General Interface Control Document

for VisiLED MC-D 1100

SCHOTT
glass made of ideas

TABLE OF CONTENTS

Click on the entry to jump to the respective chapter

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ASCII	American Standard Code for Information Interchange
EOM	End Of Message
ID	Identifier
MC-D	Microscopy Controller - Digital
MSB	Most Significant Bit
PC	Personal Computer
RL	Ring Light
USB	Universal Serial Bus
VCP	Virtual Communication Port

1. *General*

1.1 Purpose of this Document

This document describes the general interface control for the MC-D 1100 regarding the protocol version 2.0.
In this context, this document describes the hardware layer, the protocol structure and the commands used for the provision and retrieval of light states and settings as well as for the retrieval of information data.

2. *System Connection*

This chapter describes and references the necessary hardware for the physical layer and general connection-based information.

2.1 **Electrical Connection**

The MC-D 1100 has an USB connector through which it is connected to the PC.

The internal USB-serial converter will be activated only if the MC-D 1100 receives appropriate power through the separate power input.

Then the MC-D 1100 will provide a virtual communication port (VCP) for serial communication via this protocol.

2.2 **Serial Port Configuration**

The serial communication with the MC-D 1100 is based on the following serial port configuration:

Data Rate: 9600 Bit/s

Data Bits: 8

Stop Bits: 1

Parity: None

2.3 **Start-Up Sequence**

After power-on and successful USB subscription at the PC, the MC-D 1100 is immediately ready to process messages and needs therefore no specific start-up sequence.

3. *Communication Principles*

This chapter describes the general communication principles, the appropriate protocol structure and related message types.

3.1 General Definitions

The protocol is based on ASCII characters and is a master-slave oriented communication protocol whereat the PC acts as the master and the MC-D 1100 as the slave. The slave never starts the communication by itself but must always be requested by the master.

All integer numbers are hexadecimal encoded and transmitted with the most significant bit (MSB) first. The corresponding ASCII characters for the hexadecimal values for 0 - 9 are ‘0’ - '9’ (48 - 57 / 0x30 – 0x39) and for 10 - 15 are ‘A’ - ‘F’ (65 - 70 / 0x41 - 0x46) or ‘a’ - 'f’ (97 - 102 / 0x61 - 0x66). Floating point numbers are converted to integer numbers appropriately.

As a convention, this document always uses uppercase letters.

3.2 General Message Structure

In general, each message from the master or the slave consists of the slave address, the command code, the command data, and an end of message (EOM) terminator.

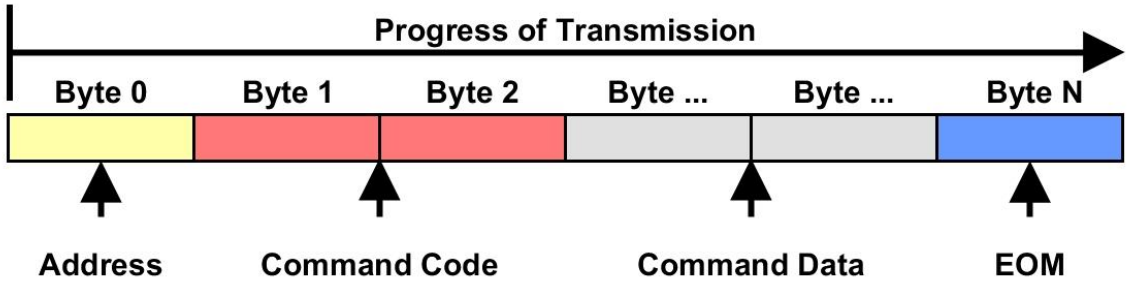

Figure 1: General Message Structure

3.2.1 Address

The address is a 4-Bit integer number with the range from 0 to 15 and is encoded with one ASCII character.

The default address of the MC-D 1100 is 15 and therefore ASCII character ‘F’ or ‘f’.

3.2.2 Command Code

The command code is always a two ASCII character mnemonic of the command. Letter characters can be used in both upper and lower case.

3.2.3 Command Data

The command data can be maximum up to 96 characters and depends on the corresponding command.

3.2.4 End Of Message Terminator

The end of message terminator is always the ASCII character ‘;’ (59 / 0x3B).

3.3 **Message Types**

All messages sent by the master are called requests and are further differentiated into read and write requests depending on whether the master wants to read or write data.
All messages sent by the slave are called responses and are further differentiated into standard and error responses depending on whether the slave accepts or denies the request from the master.

3.3.1 Read Request

If the master wants to read data from the slave, it must send a read request. The command data for a read request consists always of the single ASCII character '?' (63 / 0x3F). The slave always replies to a read request either with a standard or error response.

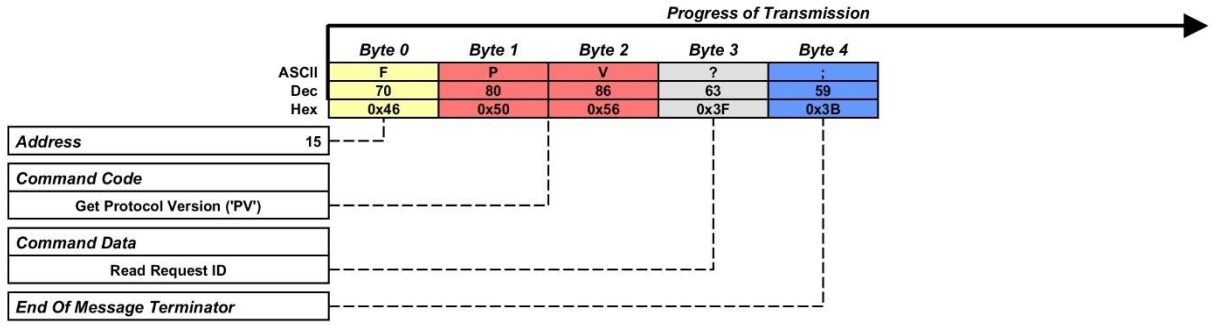

Figure 2: Read Request Example

3.3.2 Write Request

If the master wants to write data to the slave, it must send a write request. The command data for a write request depends on the specific command. The slave always replies to a write request either with a standard or error response.

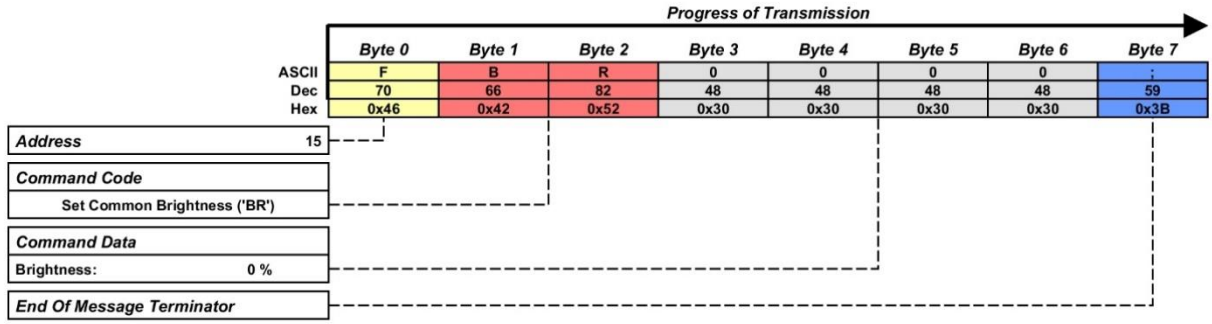

Figure 3: Write Request Example

3.3.3 Standard Response

If the slave accepts the read or write request from the master, it sends the corresponding data via a standard response.

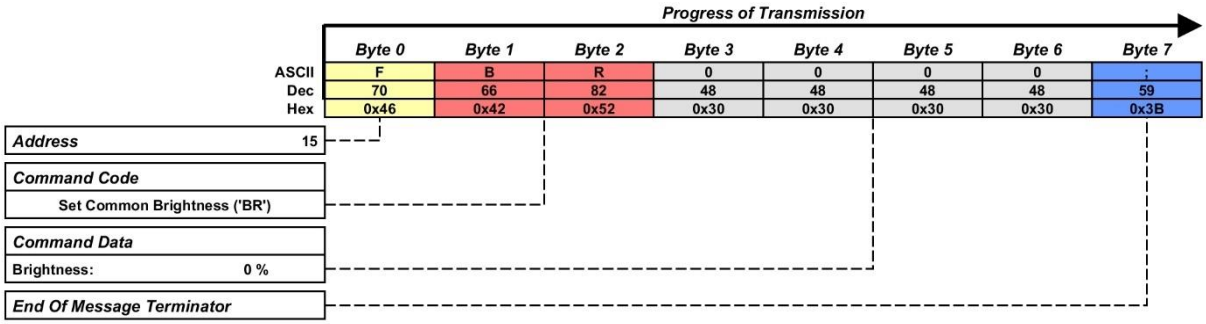

Figure 4: Standard Response Example

3.3.4 Error Response

If the slave denies the read or write request from the master, it sends the error response ID character '!' (33 / 0x21) followed by an appropriate three-character error code via an error response. The possible error codes are listed in Table 1.

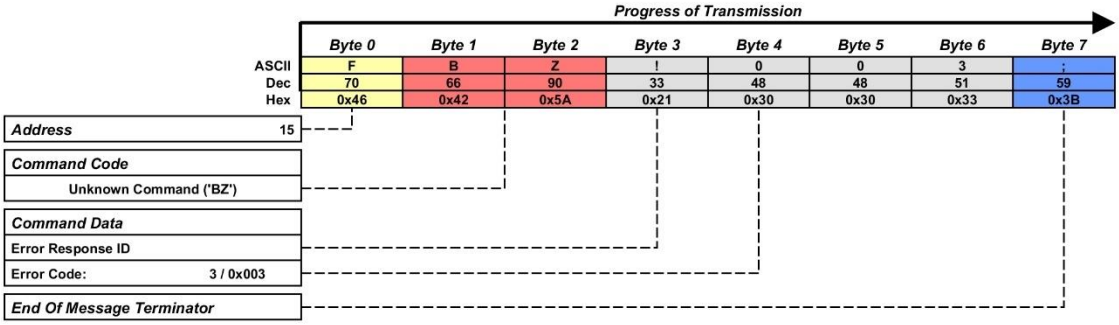

Figure 5: Error Response Example

Error Code	Description
0x002	Syntax error.
0x003	Unknown command.
0x004	Write request not supported for this command.
0x005	Read request not supported for this command.
0x006	Value out of range.
0x007	Value too low.
0x008	Value too high.
0x009	Value not a number.
0x00B	Command not supported.

Table 1: Response Error Codes

4. *Light Control Commands*

This chapter summarizes the commands used for the light control of the MC-D 1100. This includes the functionality for the segment intensity, the segment pattern, the segment rotation, the shutter and strobe control as well as the configuration for the external trigger input.
The following table gives a command overview.

Command	Mnemonic	Description
Segment Intensity		
Common Intensity	BR	Get/Set the intensity for all segments at once.
Individual Intensity	Bx	Get/Set the intensity for all segments at once or for individual segments.
Segment Pattern		
Segment States	SC	Get/Set the segments that shall be active.
Segment Rotation		
Rotate Manual	RT	Rotate the current segment pattern one step clockwise or counterclockwise.
Rotate Automatic	RA	Activate/Deactivate the clockwise or counterclockwise automatic rotation of the current segment pattern or get the current rotation mode.
Rotation Speed	RV	Get/Set the speed for the automatic segment rotation.
Shutter Control		
Shutter	SH	Activate/Deactivate the shutter or get the current shutter state.
Strobe Control		
Strobe	ST	Activate/Deactivate strobe light or get the current strobe light state.
Strobe Pulse Period	SF	Get/Set the strobe light pulse period.
Strobe Pulse Duty Cycle	SD	Get/Set the strobe light pulse duty cycle.
External Trigger Configuration		
Trigger Pause	TP	Get/Set the minimum pause time between the detection of an external trigger signal and the recognition of the next external trigger signal.
Trigger Configuration	TR	Get/Set the reaction to an external trigger signal.
Trigger Persistence	TS	Store the currently active trigger configuration permanently.

Table 2: Light Control Commands Overview

4.1 Segment Intensity

This sub chapter specifies and describes all commands regarding the segment intensity.

4.1.1 Common Intensity

This command is used to get or set the intensity for all segments of the connected ring light at once.

4.1.1.1. Write Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'BR'	Common Intensity Command
Command Data	3-6	All	16-Bit Integer	Intensity value in the range from 0 to 1000. Intensity in % is calculated based on the following formula: $I_{\%} = Value * 10$ Min.: 0.0 % Max.: 100.0 %
End Of Message	7	All	';'	Message Terminator

Table 3: Common Intensity – Write Request

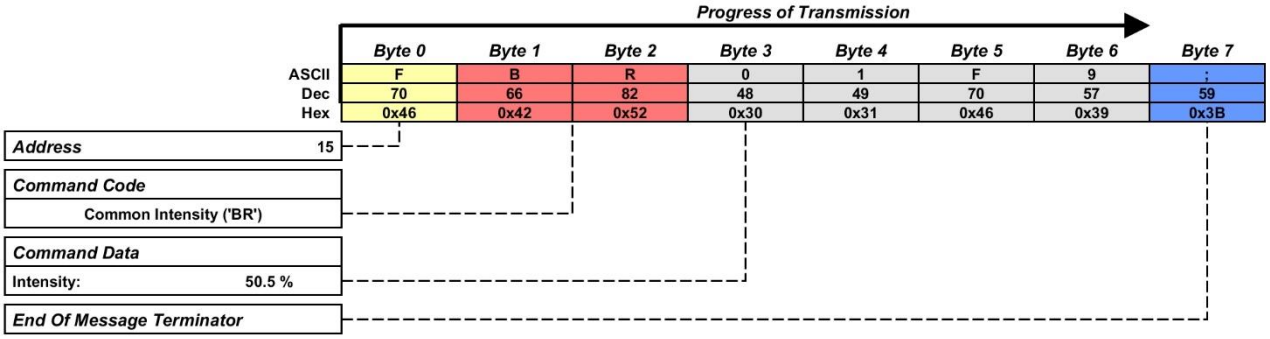

Figure 6: Common Intensity – Write Request Example

4.1.1.2. Read Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'BR'	Common Intensity Command
Command Data	3	All	'?'	Read Request ID
End Of Message	4	All	';'	Message Terminator

Table 4: Common Intensity – Read Request

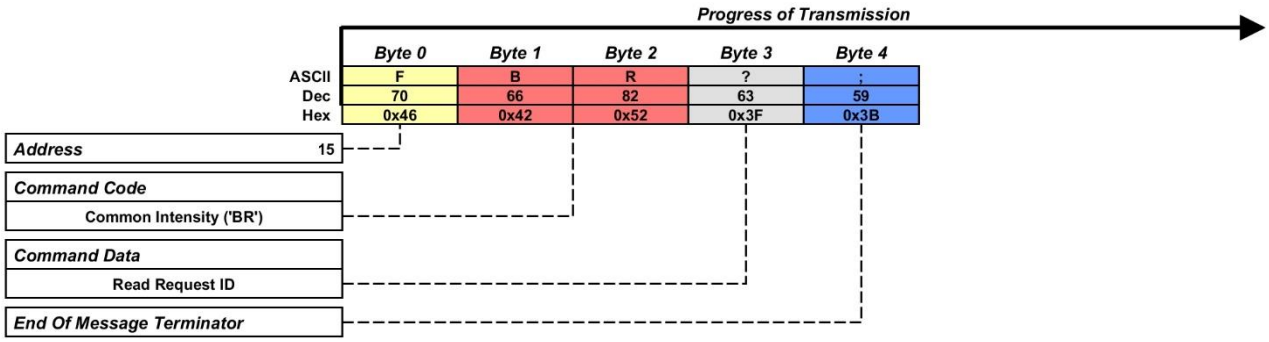

Figure 7: Common Intensity – Read Request Example

4.1.1.3. Standard Response

The following table summarizes and describes the complete command response.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'BR'	Common Intensity Command
Command Data	3-6	All	16-Bit Integer	Intensity value in the range from 0 to 1000. Intensity in % is calculated based on the following formula: $I_{\%} = Value * 10$ Min.: 0.0 % Max.: 100.0 %
End Of Message	7	All	';'	Message Terminator

Table 5: Common Intensity – Standard Response

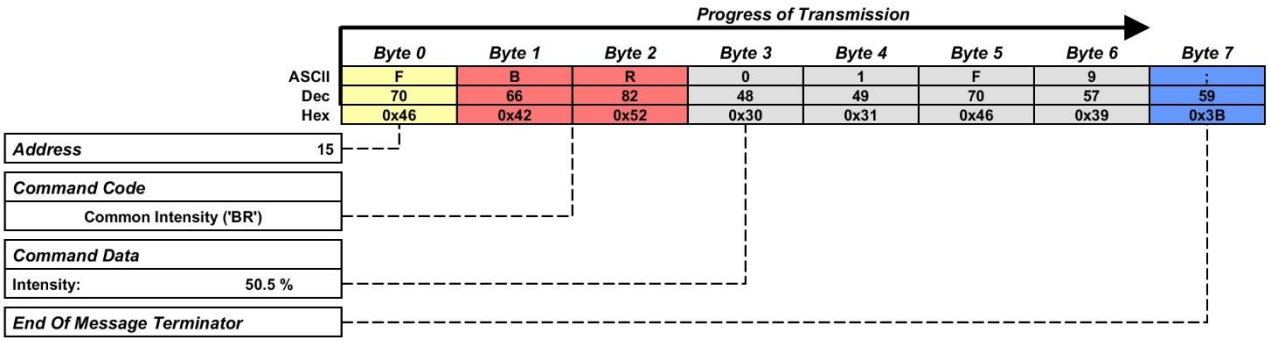

Figure 8: Common Intensity – Standard Response Example

4.1.2 Individual Intensity

This command is used to get or set the intensity for all segments of the connected ring light at once or only for an individual segment.

