

DIGITAL MULTIPHASE

LOADING PROJECTS INTO RAM

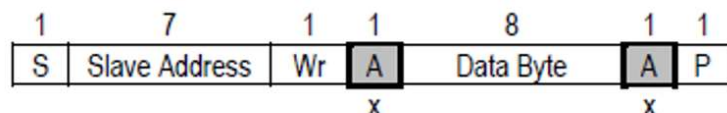
SEPTEMBER 2019

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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

Header lines starting with “#” can be ignored.

Names should be ignored.

```
# CRC= 0x57A0FCB3
```

```
PAGE
wrtProt
mfrID
mfrMod
mfrRev
mfrDate
siocResp1
siocLimit1
vddMonOn
vddMonOff
siocResp0
siocLimit0
lmsCfg
baseCfg
protocolId3
vrCapabilityLp3
svidVIDOMAXHLp3
svidAllCallRespLp3
svidIccInMax3
svidPinMax3
svidMultiVR3
svidExtCap1Lp3
svidExtCap2Lp3
svidExpAccuracy
```

Register Values

```
0x00
0x00
0x00000000
0x00000000
0x00000000
0x00000000
0x3C
0x2710
0x01C2
0x0190
0x3C
0x2710
0x0000
0x00100812
0x00000005
0x00000038
0x00000001
0x00000003
0x000000FF
0x0000004B
0x00000001
0x00000000
0x0000004F
0x00000000
```

Register Addresses

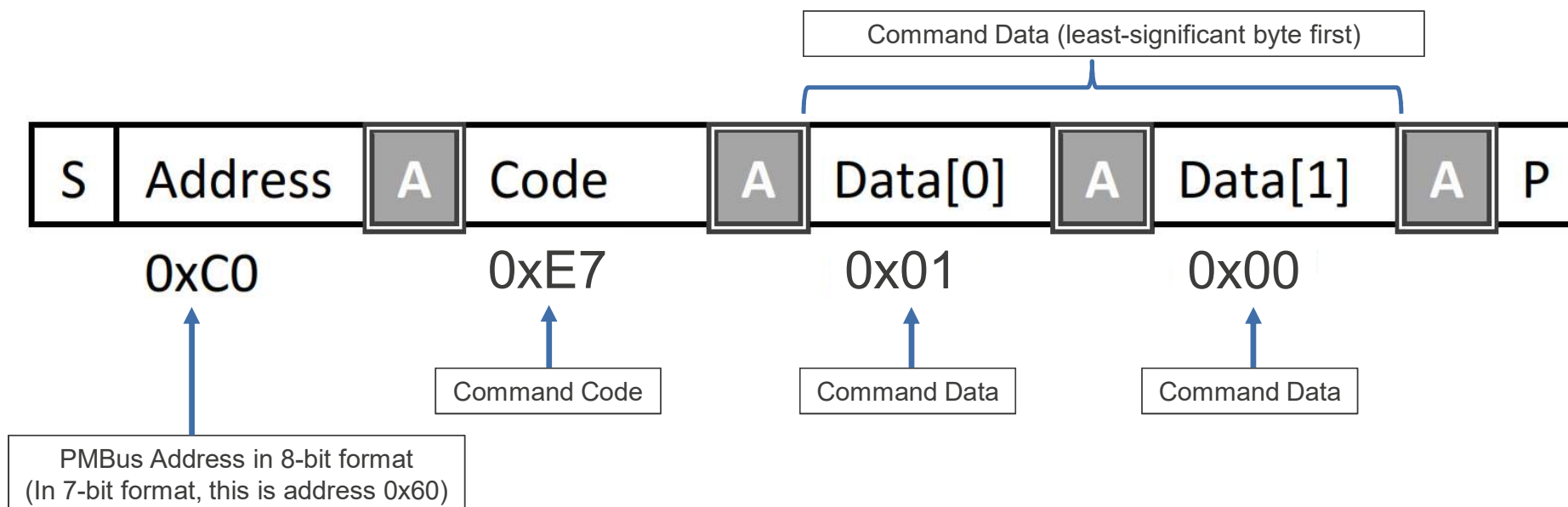
```
# 0x0
# 0x10
# 0x99
# 0x9A
# 0x9B
# 0x9D
# 0xCA
# 0xCB
# 0xD0
# 0xD1
# 0xD7
# 0xD9
# 0xED
# 0xF4
# 0xE585
# 0xE586
# 0xE589
# 0xE58F
# 0xE5A0
# 0xE5AE
# 0xE5B4
# 0xE5D0
# 0xE5D1
# 0xE5F0
```

One byte addresses (0xCB) are in PMBus space and can be directly written.

