Measurement of Automotive Module Sleep Current During Product Development

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**Introduction / Overview**

Many modern automotive modules are constantly powered, and enter a low-power mode (often called “sleep”) to minimize battery drain when the vehicle is not being used. During normal operation, current draw might be measured in amperes; whereas in sleep, current might be measured in microamperes (a current range of about a million to one). Supplying normal operational current while preserving the ability to measure the very small sleep current is a technical challenge. This document describes an approach that will work for most modules.

**Assumptions and Design Requirements**

In order for the described approach to work, it is assumed that the module whose sleep current is being measured has the following characteristic:

* It is possible to control when the module enters and exits sleep mode. (This is typically done using network traffic and directly-connected inputs.)

In general, any measurement approach must meet these requirements:

* (R1) The approach must be able to measure low current with ±5% accuracy, but hopefully with ±1%.
* (R2) Testing mistakes or a module exiting sleep mode unexpectedly must not cause hardware damage.

A typical mechanical microammeter (low-current galvanometer), such as that shown in Figure 1, does not meet (R2) because an unexpected current increase (a testing mistake or the module unexpectedly exiting sleep) will destroy the meter.



Figure : Typical Low-Current Galvanometer

**The Proposed Approach**

The proposed approach involves a current shunt and a SPST switch.