Descriptive Information

Technical Description

The RF platform of GEN11 supports highly integrated LTE/UMTS/GSM-transceiver, with all necessary features to enable multi mode, multi band car telematics applications. It incorporates a fully integrated dual mode receiver, multi band TX outputs, TCVCXO control, a measurement interface, Qualcomm(Transceiver / Modem) compliant high speed data and control interface, a multi mode timer unit and all necessary front end signals for the complete RF Engine control. Overall the GEN11 directly supports RF engines with up to GSM bands, WCDMA bands and LTE bands.

1. RF Transceiver (WTR3925)

Multimode operation (See modem IC documents for specific capabilities)

- 3GPP GSM, GPRS, and EDGE (WTR3925/WTR3905 only)
- 3GPP WCDMA Rel 99, HSDPA, HSUPA, HSPA+
- 3GPP LTE FDD and TDD, with carrier aggregation (WTR3925 only)
- TD-SCDMA

LTE carrier aggregation

- WTR3925 only
- Downlink inter-band (20 MHz and 20 MHz)
- Downlink intra-band
  – Non-contiguous 20 MHz + 20 MHz
  – Contiguous, 40 MHz for certain bands
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1) RF Transmitter Part

Transmit signal paths

- Ten single-ended Tx outputs (4 LB, 4 MHB, and 2 HMLB) – WTR3925/WTR3905 only
- Six single-ended Tx outputs (3 LB, 2 MHB, and 1 HMLB) – WTR3900 only
- One 4-line analog baseband interface from modem IC (differential I and Q)
- One baseband-to-RF quadrature upconverter supports all Tx bands
- RF AGC amplifiers and filters

LO generation and distribution

- Single Tx PLL; divider and distribution circuits to support all Tx bands

Tx bandpass filters

- Eliminated for most modes/bands supported

2) RF Receiver Part

Primary receiver paths

- 14 single-ended PRx inputs (4 LB, 5 MB, 1 MLB, 4 HB)
- Three PRx/CA1 RF-to-baseband quadrature downconverters (LB, MB, HB)
- Three PRx/CA2 RF-to-baseband quadrature downconverters (LB, MB, HB)
- Baseband filtering and amplifiers
- Two single-ended I and Q interfaces to modem IC (PRx/CA1, PRx/CA2)

Diversity receiver paths

- 14 single-ended DRx inputs (4 LB, 5 MB, 1 MLB, 4 HB)
- Three DRx/CA1 RF-to-baseband quadrature downconverters (LB, MB, HB)
- Three DRx/CA2 RF-to-baseband quadrature downconverters (LB, MB, HB)
- Baseband filtering and amplifiers
- Two single-ended I and Q interfaces to modem IC (DRx/CA1, DRx/CA2)

2. RF Transceiver (WTR4905)

Multimode operation (See modem IC documents for specific capabilities)

- 3GPP GSM, GPRS, and EDGE
- 3GPP WCDMA Rel 99, HSDPA, HSUPA, HSPA+
- 3GPP LTE FDD and TDD

Advanced RF techniques

- Mobile Rx diversity (but not SHDR due to single Rx VCO)
- Simultaneous GNSS

1) RF Transmitter Part

Transmit signal paths

- Wideband single-ended Tx outputs
- WTR4905 = 5
- 4-line analog baseband interface from modem IC (differential I & Q)
- One baseband-to-RF quadrature upconverter supports all Tx bands RF AGC amplifiers

LO generation and distribution

- Tx PLL; divider and distribution circuits to support all Tx bands

External Tx bandpass filters

- Eliminated for most modes/bands supported

2) RF Receiver Part

Primary receiver paths

- Single-ended PRx inputs

  WTR4905 = 8 (3 LB, 3 MB, 2 HB)

- PRx RF-to-baseband quadrature downconverters

  Two SAWless: LB for GSM, MB/HB for GSM and TD-SCDMA

  For all other WAN:

