

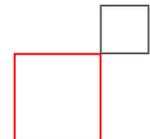


H Block

Overload Tests Results

Single Tone Desensitization (Overload) and
Duplexer Testing Over Temperature

August 31, 2004



Overview / Conclusions

- Tests on the H Block were conducted at Nokia Labs during the last week of August 2004.
- The H Block transmit frequency impacts the current PCS duplexer receive band.
- Test results show harmful interference will occur to millions of existing existing PCS handsets in the presence of an H Block signal.
 - One active H Block device could prevent another nearby handset from from placing and receiving a call.
 - Both devices do NOT have to be engaged in a call.
 - In PCS today, all PCS handsets are fully operable and non-interfering interfering at any distance with respect to each other.
 - Performance of all duplexers vary dramatically over their normal operating temperature range.
- If H Block is allocated for mobile services, **significant** power limitations limitations (likely throughout the H Block transmit band) must be imposed **along with** the out-of-band emissions criteria set forth in PCS PCS industry standard, TIA 98-F, to avoid adverse impacts to PCS consumers.
- Alternatively, the Commission should consider allocating the H Block Block for low-power unlicensed or any other non-mobile service.

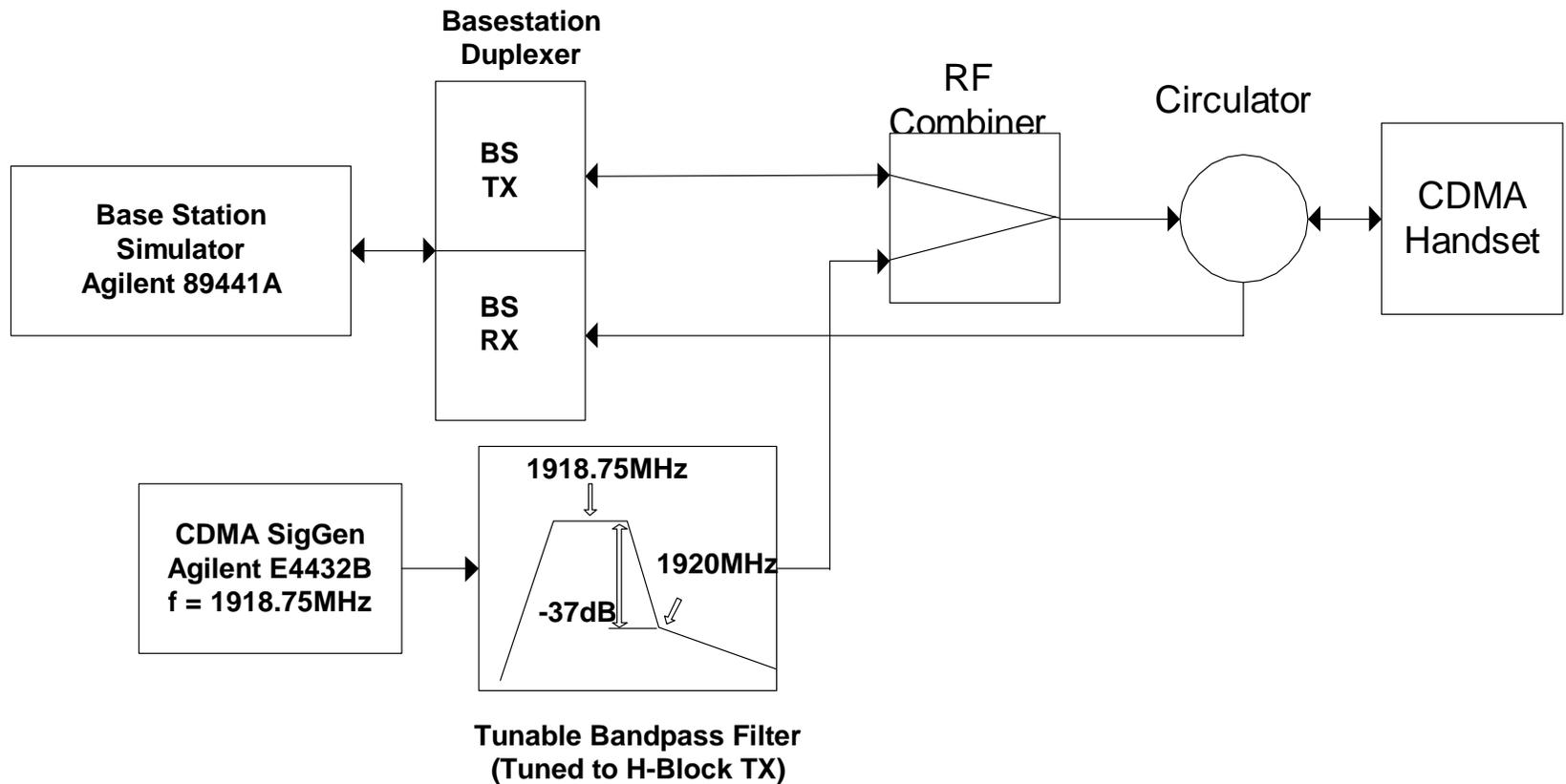
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Test Setup Parameters

