

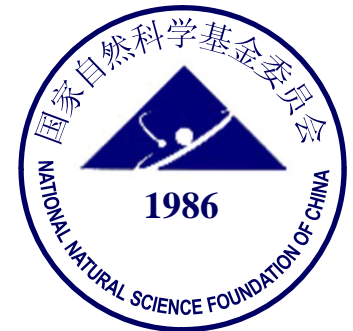


Extreme Energy-Density Research Institute  
Nagaoka University of Technology



# Compact LTD Modules for Pulsed Power Generation

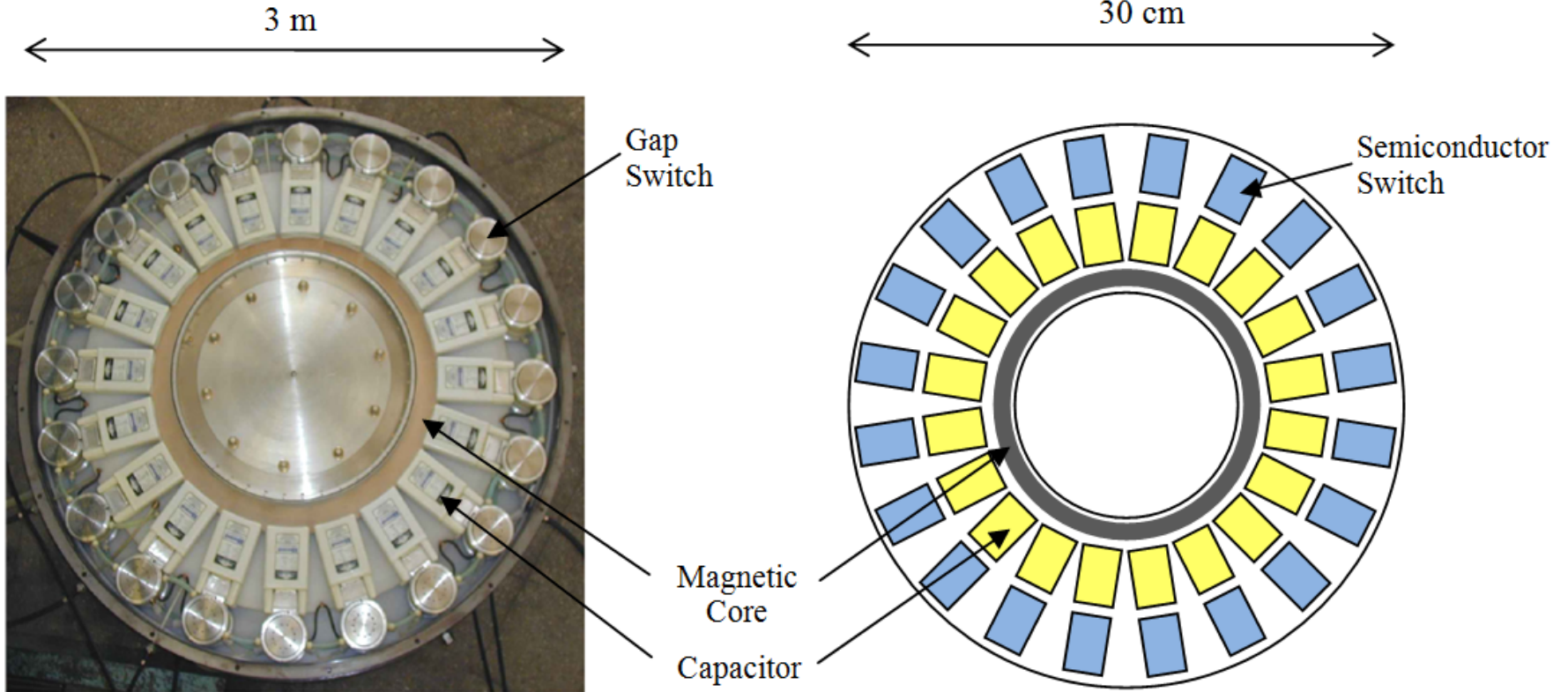
Weihua Jiang  
Akira Tokuchi



Supported by Natural Science Foundation of China (NSFC)



