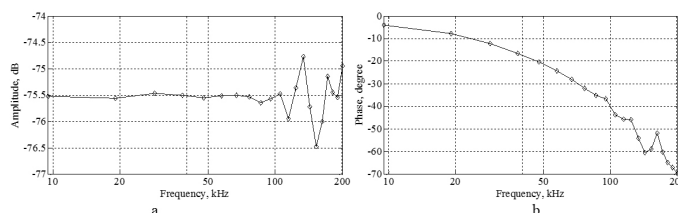




## 14AS120 Digital Pulse Determination of High-Current Shunts Frequency Response

Anton Zarevich<sup>121</sup>, Sergey Muravyov<sup>121</sup>, Elena Bedareva<sup>121</sup>

A pulse method for determination of high-current shunts frequency response is considered and experimentally verified. This is based on a joint digital processing of the input short pulse signal and a corresponding output. The frequency response is calculated by means of spectral samples series determination of the shunt and a reference current transformer output signals. It is shown that the method uncertainty can be decreased by spectral ensemble averaging.

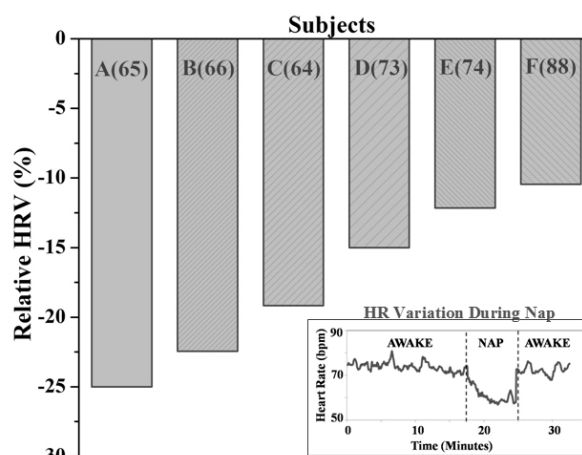


**Transfer coefficient of the high-bypass:**  
a) frequency response and b) phase response

## 14AS142 A Robust and Non-Invasive Heart-Rate Monitoring System

Krishnamoorthy S.<sup>122</sup>, Anoop C. S.<sup>122</sup>, Bobby George<sup>122</sup>

A non-invasive method for detecting the Heart Rate (HR) and its variation that aids in providing continuous, safe and effective monitoring of drowsiness of an automotive driver or a power tool operator is presented in this paper. The scheme is based on variation of HR with-respect-to the resting HR of a person. HR is detected using an appropriately located photoplethysmograph (PPG) sensor. A reliable detection scheme is developed to accurately measure HR from the PPG signal. It produces a quasi-digital signal, enabling easy interface to a digital system. This signal is independent of base-line and peak-to-peak variations that are invariably present in consecutive cycles of PPG signal. A prototype sensor and detection circuit has been built and tested. A suitable virtual instrument has been developed, which acquires and process the signals from the detection unit to obtain the HR and its variability. Tests have been conducted on volunteers to observe HR variation between awake and drowsy conditions. A consistent trend of reduction in HR was observed as the subject changes the state from awake to sleep. Tests were also performed, using suitably developed sensors, to check the reliability of the scheme while driving a vehicle. It recorded the HR data accurately while driving.



**Relative HRV (%) for different subjects (resting HR shown in brackets)**