

Before the
Federal Communications Commission
Washington, D.C. 20554

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Federal Communications Commission
Office of the Secretary

In the Matter of)
)
Amendment of Part 15 regarding new requirements) ET Docket No. 04-37
and measurement guidelines for Access Broadband)
over Power Line Systems)
)
)
Carrier Current Systems, including Broadband over) ET Docket No. 03-104
Power Line Systems)
)

**SUBMISSION BY THE OFFICE OF ENGINEERING AND TECHNOLOGY,
FEDERAL COMMUNICATIONS COMMISSION**

The following documents are submitted for inclusion in the record of ET Docket No. 04-37, "Amendment of Part 15 regarding new requirements and measurement guidelines for Access Broadband over Power Line Systems; Carrier Current Systems, including Broadband over Power Line Systems," ET Docket No. 03-104. These documents comprise internally-generated information upon which the Commission relied, in part, in reaching its determination in the Report and Order in this proceeding.

- 1) A presentation representing data collected during a field test of the Amperion and Main.Net BPL installations in Allentown, Pennsylvania, conducted to familiarize the FCC with the BPL operations and to develop measurement techniques;
- 2) A presentation representing data collected during a field test of the Current Technologies BPL installation in Potomac, Maryland, conducted to familiarize the FCC with the BPL operations and to develop measurement techniques;
- 3) A presentation representing data collected in a field investigation by FCC personnel of the BPL system in Briarcliff Manor, New York, which has been the subject of an interference complaint;
- 4) A presentation representing data collected in a field investigation by FCC personnel of the Progress Energy BPL system near Raleigh, North Carolina, which has been the subject of an interference complaint;
- 5) Spreadsheets with the data underlying each of items 1-4; and
- 6) Emails, letters, and test reports related to each of the complaints the Commission received regarding various BPL operations.

For items 1-4 above, certain portions of those presentations have been redacted, as they represent preliminary or partial results or staff opinions that were part of the deliberative process. Moreover, the redacted information was not relied on by the Commission in making its decision. The redacted portions are indicated by grey shading in place of the subject text.

Bruce Romano
Associate Chief
Office of Engineering and Technology

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Broadband Over Power-Line (BPL) Measurements in Allentown, PA

Results of Radiated Emissions Tests Conducted May 19-22, 2003

June 13, 2003

**Steve Martin & Andy Leimer
Technical Research Branch
FCC Laboratory**

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System Descriptions

(PROPRIETARY)

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AMPERION

- **Signal Structure**
 - OFDM, 3 MHz bandwidth
 - Separate channels for nearby links
- **Injection Level**
 - Set before installation
- **Backhaul Connection**
 - Wireless link (802.11b) to fiber or T1
- **Customer connection**
 - Wireless link (802.11b)
- **BPL Coupling**
 - Inductively couples to one line--usually phase
- **Device Types**
 - “Injector”--BPL-to-backhaul wireless
 - “Extractor”--BPL-to-customer wireless
 - “Repeater”--BPL repeater & wireless to customer
- **Injection Duty Factor**
 - 100% for Injector & outbound Repeater
 - 25-100% (data dependent) for Extractor & inbound Repeater

MAIN.NET

- **Signal Structure**
 - DSSS, One channel, 3-20 MHz
 - TDM for nearby links
- **Injection Level**
 - Set by software over internet
- **Backhaul Connection**
 - BPL to fiber or T1
- **Customer Connection**
 - Proprietary low-voltage BPL
- **BPL Coupling**
 - Inductively couples to two lines--phase & neutral--using opposite polarities
- **Device Types**
 - “Concentrator”--BPL at backhaul
 - “Repeater”--BPL repeater
- **Injection Duty Factor**
 - Data dependent

Major Conclusions

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Compliance w/Part 15 Emission Limits in Intended Band of Operation

- The following comply—*to the extent tested*:
 - Amperion Overhead Injector & Extractor
 - Caveat about operation > 30 MHz & untested operating frequencies
 - Amperion Underground Repeater
 - Main.Net Underground Repeater
- The following does not comply*
 - Main.Net Overhead Repeater (3 dB over the limit)
 - Power level set higher than in submitted test report
 - *Marginal compliance could be argued by distance scaling from ground wire

