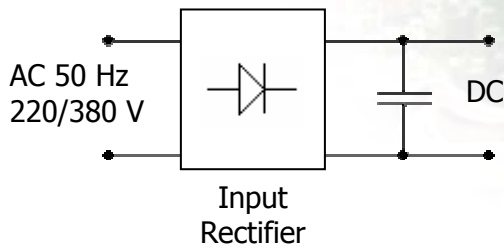
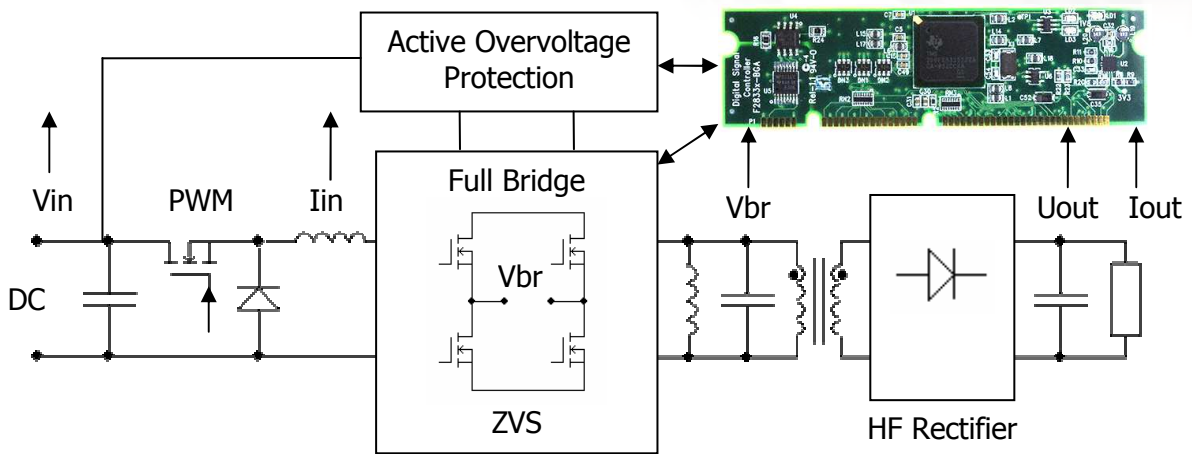