4.1.2.1. Write Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1	All	'B'	Individual Intensity Command
	2	All	4-Bit Integer [0;8]	Individual Segment Selection: ➢ '0': All Segments ➢ '1': Segment 1 ➢ … ➢ '8': Segment 8
Command Data	3-6	All	16-Bit Integer	Intensity value in the range from 0 to 1000. Intensity in % is calculated based on the following formula: $I_{\%} = Value * 10$ Min.: 0.0 % Max.: 100.0 %
End Of Message	7	All	';'	Message Terminator

Table 6: Individual Intensity – Write Request

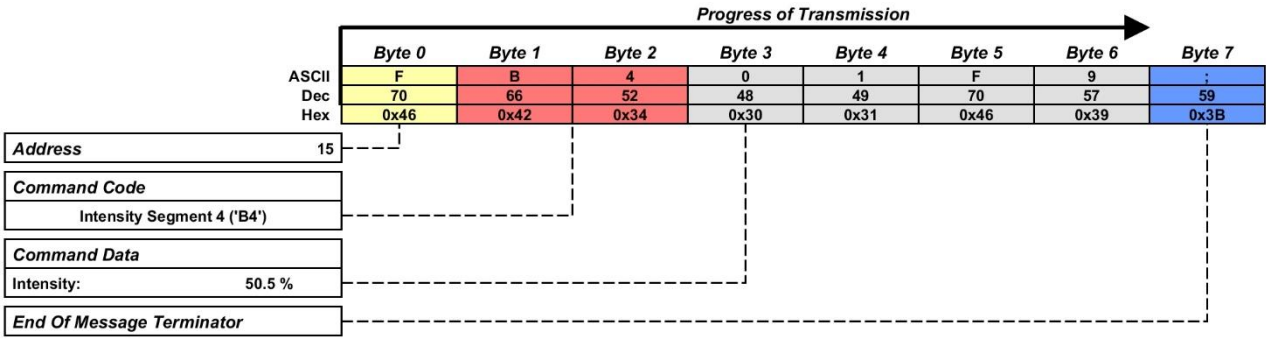

Figure 9: Individual Intensity – Write Request Example

4.1.2.2. Read Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1	All	'B'	Individual Intensity Command
	2	All	4-Bit Integer [0;8]	Individual Segment Selection: ➢ '0': All Segments ➢ '1': Segment 1 ➢ … ➢ '8': Segment 8
Command Data	3	All	'?'	Read Request ID
End Of Message	4	All	';'	Message Terminator

Table 7: Individual Intensity – Read Request

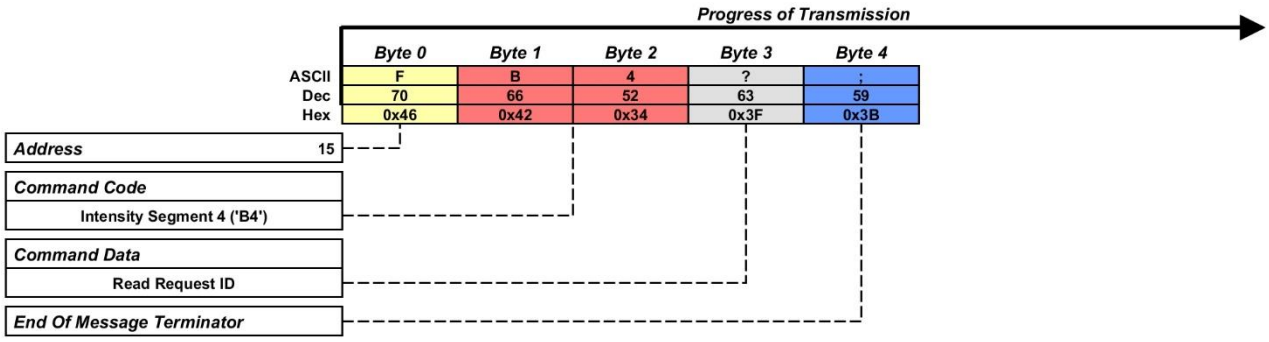

Figure 10: Individual Intensity – Read Request Example

4.1.2.3. Standard Response

The following table summarizes and describes the complete command response.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1 2	All All	'B' 4-Bit Integer [0;8]	Individual Intensity Command Individual Segment Selection: ➢ '0': All Segments ➢ '1': Segment 1 ➢ … ➢ '8': Segment 8
Command Data	3-6	All	16-Bit Integer	Intensity value in the range from 0 to 1000. Intensity in % is calculated based on the following formula: $I_{\%} = Value * 10$ Min.: 0.0 % Max.: 100.0 %
End Of Message	7	All	';'	Message Terminator

Table 8: Individual Intensity – Standard Response

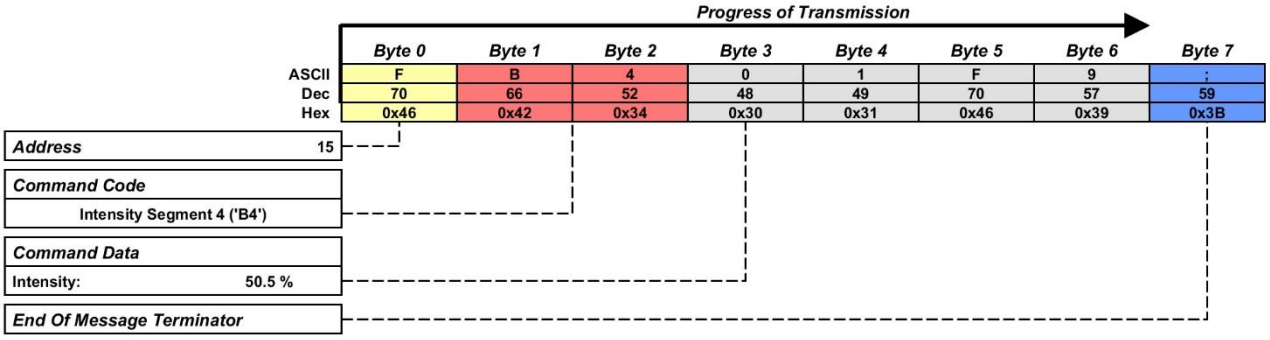

Figure 11: Individual Intensity – Standard Response Example

4.2 Segment Pattern

This sub chapter specifies and describes all commands regarding the segment pattern.

4.2.1 Segment States

This command is used to get or set the segments of the connected ring light that shall be active.

4.2.1.1. Write Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'SC'	Segment States Command
Command Data	3-6	All	16-Bit Integer	Individual Segment State: ➢ Bit 0: Segment 1 (0: Inactive / 1: Active) ➢ … ➢ Bit 7: Segment 8 (0: Inactive / 1: Active) ➢ Bit 8-15: Reserved (Shall be 0)
End Of Message	7	All	';'	Message Terminator

Table 9: Segment States – Write Request

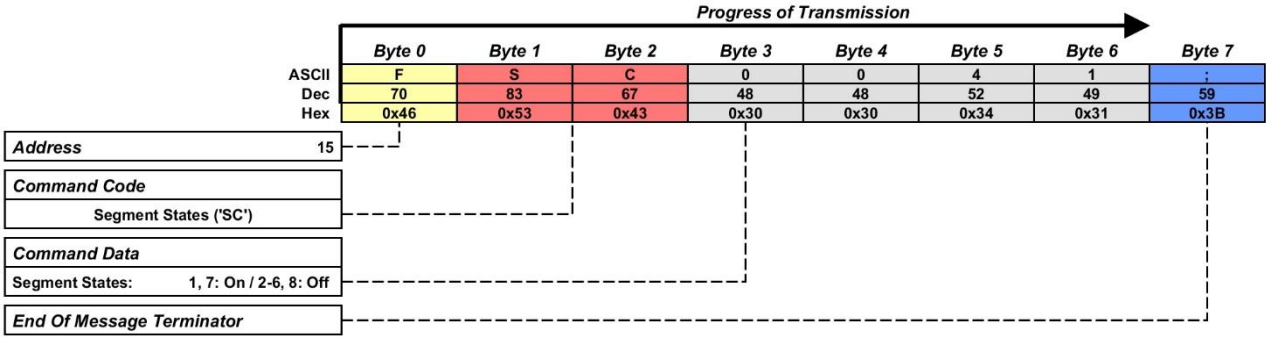

Figure 12: Segment States – Write Request Example

4.2.1.2. Read Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'SC'	Segment States Command
Command Data	3	All	'?'	Read Request ID
End Of Message	4	All	';'	Message Terminator

Table 10: Segment States – Read Request

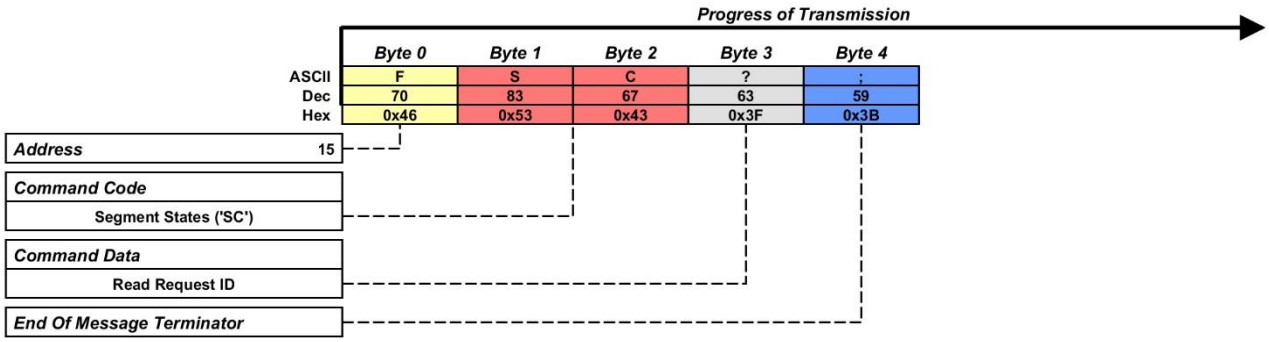

Figure 13: Segment States – Read Request Example

4.2.1.3. Standard Response

The following table summarizes and describes the complete command response.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'SC'	Segment States Command
Command Data	3-6	All	16-Bit Integer	Individual Segment State: ➢ Bit 0: Segment 1 (0: Inactive / 1: Active) ➢ … ➢ Bit 7: Segment 8 (0: Inactive / 1: Active) ➢ Bit 8-15: Reserved (Shall be 0)
End Of Message	7	All	';'	Message Terminator

Table 11: Segment States – Standard Response

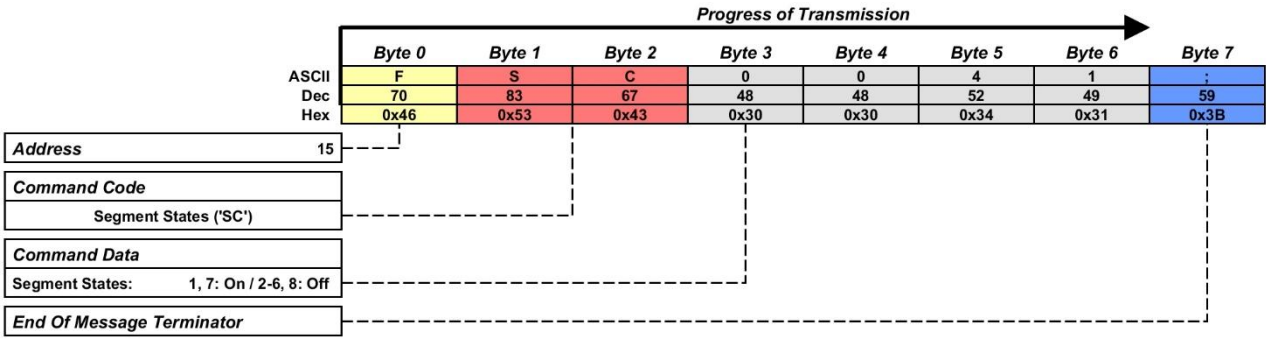

Figure 14: Segment States – Standard Response Example

4.3 Segment Rotation

This sub chapter specifies and describes all commands regarding the rotation of the current segment pattern.

4.3.1 Rotate Manual

This command is used to rotate the current segment pattern of the connected ring light one step clockwise or counterclockwise.

4.3.1.1. Write Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'RT'	Rotate Manual Command
Command Data	3-6	All	16-Bit Integer	Rotation Direction: ➢ 0x0001: Clockwise ➢ 0x0002: Counterclockwise
End Of Message	7	All	';'	Message Terminator

Table 12: Rotate Manual – Write Request

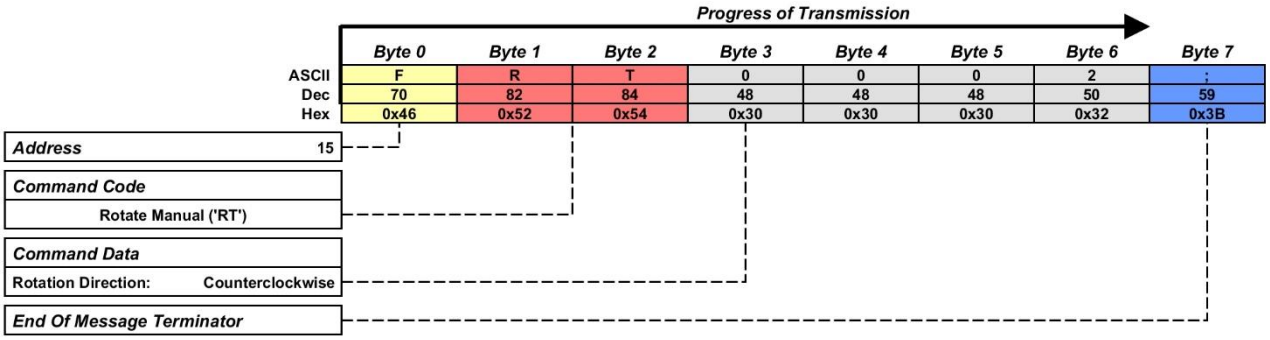

Figure 15: Rotate Manual – Write Request Example

4.3.1.2. Read Request

Read requests are not allowed for this command.

4.3.1.3. Standard Response

The following table summarizes and describes the complete command response.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'RT'	Rotate Manual Command
Command Data	3-6	All	16-Bit Integer	Rotation Direction: ➢ 0x0001: Clockwise ➢ 0x0002: Counterclockwise
End Of Message	7	All	';'	Message Terminator

Table 13: Rotate Manual – Standard Response

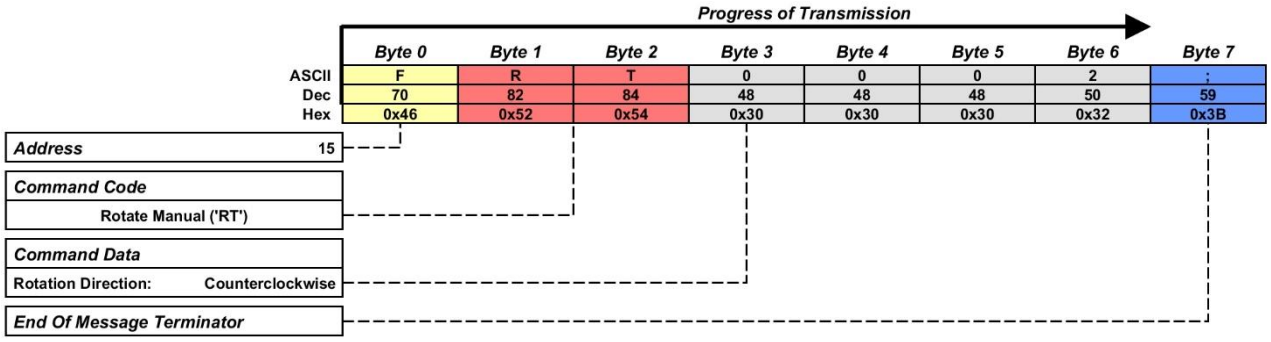

Figure 16: Rotate Manual – Standard Response Example

4.3.2 Rotate Automatic

This command is used to activate or deactivate the clockwise or counterclockwise automatic rotation of the current segment pattern of the connected ring light or to get the current rotation mode.

