OMNI-ID, INC

VIEW 4 & VIEW 3 USER MANUAL

Document Revision: Draft

Date: April 7, 2015

Omni-ID, Inc.
1200 Ridgeway Avenue
Rochester, NY

www.Omni-ID.com

Author: Jeffrey Orvek

TABLE OF CONTENTS

1 PROTOCOL

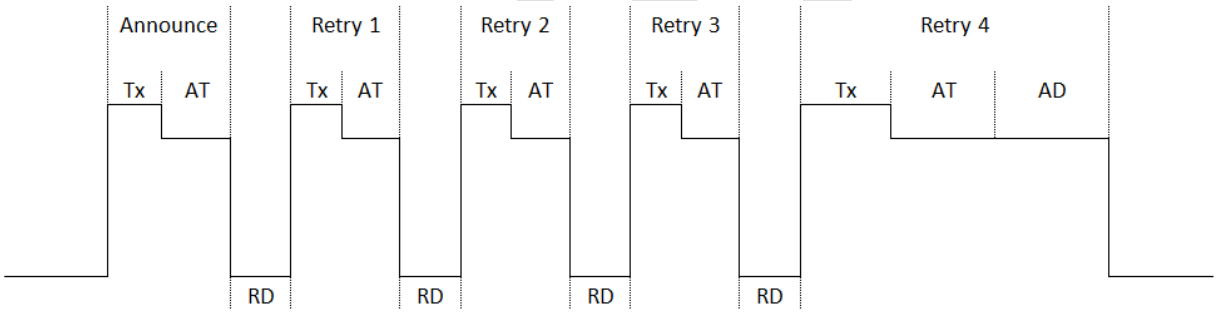
1.1 Read/Write Parameters

Parameter	Units	Min	Default	Max
Awake Dwell	Seconds	1	2	4
Sleep Dwell	Seconds	4	64800	2^32
Retry Dwell	Seconds	1	5	5
Retry Count	Attempts	0	5	5
ACK Listen Time	mS	-	200	-
RF Channel		-	0x01	-
TX Power			10	10

1.2 Read Only Parameters

1.3 433MHz Radio

1.3.1 Announce Timing



Tx	Transmit
RD	Retry Dwell
AD	Awake Dwell
AT	ACK Listen Time

Figure 1

If any valid message is received by the tag within the first 100mS after announcing, then the tag will listen consider the announce a success and listen for the full Awake Dwell before going to sleep. If no valid message is seen within the ACK listen time then the tag will go to sleep for the Retry Dwell before attempting another announce. If The Retry Count is reached, then the tag will listen for the full Awake Dwell regardless if a valid message is received in the ACK listen time.

After an announce it is recommended to send a TAG_GO_TO_SLEEP operation as the last command to the tag. This will save battery life by putting the tag back to sleep much sooner than the Awake Dwell would allow.

1.3.2 Announce Reasons

Reason	Value
TIMEOUT	0x01
REQUESTED	0x05
RFID	0x06
EXIT_RESET	0x09
MACRO_EVENT	0x0A
BUTTON_1_PRESSED	0x10

Table 1

1.4 Requested Operations

Command	Value	Length	Raw Data Bytes[1]			
			0	1	2	3
TAG_DISPLAY_PAGE	0x20	Length (1)	Page			
TAG_PAGES_LOADED	0x21	Length (1)	Total			
TAG_PAGE_LIST	0x26	Length	List …			
TAG_DISPLAY_TYPE	0x53	Length (1)	Display Type			
TAG_MAX_PAGES	0x54	Length (1)	Max Pages			
TAG_SLEEP_DWELL	0x22	Length (4)	Sleep Dwell Seconds			
TAG_AWAKE_DWELL	0x23	Length (1)	Awake Dwell Seconds			
TAG_RETRY_INTERVAL	0x29	Length (1)	Retry Interval mS			
TAG_RETRY_COUNT	0x2A	Length (1)	Retry Attempts			
TAG_RF_CHANNEL	0x40	Length (1)	Channel			
TAG_TX_POWER	0x41	Length (1)	Power			
TAG_HW_VERSION	0x50	Length (1)	Rev			
TAG_FW_VERSION	0x51	Length (8)	Board ID	Major Rev	Minor Rev	Year
TAG_BATTERY_LEVEL	0x52	Length (1)	Level			
TAG_TEMPERATURE	0x55	Length (1)	Temp			
TAG_LAST_RX_RSSI	0x43	Length (1)	RSSI			
TAG_RFID_COUNT	0x45	Length (4)	Lifetime RFID Triggers			

