

Worldwide Pollution Control Association

IL Regional Technical Seminar
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Modular Design SMPS @ 35 kHz– Can Achieve Variable Outputs without Customization Costs along with Inherent Redundancy for Maximum Availability



Discreet Driver (IGBT) Sections

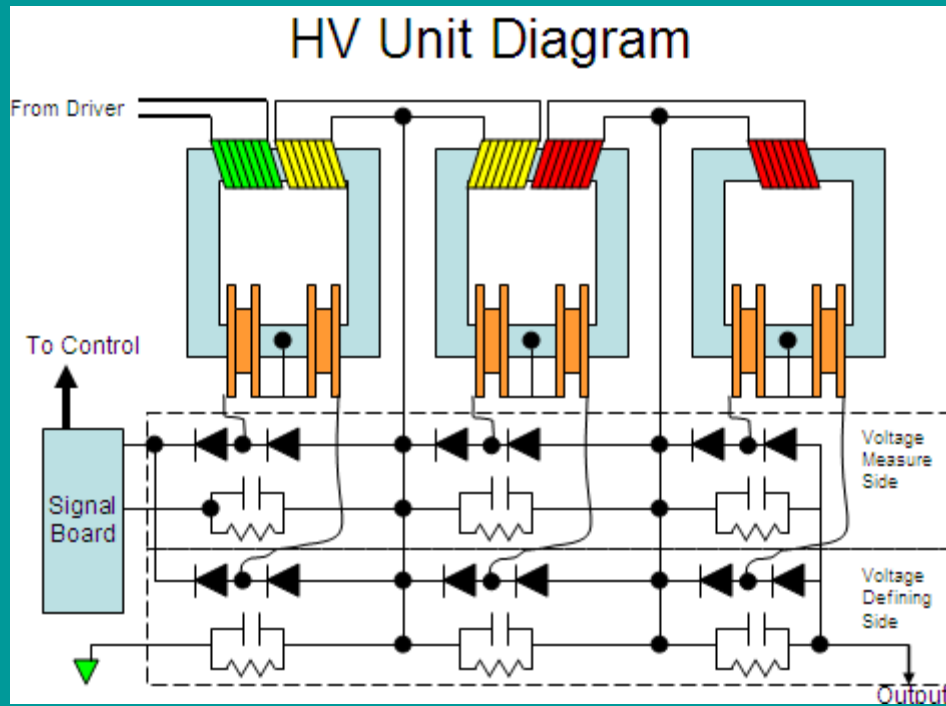
And Transformer Sections

Combine to Create....

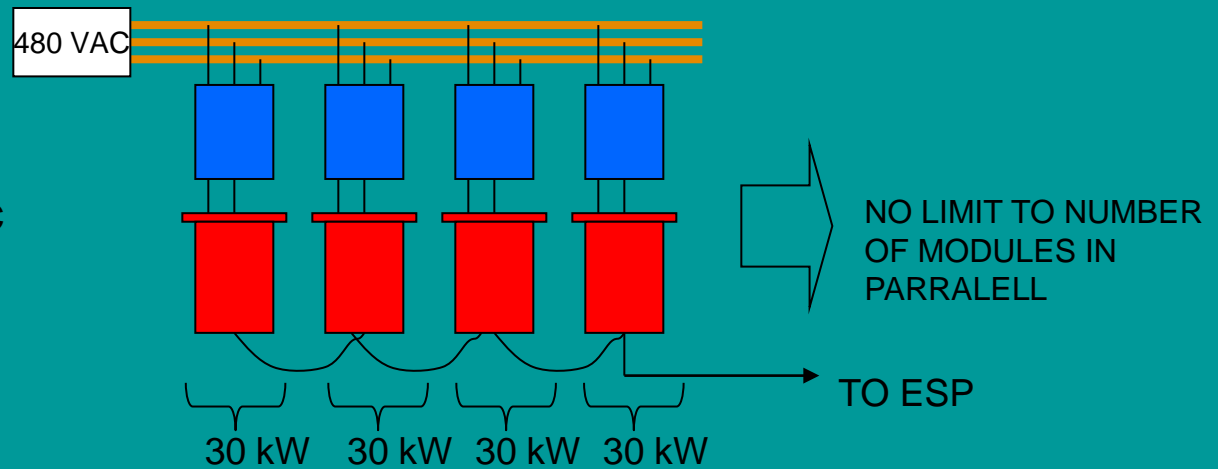
A High Frequency, Integrated Switched Mode Solution



