รายการอ้างอิง

1. กองวิชาการสำนักงานคณะกรรมการอาหารและยา. งานโครงการความปลอดภัยในการใช้เคมีวัตถุ. อาหารฉายรังสี หลักการใช้และความปลอดภัย, สิงหาคม (2532)
2. กำพล แต้พานิช. การประยุกต์ใช้อิเล็กตรอนสปินเรโซแนนซ์สเปกโตรเมตรีในการตรวจพิสูจน์ธัญพืชฉายรังสีบางชนิด. วิทยานิพนธ์ปริญญามหาบัณฑิต สาขาวิชานิวเคลียร์เทคโนโลยี คณะวิศวกรรมศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย ปีการศึกษา 2540
3. ดุสิต เครืองาม, วิโรจน์ บุญโกสุมภ์. การประยุกต์ใช้ ESR ในงานวัสดุศาสตร์, วารสารศูนย์เครื่องมือวิจัยวิทยาศาสตร์และเทคโนโลยี . ปีที่ 3 ฉบับที่ 2 (2536) : 111-140
4. ศูนย์ฉายรังสี . การถนอมอาหารด้วยรังสีในประเทศไทย. อาหารและผลิตผลทางการเกษตร (2532) ท้ายประกาศกระทรวงสาธารณสุข
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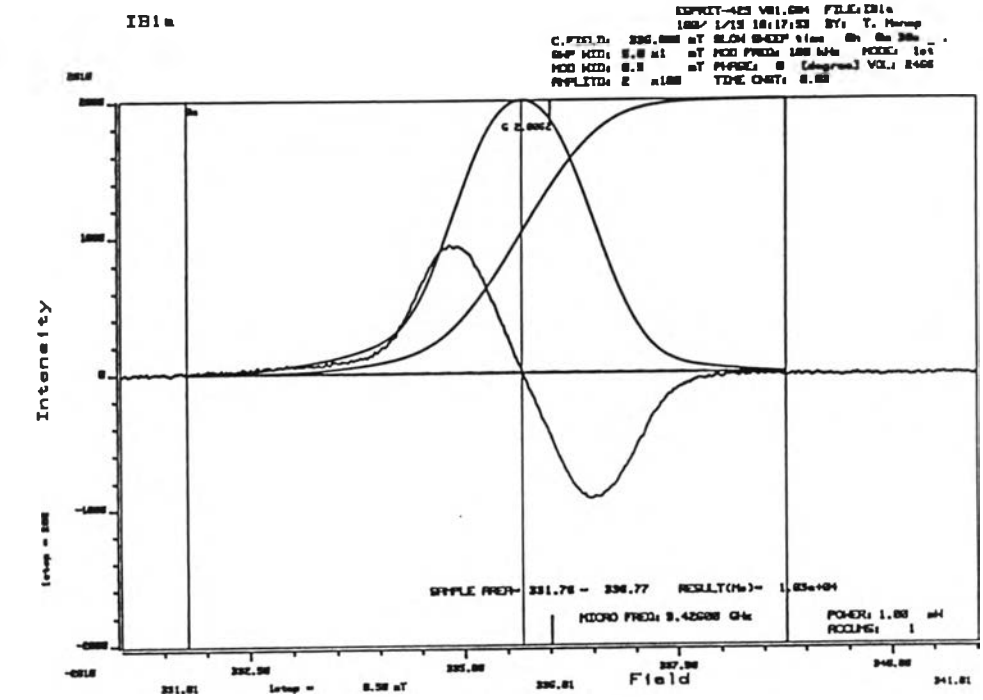
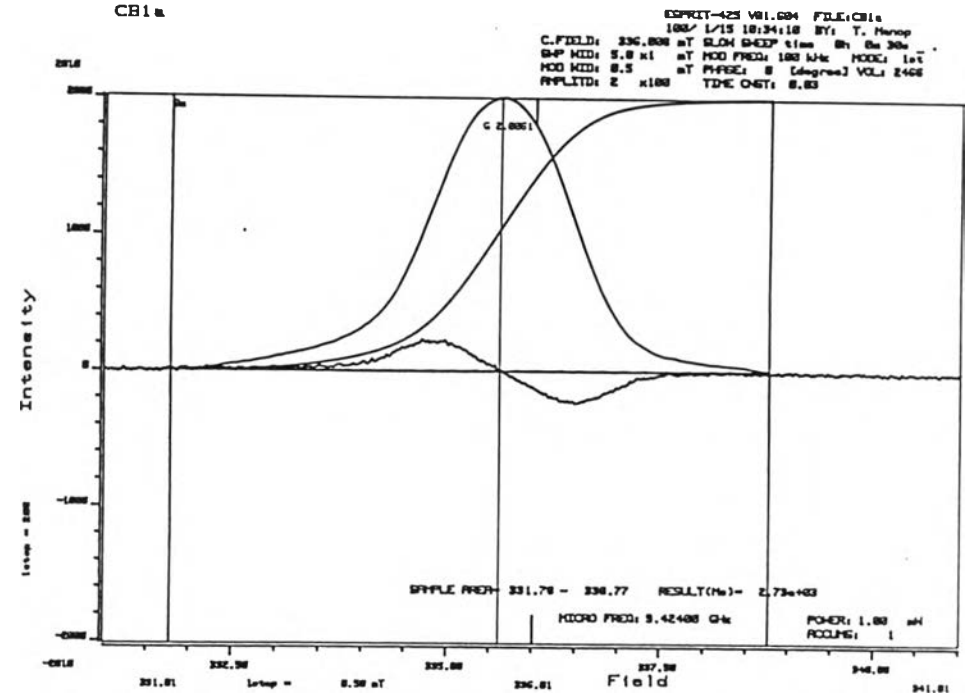
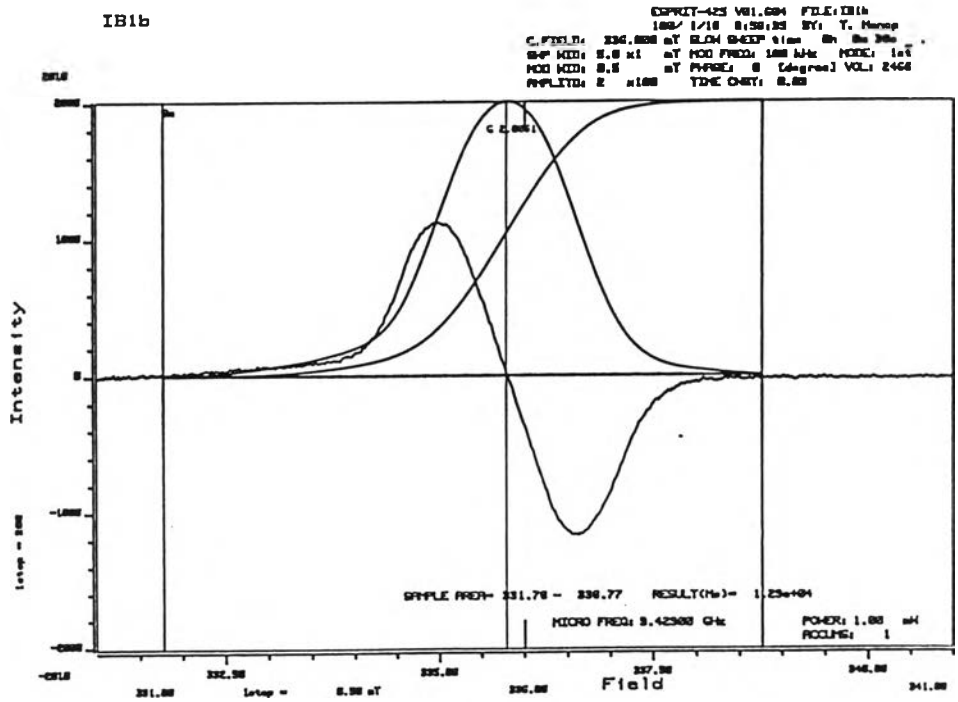
6. Desrosiers M. and McLaughlin W. L. Examination of Gamma-Irradiated Fruit and vegetable by ESR spectroscopy. Radiat. Phy. Chem. 34. (1989): 895-898
7. Dodd N. and Swallow A.J. The ESR Detection of Irradiated Food. Appl. Radiat. Isot. 40. (1989) : 1211-1214
8. Food and Environmental . Protection Newsletter . Vol. 1, No. 2, June 1998
9. High Dose Irradiation: Wholesomeness of irradiated food with Doses above 10 kGy, Report of Joint FAO/IAEA/WHO Study Group, World Health Organization Technical Report Series 890. Geneva, 1999
10. Raffi J. and Agnel J.P . ESR Identification of Irradiated Fruits. Radiat. Phy. Chem. 34. (1989): 891-894
11. Tamikazu Kume. UNDP/IAEA/RCA. Regioned Training Course an Radiation Chemistry, Takasaki City, Japan 13-24 May 1991
12. Wholesomeness of irradiated food. Report of Joint FAO/IAEA/WHO Expert Committee, World Health Organization Technical Report Series 659. Geneva, 1981

ภาคผนวก

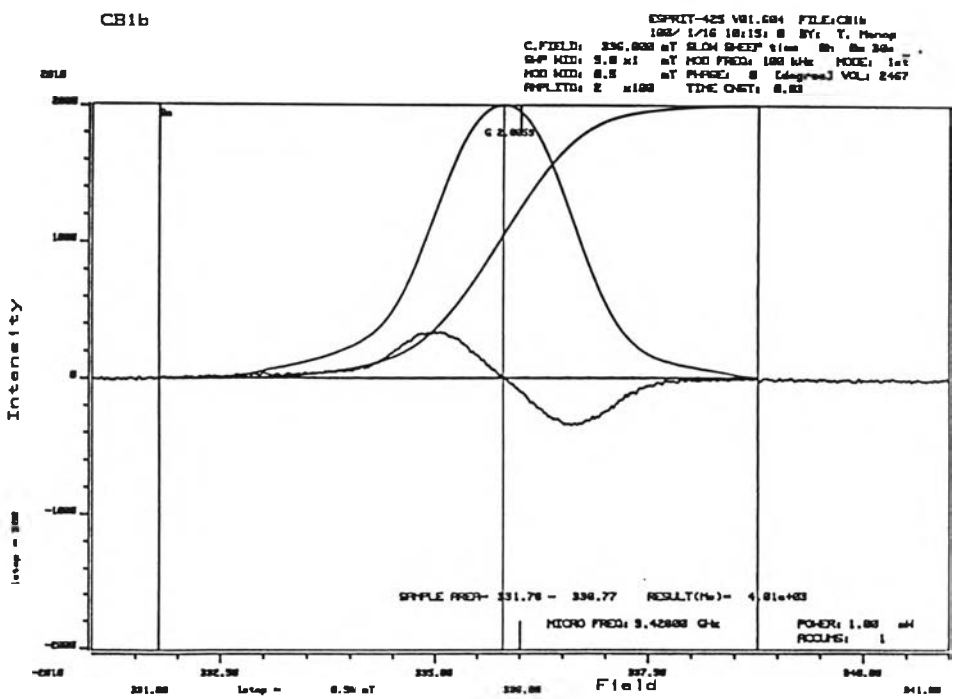

IB1a
Intensity
Field
SAMPLE AREA=
MICRO FREQ:
POWER:
ROOMS:


CB1a
Intensity
Field
SAMPLE AREA=
MICRO FREQ:
POWER:
ROOMS:

IB1b


Intensity
Field
SAMPLE AREA= 331.78 - 336.77
MICRO FREQ: 9.42300 GHz

CB1b


Intensity
Field
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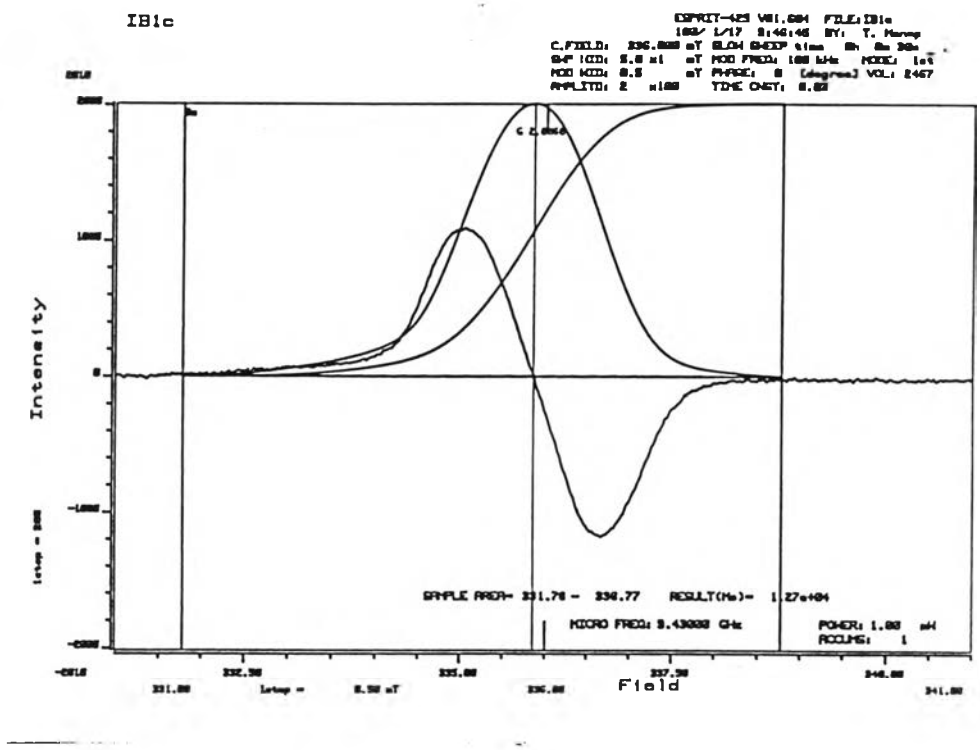
MICRO FREQ: 9.42800 GHz


