High Voltage DUT Power Supply IC for Automotive Grade

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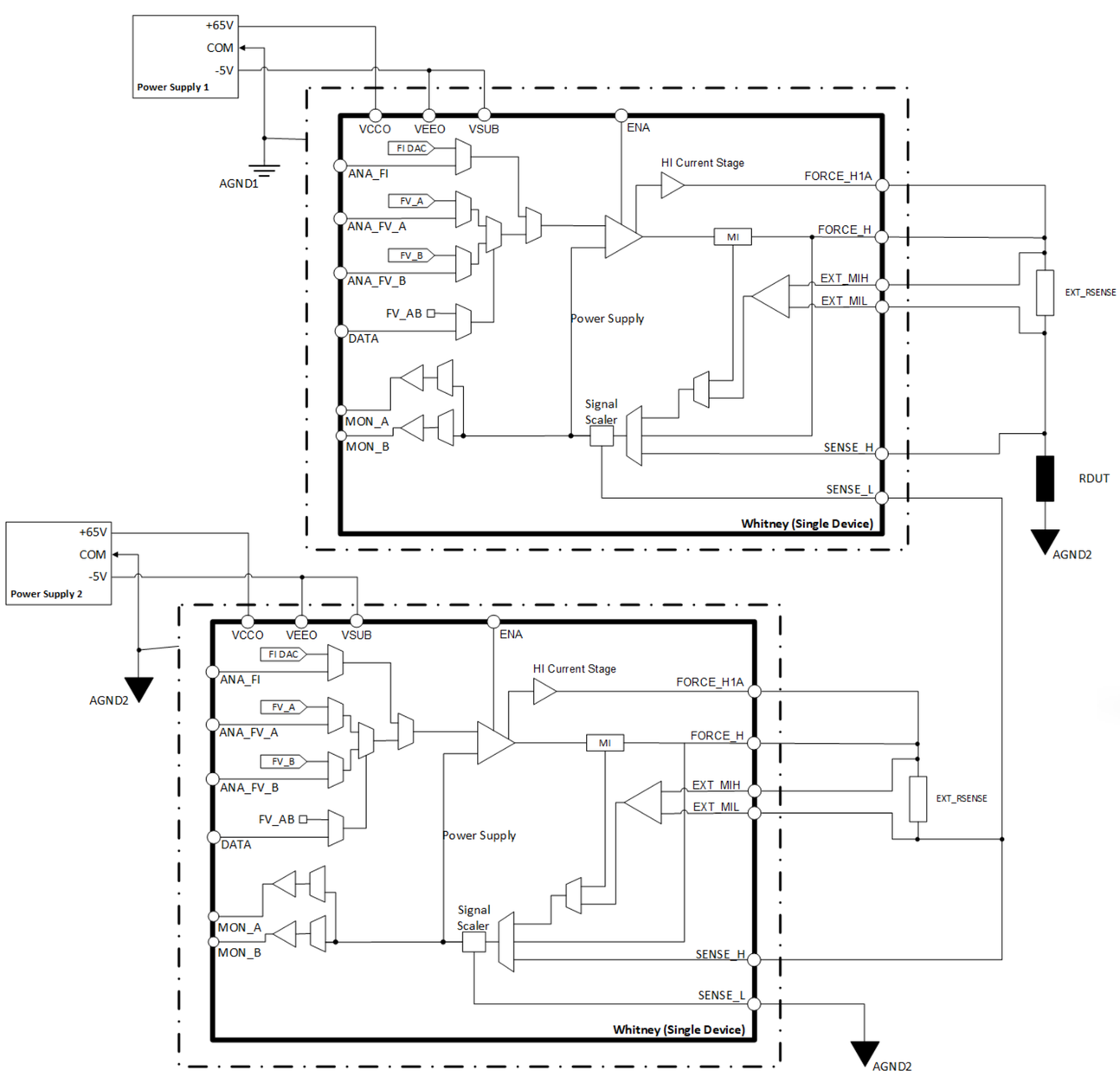
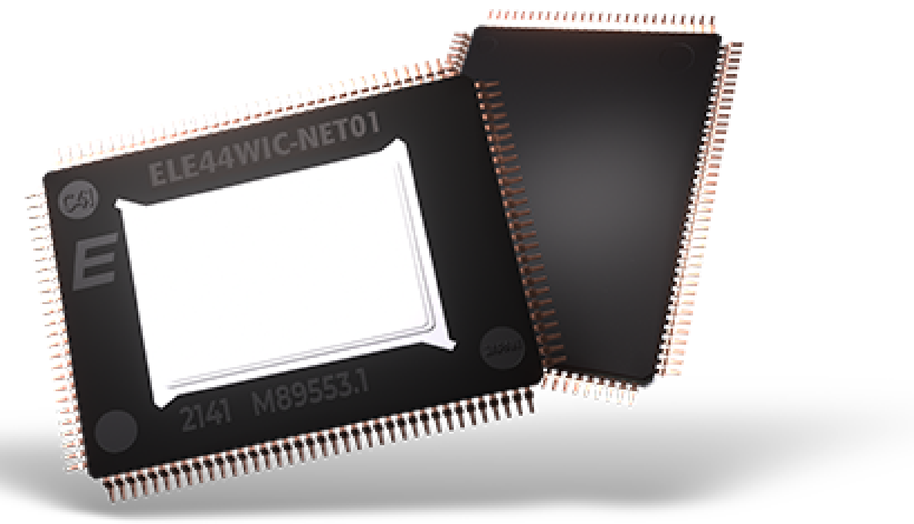
Introduction