[1] Multi-Byte data is Big Endian

TAG_AWAKE_TIME	0x49	Length (4)	Lifetime Awake Total		
TAG_ANNOUNCE_COUNT	0x4A	Length (4)	Lifetime Announce Total		
TAG_PAGE_FLIPS_COUNT	0x4B	Length (2)	Lifetime Page Flips		
TAG_RESET_COUNT	0x57	Length (2)	Lifetime Resets		

1.5 Commanded Operations

FW Name	OpCode	Length	Raw Data Bytes[2]							
			0	1	2	3	4	5	6	7
TAG_DISPLAY_PAGE	0x20	Length (1)	Page							
TAG_DELETE_IMAGE	0x28	Length (1)	Page							
TAG_IMAGE_LINE	0xA0	Length	Page	Line Number		Compression Format[3]	Data	…		
TAG_IMAGE_BLOCK	0xA1	Length	Page	X Coordinate		Y Coordinate		Compression Format	Data	…
TAG_TEMPLATE_WRITE	0xA8	Length	Page	Data	…					
TAG_TEMPLATE_DATA	0xA9	Length	Page	Field #	Data	…				
TAG_IMAGE_ASCII	0xA2	Length	Page	X Coordinate		Y Coordinate		Font Size	Data	…
TAG_WRITE_MEMORY	0xAA	Length	Page	Type[4]	Address				Data	…
TAG_SLEEP_DWELL	0x22	Length (4)	Sleep Dwell Seconds							
TAG_TEMPORARY_SLEEP_DWELL	0x4C	Length (5)	Sleep Dwell Seconds				Number of Announces			
TAG_AWAKE_DWELL_SECONDS	0x23	Length (1)	Awake Dwell Seconds							
TAG_AWAKE_DWELL_MILLI_SEC	0x4E	Length (2)	Awake Dwell Milliseconds							
TAG_RETRY_INTERVAL	0x29	Length (1)	Retry Interval mS							
TAG_RETRY_COUNT	0x2A	Length (1)	Retry Attempts							

[2] Multi-Byte data is Big Endian
[3] Supported Compression Formats {0:None}
[4] Supported Memory Types (0:RFU, 1:Image, 2:Macro}

TAG_DATA_REQUEST	0x33	Length	Requested Tag 1	Requested Tag 2	Requested Tag …					
TAG_RF_CHANNEL	0x40	Length (1)	Channel							
TAG_TX_POWER	0x41	Length (1)	Power							
SOFTWARE_RESET	0x5F	Length (0)								
TAG_FIRMWARE_CRC	0xB1	Length	TAG_CRC (0x01)	CRC[5]				TAG_COMPATIBLE_HW (0x02)	Length	List…
TAG_FIRMWARE_DATA	0xB0	Length	Address	Data	…					
TAG_FIRMWARE_ERASE_DATA	0xB2	Length (0)								
TAG_SAVE_NVM	0x34	Length (0)								
TAG_GO_TO_SLEEP	0x2C	Length (0)								
BEACON_SLEEP_DWELL	0x4D	Length								

Table 2

[5] $f(x) = x^{32} + x^{26} + x^{23} + x^{22} + x^{16} + x^{12} + x^{11} + x^{10} + x^8 + x^7 + x^5 + x^4 + x^2 + x + 1$
If fed a string of "123456789", the calculated CRC should equal 0xCBF43926

2 FW UPGRADE

FW can be upgraded by using TAG_FIRMWARE_ERASE_DATA (0xB2), TAG_FIRMWARE_DATA (0xB0) and TAG_FIRWMARE_CRC (0xB1) operations.

2.1 TAG_FIRMWARE_ERASE_DATA

This operation does not delete the running FW, but it deletes all previously downloaded FW from the external flash buffer.

2.2 TAG_FIRWMARE_DATA

This operation allows binary data to be downloaded to the tag and stored in a buffer in external flash

2.3 TAG_FIRWMARE_CRC

This operation commands the tag to compute a CRC from the data previously downloaded into the external flash buffer. If the CRC computed by the tag matches the CRC given with this operation, then the tag will erase and then reprogram itself.

2.3.1 HW Configuration Compatibility

A list of compatible HW versions is downloaded with the CRC and indicates to the tag which versions the new FW supports. This allows existing FW to refuse to update if the HW version is not supported even if the CRC successfully matches.

3 TRIGGERS

3.1 Magnetic Switch

The magnetic switch is primarily used to flip the image, but if it is held long enough a diagnostic screen is printed, and if held even longer the tag will reset.

