

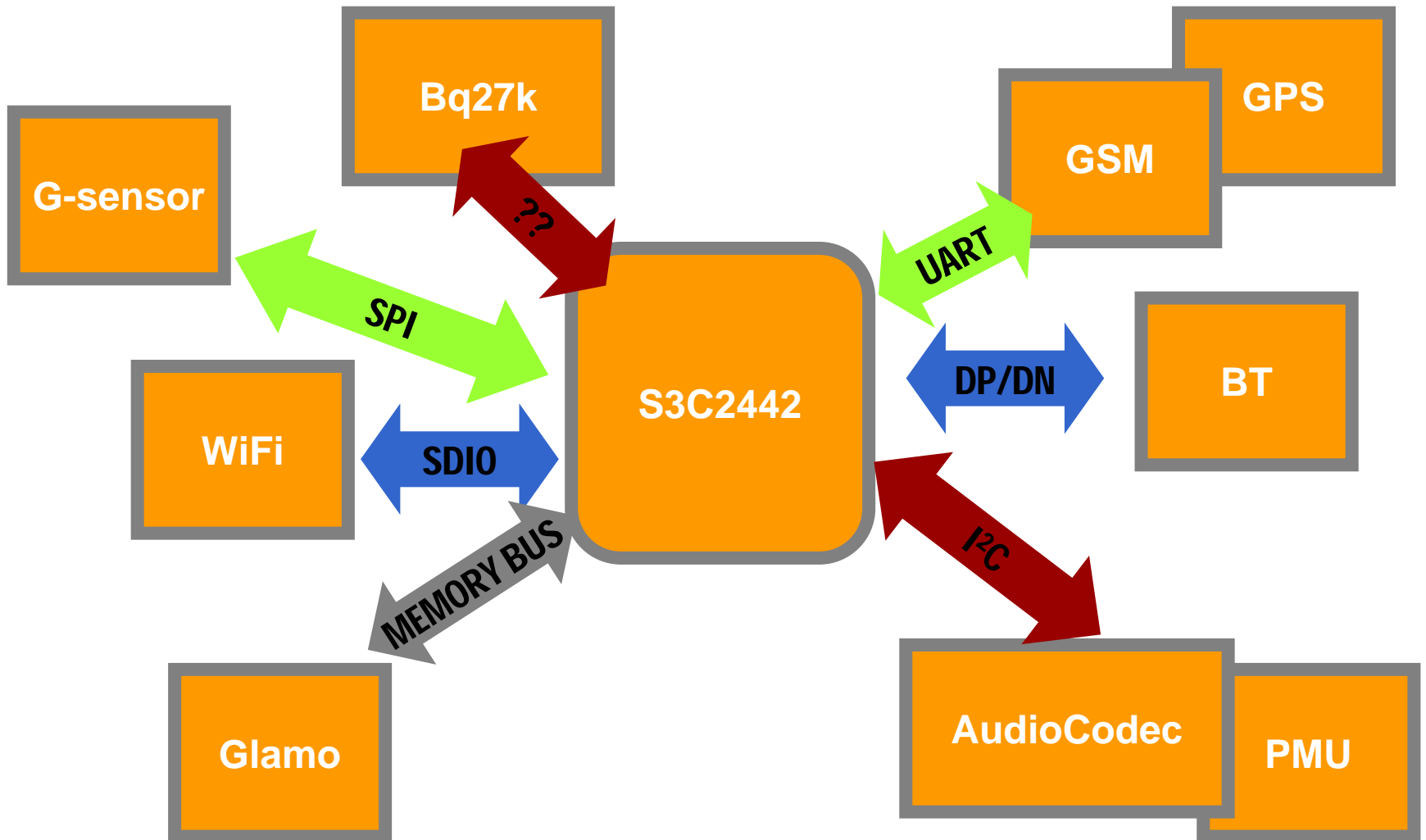
Close to Hardware –Driver Implementation

