BER Performance with Dynamic Loads

TDK Semiconductor Corp.

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Test Parameters

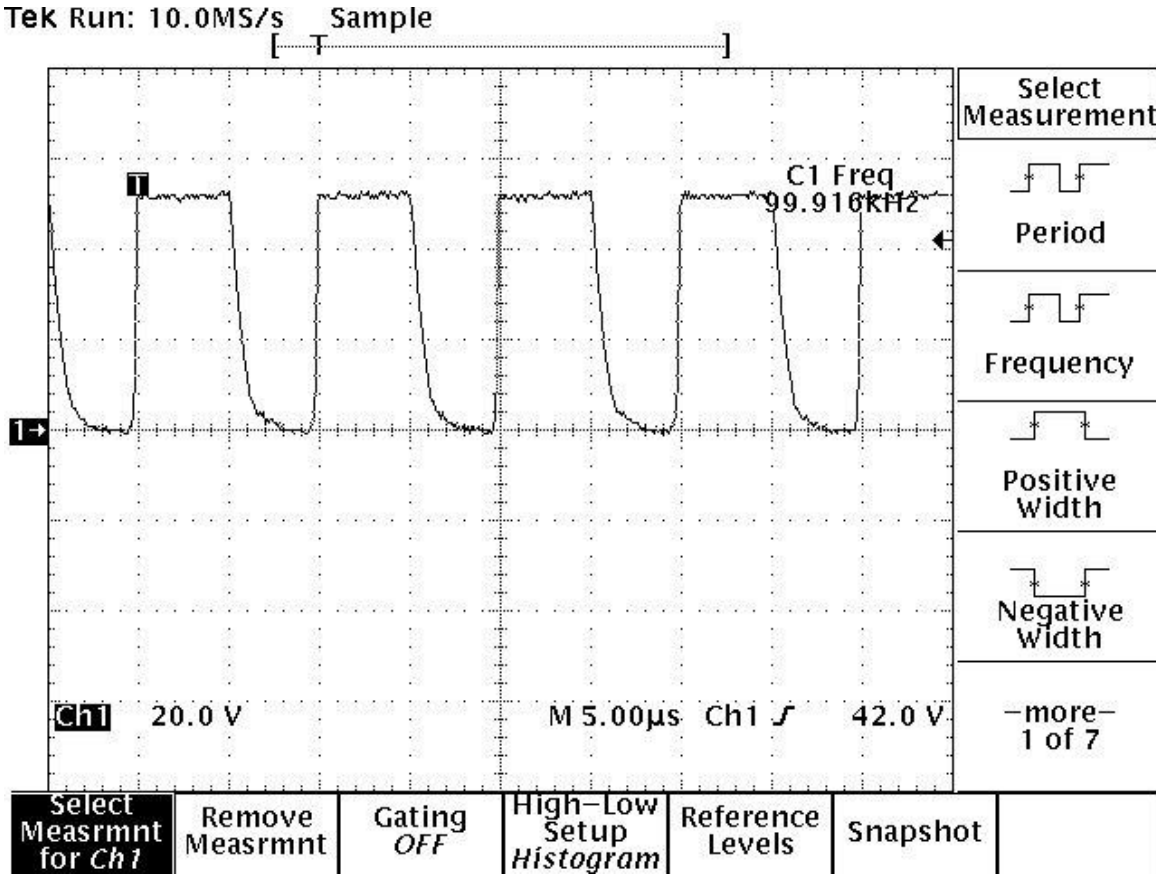
- 100TX data
- 1M packet/burst, 164 bytes/packet, random data
- Cable length increased until errors observed w/o power through cable
- Several bursts are sent with and without power & average error rate is recorded

Switched DC

- 53VDC applied across 150Ω load
- Switched with FET at 100kHz, 50% duty cycle, 100% modulation
- Error rate w/o power applied: 2.6/burst
- Error rate with power applied: 3.2/burst

Switched DC

Load Voltage Waveform



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AC, Low Power

- 10Vpp, 20kHz source
- Full wave rectifier into 150 Ω load
- About 1/3W delivered
- Errors w/o power: 8.7/burst
- Errors with power: 9.4/burst

AC, Medium Power

- 60Vpp, 20kHz source
- Full wave rectifier into 150 Ω load
- About 3W delivered to load
- Errors w/o power: 13.5/burst
- Errors with power: 11.3/burst