- Initial Test of PCS Rx channel 25 (1931.25 center freq) noise floor floor of CDMA signal generator
- Setup:
 - CDMA signal generator: E4433B
 - Per test plan: High channel Tx H block center freq = 1918.75 MHz with with 1.23 MHz bandwidth CDMA signal
 - Traffic channel = -15.6 dB
 - Pilot = -7 dB
 - Paging = -12
 - Sync = -16
 - Ambient Temp = 27 C
 - Measured with VSA 89441A
 - Path Setup: Signal generator -> isolator -> notch -> BPF (1920 tuned) -> VSA
- Both the C and G blocks were tested as interferers.
- Seven handsets from three manufacturers were tested.

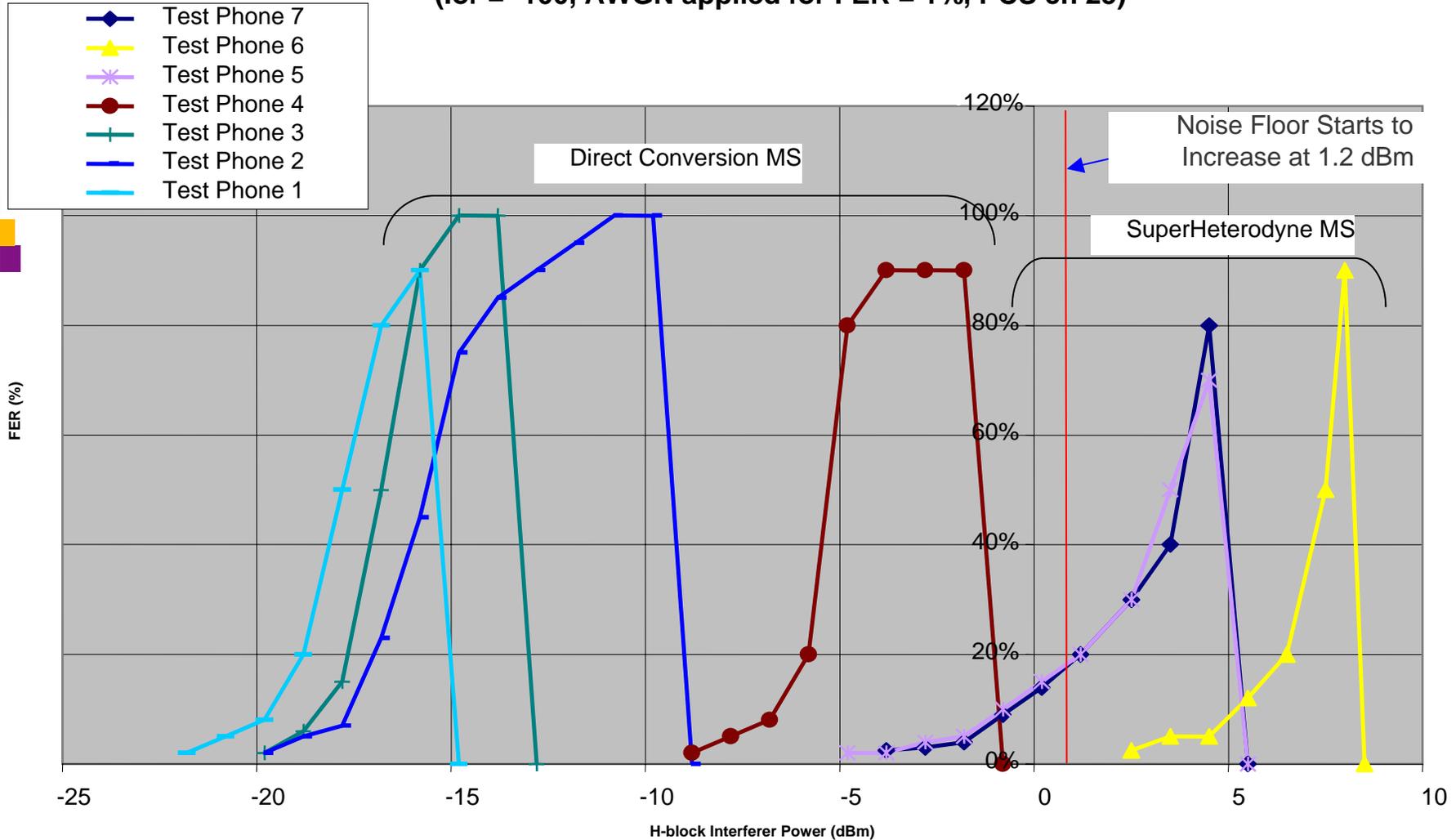
Mobile Receiver Overload Test Setup



Nokia Labs Test Results – One

FER (%) vs. H Block RF signal power (dBm) at A block antenna port

CDMA Mobile Phone FER vs H-Block CDMA Interferer @ 1918.75 MHz
($\text{Ior} = -100$, AWGN applied for FER = 1%, PCS ch 25)