Elevate Semiconductor's **Whitney** is a two-channel high voltage parametric measurement unit System-on-a-Chip designed for rigorous testing of automotive-grade semiconductors operating up to 100V and beyond.

It supports advanced four-quadrant testing through a stackable architecture with pseudo floating ground feature that enables voltages suitable for modern electric vehicles, maintaining 0.05% measurement accuracy with six integrated 16-bit DACs per channel and high-speed SPI interface to reduce test time.

Whitney facilitates comprehensive qualification of high reliability automotive ICs across extended voltage ranges, ensuring component reliability for evolving high-voltage automotive platforms while supporting efficient manufacturing throughput.





Challenges and Requirements in Automotive High-Voltage Testing

High-Voltage Operation and Safety

Automotive components such as battery management systems (BMS), gate drivers, and DC-DC converters operate at voltages exceeding 60 V. This requires test systems capable of safely generating and controlling high voltages while maintaining proper isolation and operator safety.

Wide Range and Flexibility in Testing

Automotive devices span wide operating ranges: from μA leakage measurements to multi-amp dynamic loads, and from a few volts to hundreds of volts. Test setups must handle both fine-grain precision and broad voltage scalability without excessive hardware reconfiguration.

Low-Noise, High-Fidelity Measurements

Many analog and mixed-signal ICs—such as current sensors, high-side switches, and protection ICs—require clean, low-ripple supply sources for reliable characterization. Switching-type power supplies often introduce noise that masks device behavior.