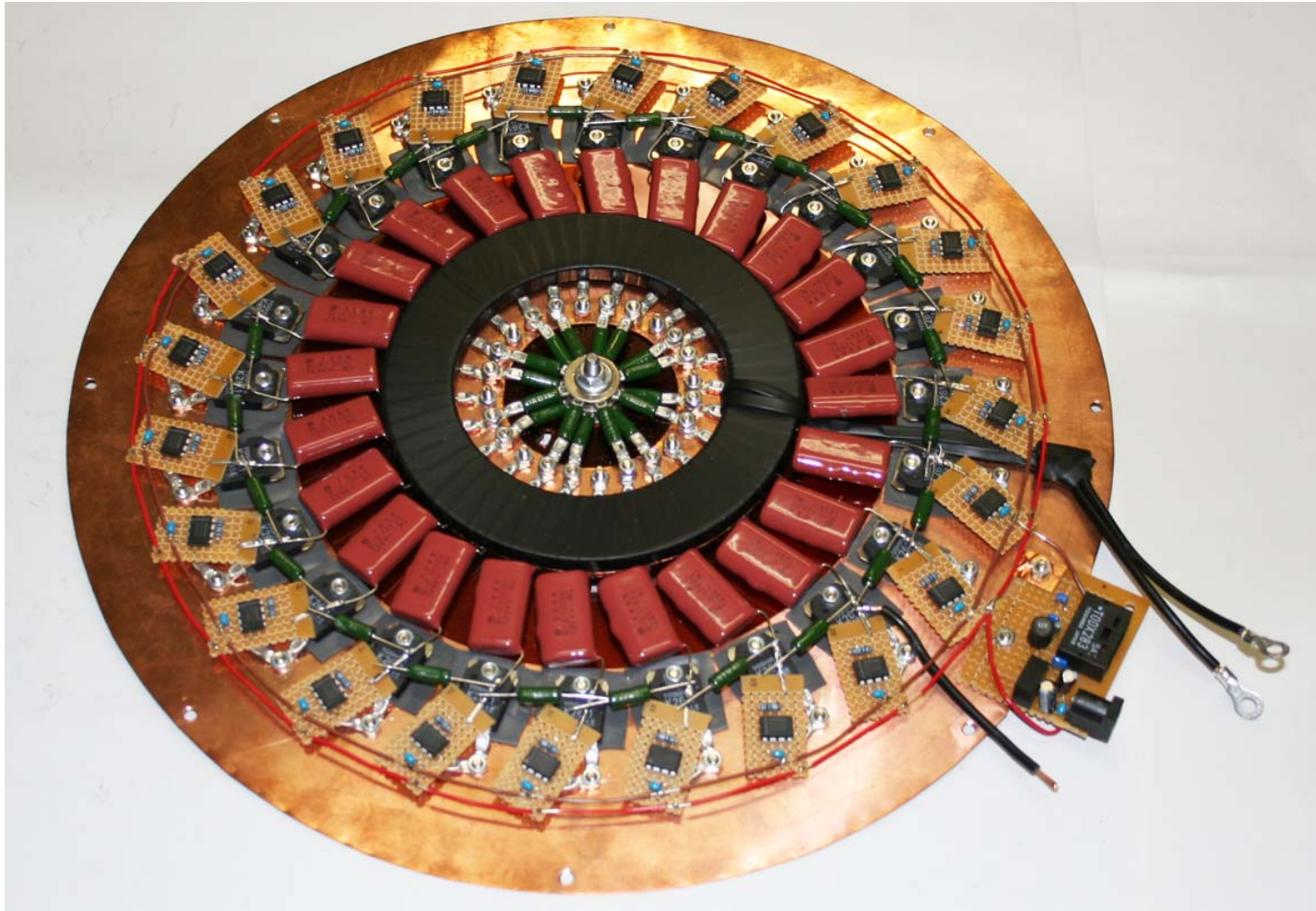
# Solid-State LTD



Large LTD Module

Solid-State LTD Module

# LTD Module Using MOSFETs





# Power MOSFET



## TOSHIBA 2SK2611

$V_{DSS} : 900 \text{ V}$

$I_D : 9 \text{ A}$

