Section 15.256

Level Probing Radar

LPR

New Rules

- Provides for LPRs
  - Inside or outside a tank, pointing down
  - 5.925-7.250, 24.05-29.00, 75-85 GHz
  - Minimum bandwidth 50 MHz
  - Fundamental emission limits EIRP
    - 1 MHz & 50 MHz bandwidth
  - Maximum antenna beamwidths
    - 12 degrees for 5.925-7.250 & 24.05-29.00 GHz
    - 8 degrees for 75-85 GHz
  - Maximum side lobe gain > 60 degrees

New Rules (cont)

- Other provisions
  - Exempt from 15.35(b) pulse amplitude limit & 15.35(c) duty cycle average
  - 75-85 GHz exempt from 15.205 (restricted bands)
  - Fixed locations only
  - No hand held
  - No marketing to consumers
  - 15.31(q) added for LPRs in concrete or metal tanks (compliance with 15.209)

Measurement Procedure
KDB Publication 890966

- General considerations
  - External harmonic mixers or frequency downconverters may be required for measurements above maximum frequency capability of the spectrum analyzer.
  - When using external harmonic mixers with a spectrum analyzer, image signals will interfere with the desired signal if the bandwidth of the desired signal is greater than twice the I.F. frequency of the analyzer unless image suppression function is available.

Measurement Procedure (cont)

- General considerations (cont)
  - External harmonic mixers also have high conversion loss.
  - Downconverters have a lower conversion loss and don't have an image problem.
  - External harmonic mixers for use with spectrum analyzers are available.
  - Downconverters must be custom designed and built.

Measurement Procedure (cont)

- Fundamental emission bandwidth
  - 10 dB with peak detector & 1 MHz RBW
- Fundamental emission power measurement
  - Radiated
    - Measure max power at far field boresighted on LPR transmit antenna with 1 MHz and 50 MHz RBW.
    - If 50 MHz RBW not available, measure with narrower RBW greater than 1 MHz & integrate power.

Measurement Procedure (cont)

– Conducted

- If possible, measure power at antenna port with 1 MHz & 50 MHz RBW.

- If 50 MHz RBW not available, measure with narrower RBW greater than 1 MHz integrate power.

- Determine F.S. or conducted power

– Radiated

- Calculate F.S. using amplifier gain, antenna factor, conversion loss, etc.
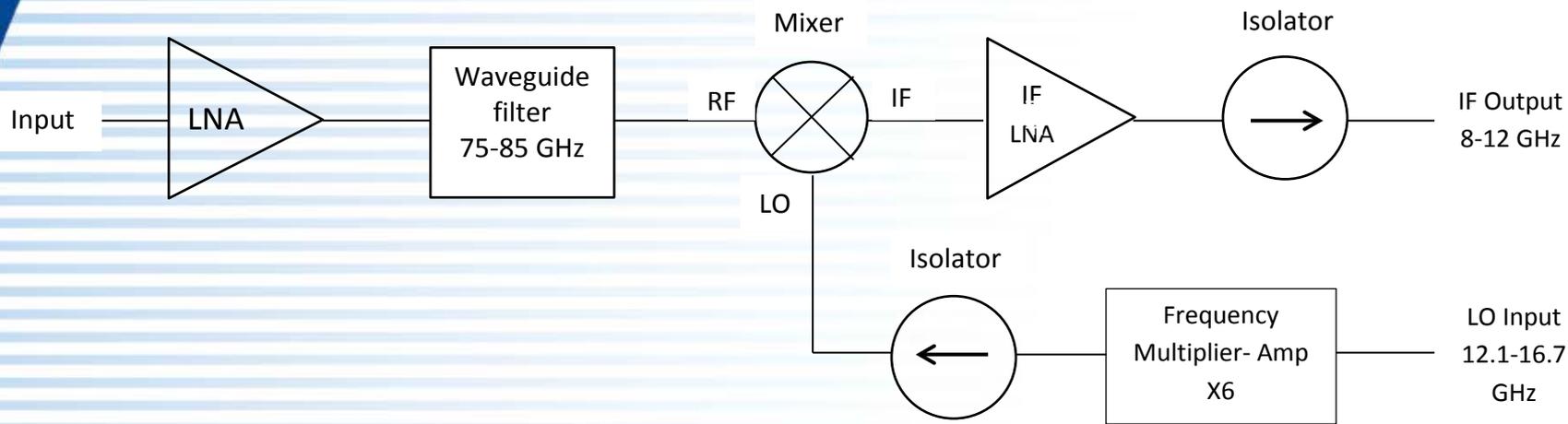
or

- Signal substitution.

Measurement Procedure (cont)

- – Conducted
    - Calculate conducted power from measurement using attenuation, conversion loss, cable loss, etc.

      or

      signal substitution.

- Calculate EIRP
    - – Radiated
        - EIRP = F.S. − 104.8 + 20 Log D
          where F.S is field strength at far field distance D
    - – Conducted
        - EIRP = conducted power + antenna gain.

W-Band Downconverter