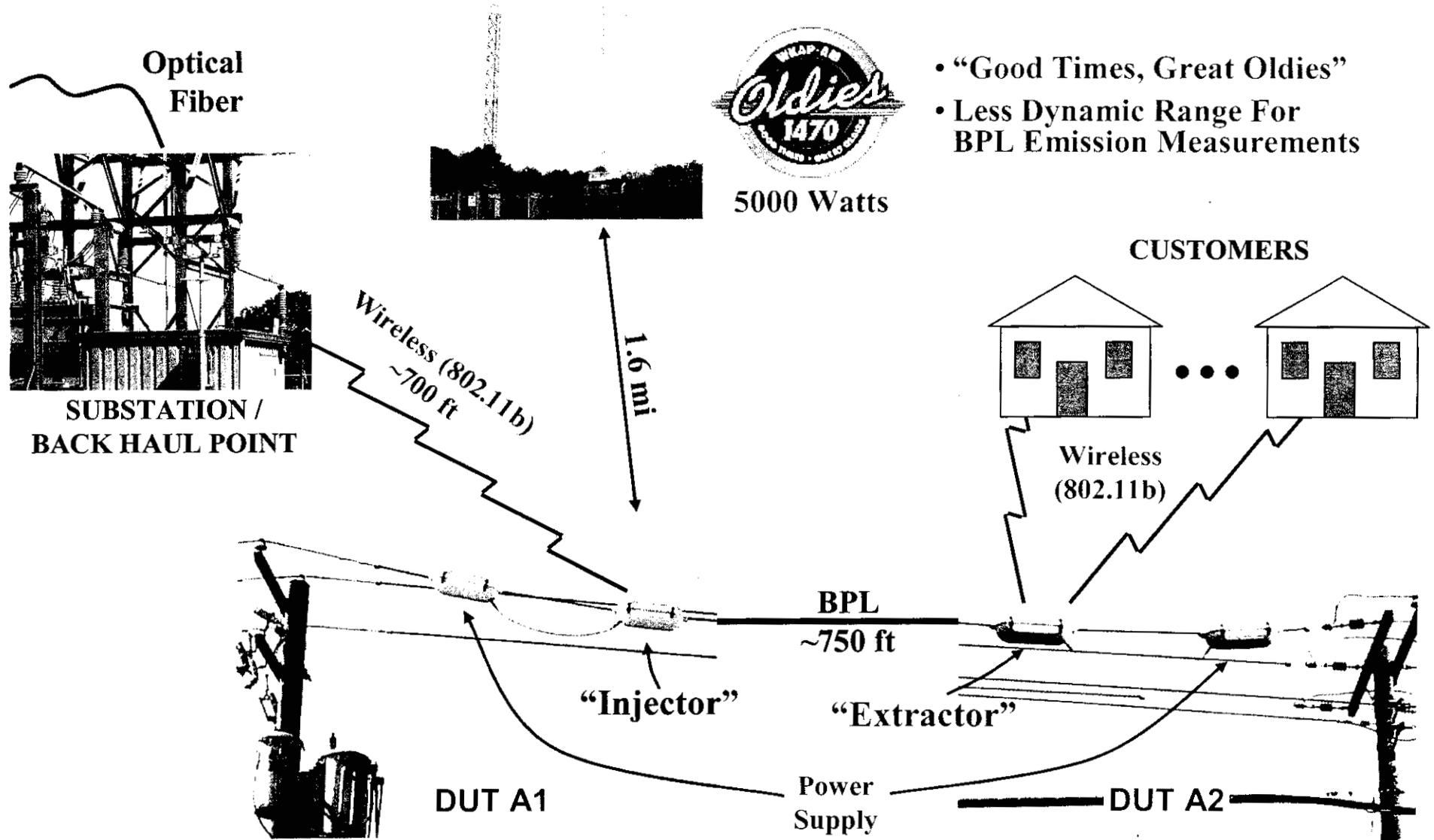


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Amperion Overhead System

Amperion's Overhead System

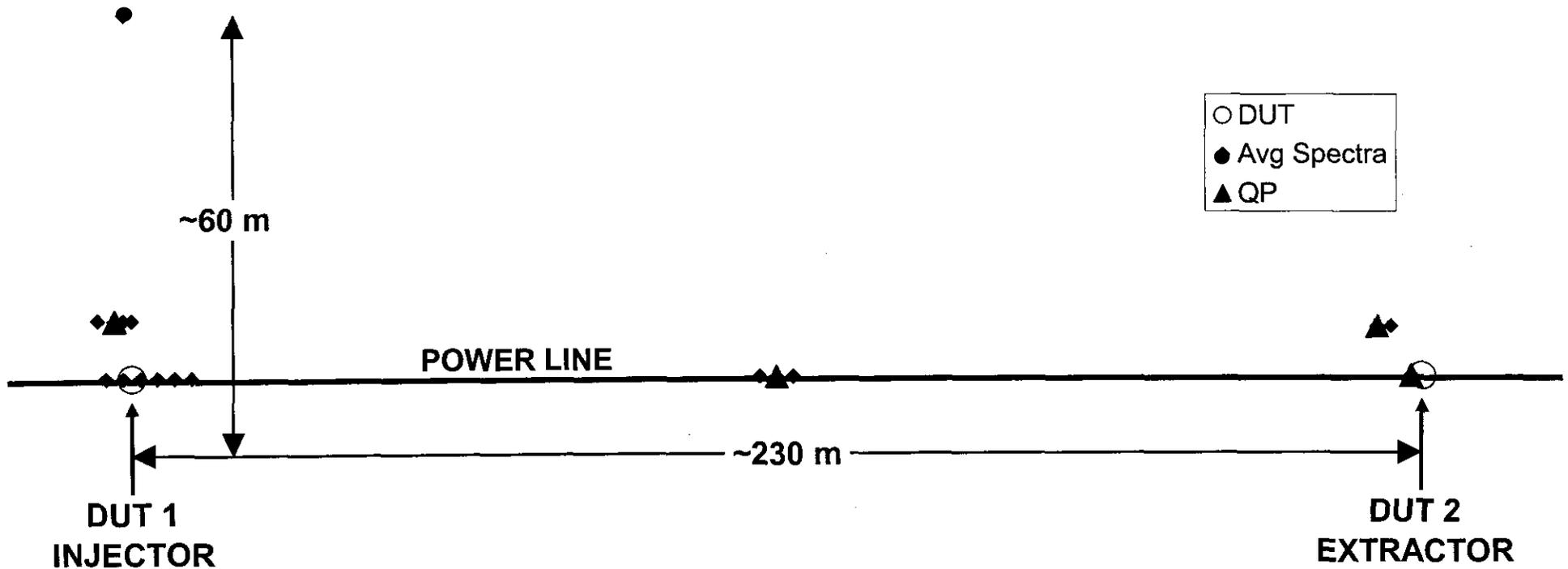
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- “Good Times, Great Oldies”
- Less Dynamic Range For BPL Emission Measurements

Measurement Locations

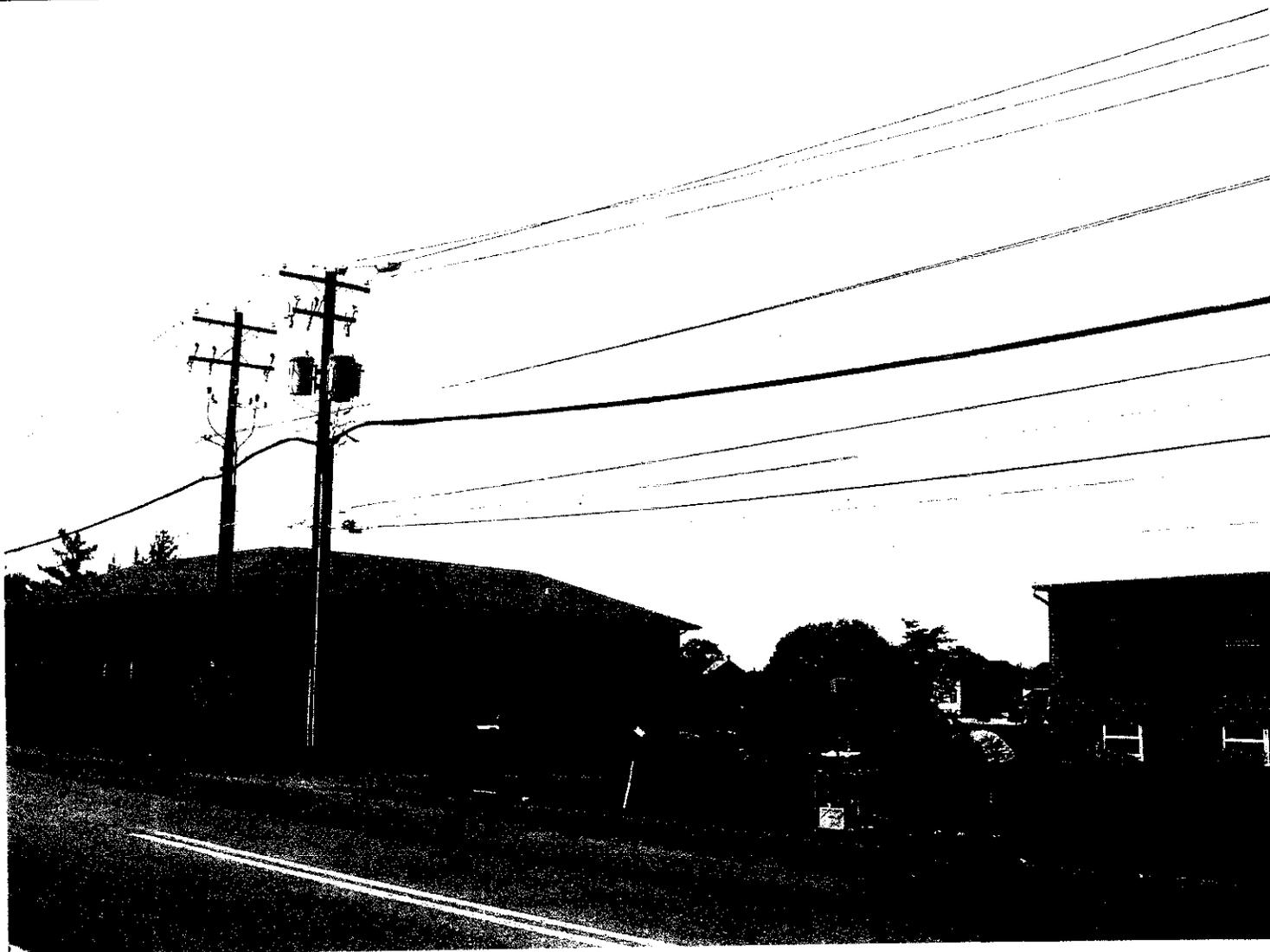
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Made measurements at 18 antenna locations around the Amperion overhead BPL system