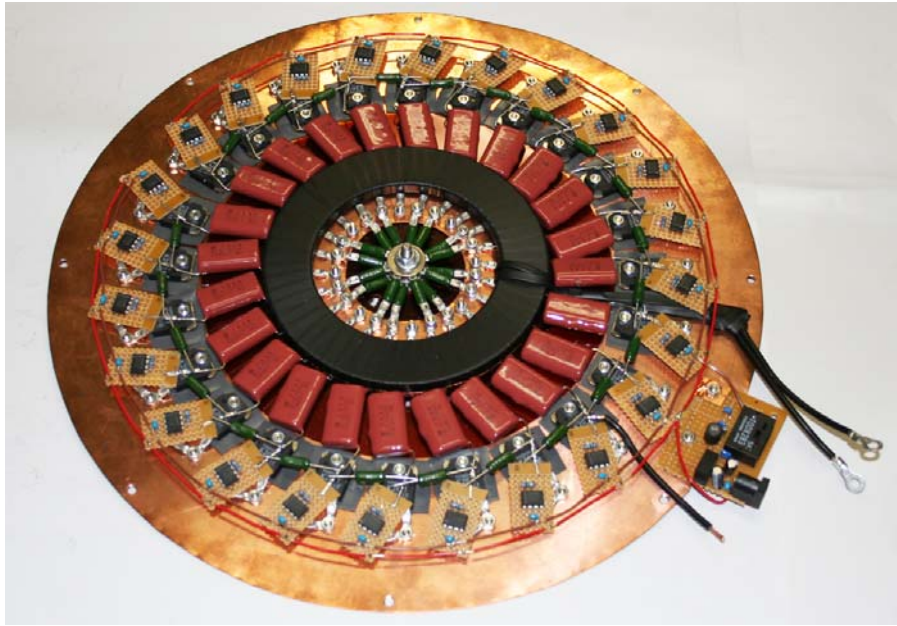
$I_{DP} : 27 \text{ A}$

$t_r : 25 \text{ ns}$

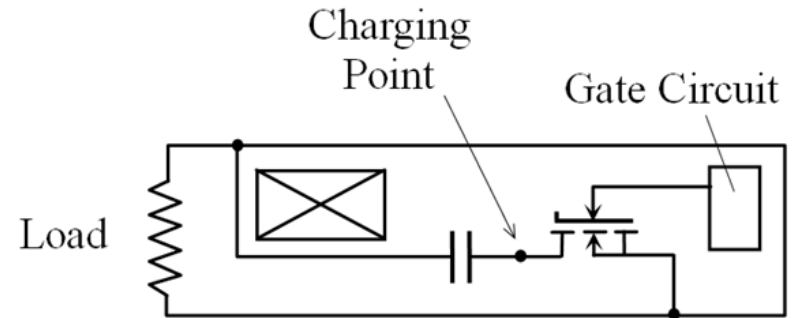
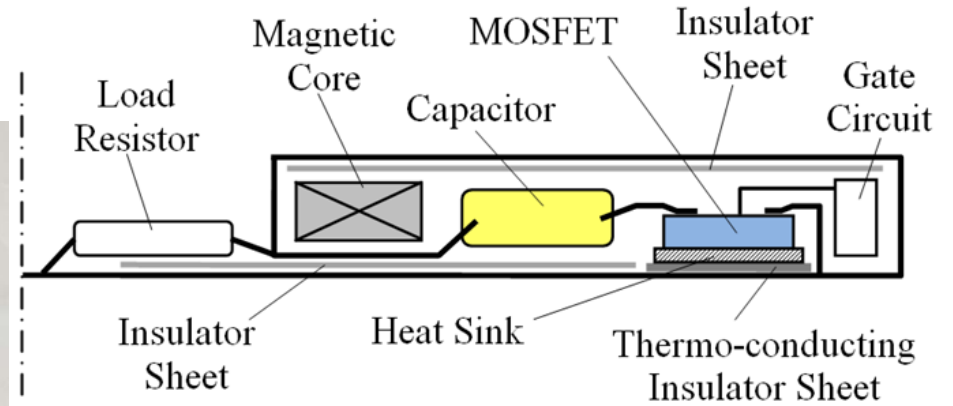
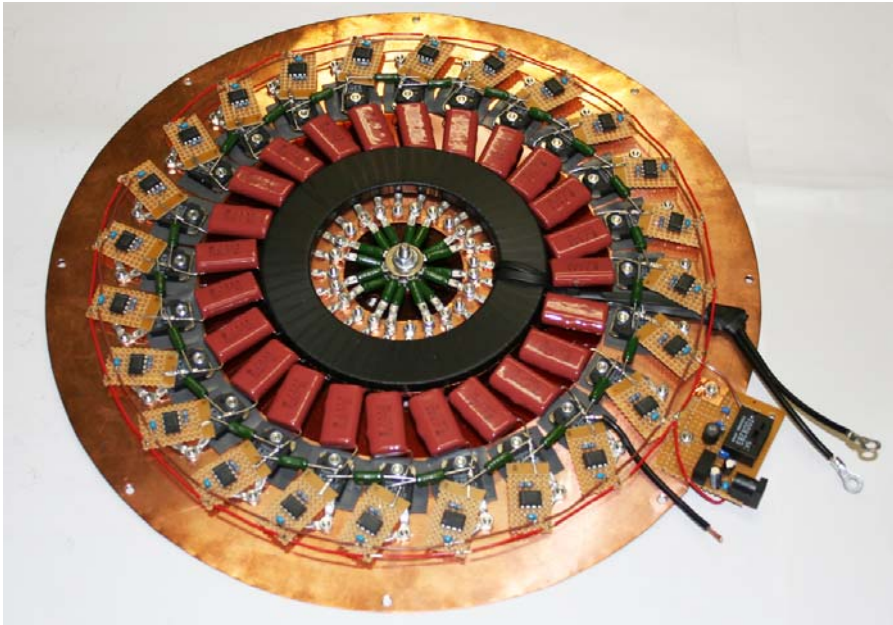
$t_f : 20 \text{ ns}$

