

## EXHIBIT 4

### TUNE-UP PROCEDURE

As required by § 2.1033(c)(9), this exhibit describes the procedures used to tune-up or initially prepare the DTSA GSM radio module for operation, in accordance with the regulations governing the operation of personal communications services (PCS) equipment given in Part 24, Subpart E.

Tune-up of the transmitter is performed at the module level and is completed at the factory prior to final assembly of the GSM radio module. DTSA maximum output power is set at the factory and cannot be increased in the field, nor are there any requirements for or capability provided to make transmitter adjustments in the field during installation or operation of the device.

In general, tune-up of the GSM radio module is performed by adjusting a series of software registers stored in the module's on-board EEPROM. To expedite the tune-up process, these registers are automatically adjusted by a test set during final manufacturing stages to optimize the settings for each module.

1. Transmitter output power control: two registers are used to control the transmitter RF output power during transmitter turn-on and turn-off. The transmitter ramp is implemented as a series of 21 steps of 32 values which are loaded every  $\frac{1}{4}$  bit into the transmitter DAC after the beginning of the ramp. These values are derived from a hamming process between the minimum and maximum power levels. Maximum RF output power level and tolerance is adjusted in accordance with GSM specifications for a Class 1 terminal (30 dBm maximum output).
2. AGC control: a series of registers are used to characterize the transmitter's automatic gain control. One of these contains a value which is proportionate to the slope of the straight line describing the RF output power level (in dBm) versus the AGC value. Accurate characterization of the AGC is necessary to ensure correct RF output power settings.
3. Frequency control: two registers are used to control the frequency of the VCXO. The first is used to compensate for the aging drift of the VCXO, while the second controls the VCXO to compensate for both doppler and temperature drift when the terminal is synchronized to the GSM network. The resolution of this second register is approximately 0.03 ppm, permitting fine adjustment of the VCXO. The combination of the two registers ensures a final frequency accuracy of better than 0.1 ppm.
4. Receiver gain: a single register contains a value, in dB, corresponding to the gain of the receiver channel. Characterization of the receive channel is used to determine the quality of the link for power control purposes.

Each GSM radio module is tuned-up at the factory and its performance is verified following integration into the DTSA as part of final assembly test and verification.