

VMD-MIDI Specification

Versatile Media of Digital Format (MIDI part)

Version 1.05

Vimicro Corporation

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Revision

Version	Date	Comment		
1.0	2/26/2004	1. Basic Version		
1.02	4/1/2004	1. Add comment block		
		2. Define the standard VMD file (VerID: 0x0000), and download VMD		
		file. (VerID: 0x0010)		
1.03	8/17/2004	1. Add Control block		
		2. Expand wave to 4 track		
		(VerID: 0x0010)		
1.04	12/21/2004	1. add index block		
		2. update vmd message		
		3. modified comment and udi block		
		4. vmd file version start from 0x0018 here		
		(VerID: 0x0018)		
1.05	04/06/2005	Tidy up document of current version.		



The VMD file format is based on standard MIDI format and supports embedded user-defined music instruments or user-defined sound effect and embedded stream. It also support other multimedia content, such as Video, Graphics and Text.

VMD file format is constructed from a basic building structure called "block". A block is defined as:

Block ID (4 Byte)	Block Size (4 Byte)	Block Data(Block Data
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There is only one Head Block in the VMD. It contains information about the entire file, including VMD format type and number of block and it is always on the first level. The other blocks contain different multimedia content. These blocks are on the same level, and are played in parallel time. So the VMD file can't supports streaming playback. All blocks have to be loaded in advance before VMD playback.

VMD file store format is Big-Endian (most significant byte first).

VMD file layout is just as the following description: Header Block Index Block /*-----*/ Standard MIDI Block Stream PCM Block User Define Sound Effect Block **User Define Instrument Block** /*-----*/ /*-----Video Block-----*/ NOT DEFINED /*-----*/ /*-----Graphics Block-----*/ NOT DEFINED /*-----*/ /*-----Text Block-----*/ NOT DEFINED /*-----*/ /*-----Control Block-----*/ Control Block /*-----*/ /*-----Comment Block----*/ Title Trunk Author Trunk

Comment Trunk /*-----*/







(4 Byte) (2 Byte) (2 Byte) (2 Byte)	Block ID (4 Byte)	Block Size (4 Byte)	File Version (2 Byte)	Block Type (2 Byte)	Number of Block (2 Byte)
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Block ID

This DWORD is always "VMHB"(0x42484d56)

Block Size

The size varies depending on the number of bytes following the block header. (Block header is the "Block ID" and "Block Size". It is always 6 in current version.)

File Version

This word simply defines the version of VMD file format.

0x0000	VMD downloaded from Vimicro.com, and can't be played on mobile platform.
0x0010	VMD 1.0, 1.02, 1.03
0x0018	Add index block, modified cmt and udi block. VMD 1.04.

Block Type

This word can be a value of 0 or 1 and describes what how the following multimedia block information is to be interpreted. A type 0 VMD file has one multimedia block. A type 1 VMD file has two or more multimedia blocks.

Number of Blocks

This word simply defines the number of multimedia blocks that follow this header block. In the type 0 VMD file, this word must be 1, because the file can only contain one multimedia block. Type 1 VMD file may contain up to 65,536 (0xFFF) multimedia blocks.





Index Block contains offset and length of the following blocks.

3.1 Block Header

Block ID (4 Byte) Block Size (4 Byte)	Block Type (2 Byte)	Trunk Number (2 Byte)
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Block ID

This DWORD is always "VMXB"(0x42584d56)

Block Size

The size varies depending on the number of bytes contained in the block.

Block Type

This word is always 0, because there is only one data trunk.

Trunk Number

There is only one data trunk, so this word is 1.

3.2 Data Trunk

Data	Data		
Trunk ID (4 Byte)	Size (4 Byte)	Offset	table

Chuck ID

This DWORD is always " DTrk" (0x6b725444)

Chunk Size

The size varies depending on the number of bytes following the trunk header. (Trunk header is the "Data Trunk ID" and "Trunk Size".)

Offset Table

It contains the offset and length of the whole following block in vmd file. It's format is as the following table.

ID	Offset	Length
4 byte	4 byte	4 byte

The ID of the offset table is corresponding to VMMB/VMSB/VMCB and so on. It contains the offset and length of corresponding block.



MIDI Block is based on General MIDI format. This block has one Block header, and at least one event trunk. (But, in this version, only defines the midi block with one event trunk.)

4.1 Block Header

Block ID (4 Byte) Block Size (4 Byte)	Block Type (2 Byte)	Trunk Number (2 Byte)
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Block ID

This DWORD is always "VMMB"(0x424d4d56)

Block Size

The size varies depending on the number of bytes contained in the block.

Block Type

This word can be a value of 0 or 1 and describes how the following event trunk block information is to be interpreted. A type 0 VMD file has one event trunk. A type 1 VMD file has two or more event trunks. But in this version, VMD file has only one event trunk. SO, this word is always 0.

Trunk Number

This word simply defines the number of event trunk that following the block header. In the type 0 VMD file, this word must be 1, because the file can only contain one event trunk. Type 1 VMD file may contain up to 65,536 (0xFFFF) event trunks. **But in this version, VMD file has only one event trunk. SO, this word is always 1.**

4.2 Event Trunk

Event Trunk ID (4 Byte)	Truck Size (4 Byte)	Event Data
-------------------------------	---------------------------	------------

Chuck ID

This DWORD is always " ETrk" (0x6b725445)

Chunk Size

The size varies depending on the number of bytes following the trunk header. (Trunk header is the "Event Trunk ID" and "Trunk Size".)

