SimpleChips Technology Inc.
Custom Analog & Mixed-Signal ASIC

16SCT001

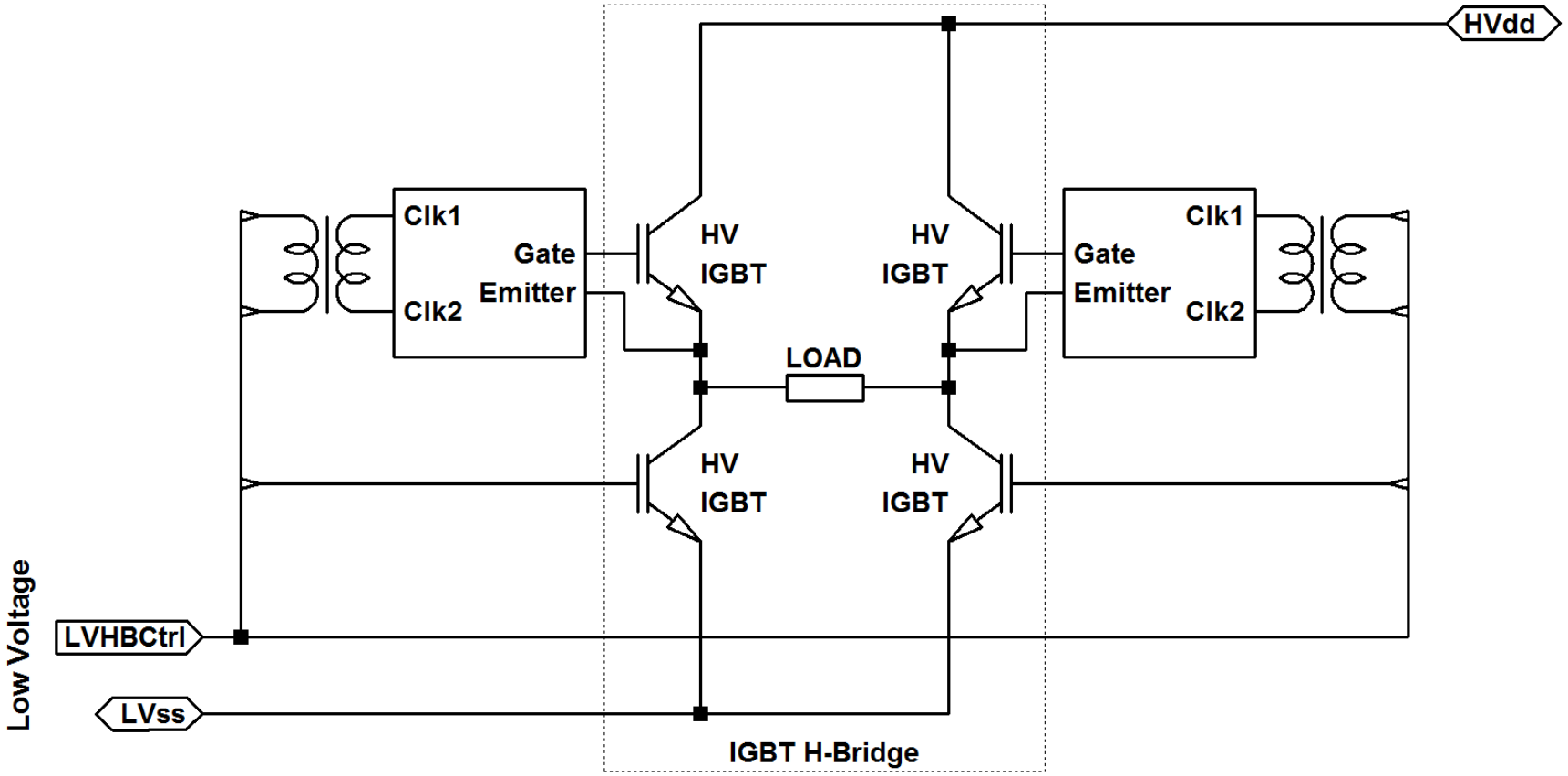
1,000V MOSFET / IGBT Gate Driver

April 22, 2017

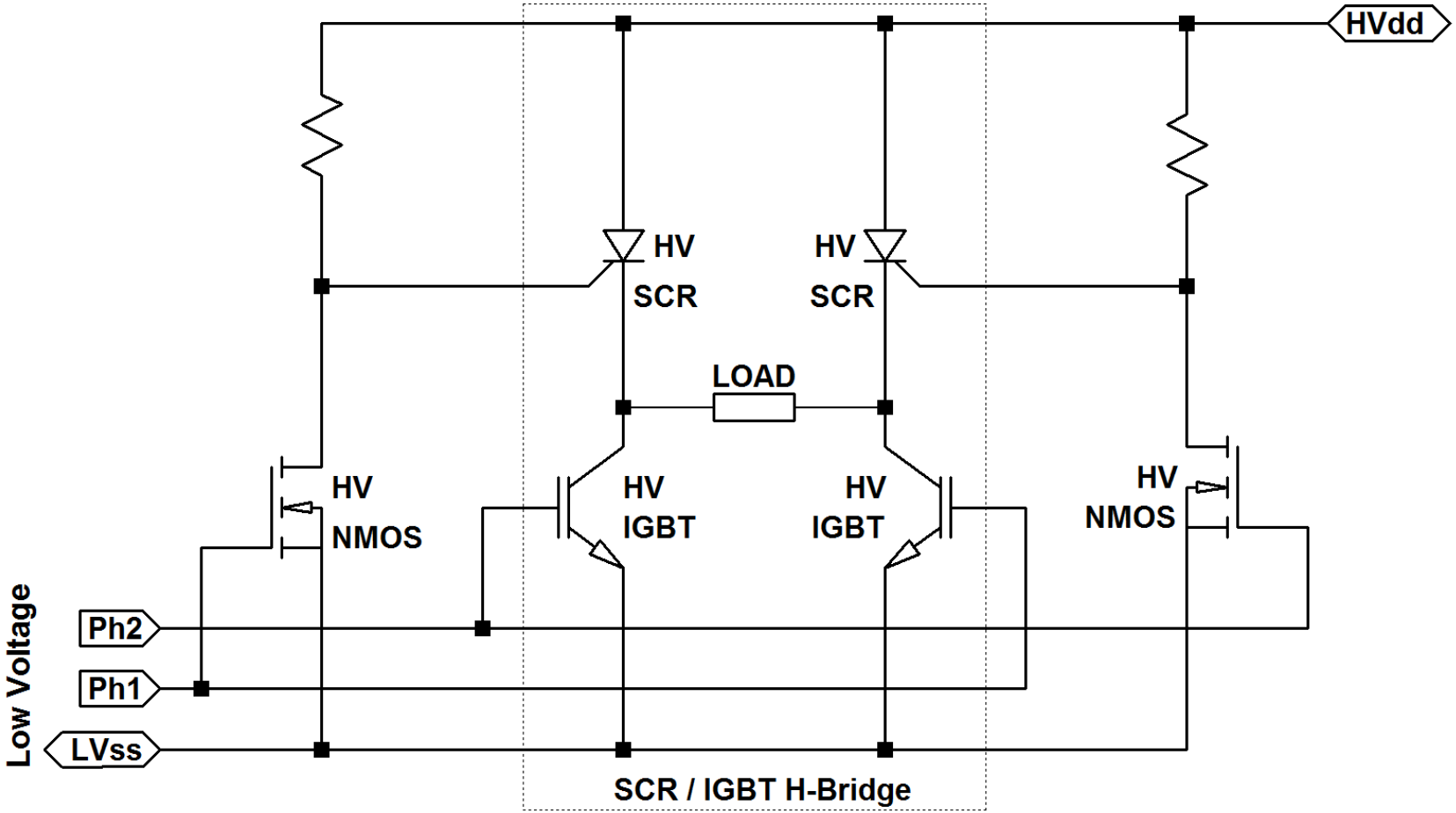
Synopsis

- Present Implementations
  - MOSFET / IGBT H-Bridge
  - SCR / IGBT H-Bridge
- Key Complications
  - Driver Count / Footprint / Cost
  - Limited HV Switch Selection (+ off = low side)
  - SCR Off-State Leakage…
- Introducing SimpleChips' 16SCT001

