DIGITAL MULTIPHASE

LOADING PROJECTS INTO RAM

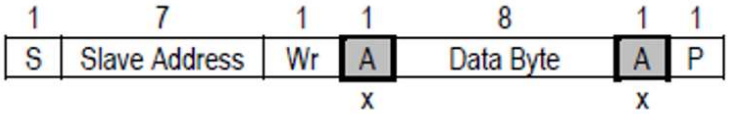
SEPTEMBER 2019

BIG IDEAS
FOR EVERY SPACE

OVERVIEW

- This guide specifies the method of loading PowerNavigator project files into RAM for Renesas Generation 2 Digital Multiphase controllers via PMBus communication.
- The guide is intended for use with TXT files used with PowerNavigator projects.
- Unless noted otherwise, timing and voltage requirements are outlined in the PMBus specification version 1.3.

PMBus Communication Key



S	Start Condition
Sr	Repeated Start Condition
Rd	Read (bit value of 1)
Wr	Write (bit value of 0)
x	Shown under a field indicates that that field is required to have the value of 'x'
A	Acknowledge (this bit position may be '0' for an ACK or '1' for a NACK)
P	Stop Condition
PEC	Packet Error Code
☐	Master-to-Slave
■	Slave-to-Master
...	Continuation of protocol

Note: See PMBus/SMBus spec for additional details and timing requirements.

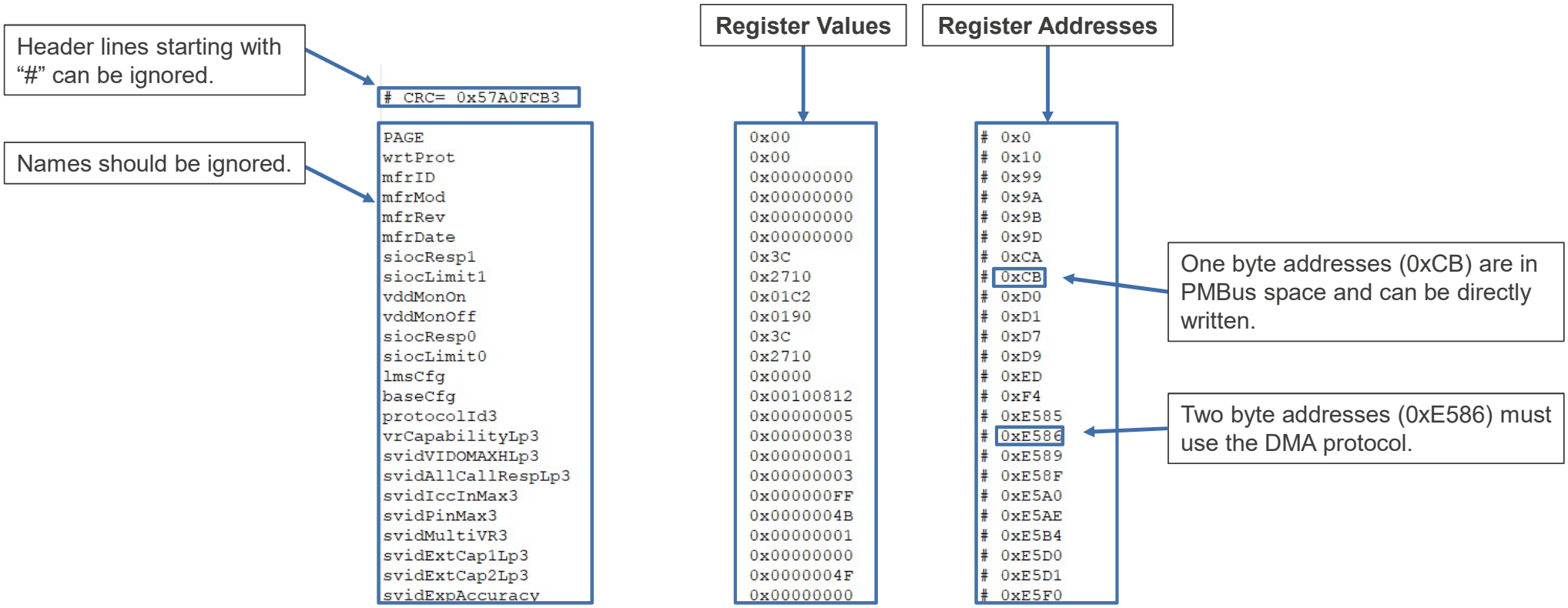
LOADING PROJECTS INTO RAM

PROJECT LOADING ALGORITHM

1. Write the registers in the **exact order** in which they appear in the TXT file.
   - One byte register addresses can be directly written using PMBus space access.
   - Two byte register addresses must use the DMA protocol. See the reference section at the end of the guide for more information.