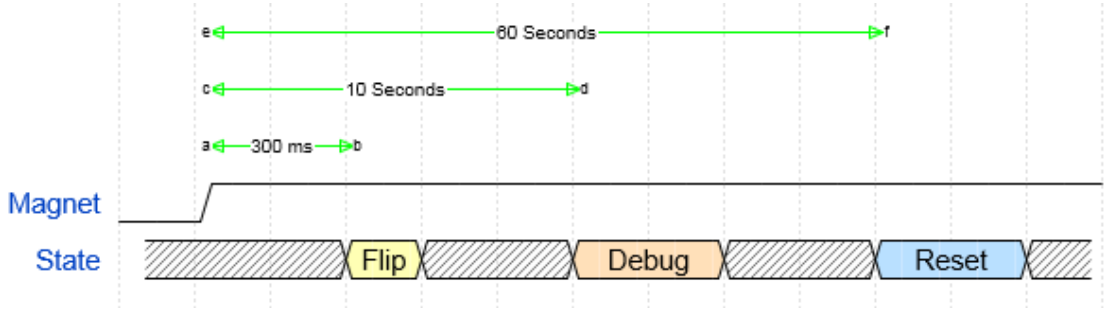


Figure 2

3.2 RFID

3.2.1 NXP IC (Gen 1 HW)

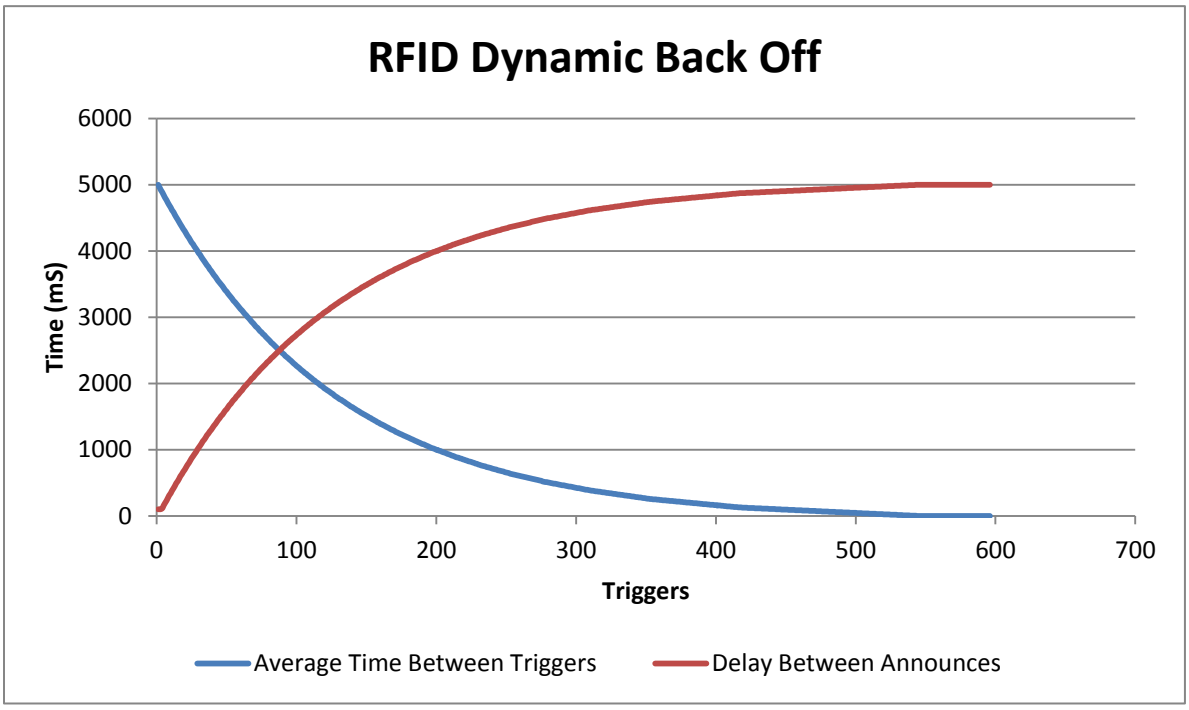


Figure 3

In existing Gen 1 HW with the NXP passive RFID IC, a dumb trigger is used to wake up the tag in the presence of a 865-928MHz signal. Because there can be many sources for this, the tag has to balance between a fast response

time and conserving power. To allow for this, a dynamic back off is used to increase the responsiveness of the tag. In the presence of a constant RFID field, the tag is initially responsive but the time between announces will slowly increase to a max value of 25 Seconds. Once 25 seconds has elapsed since the last RFID trigger, the back off time is reset.

It is important to note that once the delay time has passed, the tag announces immediately upon being triggered. This allows for immediate responsiveness when triggered, with a gradual back off to conserve energy.

3.2.2 Monza (Gen 1.5 HW)

The Monza allows communication over RFID by utilizing the user memory bank in the passive IC as a pass-through to the micro.

3.2.2.1 Address Map

Table 3 describes the layout of memory in the User Bank of the Monza.