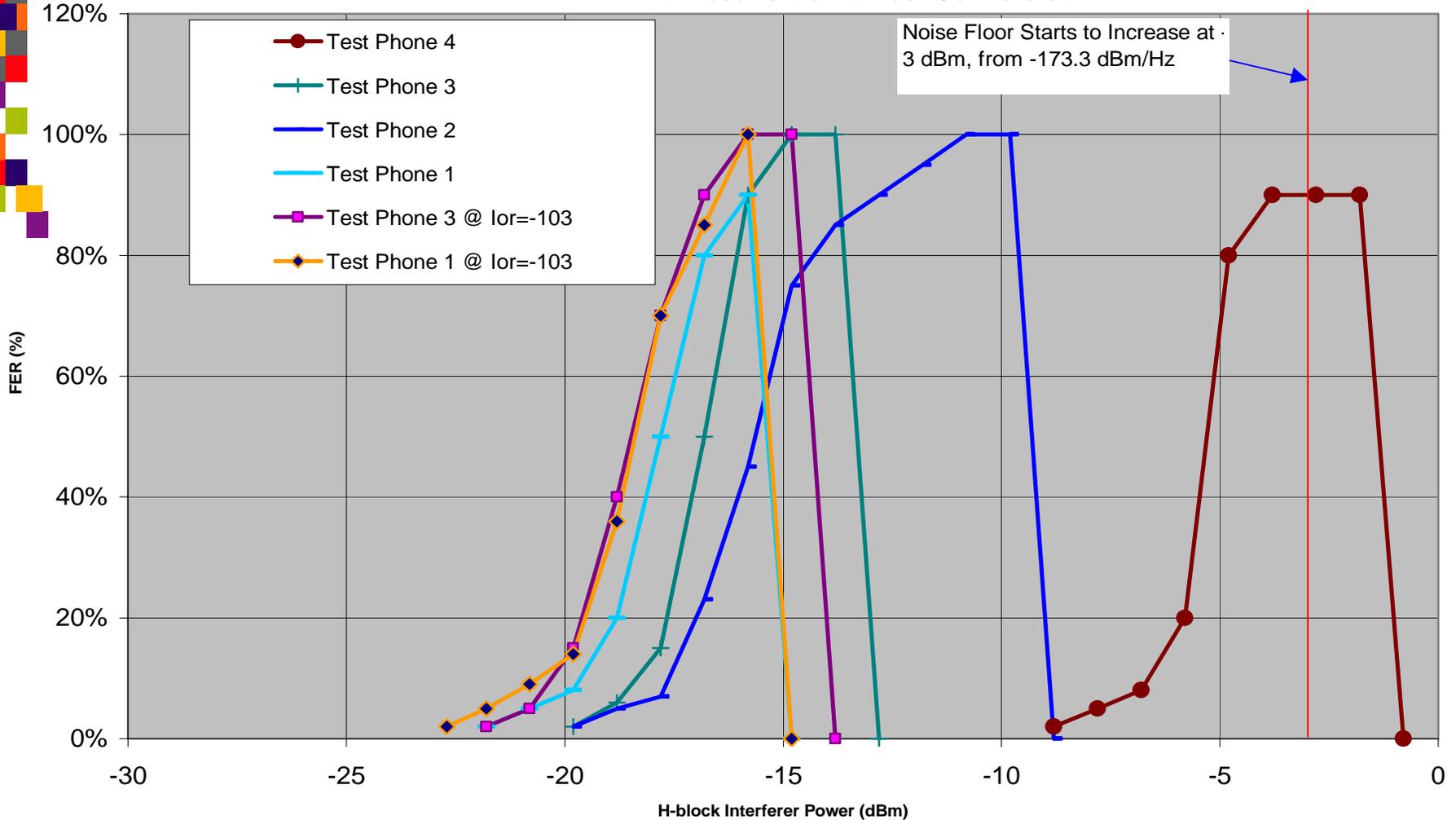


Nokia Labs Test Results – Two

FER (%) vs. H Block RF signal power (dBm) at A block antenna port

CDMA Mobile Phone FER vs H-Block CDMA Interferer @ 1918.75 MHz
($\text{lor} = -100$, AWGN applied for FER = 1%, PCS ch 25)

