DESCRIPTION OF ACTIVE DEVICES

COMPONENT DESIGNATION	FUNCTION OF DEVICE
TRANSMITTER	
N1601, N1801, N1802, N1803	GAAS FET RF Switch
N1601	Amplifier and Mixer IC
N1701	Dual Band Power Amplifier
V1804	Detector Diode
V1801	900MHz Power Amplifier
V1702, V1704, V1802, V1803, V1805	Switching Transistor
Z1801	Diplexer
Z1802	800 MHz Duplexer Filter
Z1701	Isolator, 800 MHz
Z1702	Isolator, 1900 MHz
Z1601, Z1602, Z1604	800 MHz Transmit SAW Filter
Z1603	1900 MHz Saw Filter
RECEIVER	
N1201	Dual band LNA/Mixer ASIC
N1301	Receiver IF IC
N1202	LNA/Mixer ASIC (not used)
V1301	Tuning Diode
V1201, V1202, V1210	Switching Transistor
Z1201	1900 SAW Filter
Z1203	800 MHz SAW Filter
Z1202	1900 MHz Ceramic Filter
Z1204	Crystal Filter
SYNTHESIZER	
N1501	VCO Module
N1401	Synthesizer/ Modulator IC
N1402	19.44MHz Oscillator Module
V1501, V1502	FET Amplifier
V1401	Tuning Diode
BASEBAND	
D201	Hex Inverter
D501, D502, D502	Memory
D601	Digital Signal Processor
D701	Audio Processor
D402, D403, D801	OR gate
D401	Microprocessor
N301	Battery Charging ASIC
N601, N1901, N1902, N1903, N1904	Voltage Regulators
V201, V202, V203, V702, V703,	Diode Clippers
V204, V205, V701, V1903, V1905	switching transistors
V902, V903, V904	switching transistors
V1210, V1901, V1904, V1906, V1907	Switching FET
V905	diode
V1902	zener diode
V801	Impedance buffer transistor

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Due to the high accuracy of the I/O, the modulation, transmit voice, DTMF, SAT and data deviations are all preset in the DSP software and are not adjustable in production or the field. These procedures give the test method to verify the phone has proper deviations.

RADIO TUNE/TEST INSTRUCTIONS

FILTERING
SAW, ceramic, and crystal filter technologies are used, and no tuning is required.

REFERENCE FREQUENCY ADJUSTMENT

TEST SETUP

Testing of the VCTCXO circuit is temperature dependent and should be carried out at an ambient room temperature of +23°C to +27°C. Any frequency adjustments should be made 1.0 hour after re-flow soldering to allow for relaxation of thermal stress.

Terminate ANT (X301) into a frequency counter with a 50Ω input impedance.

Enter the following test commands:
**** *The same channel should be used for all parts of this test* ****
@2705 *(read thermistor A/D from Patti)*
check result 1
@80 *(initialize the transceiver- carrier off and audio muted)*
@6502 *(AFC off)*
@E11401FF *(center DAC3)*
@3Czzxxxx *(select a MID-CHANNEL)*
@8407 *(set the transmitter power level 7)*
@81 *(turn the transmitter on)*
check result 2

TEST RESULTS

1. Verify that the returned value is in the range 41 to 54 hex. (A higher temperature corresponds to a lower reading).
2. Wait until output is stable (<±42Hz variation in frequency). Log output frequency and calculate error in Hz.

Verify that the transmitter frequency is <±100Hz of the channel frequency.

If necessary, adjust DAC3 with the commands *@E1140xxx* where xxx is 000 to 3FF (each step is approx. 48Hz) to achieve a transmitter frequency that is <±100Hz of the channel frequency plus 0.35ppm. DAC3 calibration limits are 110h and 300h.

END OF TEST

@80 *(carrier off and audio muted)*

SET TRANSMIT RF POWER

TEST SETUP

Before testing, provide the antenna (X301) with a 50Ω load capable of dissipating 5W (average power). Use 6.0 VDC at VCC_6V input on system connector.

Enter the following test commands:

@6502 *(set VCTCXO control voltage)*
@3C000334 *(tune to MID-CHANNEL CELLULAR BAND, CHAN 334)*
@81 *(turn on carrier output)*
For power levels 2 through 10, repeat the following setup and adjust the power level to comply with the Calibration Goal Mid-Channel column of the table in test results below:
@840x *(x is power level to be set, 2 = PL2, 3 = PL3, … A = PL10)*
(yy is hex setting corresponding to power level as follows:)
Each hex setting is approx. 0.15dB.
(store power level value)
For Power Levels 2 - 10 with Low and High Channel, verify that output power meets Low and High Channel Power Limits column of the table in test results below. NOTE: Before changing channels the carrier is to be turned off using the @82 command. After tuning to the desired channel using the @3C00xxxx command, turn on the carrier output using @81.

