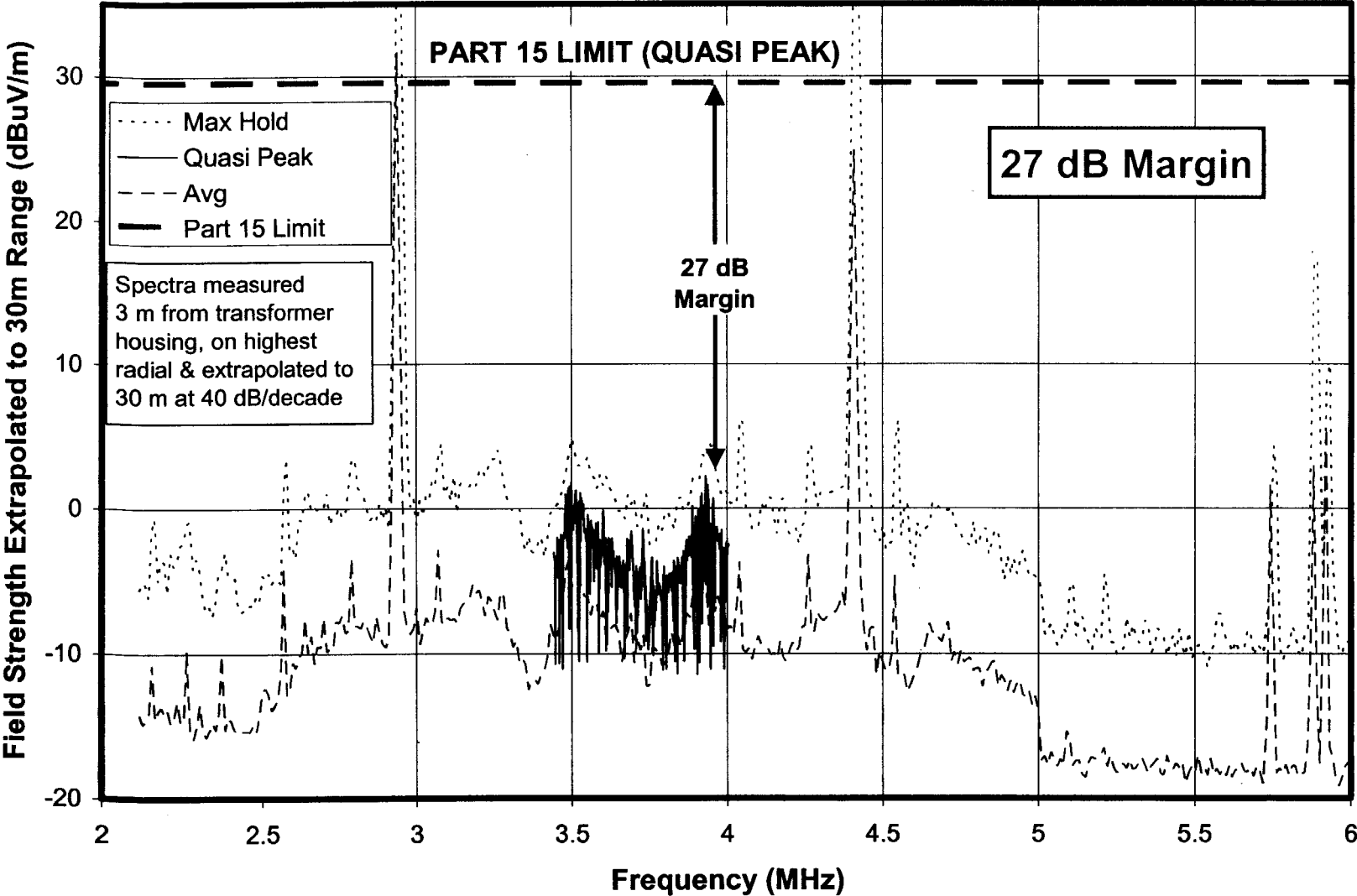


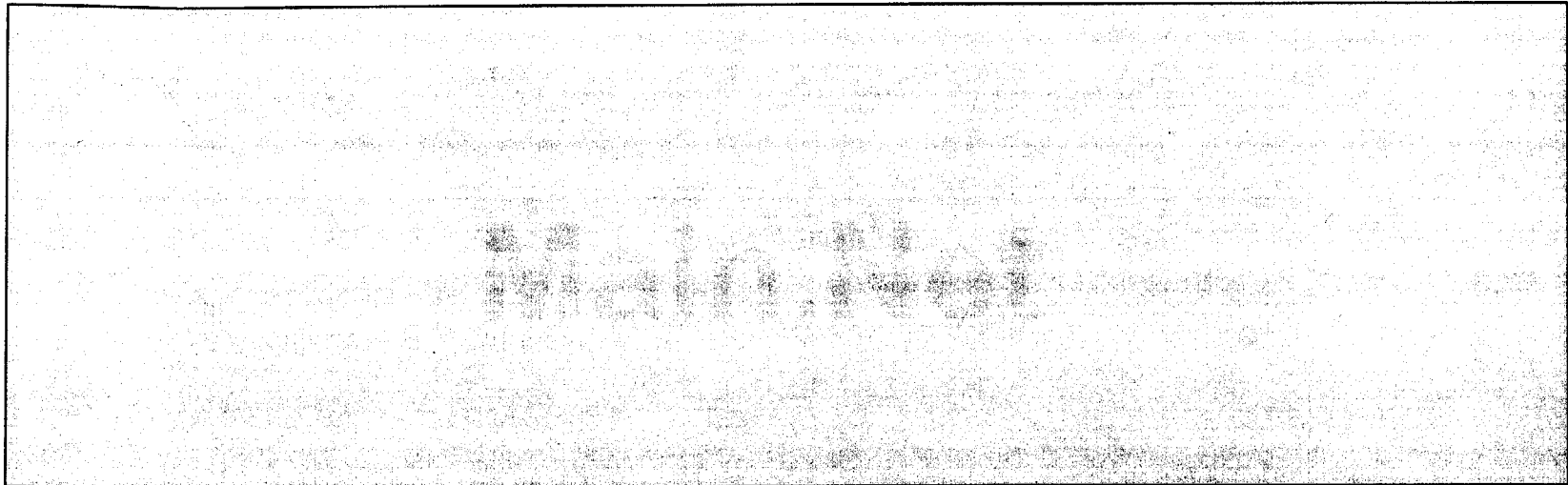
Quasi Peak of DUT A3

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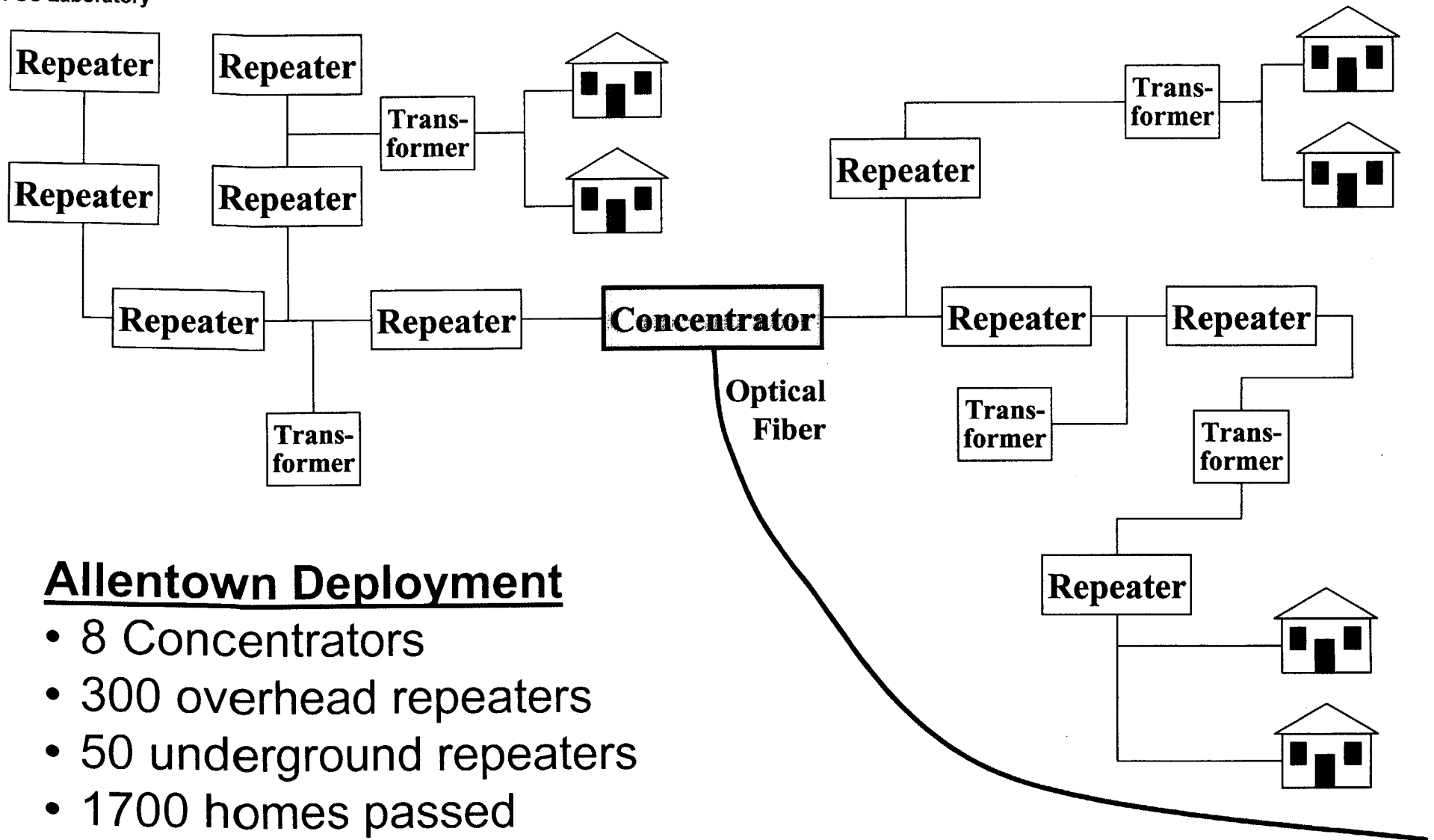
Recommendations for Amperion