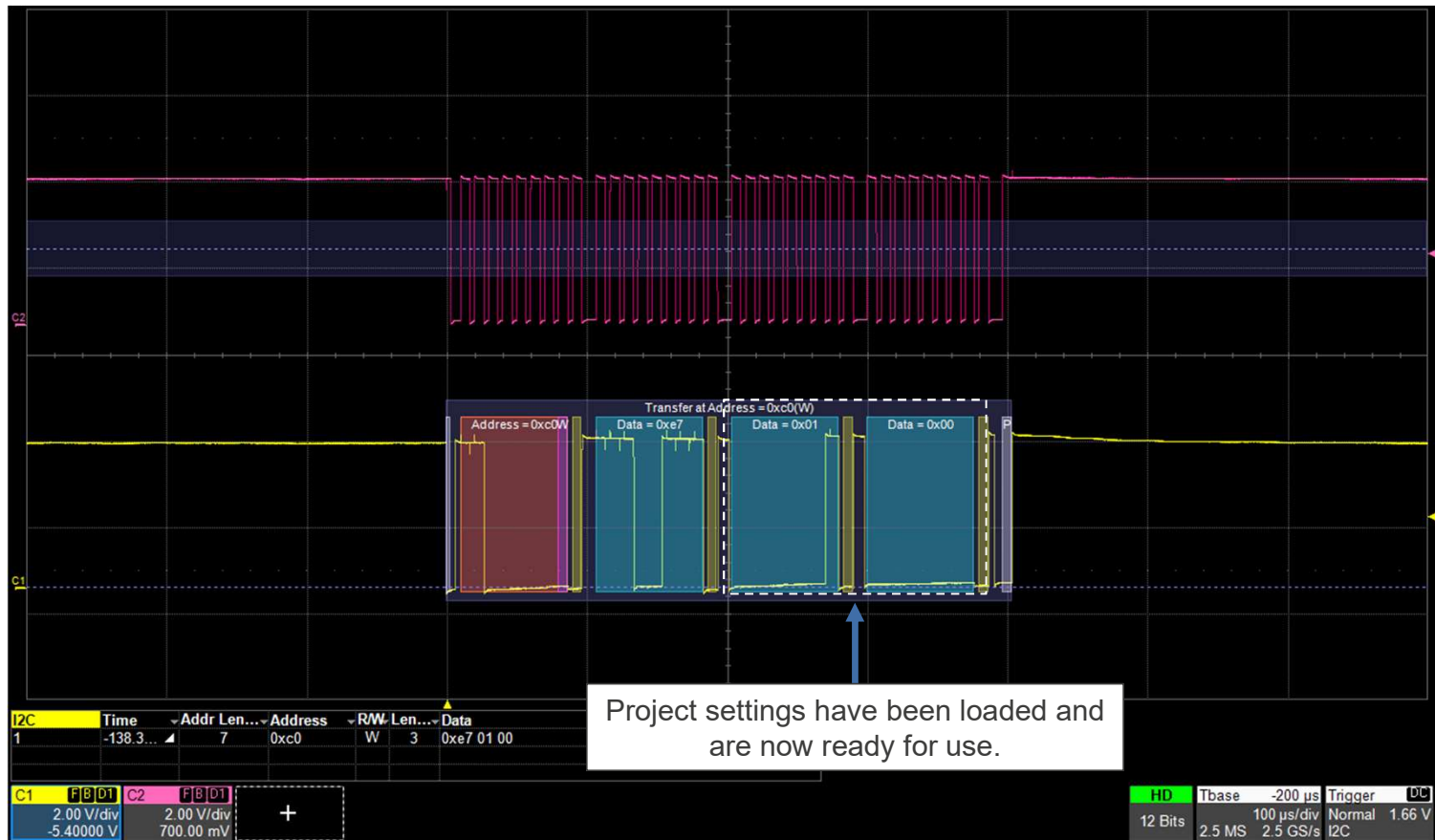
Two byte addresses (0xE586) must use the DMA protocol.

