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1   Introduction

This document specifies standard IQRF binary output device DPA commands.

ID of this standard is 0x4B.

The standard is implemented using one DPA peripheral and two DPA commands. The device supporting this standard can contain up to 32 binary outputs. The outputs implemented by the device are addressed (indexed) consecutively using the index starting from index 0 up to 31. No "gaps" are allowed.

The following chapters describe the standard in more detail. Also, see provided Custom DPA Handler source code examples for the best practice implementation details.

2   DPA Commands

The standard uses peripheral PNUM = 0x**4B** (stands **for B**inary Output)

2.1   Set Output

PCMD = 0x00

Sets outputs' state and returns a previous state. Up to 32 binary outputs are supported.

Request

NADR	PNUM	PCMD	HWPID	0 … 3	4 … n
NADR	0x4B	0x00	0xXXXX or 0xFFFF	Bitmap	NewState

Bitmap   A 32-bit bitmap (4 bytes) specifying binary outputs to set. The 1st bit specifies output index with index 0, the 32nd bit specifies output with index 31. If an unimplemented binary output is selected in the bitmap, then, of course, it is not set and also no error is reported. Thus the full bitmap 0xFF.FF.FF.FF indexing all theoretical 32 binary outputs will cause setting all actually implemented binary outputs without previous knowledge of their real count.

NewState   Byte array with a new state for each selected binary output. Thus the number of bytes in this array equals to a number of selected bits (binary outputs) in the Bitmap i.e. it equals to "n - 3". If the number of bytes is not correct then ERROR_DATA is returned. Each NewState byte has the following format:

  0x00   Sets output to the OFF state. Previously set ON timing is disabled.
  0x01   Sets output to the ON state. Previously set ON timing is disabled.
  0x02-0x7F Sets ON state for next 2-127 minutes. After the specified time the output goes to OFF state.
  0x80   Reserved. Returns ERROR_FAIL.
  0x81-0xFF Sets ON state for next 1-127 seconds (bit.7 from the state value is masked out). After the specified time the output goes to OFF state.

ON time precision depends on the particular implementation. Especially in LP mode, it is influenced by the receiving timeout value (see LPtoutRF DPA variable).

Response

NADR	PNUM	PCMD	HWPID	ErrN	DpaValue	0 … 3
NADR	0x4B	0x80	0xXXXX	0	?	PreviousStates

PreviousStates Each bit in the PreviousStates is set, when the corresponding implemented (not only selected) binary output was previously at ON state.

2.2 Enumerate Outputs

PCMD = 0x3E

This command enumerates implemented outputs.

Request

NADR	PNUM	PCMD	HWPID
NADR	0x4B	0x3E	0xXXXX or 0xFFFF

Response

NADR	PNUM	PCMD	HWPID	ErrN	DpaValue	0
NADR	0x4B	0xBE	0xXXXX	0	?	Count

Count   Number of implemented binary outputs.

3 FRC

This standard does not define any FRC as a predefined FRC "Memory read plus 1" can be used.

4 Implementation notes

The state of binary outputs after the device is reset/restarted/waken-up or before it is reset/restarted/RFPGMed/putToSleep is not standardized. This behavior is device specific and proprietary.

5 Examples

Note: always PNUM=0x4B, always the same device.

Enumerate outputs:
- Request
PCMD=0x3E
- Response
PCMD=0xBE, PData=[0x03] => device implements 3 binary outputs.

Read outputs:
PCMD=0x00, PData=[0x00,0x00,0x00,0x00]
- Response
PCMD=0x80, PData=[0x03,0x00,0x00,0x00] => 1st and 2nd outputs were ON, others were OFF.

Set and read outputs:
PCMD=0x00, PData=[0x05,0x00,0x00,0x00] [0x00] [0x82] => 1st binary output is set to OFF, 3rd output is set to ON for 2 seconds.
- Response
PCMD=0x80, PData=[0x03,0x00,0x00,0x00] => 1st and 2nd outputs were previously ON, others were OFF.

6 Revision History

0.04

- Enumeration response changed. Previously it returned a bitmap of implemented binary outputs, now it returns a number of implemented binary outputs.
- NewState=2 value at Set Output command returned a previous state of the binary output. Previous state of all implemented binary outputs is always returned so the value meaning of NewState=2 was changed to "set ON state for 2 minutes".