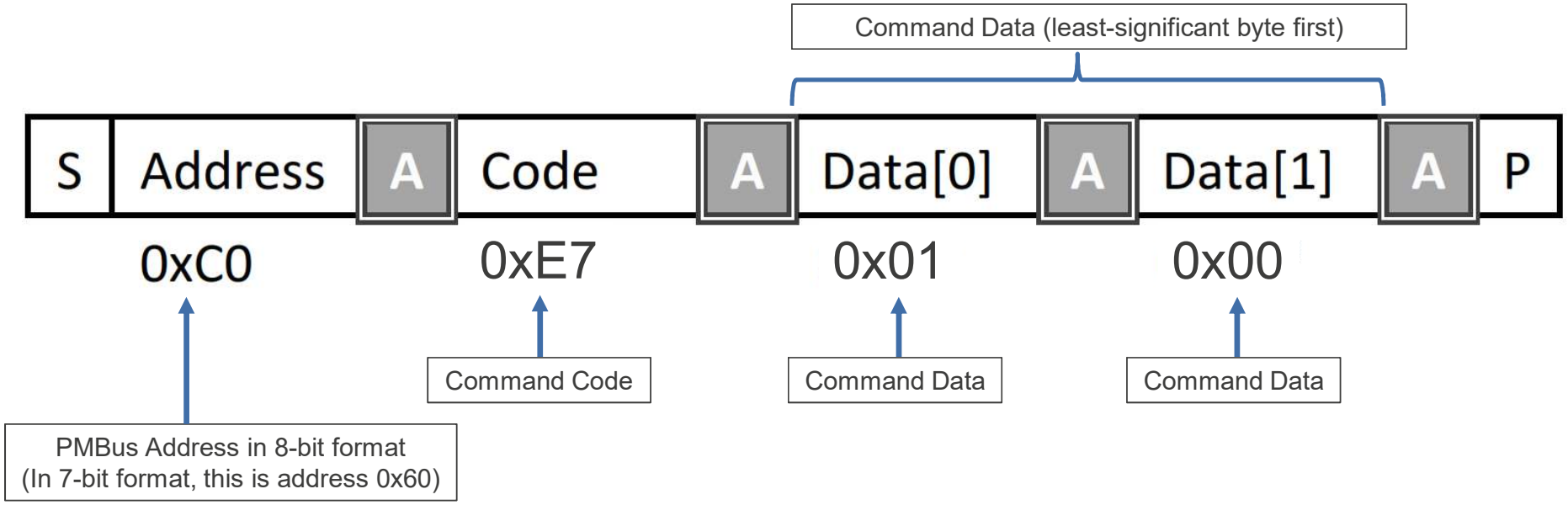
2. When all registers in the TXT file have been written, write 0x01 to register 0xE7.