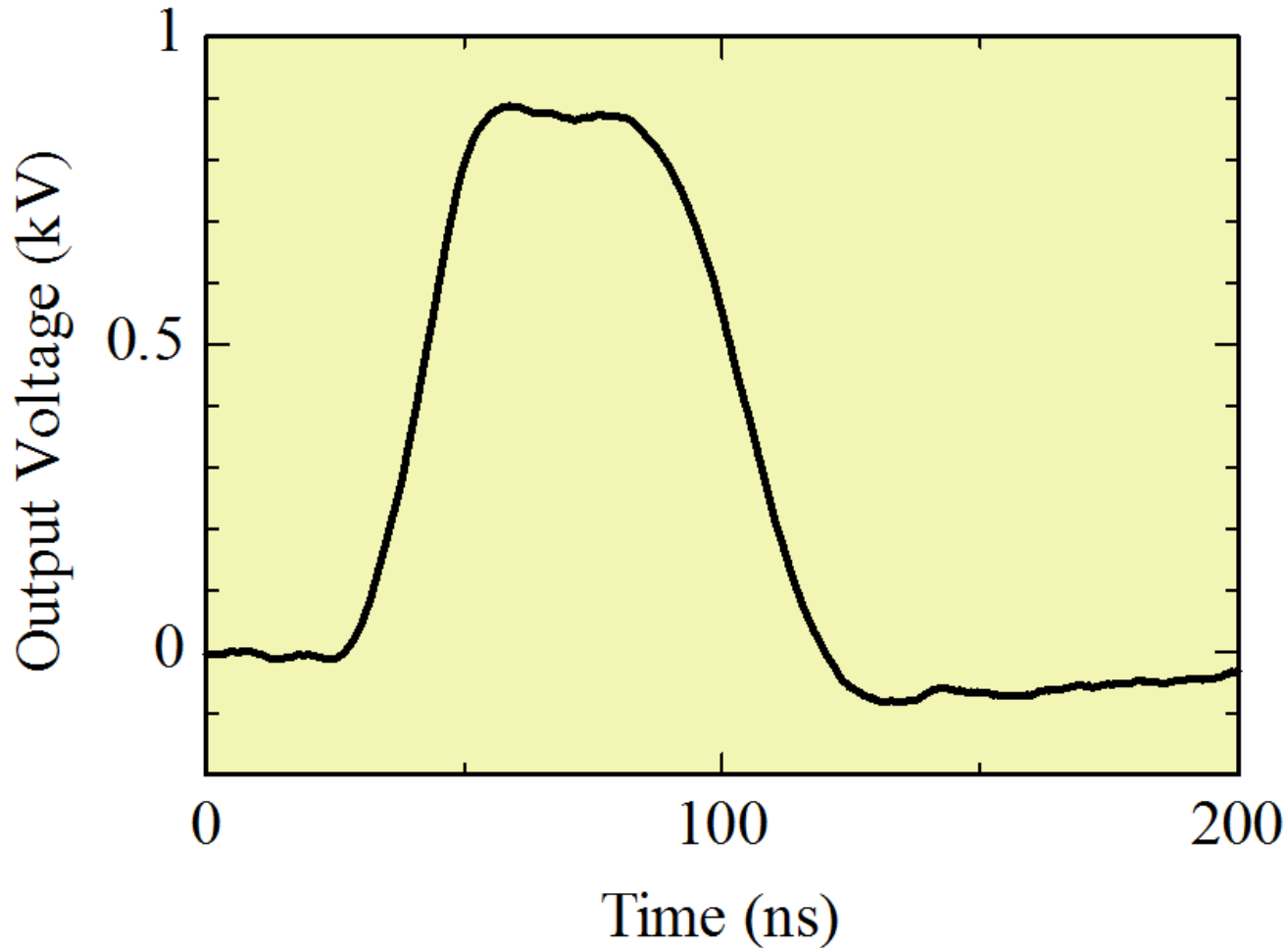


# LTD Module Using MOSFETs



# LTD Module Using MOSFETs



 Output Voltage on 3.2- $\Omega$  Load

FWHM  
~ 60 ns

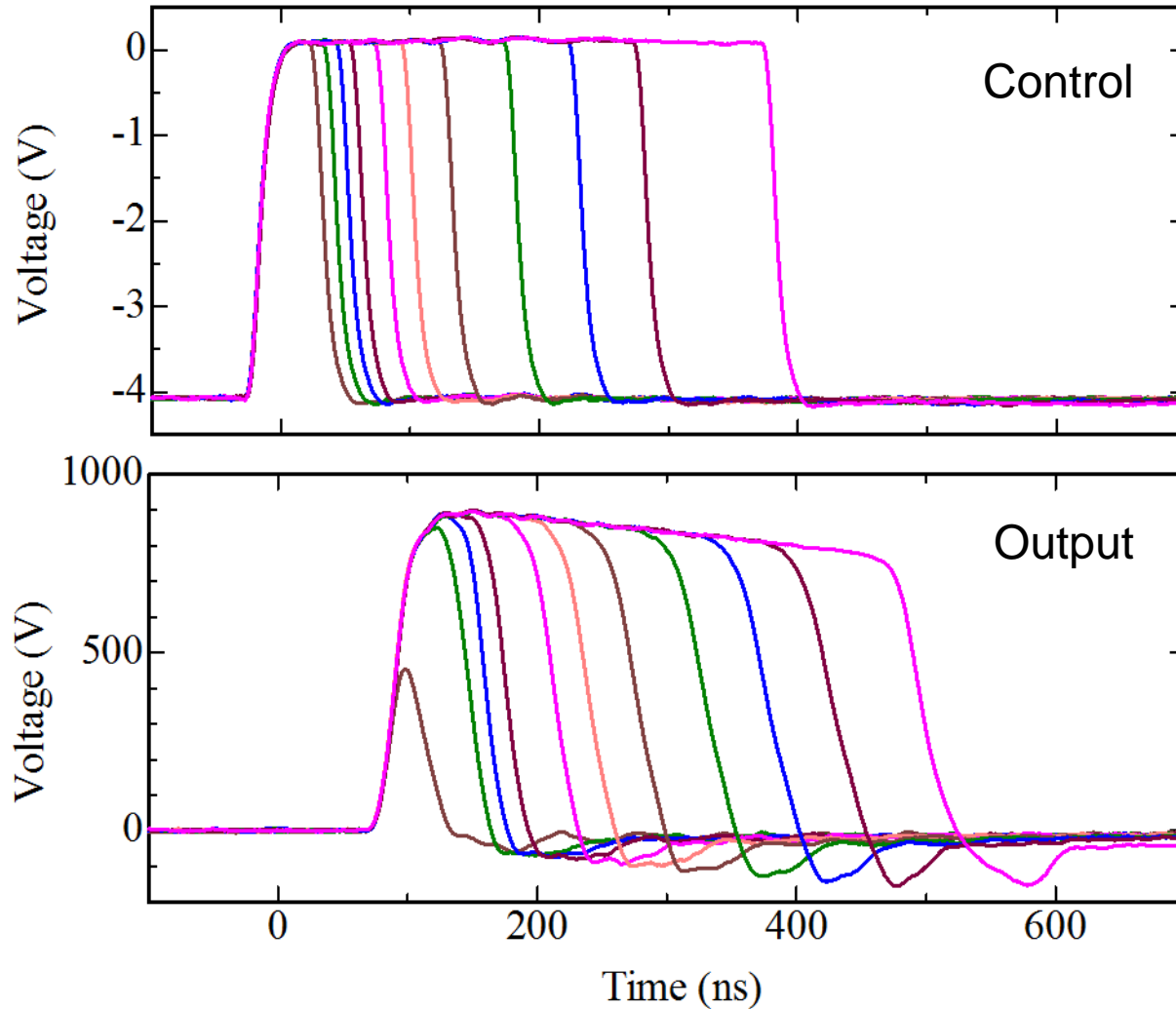
$T_{\text{rise}}$   
~ 20 ns

