

# apb

apb读写传输分为地址阶段和数据阶段。

penable拉高，表示数据阶段开始。

## 1. apb 1.0

这个是最早的apb版本，是固定2个cycle完成读写操作。

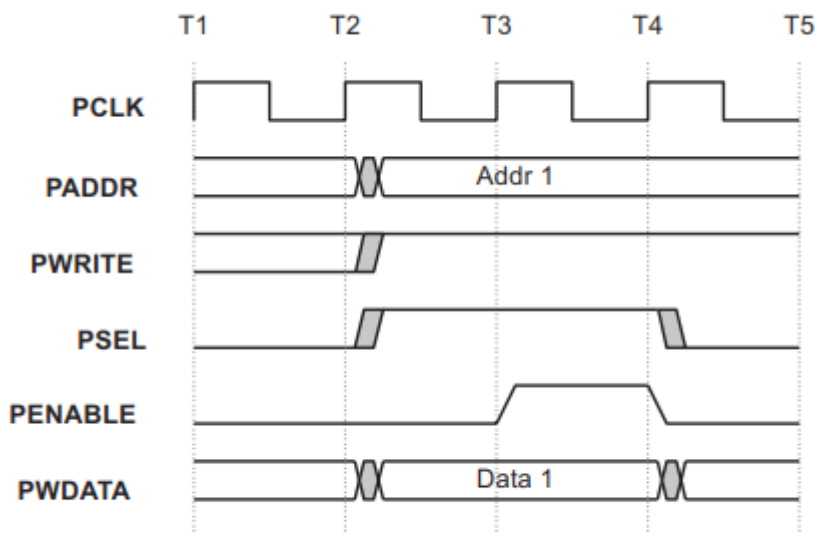


Figure 5-3 Write transfer

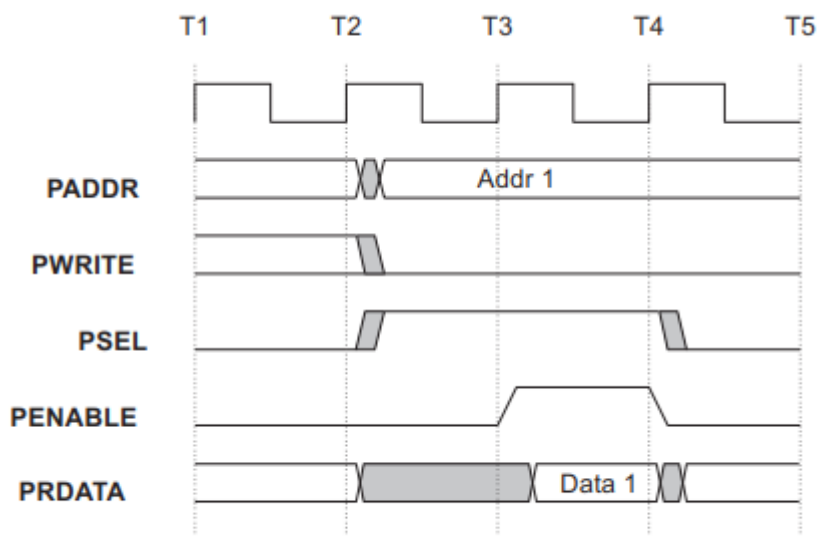


Figure 5-4 Read transfer

## 2. apb 2.0

这个是升级版本，数据阶段可以支持no ready wait

### 2.1 apb写不等

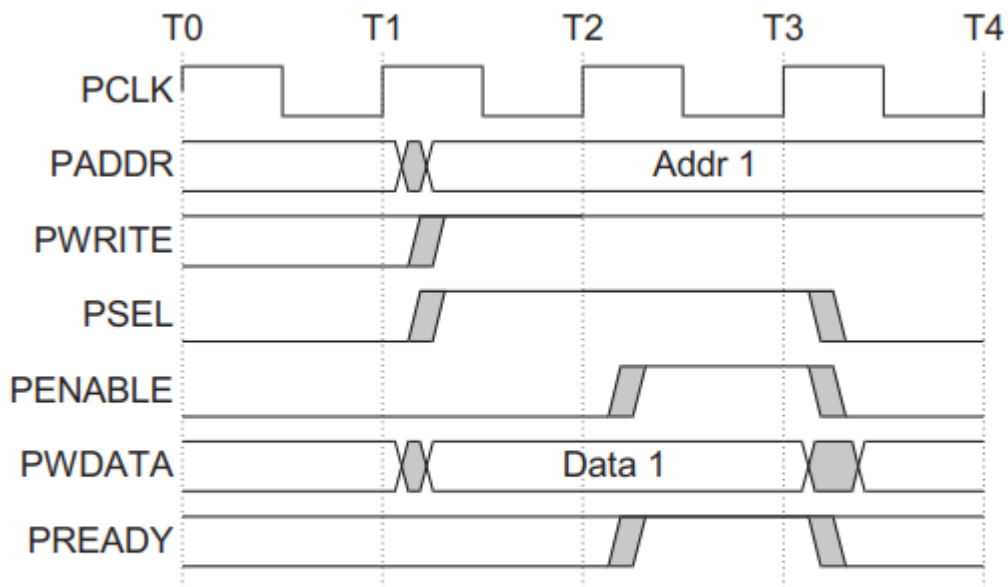