All Results from Direct Conversion

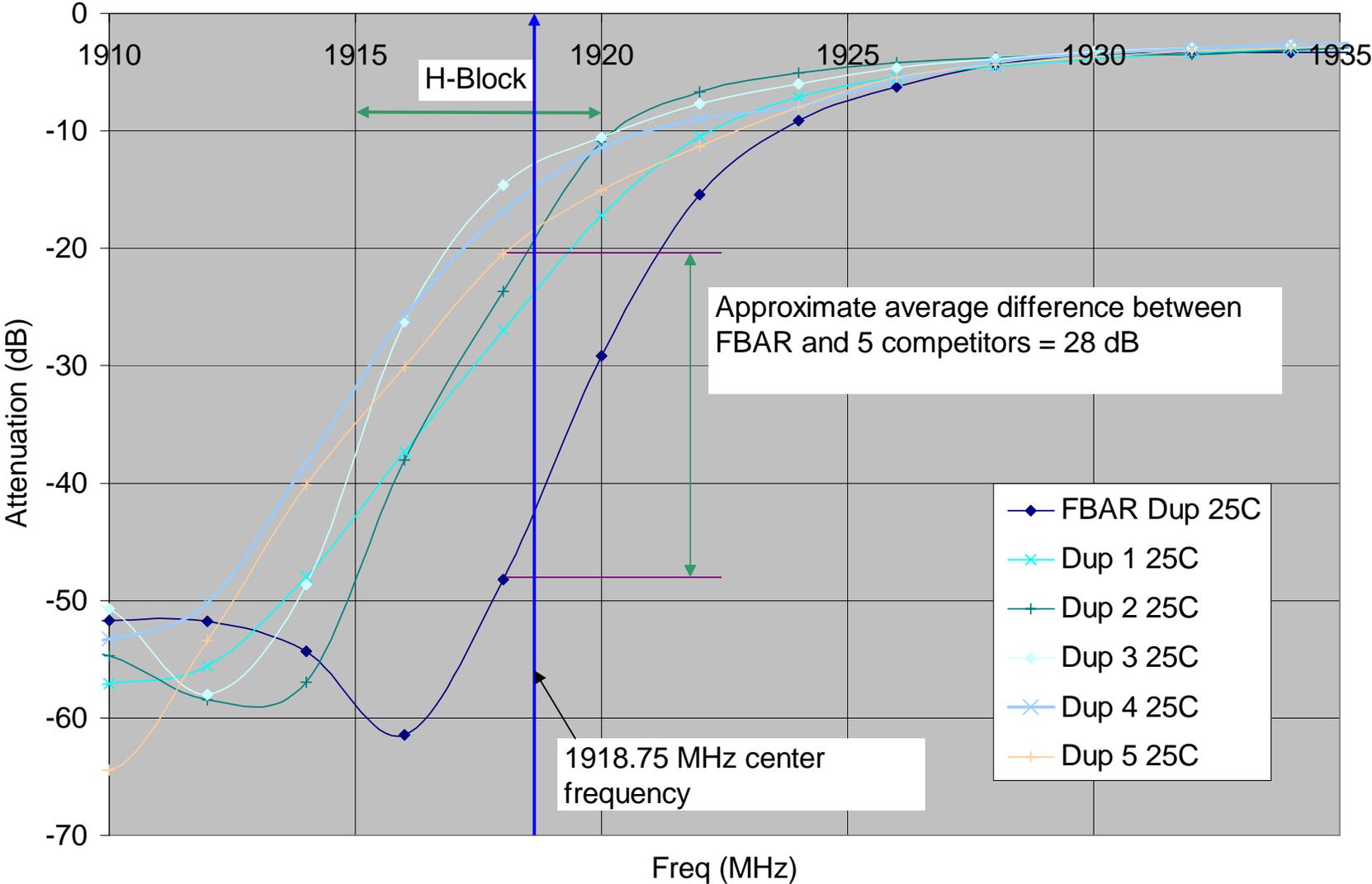


Test Results One and Two Summary

- Test data demonstrates that Direct Conversion Handsets employing SAW SAW filters (dominant filter in PCS handsets today) would experience significant “overload” interference from H block transmissions.
- Although the SuperHet handsets tested were less impacted, Direct Conversion technology has become favored by manufacturers and is now now widely deployed, with millions of handsets in the marketplace.
- When performing the same tests using C and G block signals as the interfering sources, no “overload” interference was created.
- The test data shows, for example, that if the H block phone were operated operated at 166 mW (less than 1/10th the operating power permitted for for mobiles under Part 24), it would cause an unacceptable 90 % Frame Frame Error Rate in test phone 3 one meter away.
- Millions of existing customers receive PCS services using these handsets handsets today.
- To put this into perspective, for example, more than 2 million Sprint subscribers are using test phone 3 today.