DUT A1

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Midpoint Between DUTs

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DUT A2

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AM TOWERS VISIBLE FROM MEASUREMENT SITE

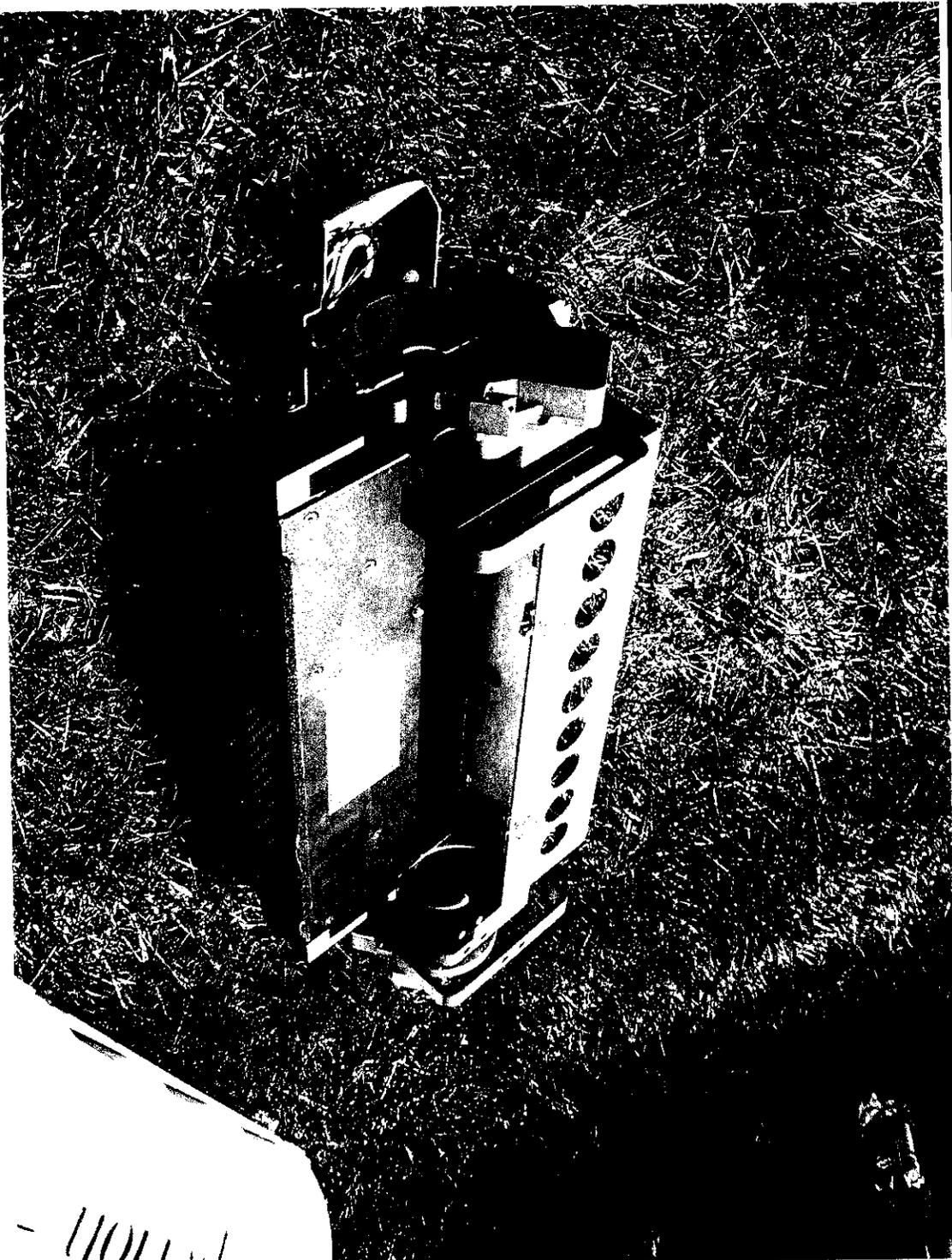
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DUT A2

FCC Laboratory



S. Martin

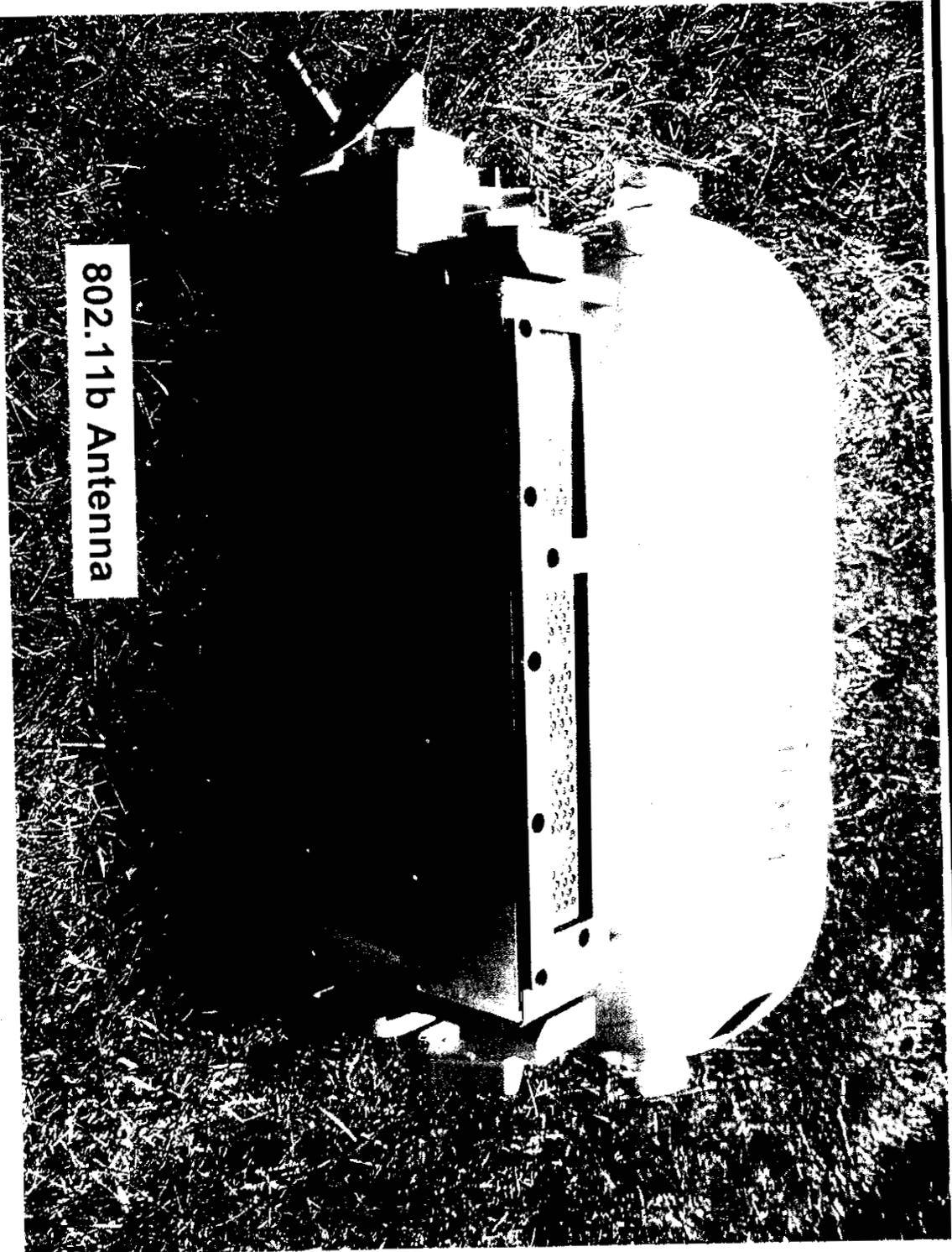
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DUT A2