Meeting These Challenges Through a Stacked Linear DPS Application

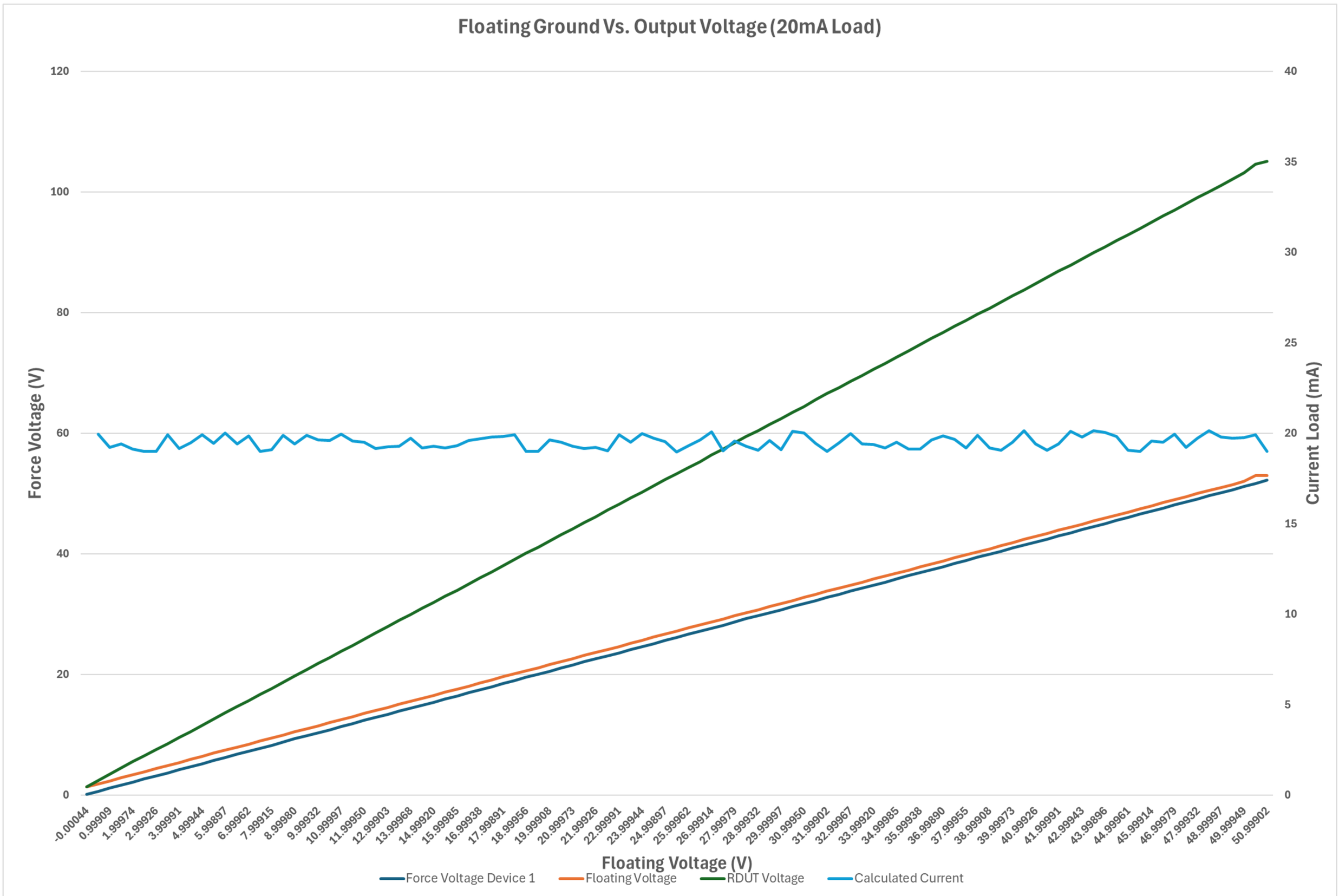
- Each DPS contributes safely to the total voltage output, enabling compliance ranges up to greater than 60V or higher.
- Programmable slew rates and list sequencing allow controlled voltage dips, surges, and recovery events for pre-compliance testing.
- The absence of switching artifacts provides a stable bias environment for analog and sensor ICs.
- Stacking and parallel configurations allow the same DPS modules to support both high-voltage and high-current test cases.

Key Benefits of using Whitney

- **Addresses voltage gaps in traditional test equipment (typically 40-60V max)**
- **Supports modern EV voltage systems (100V+)**
- **Enables comprehensive IC qualification**
- **Supports high-volume manufacturing throughput**

Method

1. Set the low-side and high-side Whitneys to Force Voltage, Disabled output.
2. Connect the low-side Whitney's output to the Sense_L of the high-side Whitney.
3. Enable both outputs.
4. Sweep the FV_A DAC of both Whitneys from 0V to 50V.



Conclusion

1. **This is feasible across all current ranges within Whitney so long as only the same current range is used across all Whitneys.**
2. **The Whitney in theory can be stacked successively enabling it to support EV voltage systems.**
3. **Future work would include checking on the negative side of the Whitney for the same functionality.**
4. **Calibration can also be done to effectively linearize the output at more than 100V range if needed.**