A Regulated Digitally Controlled Switched Mode Power Supply

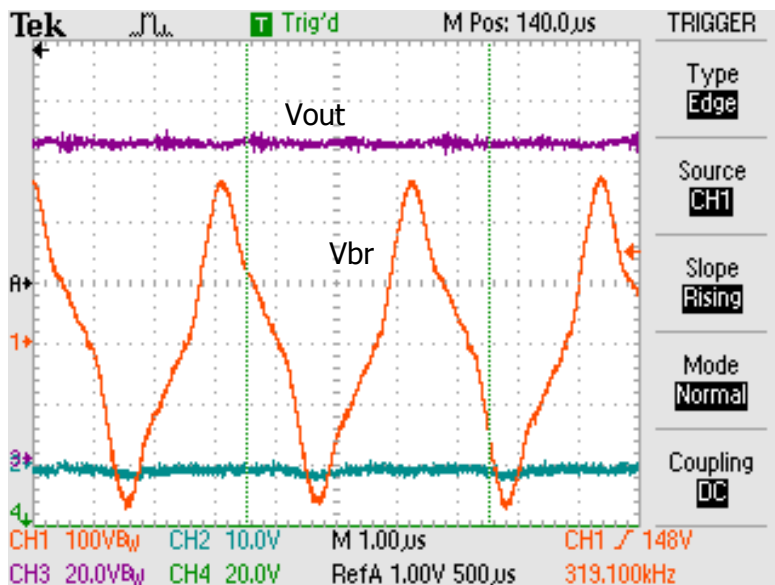


RS-232 ↔
 Digital Control Module
 TMS320F28335



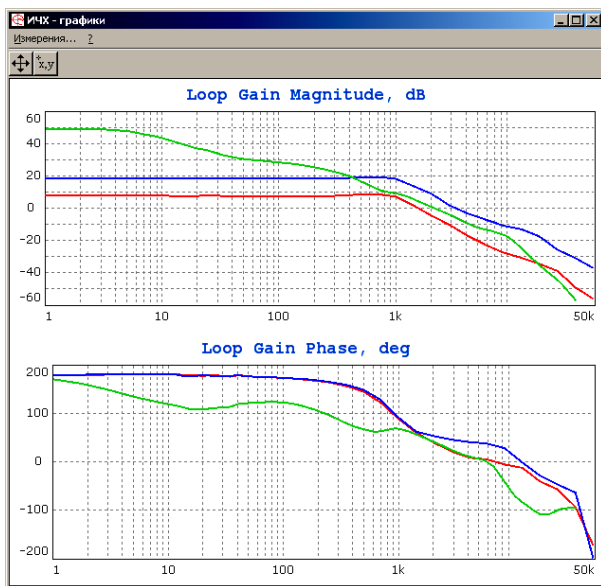
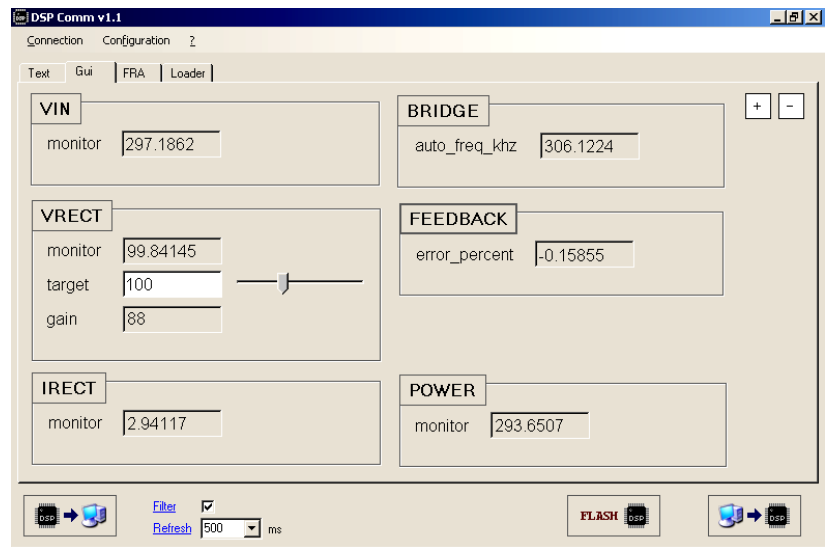
- PWM + Resonant Current Source Inverter + Rectifier
- Cycle-by-cycle current limiting through PWM MOSFET
- Active bridge overvoltage protection
- Fully digitally controlled (TMS320F28335)
- Feedback loop AC response digital correction

- Vout regulation 3-200 V
- Vout accuracy 0.2 % (>30 V)
- Power 1500 W
- Efficiency ~94%
- RS-232 (isolated)



- Bridge soft switching (zero voltage switching, ZVS)
- Automatic bridge switching frequency tuning $f_{br}: 280-340$ kHz
- Synchronous bridge and PWM operation: $f_{pwm} = f_{br}/N$ ($N=4$)
- Vbr voltage shape close to sinusoidal
- High transformer efficiency
- Capacitive output filter (inductorless)
- No overvoltage stress for output HF rectifier diodes
- Low output HF noise level

- All digital control parameters tuned via PC software tool
- Key values controlled during operation
- Parameters journaling into file and statistics gathering
- Power supply firmware update and tuning to meet specific customer requirement without hardware changes
- Unification and clear separation between power module and digital control module
- Fast development cycle
- What if?.. A perfect tool for R&D!



- Embedded AC frequency response analyzer (FRA) for feedback loop measurement
- Automated feedback loop digital correction design accounting for ADC/DPWM delay effects
- Automated C code generation for digital feedback loop correction
- High order H(z) synthesis – stability over all operation range and high output voltage regulation accuracy
- Repeatability and predictability

Texas Instruments TMS320F28335

- 150 MHz, floating point (single precision)
- ADC: 12 bit, 16 inputs, 80ns (12.5 MHz)
- PWM: 18 outputs (6 with 150ps resolution)
- 512 Kbytes Flash, 68 Kbytes RAM



Possible Applications

- Those requiring programmed output voltage shape
- Automated test stands
- Next generation laboratory power supplies

Cooperation Opportunities

- Consulting on TMS320F28335 DSC application to switched mode power supplies control
- Co-development of various topology and application switched mode devices employing full digital control