Word	I²C Byte	Description	Default
0d-3d	40d-47d	Active radio ID	00 00 00 00 00 00 00 00h
4d-5d	48d-51d	Firmware revision	00 00 00 00h
6d	52d	Operation Register	Word 32d
6d	53d	Response Register	Word 33d
7d	54d	Extended Data Registers	Word 34d
8d	56d-57d	Memory map type	EA 0Xh
9d	58d-73d	UUID	A0 BF DA F8 50 04 40 7C A3 EA B8 0B AC C2 17 14h

Table 3

3.2.2.2 Algorithm

The flowchart in Figure 4 describes the method of commanding operations using the User Memory Bank of the RFID interface as a pass through.

If successful, then the response register will contain a copy of the value written to the operation register.

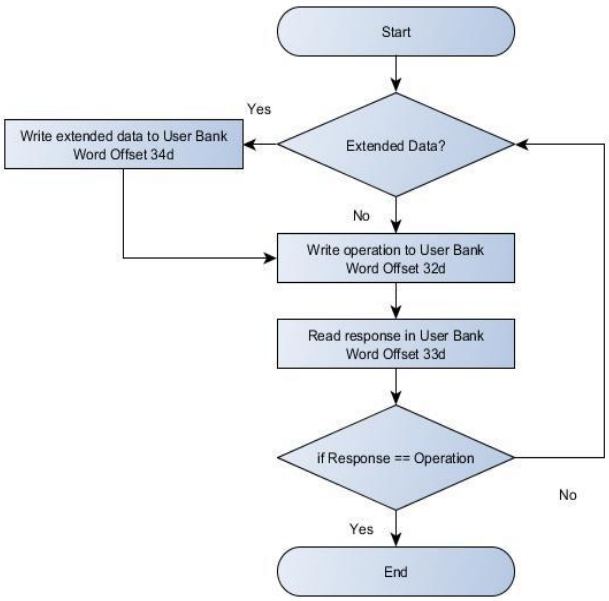


Figure 4

3.2.2.3 RFID Opcodes

RFID opcodes allow a 2 byte interface into the tag.

Command	Word[6]		Response
	High Byte	Low Byte	
Display Page	0x20	Page	
Delete Page	0x28	Page	
Announce	0x30	0x00	
Extended Data	0xFF	Data Byte Length[7]	-1 = CRC mismatch -2 = Length longer than buffer

Figure 5

3.2.2.3.1 Announce

An announce over the 433MHz interface can be triggered by writing 0x3000 to the Operation Register (32d).

3.2.2.4 Extended Opcodes

Extended data allows the existing 433MHz protocol to be used by tunneling through the RFID interface. An additional 16-bit CRC after the commanded data is used to allow the micro to verify the data. Table 4 shows an example of template data being commanded through the Monza.

Byte[7]	Use		Example	
0	Data Body	Command	0xA9 (Template Data Cmd)	
1		Page	1	
2		Length	7	
3		Field #	1	Template Data
4		Data 0	0x48 ('H')	
…		…	0x45 ('E')	
			0x4C ('L')	
			0x4C ('L')	
N		Data N	0x4F ('0')	
N+1		Byte Stuff to force 16-bit boundary	0x00	
N+2	CRC[8][9]		0x8C	
N+3			0xA9	

Table 4

3.2.2.4.1 Extended Opcode Response

[6] Words are Big Endian
[7] Maximum length is 100 Words (200 bytes)
[8] CRC as described in section 3.2.2.5
[9] CRC is Big Endian

If a response was requested through the extended data operation, then the extended response will be placed starting at the Extended Data Register (34d). The first byte will be the byte length of the response.

3.2.2.5 CRC-CCITT

The CRC-CCITT algorithm is used, based on the polynomial shown in Equation 1.

$$f(x) = x^{16} + x^{12} + x^5 + 1$$

Equation 1

It is seeded with 0xFFFF, and a reference string of "123456789" should produce a CRC of 0x29B1.

4 EVENT MACROS

Event macros allow a very limited scripting capability to handle event triggers. Each event is compared against a lookup table that indicates the macro to execute. If no event is registered in the lookup table, then the default action occurs (e.g. Button 1 announces, Button 2 flips the image).

4.1 Events

Event	Value
RFU	0x00
SYSTEM_RESET_EVENT	0x01
RFID_EVENT	0x02
BUTTON_1_EVENT	0x04
BUTTON_2_EVENT	0x05
EVENT_LOOKUP_END	0xFE

Table 5

4.2 Operations

Operation	Bytes[10]			
	Command	Extended Data		
	0	1	2	3
RFU	0x00			
PAGE_FORWARD	0x01			
MACRO_GOTO_ADDRESS	0x04	Address		
MACRO_ANNOUNCE	0x07	Address if failed[11]		
MACRO_DELAY	0x09	Seconds		
MACRO_IF_PAGE_EQUALS	0x0A	Page	Address	
MACRO_SET_PAGE	0x20	Page		
MACRO_DELETE_PAGE	0x28	Page		
MACRO_RADIO_MSG	0x70	Length	Data…	
MACRO_END	0xFE			

Table 6

[10] Multi-Byte data is big Endian
[11] Address to branch to if announce fails

4.3 Memory Layout

Error! Reference source not found. shows an example layout for the event macros. The header is used to indicate to FW the formatting used as well as the complete length of the table. This is followed by the lookup table to link the event with a specific macro address. The end of this table must contain the EVENT_LOOKUP_END operation.