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Main.Net's Architecture

TCG Laboratory



Allentown Deployment

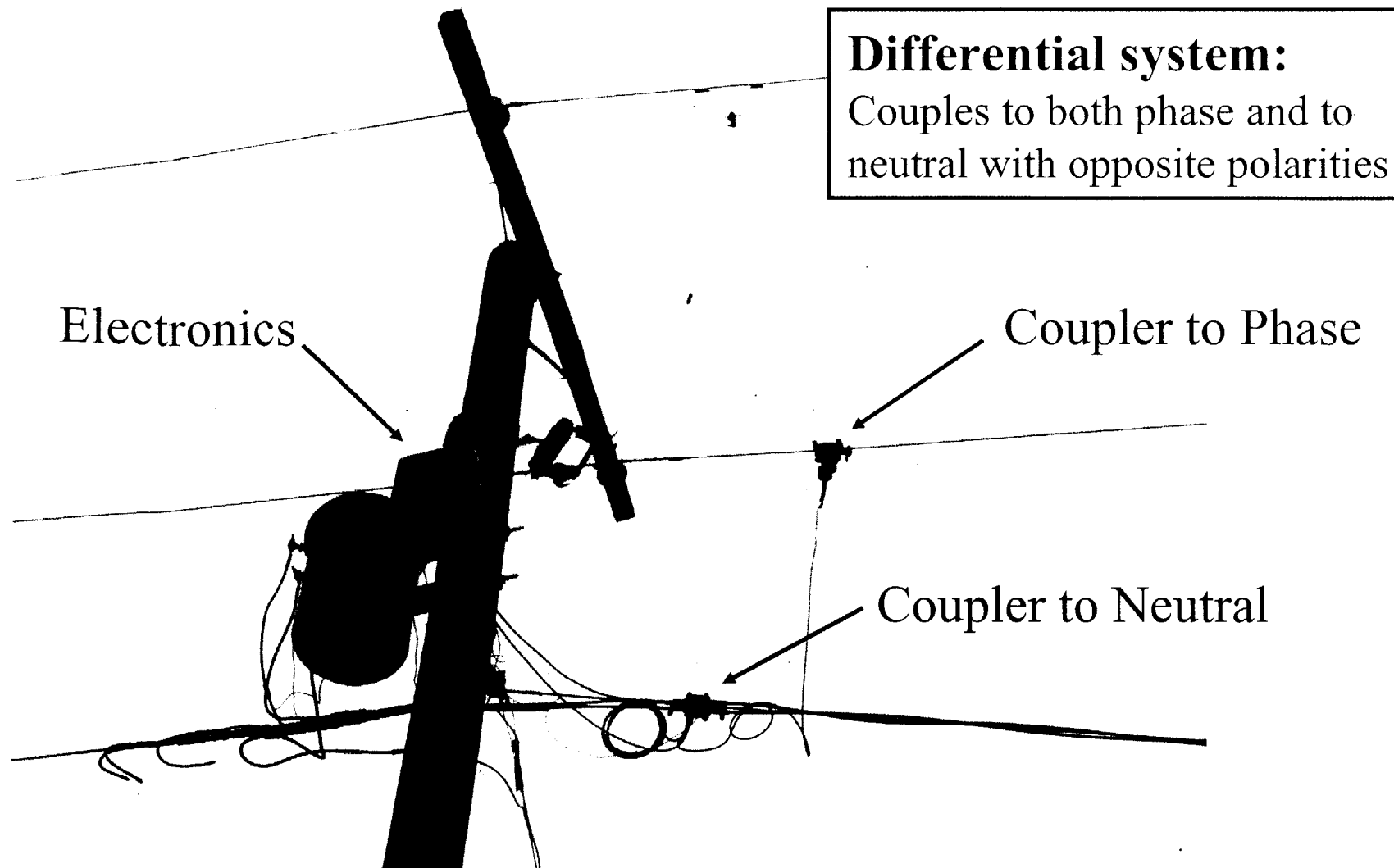
- 8 Concentrators
- 300 overhead repeaters
- 50 underground repeaters
- 1700 homes passed

FCC Laboratory

Main.Net Overhead System

Main.Net Overhead Repeater (DUT M1)

FCC Laboratory



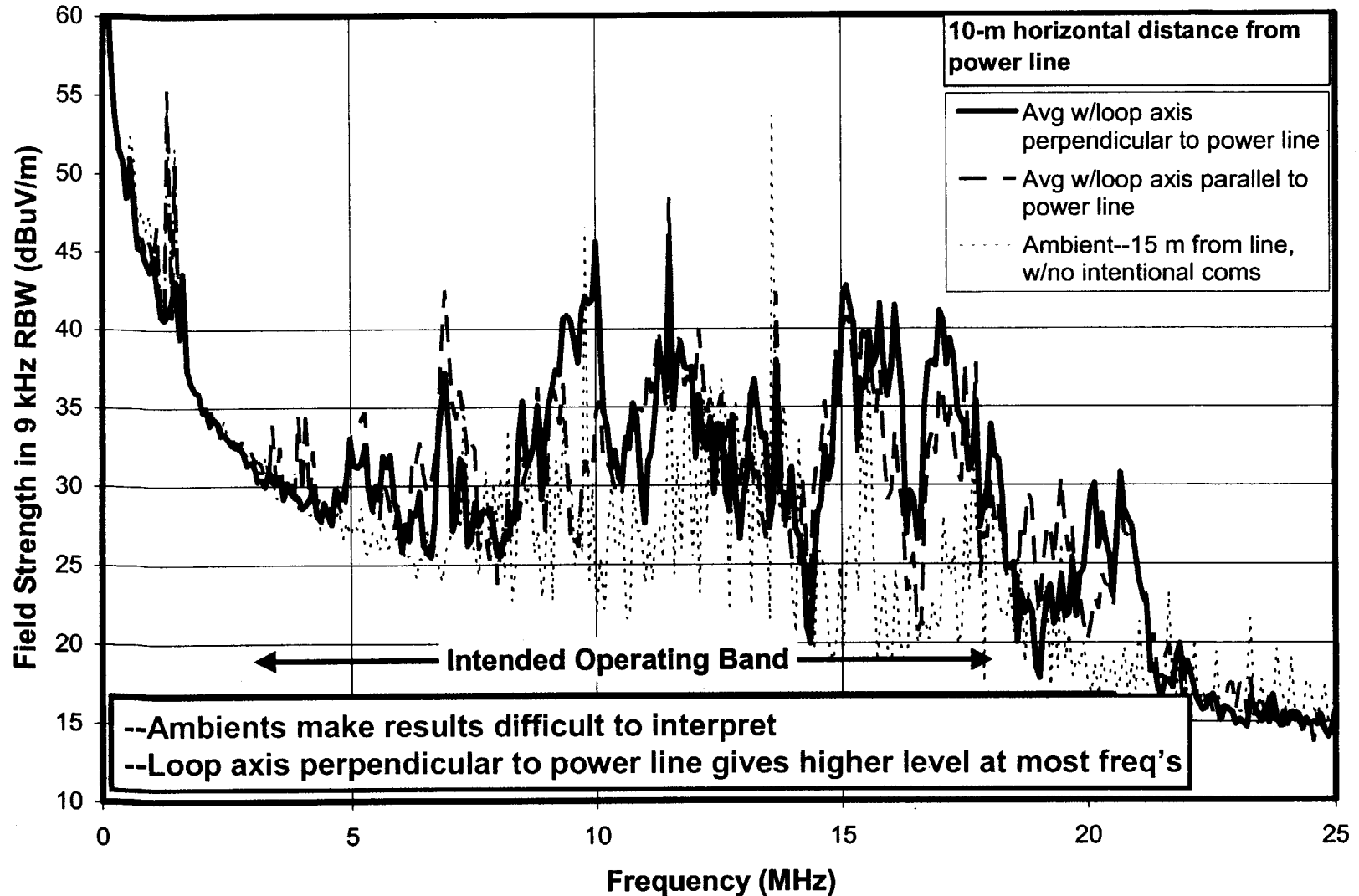
Main.Net Overhead Repeater (DUT M1)