4.3.2.1. Write Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'RA'	Rotate Automatic Command
Command Data	3-6	All	16-Bit Integer	Rotation Mode: ➢ 0x0000: Off ➢ 0x0001: Clockwise ➢ 0x0002: Counterclockwise
End Of Message	7	All	';'	Message Terminator

Table 14: Rotate Automatic – Write Request

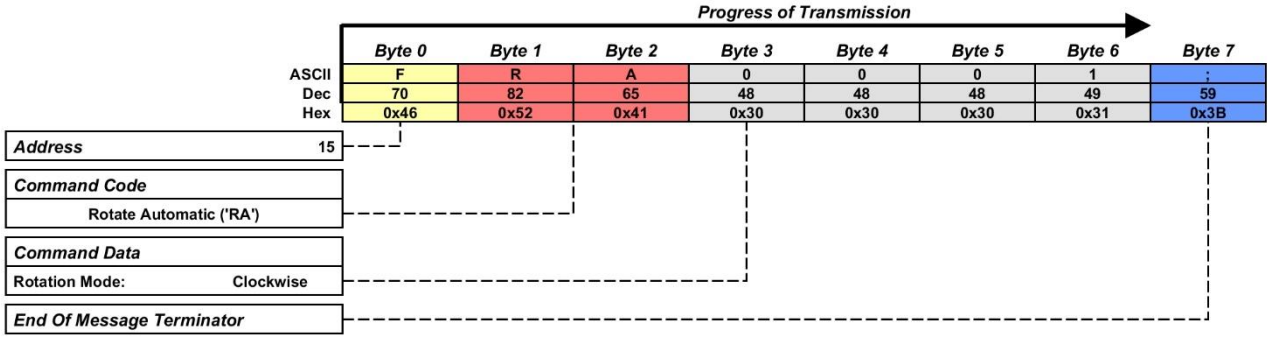

Figure 17: Rotate Automatic – Write Request Example

4.3.2.2. Read Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'RA'	Rotate Automatic Command
Command Data	3	All	'?'	Read Request ID
End Of Message	4	All	';'	Message Terminator

Table 15: Rotate Automatic – Read Request

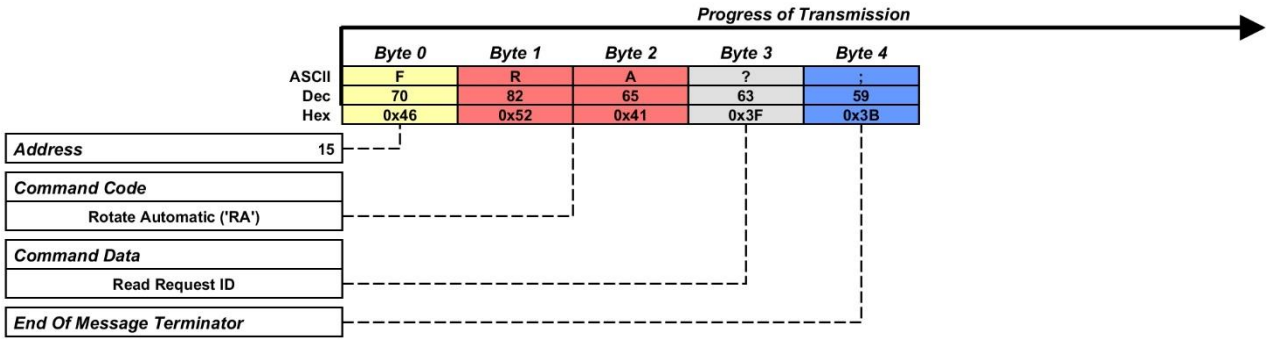

Figure 18: Rotate Automatic – Read Request Example

4.3.2.3. Standard Response

The following table summarizes and describes the complete command response.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'RA'	Rotate Automatic Command
Command Data	3-6	All	16-Bit Integer	Rotation Mode: ➢ 0x0000: Off ➢ 0x0001: Clockwise ➢ 0x0002: Counterclockwise
End Of Message	7	All	';'	Message Terminator

Table 16: Rotate Automatic – Standard Response

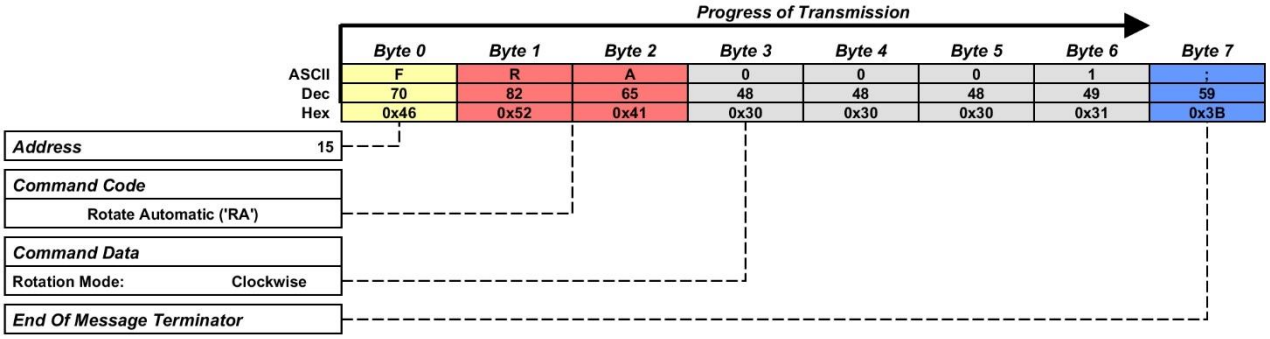

Figure 19: Rotate Automatic – Standard Response Example

4.3.3 Rotation Speed

This command is used to get or set the speed for the automatic segment rotation of the connected ring light.

4.3.3.1. Write Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'RV'	Rotation Speed Command
Command Data	3-6	All	16-Bit Integer	Speed value in the range from 1 to 2^{16}-1. Speed in µs per segment step is calculated based on the following formula: $V_{\mu s/Step} = Value * 10$ Min.: 10 µs Max.: 655.35 ms
End Of Message	7	All	';'	Message Terminator

Table 17: Rotation Speed – Write Request

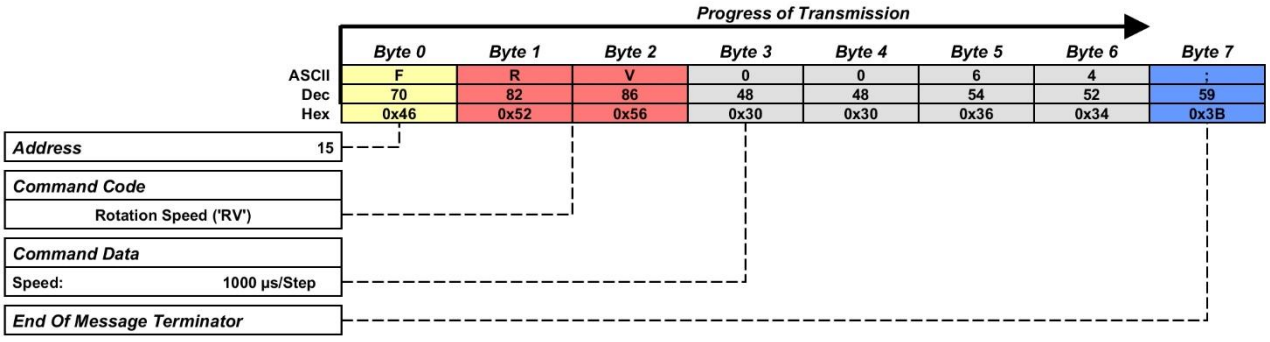

Figure 20: Rotation Speed – Write Request Example

4.3.3.2. Read Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'RV'	Rotation Speed Command
Command Data	3	All	'?'	Read Request ID
End Of Message	4	All	';'	Message Terminator

Table 18: Rotation Speed – Read Request

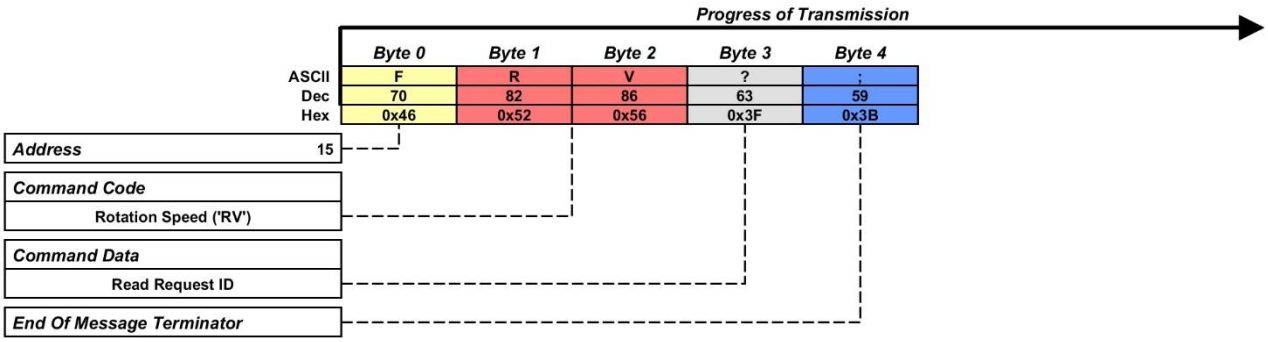

Figure 21: Rotation Speed – Read Request Example

4.3.3.3. Standard Response

The following table summarizes and describes the complete command response.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'RV'	Rotation Speed Command
Command Data	3-6	All	16-Bit Integer	Speed value in the range from 1 to 2^{16}-1. Speed in µs per segment step is calculated based on the following formula: $V_{\mu s/Step} = Value * 10$ Min.: 10 µs Max.: 655.35 ms
End Of Message	7	All	';'	Message Terminator

Table 19: Rotation Speed – Standard Response

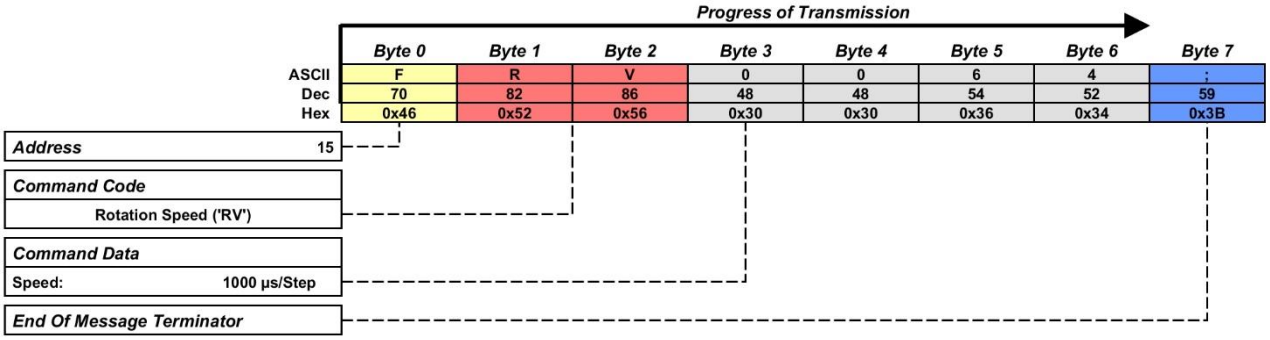

Figure 22: Rotation Speed – Standard Response Example

4.4 Shutter Control

This sub chapter specifies and describes all commands regarding the shutter.

4.4.1 Shutter

This command is used to activate or deactivate the shutter for the connected ring light or to get the current shutter state.

4.4.1.1. Write Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'SH'	Shutter Command
Command Data	3-6	All	16-Bit Integer	Shutter State: ➢ 0x0000: Off ➢ 0x0001: On
End Of Message	7	All	';'	Message Terminator

Table 20: Shutter – Write Request

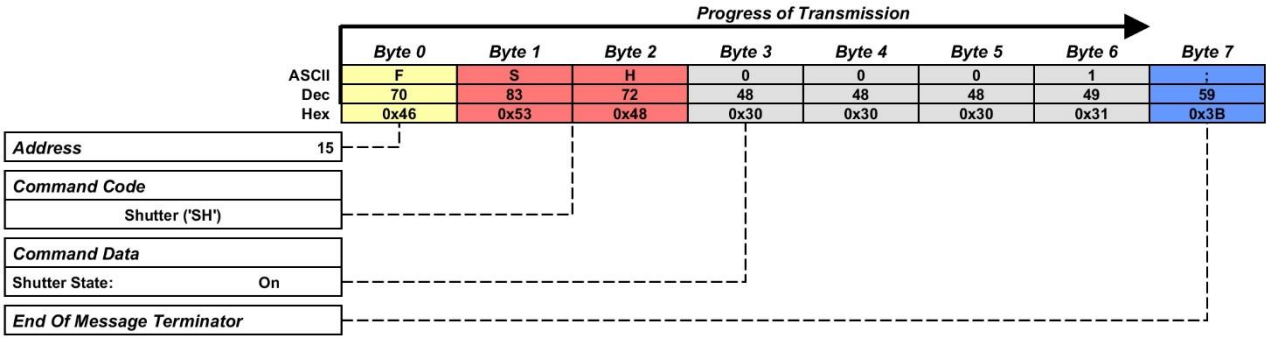

Figure 23: Shutter – Write Request Example

4.4.1.2. Read Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'SH'	Shutter Command
Command Data	3	All	'?'	Read Request ID
End Of Message	4	All	';'	Message Terminator

Table 21: Shutter – Read Request

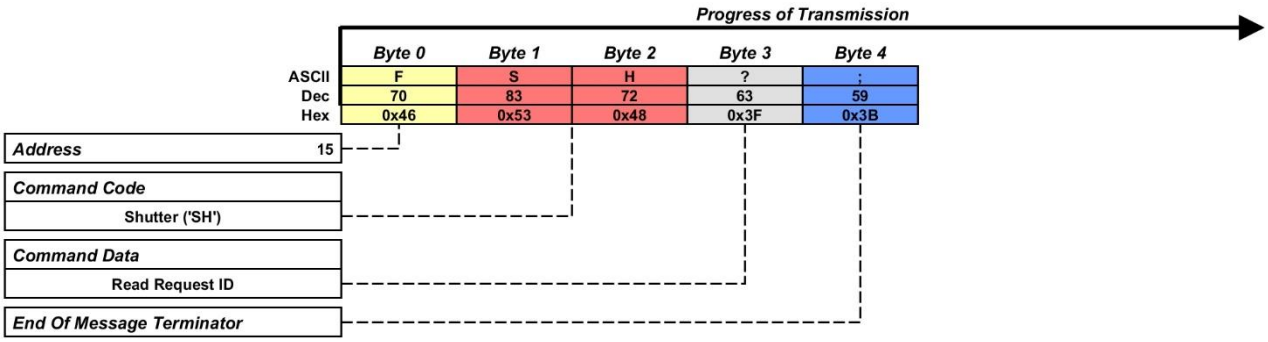

Figure 24: Shutter – Read Request Example

4.4.1.3. Standard Response

The following table summarizes and describes the complete command response.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'SH'	Shutter Command
Command Data	3-6	All	16-Bit Integer	Shutter State: ➢ 0x0000: Off ➢ 0x0001: On
End Of Message	7	All	';'	Message Terminator

Table 22: Shutter – Standard Response

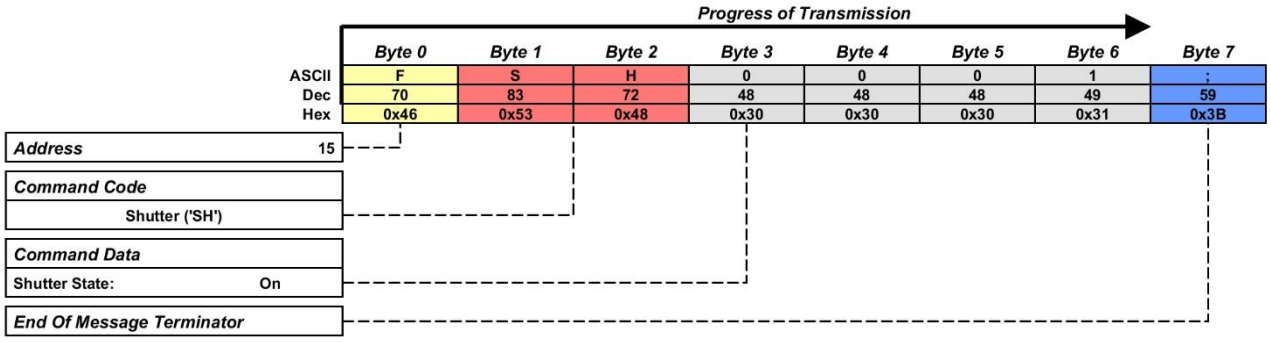

Figure 25: Shutter – Standard Response Example

4.5 Strobe Control

This sub chapter specifies and describes all commands regarding the strobe light.