		Byte[12]	Data	Example	
Header		0	Version	1	
		1	Length to End		0x00
		2			0x
		3	RFU	0	
Event Lookup Table	Event 1	4	Event	0x04 (Button 1)	
		5	Macro Address	12	0x00
		6			0x0C
		7	RFU		
	Event 2	8	Event	0x05 (Button 2)	
		9	Macro Address	26	0x00
		10			0x1A
		11	RFU		
	End	12	EVENT_LOOKUP_END	0xFE	
Macros	Macro 1	13	MACRO_SET_PAGE	0x20	
		14	Page	1	
		15	MACRO_ANNOUNCE	0x07	
		16	Address to branch to if Announce Failed	23	0x00
		17			0x17
		18	MACRO_SET_PAGE	0x20	
		19	Page	2	
		20	MACRO_GOTO_ADDRESS	0x04	
		21	Address	25	0x00
		22			0x19
		23	MACRO_SET_PAGE	0x20	
		24	Page	3	
		25	MACRO_END	0xFE	
	Macro 2	26	PAGE_FORWARD	0x01	
		27	MACRO_END	0xFE	

Table 7

[12] Multi-Byte data is big Endian

5 TEMPLATES

The template is downloaded into flash along with the background image and dictates how Template Data is formatted onto the display. This example uses two text fields of different sized text. Numbers larger than 8-bits are Big Endian.

5.1 Template Fields

These are the different Field Types supported.

Field Type	OpCode	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6
RFU	0x00							
Text	0x01	X Coordinate		Y Coordinate		Font Size	Max Text Length	
Barcode	0x02	Starting X Coordinate		Starting Y Coordinate		Y Size		Max Data Length

Table 8

5.2 Template Data

Template Data is commanded through any interface (RF or RFID) and includes a Field number and data. The Field number indicates which template field should be used to format the data. The example shown in Table 9 and Table 13 is based on the example template in Table 11.

Text Field Example		
Byte	**Data**	**Example**
0	Template Command	0xA9
1	Length (N – 1)	6
2	Page	1
3	Referenced Field Number	1
4	Data 0	0x48 ('H')
…	…	0x45 ('E')
		0x4C ('L')
		0x4C ('L')
N	Data N	0x4F ('0')

Table 9

Barcode Field Example		
Byte	**Data**	**Example**
0	Template Command	0xA9
1	Length (N – 1)	10
2	Page	1
3	Referenced Field Number	2
4	Scale Size	2
5	Data 0	
…	…	…

N	Data N	

Table 10

5.3 Memory Layout

	Byte	Data	Example	
Header	**0**	Template Format	1	
	1	Number of Fields	2	
	2	Template Length	25	
Field #0	**3**	Field Number	0	
	4	Field Type	0x01 (Text)	
	5	X Coordinate	85	0x00
	6			0x55
	7	Y Coordinate	130	0x00
	8			0x82
	9	Font Size	4 (32x32 Pixel characters)	
	10	Max Text Length	10	
Field #1	**12**	Field Number	1	
	13	Field Type	0x01 (Text)	
	14	X Coordinate	40	0x00
	15			0x28
	16	Y Coordinate	230	0x00
	17			0xE6
	18	Font Size	6 (48x48 Pixel characters)	
	19	Max Text Length	3	
Field #2	**20**	Field Number	2	
	21	Field Type	0x02 (Barcode)	
	22	Starting X Coordinate	20	0x00
	23			0x14
	24	Starting Y Coordinate	200	0x00
	25			0xC8
	26	Y Size (in pixels)	16	0x00
	27			0x10
	28	Max Data Length	10	0x0A

Table 11

5.4 Commands

Templates are located within the image address space, so it is important to follow the proper flow.

