Family of World's Smallest Linear-in-dB Log Amp RF Power Detectors

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National Semiconductor Corp. today introduced a family of RF power detectors for wireless applications that require high frequency and range, such as mobile phone power controls and power amplifier modules, wireless local area networks and global positioning system navigation modules. Linearity-in-dB, stability, reliability and accuracy are important criteria for RF applications. This family includes the smallest RF logarithmic (log) amp and mean-square detectors that meet these criteria.

These devices give RF designers outstanding RF system performance, high reliability, ease of use and the flexibility to meet worldwide standards for communications certification, ultimately delivering the smallest scalable technology for current and next-generation CDMA, WCDMA and other 3G applications.

“RF detection is an increasingly important area for National,” said Erroll Dietz, vice president of National Semiconductor’s Amplifier products group. “Accuracy, stability and ultra-small packaging are the critical specifications for power level control of multi-band power amplifiers in wireless applications, and National’s new family delivers in each of these areas. By making these products scalable, National saves end costs for the customer in IC qualifications and reduces modeling delays, helping customers to achieve faster time to market.”

LMV225, LMV226 and LMV228

National's LMV225, LMV226 and LMV228 are log amp RF power detectors with multi-band frequency ranges from 450 MHz to 2 GHz. These devices provide an accurate temperature and supply- compensated output voltage that relates linearly to the RF input power in dBm. These devices operate with a single supply from 2.7V to 5.5V.

The LMV225 has an RF power detection range from -30 dBm to 0 dBm and is ideally suited for direct use in combination with resistive taps, eliminating the need for a directional coupler. If preferred, the LMV225 can also be used with a 30-35dB directional coupler. The LMV226 and LMV228 have a detection range from -15 dBm to 15 dBm and are intended for use in combination with a 20dB directional coupler. The LMV225 and LMV228 are targeted for the CDMA and WCDMA applications, while the LMV226 is equipped with a buffered output, which makes it suitable for GSM, EDGE, GPRS and TDMA applications. These devices remain in a low-power-consumption shutdown mode until powered up through the enable pin to drive the lowest power consumption possible. The output voltage ranges from 0.2V to 2V and can be scaled down to meet analog-to-digital converter input range requirements.

One valuable application for the LMV22x family of RF power detectors is to provide RF power data to National's family of LM320x DC/DC converters, including the LM3200. The recently-released LM3200 dynamically controls the Vcc of WCDMA & CDMA RF power amplifiers to improve the overall system efficiency. This combination of DC/DC converter plus power detector generates the real-time optimum power supply voltage (Vout) for a given RF transmit power, yielding significant efficiency improvements throughout the entire transmit range, especially at low transmit power levels. The result is longer battery life in portable RF applications.

LMV232

National's LMV232 is a mean-square RF detector with two RF inputs optimized to work with 20dB directional couplers and without any external components, providing the smallest footprint for mobile RF designs. The LMV232 true mean-square power detection allows the detector's response to be independent of the RF wave shape, resulting in less calibration steps for complex (WCDMA / CDMA) RF input signals and providing excellent temperature stability. The dual-input structure allows the power control in dual-mode phones to be handled by a signal detector, or it can be used to detect a mismatched antenna condition.

The LMV232's architecture eliminates the need for phone manufactures to perform factory trimming, which reduces system certification time and speeds their time to market. It has two digital input pins, enabling a low-power shutdown mode and the selection between the two RF inputs. The external gain and filter bandwidth can be set with an external resistor and capacitor for optimal dynamic range and ripple suppression. The LMV232 enables customers to improve performance, shorten design cycles and speed certifications.