4.5.1 Strobe

This command is used to activate or deactivate the strobe light for the connected ring light or to get the current strobe light state.

4.5.1.1. Write Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'ST'	Strobe Command
Command Data	3-6	All	16-Bit Integer	Strobe Light State: ➢ 0x0000: Off ➢ 0x0001: On
End Of Message	7	All	';'	Message Terminator

Table 23: Strobe – Write Request

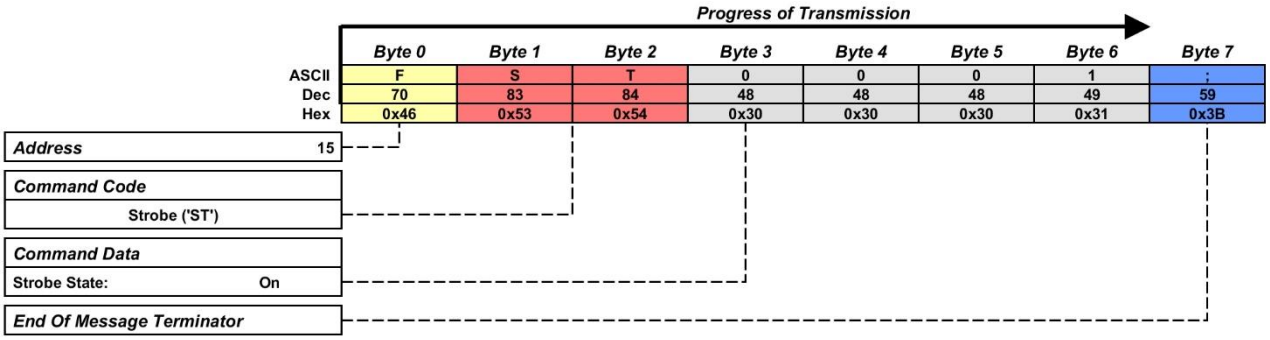

Figure 26: Strobe – Write Request Example

4.5.1.2. Read Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'ST'	Strobe Command
Command Data	3	All	'?'	Read Request ID
End Of Message	4	All	';'	Message Terminator

Table 24: Strobe – Read Request

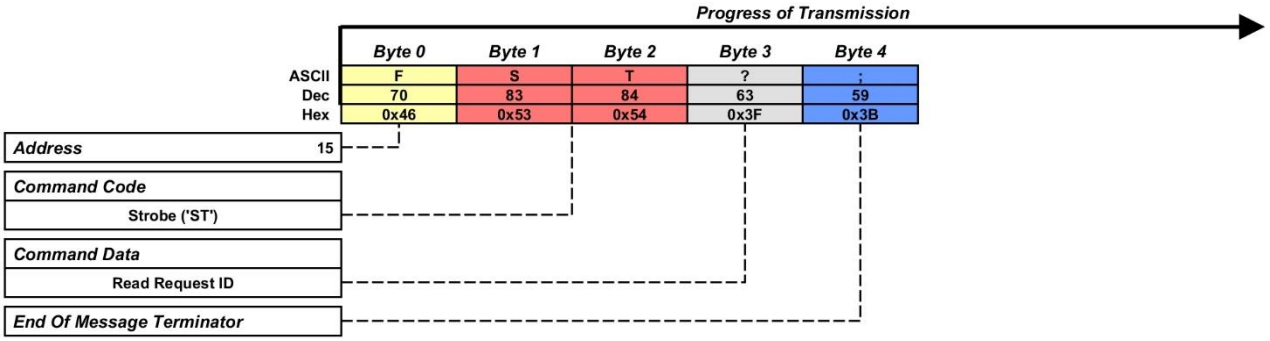

Figure 27: Strobe – Read Request Example

4.5.1.3. Standard Response

The following table summarizes and describes the complete command response.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'ST'	Strobe Command
Command Data	3-6	All	16-Bit Integer	Strobe Light State: ➢ 0x0000: Off ➢ 0x0001: On
End Of Message	7	All	';'	Message Terminator

Table 25: Strobe – Standard Response

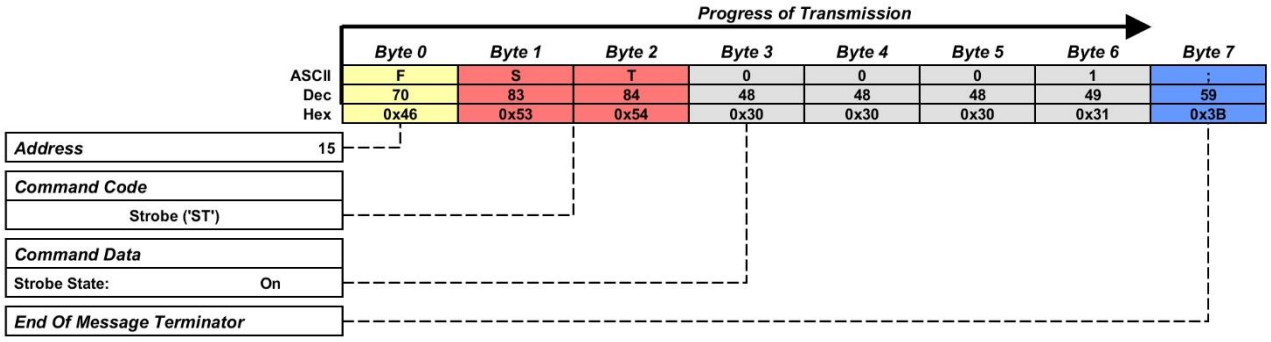

Figure 28: Strobe – Standard Response Example

4.5.2 Strobe Pulse Period

This command is used to get or set the strobe light pulse period for the connected ring light.

4.5.2.1. Write Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'SF'	Strobe Pulse Period Command
Command Data	3-6	All	16-Bit Integer	Period value in the range from 1 to 2^{16}-1. Period in µs is calculated based on the following formula: $T_{\mu s} = Value * 10$ Min.: 10 µs Max.: 655.35 ms Frequency in Hz is calculated based on the following formula: $F_{Hz} = \frac{1}{T_{\mu s}} * 10^6$ Max.: 100 kHz Min.: 1.526 Hz
End Of Message	7	All	';'	Message Terminator

Table 26: Strobe Pulse Period – Write Request

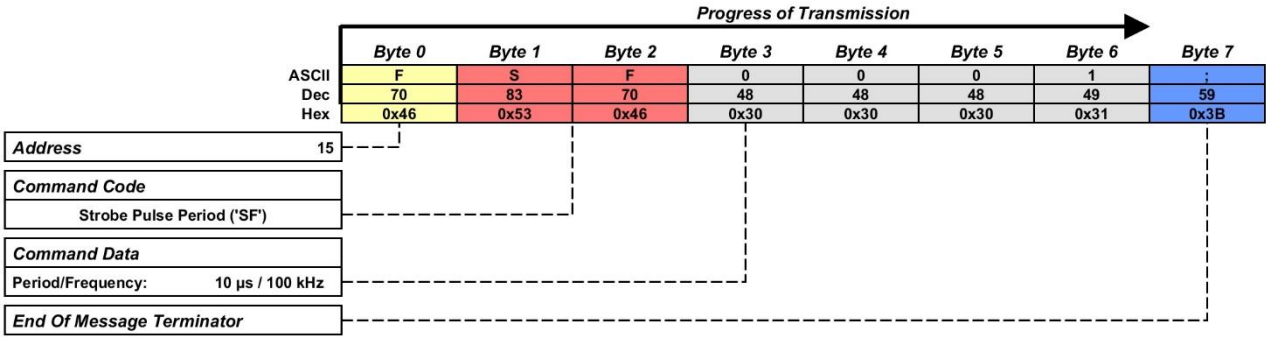

Figure 29: Strobe Pulse Period – Write Request Example

4.5.2.2. Read Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'SF'	Strobe Pulse Period Command
Command Data	3	All	'?'	Read Request ID
End Of Message	4	All	';'	Message Terminator

Table 27: Strobe Pulse Period – Read Request

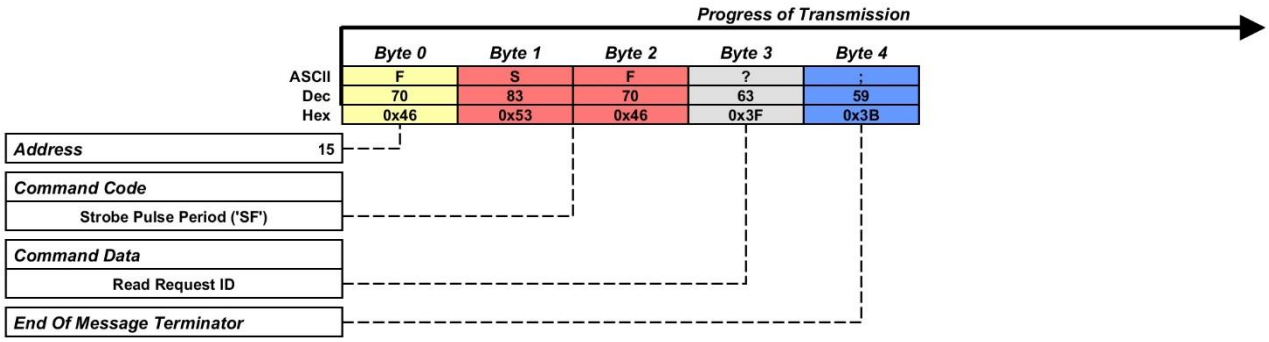

Figure 30: Strobe Pulse Period – Read Request Example

4.5.2.3. Standard Response

The following table summarizes and describes the complete command response.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'SF'	Strobe Pulse Period Command
Command Data	3-6	All	16-Bit Integer	Period value in the range from 1 to 2^{16}-1. Period in µs is calculated based on the following formula: $T_{\mu s} = Value * 10$ Min.: 10 µs Max.: 655.35 ms Frequency in Hz is calculated based on the following formula: $F_{Hz} = \frac{1}{T_{\mu s}} * 10^6$ Max.: 100 kHz Min.: 1.526 Hz
End Of Message	7	All	';'	Message Terminator

Table 28: Strobe Pulse Period – Standard Response

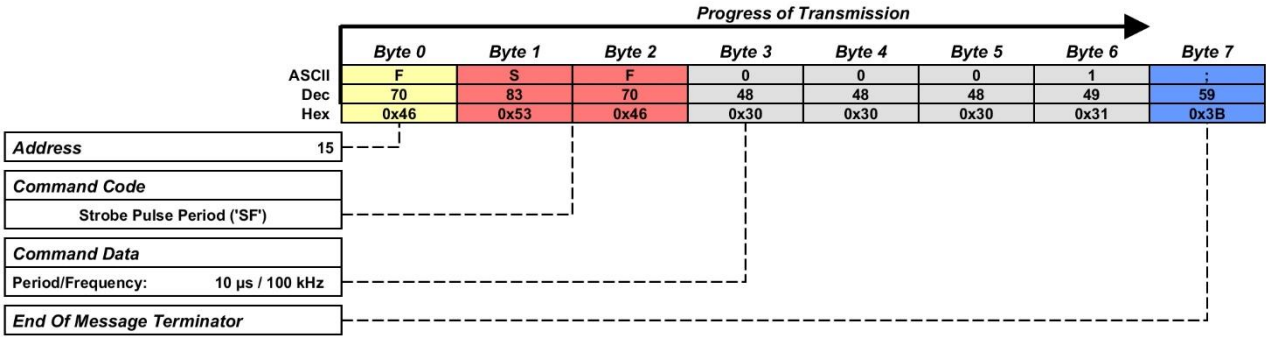

Figure 31: Strobe Pulse Period – Standard Response Example

4.5.3 Strobe Pulse Duty Cycle

This command is used to get or set the strobe light pulse duty cycle for the connected ring light.

4.5.3.1. Write Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'SD'	Strobe Pulse Duty Cycle Command
Command Data	3-6	All	16-Bit Integer	Duty cycle value in the range from 1 to 100. Duty cycle in % is equal to the duty cycle value: $DC_{\%} = Value$ Min.: 1 % Max.: 100 %
End Of Message	7	All	';'	Message Terminator

Table 29: Strobe Pulse Duty Cycle – Write Request

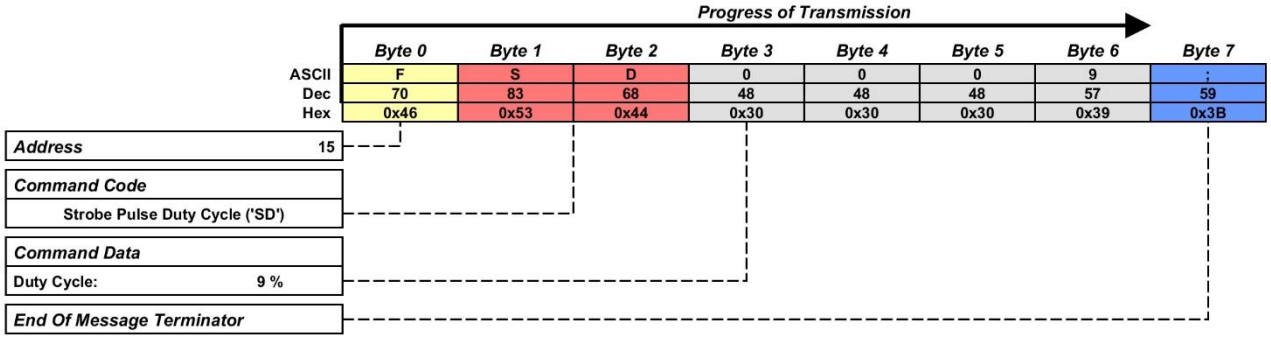

Figure 32: Strobe Pulse Duty Cycle – Write Request Example

4.5.3.2. Read Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'SD'	Strobe Pulse Duty Cycle Command
Command Data	3	All	'?'	Read Request ID
End Of Message	4	All	';'	Message Terminator

Table 30: Strobe Pulse Duty Cycle – Read Request

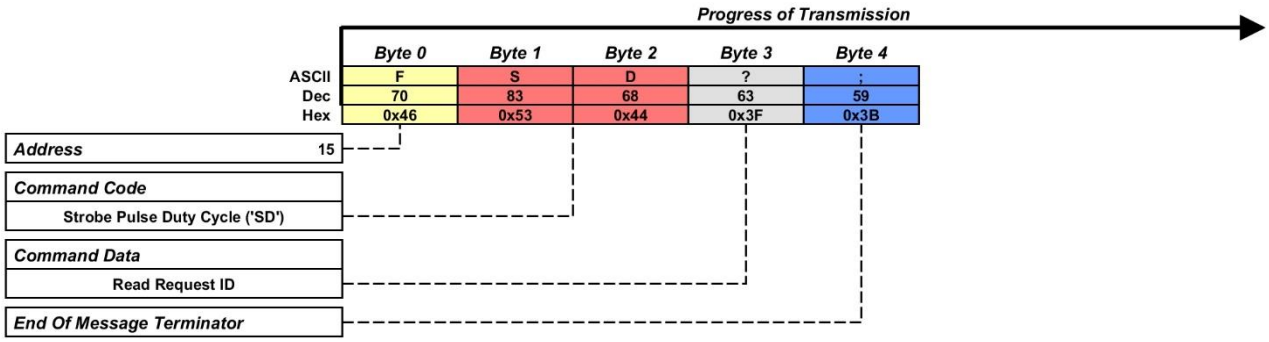

Figure 33: Strobe Pulse Duty Cycle – Read Request Example

4.5.3.3. Standard Response

The following table summarizes and describes the complete command response.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'SD'	Strobe Pulse Duty Cycle Command
Command Data	3-6	All	16-Bit Integer	Duty cycle value in the range from 1 to 100. Duty cycle in % is equal to the duty cycle value: $DC_{\%} = Value$ Min.: 1 % Max.: 100 %
End Of Message	7	All	';'	Message Terminator

Table 31: Strobe Pulse Duty Cycle – Standard Response

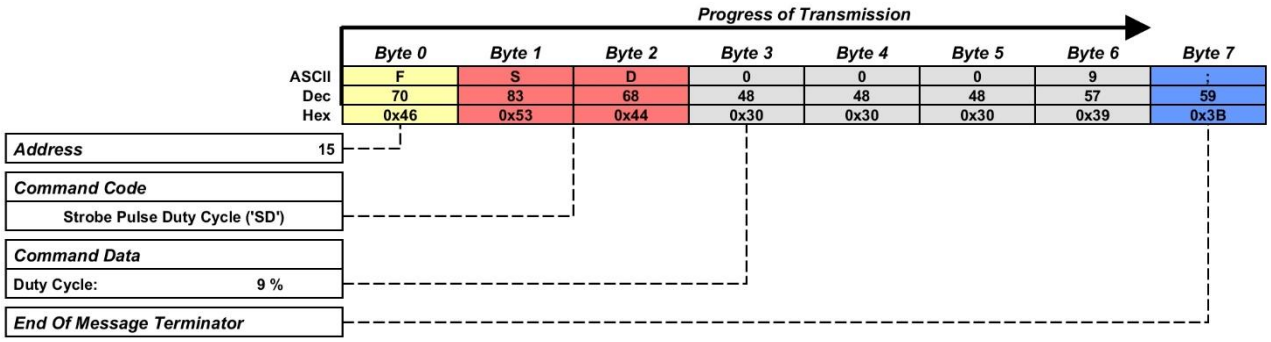

Figure 34: Strobe Pulse Duty Cycle – Standard Response Example

4.6 External Trigger Configuration

This sub chapter specifies and describes all commands regarding the configuration for the external trigger input.