IB1c
Intensity
Field
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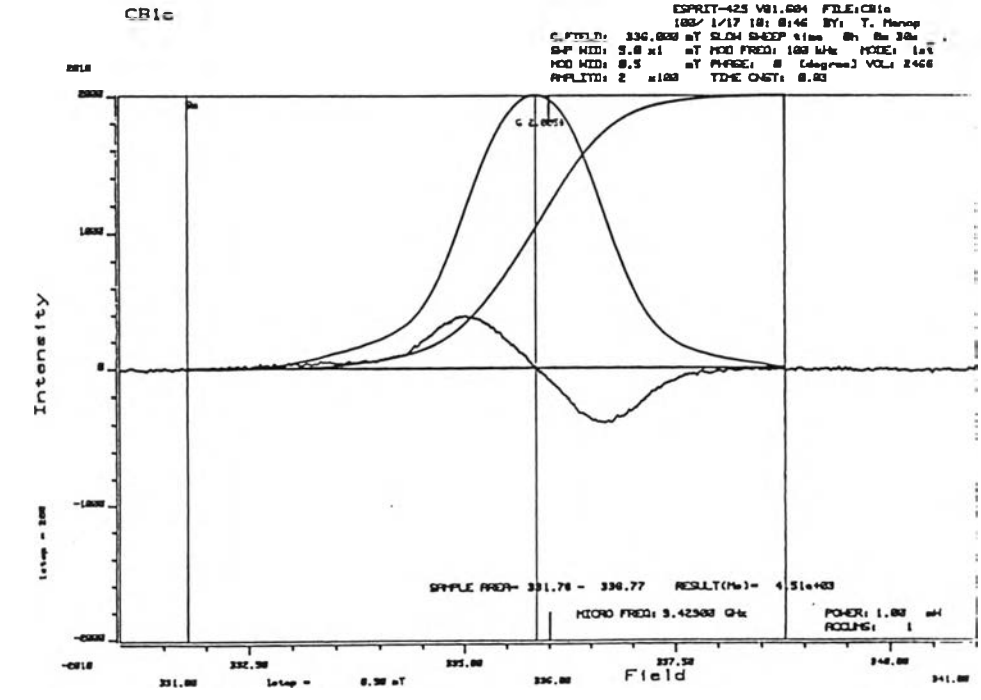
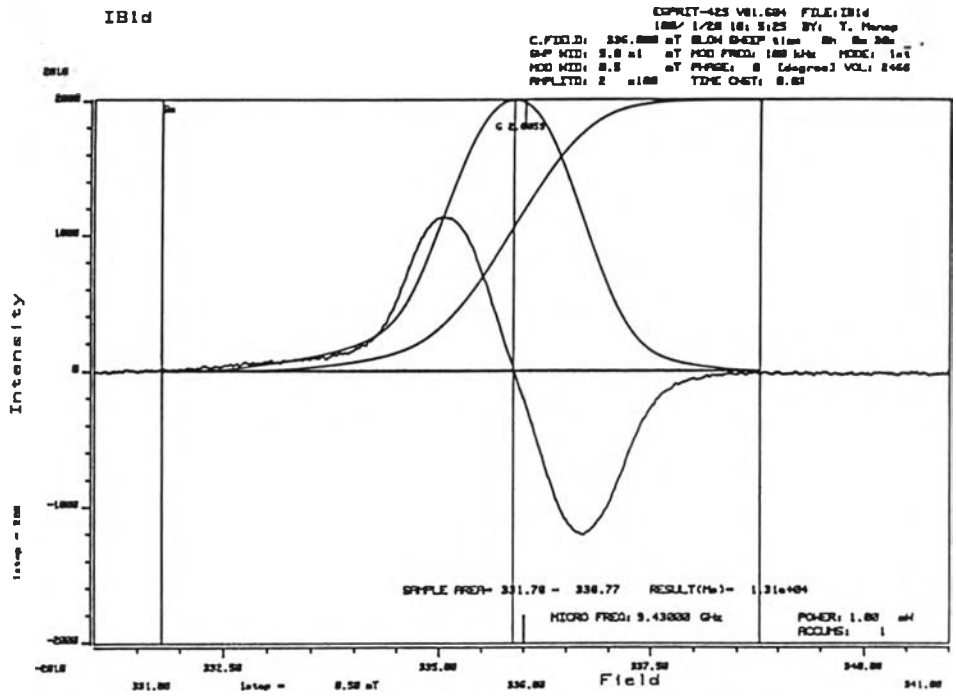
MICRO FREQ: 9.43088 GHz
POWER: 1.00 mW
ACCUMS: 1


CB1c
Intensity
Field
SAMPLE AREA= 331.78 - 336.77 RESULT(No)= 4.51e+03
MICRO FREQ: 9.42588 GHz
POWER: 1.00 mW
ACCUMS: 1


IBld
Intensity
Field
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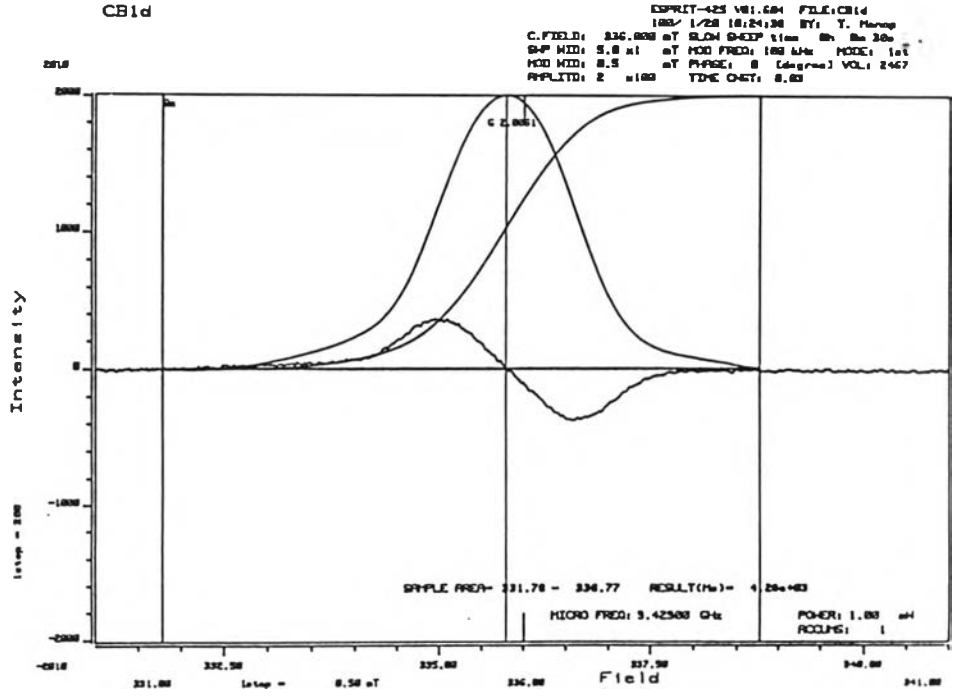
MICRO FREQ: 9.43000 GHz


CBld
Intensity
Field
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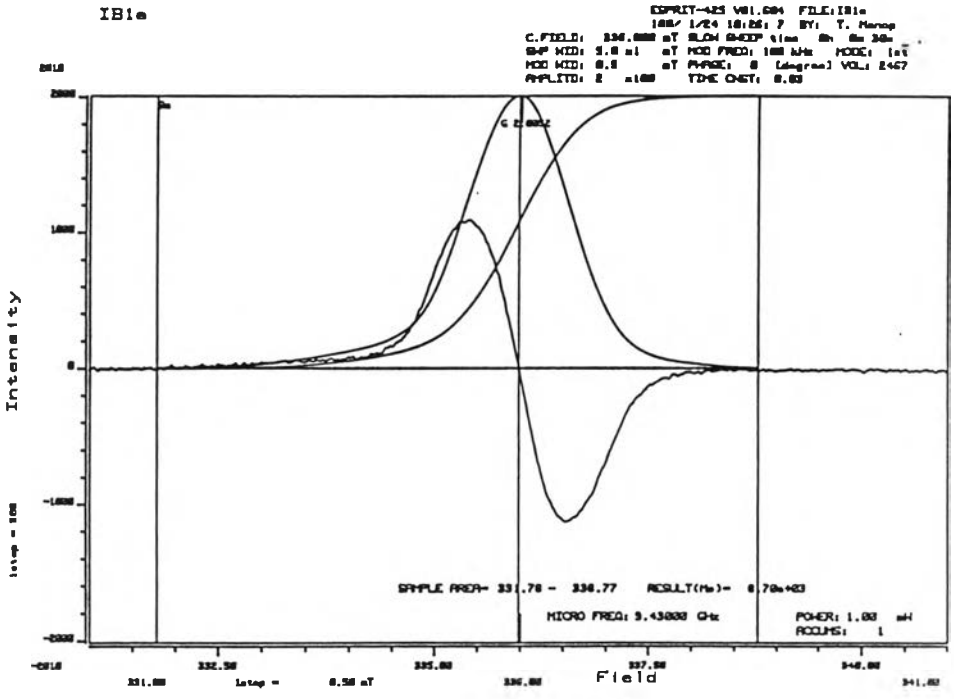
MICRO FREQ: 9.42500 GHz

IB1a


Intensity
Field
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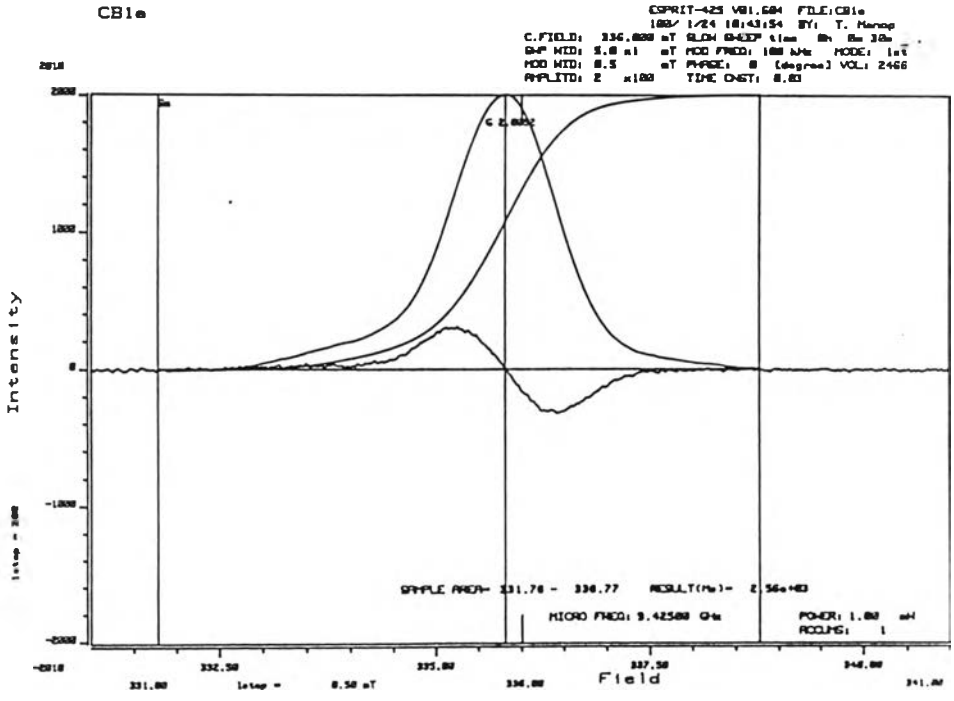
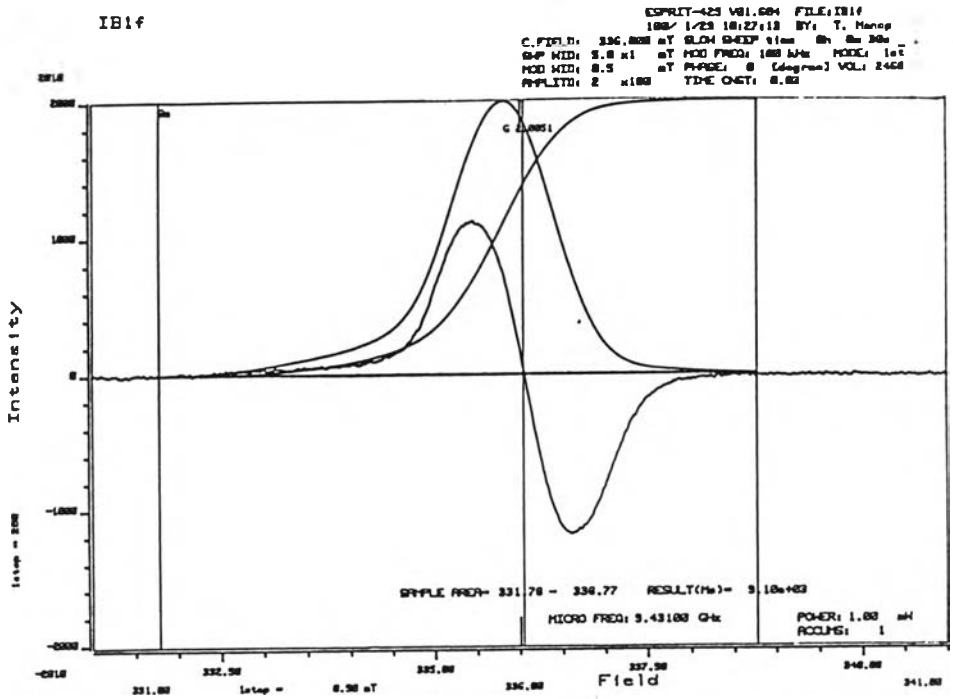
MICRO FREQ: 9.43000 GHz
POWER: 1.00 mW
ACCUMS: 1