1.) Delete Page
2.) Download Image if required (e.g. TAG_IMAGE_LINE, TAG_IMAGE_BLOCK)
3.) Download Template (e.g. TAG_TEMPLATE_WRITE)
4.) Download dynamic data for the fields (e.g. TAG_TEMPLATE_DATA)

5.) Flip to page to generate the new image

5.5 Limitations

- Maximum of 10 Fields
- Each Field can have a maximum of 20 bytes of data
- Maximum template size of 100 bytes
- FW only holds the dynamic data for one page at a time. Flipping to any other page results in dynamic data previously downloaded via the TAG_TEMPLATE_DATA

6 TEXT RENDERING

6.1 Character Set

Supported ASCII characters are listed in Table 12. All other characters will be displayed as a checkered pattern: 

Character	Hex	Dec
0	0x30	48
1	0x31	49
2	0x32	50
3	0x33	51
4	0x34	52
5	0x35	53
6	0x36	54
7	0x37	55
8	0x38	56
9	0x39	57
:	0x3A	58
A	0x41	65
B	0x42	66
C	0x43	67
D	0x44	68
E	0x45	69
F	0x46	70
G	0x47	71
H	0x48	72

Character	Hex	Dec
I	0x49	73
J	0x4A	74
K	0x4B	75
L	0x4C	76
M	0x4D	77
N	0x4E	78
O	0x4F	79
P	0x50	80
Q	0x51	81
R	0x52	82
S	0x53	83
T	0x54	84
U	0x55	85
V	0x56	86
W	0x57	87
X	0x58	88
Y	0x59	89
Z	0x5A	90
a[13]	0x61	97

Character	Hex	Dec
b[13]	0x62	98
c[13]	0x63	99
d[13]	0x64	100
e[13]	0x65	101
f[13]	0x66	102
g[13]	0x67	103
h[13]	0x68	104
i[13]	0x69	105
j[13]	0x6A	106
k[13]	0x6B	107
i[13]	0x6C	108
m[13]	0x6D	109
n[13]	0x6E	110
o[13]	0x6F	111
p[13]	0x70	112
q[13]	0x71	113
r[13]	0x72	114
s[13]	0x73	115
t[13]	0x74	116

Character	Hex	Dec
u[13]	0x75	117
v[13]	0x76	118
w[13]	0x77	119
x[13]	0x78	120
y[13]	0x79	121
z[13]	0x7A	122

Table 12

[13] Lowercase letters are replaced with Uppercase letters when displayed

6.2 Character Font Size

A scalable 8-pixel font is used allowing multiple font sizes. Table 13 shows a range of font sizes with their correlating pixel size.

Font Size	Pixel Size
1	8x8
2	16x16
3	24x24
4	32x32
5	40x40
6	48x48
7	56x56
N	…

Table 13

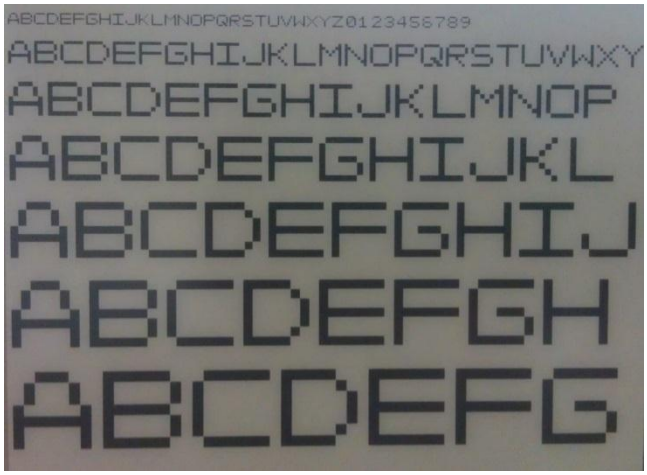


Figure 6

7 EXTERNAL FLASH

7.1 Memory Map

	Address	2.7" 264 x 176 Pixel	4.41" 400 x 300 Pixel
RFU (32KB)	0x00000		
	0x07FFF		
Scratch Pad (32KB)	0x08000		
	0x0FFFF		
Images (384KB)	0x10000	Page 1	Page 1
	0x11FFF		
	0x12000	Page 2	
	0x13FFF		
	…	…	…
	0x6C000	Page 47	Page 24
	0x6DFFF		
	0x6E000	Page 48	
	0x6FFFF		
Log (64KB)	0x70000		
	0x7FFFF		

Table 14

7.2 Space Between Images

	Address Offset	2.7" 264 x 176 Pixel	4.41" 400 x 300 Pixel
Page	0x0000	Page 1 Image	Page 1 Image
	0x16AF		
	0x16B0	Image Dirty Byte	
	0x16B1	Template Dirty Byte	
	0x16B2	RFU	
	0x16BF		
	0x16C0	Template Space	
	0x1FFF		
	0x2000		
	0x3A97		
	0x3A99		Image Dirty Byte
	0x3A9A		Template Dirty Byte
	0x3A9B		RFU
	0x3AA7		
	0x3AA8		Template Space
	0x3FFF		

Table 15

7.2.1 Image Dirty Byte

The image dirty byte is set to flag if the image is valid. It is also used to flag if the space is still valid and being used for other purposes, such as memory storage, but should not be displayed.

