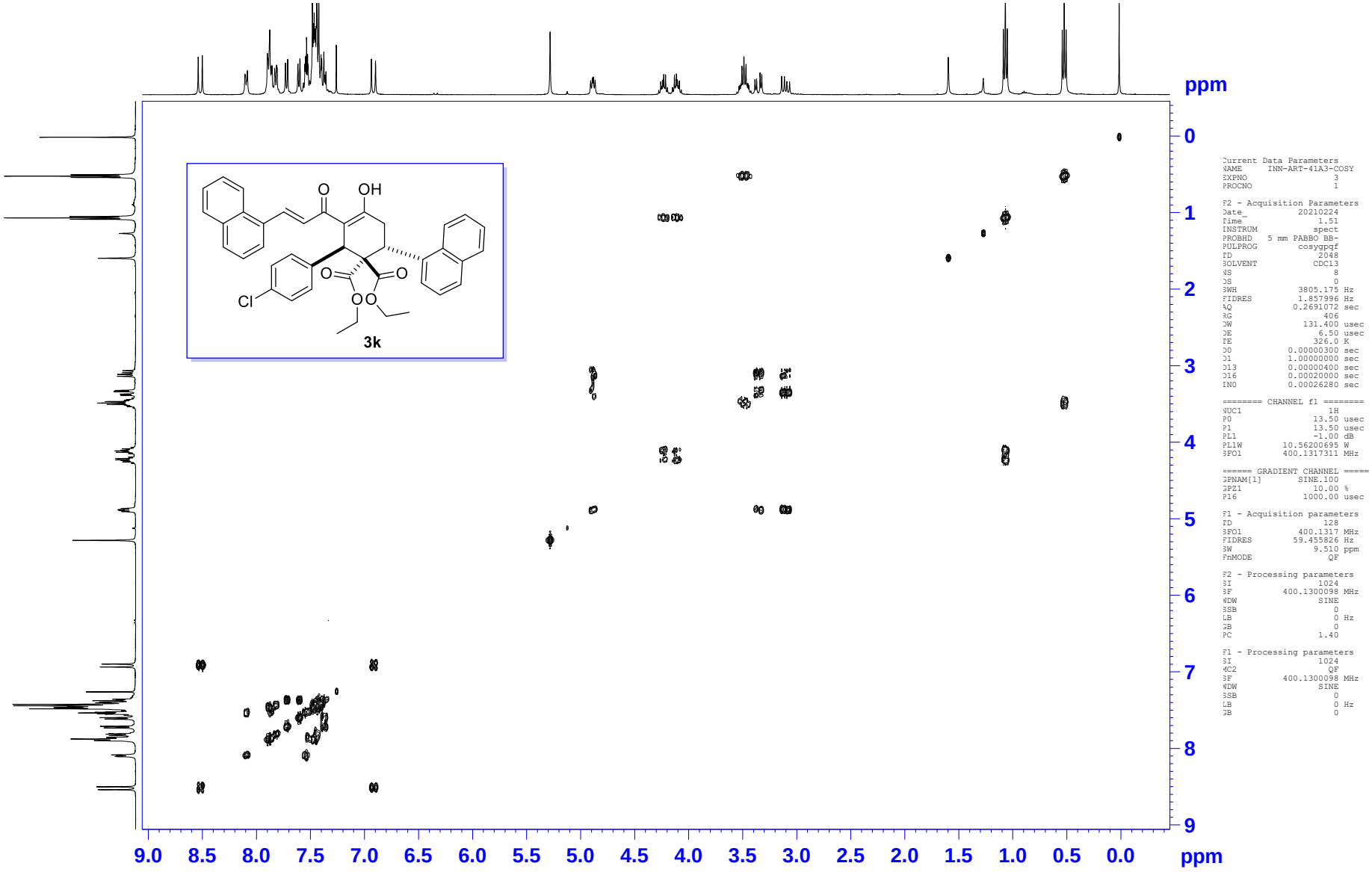

Fig S39. ^{1}H-^{1}H COSY NMR spectrum of 3k

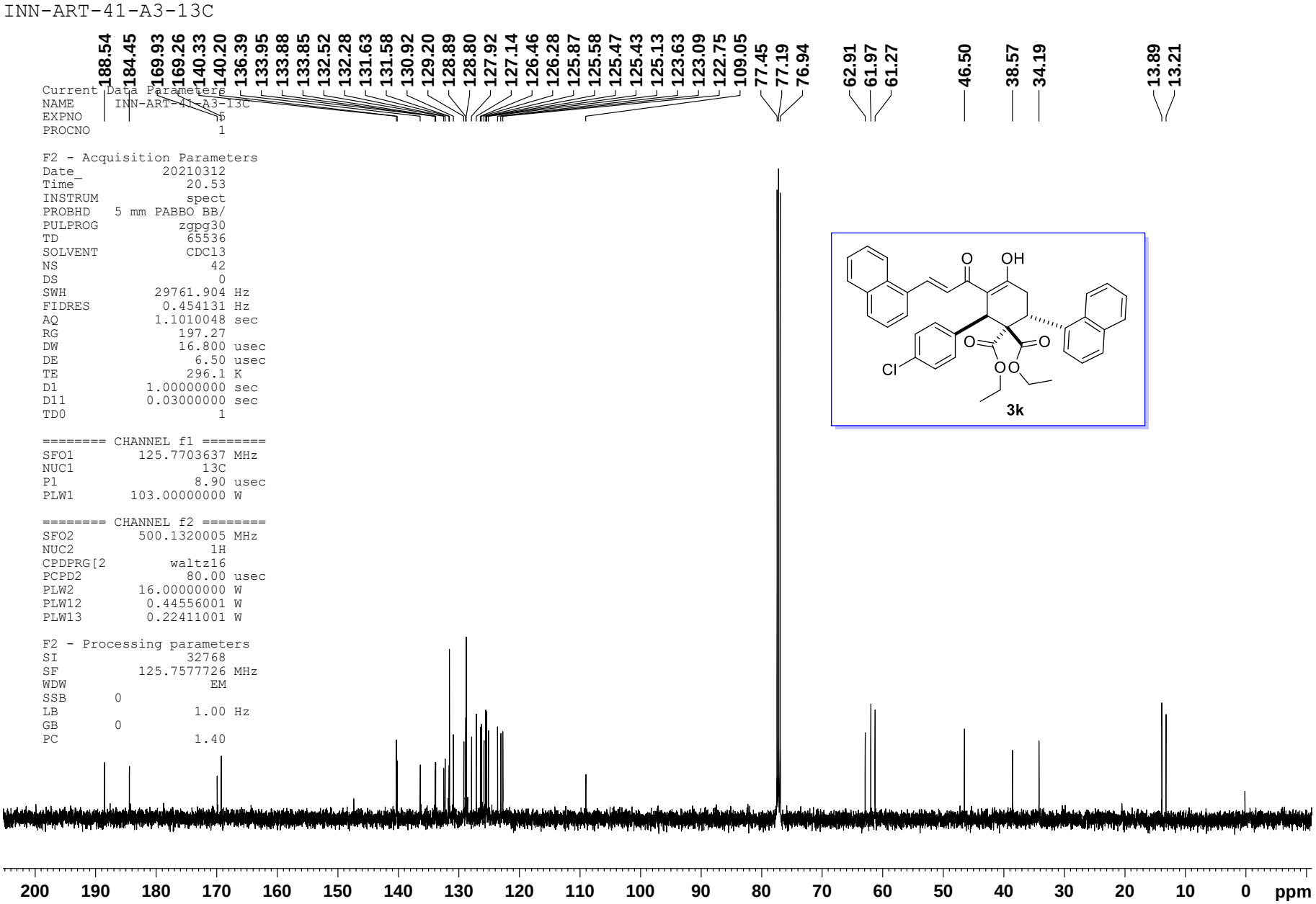

Fig S40. ^{13}C NMR spectrum of 3k

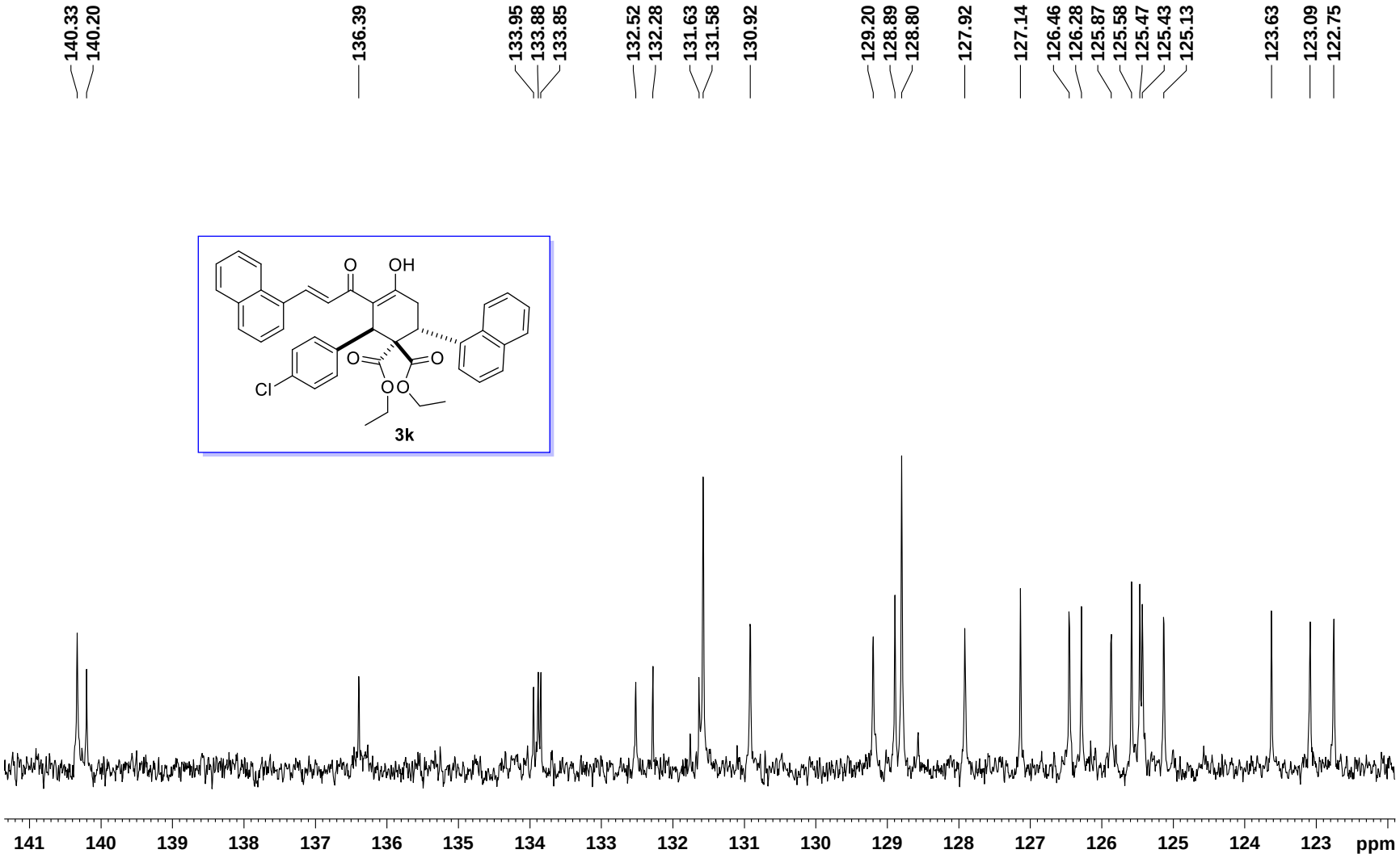

Fig S41. ^{13}C NMR spectrum expansion of 3k