TEST RESULTS
Verify that the power levels for each of the setup settings is within the tolerance shown below. Use Calibration Goal Mid-Channel for calibration of levels 2 through 10.

POWER LEVEL	POWER OUTPUT	Calibration Goal Mid-Channel	Low and High Channel Power Limits
2	+25.5 dBm	±0.25dB	+1.0dB/-1.5dB
3	+22.5 dBm	±0.5dB	+2.0dB/-2.0dB
4	+19.0dBm	±0.5dB	±2.5dB
5	+15.0dBm	±0.5dB	±2.5dB
6	+11.0dBm	±0.5dB	±2.5dB
7	+ 7.0dBm	±0.5dB	±2.5dB
8	+ 3.0dBm	±0.5dB	±3.0dB
9	-1.0dBm	±0.5dB	±5.5dB
10	-5.0dBm	±2.0dB	±8.5dB

END OF TEST
@82 *(turn carrier off)*

SET BURST MODE TRANSMIT RF POWER

TEST SETUP
Before testing, provide the antenna (X301) with a 50Ω load capable of dissipating 5W (average power). Use 6.0 V at VCC_6V and 12.0 V at VCC_12V input on system connector. **NOTE: This test must be completed within 10 seconds or transmitter will be automatically shut off to prevent component overheating.

Enter the following test commands:
@6502 *(set VCTCXO control voltage)*
@3C000384 *(tune to MID-CHANNEL CELLULAR BAND, CHAN 384)*
@81 *(turn on carrier output)*
(switch transmitter path and enable burst mode transistor)

For each power level, 0 through 1, repeat the following setup and adjust the power level to comply with the Calibration Goal Mid-Channel column of the table in test results below:
@840x *(x is power level to be set, 0=pl 0, 1=pl 1)*
(yy is hex setting corresponding to power level as follows:)
Each hex setting is approx. 0.15dB.

Record the VGA hex setting for power levels 0 - 1.

(store power level value)
NOTE: you MUST store a value here, EVEN if it's the same as the initial guess.

For Power Levels 0 and 1 with Low and High Channel, verify that output power meets Low and High Channel Power Limits column of the table in test results below.
NOTE: Before changing channels the carrier is to be turned off using the @82 command. After tuning to the desired channel using the @3C00xxxx command, turn on the carrier output using @81.

TEST RESULTS
Verify that the power levels for each of the setup settings is within the tolerance shown below. Use Calibration Goal Mid-Channel for calibration of levels 0 and 1.

POWER LEVEL	POWER OUTPUT	Calibration Goal Mid-Channel	Low and High Channel Power Limits
0	+35.0dBm	±0.25dB	+1.0dB/-1.5dB
1	+31.0dBm	±0.25dB	+1.0dB/-1.5dB

END OF TEST
turn burst mode off)
@82 *(turn carrier off)*

TRANSMIT DEVIATION

TEST SETUP
Set the modulation test equipment to have 50 Hz high-pass and 15kHz low-pass filtering, and use Average detector.

Inject a 1004 Hz signal into the system connector input (X1200-2 ATMS and X1200-4 AGND). Adjust the level of the input signal to 45mV RMS.

Enter the following test commands:
@6502 *(AFC off)*
@3Czzxxxx *(tune to MID-CHANNEL CELLULAR BAND)*
@8400 *(set attenuation to power level 0)*
@81 *(turn the carrier on)*
@88 *(un-mute the transmit path)*
@AC *(turn on the compander)*
(disable auto-writes to PATTI addr. 40, 48, & 88)
(Tx PGA = -2.5dB, Rx PGA = +2.5dB)
(audio to system connector)
Record the average deviation level. Multiply by 1.414 to get peak deviation.

TEST RESULTS
The transmit peak deviation should be 2.9kHz±500Hz

NOTE: Use of an Average detector (not peak) and multiplying the number measured by 1.414 to get peak removes the incidental FM from the measurement.

END OF TEST
@80 *(reset transceiver*

DTMF DEVIATION AND HIGH FREQUENCY

TEST SETUP

Set modulation analyzer for 50Hz HP and 15kHz LP, and use Average detector.

Enter the following test commands:

@3Czzxxxx *(tune to MID-CHANNEL CELLULAR BAND)*
@88 *(open transmit audio)*
@8400 *(set attenuation to power level 0)*
@81 *(turn the carrier on)*
@AA0D *(turn on DTMF high tone)*

Turn off injected audio signal to TU.