$T_{\text{fall}}$   
~ 30 ns



# Variable Pulse Length

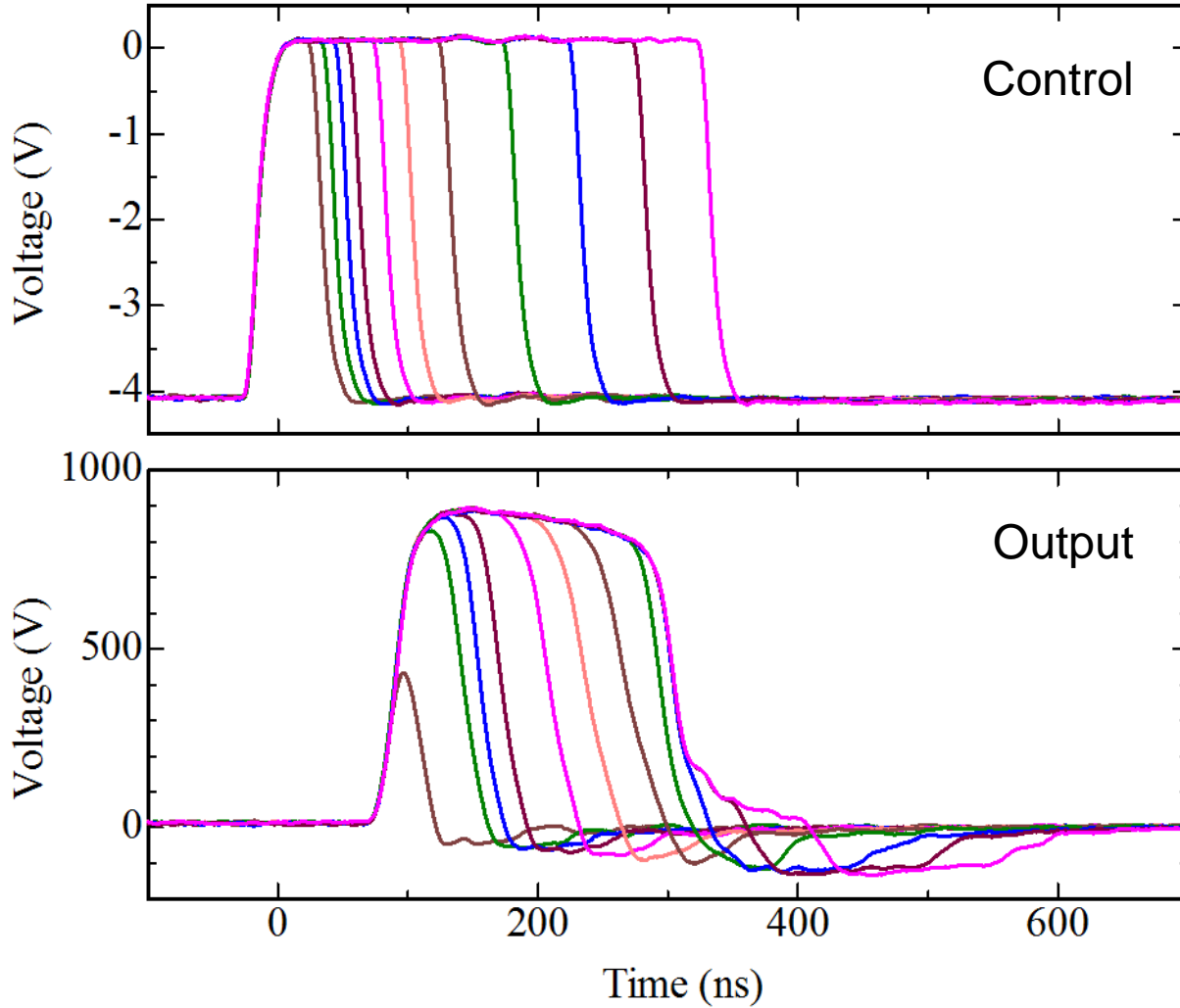
10 mm Core





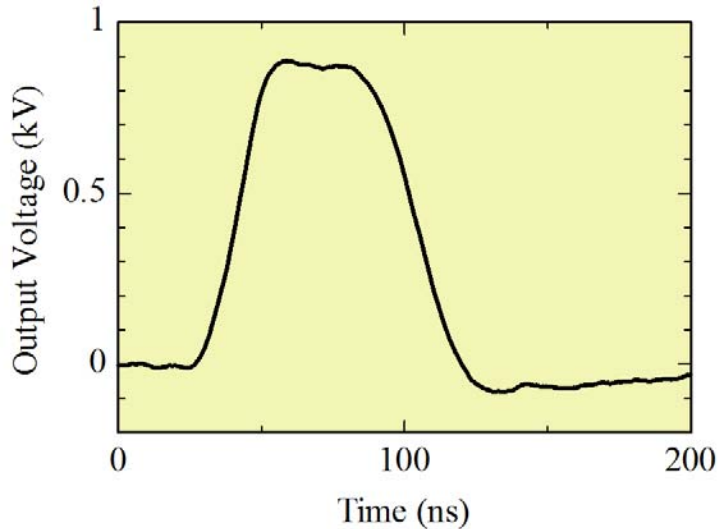
# Variable Pulse Length

5 mm Core



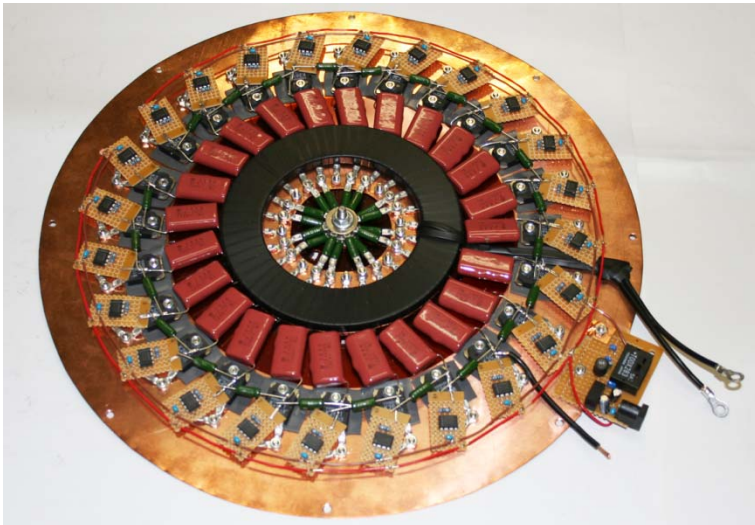


# Power and Efficiency



Input Voltage	800 V
Input Current	48 mA
Repetition Rate	3 kHz
Load Resistance	3.2 $\Omega$

Output Energy	$\sim 10$ mJ/pulse
Average Output Power	$\sim 30$ W
Average Input Power	$\sim 38$ W