Step 2 – Apply Project Settings

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



Step 2 – Example Waveform



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

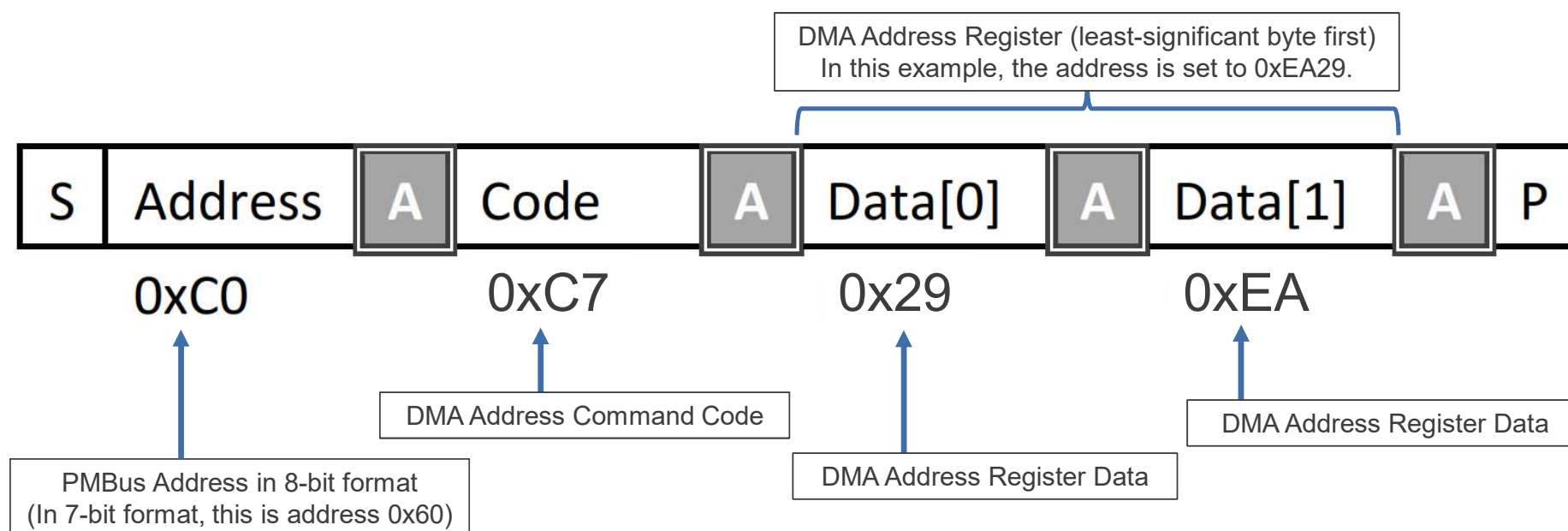
This section explains direct memory access (DMA) commands.
DMA is completed through 3 command codes:

- **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.

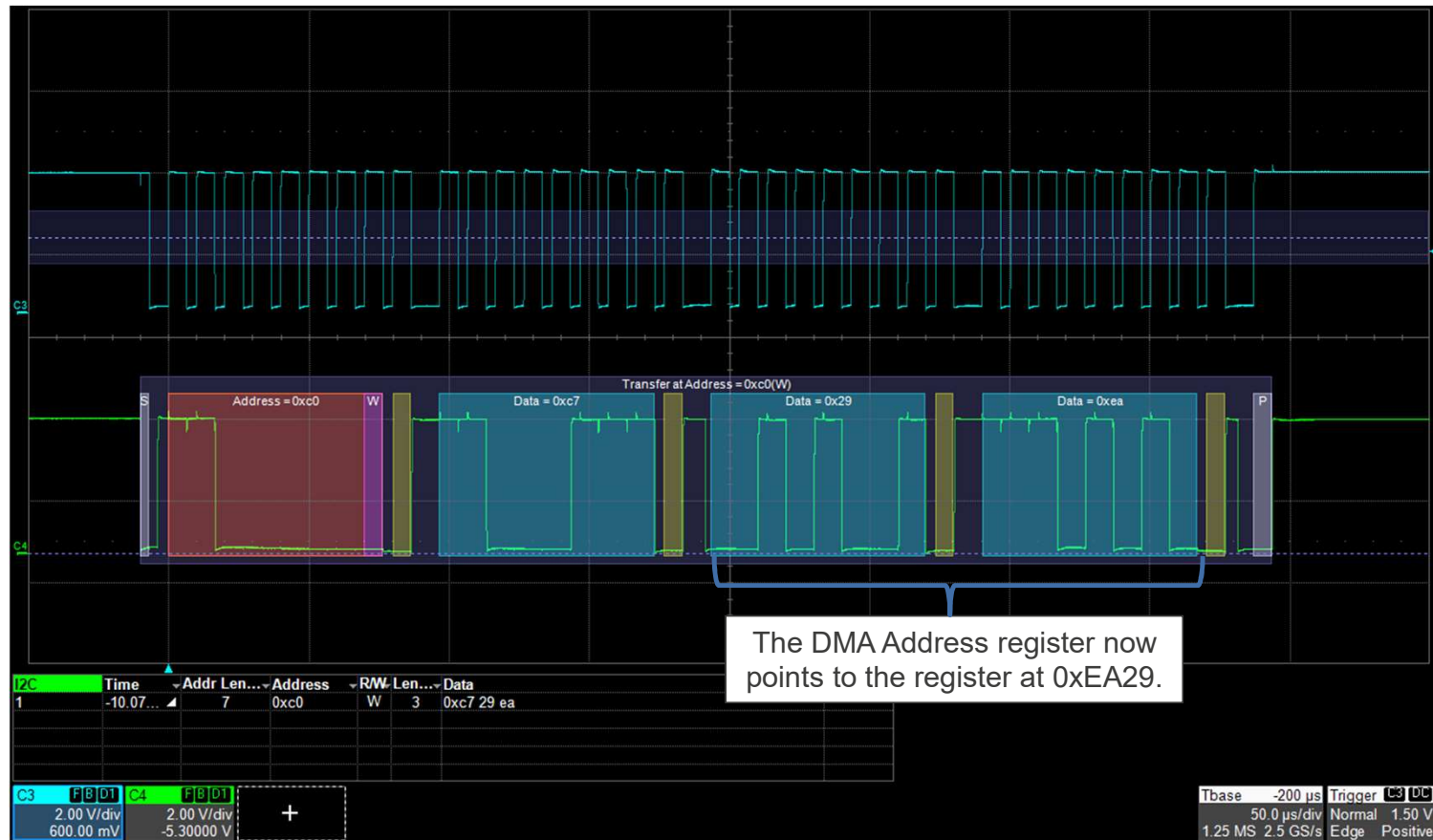
DMA ADDRESS (0XC7)