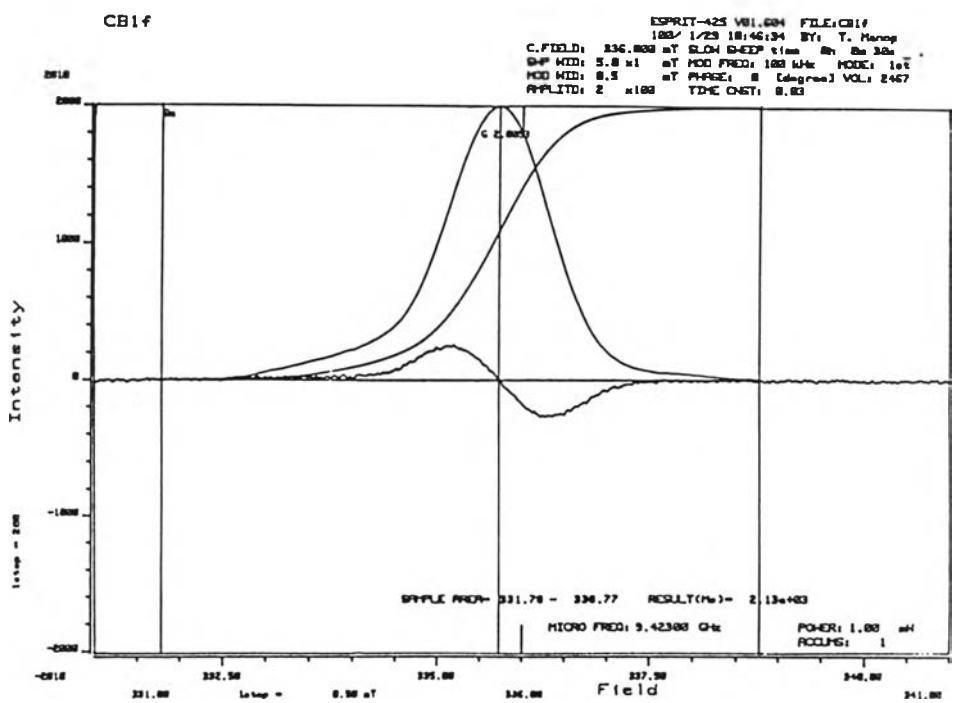
CB1a


Intensity
Field
SAMPLE AREA= 331.78 - 336.77
MICRO FREQ: 9.42500 GHz
POWER: 1.00 mW
ACCUMS: 1

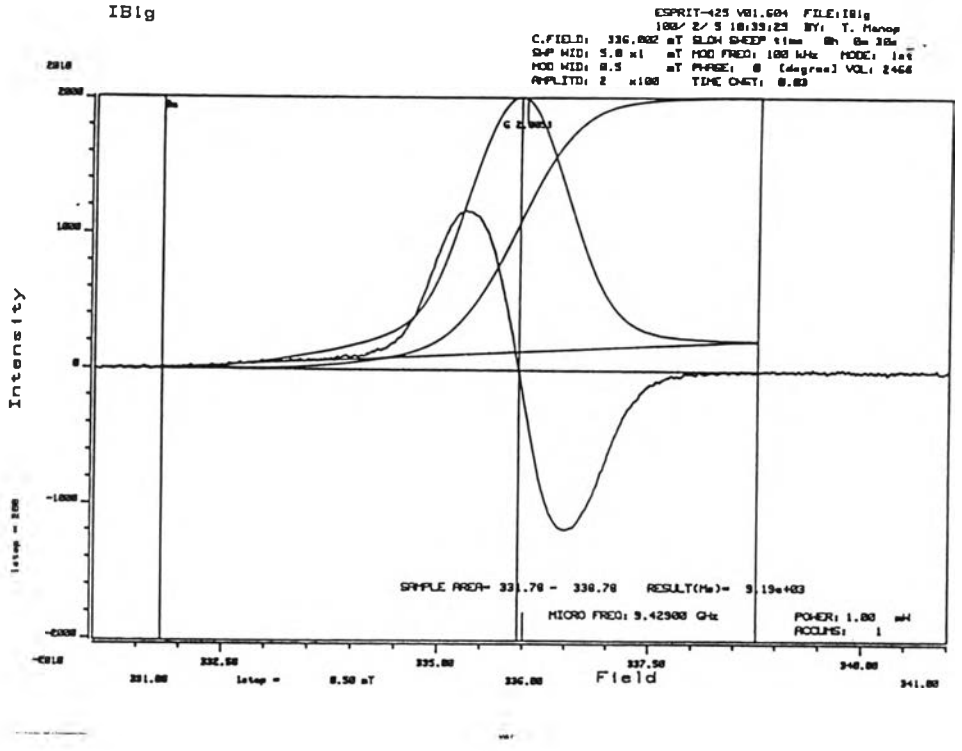
IB1f


Intensity
Field
SAMPLE AREA= 331.78 - 336.77
MICRO FREQ: 9.43100 GHz
POWER: 1.00 mW
ACCUMS: 1

CB1f


Intensity
Field
SAMPLE AREA= 331.78 - 336.77
MICRO FREQ: 9.42300 GHz
POWER: 1.00 mW
ACCUMS: 1

IB1g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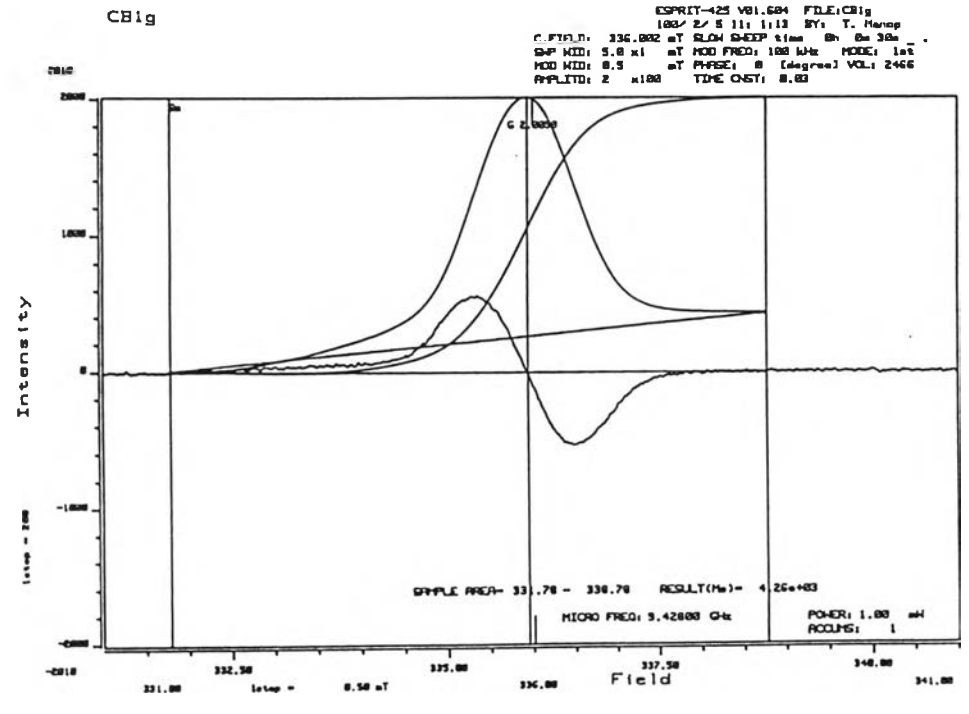
C.FIELD: 336.002 mT SLOW SWEEP time
SWP WID: 5.0 x1 mT MOD FREQ: 100 kHz MODE: 1st
MOD WID: 0.5 mT PHASE: 0 [degree] VOL: 2466
AMPLITD: 2 x100 TIME CNST: 0.03
SAMPLE AREA= 331.70 - 338.70 RESULT(Ms)= 9.19e+03
MICRO FREQ: 9.42900 GHz
POWER: 1.00 mW
ACCUMS: 1
Intensity
Field
331.00
332.50
335.00
336.00
337.50
340.00
341.00
8.50 mT