Step 1 – TXT File Overview

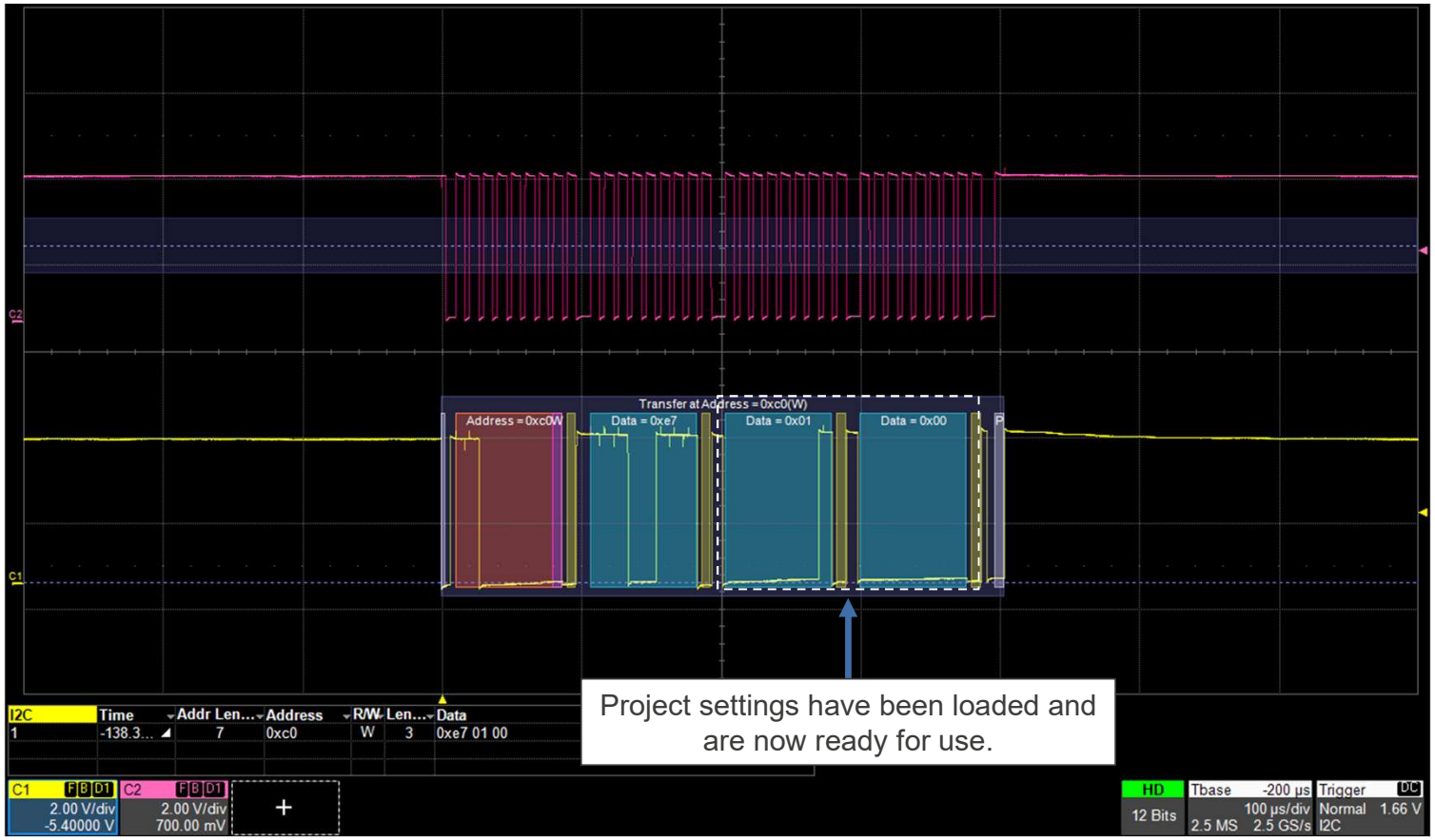


Step 2 – Apply Project Settings

To apply project settings, send the command as shown below.



Step 2 – Example Waveform



Project settings have been loaded and are now ready for use.

Project Load Complete

- The project has now been loaded into RAM and is ready for use.
- No changes to OTP memory have been committed. If VCC is interrupted, the project must be loaded again.

DMA COMMAND FORMAT REFERENCE

Direct Memory Access (DMA) Command Codes