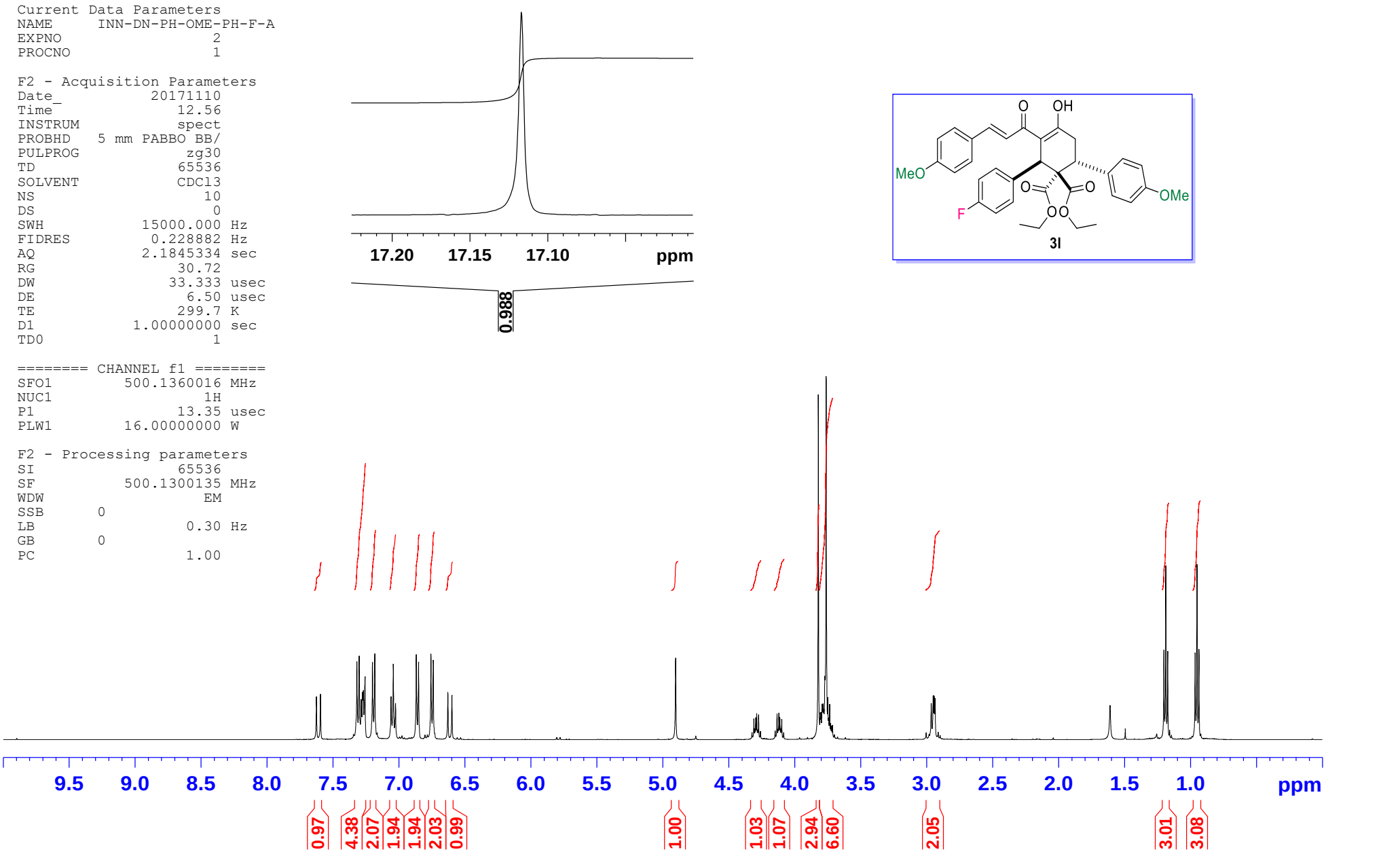

Fig S42. ^{1}H NMR Spectrum of 3l

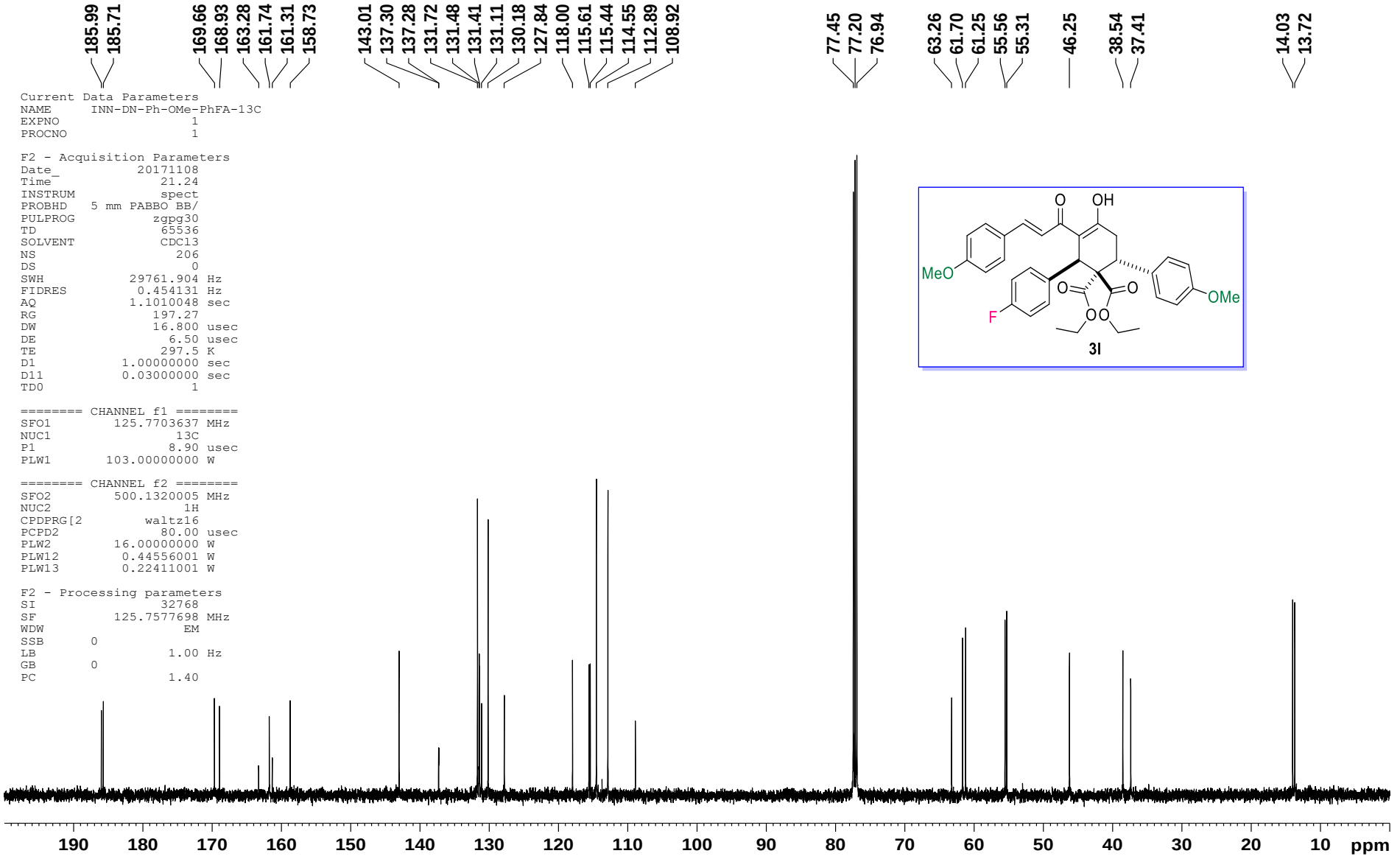

Fig S43. ^{13}C NMR Spectrum of 3l

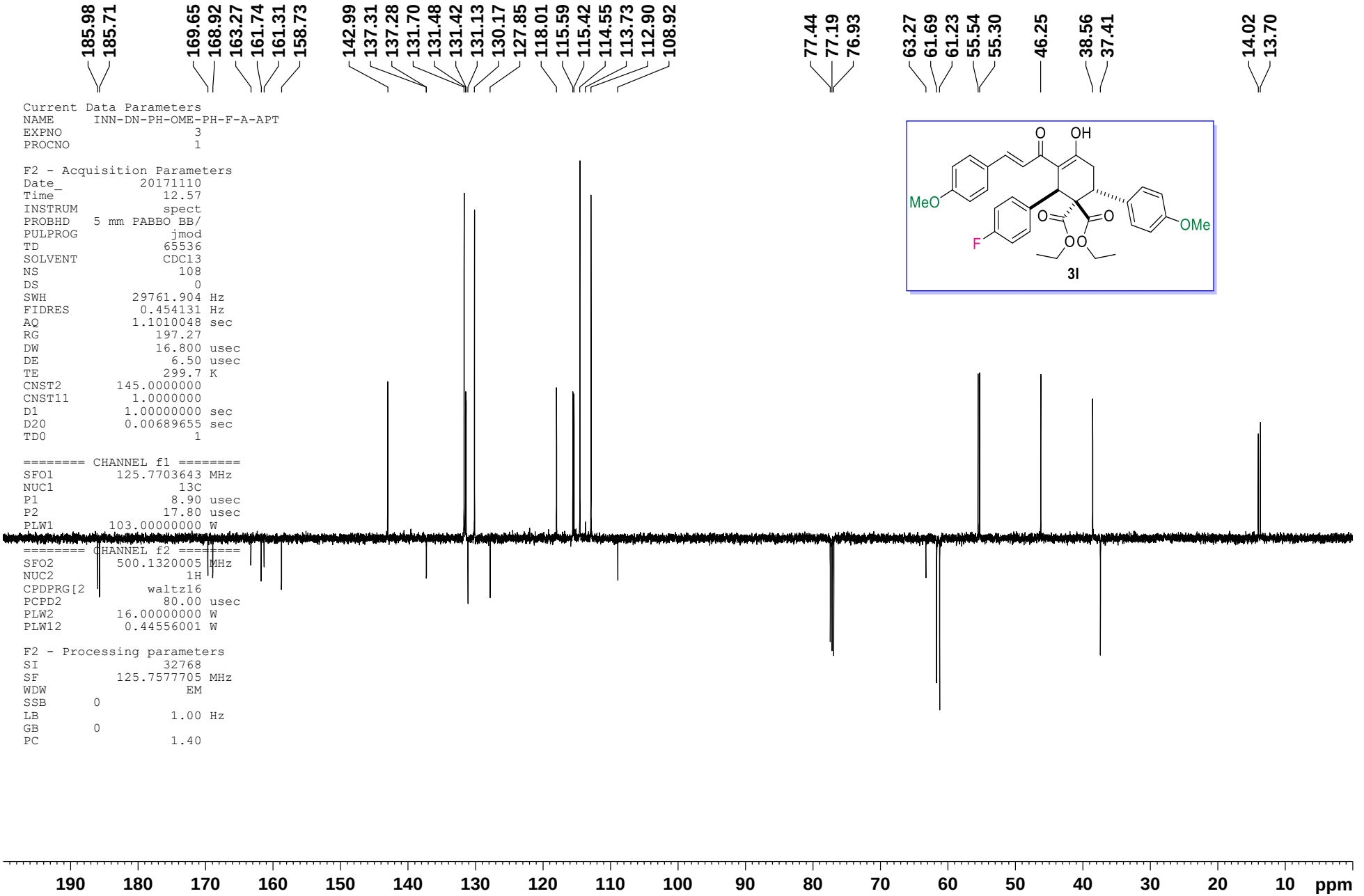

Fig S44. APT spectrum of 3l