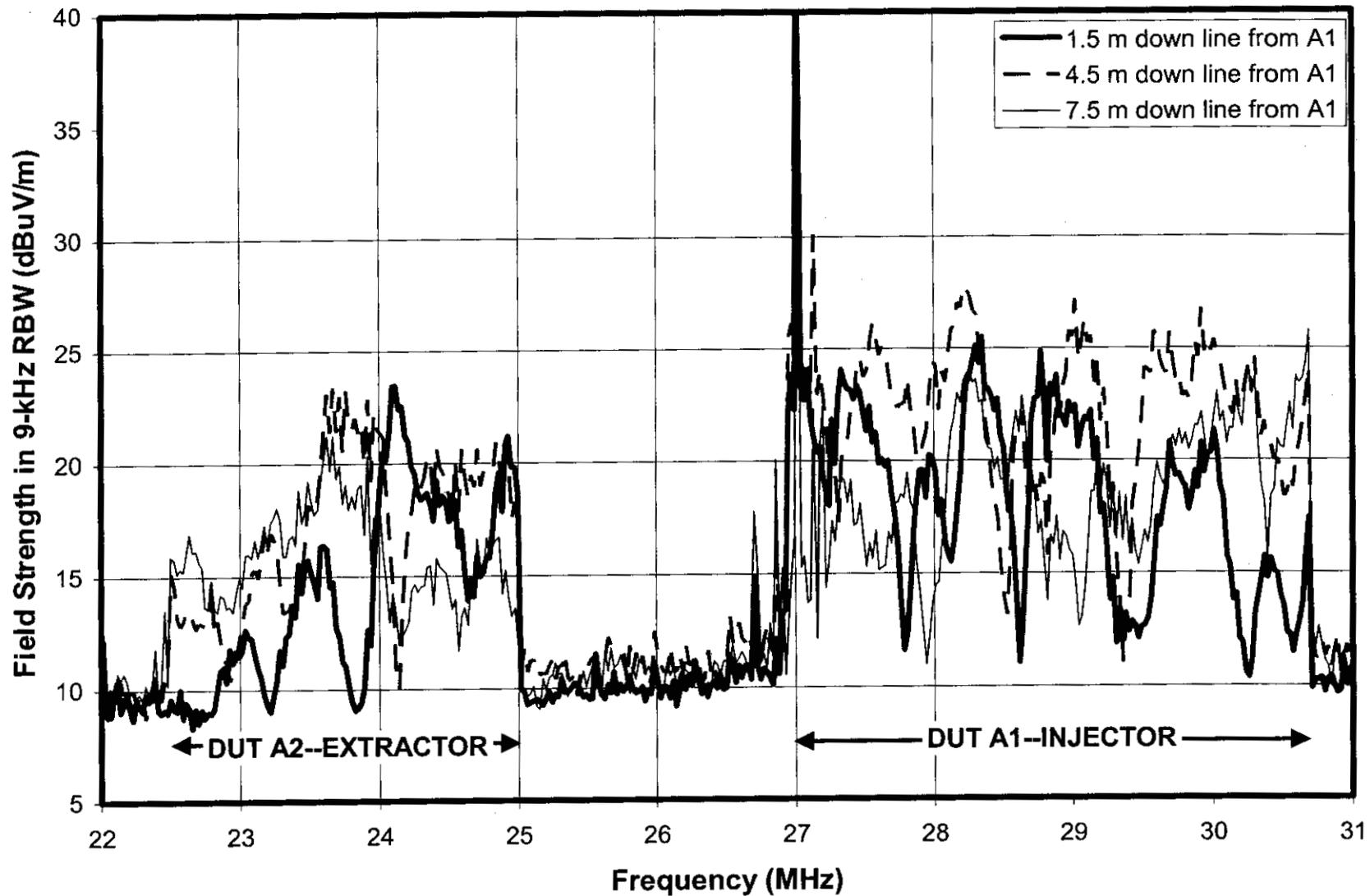
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802.11b Antenna