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.

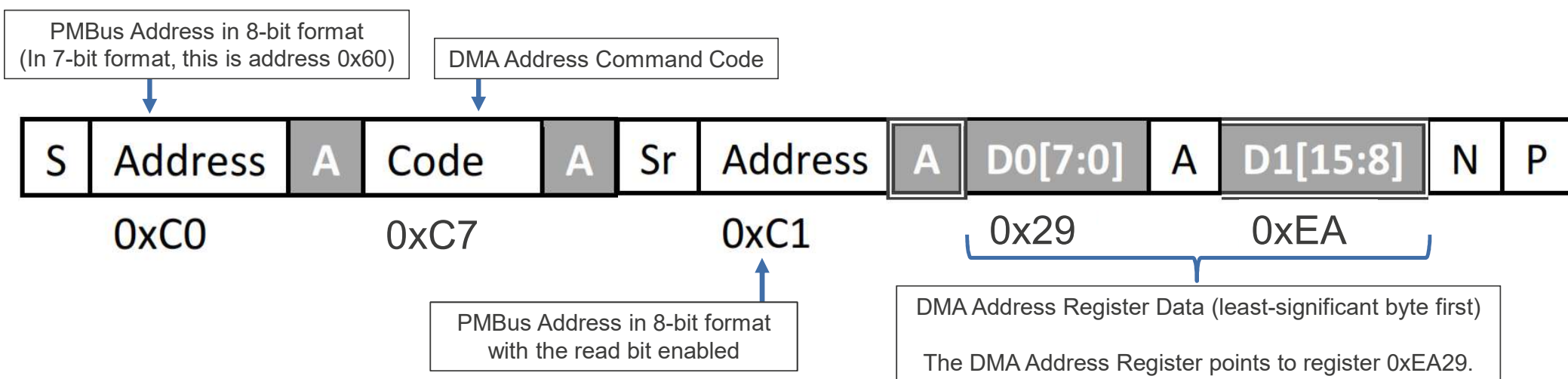


DMA Address (0xC7) – Write Waveform



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



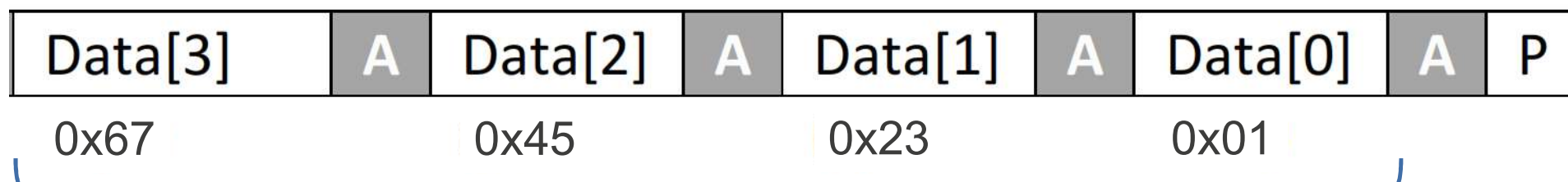