```
Current Data Parameters
NAME      INN-ART-45-A1-19F
EXPNO                   4
PROCNO                  1

F2 - Acquisition Parameters
Date_            20210508
Time                9.46
INSTRUM            spect
PROBHD    5 mm PABBO BB/
PULPROG           zgflqn
TD                131072
SOLVENT            CDCl3
NS                    30
DS                     0
SWH           113636.367 Hz
FIDRES          0.866977 Hz
AQ             0.5767168 sec
RG                119.07
DW                 4.400 usec
DE                 6.50 usec
TE                297.7 K
D1            1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         470.5453180 MHz
NUC1                19F
P1                19.75 usec
PLW1         55.00000000 W

F2 - Processing parameters
SI                 65536
SF           470.5923770 MHz
WDW                  EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```

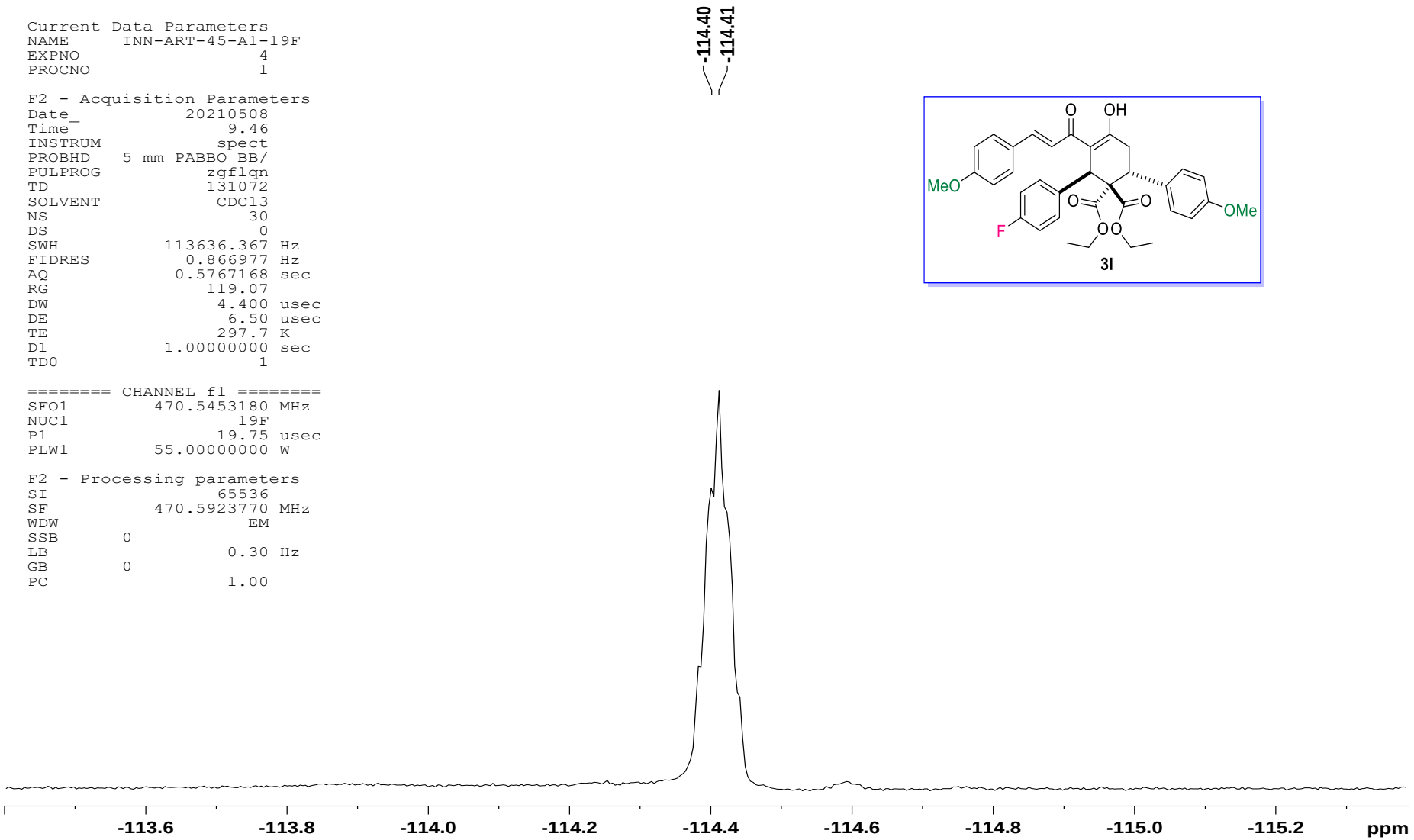

Fig S45. ^{19}F NMR spectrum of 3l