CB1g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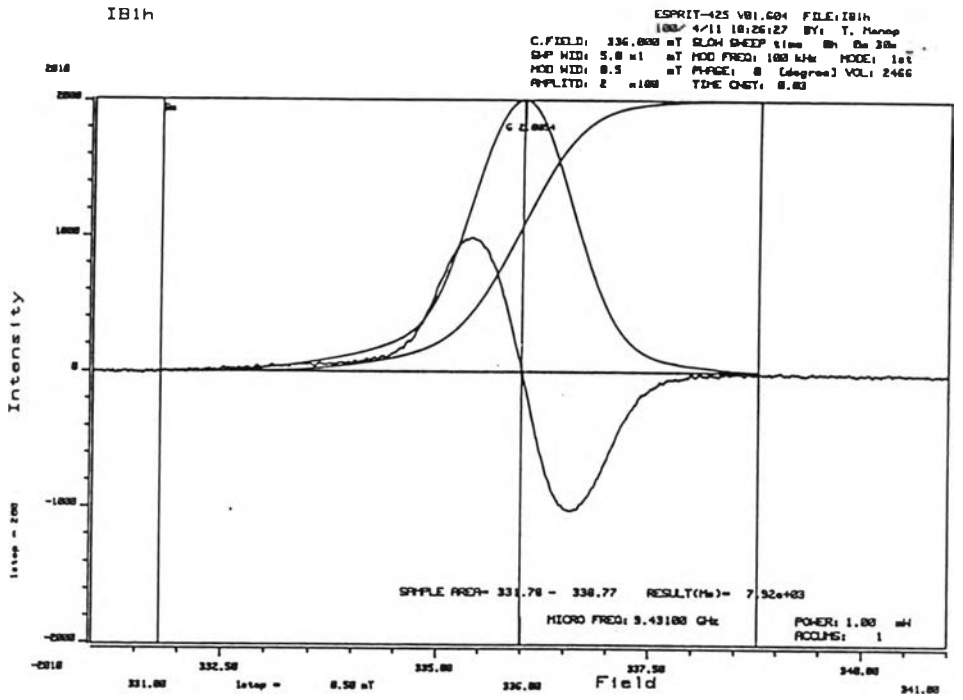
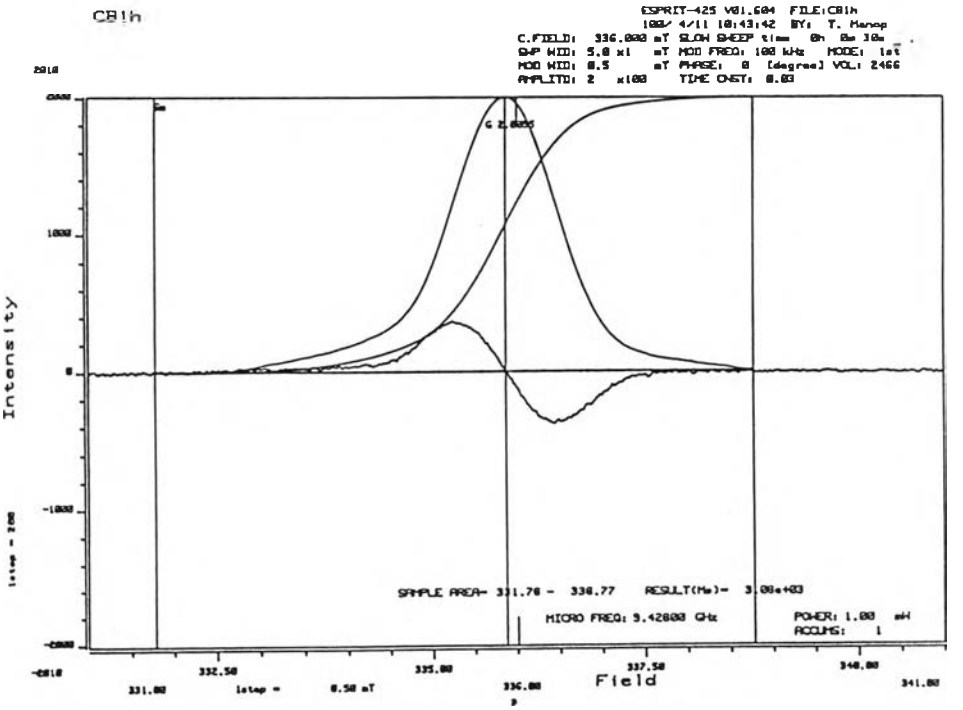
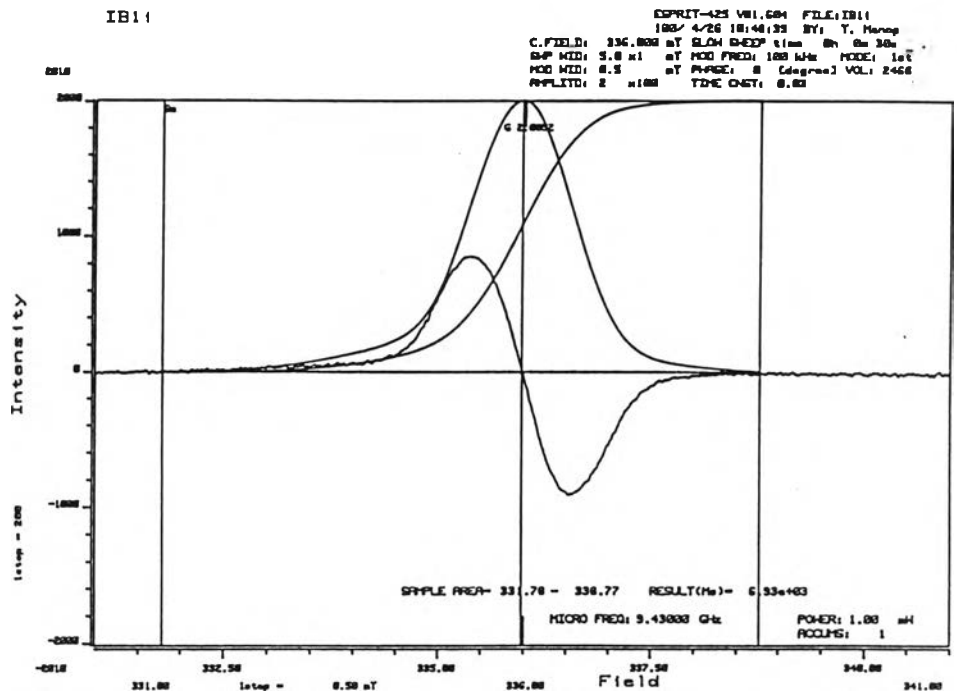
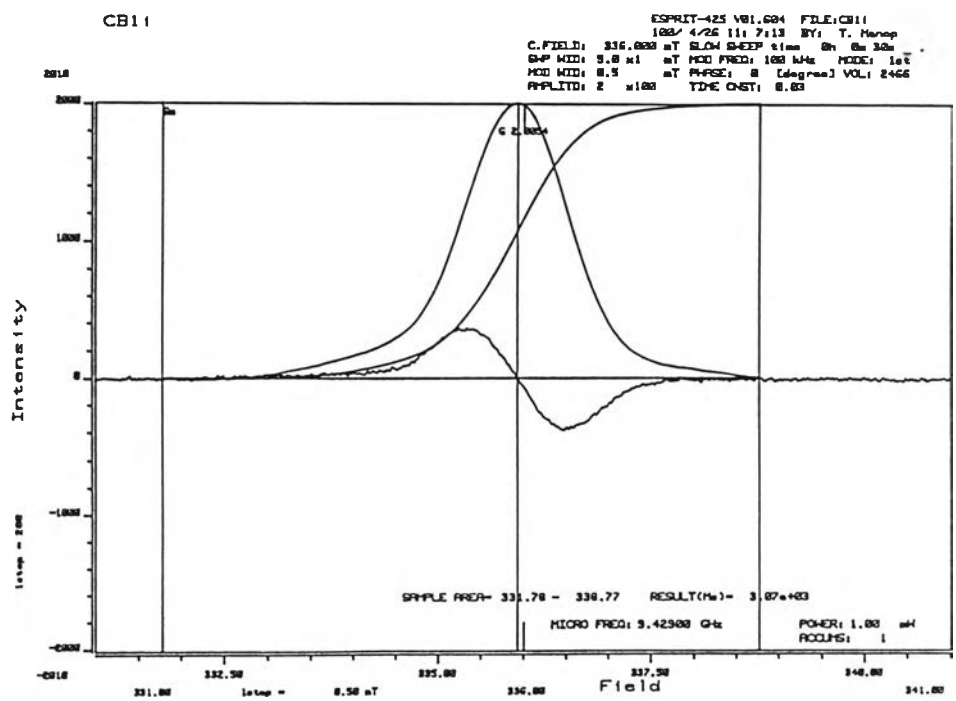
C.FIELD: 336.002 mT SLOW SWEEP time
SWP WID: 5.0 x1 mT MOD FREQ: 100 kHz MODE: 1st
MOD WID: 0.5 mT PHASE: 0 [degree] VOL: 2466
AMPLITD: 2 x100 TIME CNST: 0.03
SAMPLE AREA= 331.70 - 338.70 RESULT(Ms)= 4.26e+03
MICRO FREQ: 9.42800 GHz
POWER: 1.00 mW
ACCUMS: 1
Intensity
Field
331.00
332.50
335.00
336.00
337.50
340.00
341.00
8.50 mT

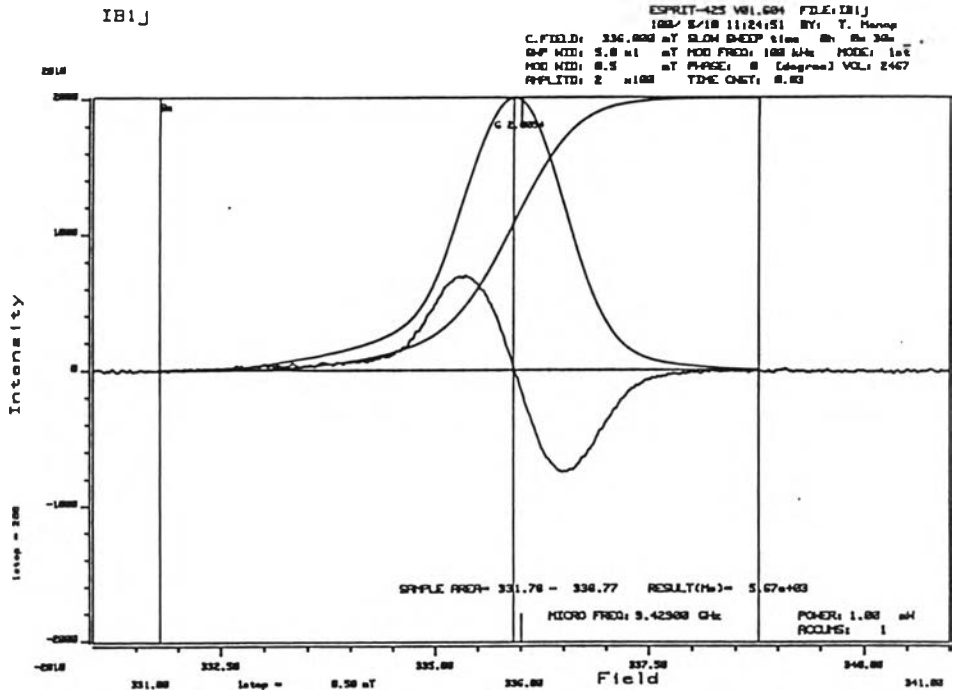

IB1h
ESPRIT-425 V01.604 FILE:IB1h
Intensity
Field
SAMPLE AREA= 331.78 - 336.77 RESULT(Ms)= 7.92e+03
MICRO FREQ: 9.43100 GHz
POWER: 1.00 mW
ACCUMS: 1


CB1h
ESPRIT-425 V01.604 FILE:CB1h
Intensity
Field
SAMPLE AREA= 331.78 - 336.77 RESULT(Ms)= 3.00e+03
MICRO FREQ: 9.42800 GHz
POWER: 1.00 mW
ACCUMS: 1


IB11
ESPRIT-425 V01.604 FILE:IB11
C.FIELD: 336.000 mT SLOW SWEEP time 0h 0m 30s
SWP WID: 5.0 x1 mT MOD FREQ: 100 kHz MODE: 1st
MOD WID: 0.5 mT PHASE: 0 [degree] VOL: 2466
AMPLITD: 2 x100 TIME CNST: 0.03
SAMPLE AREA= 331.78 - 338.77 RESULT(Ms)= 6.33e+03
MICRO FREQ: 9.43000 GHz
POWER: 1.00 mW
ACCUMS: 1
Intensity
Field


CB11
ESPRIT-425 V01.604 FILE:CB11
C.FIELD: 336.000 mT SLOW SWEEP time 0h 0m 30s
SWP WID: 5.0 x1 mT MOD FREQ: 100 kHz MODE: 1st
MOD WID: 0.5 mT PHASE: 0 [degree] VOL: 2466
AMPLITD: 2 x100 TIME CNST: 0.03
SAMPLE AREA= 331.78 - 338.77 RESULT(Ms)= 3.07e+03
MICRO FREQ: 9.42900 GHz
POWER: 1.00 mW
ACCUMS: 1
Intensity
Field

IB1J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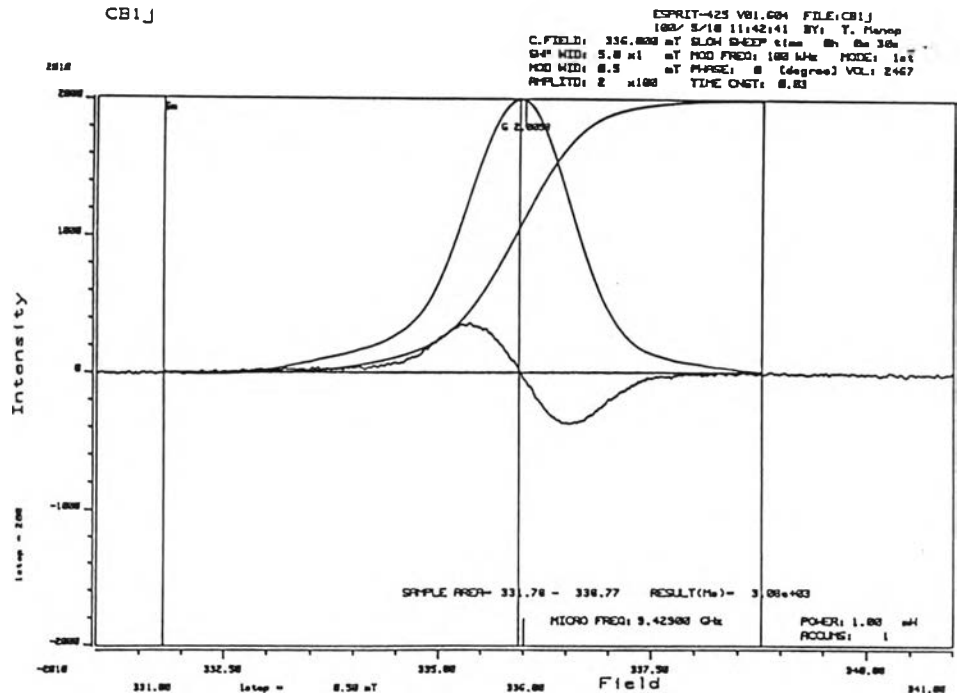
C.FIELD: 336.800 mT SLOW SWEEP time 0h 0m 30s
SW WID: 5.0 x1 mT MOD FREQ: 100 kHz MODE: 1st
MOD WID: 0.5 mT PHASE: 0 [degree] VOL: 2467
AMPLITD: 2 x100 TIME CNST: 0.03
SAMPLE AREA= 331.78 - 336.77 RESULT(Ma)= 5.67e+03
MICRO FREQ: 9.42300 GHz
POWER: 1.00 mW
ACCUMS: 1
Intensity
Field
331.00
332.50
335.00
336.80
337.50
340.00
341.00