Peripheral Interface

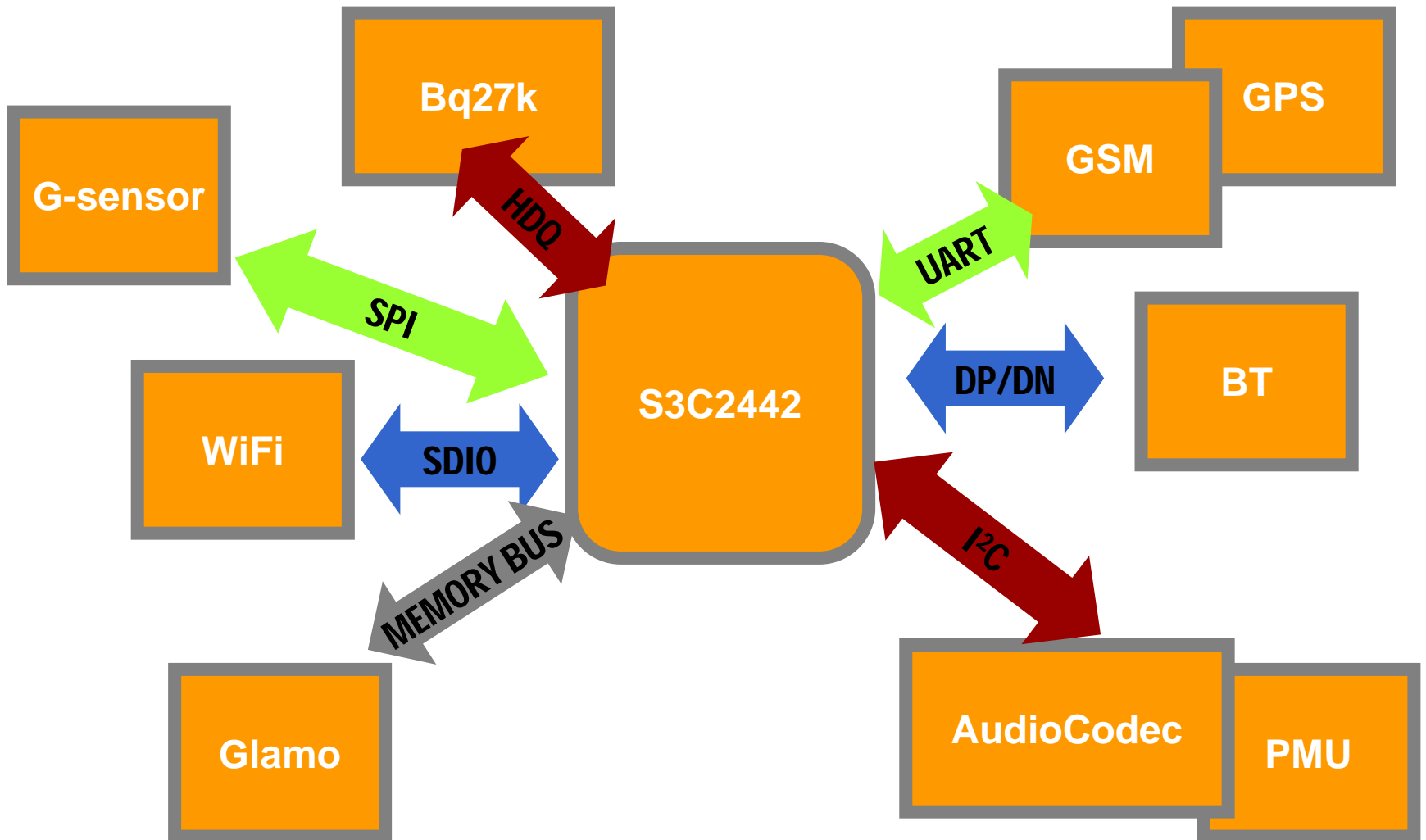
Agenda

- Overview of GTA02
- Bq27k
- HDQ
- FIQ

Overview of GTA02



Interface: HDQ



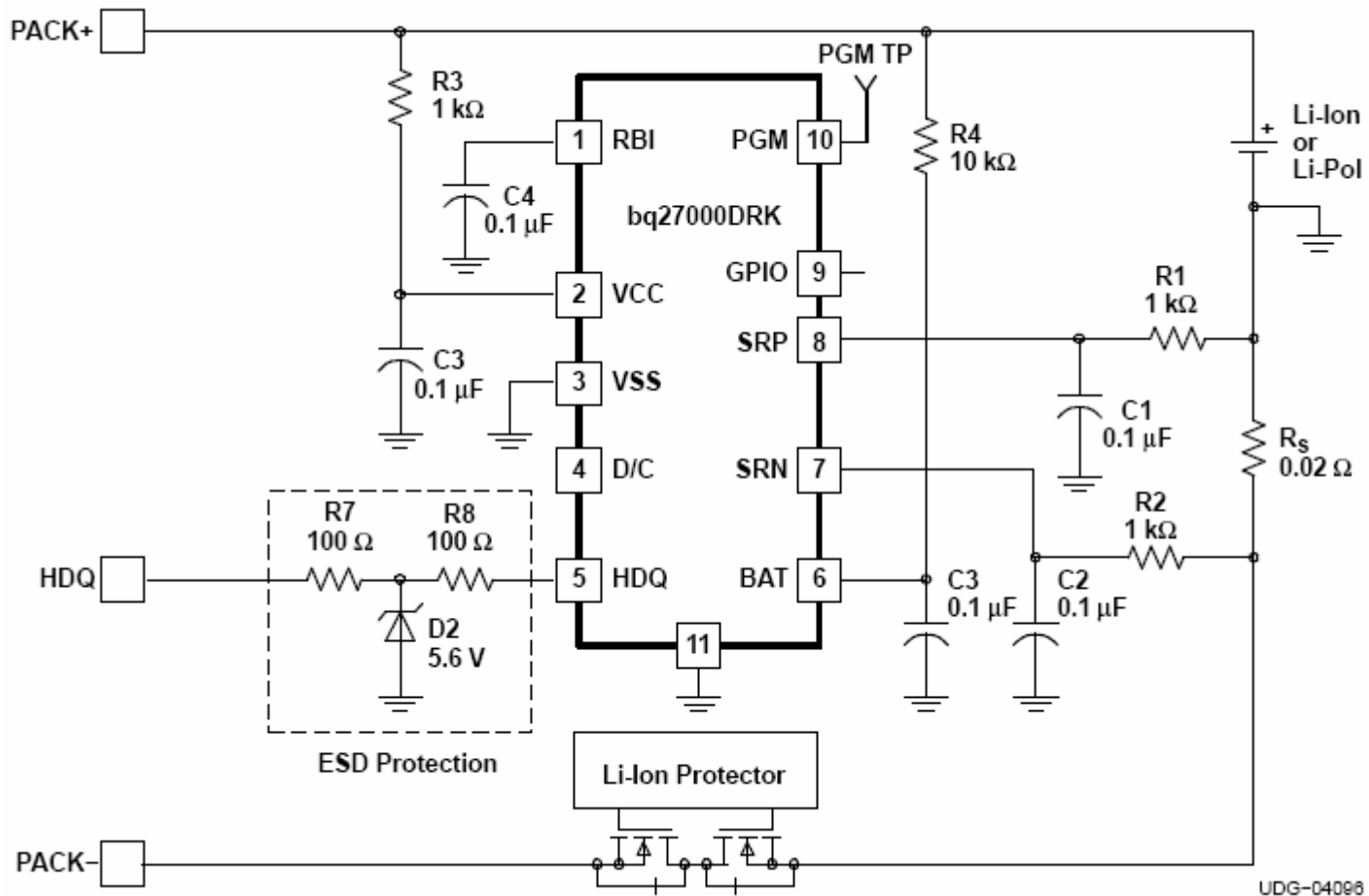
Driver Implementation

- First three things
 - 1. Read datasheet
 - 2. Read datasheet
 - 3. Read datasheet again
- Familiar with peripheral interfaces
 - Linux API is a good reference
- Good tools are prerequisite to the successful execution of a job
 - Scope
 - Logic Analyzer
 - Memter

Bq27k

- Bq27k is
 - Battery capacity monitoring and reporting device
- Why we use Bq27k?
 - Space consideration?
 - Something new can be hacked?
- What's the interface of this device?
 - HDQ
 - I²C
- Why HDQ?