Simplified IGBT H-Bridge



Simplified SCR/IGBT H-Bridge



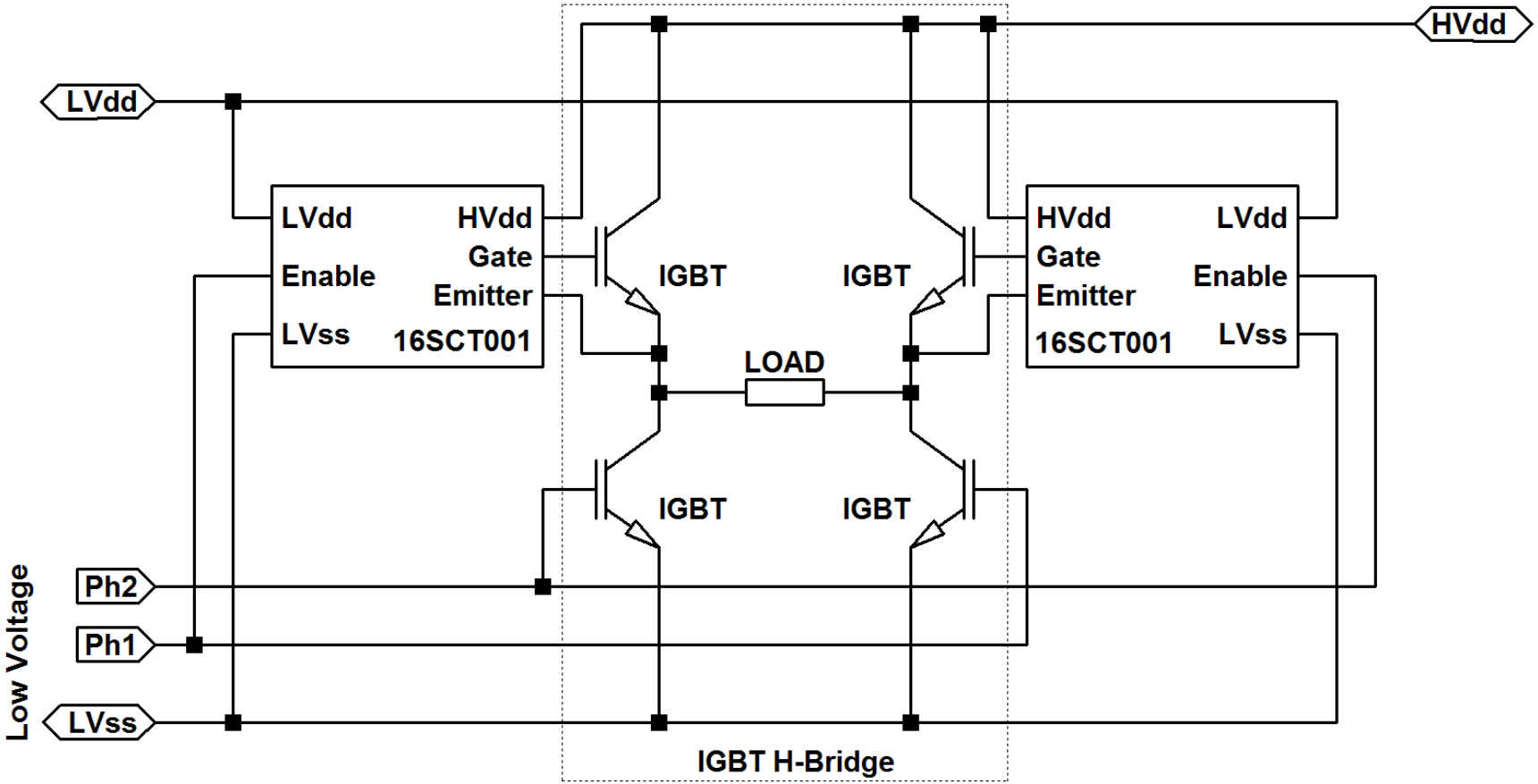
Key Complications

- Driver Count / Footprint / Cost
- Limited HV Switch Selection
- SCR Off-State Leakage
- Thermal Management
- HV Isolation / Management
- Low side turn-off

Introducing SimpleChips' 16SCT001

- Maximum Voltage. . . 1,100V
- Zero External Components
- Direct Drive From Low-Voltage Control Signals
- Fast IGBT Turn-On & Turn-Off Times
- Integrated Gate Bias Circuitry
- Low HV Current
- Ultra-Low Idle Current