FCC Laboratory



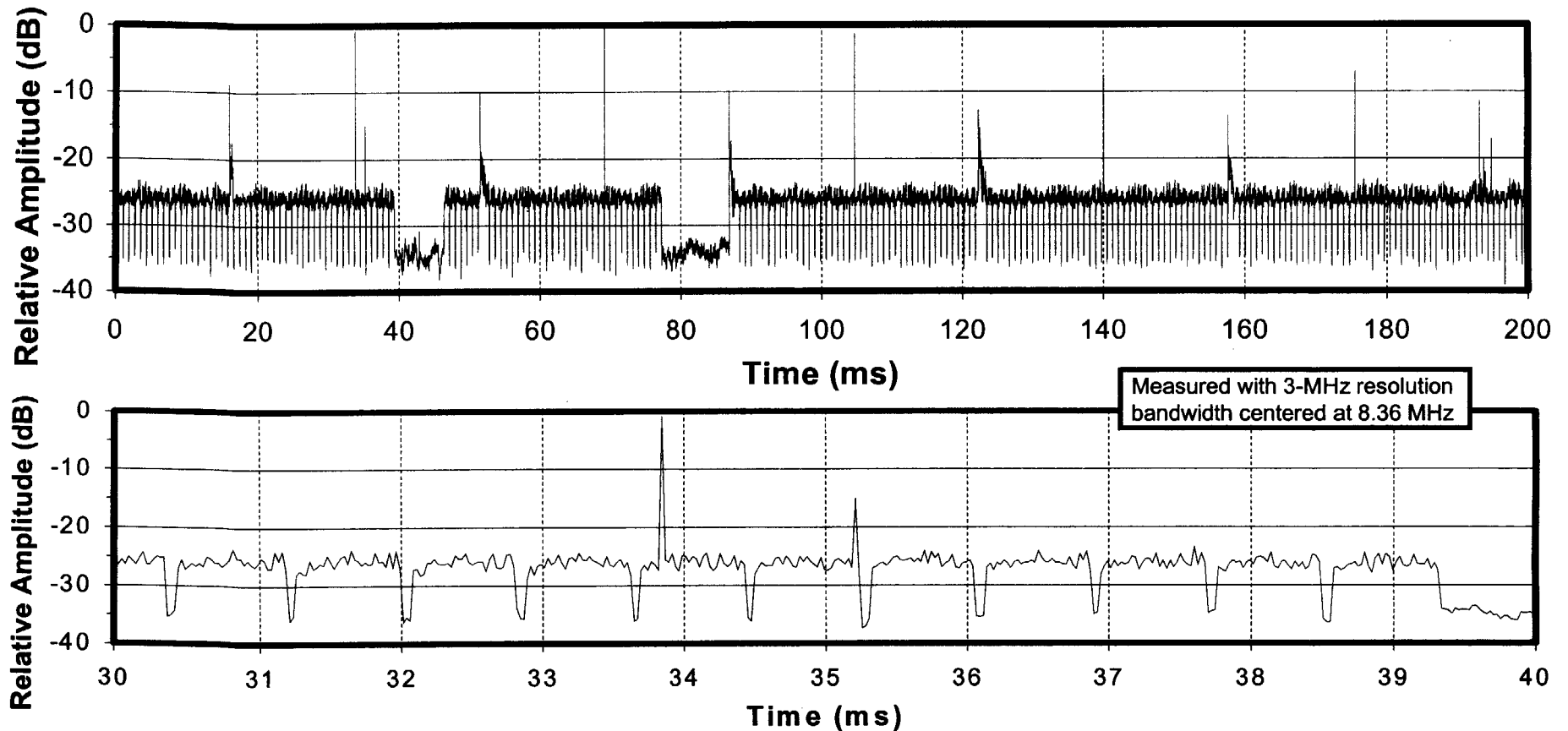
Ambients and BPL Signal at Two Polarizations

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Temporal Measurements

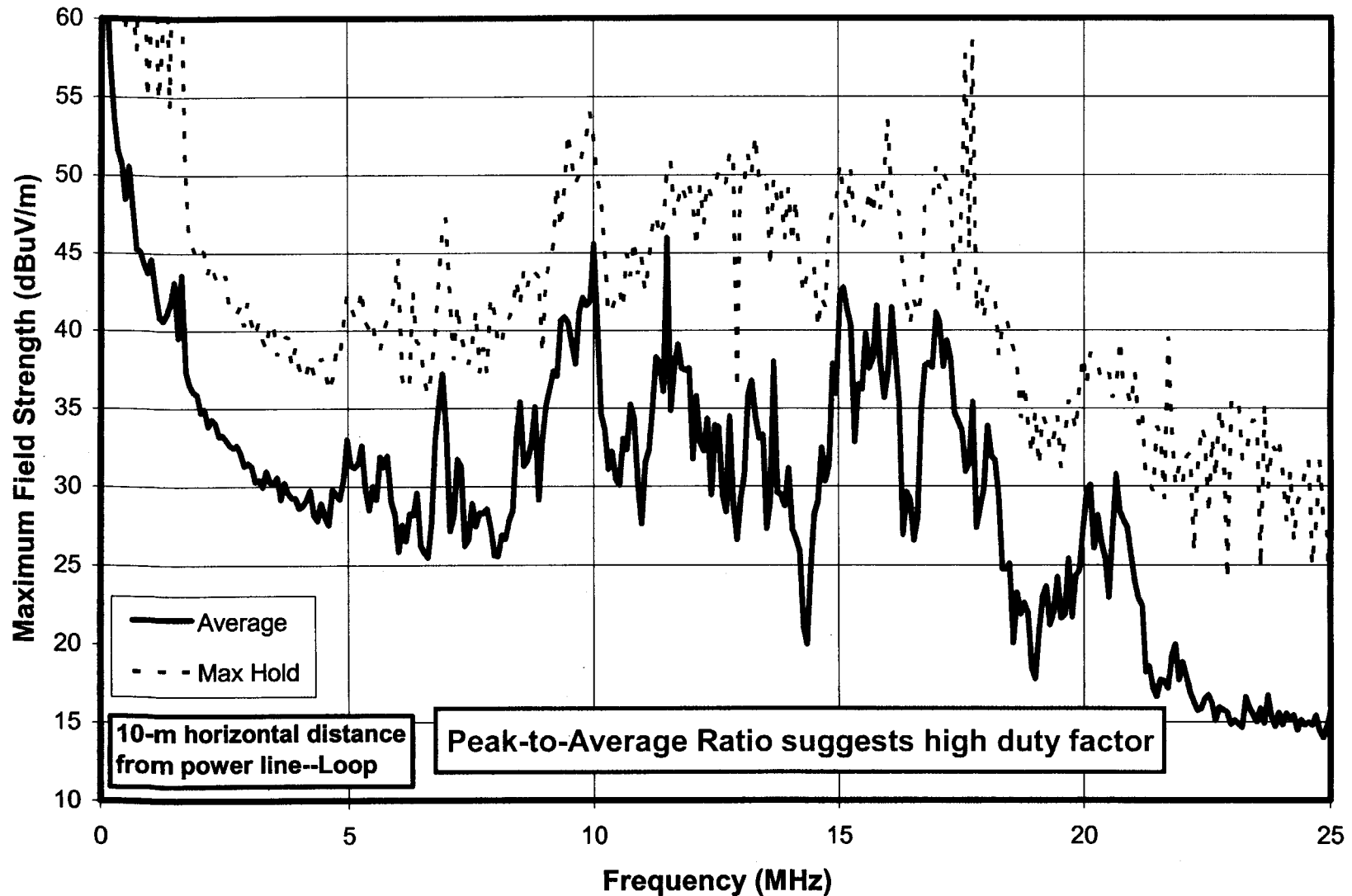
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- Duty factor of primary signal was 85%
- Required 20 Hz pulse rate for quasi peak was achieved
- Source of higher level pulses 17.7 ms intervals was not determined, but did not impact quasi peak measurements