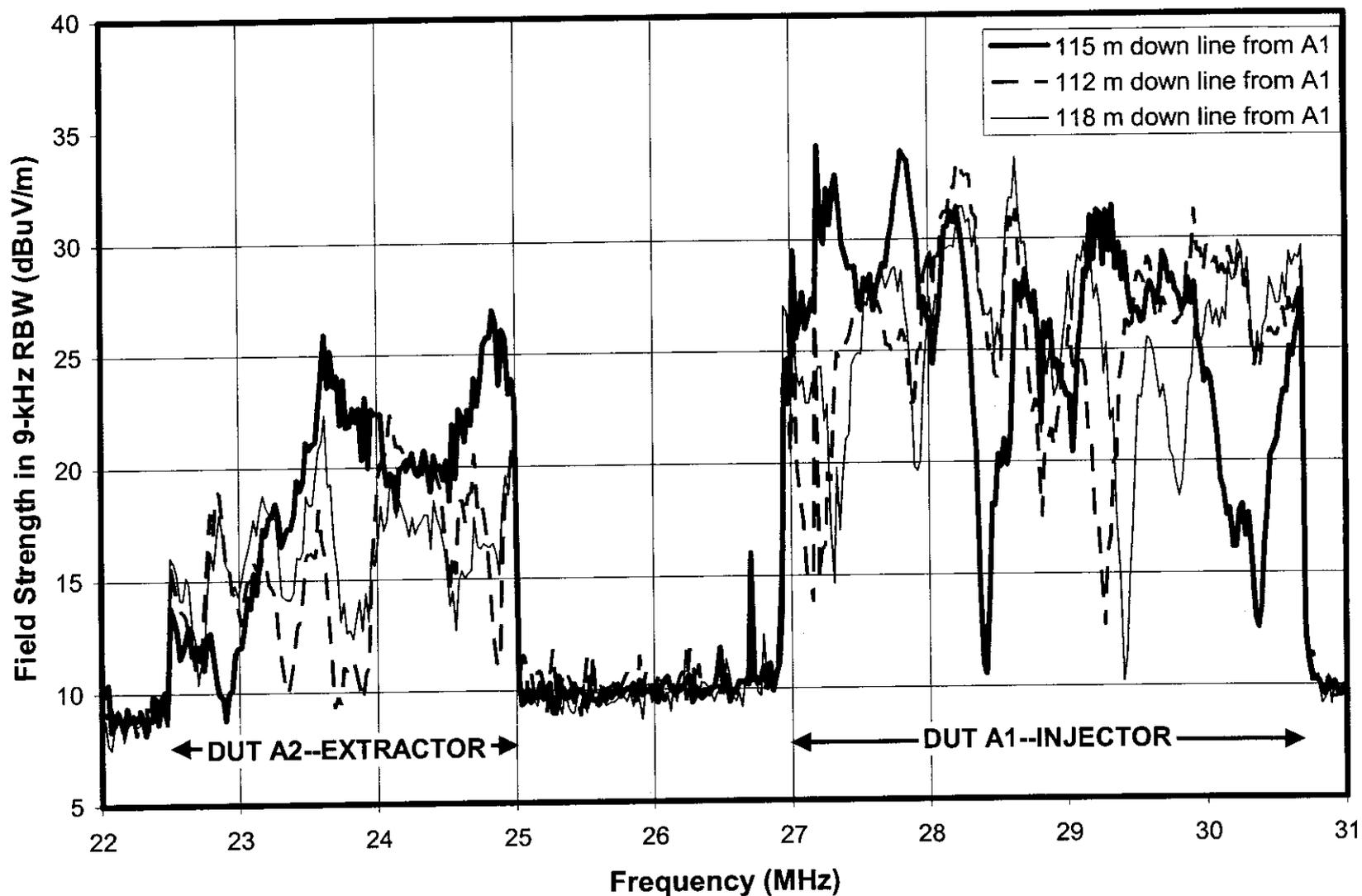
Under DUT A1

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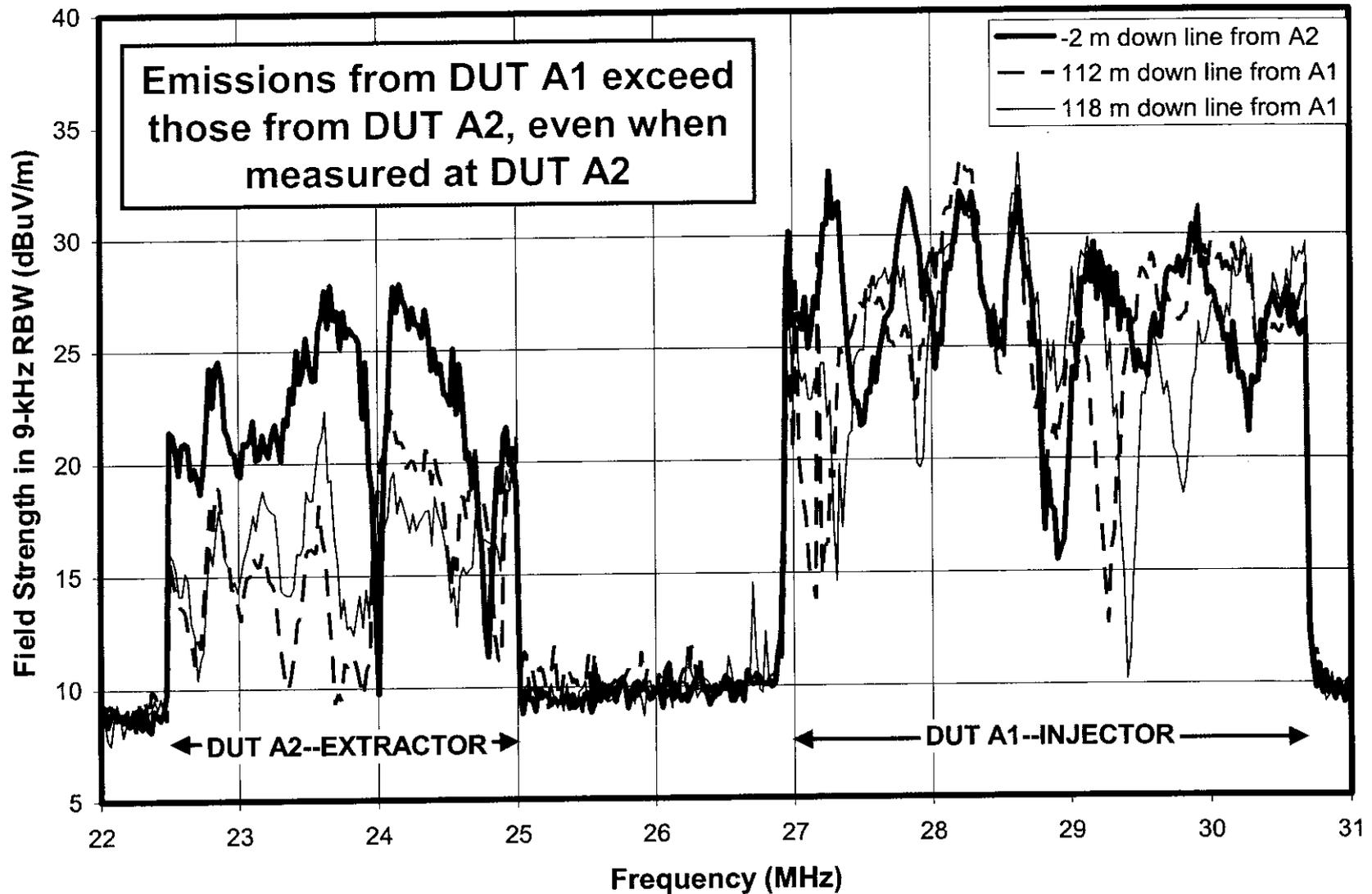
Under Midpoint Between DUTs