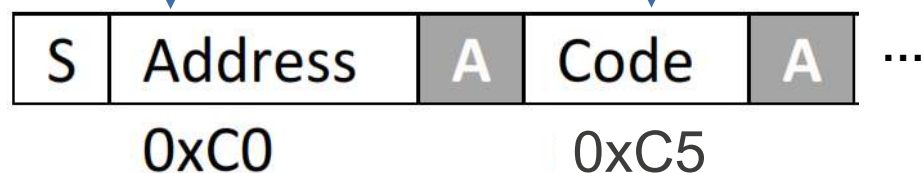
DMA DATA (0XC5)

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.

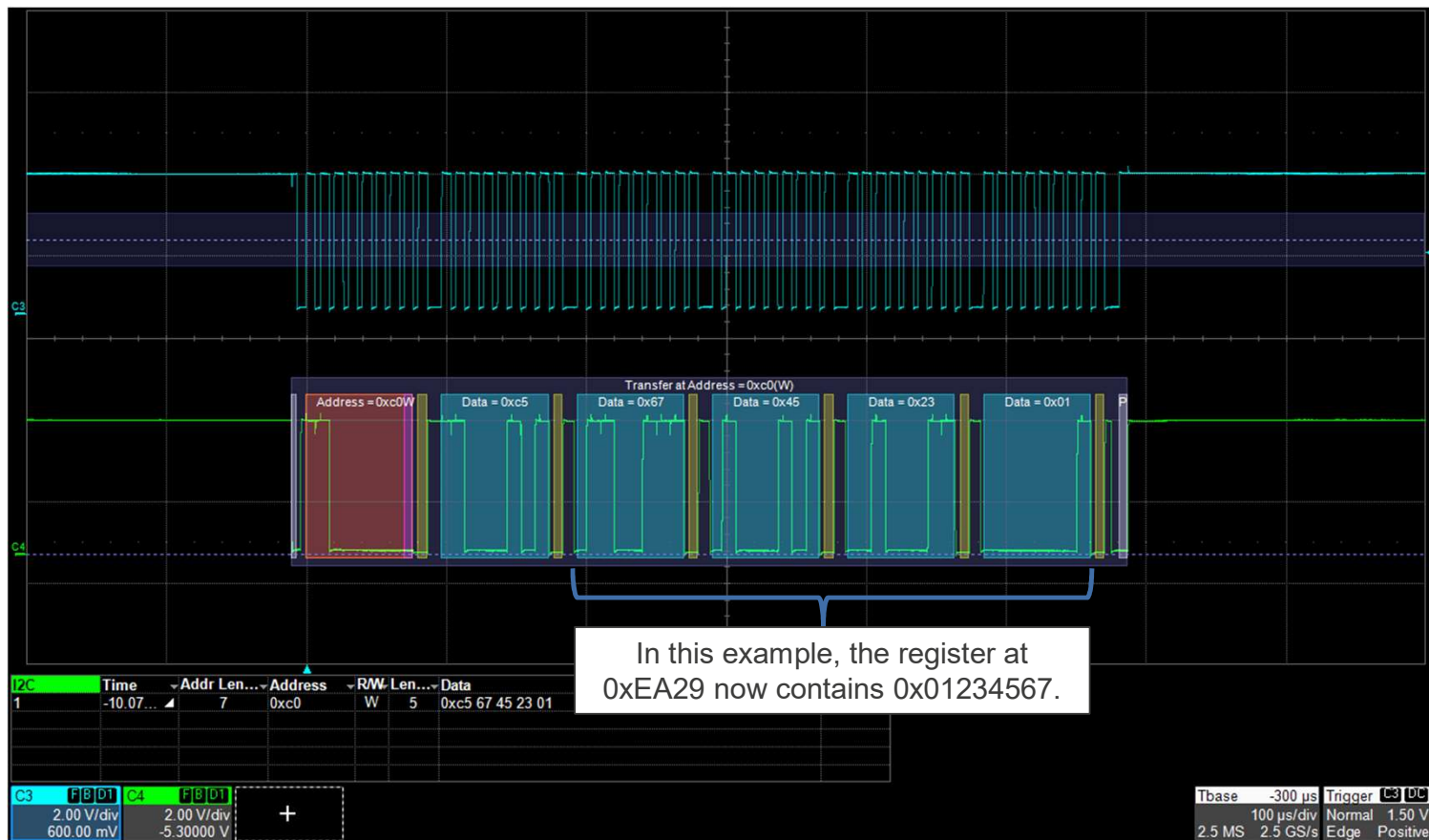
PMBus Address in 8-bit format
(In 7-bit format, this is address 0x60)