4.6.1 Trigger Pause

This command is used to get or set the minimum pause time between the detection of an external trigger signal and the recognition of the next external trigger signal.

4.6.1.1. Write Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'TP'	Trigger Pause Command
Command Data	3-6	All	16-Bit Integer	Pause time value in the range from 1 to 2^{16}-1. Pause time in µs is calculated based on the following formula: $Tp_{\mu s} = Value * 100$ Min.: 100 µs Max.: 6.5535 s
End Of Message	7	All	';'	Message Terminator

Table 32: Trigger Pause – Write Request

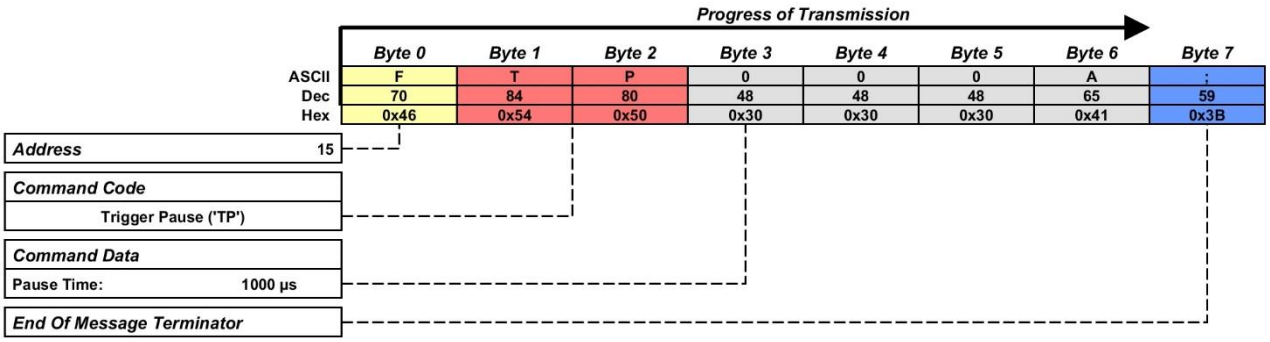

Figure 35: Trigger Pause – Write Request Example

4.6.1.2. Read Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'TP'	Trigger Pause Command
Command Data	3	All	'?'	Read Request ID
End Of Message	4	All	';'	Message Terminator

Table 33: Trigger Pause – Read Request

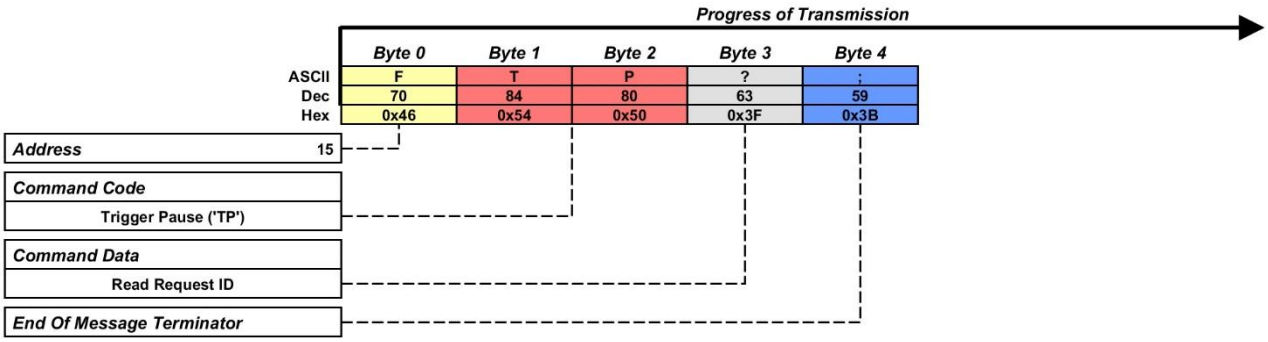

Figure 36: Trigger Pause – Read Request Example

4.6.1.3. Standard Response

The following table summarizes and describes the complete command response.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'TP'	Trigger Pause Command
Command Data	3-6	All	16-Bit Integer	Pause time value in the range from 1 to 2^{16}-1. Pause time in µs is calculated based on the following formula: $Tp_{\mu s} = Value * 100$ Min.: 100 µs Max.: 6.5535 s
End Of Message	7	All	';'	Message Terminator

Table 34: Trigger Pause – Standard Response

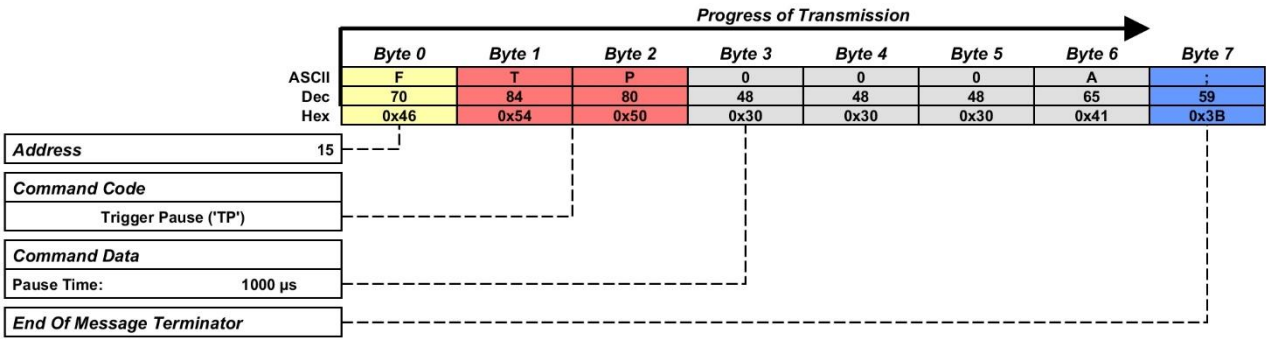

Figure 37: Trigger Pause – Standard Response Example

4.6.2 Trigger Configuration

This command is used to get or set the reaction to an external trigger signal.

4.6.2.1. Write Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'TR'	Trigger Configuration Command
Command Data	3	All	4-Bit Integer	Trigger Mode: ➢ 0x0: Off ➢ 0x1: Toggle Shutter State ➢ 0x2: Rotate Manual ➢ 0x3: Rotate Automatic ➢ 0x4: Toggle Strobe Light State ➢ 0x5: Increase Intensity Relative ➢ 0x6: Decrease Intensity Relative ➢ 0x7: Rotate + Intensity Pulse
Command Data **Off**	4-6	All	'000'	Fixed
Command Data **Toggle Shutter State**	4-6	All	'000'	Fixed
Command Data **Rotate Manual**	4	All	'0'	Fixed
	5	All	4-Bit Integer	Rotation Direction: ➢ 0x1: Clockwise ➢ 0x2: Counterclockwise
	6	All	4-Bit Integer	Segment Steps: ➢ 0x1: 1 Segment Step ➢ … ➢ 0x7: 7 Segment Steps
Command Data **Rotate Automatic**	4	All	4-Bit Integer	Rotation Mode Sequence Step 1: ➢ 0x0: Off ➢ 0x1: Clockwise ➢ 0x2: Counterclockwise
	5	All	4-Bit Integer	Rotation Mode Sequence Step 2: ➢ 0x0: Off ➢ 0x1: Clockwise ➢ 0x2: Counterclockwise
	6	All	4-Bit Integer	Rotation Mode Sequence Step 3: ➢ 0x0: Off ➢ 0x1: Clockwise ➢ 0x2: Counterclockwise
Command Data **Toggle Strobe Light State**	4-6	All	'000'	Fixed

Field	Byte	Bit	Value	Remark
Command Data **Increase Intensity Relative**	4-6	All	12-Bit Integer	Relative intensity value in the range from 1 to 1000. Relative intensity step in % is calculated based on the following formula: $Istep_{\%} = Value * 10$ Min.: 0.1 % Max.: 100.0 % The relative intensity step is applied to all segments individually. If the step results in an intensity that is higher than the absolute maximum intensity of 100 %, the resulting final intensity will be according to the following formula: $Ifinal_{\%} = Icurrent_{\%} + Istep_{\%} - 100\ \%$
Command Data **Decrease Intensity Relative**	4-6	All	12-Bit Integer	Relative intensity value in the range from 1 to 1000. Relative intensity step in % is calculated based on the following formula: $Istep_{\%} = Value * 10$ Min.: 0.1 % Max.: 100.0 % The relative intensity step is applied to all segments individually. If the step results in an intensity that is lower than the absolute minimum intensity of 0 %, the resulting final intensity will be according to the following formula: $Ifinal_{\%} = Icurrent_{\%} - Istep_{\%} + 100\ \%$
Command Data **Rotate + Intensity Pulse**	4	All	'0'	Fixed
	5	All	4-Bit Integer	Rotation Direction: ➢ 0x0: No Rotation ➢ 0x1: Clockwise ➢ 0x2: Counterclockwise
	6	All	4-Bit Integer	Segment Steps: ➢ 0x0: 0 Segment Steps ➢ 0x1: 1 Segment Step ➢ … ➢ 0x7: 7 Segment Steps
	7-10	All	16-Bit Integer	Intensity pulse duration value in the range from 1 to 2^{16}-1. Intensity pulse duration in µs is calculated based on the following formula: $Ipulse_{\mu s} = Value * 10$ ➢ Min.: 10 µs ➢ Max.: 655.35 ms
End Of Message	7/11	All	';'	Message Terminator

Table 35: Trigger Configuration – Write Request

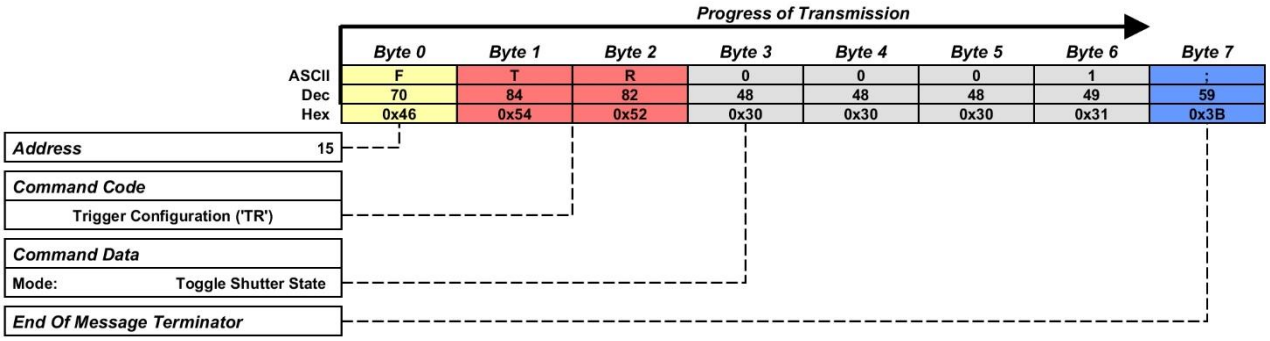

Figure 38: Trigger Configuration – Write Request Example

4.6.2.2. Read Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'TR'	Trigger Configuration Command
Command Data	3	All	'?'	Read Request ID
End Of Message	4	All	';'	Message Terminator

Table 36: Trigger Configuration – Read Request

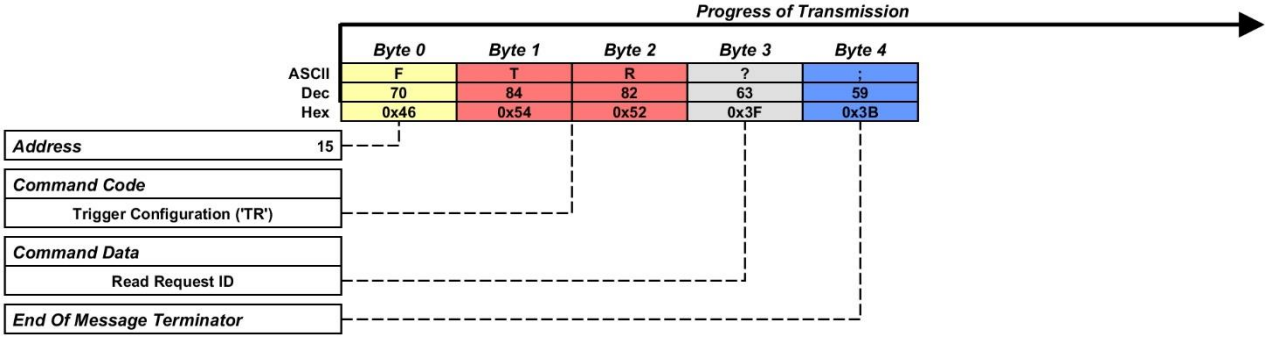

Figure 39: Trigger Configuration – Read Request Example

4.6.2.3. Standard Response

The following table summarizes and describes the complete command response.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'TR'	Trigger Configuration Command
Command Data	3	All	4-Bit Integer	Trigger Mode: ➢ 0x0: Off ➢ 0x1: Toggle Shutter State ➢ 0x2: Rotate Manual ➢ 0x3: Rotate Automatic ➢ 0x4: Toggle Strobe Light State ➢ 0x5: Increase Intensity Relative ➢ 0x6: Decrease Intensity Relative ➢ 0x7: Rotate + Intensity Pulse
Command Data **Off**	4-6	All	'000'	Fixed
Command Data **Toggle Shutter State**	4-6	All	'000'	Fixed
Command Data **Rotate Manual**	4	All	'0'	Fixed
	5	All	4-Bit Integer	Rotation Direction: ➢ 0x1: Clockwise ➢ 0x2: Counterclockwise
	6	All	4-Bit Integer	Segment Steps: ➢ 0x1: 1 Segment Step ➢ … ➢ 0x7: 7 Segment Steps
Command Data **Rotate Automatic**	4	All	4-Bit Integer	Rotation Mode Sequence Step 1: ➢ 0x0: Off ➢ 0x1: Clockwise ➢ 0x2: Counterclockwise
	5	All	4-Bit Integer	Rotation Mode Sequence Step 2: ➢ 0x0: Off ➢ 0x1: Clockwise ➢ 0x2: Counterclockwise
	6	All	4-Bit Integer	Rotation Mode Sequence Step 3: ➢ 0x0: Off ➢ 0x1: Clockwise ➢ 0x2: Counterclockwise
Command Data **Toggle Strobe Light State**	4-6	All	'000'	Fixed

Field	Byte	Bit	Value	Remark
Command Data **Increase Intensity Relative**	4-6	All	12-Bit Integer	Relative intensity value in the range from 1 to 1000. Relative intensity step in % is calculated based on the following formula: $Istep_{\%} = Value * 10$ Min.: 0.1 % Max.: 100.0 % The relative intensity step is applied to all segments individually. If the step results in an intensity that is higher than the absolute maximum intensity of 100 %, the resulting final intensity will be according to the following formula: $Ifinal_{\%} = Icurrent_{\%} + Istep_{\%} - 100\ \%$
Command Data **Decrease Intensity Relative**	4-6	All	12-Bit Integer	Relative intensity value in the range from 1 to 1000. Relative intensity step in % is calculated based on the following formula: $Istep_{\%} = Value * 10$ Min.: 0.1 % Max.: 100.0 % The relative intensity step is applied to all segments individually. If the step results in an intensity that is lower than the absolute minimum intensity of 0 %, the resulting final intensity will be according to the following formula: $Ifinal_{\%} = Icurrent_{\%} - Istep_{\%} + 100\ \%$
Command Data **Rotate + Intensity Pulse**	4	All	'0'	Fixed
	5	All	4-Bit Integer	Rotation Direction: ➢ 0x0: No Rotation ➢ 0x1: Clockwise ➢ 0x2: Counterclockwise
	6	All	4-Bit Integer	Segment Steps: ➢ 0x0: 0 Segment Steps ➢ 0x1: 1 Segment Step ➢ … ➢ 0x7: 7 Segment Steps
	7-10	All	16-Bit Integer	Intensity pulse duration value in the range from 1 to 2^{16}-1. Intensity pulse duration in µs is calculated based on the following formula: $Ipulse_{\mu s} = Value * 10$ ➢ Min.: 10 µs ➢ Max.: 655.35 ms
End Of Message	7/11	All	';'	Message Terminator

Table 37: Trigger Configuration – Standard Response

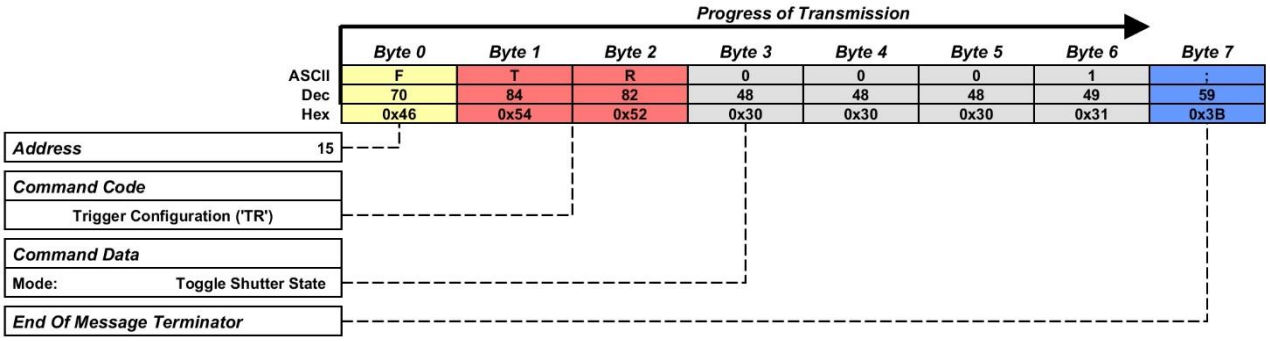

Figure 40: Trigger Configuration – Standard Response Example

4.6.3 Trigger Persistence

This command is used to store the currently active trigger configuration permanently in the non-volatile memory of the MC-D 1100.