CB1J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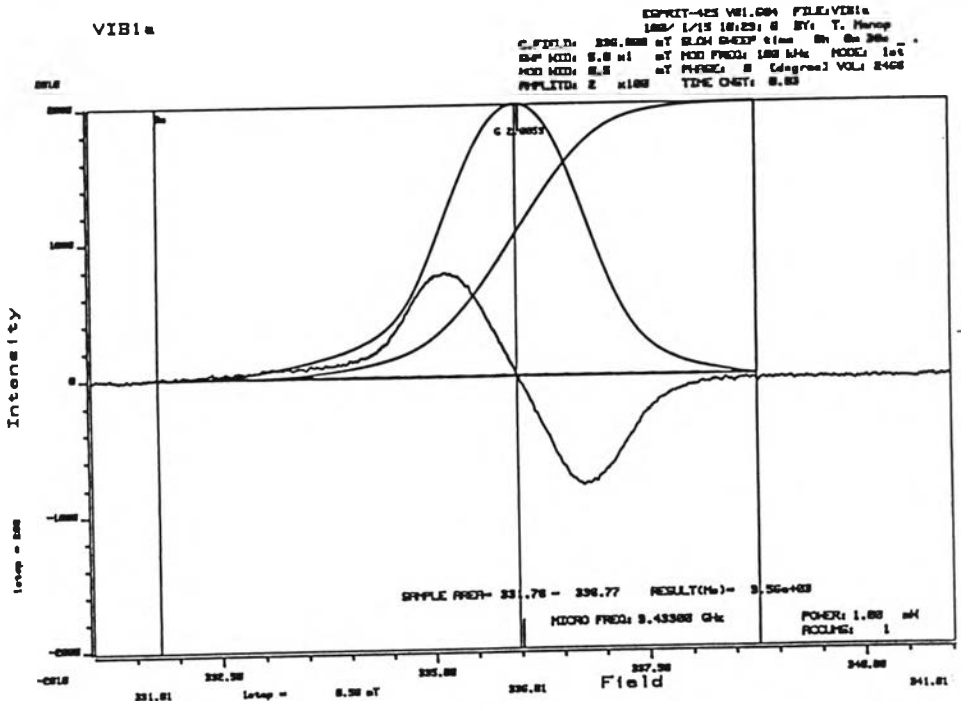
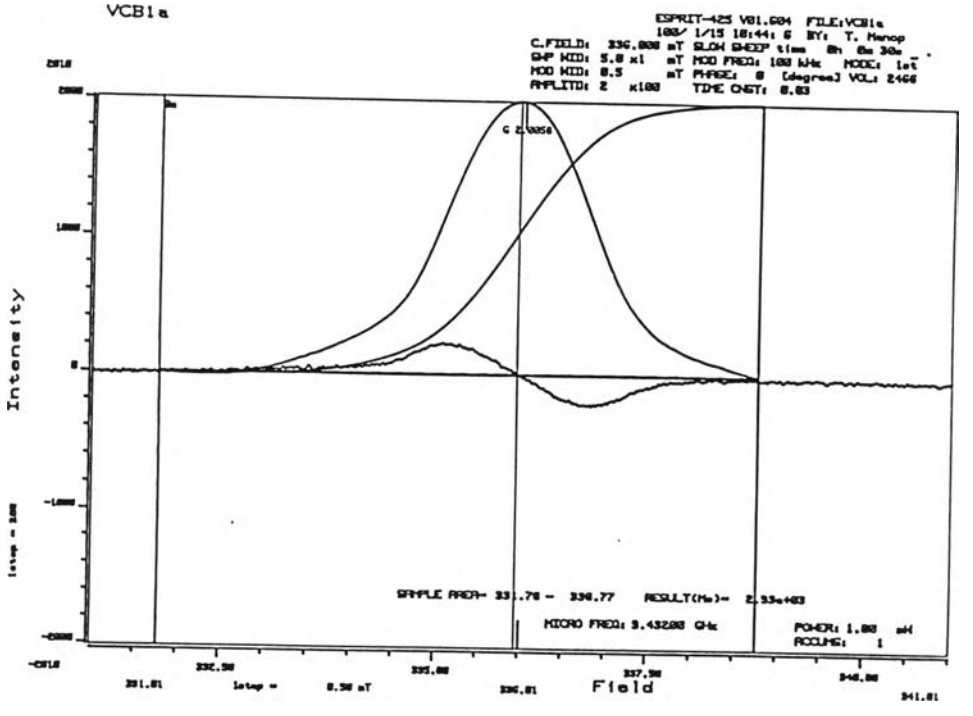
SW WID: 5.0 x1 mT MOD FREQ: 100 kHz MODE: 1st
MOD WID: 0.5 mT PHASE: 0 [degree] VOL: 2467
AMPLITD: 2 x100 TIME CNST: 0.03
SAMPLE AREA= 331.78 - 336.77 RESULT(Ma)= 3.08e+03
MICRO FREQ: 9.42300 GHz
POWER: 1.00 mW
ACCUMS: 1
Intensity
Field
331.00
332.50
335.00
336.80
337.50
340.00
341.00


VIB1a
Intensity
Field
SAMPLE AREA= 33..76 - 336.77
MICRO FREQ: 9.43388 GHz


VCB1a
Intensity
Field
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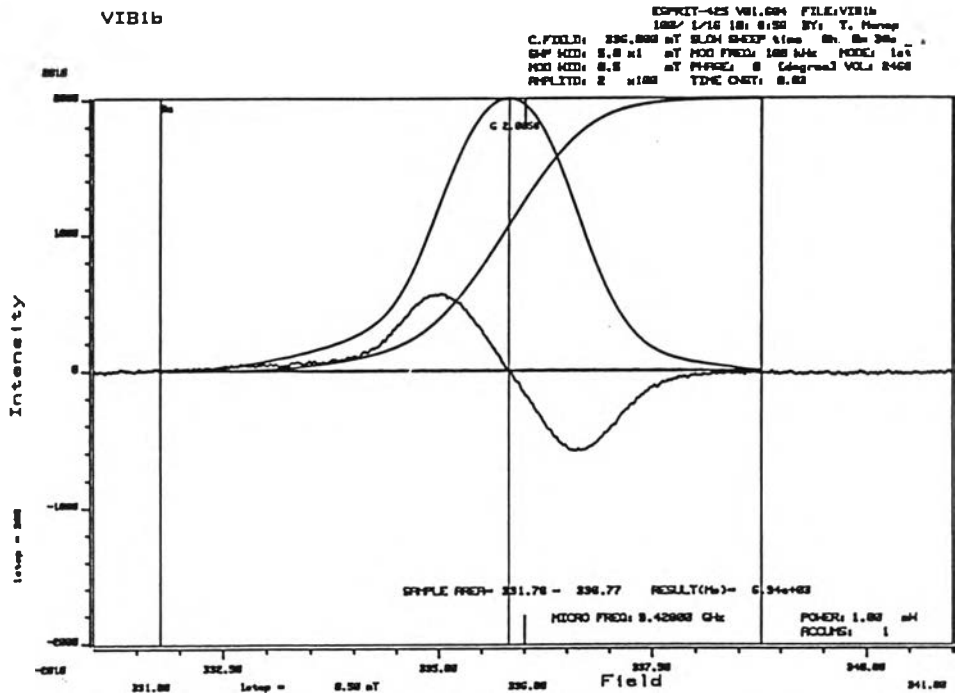
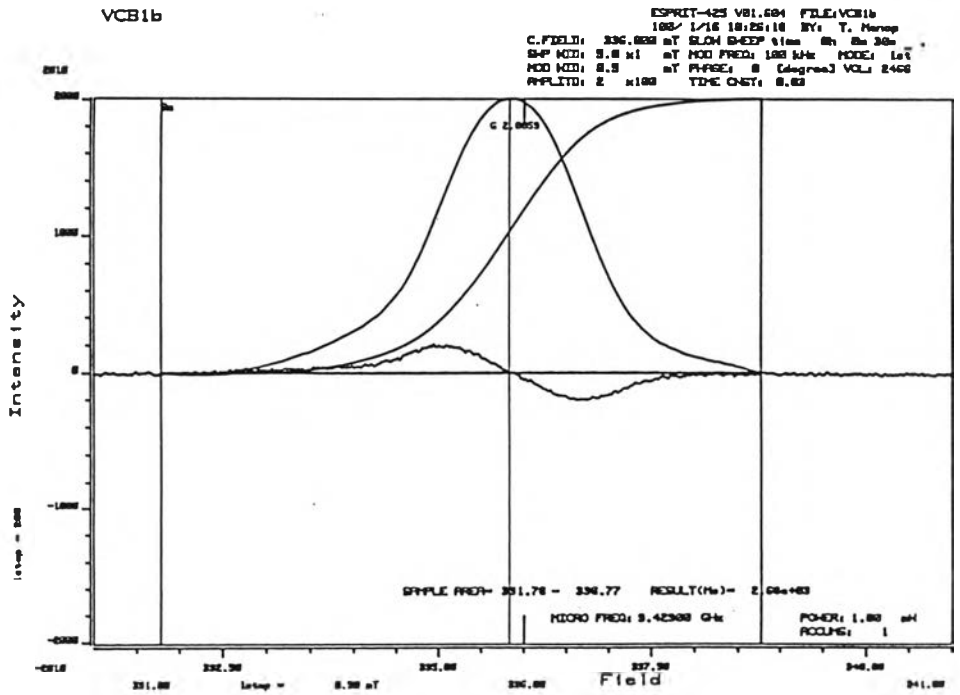
MICRO FREQ: 9.43288 GHz

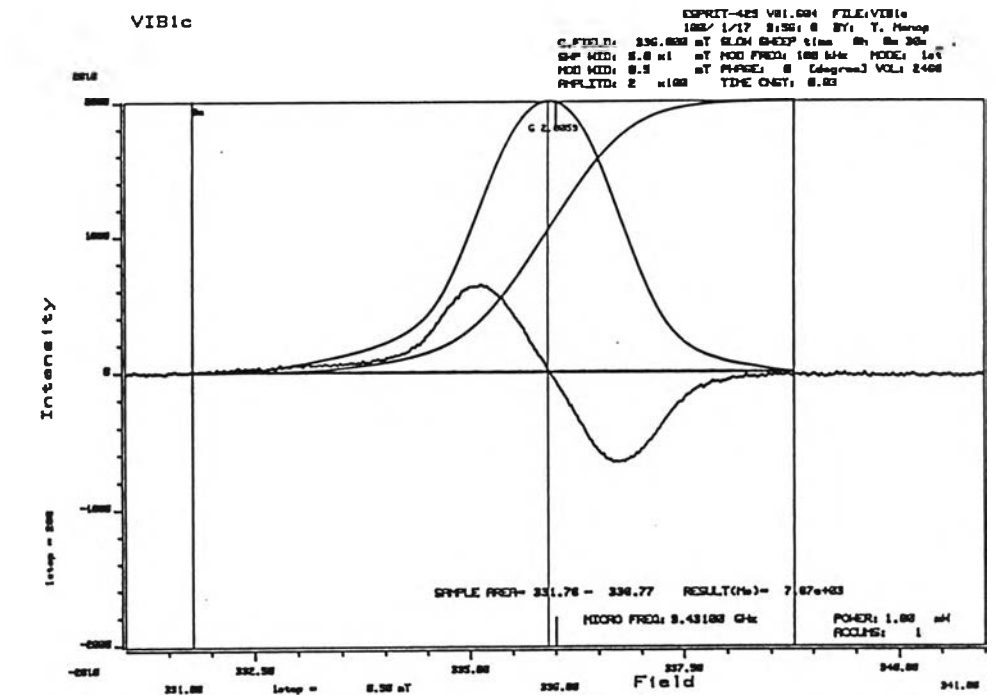
VIB1b


Intensity
Field
SAMPLE AREA= 331.78 - 336.77
MICRO FREQ: 9.42988 GHz
POWER: 1.00 mW
ACCUMS: 1

VCB1b


Intensity
Field
SAMPLE AREA= 331.78 - 336.77
MICRO FREQ: 9.42988 GHz
POWER: 1.00 mW
ACCUMS: 1

