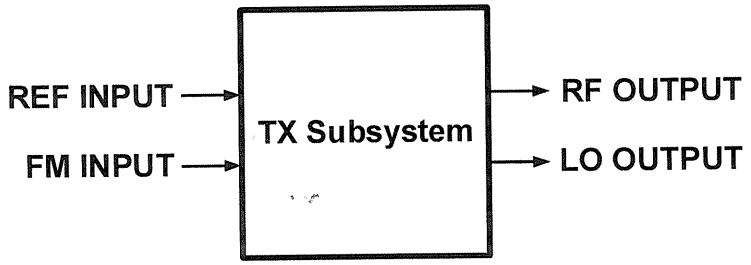
PRODUCT SPECIFICATION

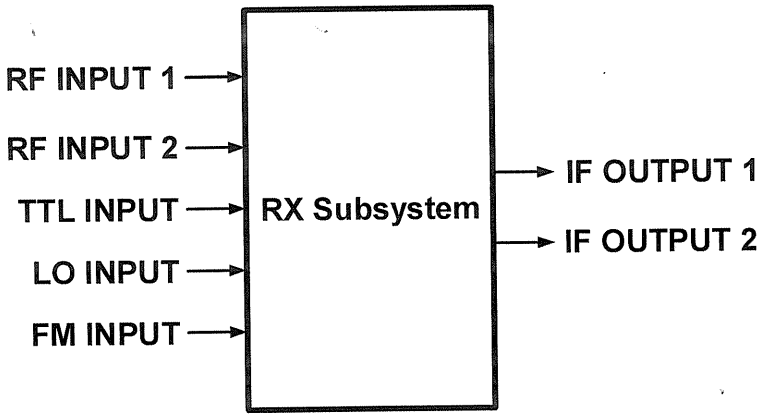
W-Band Transceiver Front End

The objective of this work is to deliver a W-band Transceiver comprising 1 transmitter and multiple receivers. The number of receivers shall be at least 2, but extendable to 8.

The block diagram below illustrates all inputs and outputs, excluding power supply bias lines.

All specifications must be tested.





Mechanical Specifications

- TX size: 7.8" x 5.5" x 2.8" max
- RX size: 17.0" x 16" x 3.5" max
- TX Operating Temperature: -40°C to +75°C
- RX Operating Temperature: -40°C to +85°C
- Atmospheric Pressure: 0.25 atmospheres

Electrical Specifications

- TX Reference Frequency Input
  - Frequency: 10 MHz
  - Connector: SMA (F)
- TX FM Input

  - Linear Frequency Ramp from 5.5 to 8.5 GHz
  - Typical Power Level: -20 dBm
  - Connector: SMA(F)
- TX RF Output
  - Center Frequency: 94 GHz
  - Signal Bandwidth: 3 GHz
  - P1dB: 23 dBm for a 3 GHz bandwidth signal
  - Power variation over bandwidth: ±1 dB max, for a single tone
  - Power variation over temperature: ±1 dB, for a single tone
  - Image and LO Rejection: 50 dB min
  - Connector: WR-10
- TX LO Output
  - Center Frequency: 14.5 GHz
  - Power: 9 dBm
  - Phase Noise: -102 dBc/Hz at 1 kHz offset (reference dependent)
  - Frequency Stability: ±1.5 ppm
  - Connector: SMA (F)
- TX Bias
  - Power Consumption: 28 W max
  - Number of Supply Voltages: 3 max
- RX RF Inputs
  - Center Frequency: 94 GHz
  - Signal Bandwidth: 3 GHz
  - Input Power: 23 dBm max
  - Blanking Switch Speed: < 250 ns rise/fall based on detected RF power
  - Connectors: WR-10, all facing the same direction at the same level
- RX TTL Input
  - Logic Low/High: 0 / 5 V
  - Single SMA (F) connector.
- RX LO Input
  - Center Frequency: 14.5 GHz
  - Connector: SMA (F).
  - Min Required LO Input Power: 6 dBm
- RX FM Input
  - Linear Frequency Ramp from 3.5 to 6.5 GHz
  - Typical Power Level: -20 dBm
  - Connector: SMA (F)
- RX IF Output
  - Center Frequency: DC – 3 GHz
  - Connector: SMA (F)
- RX Bias
  - Power Consumption per channel: 7 W max
  - Additional RX Power Consumption: 3.5 W max
  - Number of supply voltages: 3 max
- RX RF-to-IF Characteristics
  - Overall Noise Figure: 7.5 dB max over all variation in frequency and temperature