TEST RESULTS

Verify that the mobile transmitted tone is 1143Hz ±1.5% and the Average deviation 3.64kHz ± 10%. This corresponds to a peak radian deviation of (3.64kHz ±10% X 1.414) / 1.143kHz = 4.5 ±10%.

NOTE: Use of an Average detector (not peak) and multiplying the number measured by 1.414 to get peak removes the incidental FM from the measurement.

END OF TEST

@AB *(turn DTMF off)*
@80 *(initialize transceiver)*

SAT DEVIATION

TEST SETUP

Set modulation analyzer for 50Hz HP and 15kHz LP *NOTE: Use of an Average detector (not peak) and multiplying the number measured by 1.414 to get peak removes the incidental FM from the measurement.* Apply an on-channel RF signal to the antenna connector at –50dBm, 6030.0Hz tone at ±2kHz deviation *(this is required for the phone to transpond the tone)*.

Enter the following test commands:

@3Czzxxxx *(tune to MID-CHANNEL CELLULAR BAND)*
@6502 *(lock the VCTCXO)*
@8400 *(power level 0)*
@81 *(turn on transmitter)*
@A002 *(turn SAT on (6030 Hz))*
@85 *(mute receive audio)*
@87 *(mute transmit audio)*

TEST RESULTS

Verify that the mobile transmitted frequency is 6030Hz ±1Hz and the Average frequency deviation is:
1.414 KHz ±10%. This corresponds to a peak deviation of (1.414kHz ±10%) X 1.414 = 2.0kHz ±10%.

NOTE: Use of an Average detector (not peak) and multiplying the number measured by 1.414 to get peak removes the incidental FM from the measurement.

END OF TEST

@80 *(initialize transceiver)*

DATA (SIGNALING TONE) DEVIATION

TEST SETUP
Set modulation analyzer for 50Hz HP and 15kHz LP, and use Average detector.

Enter the following test command:
@3Czzxxxx *(tune to MID-CHANNEL CELLULAR BAND)*
@6502 *(lock the VCTCXO)*
@8400 *(set attenuation to power level 0)*
@81 *(turn the carrier on)*
@8F *(turn on 10kHz data tone)*

TEST RESULTS
Verify that the Average transmit deviation level is 5.66kHz ±10%. This corresponds to a peak deviation of (5.66kHz ±10%) X 1.414 = 8.0kHz ±10%.

NOTE: Use of an Average detector (not peak) and multiplying the number measured by 1.414 to get peak removes the incidental FM from the measurement.

END OF TEST
@80 *(initialize transceiver)*

SET TRANSMIT RF POWER PCS BAND

TEST SETUP
Before testing, provide the antenna (X301) with a 50Ω load capable of dissipating 1W (average power).
Enter the following test commands:
@6502 *(set VCTCXO control voltage)*
@3C011000 *(tune to MID-CHANNEL PCS BAND, Channel 1000)*
@81 *(turn on carrier output)*

For power levels 0 through 10, repeat the following setup and adjust the power level to comply with the Calibration Goal Mid-Channel column of the table in test results below:
@840x *(x is power level to be set, 0 = PL2, 3 = PL3, … A = PL10)*
(yy is hex setting corresponding to power level as follows: 00=full pwr, FF=lowest pwr)
(store power level value)
Each hex setting is approx. 0.18dB
NOTE: A value MUST be stored here, even it is the same as the initial guess. Levels 0,1,&2 are set when level 0 is set.

For Power Levels 0 - 10 with Low and High Channel, verify that output power meets Low and High Channel Power Limits column of the table in test results below. **NOTE: Before changing channels the carrier is to be turned off using the @82 command. After tuning to the desired channel using the @3C01xxxx command, turn on the carrier output using @81.**

TEST RESULTS

Verify that the power levels for each of the setup settings is within the tolerance shown below. Use Calibration Goal Mid-Channel for calibration of levels 0 through 10.

POWER LEVEL	POWER OUTPUT	Calibration Goal Mid-Channel	Low and High Channel Power Limits
0,1,2	+25.5 dBm	±0.25dB	+1.0dB/-1.5dB
3	+22.5 dBm	±0.5dB	±2.0dB
4	+19.0dBm	±0.5dB	±2.5dB
5	+15.0dBm	±0.5dB	±2.5dB
6	+11.0dBm	±0.5dB	±2.5dB
7	+ 7.0dBm	±0.5dB	±2.5dB
8	+ 3.0dBm	±0.5dB	±3.0dB
9	-1.0dBm	±0.5dB	±5.5dB
10	-5.0dBm	±2.0dB	±8.5dB

END OF TEST

@82 *(turn carrier off)*

RECEIVER ALIGNMENT

The receiver requires no alignment.