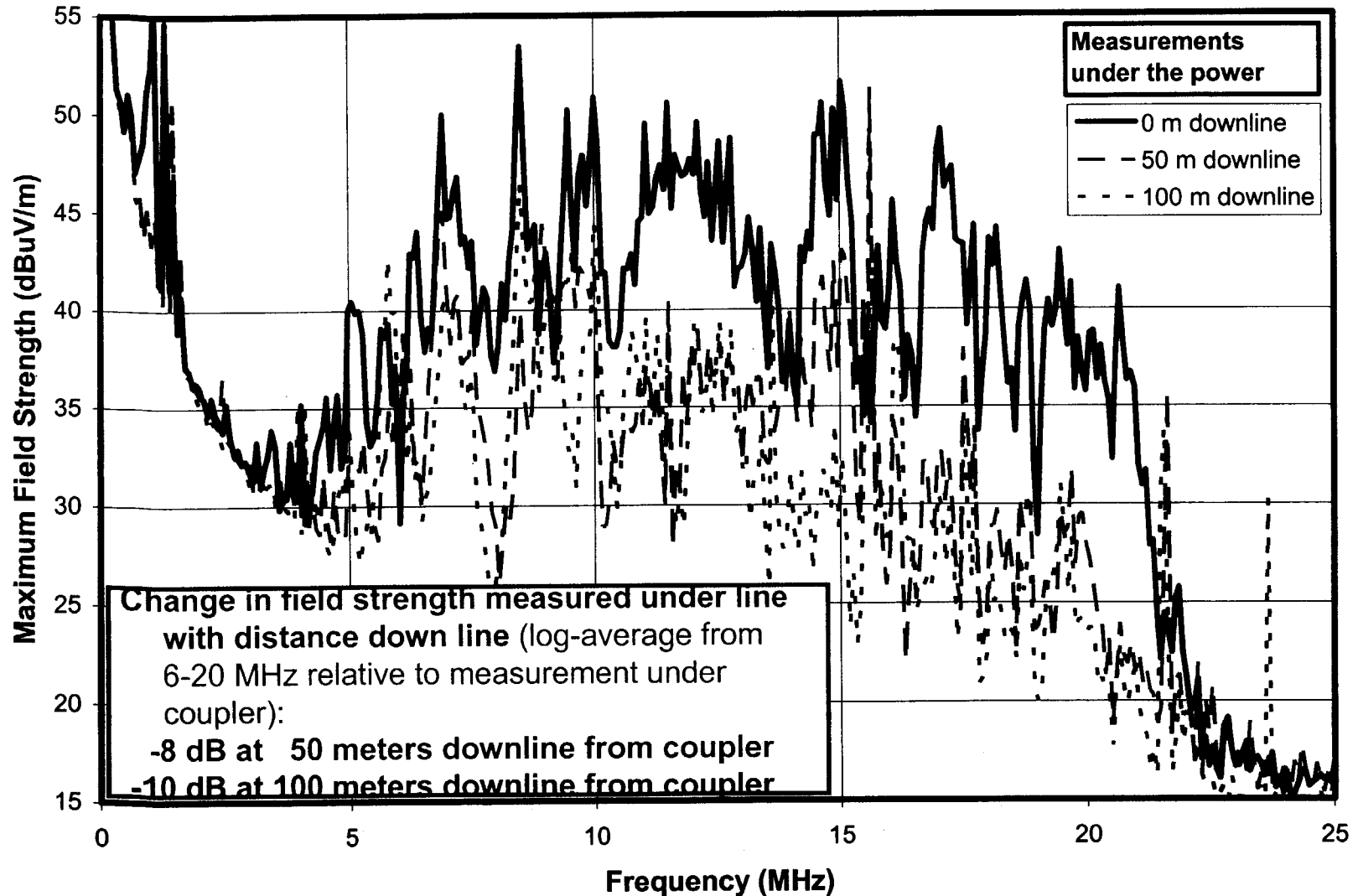
Average and Peak

FCC Laboratory



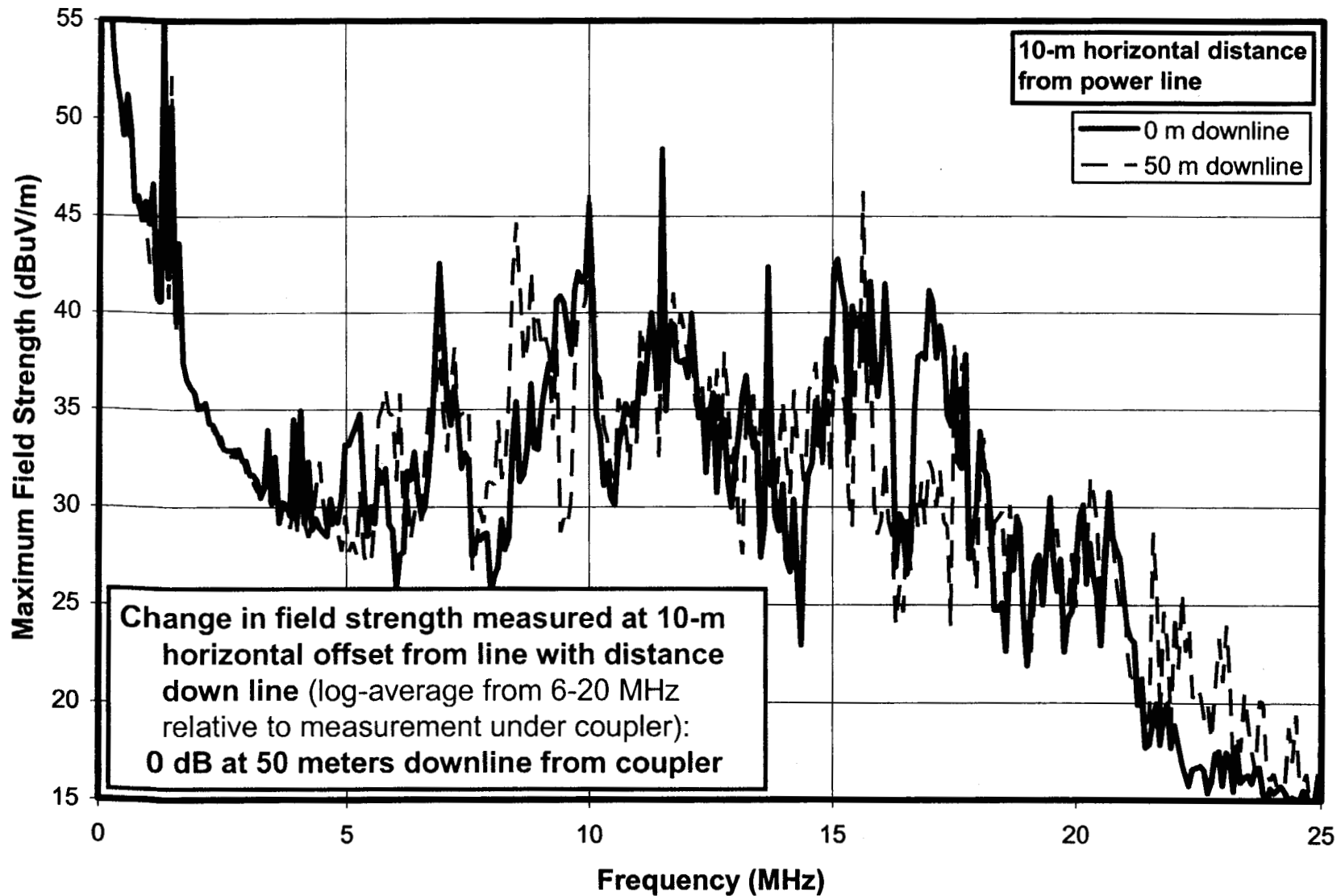
Moving Down the Line Under the Line

FCC Laboratory



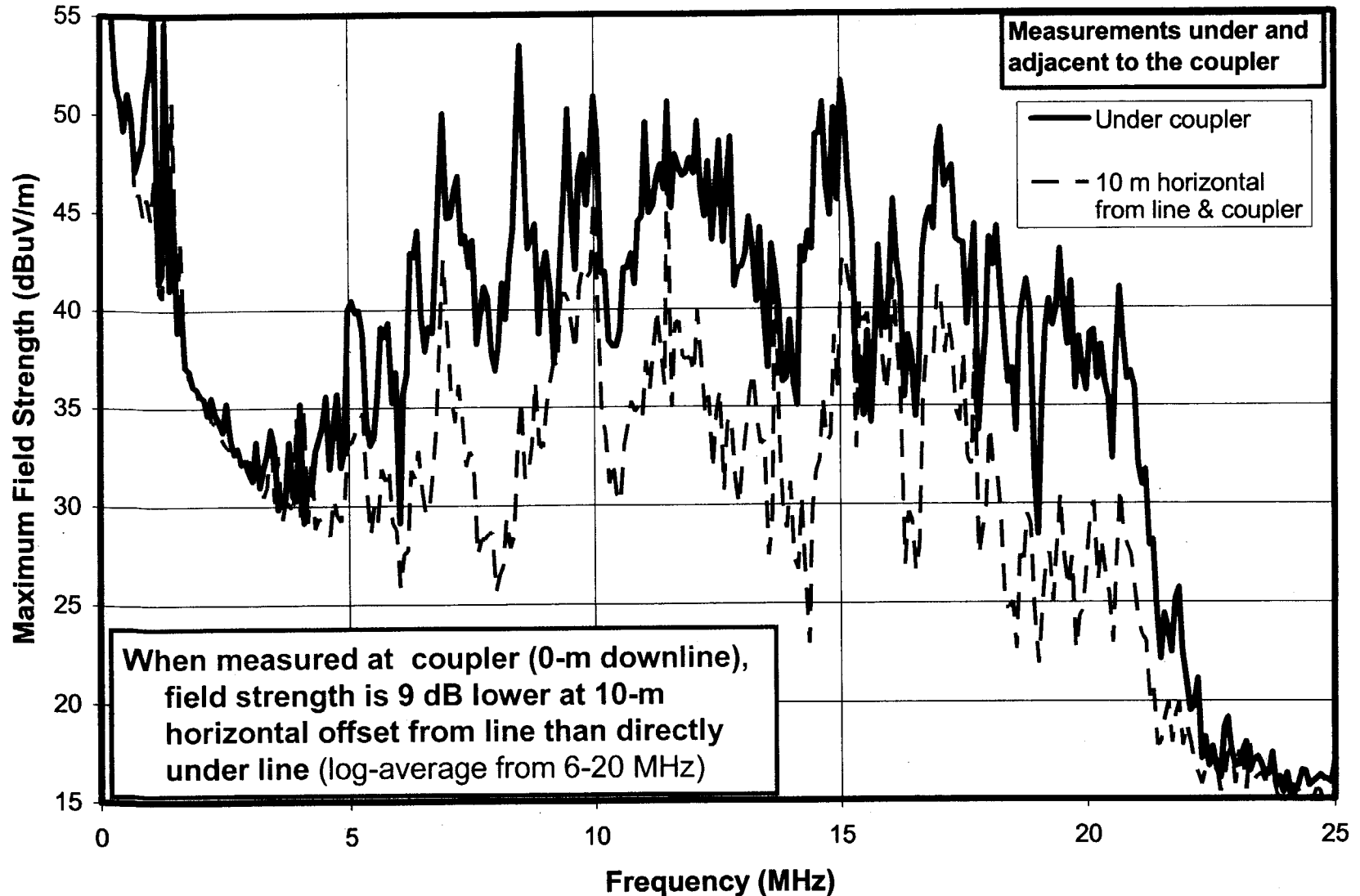
Moving Down the Line 10 m to the Side