  WTR4905 = 3 (LB, MB, and HB)
- Baseband filtering and amplifiers
- 2-line analog baseband interface to modem IC (single-ended I & Q)
- **Diversity receiver paths**
- Single-ended DRx inputs

  WTR4905 = 7 (3 LB, 2 MB, 2 HB)
- DRx RF-to-baseband quadrature downconverters

  WTR4905 = 3 (LB, MB, and HB)
- Baseband filtering and amplifiers
- 2-line analog baseband interface to modem IC (single-ended I & Q)

3. Modem Part (MDM9615)

The MDM9x40 is the latest-generation Qualcomm Technologies, Inc. (QTI) MDM device, which further expands mass-market chipset capabilities by making 3G and 4G high-speed data services accessible to more consumers in developed and developing countries. An MDM device is similar to a QTI MSM™ device, but without multimedia logic.

The MDM9x40 chipset supports high-speed data capabilities over a wide range of air interface standards.

The MDM9x40 device is fabricated using the advanced 20 nm SoC CMOS process, and is available in the 8.6 × 9.8 × 0.82 mm, 527-pin pico-scale package (527 PSP). It includes many ground pins for improved electrical grounding, mechanical strength, and thermal continuity.

4. Power Management Part (PMD9645)

The PMD9645 device integrates all the wireless product's power management, general housekeeping, and user interface support functions into a single mixed-signal IC. Its versatile design is suitable for any multimode, multiband product.

The PMD9645 mixed-signal BiCMOS device is available in the 103-pin wafer-level nanoscale package (103 WLNSP) that includes ground pins for improved electrical ground, mechanical stability, and thermal continuity.

- Input power management
- Output voltage regulation
- General housekeeping
- User interfaces
- IC interfaces

5. Clocks

The PMIC includes several clock circuits whose outputs are used for general housekeeping functions, and elsewhere within the handset system. These circuits include a 19.2 MHz XO with multiple controllers and buffers, an MP3 clock output, an RC oscillator, and sleep-clock outputs.

Performance specifications for these functions are presented in the following subsections.

- 19.2MHz : An external crystal is supplemented by on-chip circuits to generate the desired 19.2 MHz reference signal. Using an external thermistor network, the on-chip ADC, and advanced temperature compensation software, the PMIC eliminates the large and expensive VCTCXO module required by previous-generation chipsets. The XO circuits initialize and maintain valid pulse waveforms, and measure time intervals for higher-level handset functions. Multiple controllers manage the XO warmup and signal buffering, and generate the desired clock outputs.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

RF Exposure Statement

The antenna(s) must be installed such that a minimum separation distance of at least 20 cm is maintained between the radiator (antenna) and all persons at all times. This device must not be co-located or operating in conjunction with any other antenna or transmitter. The highest permitted antenna gains including cable loss for use with this device are:

GSM 850	-6.15 dBi
GSM 1900	-7.09 dBi
WCDMA 2	-7.09 dBi
WCDMA 4	-8.05 dBi
WCDMA 5	-6.15 dBi
LTE 2	-7.09 dBi
LTE 4	-8.05 dBi
LTE 5	-6.15 dBi
LTE 12	-6.29 dBi
LTE 13	-6.46 dBi
LTE 17	-6.32 dBi

End Product Labeling

The module is labeled with its own FCC ID. If the FCC ID is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. In that case, the final end product must be labeled in a visible area with the following:

Contains FCC ID: BEJGEN11NAN

OEM Responsibilities to comply with FCC Regulations

The module has been certified for integration into products only by OEM integrators under the following condition: - The antenna(s) must be installed such that a minimum separation distance of at least 20 cm is maintained between the radiator (antenna) and all persons at all times.

- The transmitter module must not be co-located or operating in conjunction with any other antenna or transmitter except in accordance with FCC multi-transmitter product procedures. As long as the two condition above is met, further transmitter testing will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

"The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module or change RF related parameters in the user manual of the end product."

IMPORTANT NOTE: In the event that these conditions can ' t be met (for certain configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can't be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

Manual Information To the End User

This device complies with part 15 of the FCC rules Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.