DMA Data Command Code



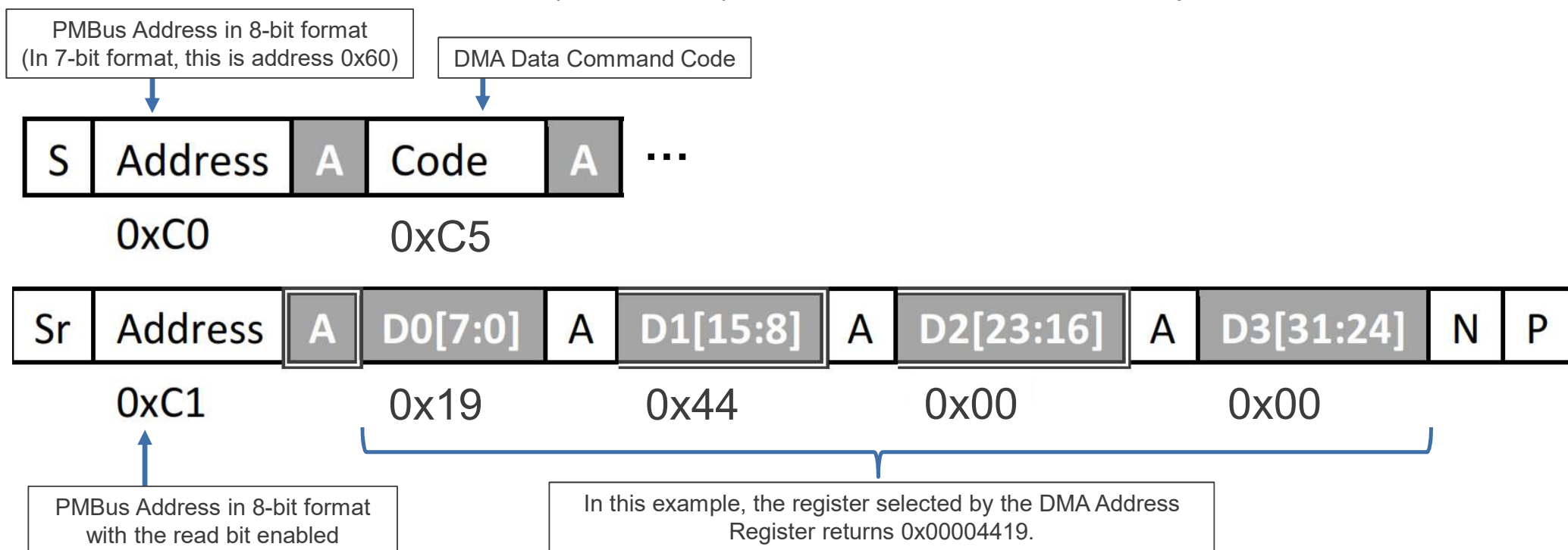
In this example, the register selected by the DMA Address Register will contain 0x01234567.