FCC Laboratory



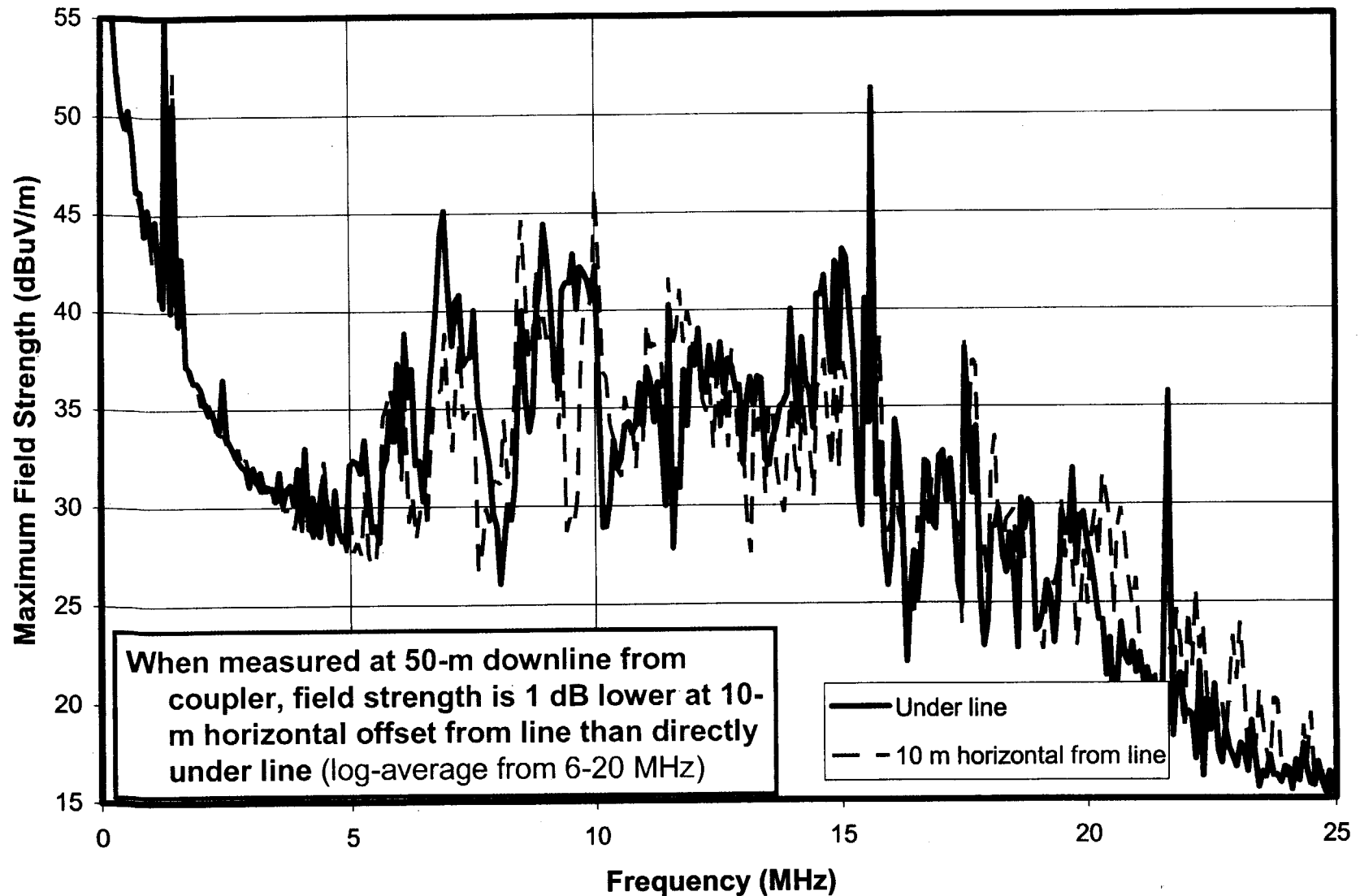
Under and Adjacent to the Coupler

FCC Laboratory



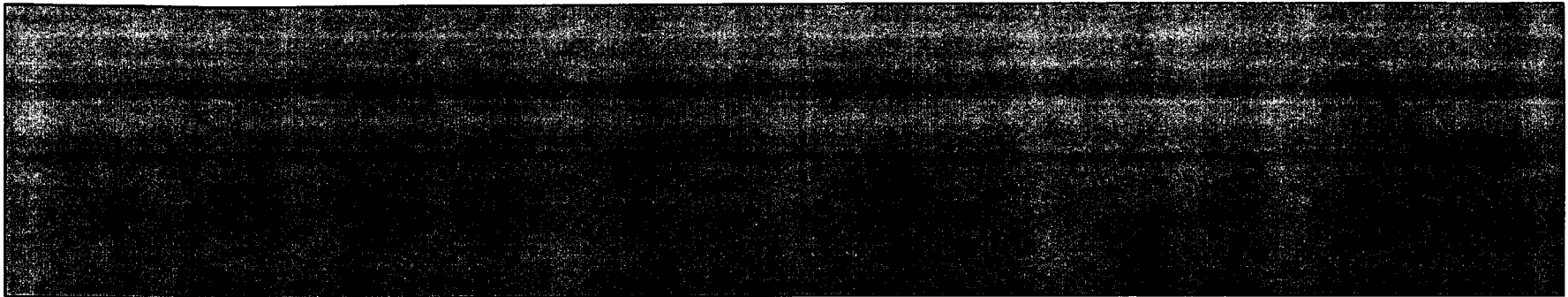
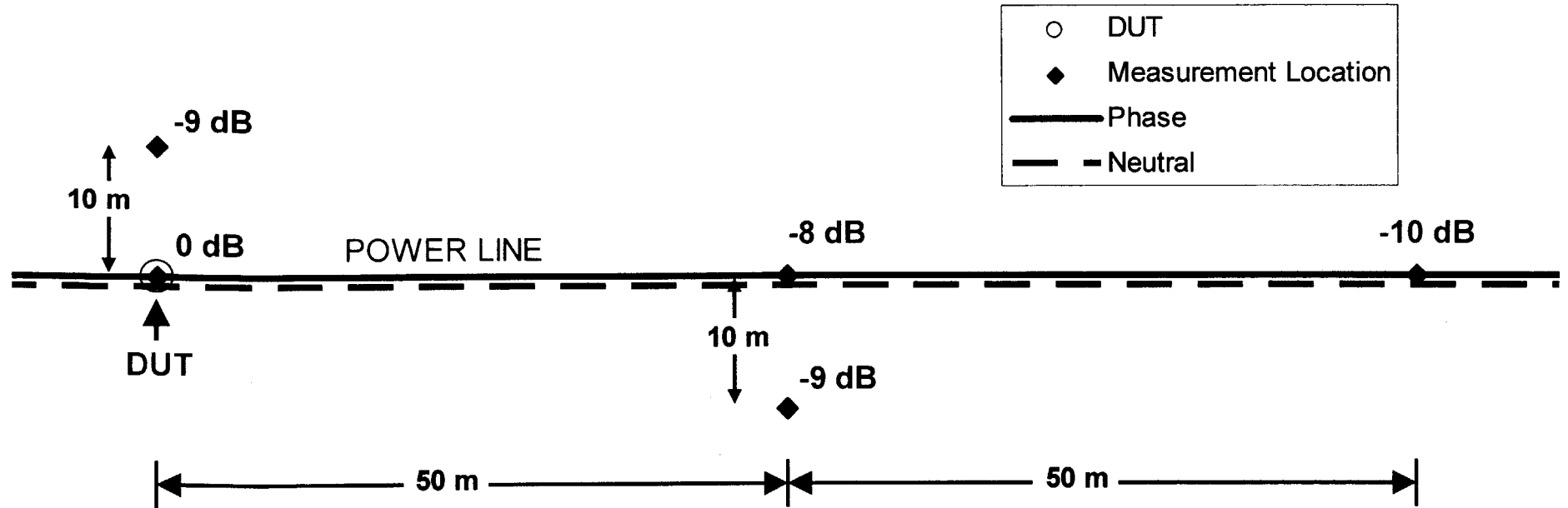
Under & 10 m to the Side, 50m Down Line