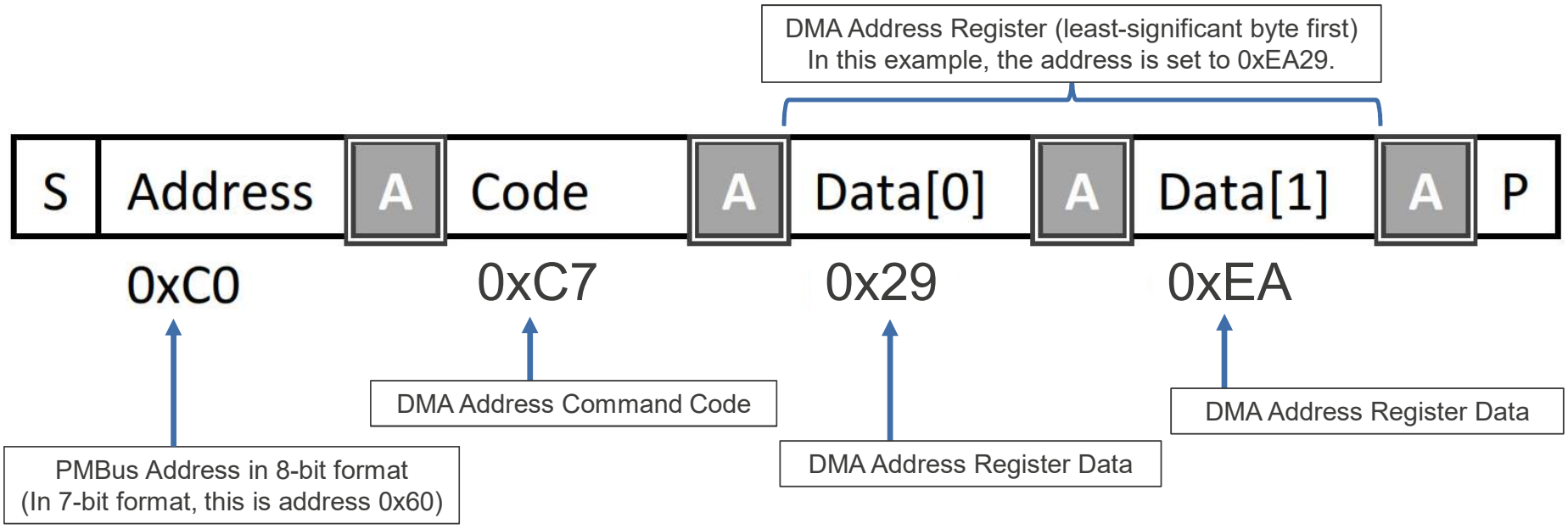
This section explains direct memory access (DMA) commands. DMA is completed through 3 command codes:

- **DMA Address (Command Code 0xC7):** Used to set the register address to use with other DMA commands.
- **DMA Data (Command Code 0xC5):** Used to read from or write to the register selected by the DMA Address command.
- **DMA Sequential (Command Code 0xC6):** Used to read from or write to the register selected by the DMA Address command, then automatically increment the register address by 1.