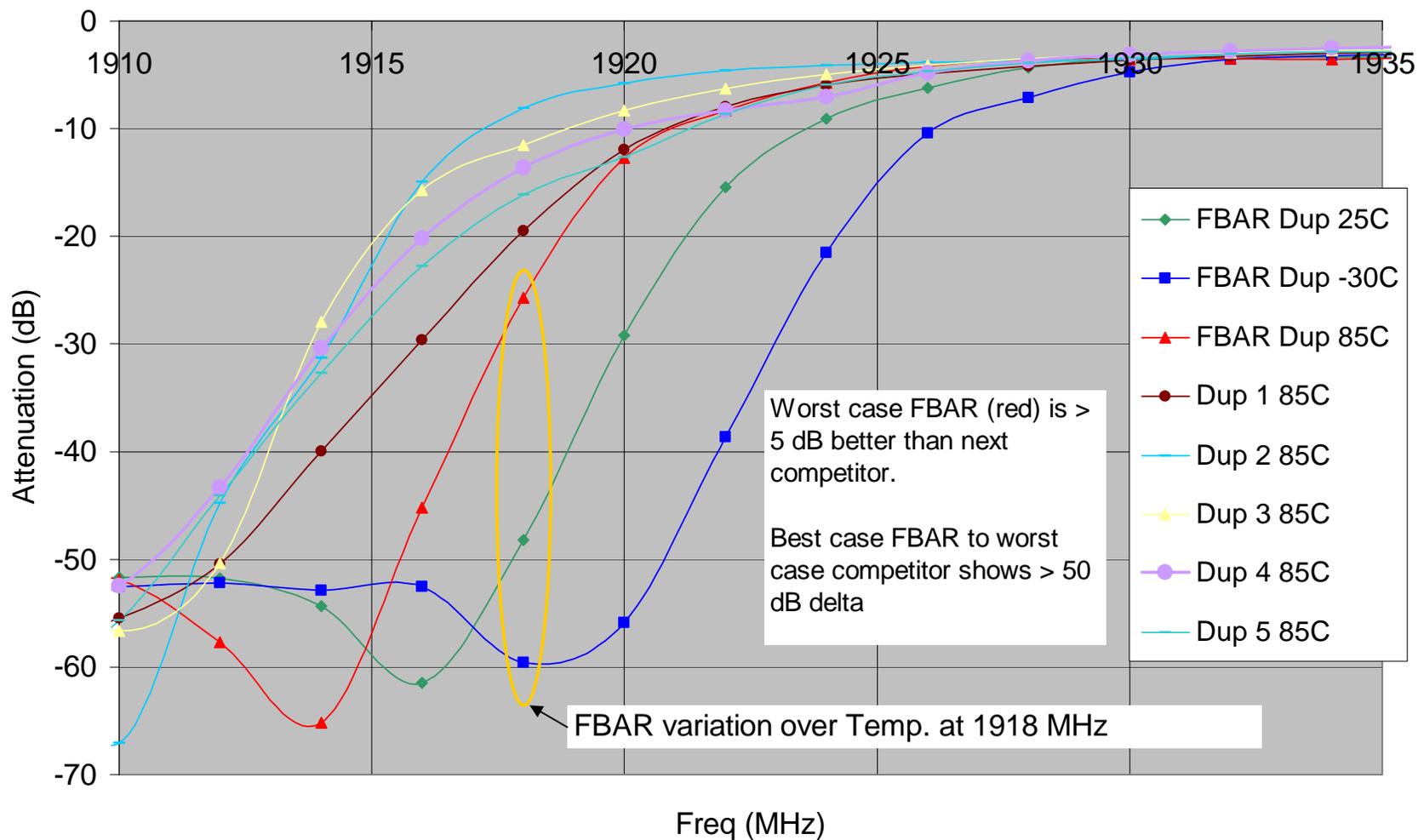
Duplexer Testing

PCS Duplexer Rx Response to H-block Interferers (Room Temp, 25 C)