4.6.3.1. Write Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'TS'	Trigger Persistence Command
Command Data	N/A	N/A	N/A	Empty
End Of Message	3	All	';'	Message Terminator

Table 38: Trigger Persistence – Write Request

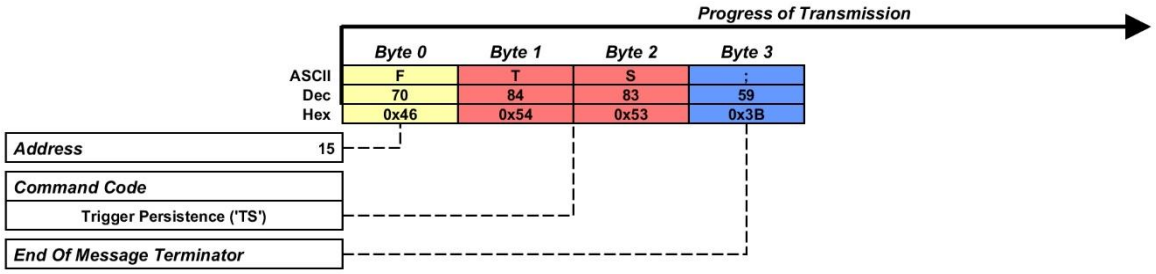

Figure 41: Trigger Persistence – Write Request Example

4.6.3.2. Read Request

Read requests are not allowed for this command.

4.6.3.3. Standard Response

The following table summarizes and describes the complete command response.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'TS'	Trigger Persistence Command
Command Data	3-6	All	16-Bit Integer	Result: ➢ 0x0000: Configuration could not be saved ➢ 0x0001: Configuration saved successfully
End Of Message	7	All	';'	Message Terminator

Table 39: Trigger Persistence – Standard Response

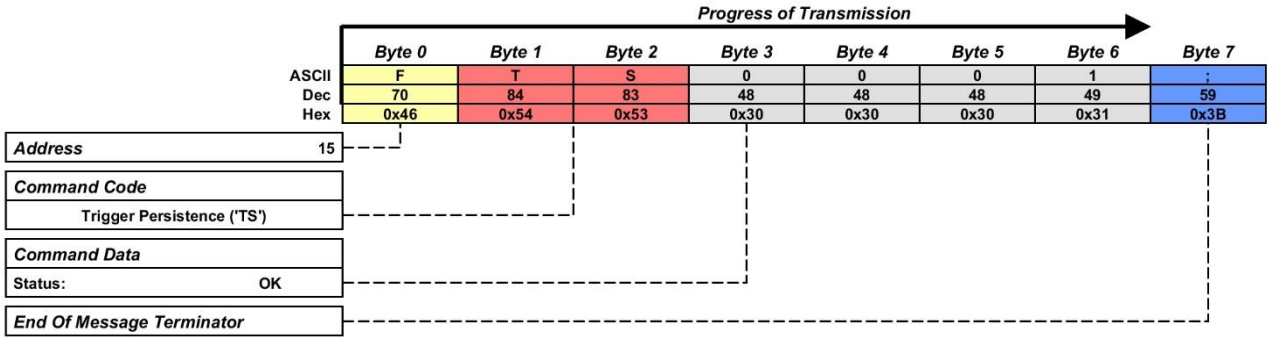

Figure 42: Trigger Persistence – Standard Response Example

5. *Information Commands*

This chapter summarizes the commands used to read information data from the MC-D 1100.
The following table gives a command overview.

Command	Mnemonic	Description
MC-D 1100 Data		
Get Protocol Version	PV	Read the protocol version of the MC-D 1100.
Get Device ID	ID	Read the part description and software version of the MC-D 1100.
Get Software Version	SW	Read the software version of the MC-D 1100.
Get Part Number	PN	Read the part number of the MC-D 1100.
Get Part Description	PD	Read the part description of the MC-D 1100.
Get Serial Number	SN	Read the serial number of the MC-D 1100.
Ring Light Data		
Get RL Part Number	RP	Read the part number of the connected ring light.
Get RL Part Description	RD	Read the part description of the connected ring light.
Get RL Serial Number	RS	Read the serial number of the connected ring light.
Get RL Temperature Status	TE	Read the temperature status of the connected ring light.
Get RL Temperature	TX	Read the temperature of the connected ring light.

Table 40: Information Commands Overview

5.1 MC-D 1100 Data

This sub chapter specifies and describes all commands related to the information regarding the MC-D 1100.

5.1.1 Get Protocol Version

This command is used to read the protocol version of the MC-D 1100.

5.1.1.1. Read Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'PV'	Protocol Version Command
Command Data	3	All	'?'	Read Request ID
End Of Message	4	All	';'	Message Terminator

Table 41: Get Protocol Version – Read Request

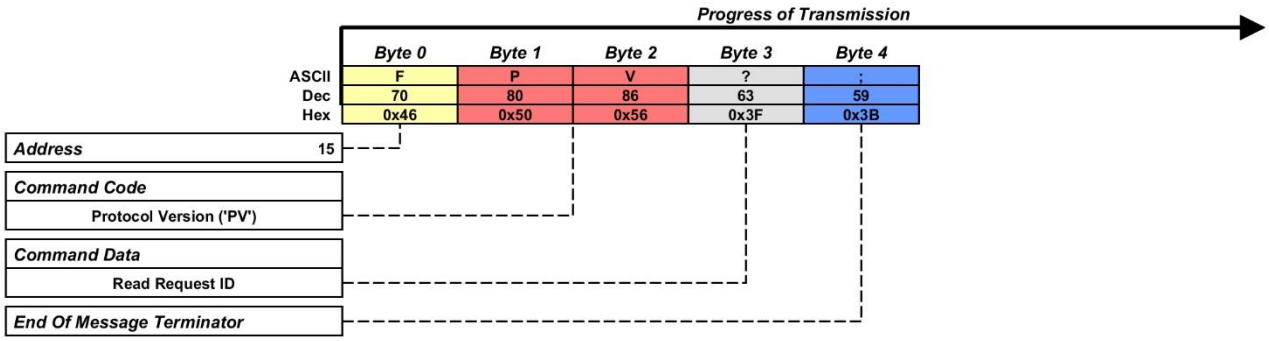

Figure 43: Get Protocol Version – Read Request Example

5.1.1.2. Standard Response

The following table summarizes and describes the complete command response.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'PV'	Protocol Version Command
Command Data	3-4	All	8-Bit Integer	Major Protocol Version
	5-6	All	8-Bit Integer	Minor Protocol Version
End Of Message	7	All	';'	Message Terminator

Table 42: Get Protocol Version – Standard Response

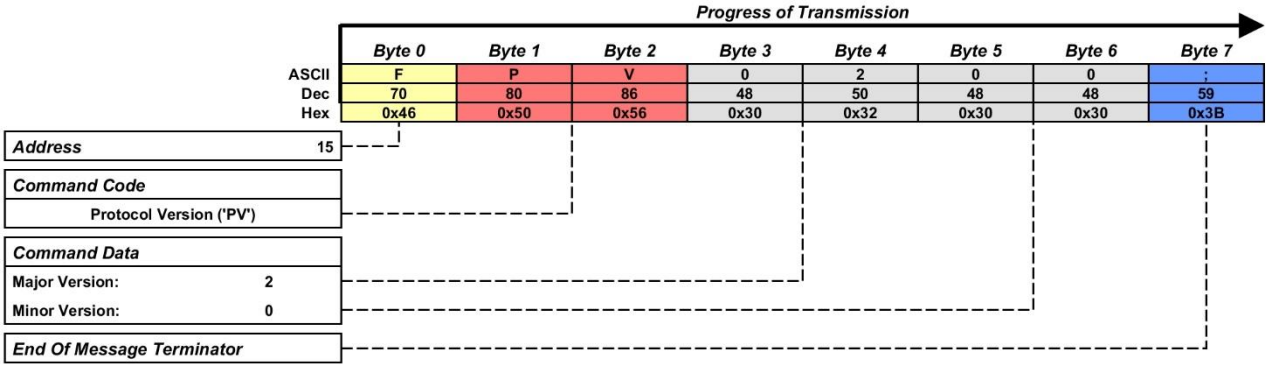

Figure 44: Get Protocol Version – Standard Response Example

5.1.2 Get Device ID

This command is used to read the part description and software version of the MC-D 1100 as a human readable ASCII string.

5.1.2.1. Read Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'ID'	Device ID Command
Command Data	3	All	'?'	Read Request ID
End Of Message	4	All	';'	Message Terminator

Table 43: Get Device ID – Read Request

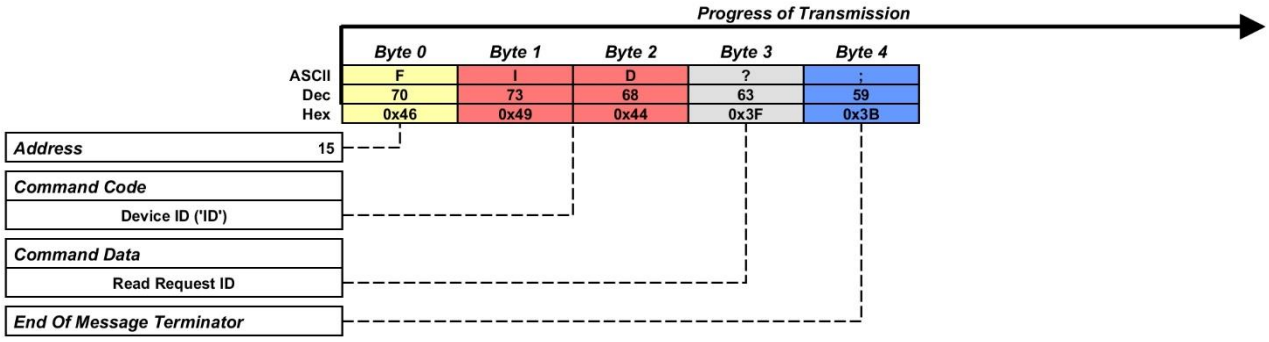

Figure 45: Get Device ID – Read Request Example

5.1.2.2. Standard Response

The following table summarizes and describes the complete command response.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'ID'	Device ID Command
Command Data	3-N	All	X	Max. 96 ASCII data bytes for Part Description & Software Version
End Of Message	N+1	All	';'	Message Terminator

Table 44: Get Device ID – Standard Response

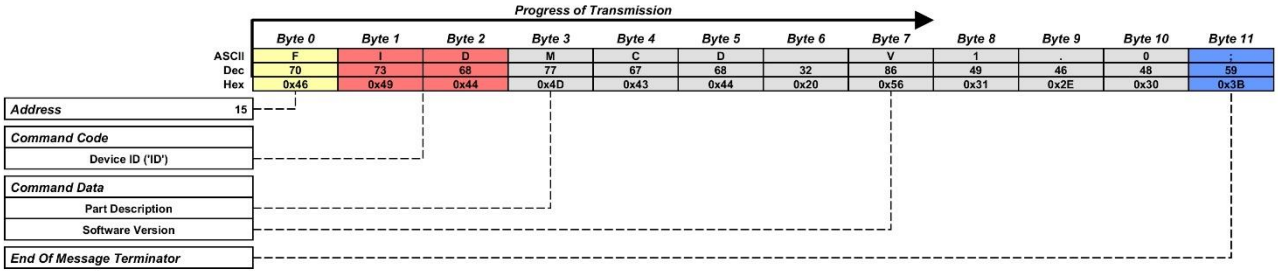

Figure 46: Get Device ID – Standard Response Example

5.1.3 Get Software Version

This command is used to read the software version of the MC-D 1100 as a human readable ASCII string.

5.1.3.1. Read Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'SW'	Software Version Command
Command Data	3	All	'?'	Read Request ID
End Of Message	4	All	';'	Message Terminator

Table 45: Get Software Version – Read Request

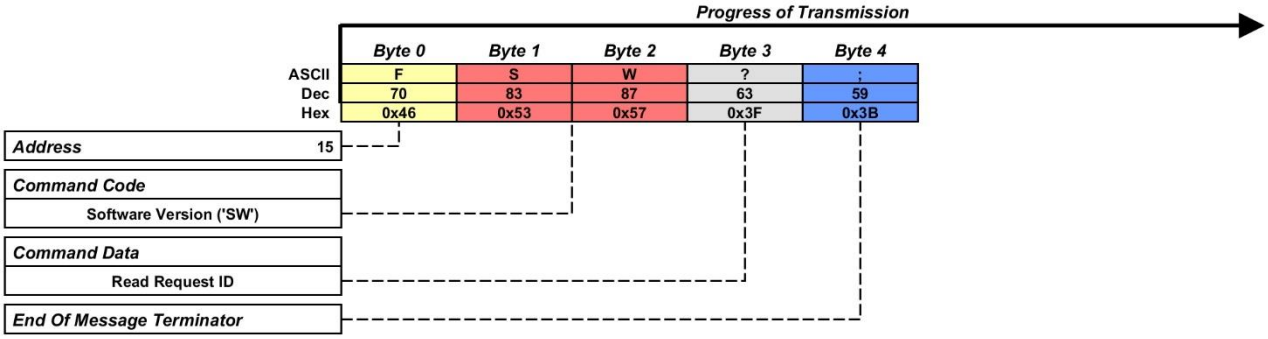

Figure 47: Get Software Version – Read Request Example

5.1.3.2. Standard Response

The following table summarizes and describes the complete command response.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'SW'	Software Version Command
Command Data	3-N	All	X	Max. 32 ASCII data bytes for Software Version
End Of Message	N+1	All	';'	Message Terminator

Table 46: Get Software Version – Standard Response

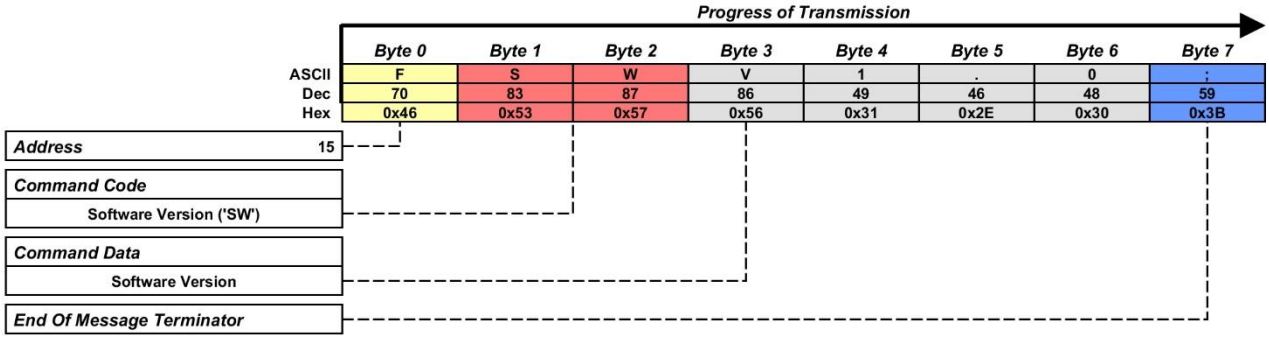

Figure 48: Get Software Version – Standard Response Example

5.1.4 Get Part Number

This command is used to read the part number of the MC-D 1100 as a human readable ASCII string.