DMA ADDRESS (0XC7)

DMA Address (0xC7) – Write

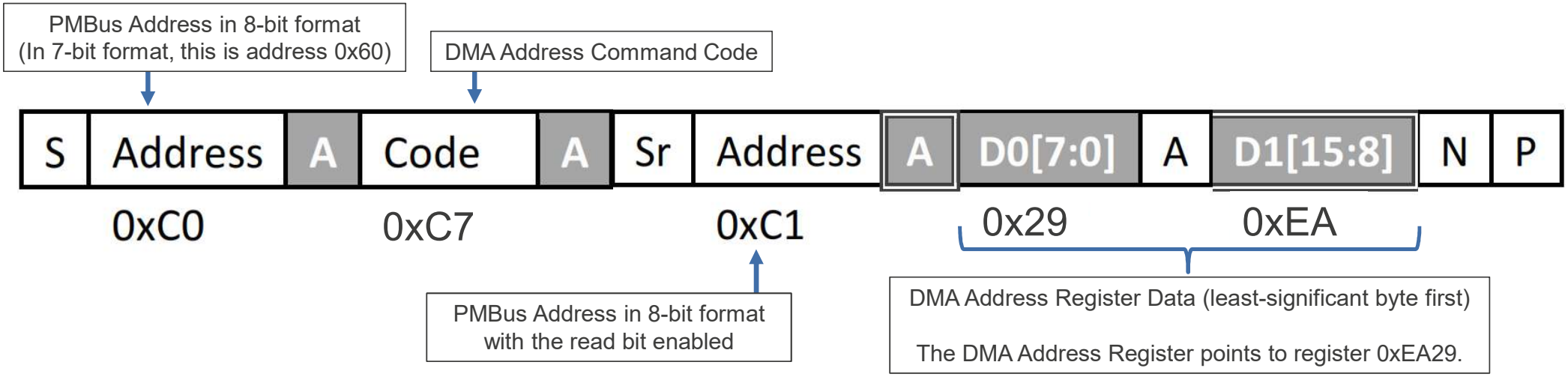
To set a pointer to a register for use with other DMA commands, use the DMA Address command (code 0xC7). This command accepts exactly two bytes of data.



DMA Address (0xC7) – Write Waveform

DMA Address (0xC7) – Read

To read a pointer to a register used with other DMA commands, use the DMA Address command (code 0xC7). This command will return two bytes of data.