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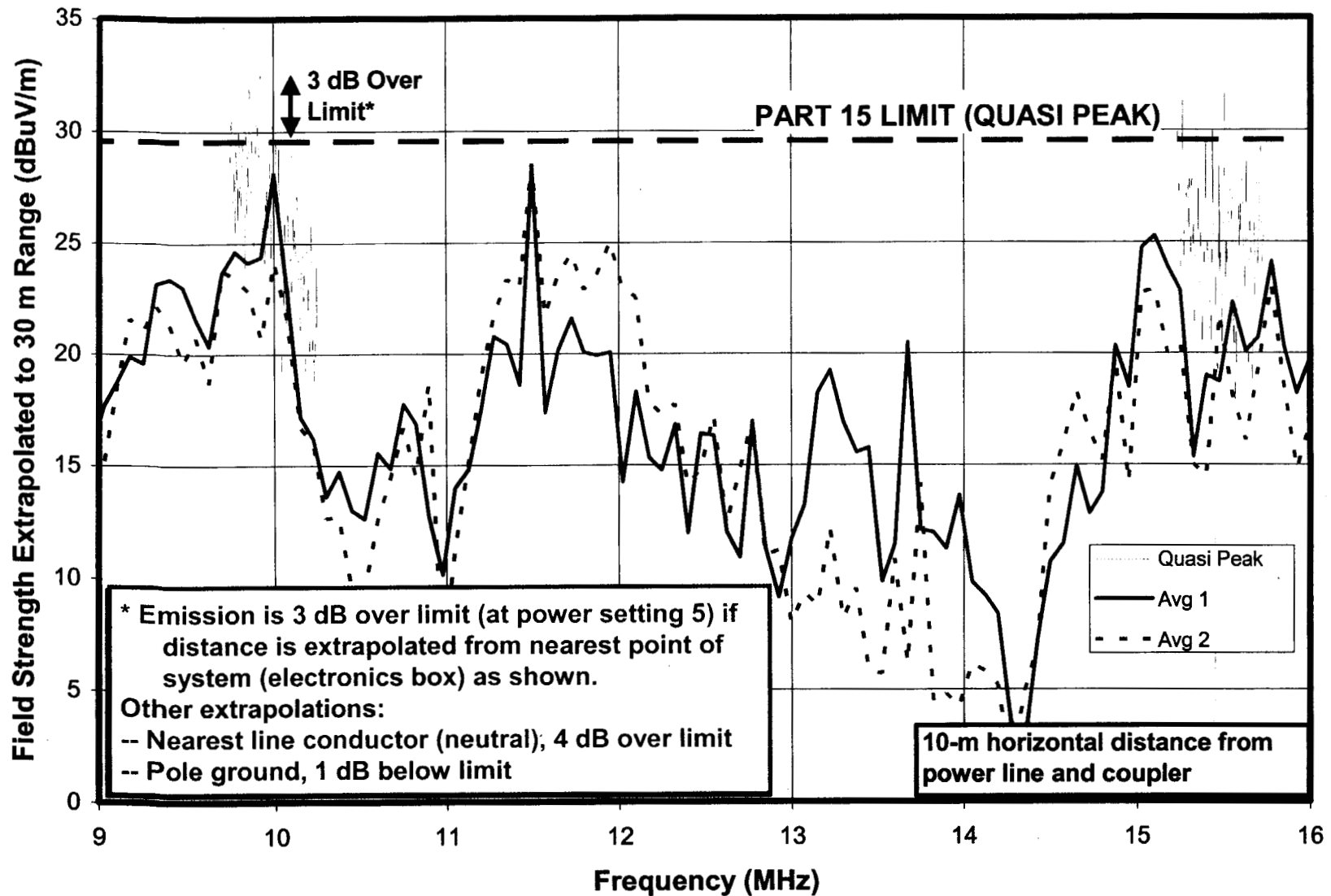
Summary of Relative Average Levels

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Quasi Peak

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Non-Public -- For Internal Use Only -- Contains Proprietary Information

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Main.Net Ground-Based System

S. Martin

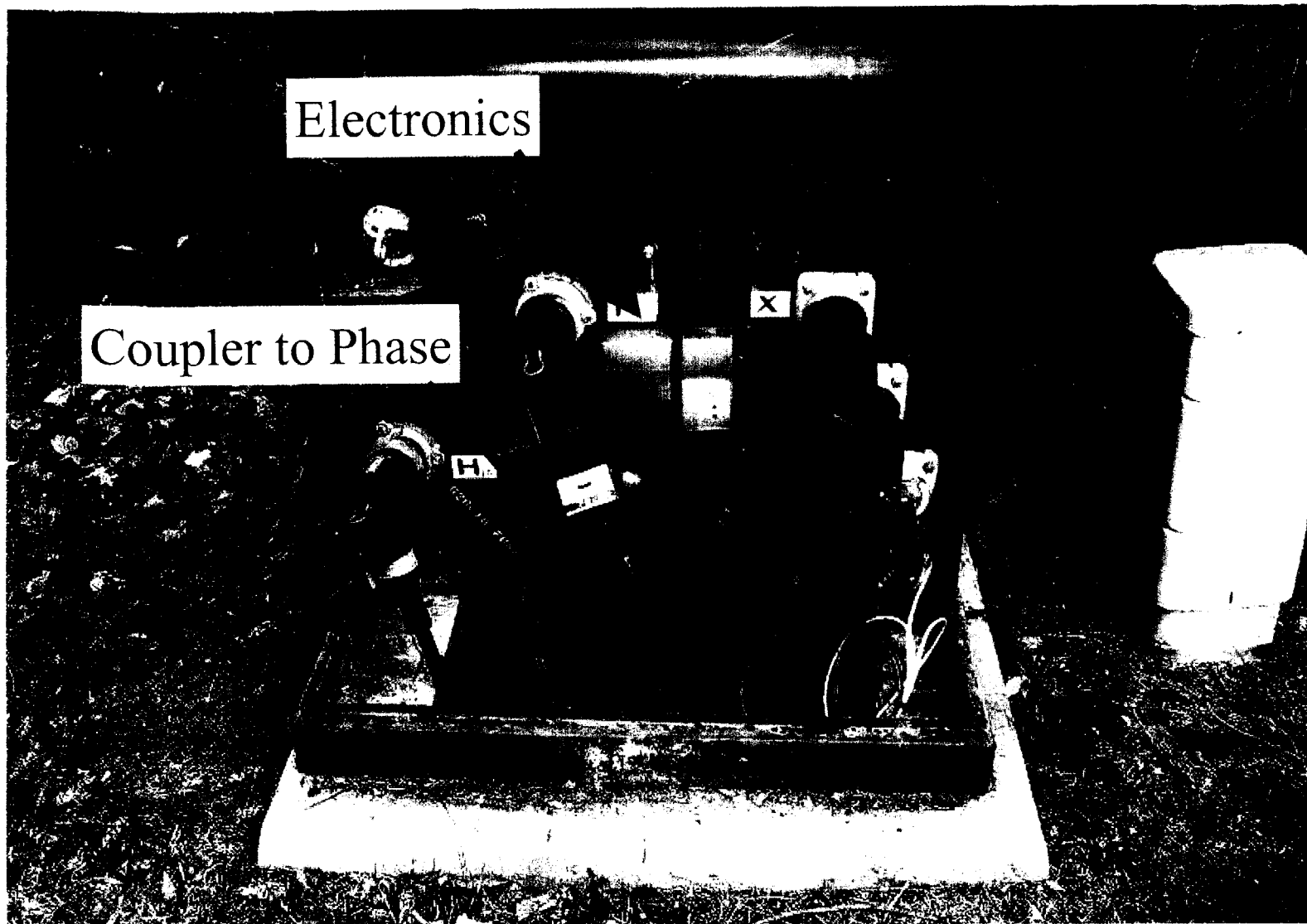
Non-Public -- For Internal Use Only -- Contains Proprietary Information