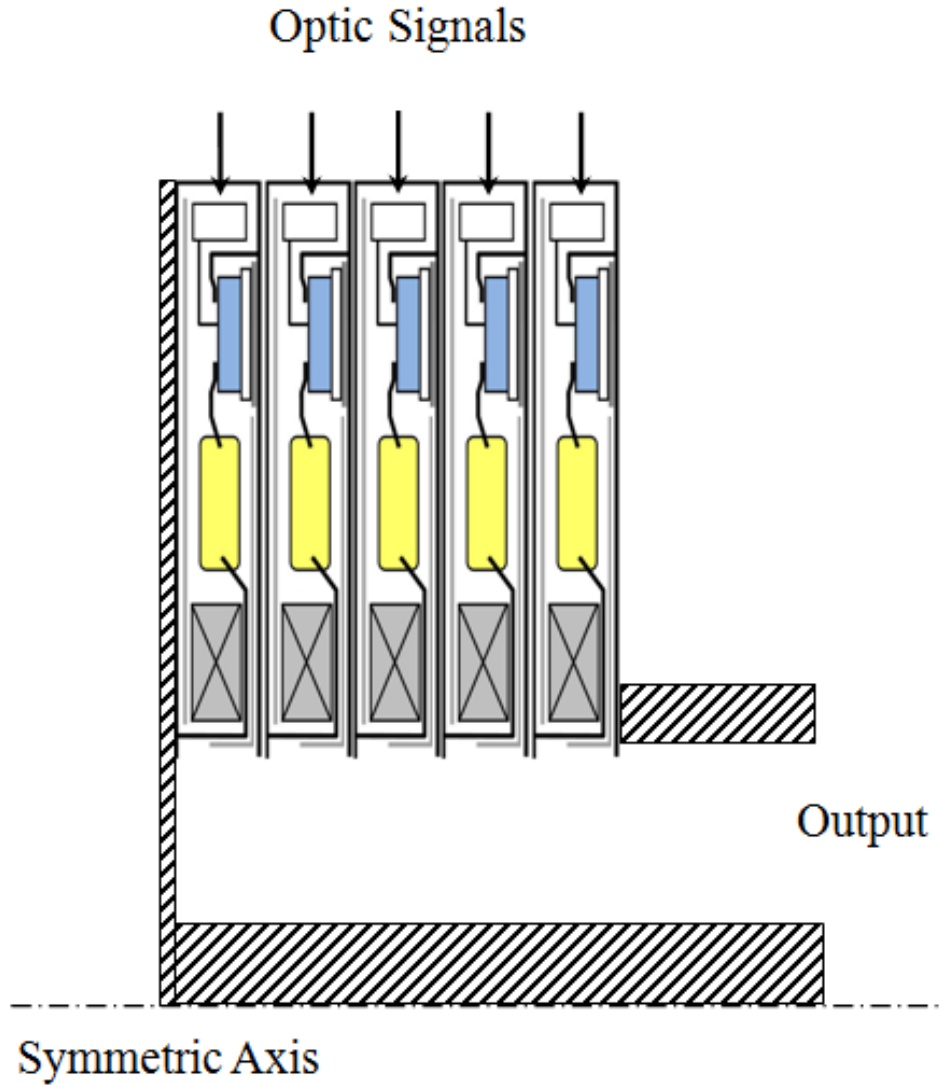


Overall Efficiency

$$\eta \sim 79 \%$$



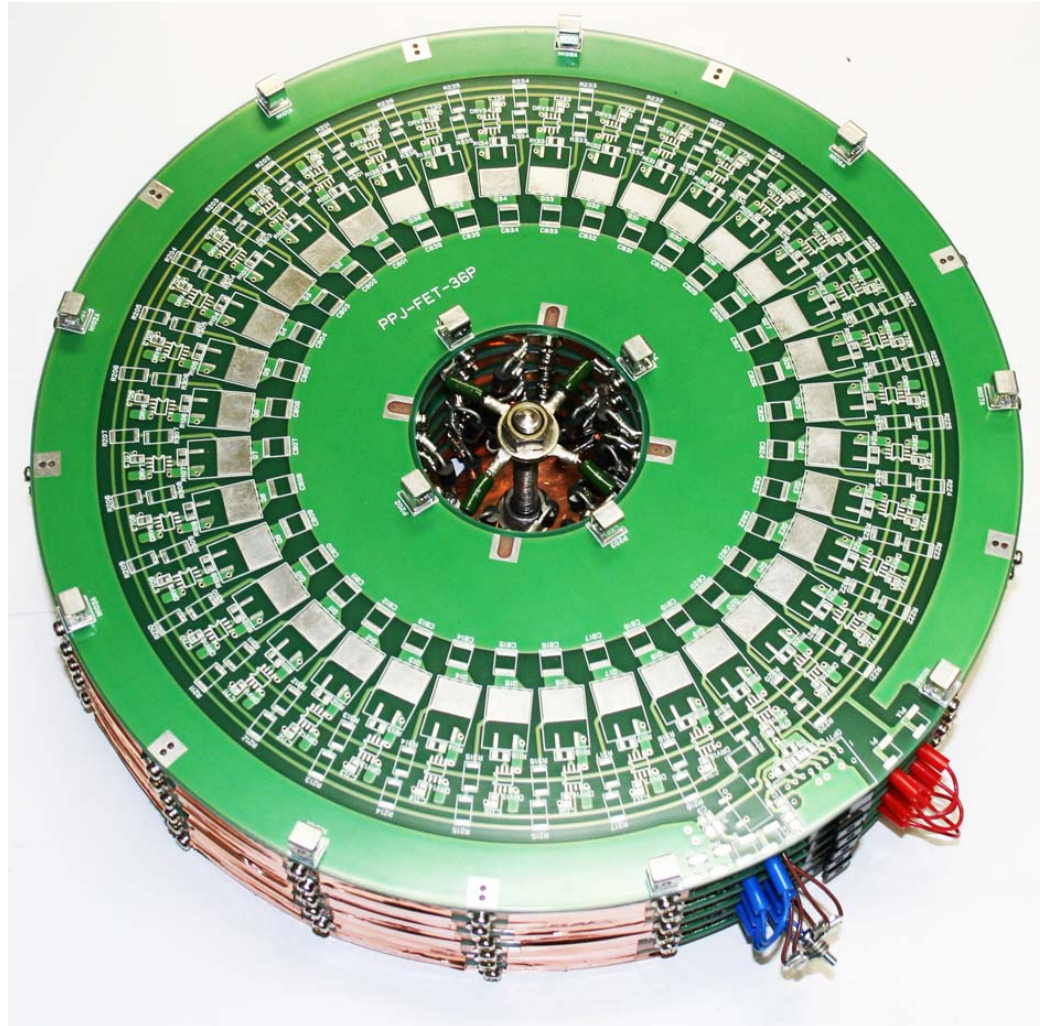
# 5-Stage LTD





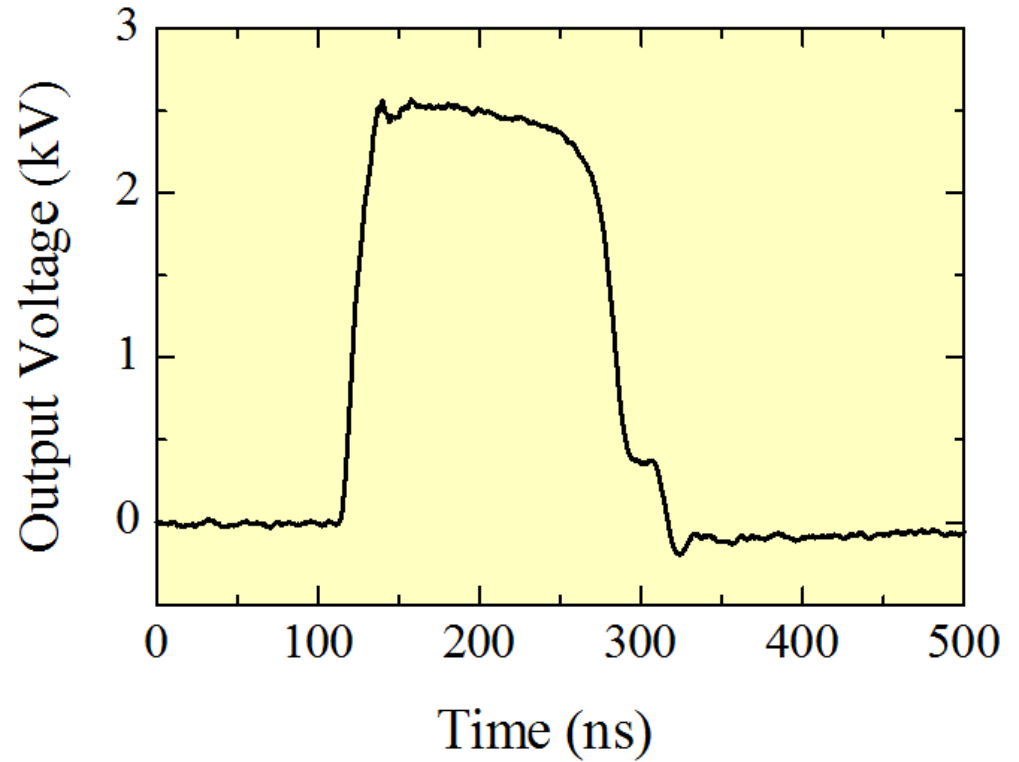
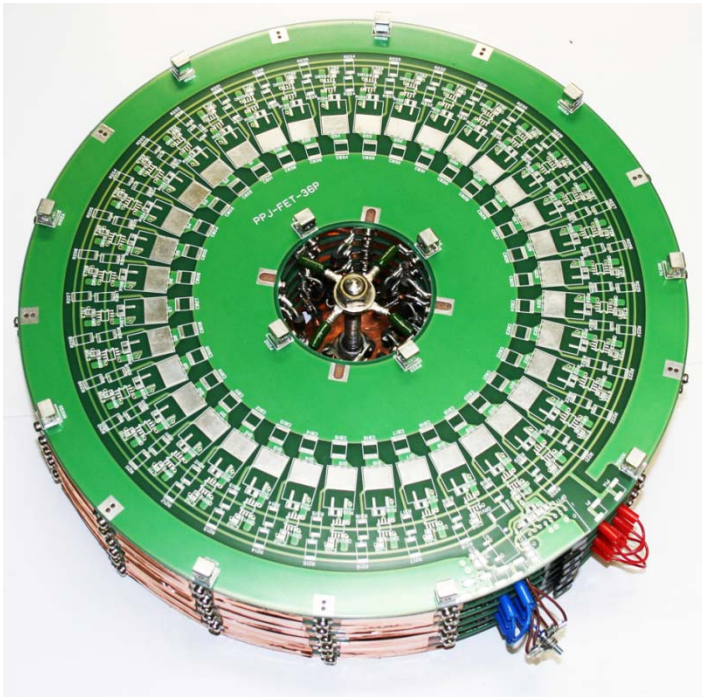


# 5- Module LTD Stack





# 5- Module LTD Stack





# Summary

- Solid State LTD Using MOSFETs
- 800 V and 60 ns on 3.2- $\Omega$  at 3 kHz
- Overall efficiency of  $\sim 79\%$
- 5-stage stack at 2.5 kV