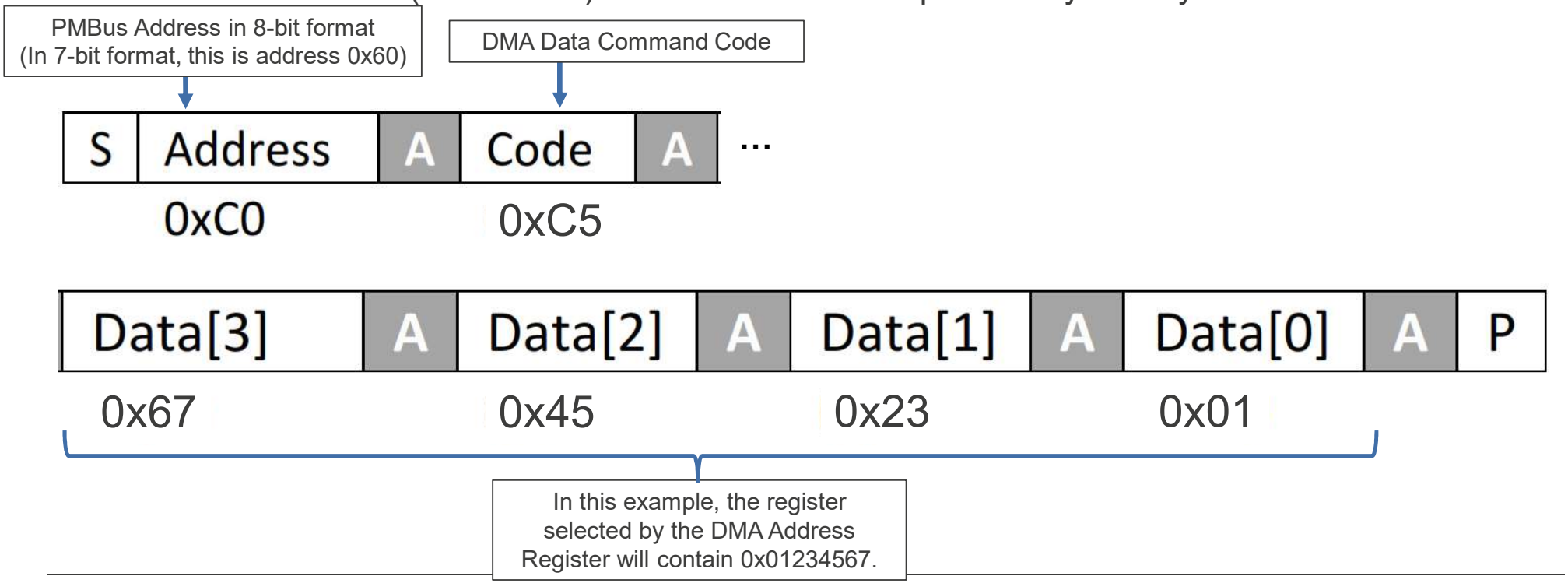


DMA Address (0xC7) – Read Waveform

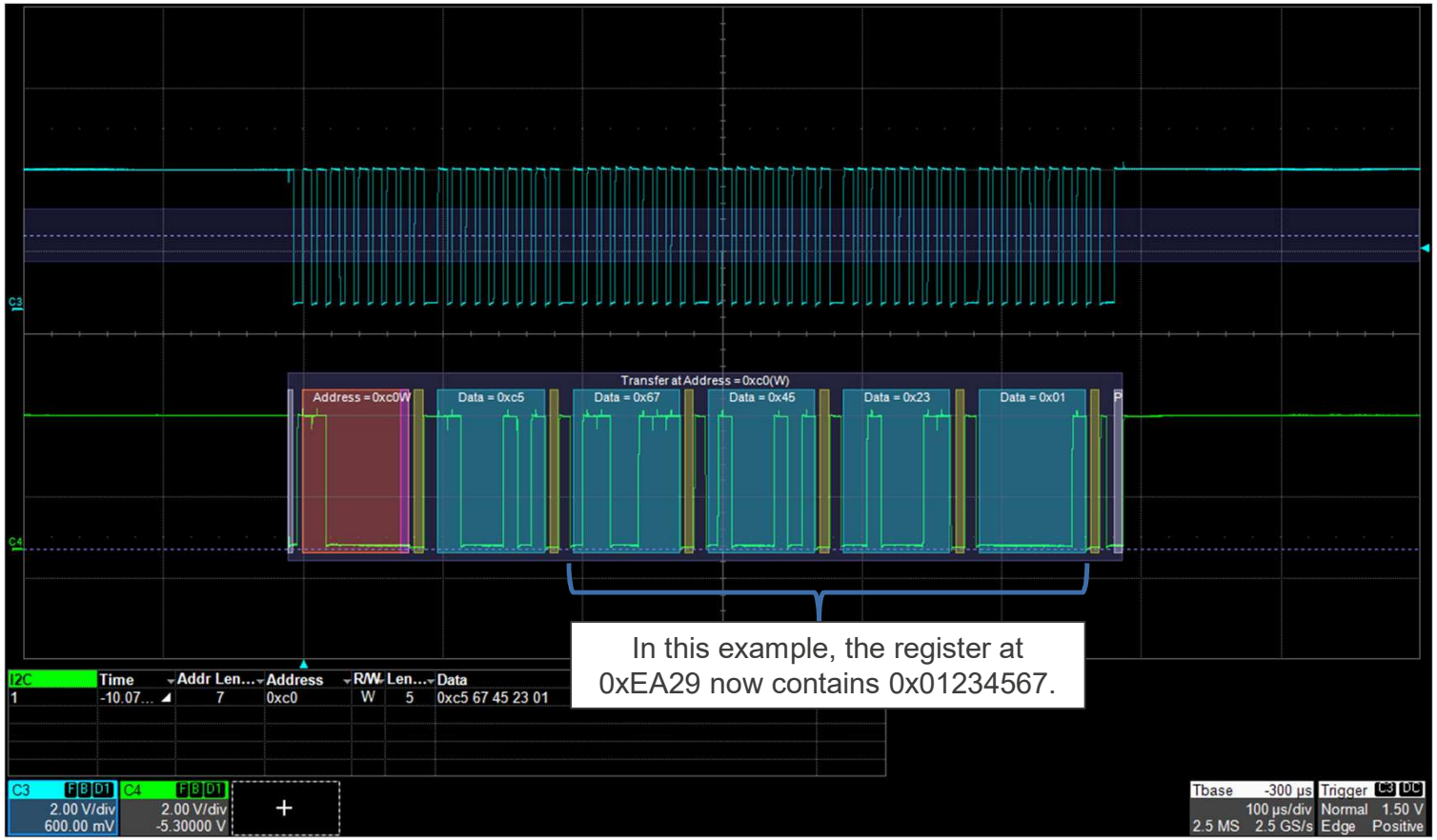
DMA DATA (0XC5)

DMA Data (0xC5) – Write

To set the data at the register selected by the DMA Address Register, use the DMA Data command (code 0xC5). This command accepts exactly four bytes of data.