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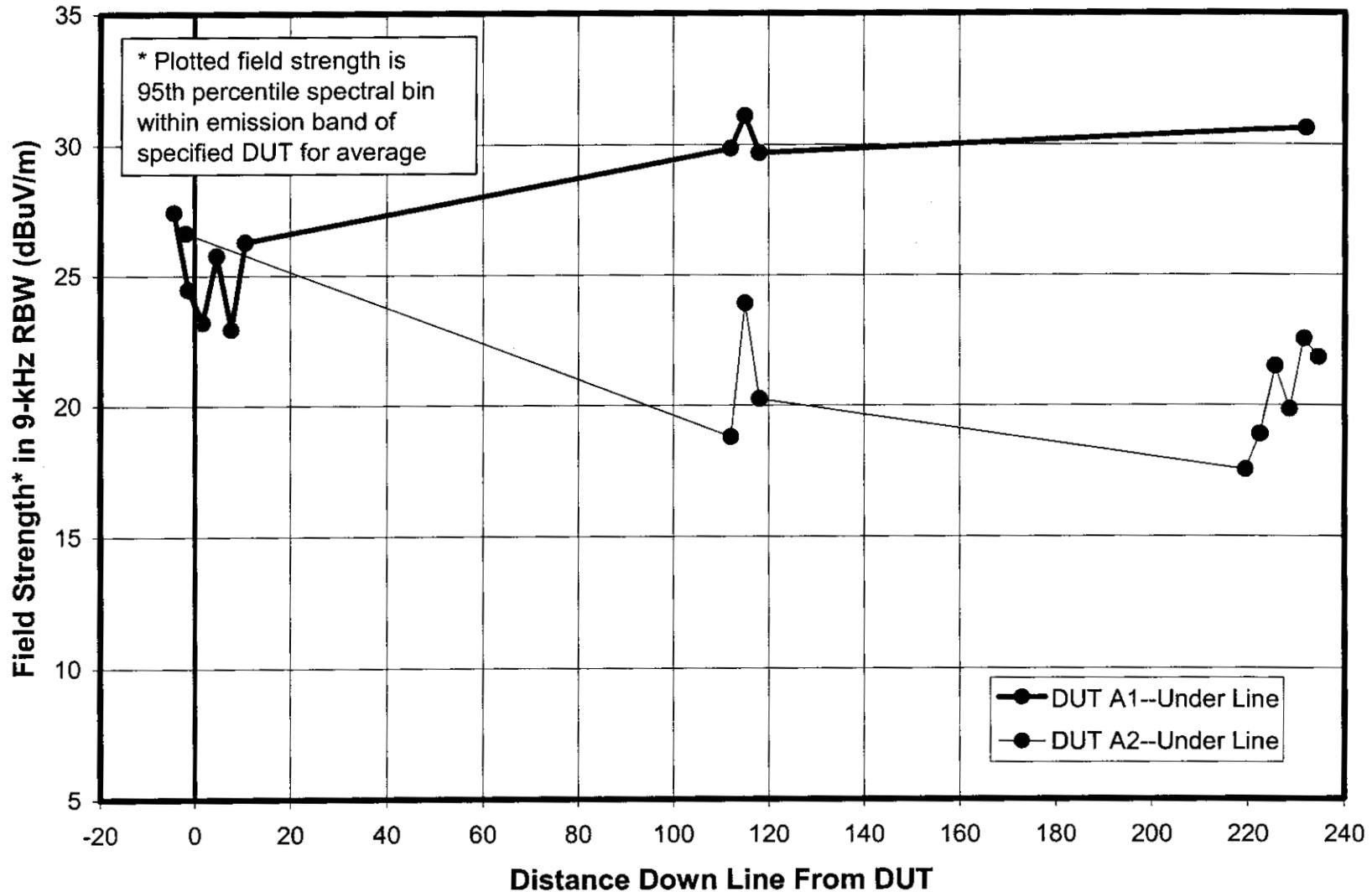
Under DUT A2

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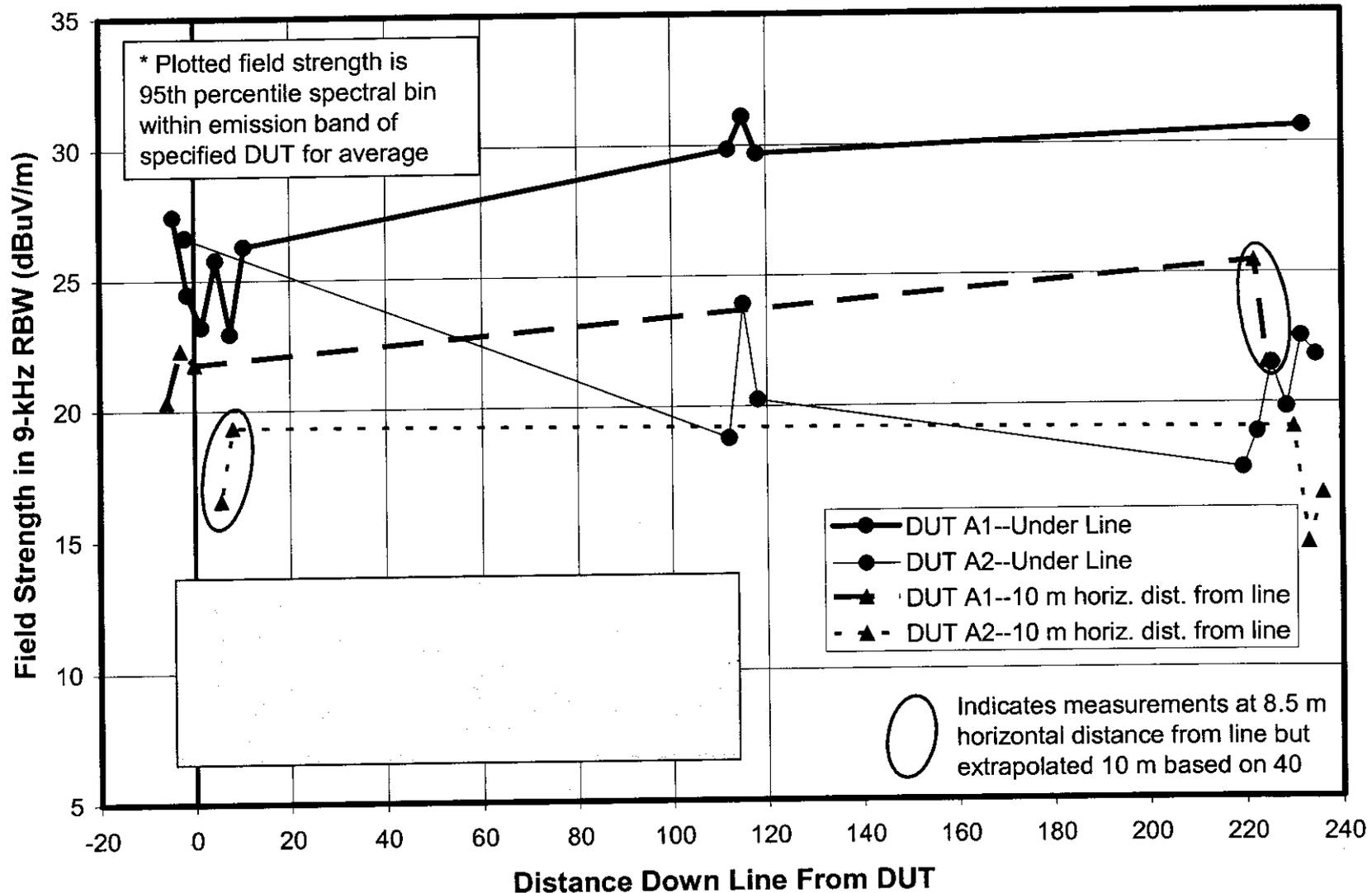
Under-Line Field Strength vs Distance Down Line