Value	Meaning
0x00	RFU
0x01	Valid Image
0xFF	No Valid Image

Table 16

7.2.2 Template Dirty Byte

The template dirty byte is set to flag if there is a valid template that needs to be processed on an image update.

Value	Meaning
0x00	RFU
0x01	Valid Template
0xFF	No Valid Template

Table 17

8 EVENT LOG

8.1 Overview

Events are logged to external flash (see Table 14 for address) serially. An event is triggered when a preset threshold is reached. For example, every 100 announces a LOG_ANNOUNCE is saved in the event log. Combined with a LOG_TIMESTAMP saved once per day, this gives a fairly detailed account of the tag's life.

8.2 Cheat Sheet

REASON	Default Cadence	Max Lifetime Expected	Max Expected Log Size	Raw Data Bytes[14]									Notes
				Code	1	2	3	4	5	6	7	8	
				0									
LOG_RFU				0x00									Reserved
LOG_HEADER				0x01	Log Version								
LOG_TIMESTAMP	Every 1 Day	5 Years	1825	0x02									Time in seconds
LOG_ANNOUNCE	100	285,000	2850	0x03									
LOG_ANNOUNCE_NO_ACK	200	2,900,000	14,500	0x04									
LOG_PAGE_FLIP	Every 10	120,000	12,000	0x05									
LOG_RADIO_ON_TIME	Every 5 Minutes	8,333 Minutes	1,666	0x06									Time in seconds
LOG_TRIGGER_COUNT	200	2,900,000	14,500	0x07									
LOG_FW_VERSION	1	5	20	0x08	FW Version (App Type, Major Rev, Minor Rev, Sub Rev)								
LOG_RESET_POWER_ON	1	5	5	0x09									Separate from LOG_RESET_REASON so we can distinguish brown out resets
LOG_RESET_REASON	1	5	20	0x0A	Reason[15]								
LOG_FLASH_ON_TIME				0x0E									
LOG_CHANGE_TH_TIMESTAMP	1	5 Years	20	0x72	New Threshold								
LOG_CHANGE_ TH_ANNOUNCE_NO_ACK	1	5	5	0x73	New Threshold								
LOG_CHANGE_	1	5	5	0x74	New								

[14] Multi-Byte data is stored little Endian

[15] Reasons {0:RFU, 1:Unused, 2:Unexpected RF Interrupt, 3:FW Update, 4:Requested, 5:MagSwitch/Button, 6:Unexpected Interrupt}

TH_ANNOUNCE_NO_ACK					Threshold								
LOG_CHANGE_ TH_PAGE_FLIP	1	5	5	0x75	New Threshold								
LOG_CHANGE_ TH_RADIO_ON_TIME	1	5	20	0x76	New Threshold								
LOG_CHANGE_ TH_TRIGGER_COUNT	1	5	5	0x77	New Threshold								
LOG_CHANGE_TH_RESET	1	5	5	0x79	New Threshold								
LOG_CHANGE_TH_FLASH				0x7E	New Threshold								
LOG_CHANGE_NAH_TIMESTAMP	1	5	40	0x42	New nAh per second								
LOG_CHANGE_NAH_PAGE_FLIP	1	5	40	0x45	New nAh per tick								
LOG_CHANGE_NAH_RADIO_ON_TIME	1	5	40	0x46	New nAh per second								
LOG_CHANGE_NAH_FLASH_ON_TIME				0x4E	New nAh per second								
LOG_UNUSED				0xFF									

Table 18

8.3 Log Header

The log header is used to indicate that the logging format was changed. This allows FW updates in the field that impact the event logger without negating the old log data.

8.4 LOG_CHANGE_

The LOG_CHANGE_ operations allow changes in the hardcoded thresholds and expected nAh battery usage to be logged. This allows FW to parse the log at runtime and react to threshold and power differences between FW updates.

9 INTERNAL FLASH

9.1 Address Map

	Address	Uses				
Info D (Calibration)	0x1800	Type 0	Type 1		Type 2	
	0x1801					
	0x1802	UID	UID		UID	
	0x1803					
	0x1804					
	0x1805					
	0x1806					
	0x1807					
	0x1808					
	0x1809					
	0x180A	RfFreq2	RfFreq2		RfFreq2	
	0x180B	RfFreq1	RfFreq1		RfFreq1	
	0x180C	RfFreq0	RfFreq0		RfFreq0	
	0x180D	RfMaxPower	RfMaxPower		RfMaxPower	
	0x180E		HwVersion		HwVersion	
	…					
	0x187F					
Info C (Parameters)	0x1880	Type 0	Type 1	Type 2	Type 3	Type 4
	0x1881					
	0x1882	SleepDwell	SleepDwell	SleepDwell	SleepDwell	SleepDwell
	0x1883					
	0x1884					
	0x1885					
	0x1886	AwakeDwell	AwakeDwell	AwakeDwell	AwakeDwell	
	0x1887	RetryInterval	RetryInterval	RetryInterval	RetryInterval	RetryInterval
	0x1888	BeaconPeriod	BeaconPeriod	BeaconPeriod		
	0x1889					
	0x188A	FamilyValue	FamilyValue	FamilyValue		
	0x188B					
	0x188C	DomainValue	DomainValue	DomainValue		AwakeTime