Switching Regulator

- Power Trends PT3342 Module
  - 5V Output
  - PWM, 40 kHz switch frequency
- Input voltage set to 25V

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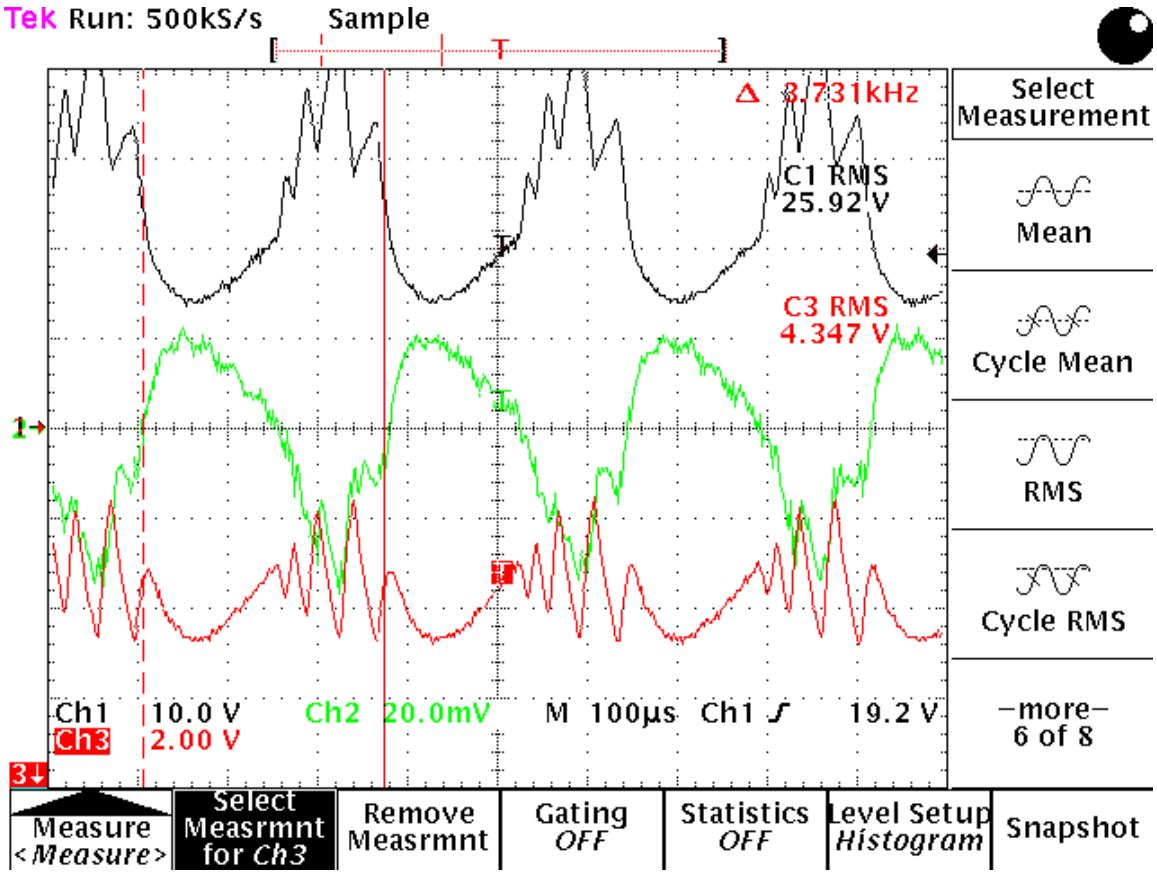
Switching Regulator

- With 170 mW delivered to load
  - Errors w/o power: 13.9/burst
  - Errors with power: 15.5/burst
- With 700 mW delivered to load
  - Errors w/o power: 14.5/burst
  - Errors with power: 14.7/burst

Switching Regulator

- With 2.6 W delivered to load
  - Errors w/o power: 7.9/burst
  - Errors with power: 10.1/burst
- With 5.8 W delivered to load
  - Errors w/o power: 10.7/burst
  - Errors with power: 9.2/burst

Switching Regulator



Channel 1: Voltage at transformer

Channel 2: Current at transformer, 1ma/mv

Channel 3: Voltage at load, low frequency oscillation due to cable impedance; shorter cable eliminates oscillation

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Conclusions

- System CMRR is sufficient to reject significant common mode noise
- 100TX can be relatively insensitive to the types of interference presented by these loads
- Garden variety switchers won’t tolerate the source impedance of long cables