DMA Data (0xC5) – Write Waveform

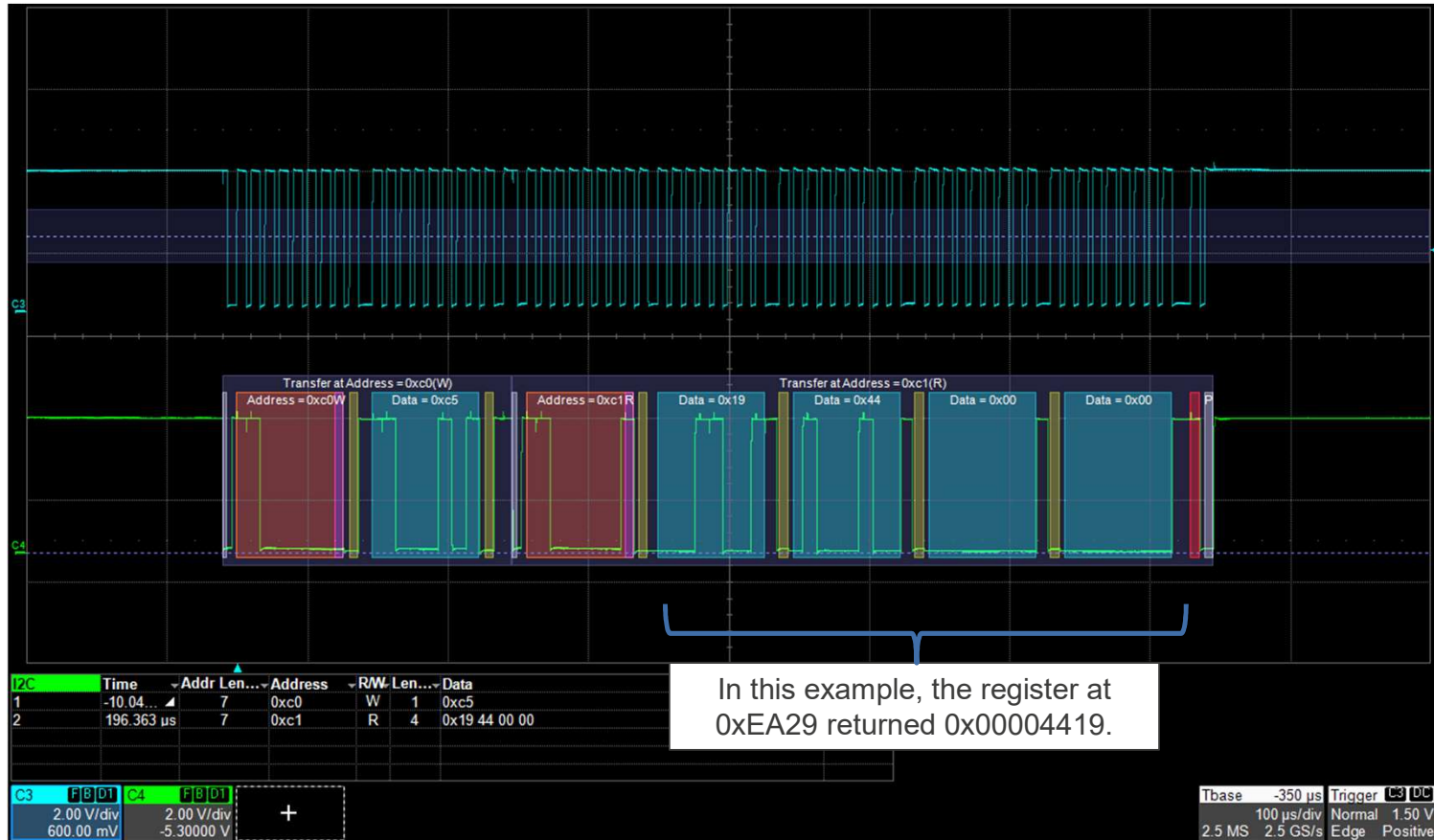


DMA Data (0xC5) – Read

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

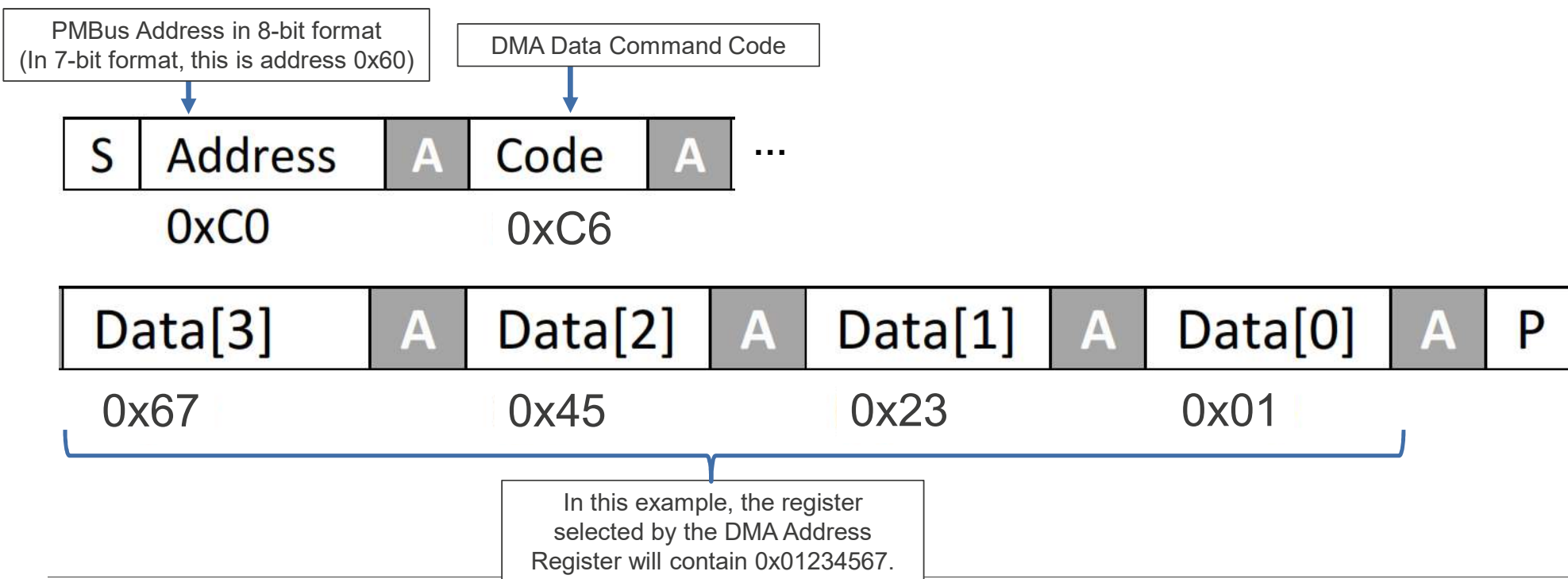


DMA SEQUENTIAL (0XC6)