VIB1c


Intensity
Field
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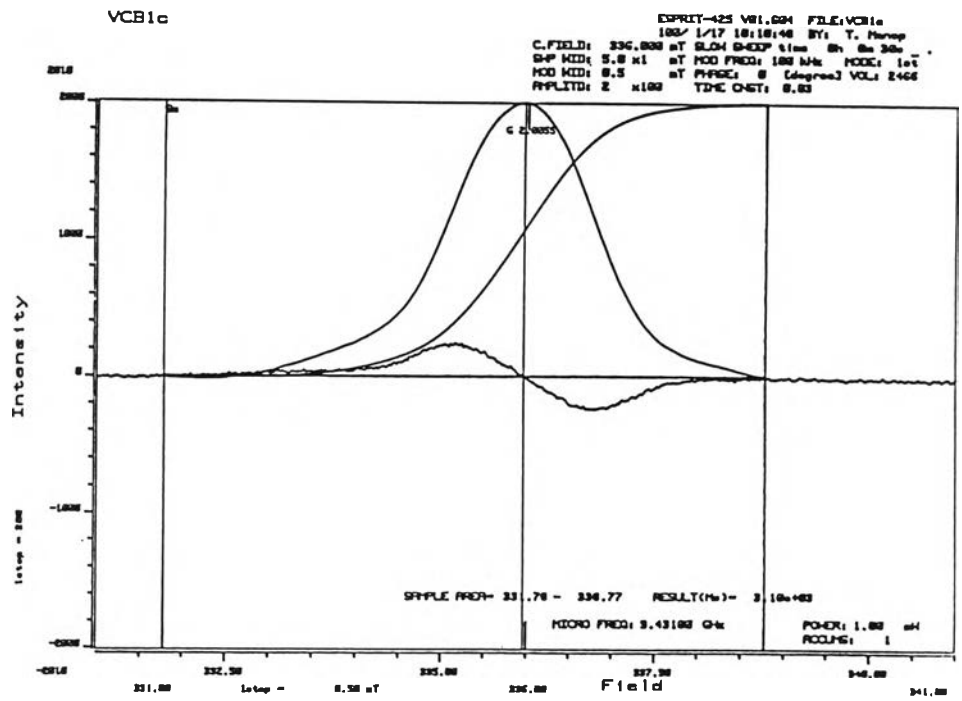
MICRO FREQ: 9.43100 GHz
POWER: 1.00 mW
ACCUMS: 1

VCB1c


Intensity
Field
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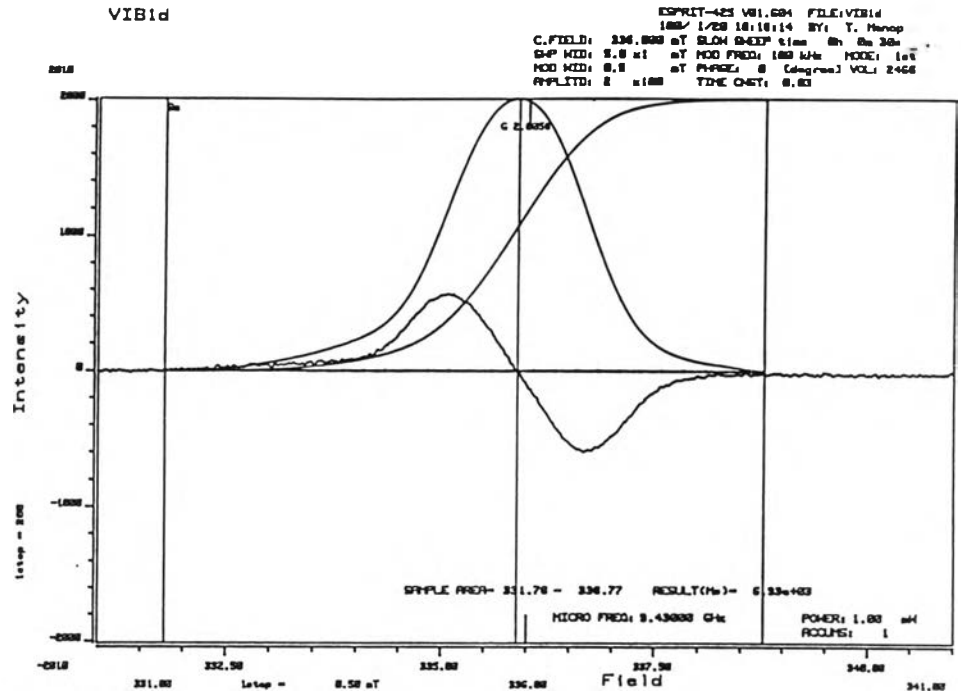
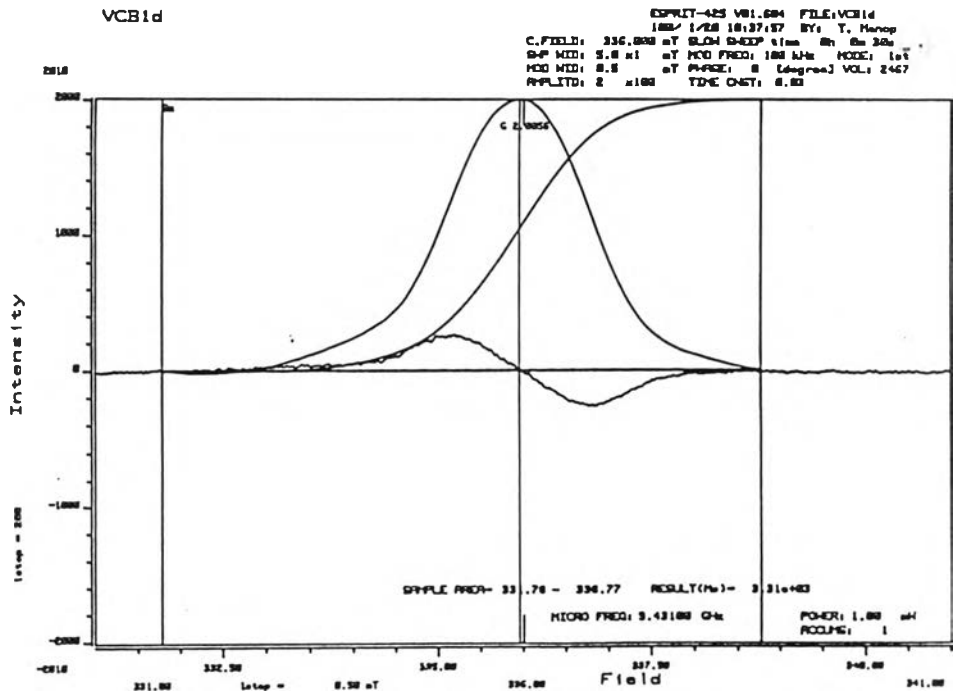
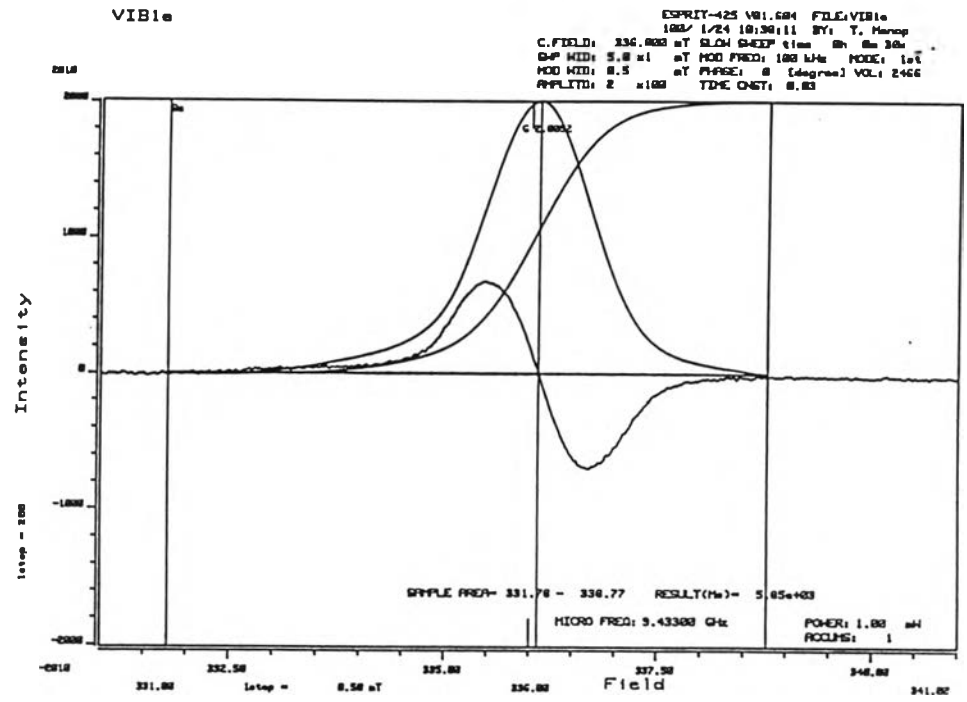
MICRO FREQ: 9.43100 GHz
POWER: 1.00 mW
ACCUMS: 1

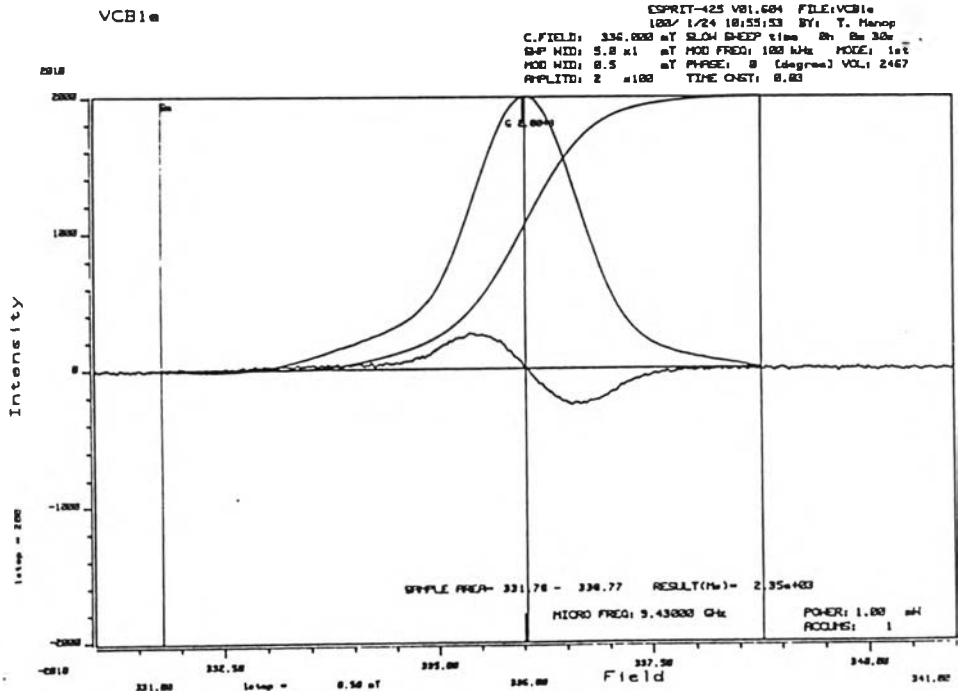
VIB1d



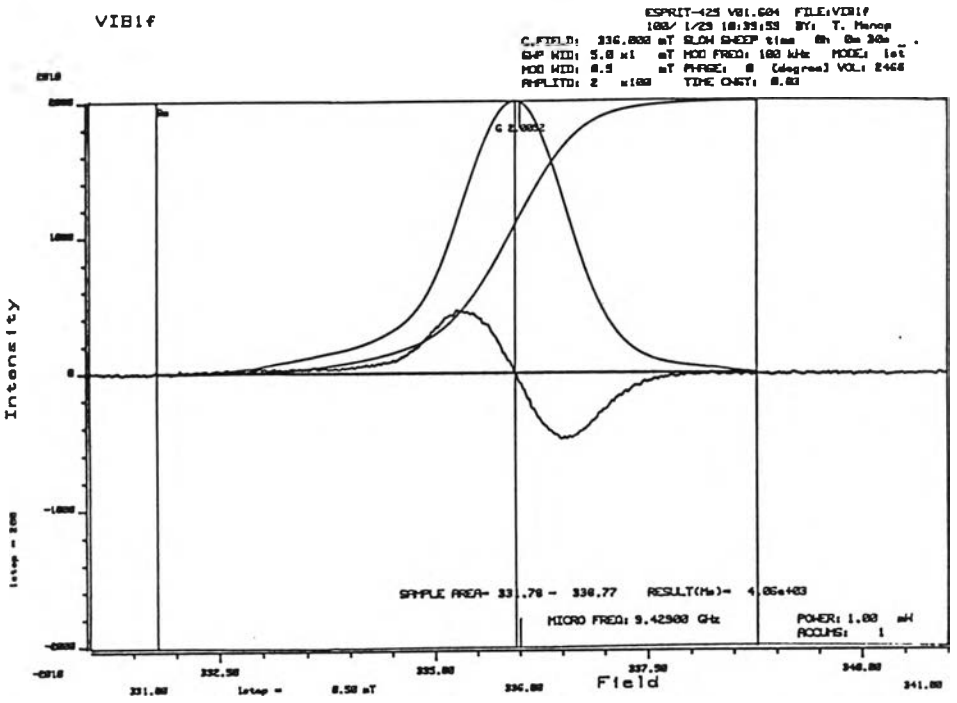
VCB1d




VIB1a
ESPRIT-425 V01.684 FILE:VIB1a
C.FIELD: 336.000 mT SLOW SWEEP time 0h 0m 30s
SWP WID: 5.0 x1 mT MOD FREQ: 100 kHz MODE: 1st
MOD WID: 0.5 mT PHASE: 0 [degree] VOL: 2466
AMPLITD: 2 x100 TIME CNST: 0.03
SAMPLE AREA= 331.78 - 336.77 RESULT(Hz)= 5.05e+03
MICRO FREQ: 9.43300 GHz
POWER: 1.00 mW
ACCUMS: 1
Intensity
Field