12/22/2004 - Slide 22

Non-Public -- For Internal Use Only – Contains Proprietary Information

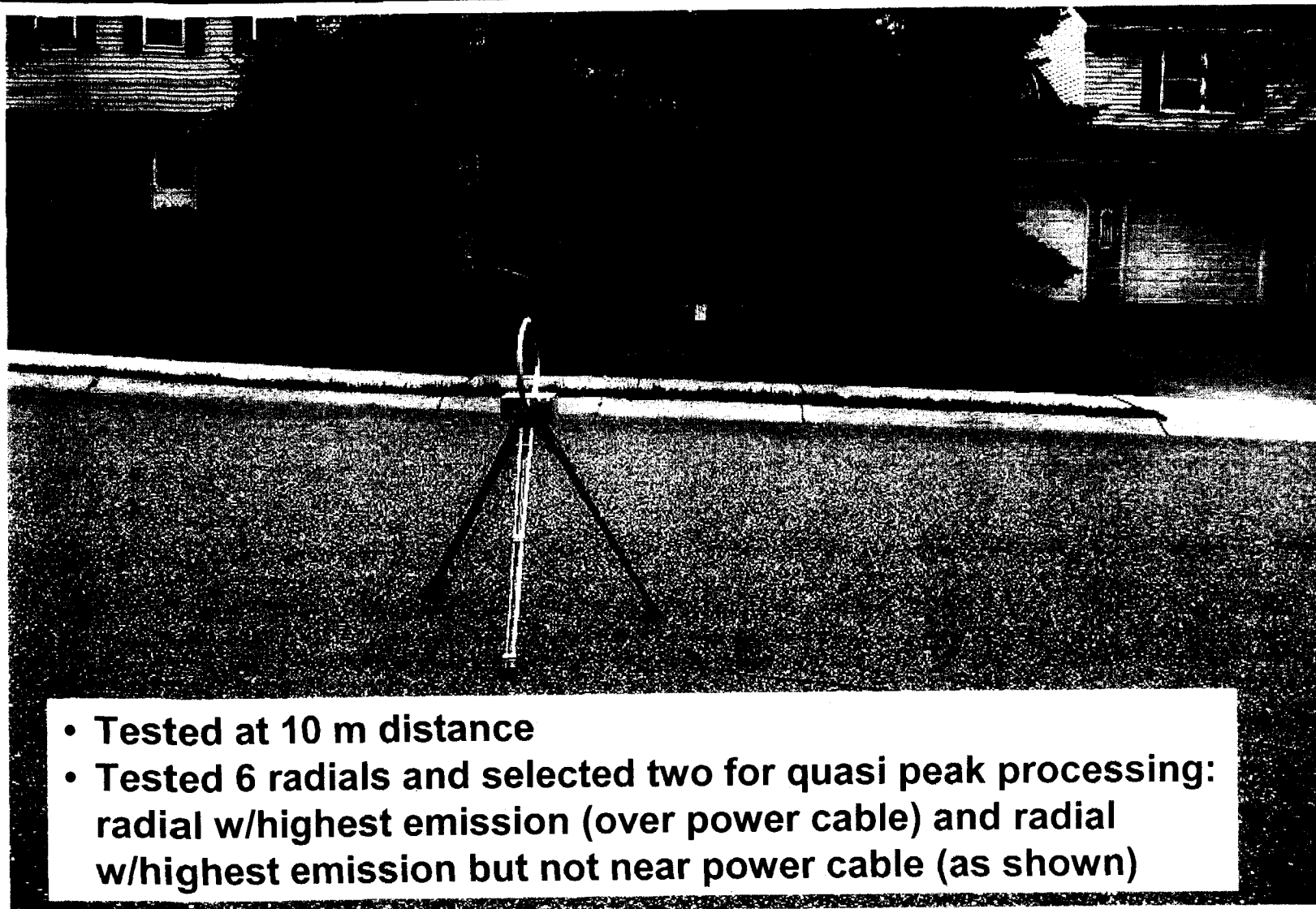
Main.Net Overhead Repeater (DUT M1)

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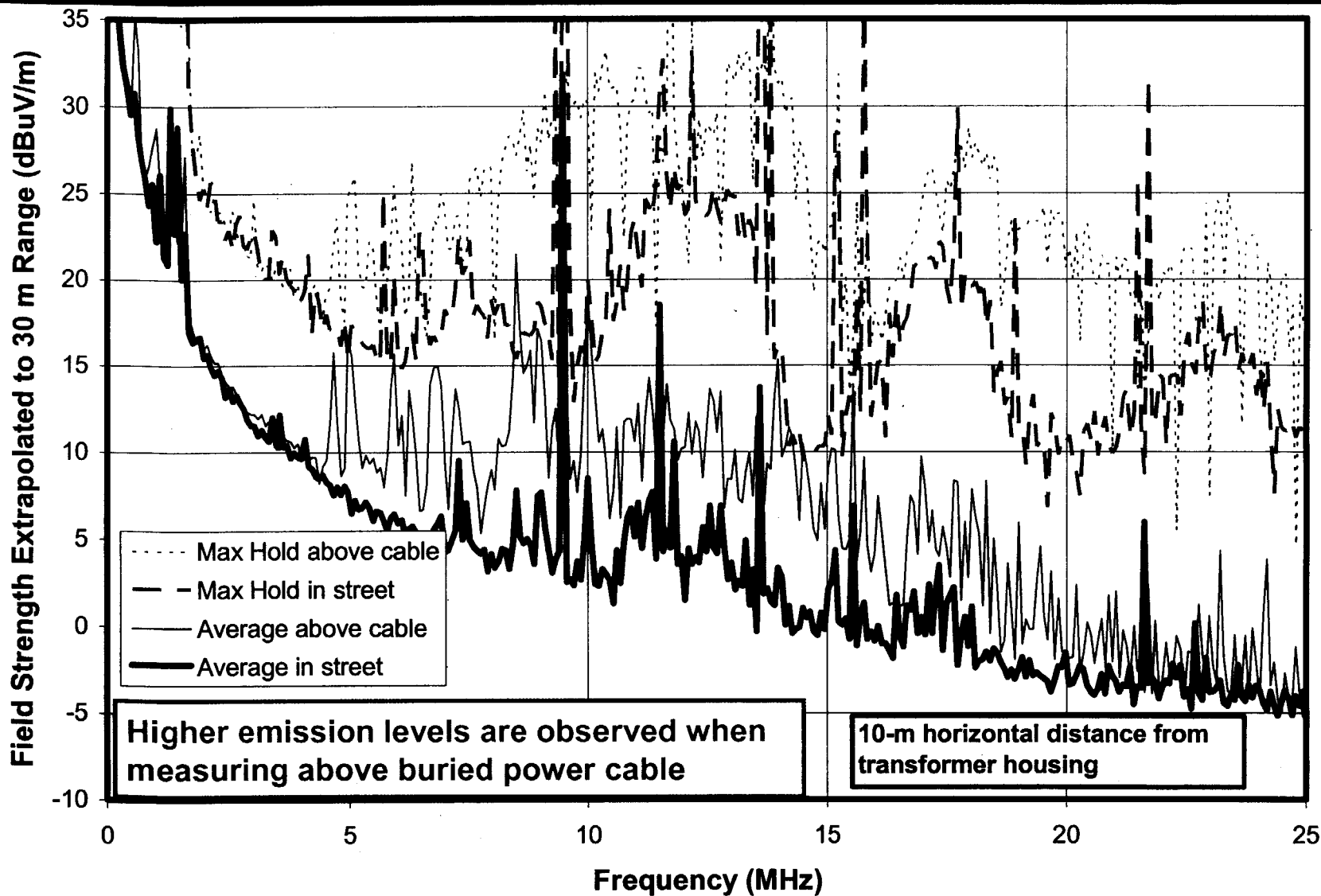
Main.Net Ground-Based Repeater (DUT M2)