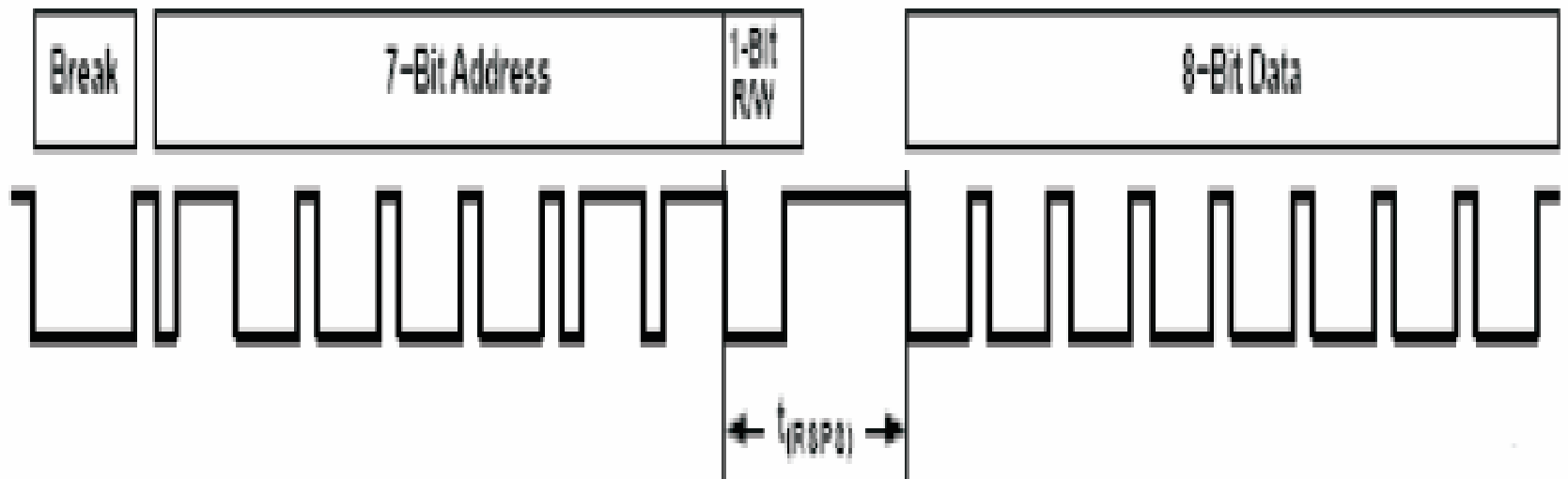
Typical Application



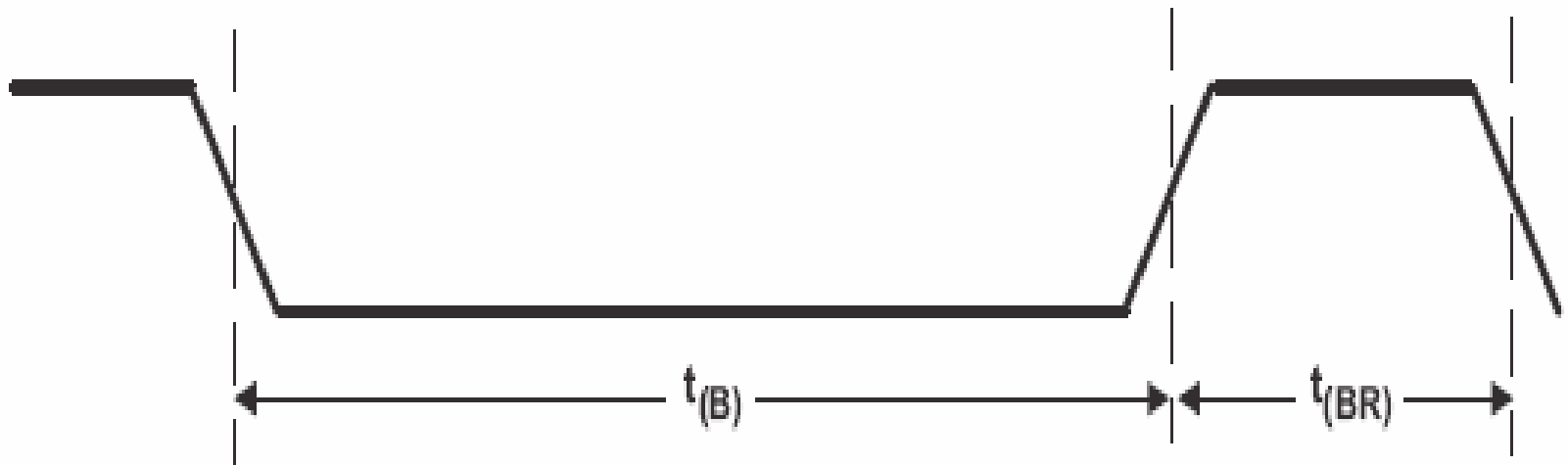
HDQ Communication Basics

- HDQ means??
- HDQ is a protocol
 - Asynchronous
 - Return-to-one
 - Single-wire
 - Open Drain
- Implementing the HDQ interface
 - Discrete I/O
 - UART