Building Up Modules

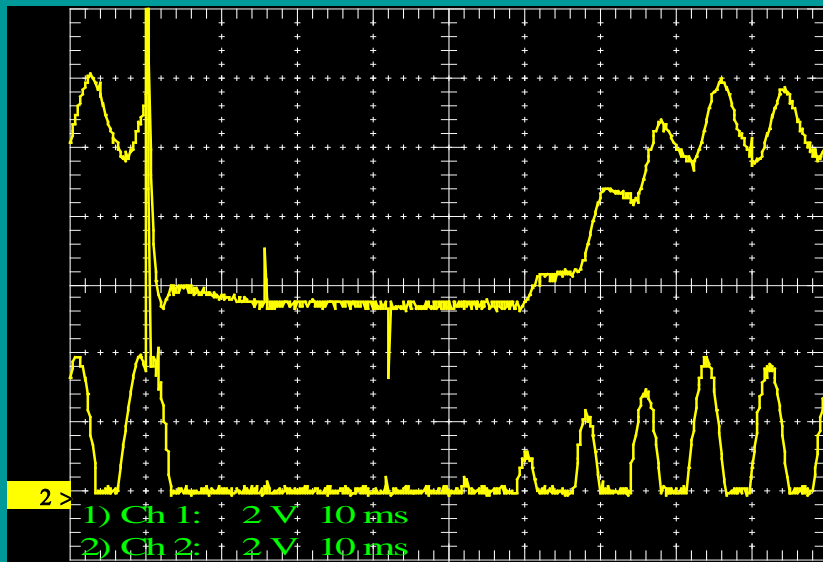


Overall Schematic

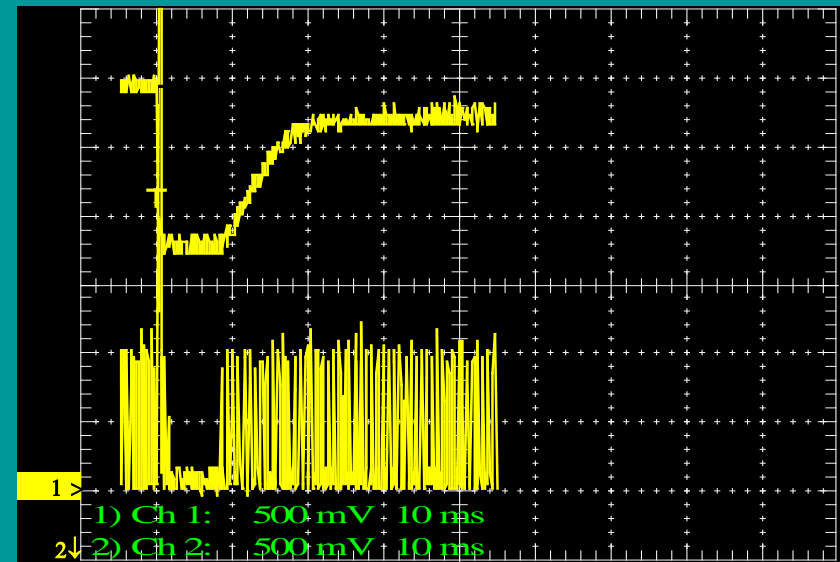


Wave Form Comparison

Conventional



HF



Modular Power Supply Attributes

Mount on ESP Roof OR at Grade

Operate in $>50^{\circ}\text{C}$ Temperatures

Achieve up to 3000 mA at up to 120 kV in One Unit

Continue Operation with a Component Failed

Perform Repairs in House and On-Line

Support Plate Spacing of 450 mm or More



Modular SMPS Advantages

- Modularity Provides
 - Opportunity to size power supply for the application, not live with whatever is closest
 - Built in fault tolerance: One module fails, the others keep running.
 - Supporting diagnostic data from multiple modules to diagnose single module vs. ESP issue
- 2 phase cooling. 50 C max ambient operating capability
- Transformer oil is cooled actively vs. air cooling on other designs. Reduces Hot Spots inside HV Unit.
- Simple topology
- Capacity can be added / taken from each bus section as needed
- Use of HV cable instead of or with bus duct and solid conductor allows power supplies to be located at grade
- Faster at quenching sparks than conventional TR OR competitive units
- ModuPower™ can operate with open circuit. Allows quick test for power supply ground vs. ESP internal ground.
- Higher Efficiency than Conventional Transformer/Rectifier Sets. PF +/- 1.0

Ultra Wide Spacing Application



18.25" Plate Spacing in a Wet ESP

Air Load Dry: 95 kV (current limit)

Air Load Wet: 90 kV

Max Operating: 92 kV (current limit)



MP Rating Field 1 (5 ft. length): 100 kV, 300 mA, 30 kW Qty 2

MP Rating Field 2 (5 ft. length): 100 kV, 300 mA, 30 kW Qty 2

MP Rating Field 3 (10 ft. Length): 100 kV, 900 mA, 90 kW Qty 2

At full power, actual current densities were over 100 mA / 1000 ft²!

ModuPower kV Ratings go up to 120 kV.

All ModuPowers use same Driver Unit regardless of size.

All ModuPowers with same kV rating use same HV Unit.

This plant only had to stock 1 spare Driver and 1 spare HV Unit to cover ALL (6) ModuPowers!!!!

Modular SMPS – A Different Solution for Improving ESP Performance...and a Cleaner Stack