FCC Laboratory



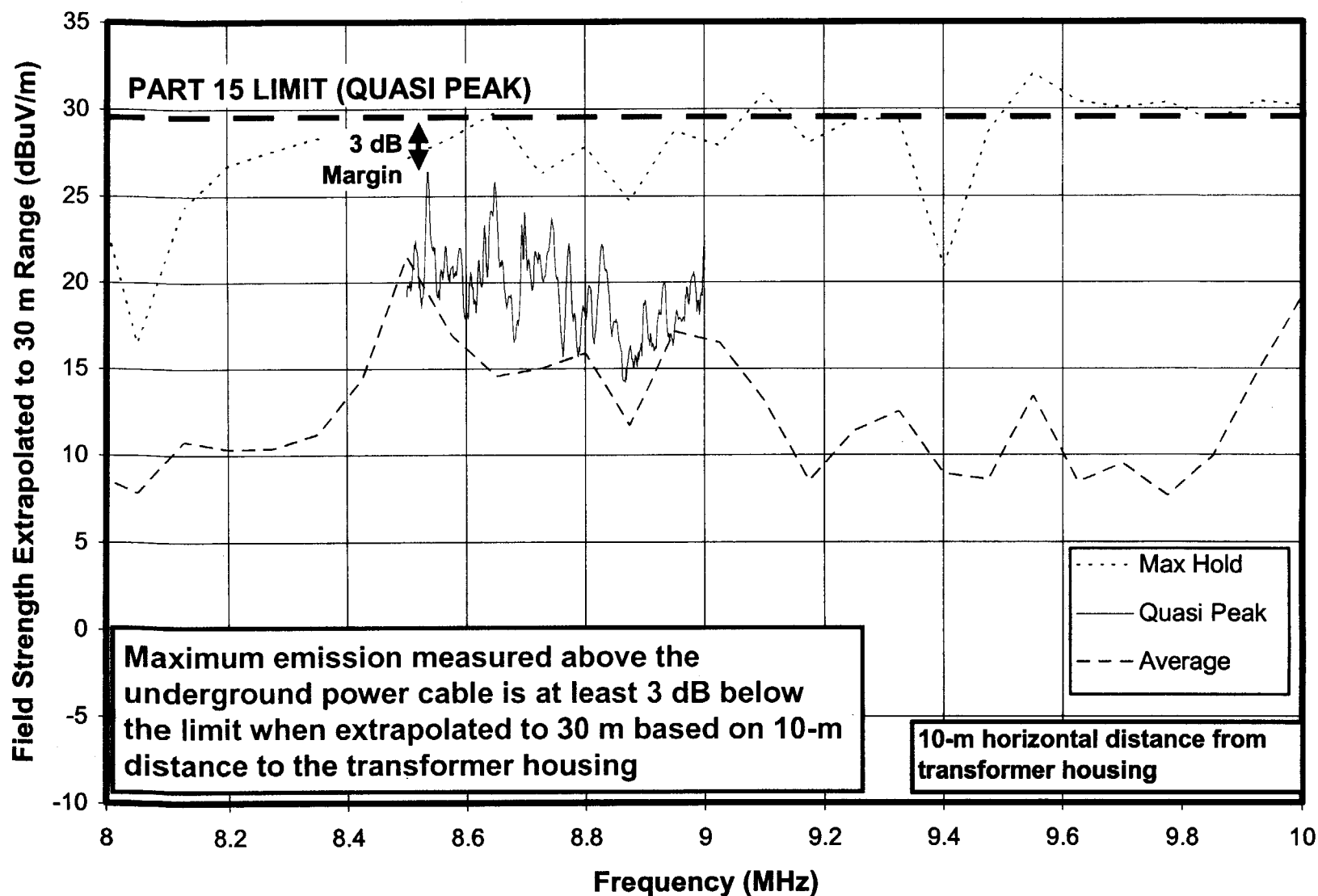
Effect of Buried Power Cable

FCC Laboratory



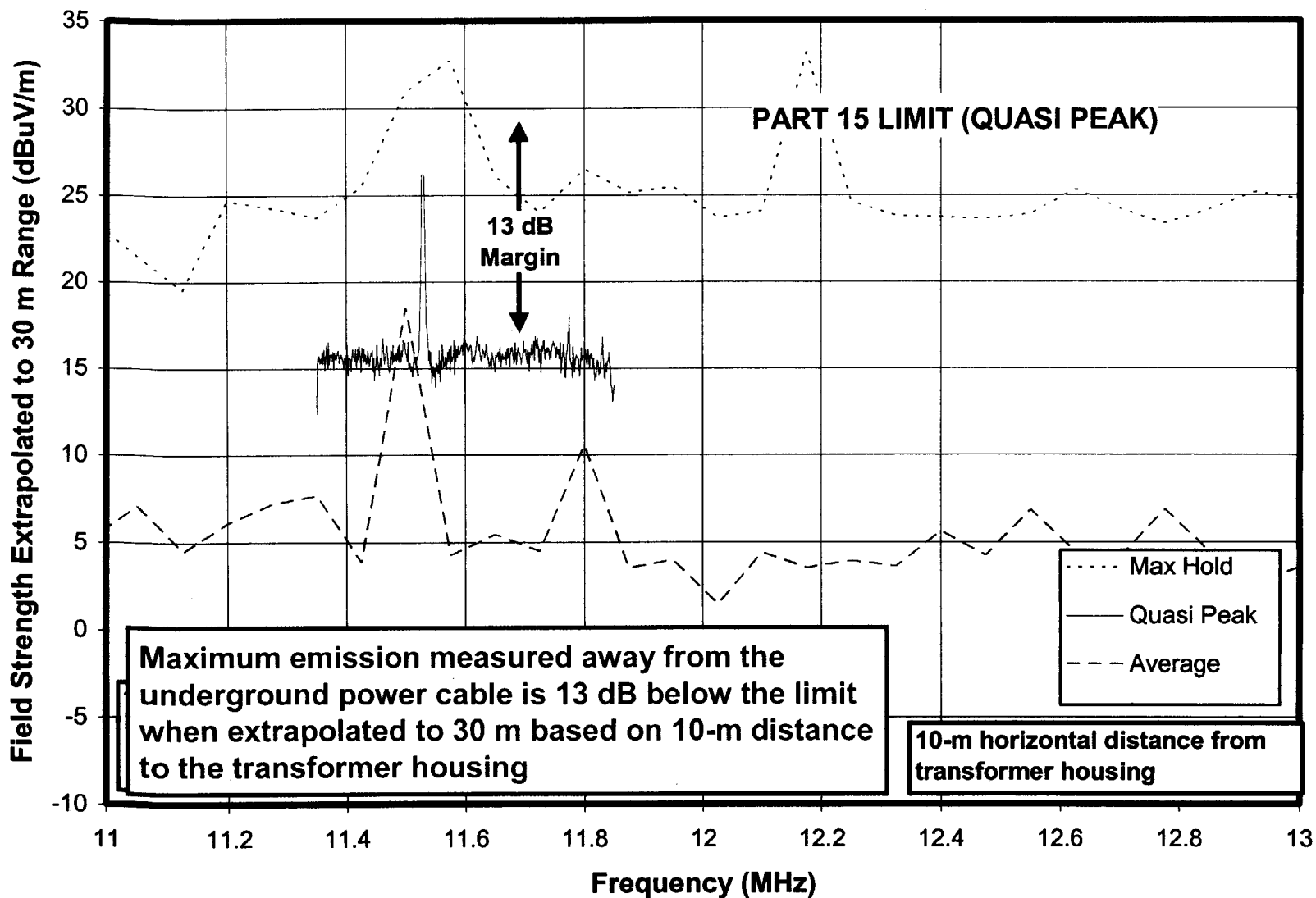
Quasi Peak Above Buried Power Cable

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Quasi Peak away from Buried Power Cable

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Conclusions Regarding Main.Net

FCC Laboratory

- **Compliance**

- Overhead device (Repeater on medium voltage lines)
 - Measured emissions exceeded the Part 15 limit
 - Maximum observed radiated emission was 3 dB over the limit
 - Tested unit was said to be set to power level 5. Submitted test report was based on power level 4
 - If distance scaling were based on distance to the pole ground wire rather than the nearest part of the BPL system [REDACTED] measurements would have passed with 1 dB margin at the selected quasi-peak measurement location
- Ground-based device (Repeater on medium voltage lines)
 - Measurements were within limits
 - Maximum observed radiated emission was 13 dB below the Part 15 limit when measured in the street
 - Maximum observed radiated emission was 3 dB below the Part 15 limit when measured over the buried power cable

- **Caveats**

- Measurements were not intended to ensure compliance
 - Testing was limited to intended operating bands of devices. Compliance was not tested over the full range of frequencies required by rules.
 - Testing was not performed on 3 installations or over a full set of radials
 - No conducted testing was performed

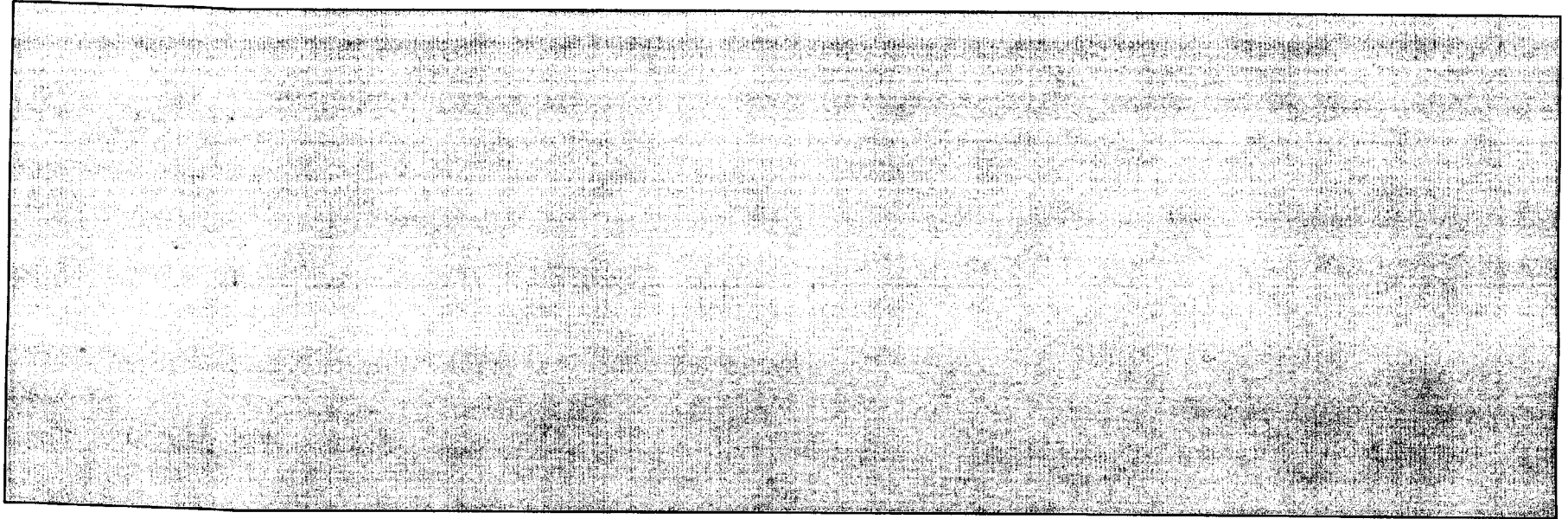
Recommendations for Main.Net

FCC Laboratory

- **Don't operate overhead units above power level 4**

Conclusions Regarding Access BPL

FCC Laboratory



Conclusions Regarding Testing

FCC Laboratory

- **Test Issues**

- Underground systems
 - Buried power cable influences emission measurements in its vicinity. Should testing in its immediate vicinity be avoided?
- Overhead systems
 - Pole ground wire appears to be a source of radiation for an overhead system that couples to neutral, but we don't believe that it should be a considered part of the system for distance scaling purposes
- Ambients that exceed limits will be present & must be excluded based on bandwidth

- **Future Test Considerations**

- Need notch or high-pass filter to attenuate AM radio signals
- Average spectra work well for finding peak emission locations
- Achieving high duty factor is important but time consuming.
It can take several hours to get the right signal with cooperation from system developer
 - Control computer needs rebooting & no one is in facility
 - Control computer facility is being moved by the power company to another room.
Need to wait for lineman to access system through another transformer.
- Testing in a cold rain is not fun