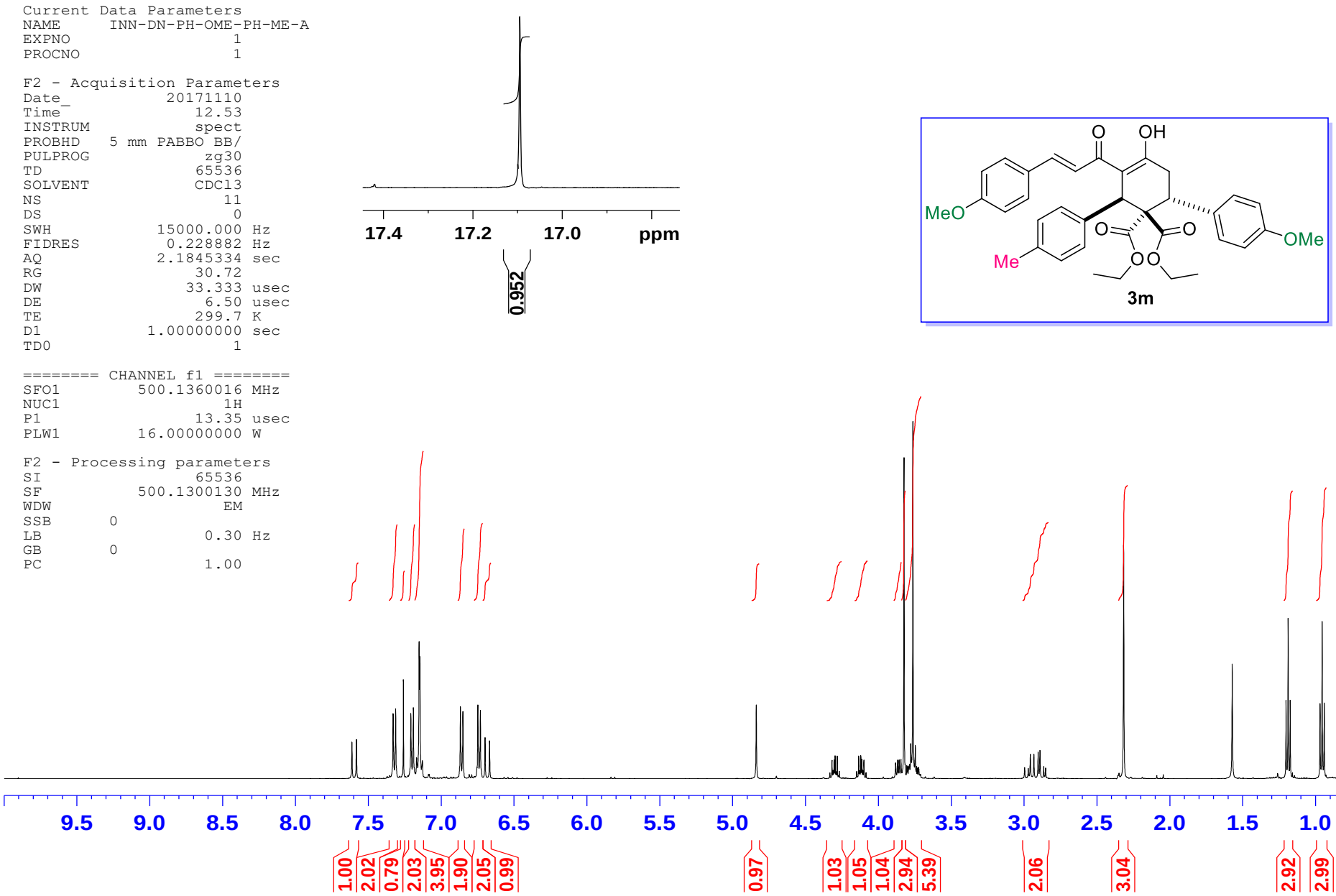

Fig S46. ^{1}H NMR Spectrum of 3m

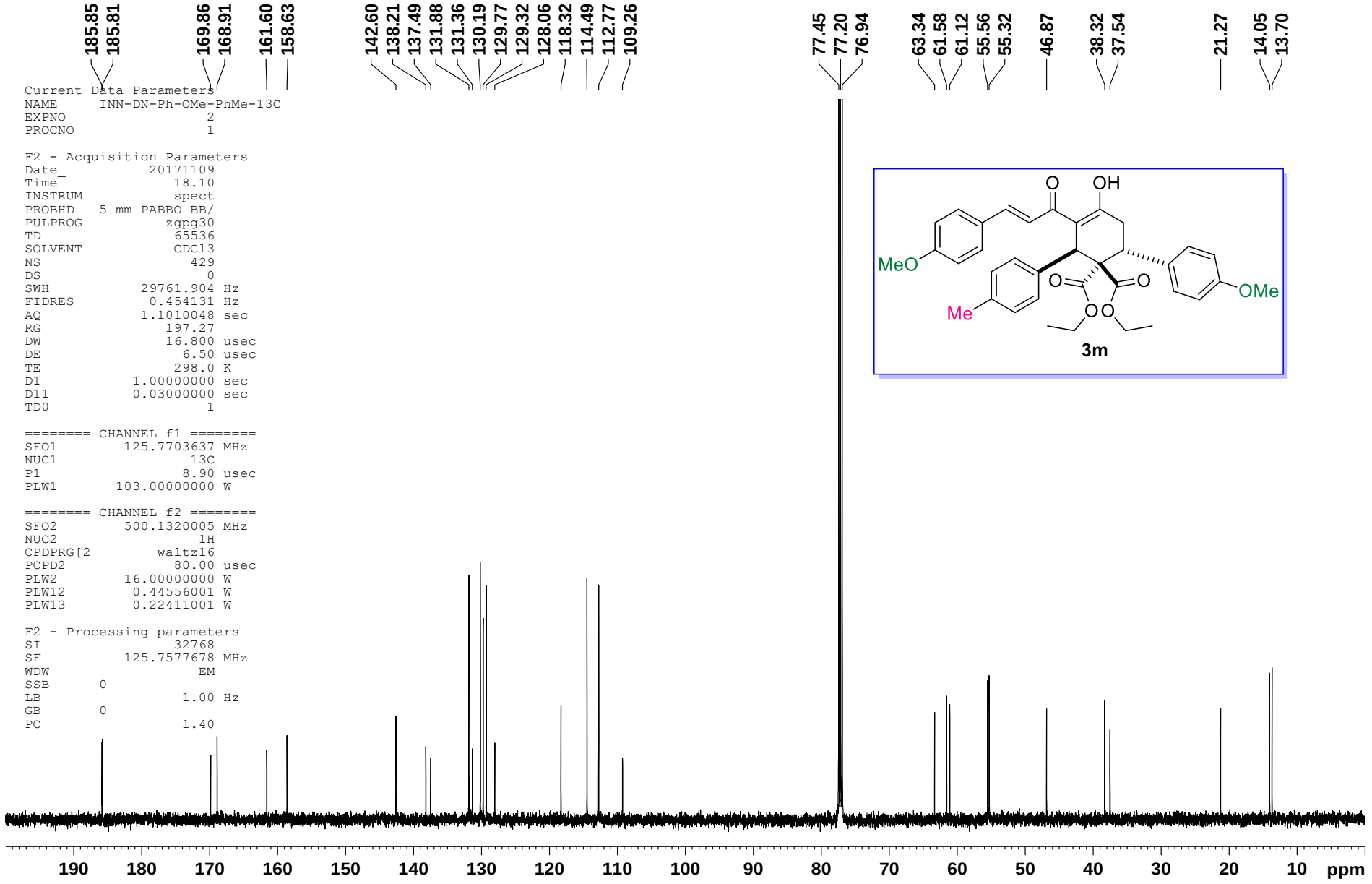

Fig S47. ^{13}C NMR Spectrum of 3m

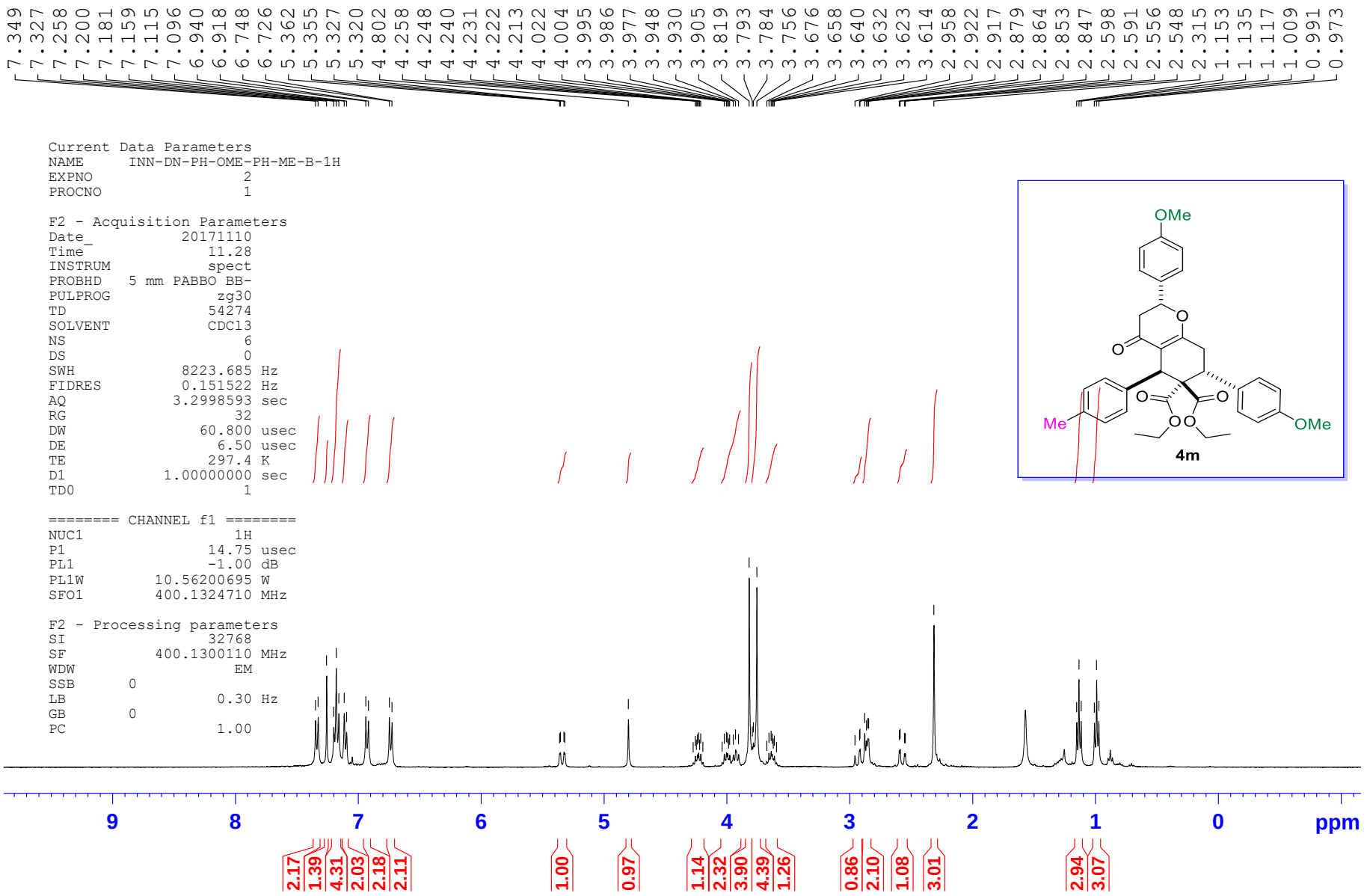

Fig S48. ^{1}H NMR Spectrum of 4m