VCB1a
ESPRIT-425 V01.684 FILE:VCB1a
C.FIELD: 336.000 mT SLOW SWEEP time 0h 0m 30s
SWP WID: 5.0 x1 mT MOD FREQ: 100 kHz MODE: 1st
MOD WID: 0.5 mT PHASE: 0 [degree] VOL: 2467
AMPLITD: 2 x100 TIME CNST: 0.03
SAMPLE AREA= 331.78 - 336.77 RESULT(Hz)= 2.35e+03
MICRO FREQ: 9.43300 GHz
POWER: 1.00 mW
ACCUMS: 1
Intensity
Field

VIB1f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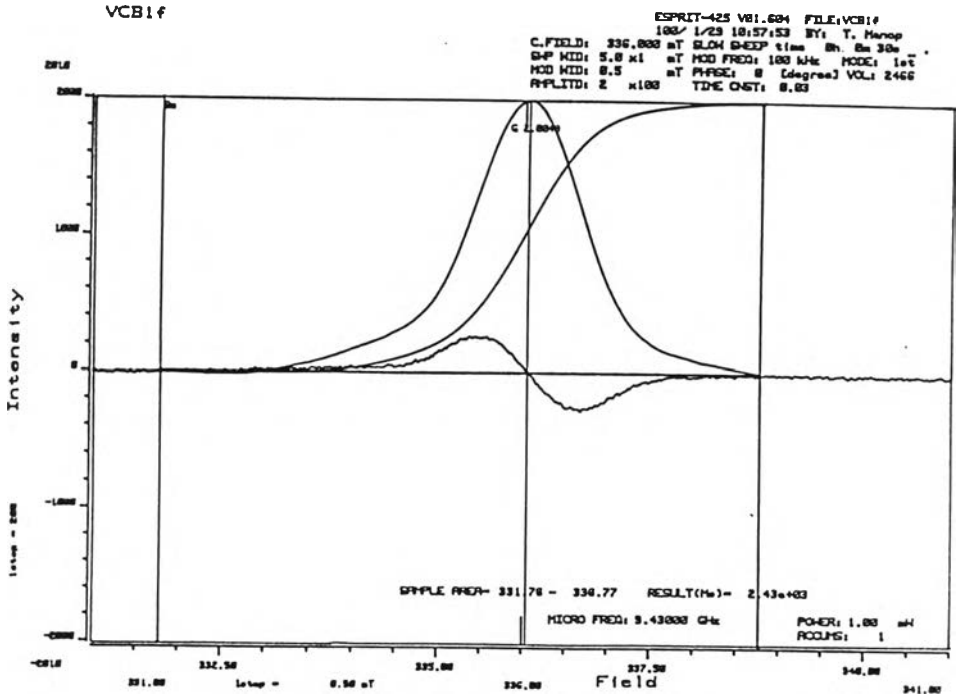
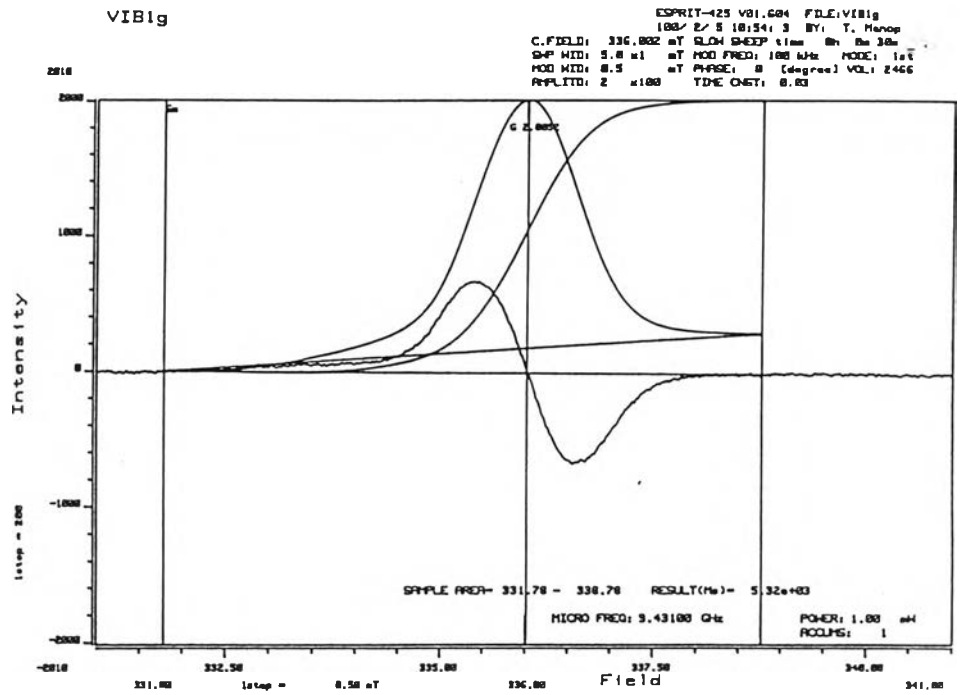
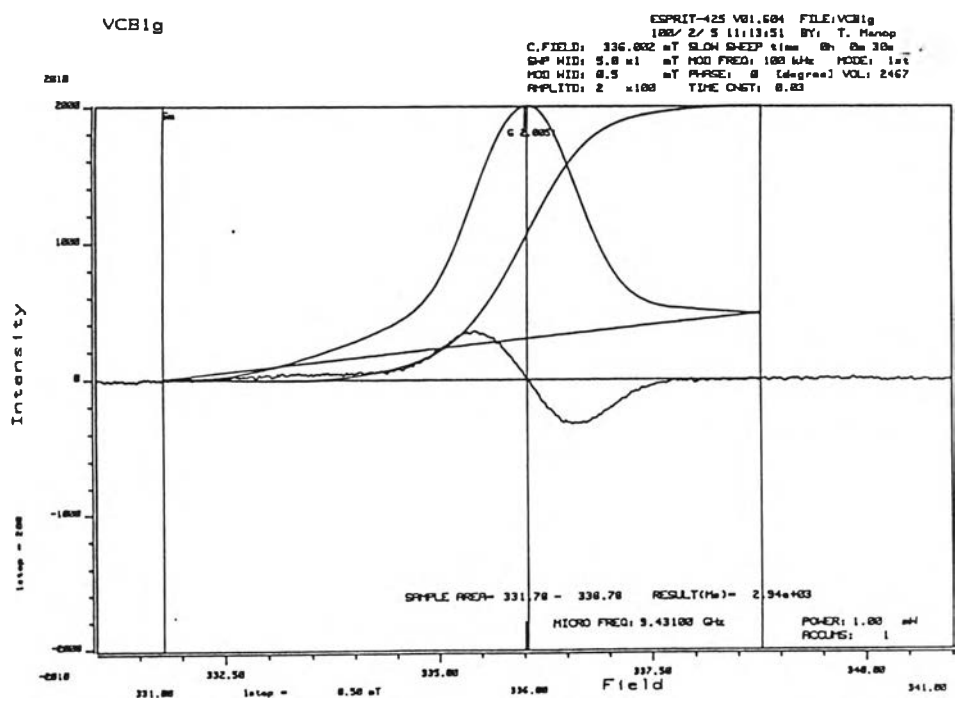
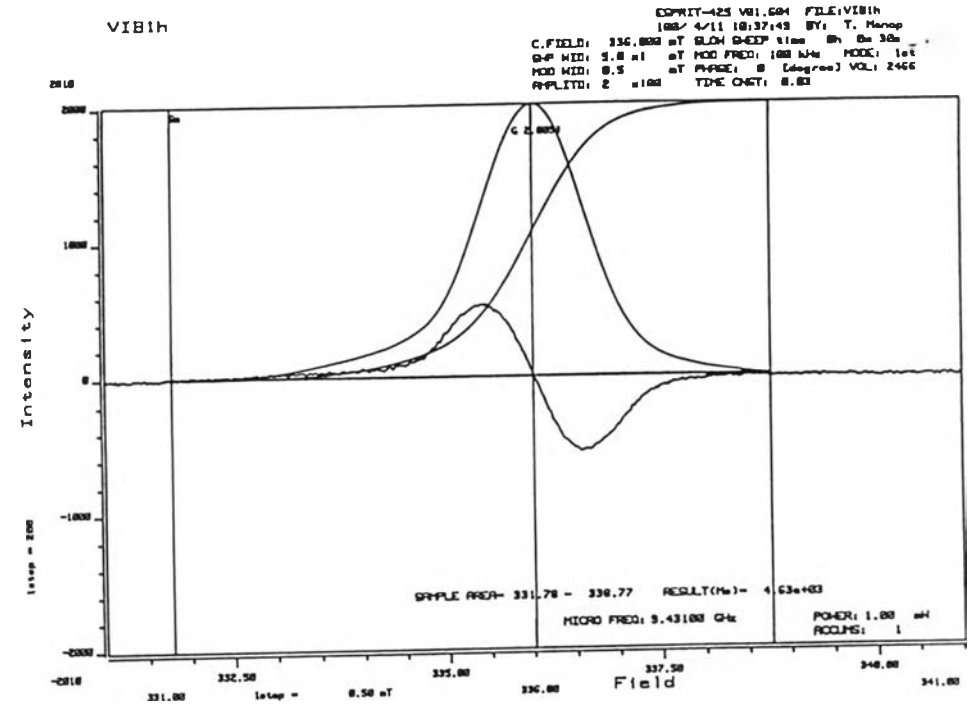
C.FIELD: 336.800 mT SLOW SWEEP time 0h 0m 30s
SWP WID: 5.0 x1 mT MOD FREQ: 100 kHz MODE: 1st
MOD WID: 0.5 mT PHASE: 0 [degree] VOL: 2466
AMPLITD: 2 x100 TIME CNST: 0.03
Intensity
SAMPLE AREA= 33 .78 - 336.77 RESULT(Hz)= 4.05e+03
MICRO FREQ: 9.42900 GHz
POWER: 1.00 mW
ACCUMS: 1
Field

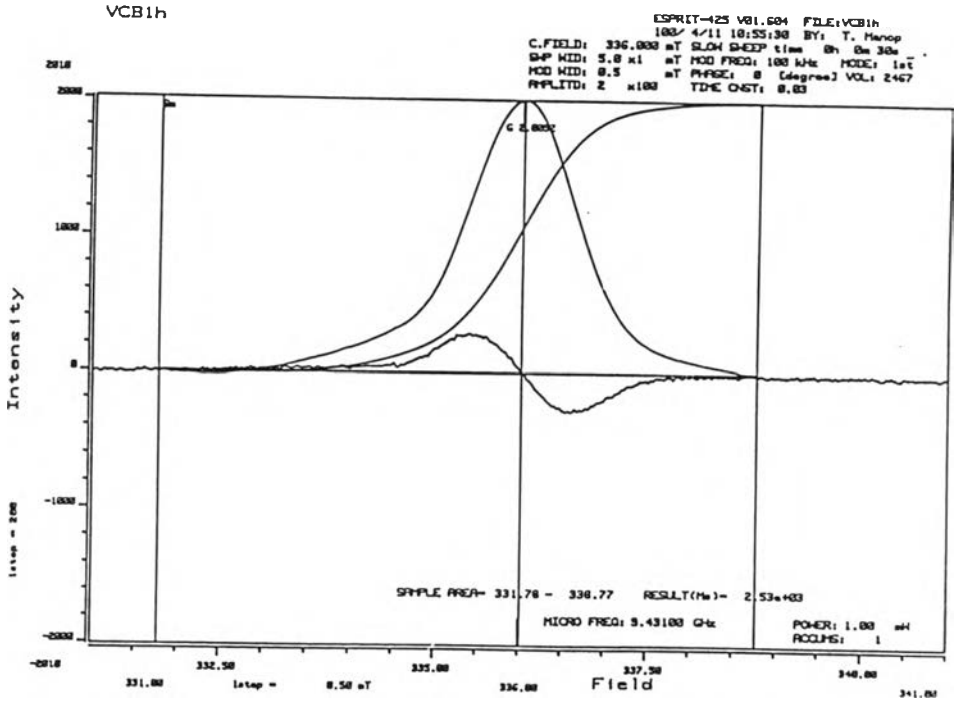
VCB1f


ESPRIT-425 V01.604 FILE:VCB1f
C.FIELD: 336.800 mT SLOW SWEEP time 0h 0m 30s
SWP WID: 5.0 x1 mT MOD FREQ: 100 kHz MODE: 1st
MOD WID: 0.5 mT PHASE: 0 [degree] VOL: 2466
AMPLITD: 2 x100 TIME CNST: 0.03
Intensity
SAMPLE AREA= 331.78 - 336.77 RESULT(Hz)= 2.43e+03
MICRO FREQ: 9.43000 GHz
POWER: 1.00 mW
ACCUMS: 1
Field