5.1.4.1. Read Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'PN'	Part Number Command
Command Data	3	All	'?'	Read Request ID
End Of Message	4	All	';'	Message Terminator

Table 47: Get Part Number – Read Request

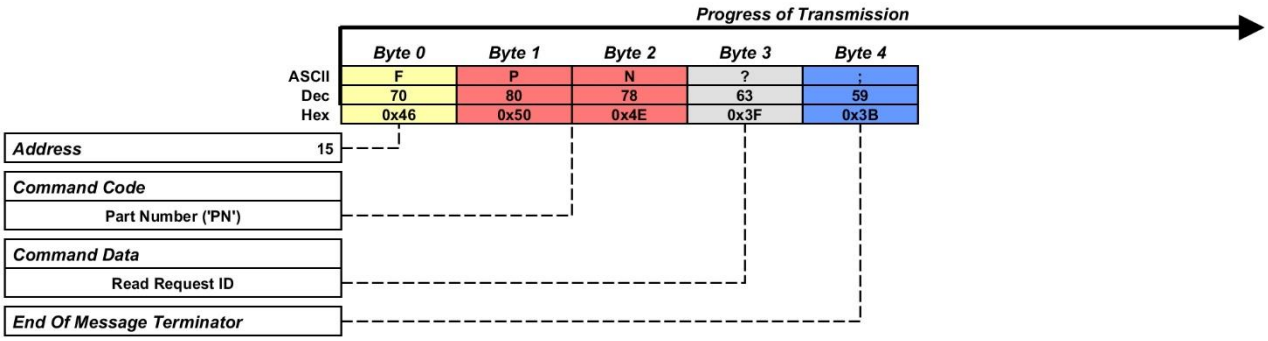

Figure 49: Get Part Number – Read Request Example

5.1.4.2. Standard Response

The following table summarizes and describes the complete command response.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'PN'	Part Number Command
Command Data	3-N	All	X	Max. 32 ASCII data bytes for Part Number
End Of Message	N+1	All	';'	Message Terminator

Table 48: Get Part Number – Standard Response

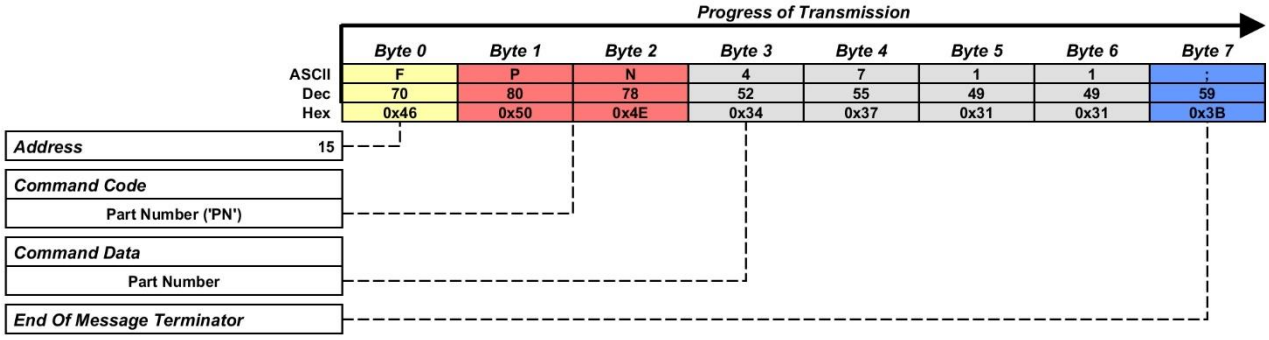

Figure 50: Get Part Number – Standard Response Example

5.1.5 Get Part Description

This command is used to read the part description of the MC-D 1100 as a human readable ASCII string.

5.1.5.1. Read Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'PD'	Part Description Command
Command Data	3	All	'?'	Read Request ID
End Of Message	4	All	';'	Message Terminator

Table 49: Get Part Description – Read Request

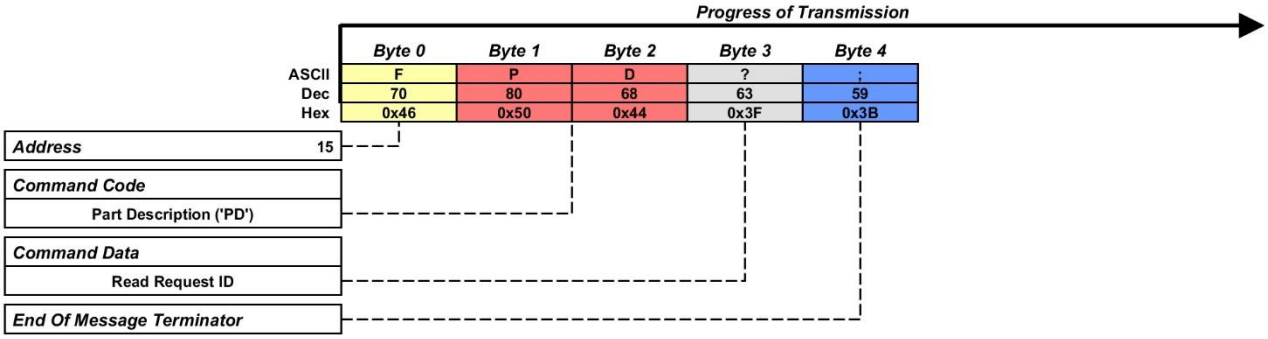

Figure 51: Get Part Description – Read Request Example

5.1.5.2. Standard Response

The following table summarizes and describes the complete command response.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'PD'	Part Description Command
Command Data	3-N	All	X	Max. 64 ASCII data bytes for Part Description
End Of Message	N+1	All	';'	Message Terminator

Table 50: Get Part Description – Standard Response

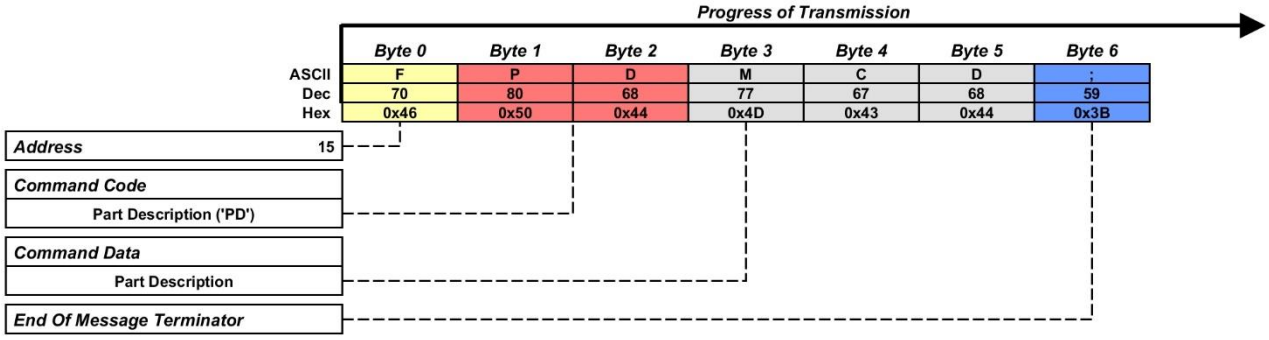

Figure 52: Get Part Description – Standard Response Example

5.1.6 Get Serial Number

This command is used to read the serial number of the MC-D 1100 as a human readable ASCII string.

5.1.6.1. Read Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'SN'	Serial Number Command
Command Data	3	All	'?'	Read Request ID
End Of Message	4	All	';'	Message Terminator

Table 51: Get Serial Number – Read Request

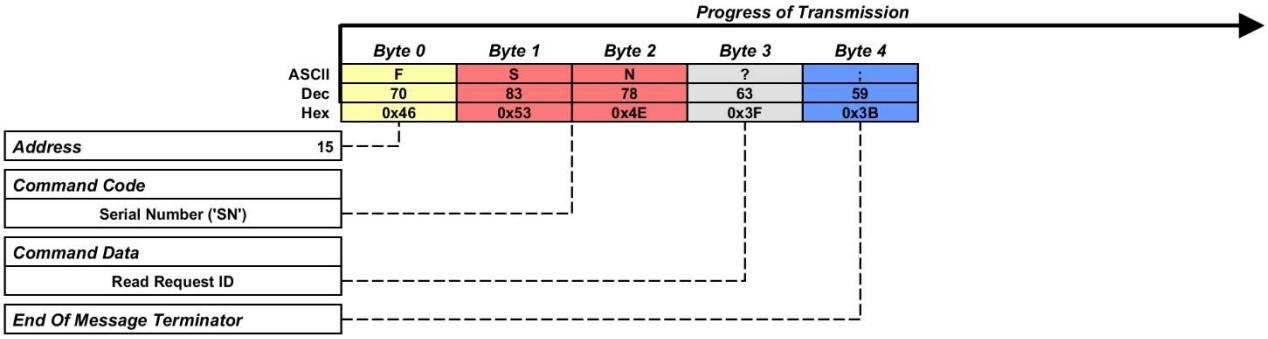

Figure 53: Get Serial Number – Read Request Example

5.1.6.2. Standard Response

The following table summarizes and describes the complete command response.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'SN'	Serial Number Command
Command Data	3-N	All	X	Max. 32 ASCII data bytes for Serial Number
End Of Message	N+1	All	';'	Message Terminator

Table 52: Get Serial Number – Standard Response

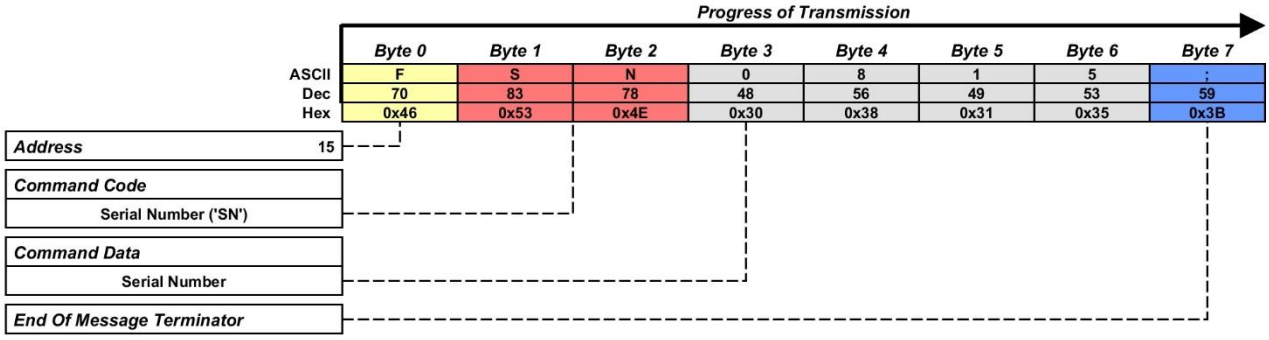

Figure 54: Get Serial Number – Standard Response Example

5.2 **Ring Light Data**

This sub chapter specifies and describes all commands related to the information regarding the connected ring light.

5.2.1 Get RL Part Number

This command is used to read the part number of the connected ring light as a human readable ASCII string.

5.2.1.1. Read Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'RP'	RL Part Number Command
Command Data	3	All	'?'	Read Request ID
End Of Message	4	All	';'	Message Terminator

Table 53: Get RL Part Number – Read Request

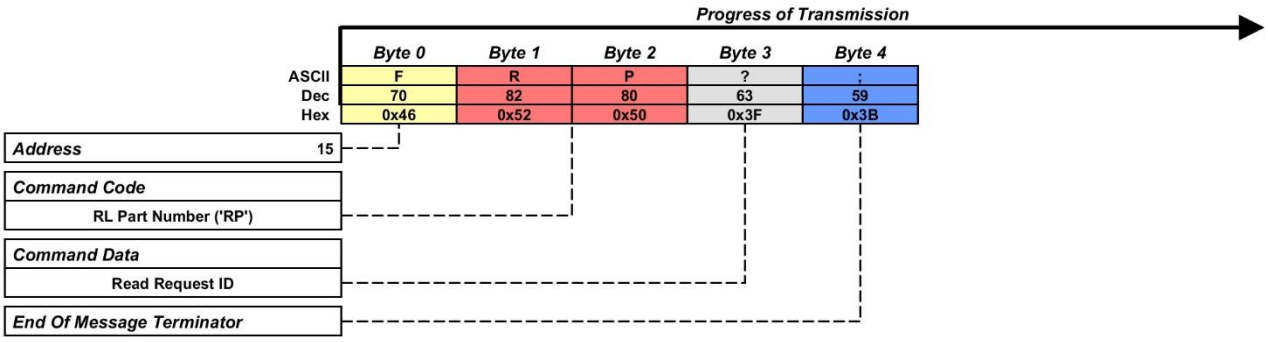

Figure 55: Get RL Part Number – Read Request Example

5.2.1.2. Standard Response

The following table summarizes and describes the complete command response.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'RP'	RL Part Number Command
Command Data	3-N	All	X	Max. 64 ASCII data bytes for RL Part Number/s If no ring light is connected the command data will be completely empty.
End Of Message	N+1	All	';'	Message Terminator

Table 54: Get RL Part Number – Standard Response

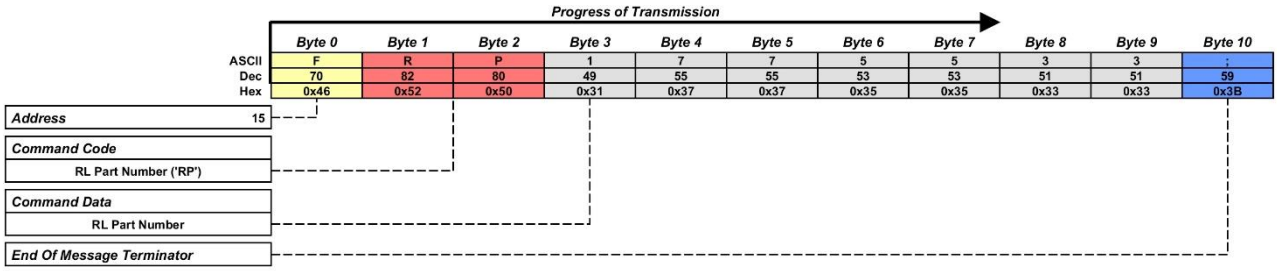

Figure 56: Get RL Part Number – Standard Response Example

5.2.2 Get RL Part Description

This command is used to read the part description of the connected ring light as a human readable ASCII string.

5.2.2.1. Read Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'RD'	RL Part Description Command
Command Data	3	All	'?'	Read Request ID
End Of Message	4	All	';'	Message Terminator

Table 55: Get RL Part Description – Read Request

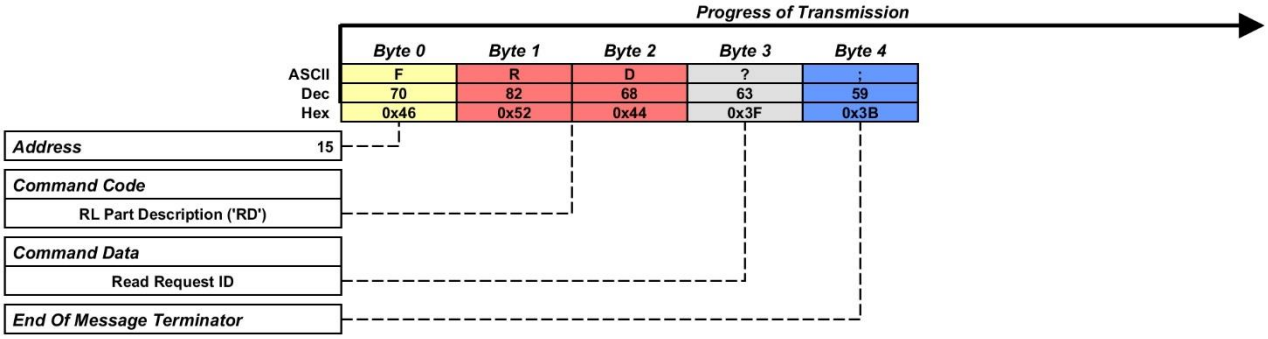

Figure 57: Get RL Part Description – Read Request Example

5.2.2.2. Standard Response

The following table summarizes and describes the complete command response.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'RD'	RL Part Description Command
Command Data	3-N	All	X	Max. 64 ASCII data bytes for RL Part Description/s If no ring light is connected the command data will be completely empty.
End Of Message	N+1	All	';'	Message Terminator

Table 56: Get RL Part Description – Standard Response

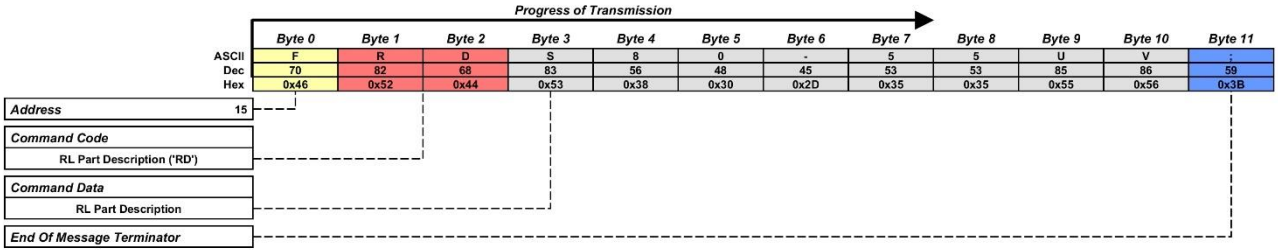

Figure 58: Get RL Part Description – Standard Response Example

5.2.3 Get RL Serial Number

This command is used to read the serial number of the connected ring light as a human readable ASCII string.