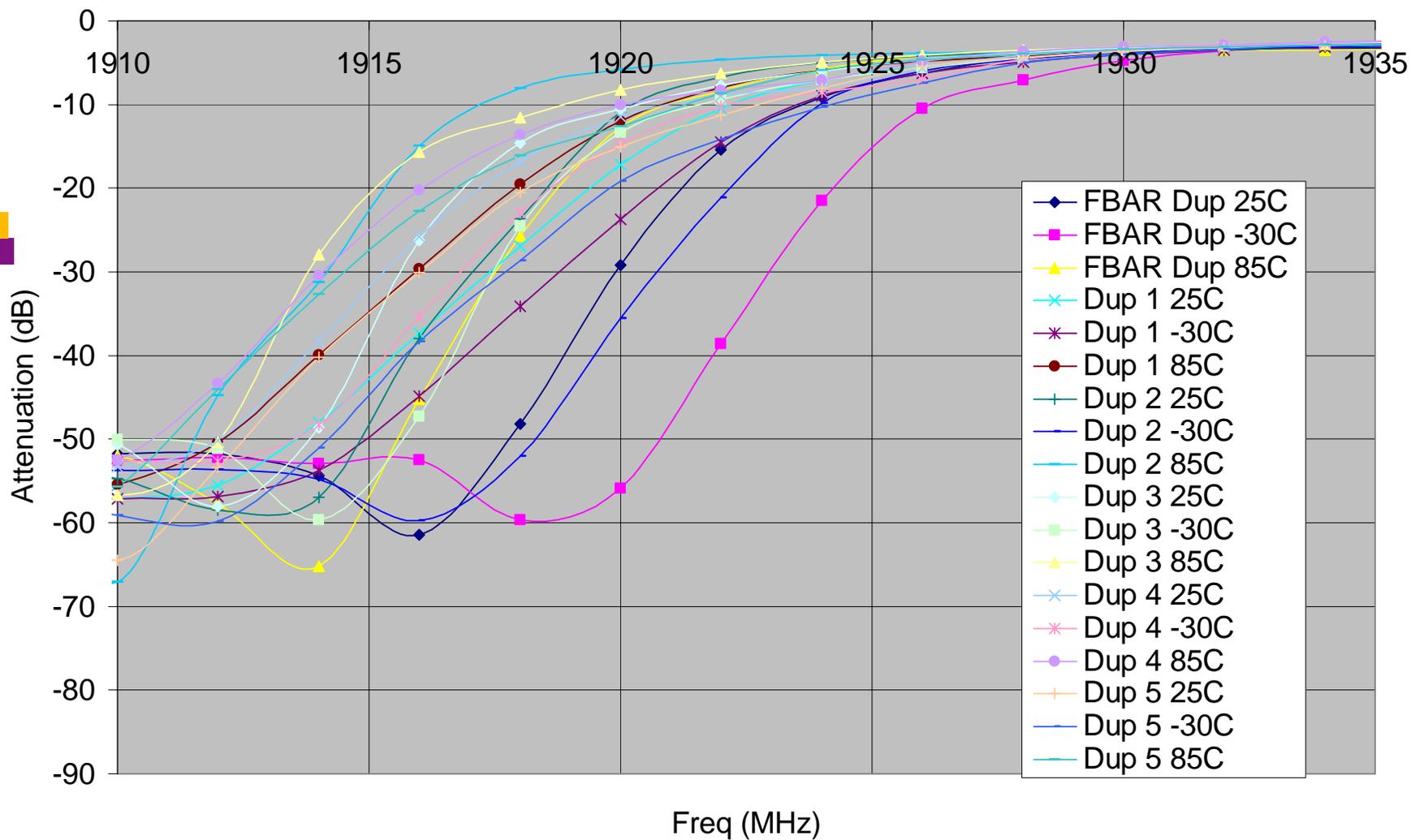
Duplexer Testing

PCS Duplexer Rx Response to H-block Interferers (85 C)



Duplexer Testing

PCS Duplexer Rx Response to H-block Interferers (All Temps)



Duplexer Testing Summary

- Attenuation and frequency variations are dramatic over the normal normal operating range of a duplexer – as the duplexer gets hotter, hotter, the performance degrades significantly.
- Higher operating temperatures result in less attenuation across the the entire H block.
- SAW filters are widely deployed in the marketplace and therefore therefore the FCC must base H block allocation decision and service rules on SAW technology parameters.
- Degradation of all duplexer performance varies significantly by manufacturer and temperature range.
- Response in duplexer performance to temperature shifts suggests suggests that “overload” interference problem can be attributed to attributed to all H block channels – not just the channel closest to to the PCS A block.
- Additional testing is required to confirm the scope of this problem. problem.