FCC Laboratory



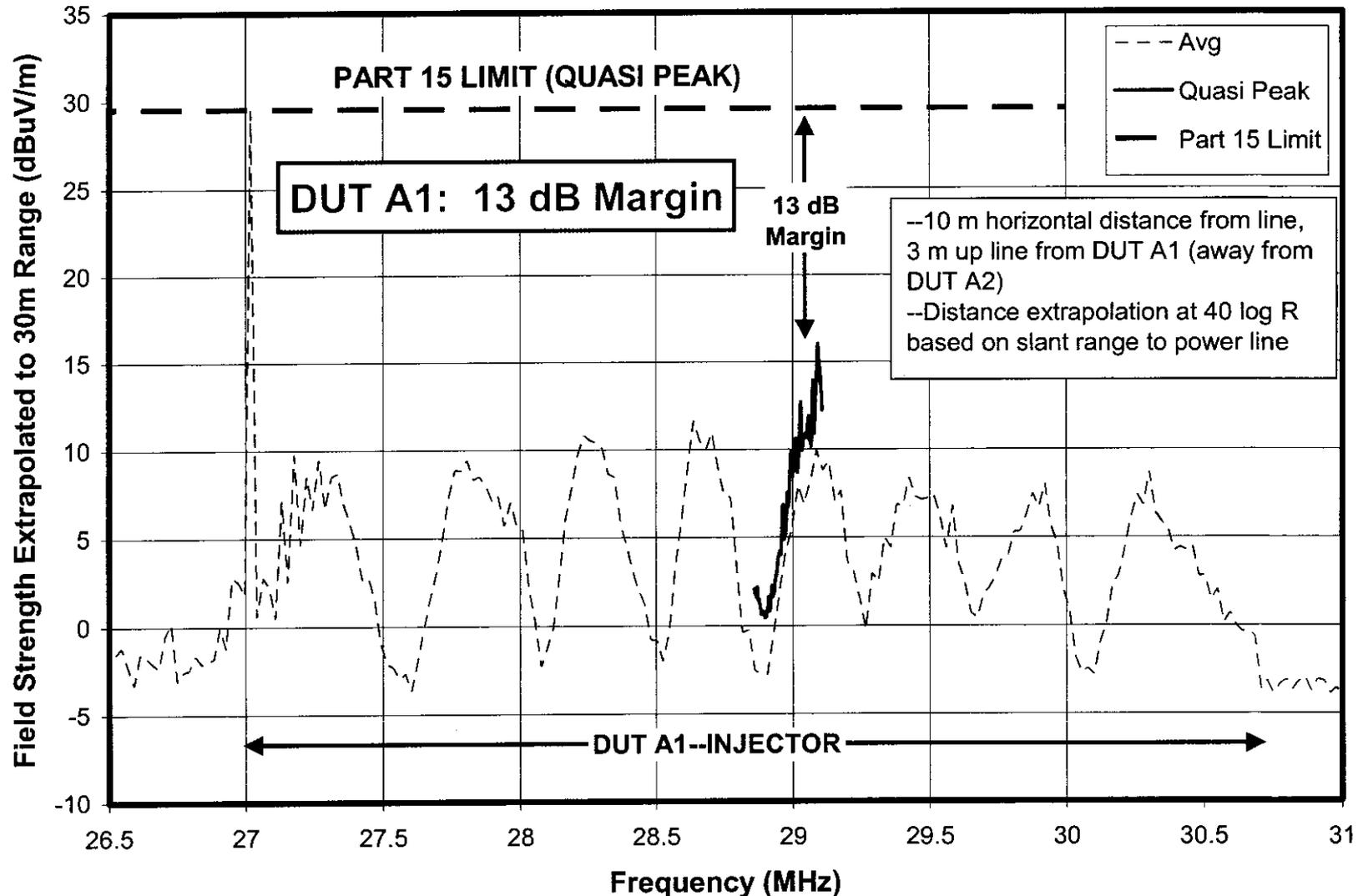
Under-Line Field Strength vs Distance Down Line

FCC Laboratory



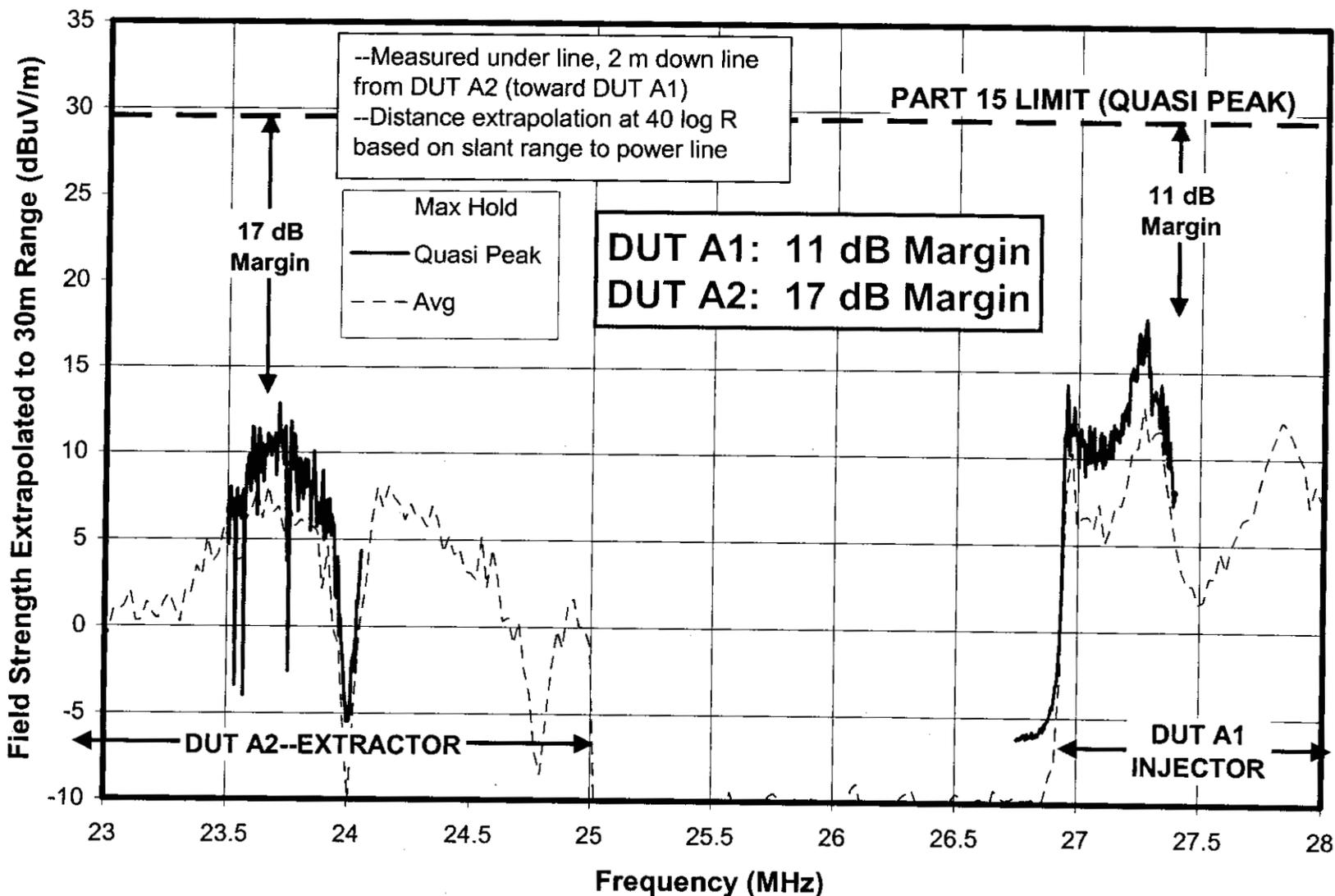
Quasi Peak of DUT A1: 10 m from line near DUT A1

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Quasi Peak of DUTs A1 & A2: Under line near DUT A2