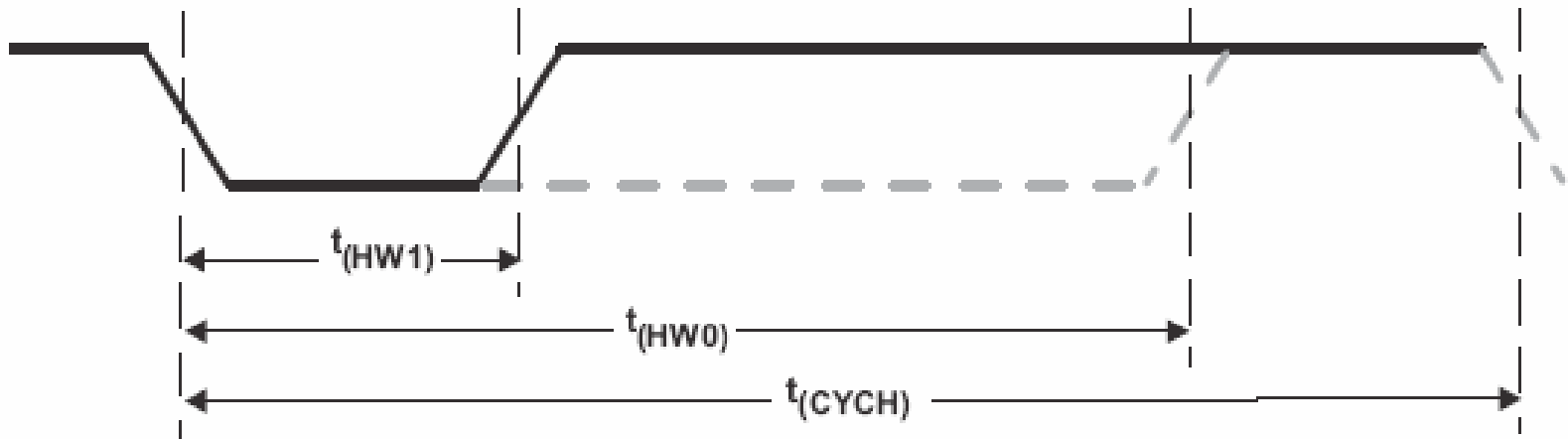
Typical HDQ read cycle



Break and Break Recovery



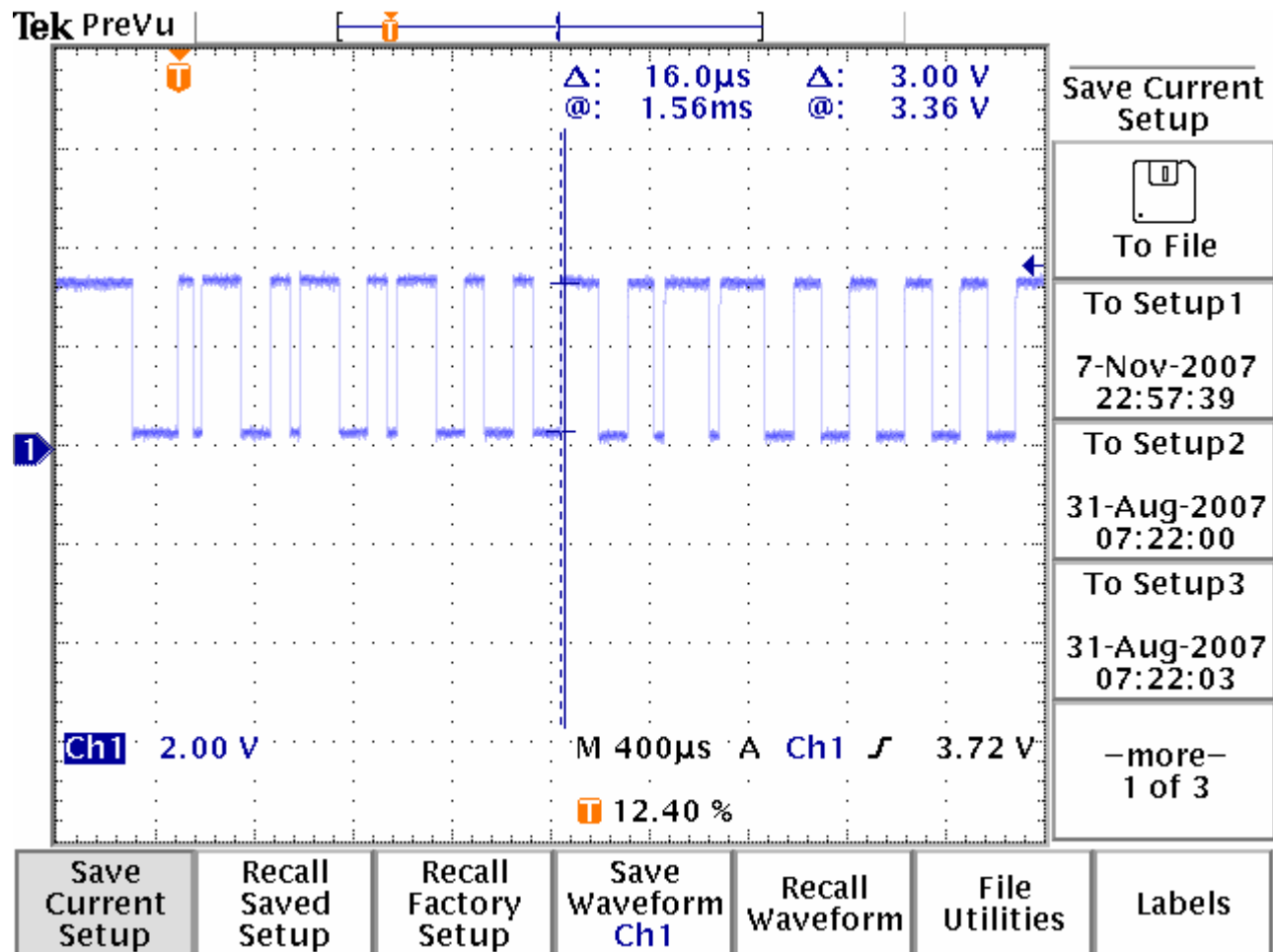
Host/Slave Transmitted Bit



Timing Table

bq2019, bq262x0, bq2650x, bq270x0 (Updated Timing Methodology)			
Parameter	Device	Minimum	Maximum
$t_{(B)}$	All	190 μs	
$t_{(BR)}$	All	40 μs	
$t_{\text{start-detect}}$	bq2019, bq262x0	5 ns ⁽¹⁾	
$t_{(HW1)}$	bq2019, bq262x0	32 μs ⁽¹⁾	
	bq26500	17 μs ⁽²⁾	
	bq26051, bq270x0	0.5 μs ⁽²⁾	
	All		50 μs
$t_{(HW0)}$	bq2019, bq262x0, bq26500	100 μs	
	bq26501, bq270x0	86 μs ⁽³⁾	
	All		145 μs
$t_{(CYCH)}$	All	190 μs	
$t_{(DW1)}$	All	32 μs	
			50 μs
$t_{(DW0)}$	All	80 μs	
			145 μs
$t_{(CYCD)}$	All but bq2650x	190 μs	250 μs
	bq2650x		260 μs ⁽⁴⁾
$t_{(RSPS)}$	All	190 μs	320 μs