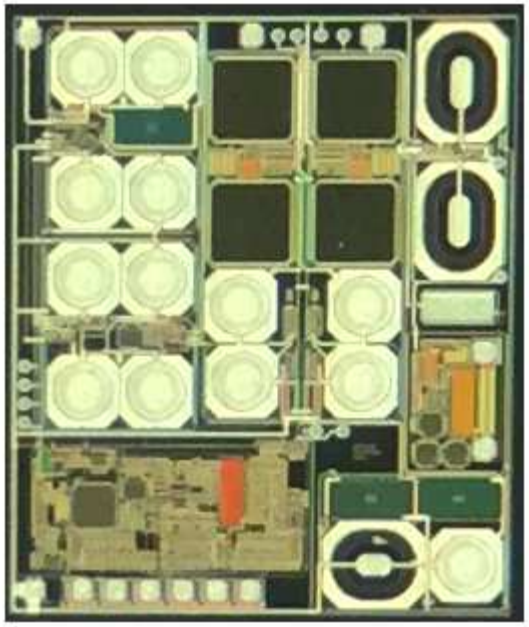
Typical IGBT H-Bridge Application



16SCT001 Key Specifications

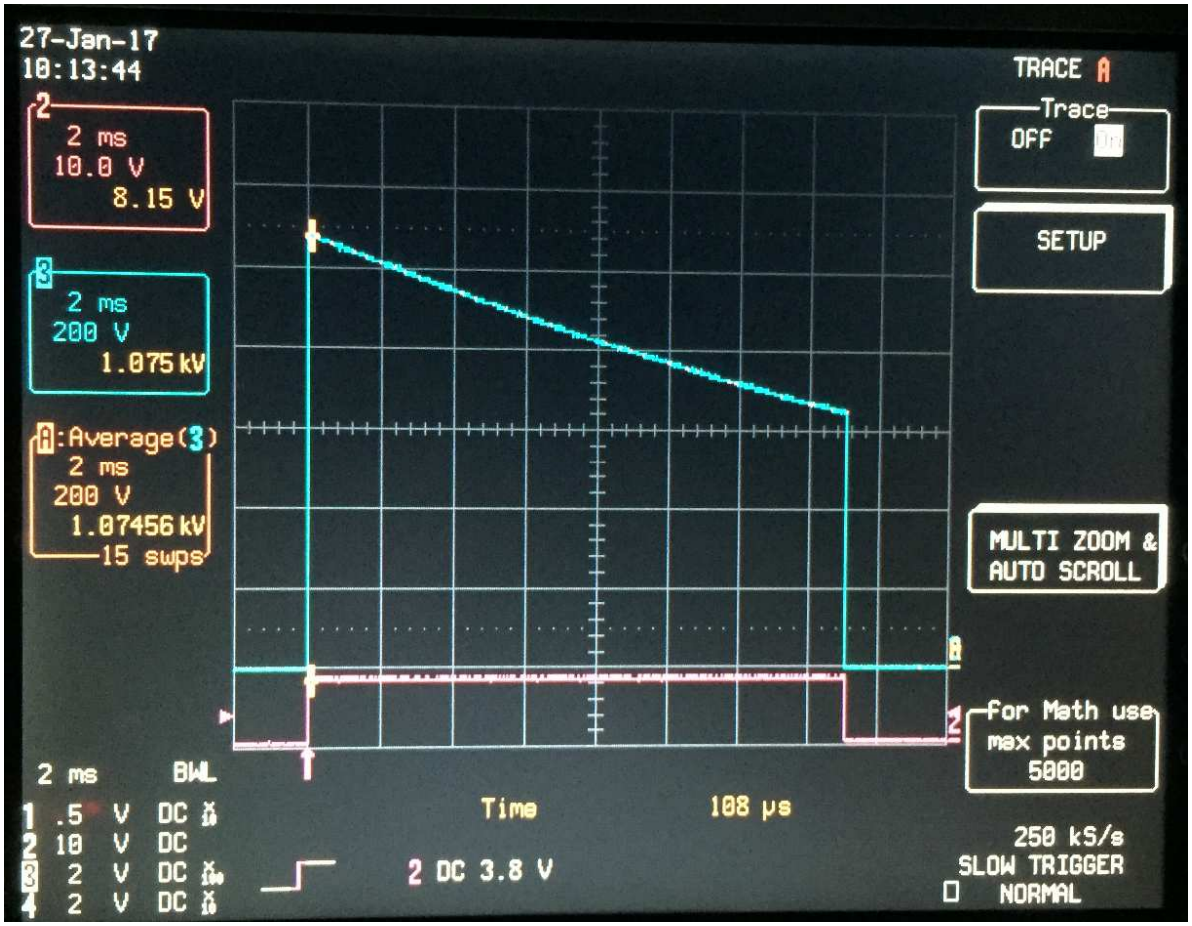
- Proprietary High-Voltage Architecture
  - Patent Pending
- Blocking Voltage to 1,100V
- Pulse Capable to 1,100V
- Using IXGP12N120 IGBT load
  - Turn-On 10% - 90% = 0.7µS
  - Turn-Off 90% - 10% = 1.6µS
- LV_{dd} Off-State Current < 10nA
- Low HV_{dd} Current
  - < ~80µA @ HV_{dd}=750V; LV_{dd}=10V
- Short-circuit turn-off delay ~ 2.2µS

16SCT001 Die Dimensions



Symbol	Dimension	Nominal	Tol / Unit
X_{dim}	Long Side	3,260	±50 µm
Y_{dim}	Short Side	2,750	±50 µm
Z_{dim}	Die Thickness	285	±25 µm

Alpha-Silicon Results



1075V peak, 15mSec duration, τ = 30mSec, every 10sec continuous

Summary

- Performance as predicted up to 1,100V.
- 16SCT001 shows good switching ON and OFF
  - <3-5µSec under normal conditions
- Short-circuit turn-off
  - <2.2µSec at 3.9Ω/200V
- Work is ongoing to further characterize
  - Expecting samples available in June, 2017.