	0x188D					
	0x188E					
	0x188F					
	0x1890	BeaconCount	BeaconCount	BeaconCount		BeaconCount
	0x1891					
	0x1892					
	0x1893					
	0x1894	CurrentPage	CurrentPage	CurrentPage	CurrentPage	CurrentPage
	0x1895	RetryCount	RetryCount	RetryCount	RetryCount	RetryCount
	0x1896	RfChannel	RfChannel	RfChannel	RfChannel	RfChannel
	0x1897	TxPower	TxPower	TxPower	TxPower	TxPower
	0x1898	RFIDTriggerCount	RFIDTriggerCount	RFIDTriggerCount		
	0x1899					
	0x189A					
	0x189B					
	0x189C	WatchdogExpireCount	WatchdogExpireCount	WatchdogExpireCount		
	0x189D					
	0x189E					
	0x189F					
	0x18A0		awakeTimeCount	awakeTimeCount		
	0x18A1					
	0x18A2					
	0x18A3					
	0x18A4		announceCount	announceCount		
	0x18A5					
	0x18A6					
	0x18A7					
	0x18A8		pageFlipCount	pageFlipCount		
	0x18A9					
	0x18AA			button1Presses		
	0x18AB					
	0x18AC					
	0x18AD					
	0x18AE			button2Presses		
	0x18AF					
	0x18B0					

	0x18B1					
	…					
	0x18FF					
Info B (Debug)	0x1900	ResetCount				
	0x1901					
	0x1902	FailureCode				
	0x1903					
	0x1904	StateTransition				
	0x1905	State				
	0x1906	OTState				
	…					
	0x197F					
Info A	0x1980					
	0x19FF					

9.2 Calibration Data ".infoD"

Unused

9.3 HW Configuration

HW Configuration is set at manufacturing and allows a single base FW to decide at run time which HW options to utilize. For example, the micro must know if the mag switch is populated or not and can determine this by the HW Configuration version.

Product	Version	Value	Magswitch	Buttons	Prototypes Never in Production	In Production	Notes
P3	A1	0x01	NO	NO			
P3	A2	0x02	YES	NO	X		
P3	A3	0x03	YES	YES			Inverted Discharge Inverted LED & Button input
P3	A4	0x04	YES	YES	X		Inverted Discharge
P3	A5	0x05	YES	NO		X	Monza (I2C) Display Power moved. Flash Power Enable added.
P3	A6	0x06	YES	YES		X	
P4	A1	0x11	NO	NO	X		
P4	A2	0x12	YES	NO		X	
P4	A3	0x13	YES	YES		X	
P4	A5	0x14	YES	NO			Monza (I2C) Display Power moved. Flash Power Enable added.
P4	A6	0x15	YES	YES			
L3	A1	0x21					
L4	A1	0x31					

Table 19

10 POWER MEASUREMENTS

Power usage is tracked in FW to allow an estimation of battery life remaining. This value is a very rough estimate based on typical power measurements, and only accounts for power used in a few operations.

10.1 Revision 01.03.00.00

Monitored	Measured		Calculated in FW
	Current	mAh	nAh
Page Flip	-	0.01555555	15700 per Flip
Standby	2.8uA	0.00000077	2 per Second
Standby In constant RFID	10uA	0. 00000277	
Radio On Time	-	0.00529288	5300 per Second
Flash On Time	19mA	0.00527777778	5300 per Second
Reset per mS			

1.378mA Running no flash

20uA Flash on in sleep

18.2mA flash on no read

18.5mA flash on constant read

20.6 flash write

FCC Compliance

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Industry Canada Compliance

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:
(1) this device may not cause interference, and
(2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :
(1) l'appareil ne doit pas produire de brouillage, et
(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si lebrouillage est susceptible d'en compromettre le fonctionnement.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada.
To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada.
Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

This radio transmitter 10336A-VIEW4 has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.
Le présent émetteur radio (identify the device by certification number, or model number if Category II) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste,
ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour

l'exploitation de l'émetteur.

Omni-ID
1200 Ridgeway Ave.
Suite 106
Rochester, NY 14615

www.omni-id.com