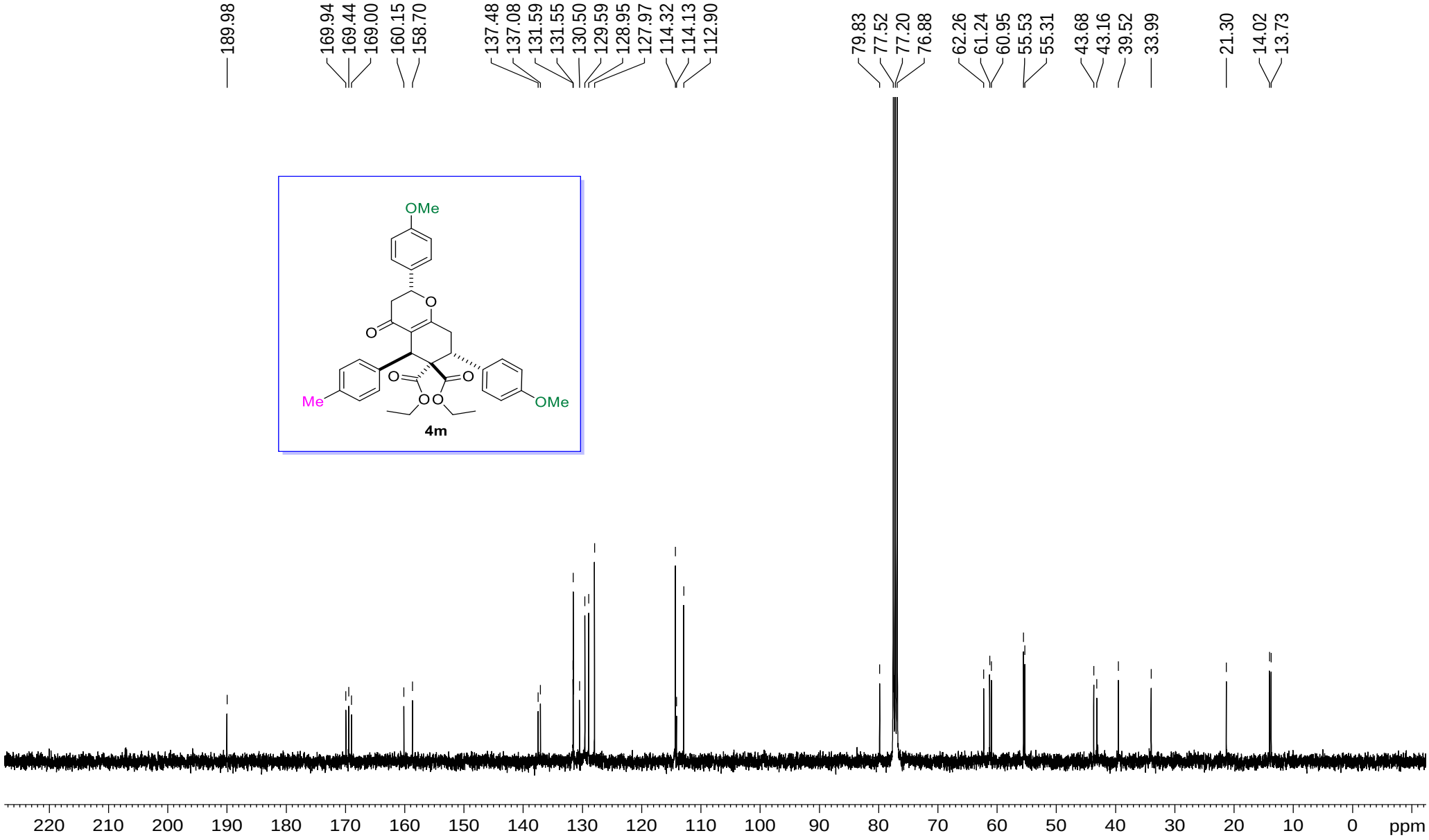

Fig S49. ^{13}C NMR Spectrum of 4m

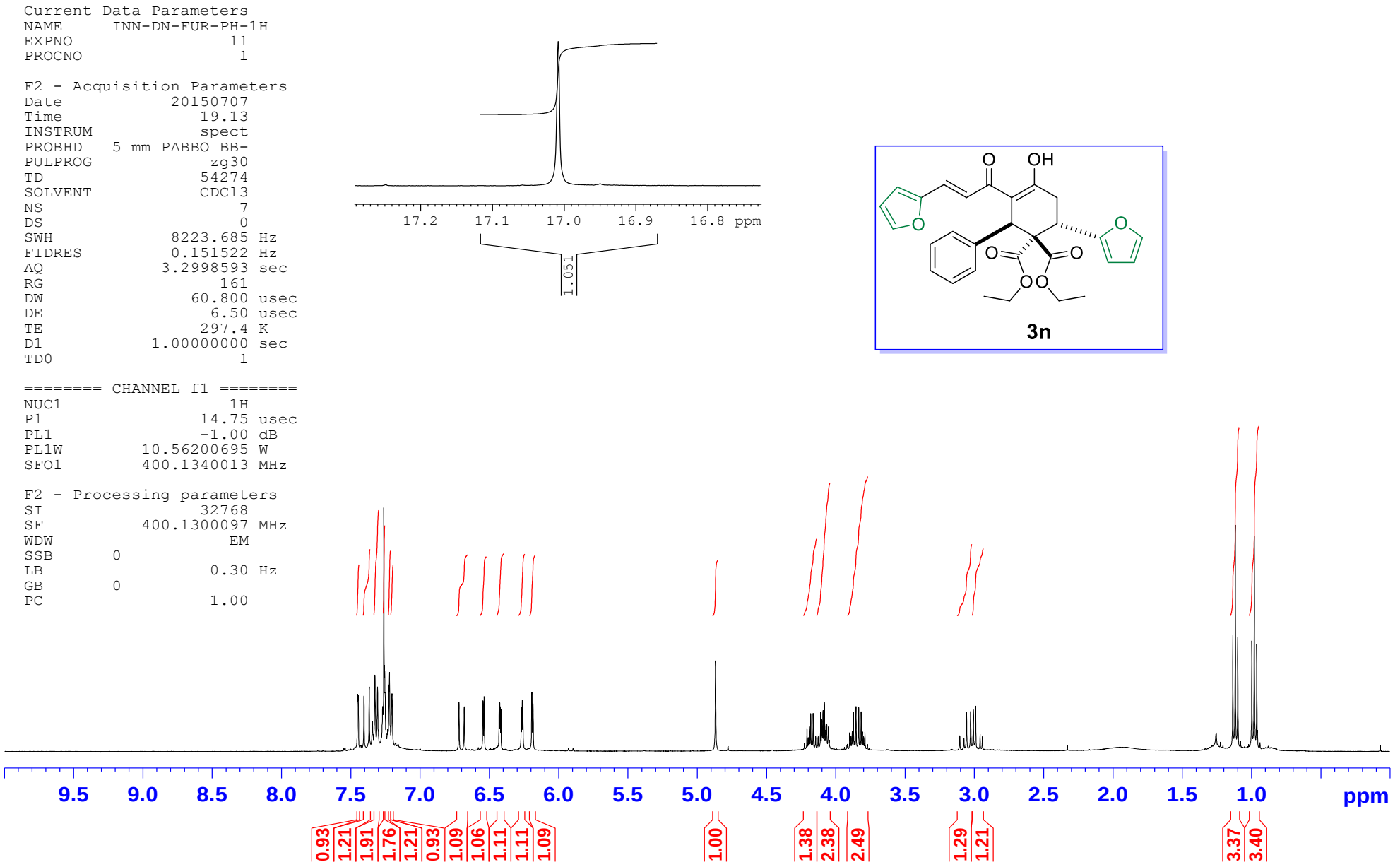

Fig S50. ^{1}H NMR Spectrum of 3n

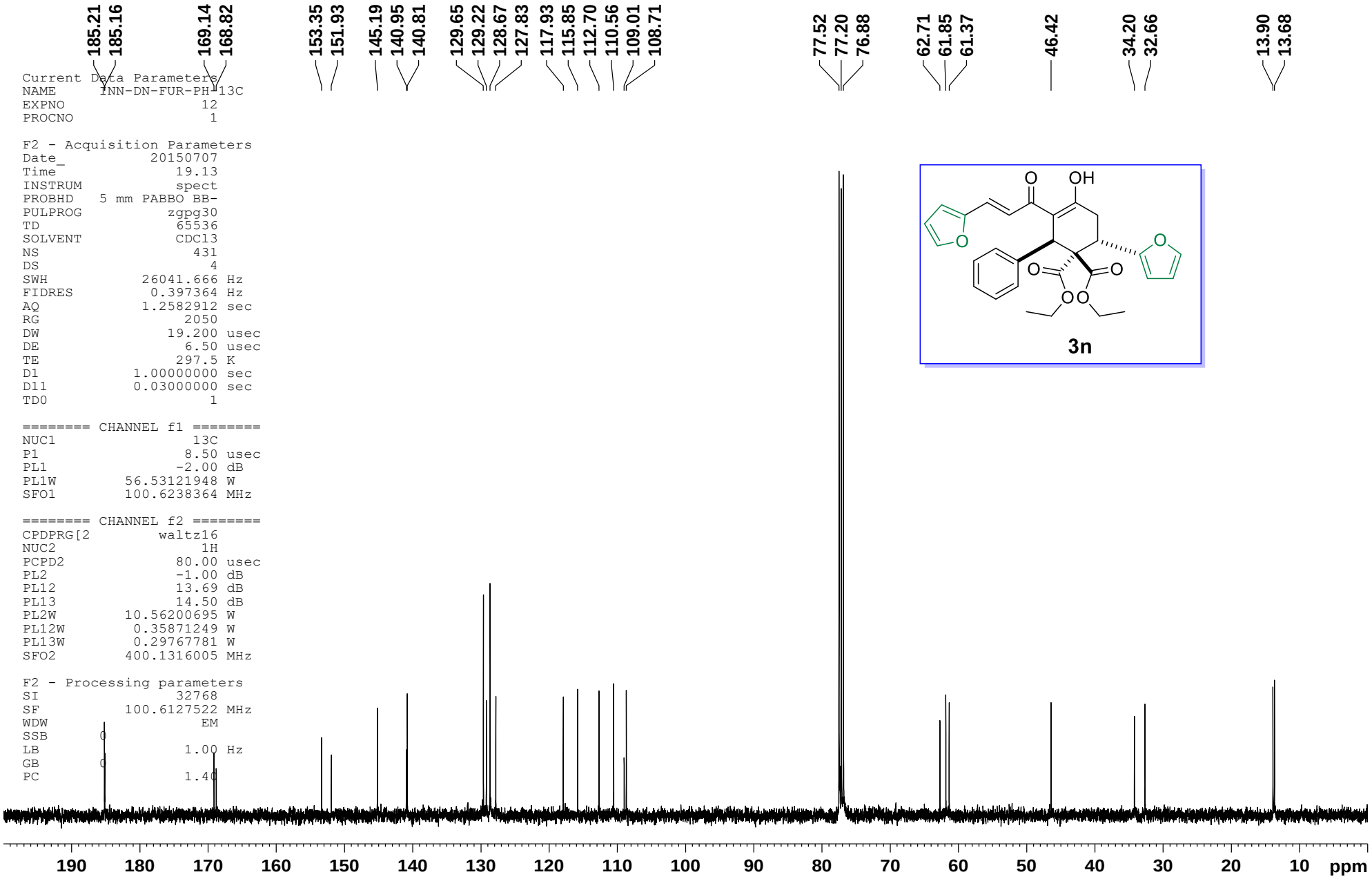

Fig S51. ^{13}C NMR Spectrum of 3n