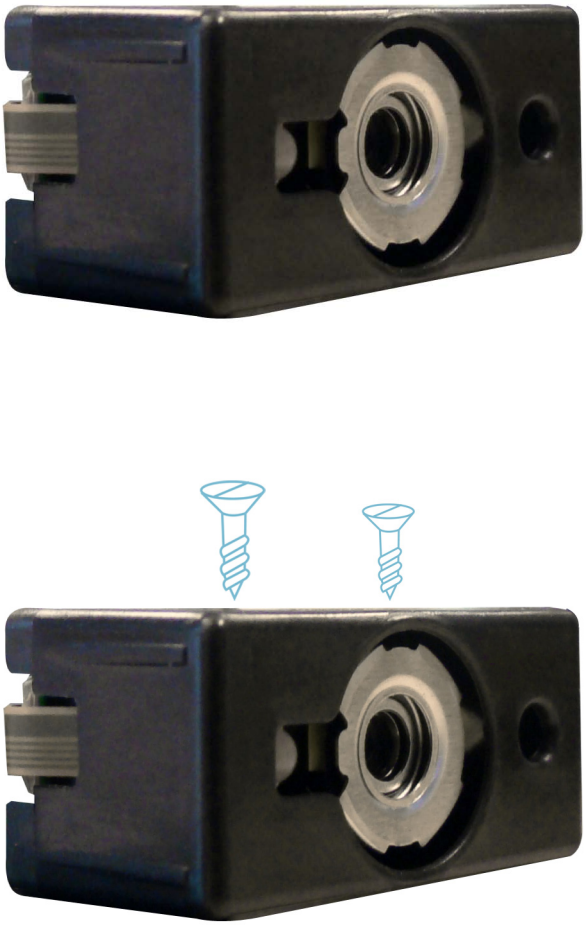
OPTICON

2D CMOS Imager

MDI 2000/MDI 2200



Picture Commands Guide

"Take picture" commands using the 2D barcode engine.

All information subject to change without notice.

Document History

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SUPPORT

USA	Europe
Phone: 800-636-0090	
Email: support@opticonusa.com	Email: support@opticon.com
Web: www.opticonusa.com	Web: www.opticon.com

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1. Abstract

The 2D CMOS engine can be instructed to take a single image and send that unprocessed image via the serial or USB-VCP interface. This document describes which command should be sent to the unit, and it describes the response from the 2D engine.

A few steps are required to get the picture from the 2D CMOS engine:

- The 2D CMOS engine has to be configured to a baud rate of 115 KB.
- The picture transfer command has to be sent.
- The format and the size of the picture have to be specified.
- The host waits for a header with information about the picture.
- The host acknowledges the header record.
- The host receives the JPEG or BMP data, sent in a series of records.
- All records are acknowledged by the host.

At any time, the picture transfer can be terminated by sending the CAN character (0x18)

2. Commands

2.1. Set Baud Rate to 115 KB

The first step is to set the 2D CMOS engine to the highest possible baud rate. (This is not required when USB is used, since USB always uses the highest possible transfer speed, regardless of the configured baud rate.)

This can be done with the following command (the command takes approx 200 ms to complete):

0x1B	$	Z	0x0D

The baud rate is activated when the host sends the “save settings” command (this command takes approx. 500 ms to complete):

0x1B	Z	2		0x0D

2.2. Set Picture Transfer Mode

Now, the Image transfer command has to be send by the host. (This command is processed immediately):

0x1B	(	(	0x0D	

Important notes:

- The host has to also set its baud rate to 115 KB before this command is sent.
- When this command is sent, the 2D CMOS engine will only process the ‘Picture format specifier’. It will ignore all other serial commands. It will also ignore a press on the trigger button. The only way to get out of this mode is a reset. (Or send the ‘Picture format specifier’)

2.3. Picture Format Specifier

The transfer command should be followed by a format specifier string. This specifies the format and the size of the picture that is going to be sent by the 2D engine:

@OPTO ,		Left	,	Top	,	Right	,	Bottom	,	Resolution	, BPP ,		Turn ,						
JPEG Quality	, Snap shot		, File format		, Host/ scanner		, Trans mode		#										

The various fields in this string are separated by commas (0x2C) and are defined as follows:

Field name	Size (in bytes)	Range / value	Description
Field start	5	@OPTO	Fixed start of the string
Left	4	0-1279	Left coordinate of the picture to be sent
Top 4		0-1023	Top coordinate of the picture to be sent
Right 4		0-1279	Right coordinate of the picture to be sent
Bottom	4	0-1023	Bottom coordinate of the picture to be sent
Resolution	1	1-4	Resolution for sub-sampling. The resolution is full, 1/4 , 1/9 or 1/16 (Full=1 and 1/16 =4)
BPP	1	1, 4 or 8	No. of bits per pixel. Must be eight for normal pictures
Turn	1	0, 1	180º rotation when 1
JPEG quality	3	0-500	The JPEG quality.
Snap shot	1	0	Reserved for future use. Fix to 0
File format	1	1 or 3	1 = JPEG 3 = BMP
Host/Scanner	1	0	Reserved for future use. Fix to 0
Trans mode	1	0	Reserved for future use. Fix to 0
terminator 1		#	Terminator character

Important notes:

- The values should be specified in plain ASCII.
- The fields all must have the number of bytes specified above. The values must be right-aligned with trailing spaces. For example: if the “Left” field is twelve, then the data must be “ 12”. In ASCII code this is: 0x20 0x20 0x31 0x32.
- When this specifier is sent, the 2D CMOS engine will start the JPEG or BMP data. It will not process any other serial commands, nor will it handle a press on the trigger. To get out of this mode, the host can send a CAN character (0x18). The unit will then return to normal operation.

  An example of the format specifier is:

  @OPTO, 0, 0,1279,1023,1,8,0, 65,0,1,0,0#

  This is a request for a complete picture in JPEG format.

3. Response

3.1. Response Record Description

When the picture transfer command is sent, followed by the format specifier, the 2D CMOS engine returns the JPEG or BMP picture in a series of records. All the records have the same format, but the first record contains information about the picture; the rest of the records contain the JPEG or BMP data.

The format of the records returned by the 2D CMOS engine is defined as follows:

:	Rec no	Data length	Data	Reserved	0x0D

The various fields are defined as follows:

Field name	Size (in bytes)	Range / value	Description
Field start	1	:	Fixed start character
Record no.	2	0..65535	The record sequence number, starting with 0 for the first record.
Data length	4	4	The size of the 'Data' field.
Data	256 or 1280		The first record contains information about the picture (See below). The other records contain the JPEG or BMP data.
Reserved 2			
Terminator 1		0x0D	Terminator character

Important notes:

- - The various fields are binary, so this means that if the "Rec no" field contains 0x01 0x23, the record number is 291.

Except for the very first record, the data field contains the JPEG or BMP data. When all these data fields are written to a file, the result is a file that holds a JPEG or BMP picture. The data field of the first record is defined as follows:

im	g	gr	ay	s	x	LEFT	,sy	TOP	,ex	RIGHT,	ey	BOT	,bai	RES,

c	BPP,	f	FORMAT,	v	TRIG,	g	=	GAIN,	DIAG,	Trans_cnt

The following table defines possible values for the records.

Field name	Size (in bytes)	Range / value	Description
LEFT 4		0-1279	Left coordinate of the picture.
TOP 4		0-1023	Top coordinate of the picture.
RIGHT	4	0-1279	Right coordinate of the picture.
BOT	4	0-1023	Bottom coordinate of the picture.
RES	1	1-4	Resolution for sub-sampling. The resolution is full, 1/4 , 1/9 or 1/16 (Full=1 and 1/16 =4)
BPP	1	1, 4 or 8	Number of bits per pixel.
FORMAT	1	1 or 3	1 = JPEG 3 = BMP
TRIG 1			Diagnostics field for factory test
GAIN	2	0, 1	Diagnostics field for factory test. (Used gain value)
DIAG 22			Diagnostics field for factory test.
Trans_cnt	4		Number of records that the CMOS engine will send (Including this one)

Most of these fields can be ignored, except for the last one. The host should check this field to determine how many records the CMOS sensor will send.

3.2. Host Acknowledgement

When the host has received a record, it has to inform the 2D CMOS sensor that it has received it correct, or not, or that the host wants to terminate the command. Therefore the host can send the following responses:

ACK	0x06	Data received OK. Transfers next line of data.
NAK	0x15	Data not received OK. Resend the last record.
ENQ	0x05	Resend all the data from the beginning.
CAN	0x18	Cancel the picture command.