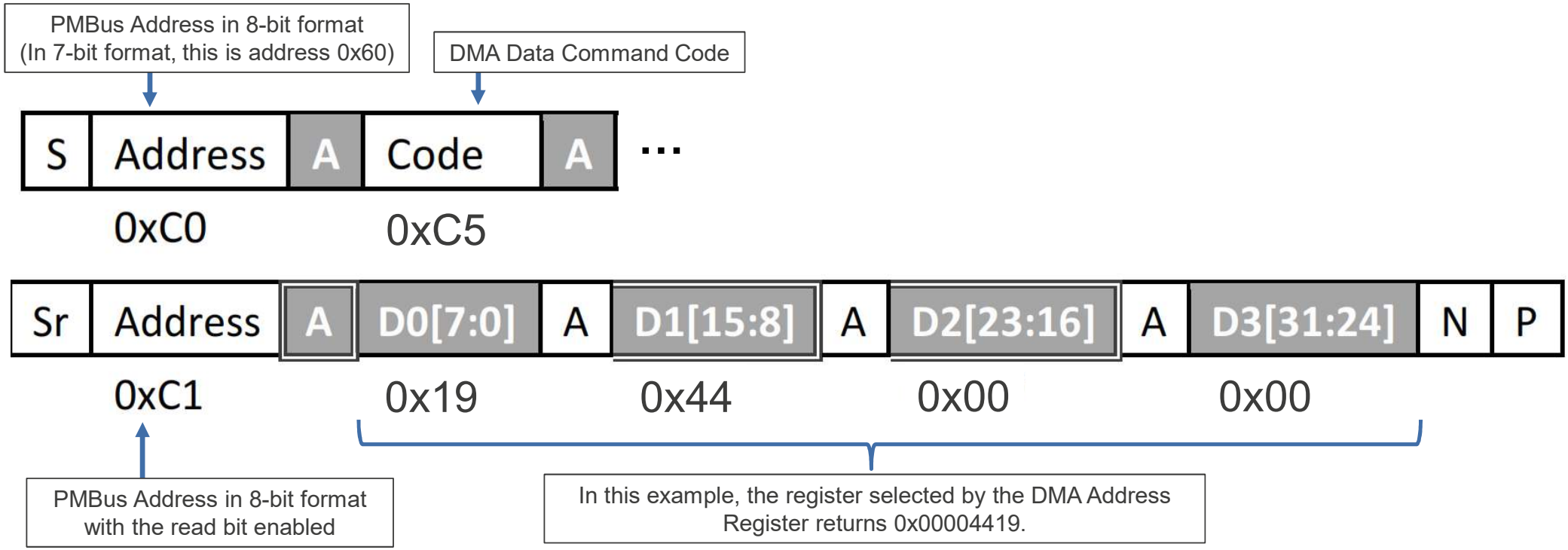


DMA Data (0xC5) – Write Waveform

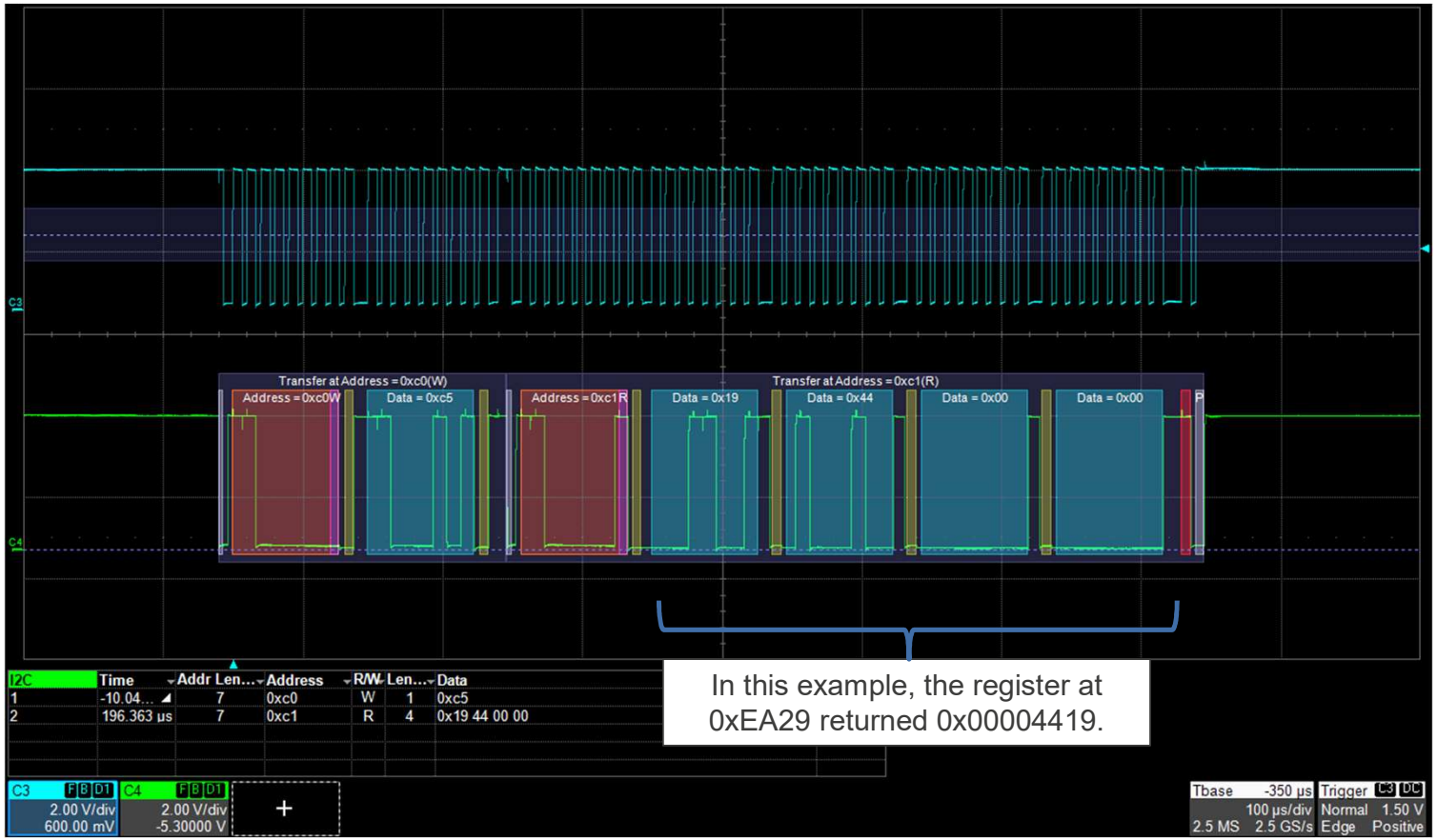


DMA Data (0xC5) – Read

To read the data at the register selected by the DMA Address Register, use the DMA Data command (code 0xC5). This command returns four bytes of data.