Figure 3-1 Write transfer with no wait states

### 2.2 apb写等

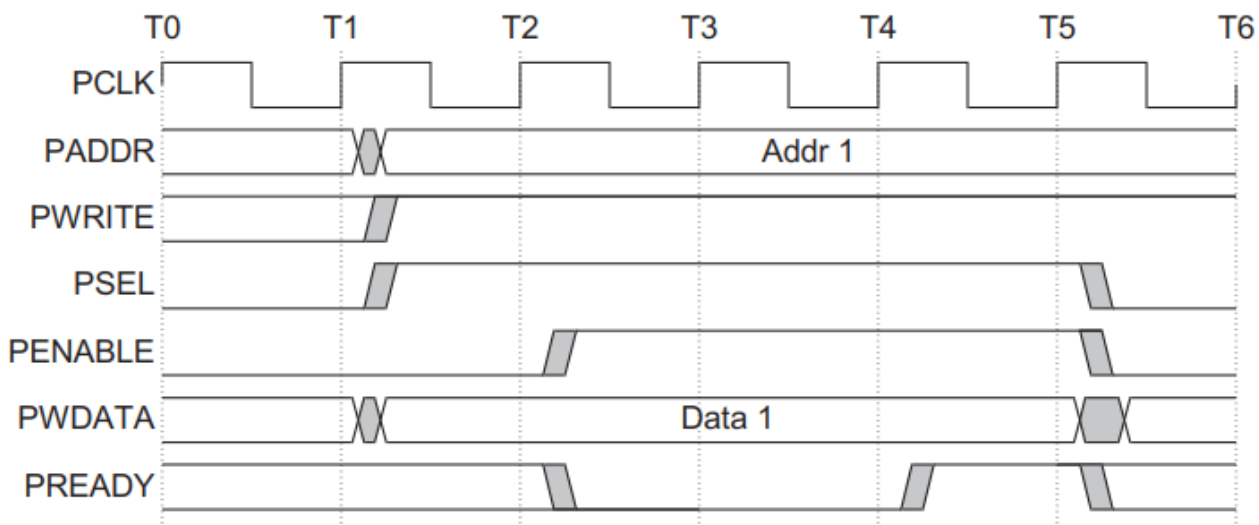


Figure 3-2 Write transfer with wait states

### 2.3 apb读不等

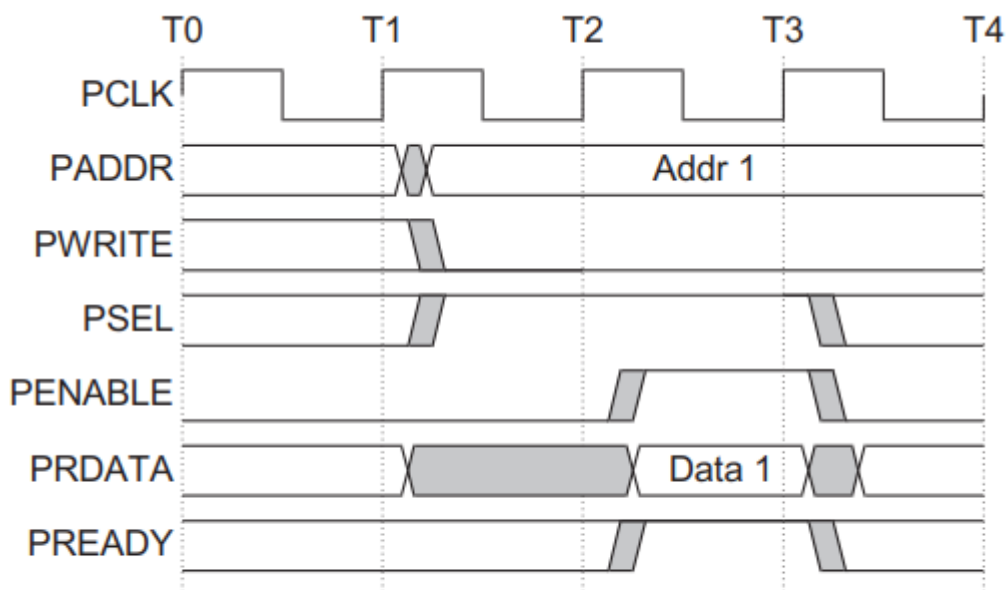


Figure 3-4 Read transfer with no wait states

### 2.4 apb读等

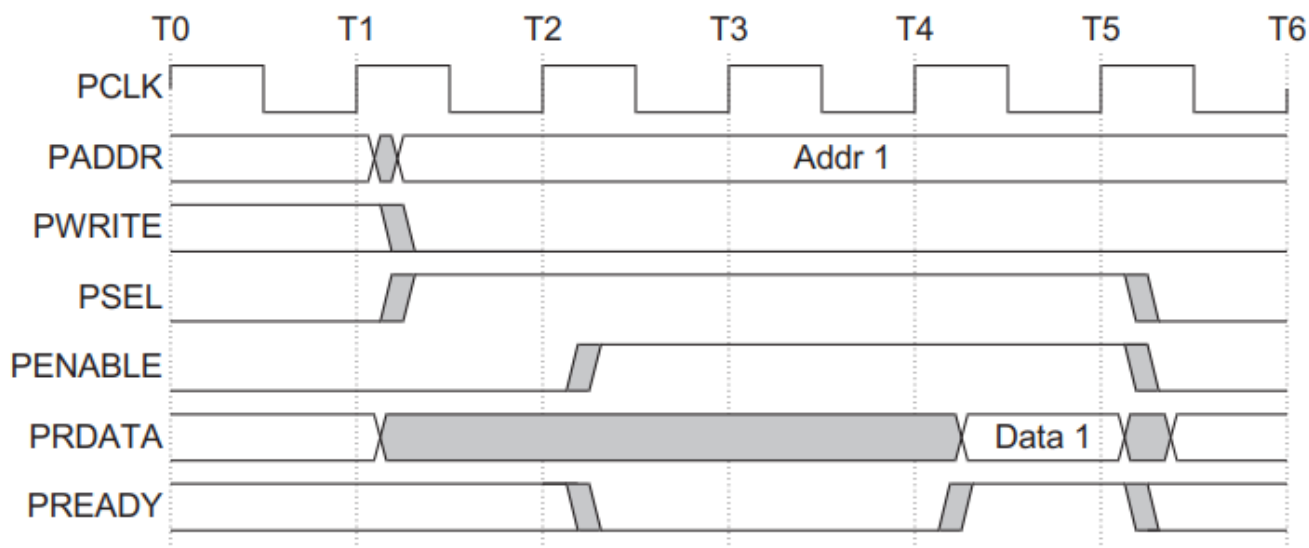


Figure 3-5 Read transfer with wait states

### 3. haddr非对齐传输

**Table 3-6 Active byte lanes for a 32-bit little-endian data bus**

<b>Transfer size</b>	<b>Address offset</b>	<b>DATA [31:24]</b>	<b>DATA [23:16]</b>	<b>DATA [15:8]</b>	<b>DATA [7:0]</b>
Word	0	✓	✓	✓	✓
Halfword	0	-	-	✓	✓
Halfword	2	✓	✓	-	-
Byte	0	-	-	-	✓
Byte	1	-	-	✓	-
Byte	2	-	✓	-	-
Byte	3	✓	-	-	-