5.2.3.1. Read Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'RS'	RL Serial Number Command
Command Data	3	All	'?'	Read Request ID
End Of Message	4	All	';'	Message Terminator

Table 57: Get RL Serial Number – Read Request

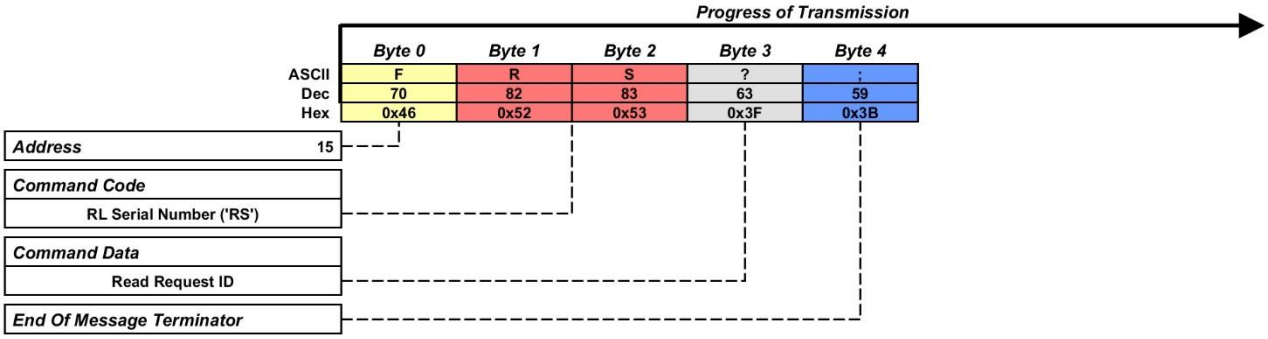

Figure 59: Get RL Serial Number – Read Request Example

5.2.3.2. Standard Response

The following table summarizes and describes the complete command response.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'RS'	RL Serial Number Command
Command Data	3-N	All	X	Max. 32 ASCII data bytes for RL Serial Number If no ring light is connected the command data will be completely empty. If the connected ring light does not support digital reading of the serial number the command data will be 'N/A'.
End Of Message	N+1	All	';'	Message Terminator

Table 58: Get RL Serial Number – Standard Response

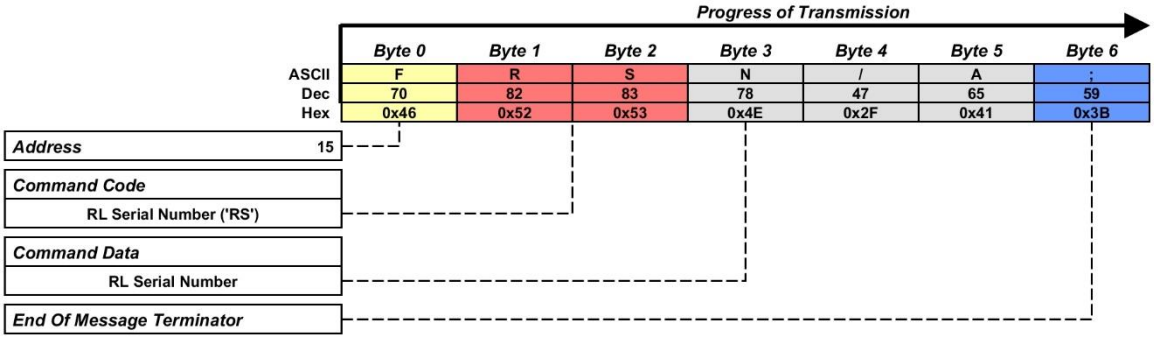

Figure 60: Get RL Serial Number – Standard Response Example

5.2.4 Get RL Temperature Status

This command is used to read the temperature status of the connected ring light.

5.2.4.1. Read Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'TE'	RL Temperature Status Command
Command Data	3	All	'?'	Read Request ID
End Of Message	4	All	';'	Message Terminator

Table 59: Get RL Temperature Status – Read Request

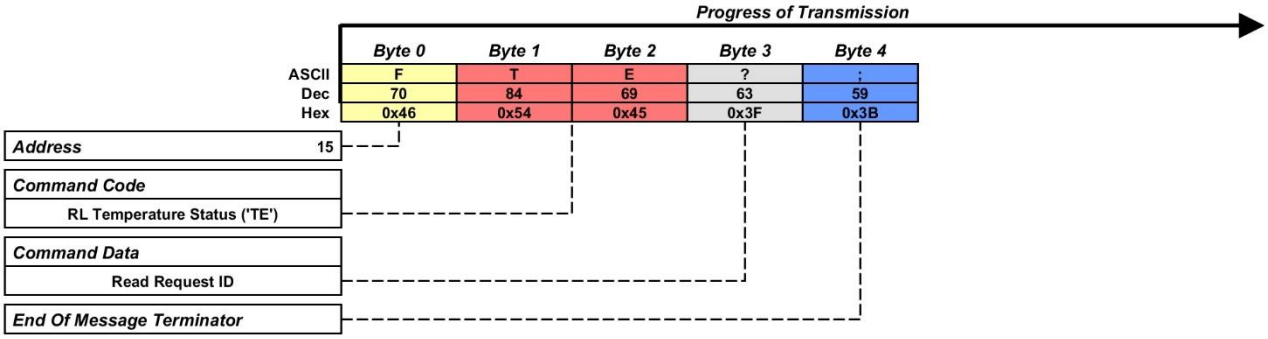

Figure 61: Get RL Temperature Status – Read Request Example

5.2.4.2. Standard Response

The following table summarizes and describes the complete command response.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'TE'	RL Temperature Status Command
Command Data	3-6	All	16-Bit Integer	Temperature Status: ➢ 0x0000: OK ➢ 0x0004: Overtemperature ➢ 0x0008: NOK
End Of Message	7	All	';'	Message Terminator

Table 60: Get RL Temperature Status – Standard Response

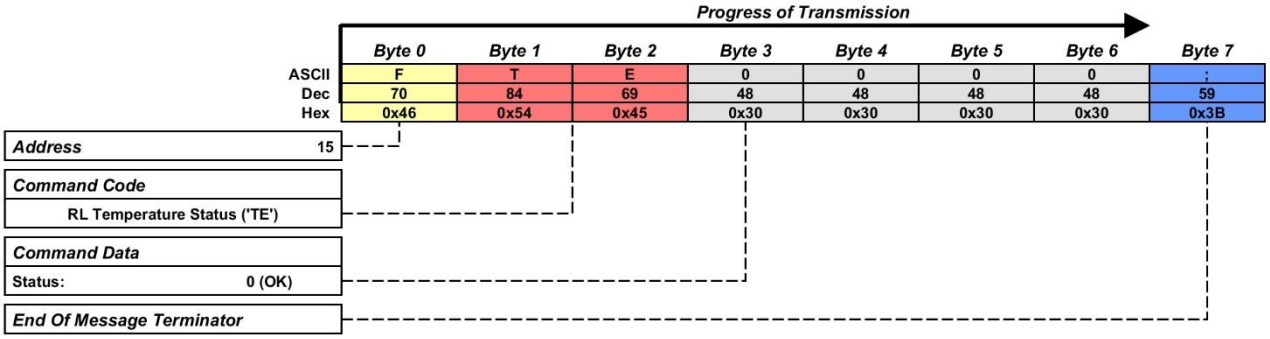

Figure 62: Get RL Temperature Status – Standard Response Example

5.2.5 Get RL Temperature

This command is used to read the temperature of the connected ring light.

5.2.5.1. Read Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'TX'	RL Temperature Command
Command Data	3	All	'?'	Read Request ID
End Of Message	4	All	';'	Message Terminator

Table 61: Get RL Temperature – Read Request

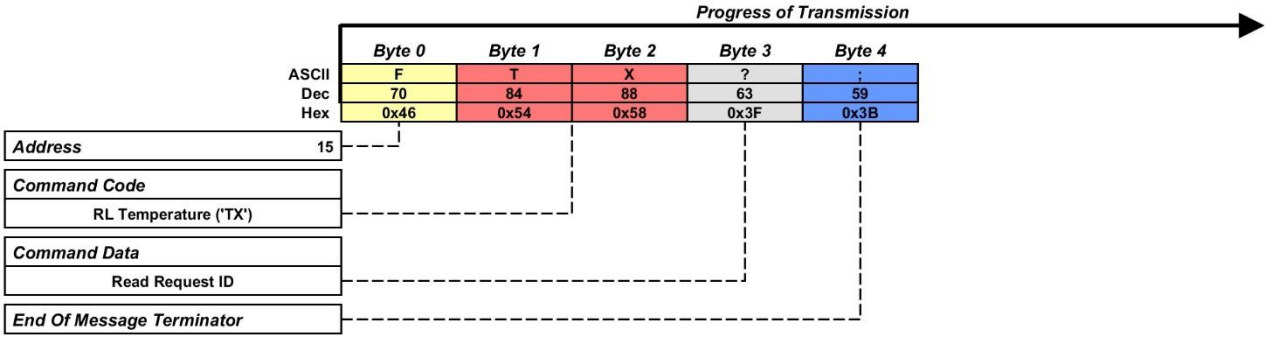

Figure 63: Get RL Temperature – Read Request Example

5.2.5.2. Standard Response

The following table summarizes and describes the complete command response.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'TX'	RL Temperature Command
Command Data	3-6	All	16-Bit Integer	Temperature value in steps of 0.0625 K. Temperature in °C is calculated based on the following formula: $T_{°C} = Value * 0.0625\ K - 273.15\ K$
End Of Message	7	All	';'	Message Terminator

Table 62: Get RL Temperature – Standard Response

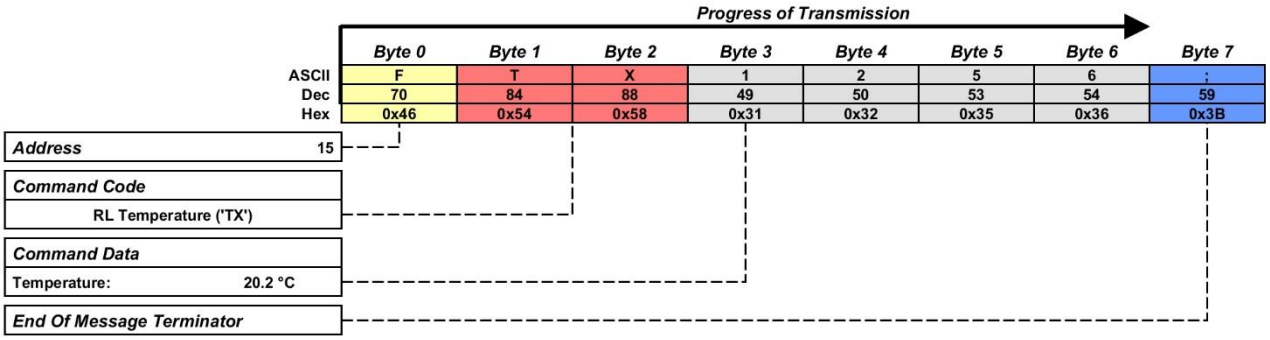

Figure 64: Get RL Temperature – Standard Response Example

6. *Additional Commands*

This chapter summarizes additional commands for the MC-D 1100.
The following table gives a command overview.

Command	Mnemonic	Description
Communication Settings		
Change Address	AC	Change the slave address of the MC-D 1100.

Table 63: Additional Commands Overview

6.1 Communication Settings

This sub chapter specifies and describes all commands regarding the communication settings of the MC-D 1100.

6.1.1 Change Address

This command is used to change the slave address of the MC-D 1100.

6.1.1.1. Write Request

The following table summarizes and describes the complete command request.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Slave Address
Command Code	1-2	All	'AC'	Change Address Command
Command Data	3-5	All	'000'	Fixed
	6	All	4-Bit Integer [0;15]	New Slave Address
End Of Message	7	All	';'	Message Terminator

Table 64: Change Address – Write Request

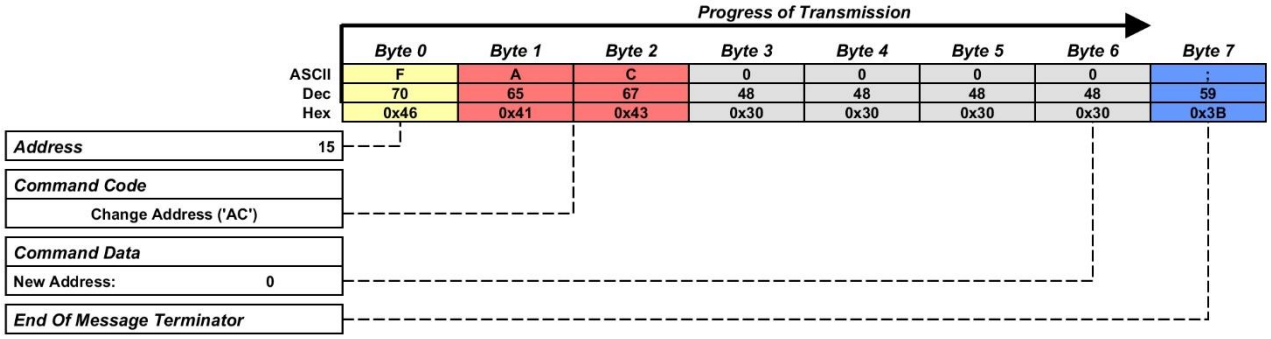

Figure 65: Change Address – Write Request Example

6.1.1.2. Read Request

Read requests are not allowed for this command.

6.1.1.3. Standard Response

The following table summarizes and describes the complete command response.

Field	Byte	Bit	Value	Remark
Address	0	All	4-Bit Integer [0;15]	Old Slave Address
Command Code	1-2	All	'AC'	Change Address Command
Command Data	3-5	All	'000'	Fixed
	6	All	4-Bit Integer [0;15]	New Slave Address
End Of Message	7	All	';'	Message Terminator

Table 65: Change Address – Standard Response

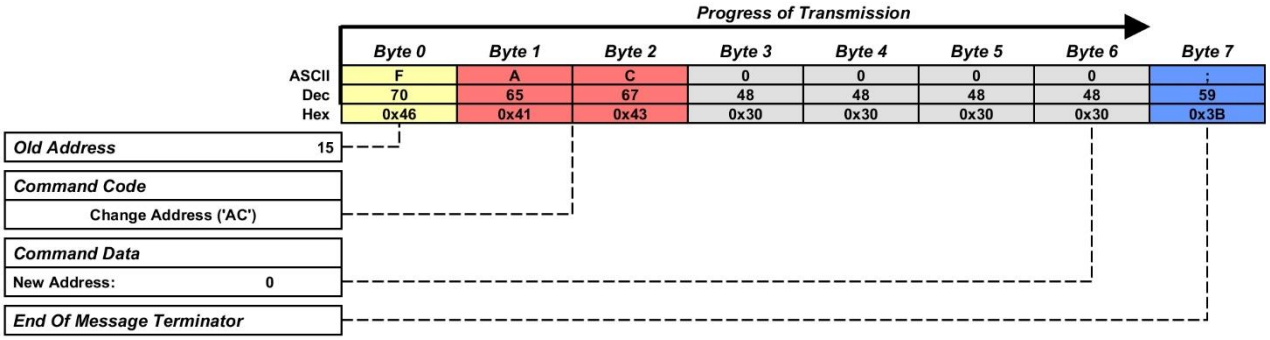

Figure 66: Change Address – Standard Response Example