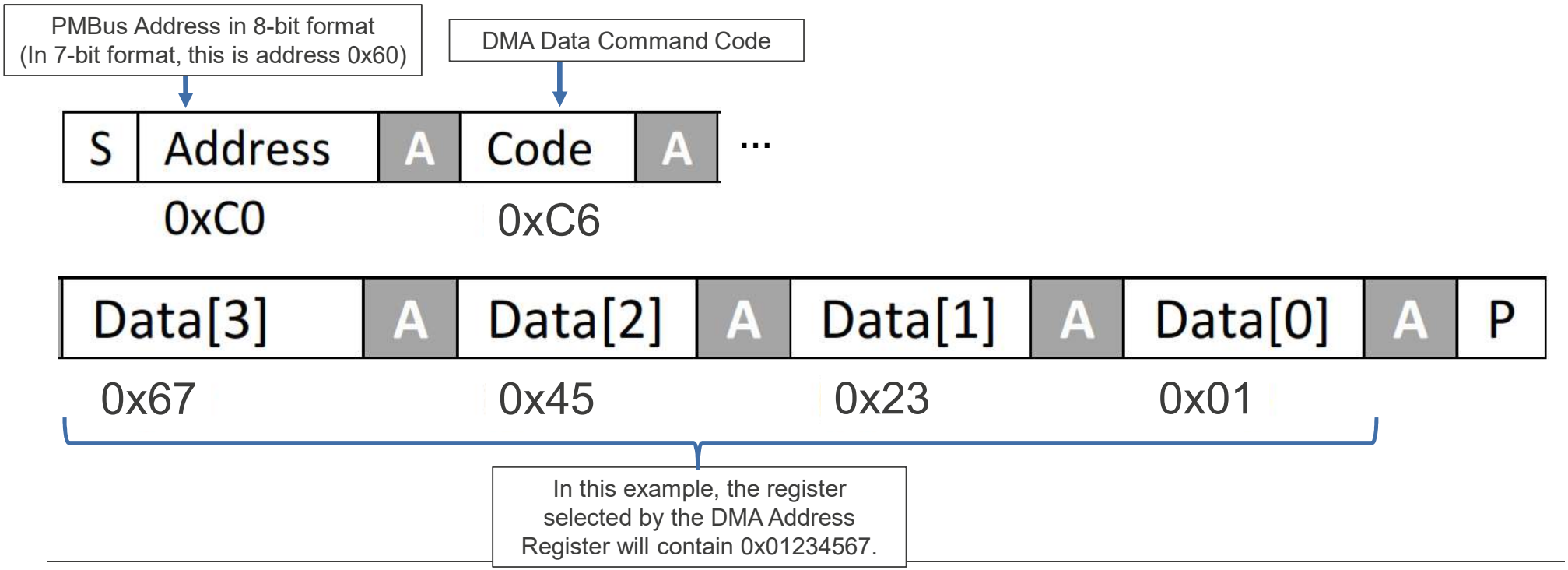
DMA Data (0xC5) – Read Waveform



DMA SEQUENTIAL (0XC6)

DMA Sequential (0xC6) – Write

To set the data at the register selected by the DMA Address Register, use the DMA Sequential command (code 0xC6). This command accepts exactly four bytes of data. The DMA Sequential command then increments the DMA Address Register.



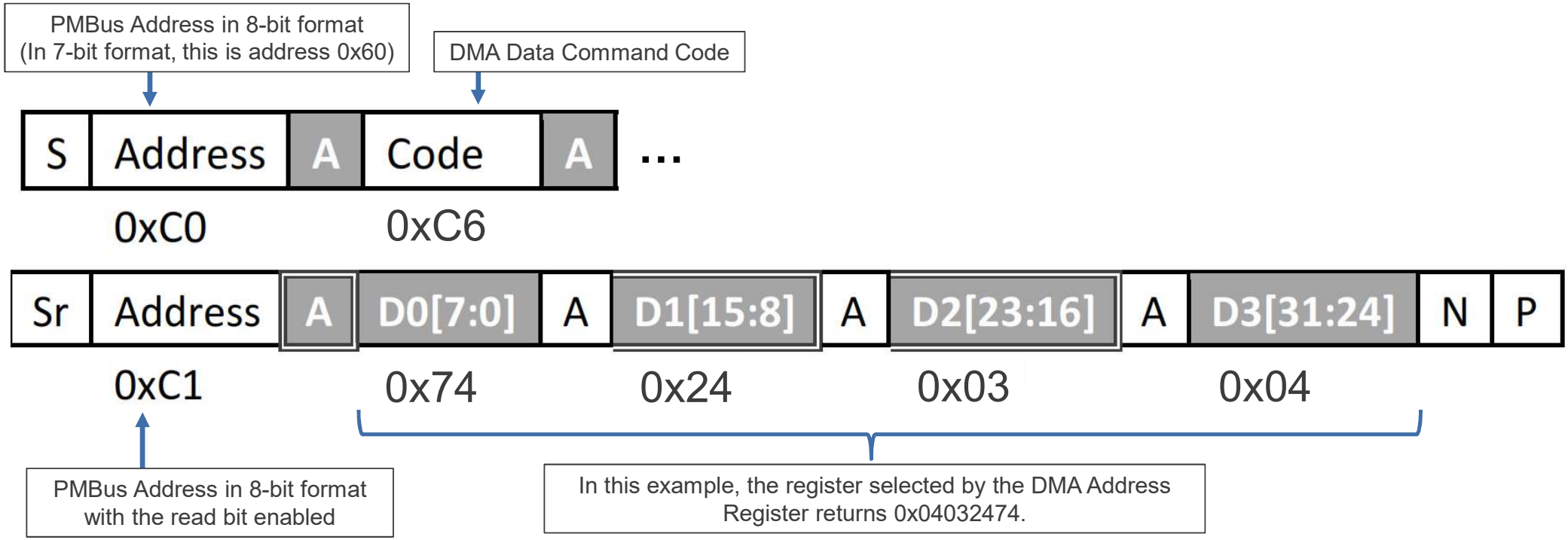
DMA Sequential (0xC6) – Write Waveform

In this example, the register at 0xEA29 now contains 0x01234567.

The DMA Address Register now points to the register at 0xEA2A.

DMA Sequential (0xC6) – Read

To read the data at the register selected by the DMA Address Register, use the DMA Sequential command (code 0xC6). This command returns four bytes of data. The DMA Sequential command then increments the DMA Address Register.



DMA Sequential (0xC6) – Read Waveform

In this example, the register at 0xEA29 returned 0x00004419.

The DMA Address Register now points to the register at 0xEA2A.

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