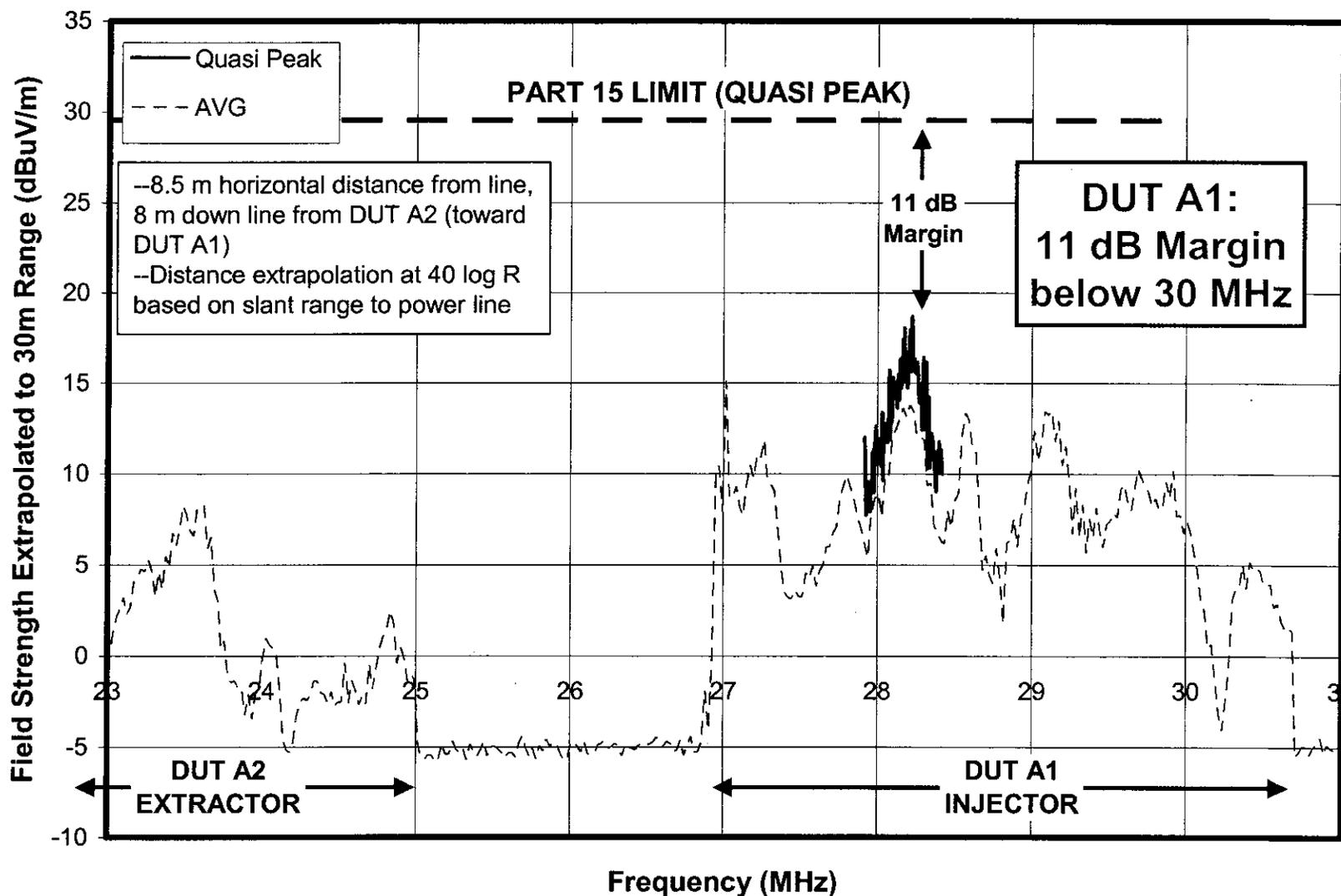
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Quasi Peak of DUTs A1 & A2:

8.5 m from line near DUT A2

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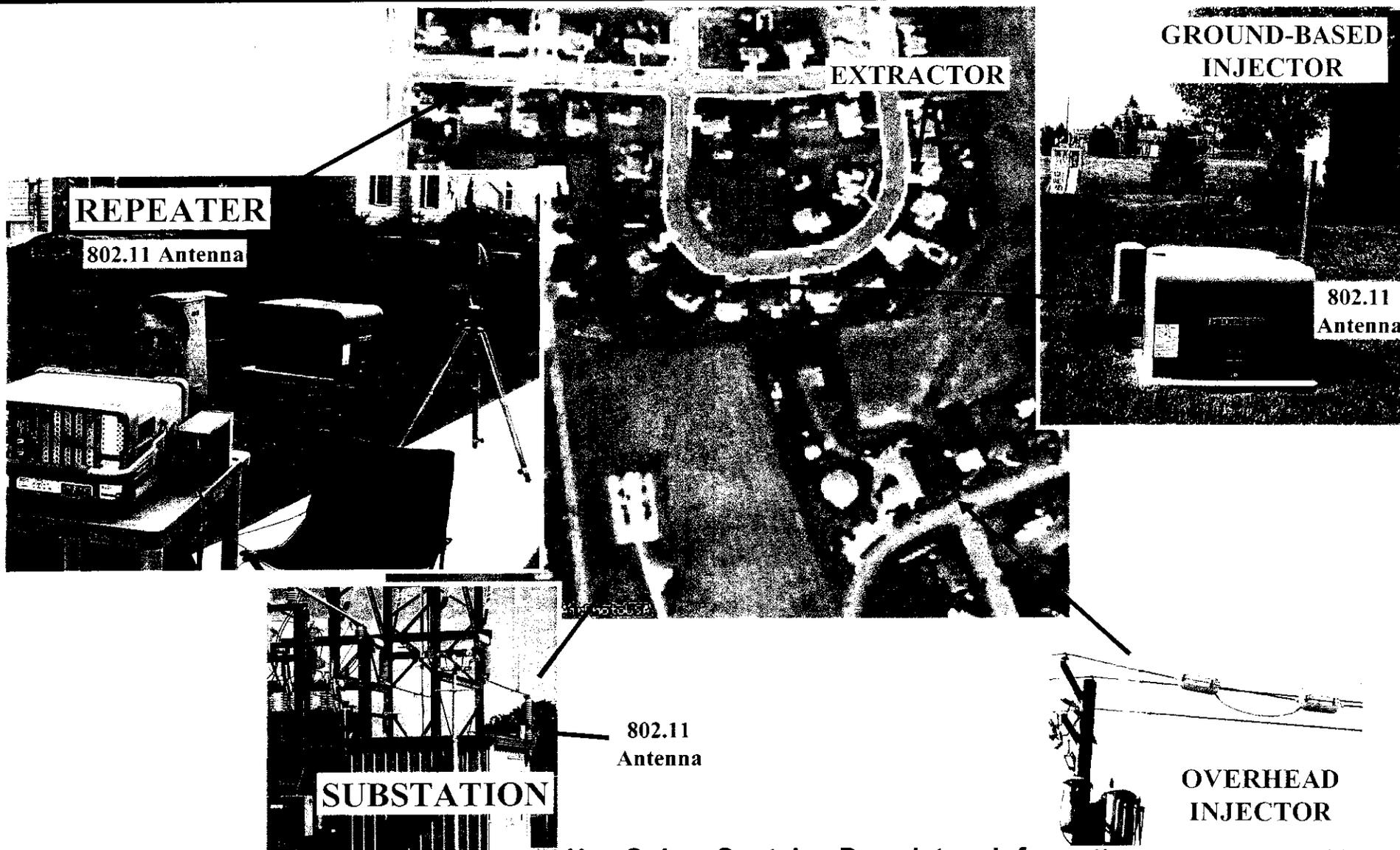


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Amperion Ground-Based System

Amperion's Ground-Based System

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Ground-Based Repeater (DUT A3)

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- Tested at 3 m distance to achieve adequate SNR
- Tested 4 radials: 90°, 45°, 0°, & - 45° (CW from street)
- Highest emissions at 45° (as shown)