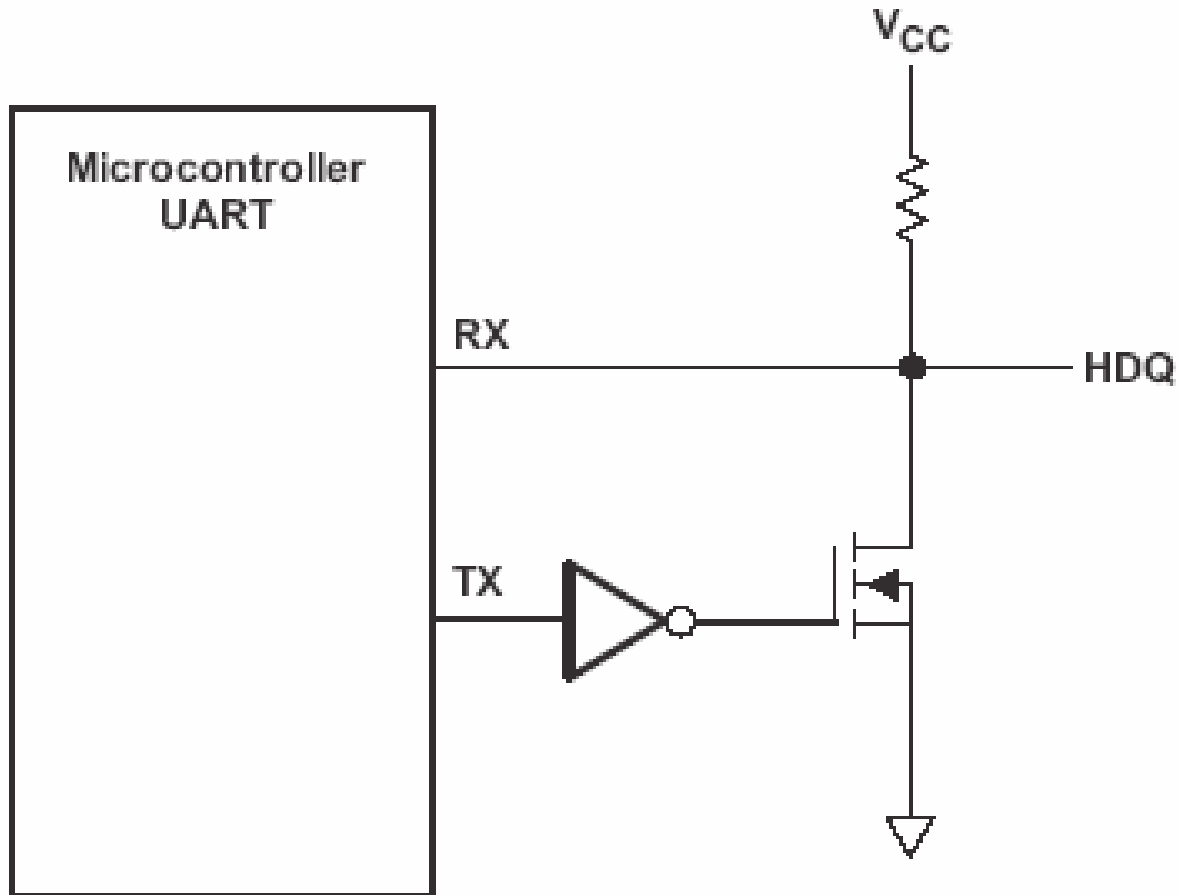
The real world of HDQ



Driver Implementation of HDQ

- Interrupts Using I/O Port for HDQ
- We need a TIMER Interrupt
- What's the timing resolution?
 - 32us
- How to make sure timing is correct?
- UART interface to HDQ
- Interrupt do not affect the timing of HDQ communication

HDQ Communication with UART



FIQ

- FIQ -Fast Interrupt Request
- Why FIQ?
 - The priority of FIQ is higher than IRQ
 - Atomic operation
- The vector of FIQ is 0x18