  - Total Gain: 27 dB
  - Gain variation over frequency: ± 2 dB
  - Gain variation over temperature: ± 3 dB
  - Image rejection: 10 dB
- Isolation Requirements
  - from TX RF Output to TX LO Output: 130 dB min
  - from TX RF Output and any RX port: 130 dB min
  - from TX internal upconverter output to TX LO Output: 130 dB min
  - from TX internal upconverter output and any RX port: 130 dB min
  - from RX FM input to RX IF output: 130 dB min
  - between any two RX ports (RF Inputs, LO Input, FM Inputs, IF Outputs): 130 dB min
  - between any two RX internal downconverter RF inputs: 130 dB min
  - between any two RX internal downconverter LO inputs: 130 dB min
  - between TX and DC bias: 85 dB min
  - between any RX channel and DC bias: 85 dB

Design Support

- Lifetime design support and upgradability.
- All specifications 100% tested.

Supplementary Transmitter Specifications

- Drive Amplifier Gain: 30 dB (Min)
- Drive Amplifier Gain Flatness: ± 0.5 dB (Max)
- Drive Amplifier P1dB: 10 dBm
- Power Amplifier Gain: 30 dB (Min)
- Power Amplifier Gain Flatness Over Freq.: ±1.0dB (Max)
- Up-converter Conversion Loss: 7.0 dB (Max)
- Up-converter RF to IF Isolation: -25 dBc (Min)
- Up-converter LO to RF Isolation: -20 dBc (Min)
- Up-converter RF to LO Isolation: -20 dBc (Min)
- Image and LO Rejection: -50 dB (Min)
- LO x6 Multiplier Output P1dB: 13 dBm (Min)
- LO x6 Multiplier Harmonics: 20 dBc
- RF leakage from DC bias: -85 dBc min

Supplementary Receiver Specifications

- Receiver LNA Gain: 38.0 dB
- Receiving LNA Noise Figure: 4.5 dB (Max)
- Receiving LNA P1dB: 10dBm
- Receiving LNA Flatness: ± 0.5 dB (Max)
- Down-converter C. L.: 7.0 dB (Max)
- Down-converter RF/IF Isolation: -25 dBc (Min)
- Down-converter RF/LO Isolation: -20 dBc (Min)
- Down-converter LO/RF Isolation: -20 dBc (Min)
- Blanking PIN Switch Insertion Loss: 3.0 dB (Max)

- Blanking PIN Switch Isolation: 40 dB (Min)
- LO Input Frequency: 14.50 GHz
- Internal W-Band LO Input Frequency: 91.5 to 94.5 GHz
- Internal W-Band LO Power Amplifier Gain: 45.0 dB
- Internal W-band LO PA Gain Flatness: ± 1.0 dB
- Internal W-Band LO PA P1dB: 13.0 dBm
- FM Modulation Input Freq: 3.5~6.5 GHz
- FM Modulation Input Power: -20dBm (Typ)
- LO Phase Noise (Reference Dependent):
- 102 dBc/Hz @ 1 KHz Offset
- 8 Way Power Divider Insertion Loss: 2.0 dB
- 8 Way Power Divider Isolation: 15.0 dB (Min)
- RF Leakage from DC Bias: -85 dBc
- RF Interfaces: WR-10, UG-387/UM
- IF/LO/FM Modulation Connectors: SMA (F)
- Blanking TTL Control Connectors: SMA (F)
- FM modulator image and LO rejection: 50 dB min
- RF downconversion image rejection: 10 dB min