Means for determining and stabilizing frequency in C62

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Status Approved
Version 1.0

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Change History

Version	Date	Handled / Approved by	Status	More Information
1.0	25.09.2003	Jari Greus	Approved	

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GLOSSARY

1 MEANS FOR DETERMINING AND STABILIZING FREQUENCY, SUPPRESSION OF SPURIOUS RADIATION, LIMITING MODULATION, AND LIMITING POWER

As required by § 2.1033(c)(10), this exhibit details the methods employed to determine and stabilize frequency, suppress spurious radiation and to limit both modulation and power

Means for Determining and Stabilizing Frequency

The frequency stability of the equipment shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. Specifically, this is accomplished as follows:

The transmit RF carrier of the Engine is generated by a voltage controlled oscillator

(VCO) which is phase locked to a 13 MHz master reference clock. This 13 MHz source

is synchronized to the GSM network and, within the engine board, is controlled by an 10 bit DAC to keep the carrier to within ±0.1 ppm of the network reference.

As a GSM-compliant terminal, the stability of the engine board carrier is to be within ±0.1 ppm (±190 Hz in PCS 1900MHz) of the nominal value, in accordance with GSM performance requirements 3GPP TS 51.010

Means for Suppression of Spurious Radiation

Suppression of spurious and harmonic radiation in the engine board is ensured through good engineering practices and proper transmitter design, layout, and construction.

1. Transmitter Architecture and Design

–Frequency plan of the transmitter—local oscillator frequencies were selected to minimize spurious products.

–Use of an direct conversion architecture to minimize spurious and noise power level in the PCS1900 receive band (1930-1990 MHz).

–Lowpass filtering within and prior to the Antenna switch module to further reduce harmonics.

2. Physical realization of the engine

–Fully shielded GSM radio module construction with filtering on all signal (data,control,clock) and power supply leads.

–Localized shielding over the GSM radio and digital/baseband sections.

–Careful component placement and layout, multi-layer circuit board construction,microstrip signal routing, and construction techniques to eliminate cavity moding and resonances.

Means for Limiting Modulation

Per GSM specifications, the modulation scheme implemented by the engine board is Gaussian MSK (GMSK), with a bandwidth-time product of BT = 0.3. Modulation rate is 1625/6 kbps, or approximately 280.83 kbps. To minimize spreading of the spectrum, GSM standards require that the RF output spectrum meet the mask shown in Figure E6.1. In the engine board, modulation accuracy is maintained through the use of direct digital synthesis techniques.

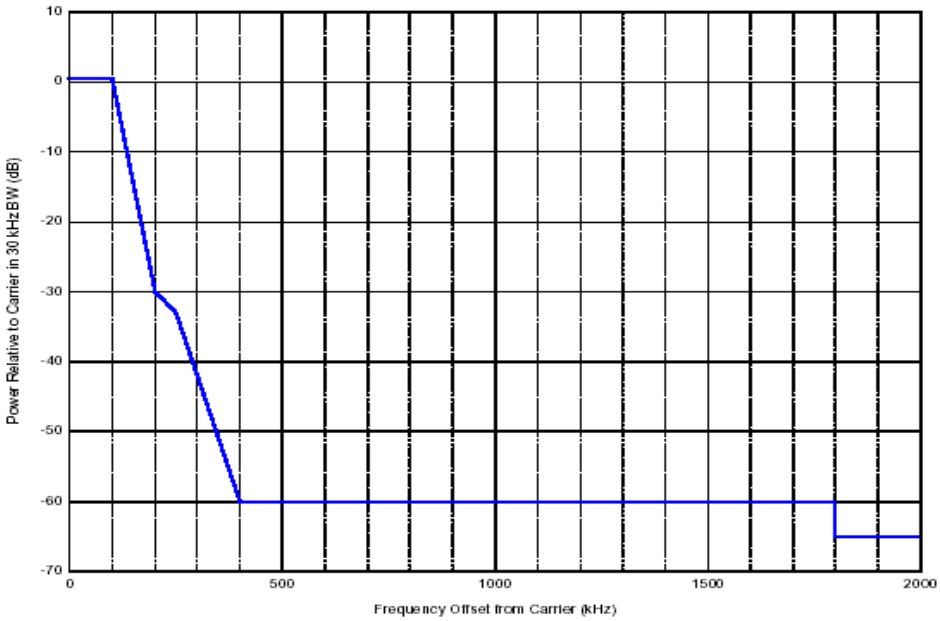

Figure E6.1. GSM terminal modulation mask.

Figure E6.1. GSM terminal modulation mask.

Means for Limiting Power

As a GSM-compliant terminal, the engine board is capable of transmitting at any of the 16 defined nominal RF output power levels, ranging from 30.0 dBm to 0.0 dBm, during its assigned TDMA frame. Engine board transmitter operation (output power level) is controlled by the GSM network, and specifically by the base station to which the engine board is attached. All RF output power levels of the engine board are set at the factory and cannot be altered or increased by user. Furthermore, the temporal variation in power level within each transmission (i.e., transmission burst time mask) is in accordance with GSM requirements. This is accomplished by adjusting transmitter gain through a power control loop and ramping the transmitter on and off at the beginning and ending of each burst. The power control loop is integrated to Power Amplifier Module proven to have little effect on output power versus temperature. Maximum RF power is adjusted to within the specified tolerance during each burst, at the output power level specified by the base station.