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.



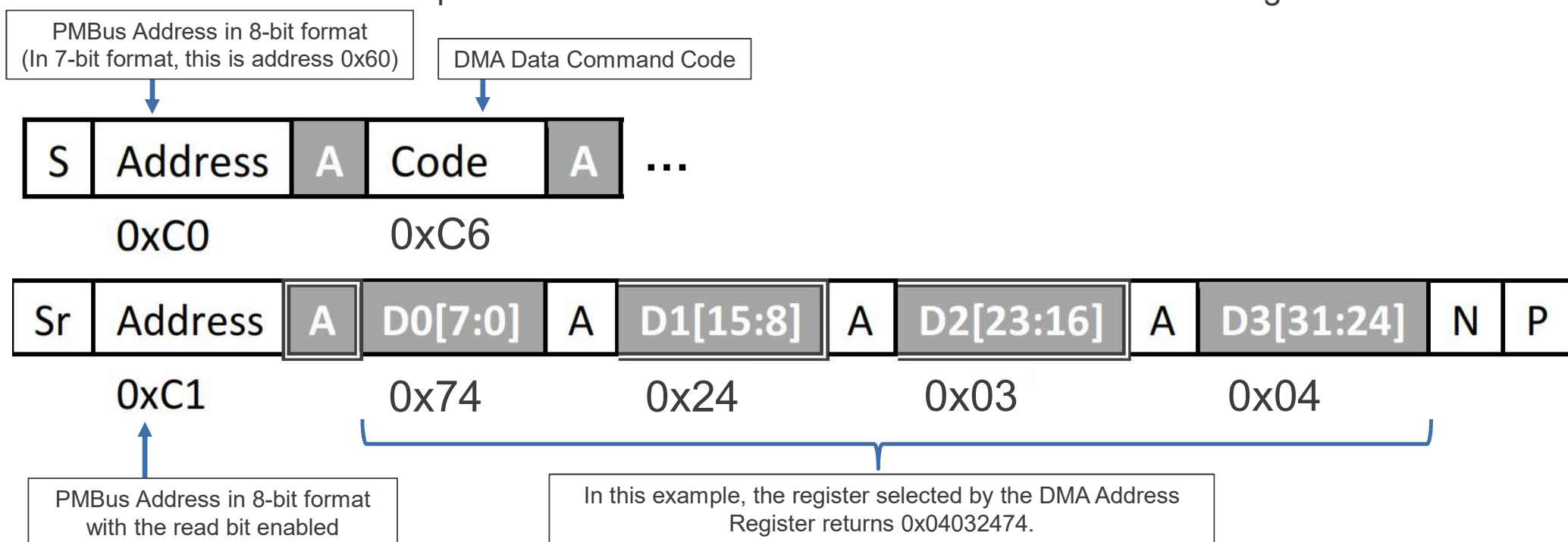
DMA Sequential (0xC6) – Write Waveform



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



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