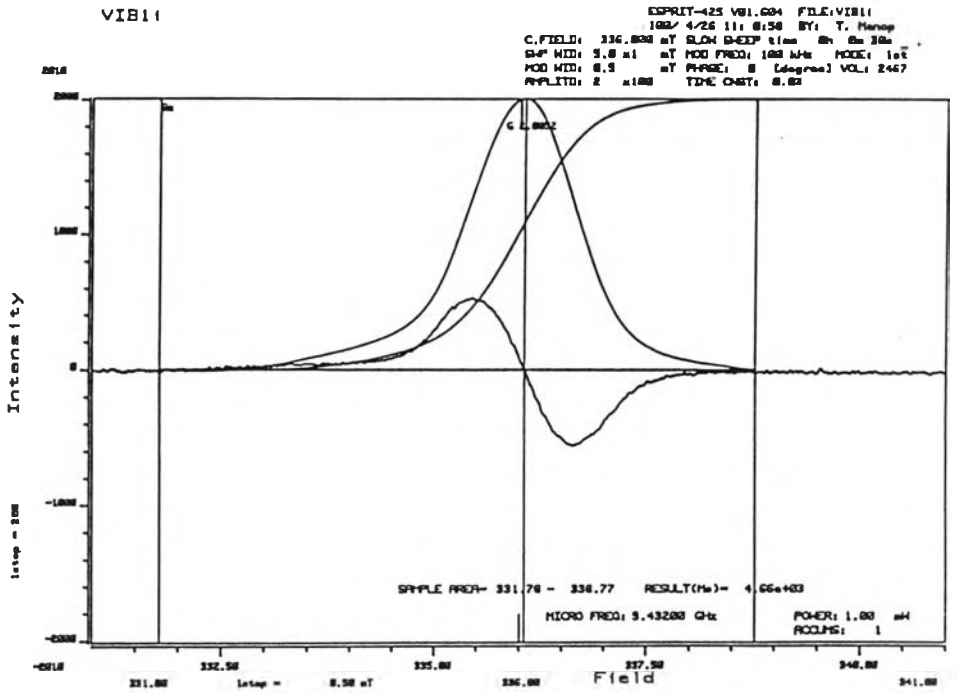

VIB1g
ESPRIT-425 V01.604 FILE:VIB1g
C.FIELD: 336.002 mT SLOW SWEEP time 0h 0m 30s
SWP WID: 5.0 x1 mT MOD FREQ: 100 kHz MODE: 1st
MOD WID: 0.5 mT PHASE: 0 [degree] VOL: 2466
AMPLITD: 2 x100 TIME CNST: 0.03
SAMPLE AREA= 331.78 - 338.78 RESULT(Ms)= 5.32e+03
MICRO FREQ: 9.43100 GHz
POWER: 1.00 mW
ACCUMS: 1
Intensity
Field


VCB1g
ESPRIT-425 V01.604 FILE:VCB1g
C.FIELD: 336.002 mT SLOW SWEEP time 0h 0m 30s
SWP WID: 5.0 x1 mT MOD FREQ: 100 kHz MODE: 1st
MOD WID: 0.5 mT PHASE: 0 [degree] VOL: 2467
AMPLITD: 2 x100 TIME CNST: 0.03
SAMPLE AREA= 331.78 - 338.78 RESULT(Ms)= 2.94e+03
MICRO FREQ: 9.43100 GHz
POWER: 1.00 mW
ACCUMS: 1
Intensity
Field

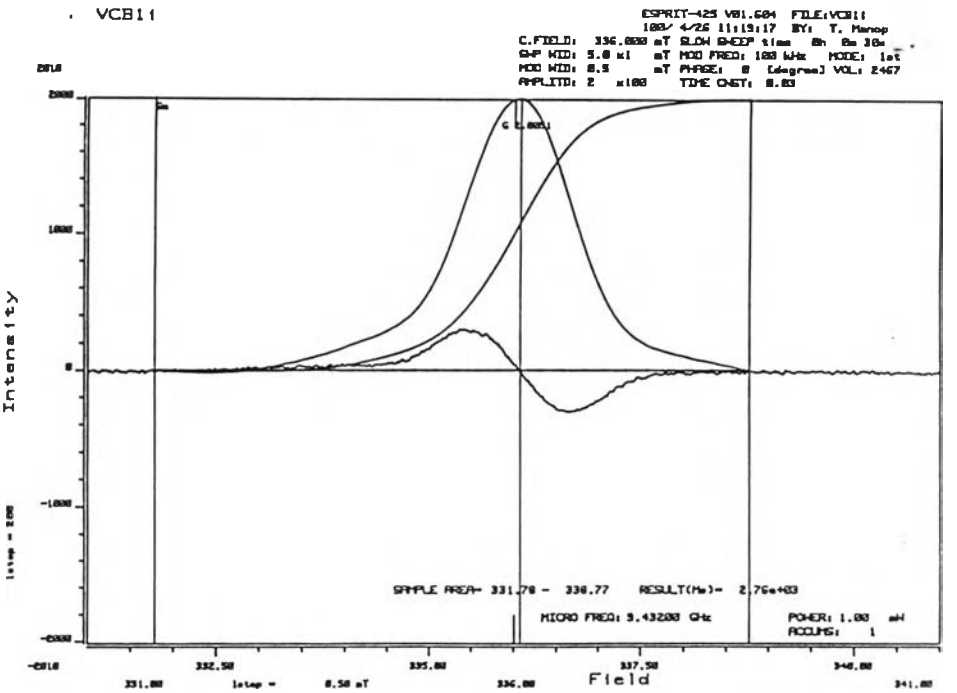

VIB1h
Intensity
Field
SAMPLE AREA= 331.78 - 338.77
MICRO FREQ: 9.43100 GHz
POWER: 1.00 mW
ACCUMS: 1

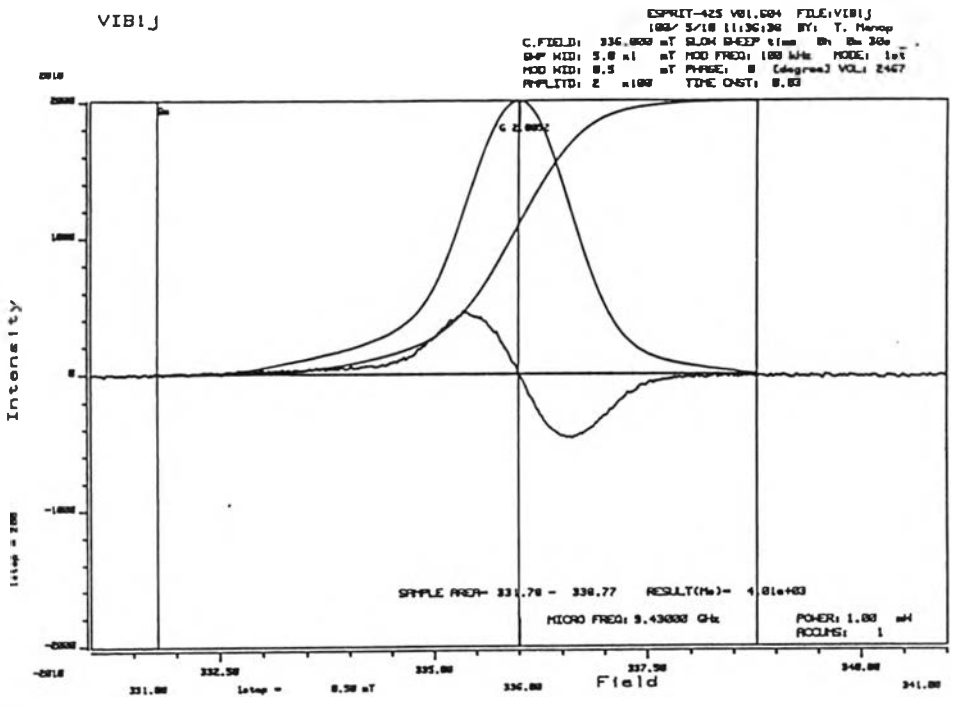

VCB1h
Intensity
Field
SAMPLE AREA= 331.78 - 338.77
MICRO FREQ: 9.43100 GHz
POWER: 1.00 mW
ACCUMS: 1

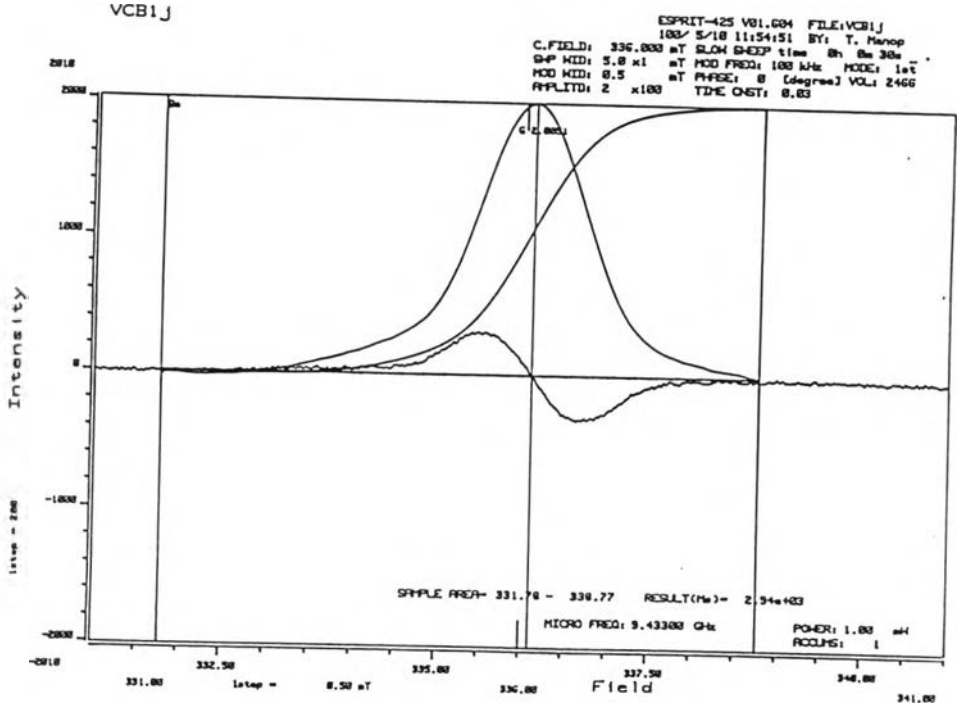
VIB11


ESPRIT-425 V01.604 FILE:VIB11
C.FIELD: 336.000 mT SLOW SWEEP time 0h 0m 30s
SWP WID: 5.0 x1 mT MOD FREQ: 100 kHz MODE: 1st
MOD WID: 0.5 mT PHASE: 0 [degree] VOL: 2467
AMPLITD: 2 x100 TIME CNST: 0.03
SAMPLE AREA= 331.78 - 336.77 RESULT(Ms)= 4.66e+03
MICRO FREQ: 9.43200 GHz
POWER: 1.00 mW
ACCUMS: 1
Intensity
Field

VCB11


ESPRIT-425 V01.604 FILE:VCB11
C.FIELD: 336.000 mT SLOW SWEEP time 0h 0m 30s
SWP WID: 5.0 x1 mT MOD FREQ: 100 kHz MODE: 1st
MOD WID: 0.5 mT PHASE: 0 [degree] VOL: 2467
AMPLITD: 2 x100 TIME CNST: 0.03
SAMPLE AREA= 331.78 - 336.77 RESULT(Ms)= 2.76e+03
MICRO FREQ: 9.43200 GHz
POWER: 1.00 mW
ACCUMS: 1
Intensity
Field


VIB1J
ESPRIT-425 V01.G04 FILE:VIB1J
Intensity
Field
SAMPLE AREA= 331.78 - 336.77 RESULT(Ma)= 4.81e+03
MICRO FREQ: 9.43000 GHz
POWER: 1.00 mW
ACCUMS: 1


VCB1J
ESPRIT-425 V01.G04 FILE:VCB1J
Intensity
Field
SAMPLE AREA= 331.78 - 336.77 RESULT(Ma)= 2.54e+03
MICRO FREQ: 9.43300 GHz
POWER: 1.00 mW
ACCUMS: 1

ประวัติผู้เขียนวิทยานิพนธ์

นาย ธนาวิทย์ กุลรัตนรักษ์ เกิดวันที่ 26 มกราคม พ.ศ. 2518 ที่อำเภอจอมทอง จังหวัดกรุงเทพมหานคร สำเร็จการศึกษาปริญญาตรีวิศวกรรมศาสตรบัณฑิต สาขาวิศวกรรมการอาหาร คณะวิศวกรรมศาสตร์ มหาวิทยาลัยเกษตรศาสตร์ ในปีการศึกษา 2539 และเข้าศึกษาต่อในหลักสูตรวิศวกรรมศาสตรมหาบัณฑิต ภาควิชานิวเคลียร์เทคโนโลยี ที่จุฬาลงกรณ์มหาวิทยาลัย เมื่อ พ.ศ. 2541