Event Data

Contain the VMD MIDI message generating from general MIDI message.

4.3 VMD MIDI Message



It is a time-stamp that makes up each VMD MIDI Message. It represents how many milliseconds to wait before "playing" the message. A delta-time is stored as a series of bytes that is called a variable length quantity. Only the first 7 bits of each byte is significant. So, delta-time, more than 128 milliseconds, has to be unpacked into a series of 7-bit bytes. To indicate which is the last byte of the series, bit 7 must be 0. In all of the preceding bytes, the bit 7 must be 1. Here are some examples of delta-time, and they are presented with little-endian.

Delta Time (millisecond)	Variable Length Quantity (Bin)	Variable Length Quantity (Hex)
0	000000	0
127	01111111	7F
128	10000001 00000000	90 00
511	10000011 01111111	83 7F

Midi Note On Message (9)

1	Delta time L_7 bit				
0	Delta time H_7 bit				
1	0 0 1 Chn num				
0	Note				
Veloc	Velocity 5 bit Dur 1_3 bit				
1	Duration L_7 bit				
0	Duration H_7 bit				

Midi Program change Message (C)

1	Delta time L_7 bit					
0	Delta time H_7 bit					
1	1	1 0 0 Chn Num				
0	Data					

Midi Pressure Message (D)

1	Delta time L_7 bit						
0	Delta time H_7 bit						
1	1	1 0 1 Chn Num					
0	Data						

Midi Pitch Bend Message (E)

1	Delta time L_7 bit						
0	Delta time H_7 bit						
1	1	1 1 0 Chn Num					
0	Data						
0	Data						

Midi Control Message (B)



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1	Delta	Delta time L_7 bit				
0	Delta	Delta time H_7 bit				
1	0	1	1	Chn Num		
1	0	0	0	Ctrl Num		
0	Data					

BankID, 要映射

Control Code	Vmd Code	GM Code
Modulation	0	1
Volume	1	7
Pan	2	10
Express	3	11
Hold1	4	64
Reset Ctrls	5	121
All Note Off	6	123
Reg Para LSB	7	100
Reg Para MSB	8	101
Data Entry MSB	9	6
Data Entry LSB	10	26
Bank Select	11	0



This block stores the PCM or ADPCM streaming data. It has one block header, one event trunk and at least one data trunk.

5.1 Block Header

Block ID (4 Byte)	Block Size (4 Byte)	Block Type (2 Byte)	Trunk Number (2 Byte)
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Block ID

This DWORD is always "VMSB"(0x42534d56)

Block Size

The size varies depending on the number of bytes contained in the block.

Block Type

It is always 1, because there are at least two trunks in this block.

Trunk Number

This word simply defines the number of event trunk that follow the block header. It is always more than two.

5.2 Event Trunk



Chuck ID

This DWORD is always " ETrk" (0x6b725445)

Chunk Size

The size varies depending on the number of bytes following the trunk header. (Trunk header is the "Event Trunk ID" and "Trunk Size".)

Event Data

Contain the VMD WAVE Message generating from general MIDI message.

VMD Wave on message

1	Delta time L_7 bit					
0	Delta time H_7 bit					
1	0 1 0 Chn Num(0-3)					
0	Data					
0	Volume					
0	Pan					



5.3 Data Trunk

Chuck ID

This DWORD is always " DTrk" (0x6b725444)

Chunk Size

The size varies depending on the number of bytes following the trunk header. (Trunk header is the "Data Trunk ID" and "Trunk Size".)

Format

This word can be a value of 0 or 1. 0 means that the streaming data is PCM, and 1 means ADPCM.

Channel Describe the number of channels. 1 means mono, and 2 means stereo.

Bits Per Sample

The value must be among 4, 8, 16 and 32. It must be 4 if the streaming data is adpcm.

Signed or Unsigned 0 means signed, and 1 means unsigned.

Sample Rate Describe the sample rate of streaming data.



6 User Defined Sound Effect (UDSE)

This block stores the PCM or ADPCM sound effect. It has one block header, one event trunk and at least one data trunk. The size of PCM or ADPCM data must be less than 8K bytes.

6.1 Block Header

Block ID

This DWORD is always "VMEB" (0x42454d56)

Block Size

The size varies depending on the number of bytes contained in the block.

Block t Type

It is always 1, because there are at least two trunks in this block.

Trunk Number

This word simply defines the number of event trunk that follow the block header. It is always more than two.

6.2 Event Trunk



Chuck ID

```
This DWORD is always " ETrk" (0x6b725445)
```

Chunk Size

The size varies depending on the number of bytes following the trunk header. (Trunk header is the "Event Trunk ID" and "Trunk Size".)

Event Data

Contain the VMD message generating from general MIDI message.

6.3 Data Trunk

Chuck ID

This DWORD is always " DTrk" (0x6b725444)



Chunk Size

The size varies depending on the number of bytes following the trunk header. (Trunk header is the "Data Trunk ID" and "Trunk Size".)

Format

This word can be a value of 0 or 1. 0 means that the streaming data is PCM, and 1 means ADPCM.

Channel Describe the number of channels. 1 means mono, and 2 means stereo.

Bits Per Sample The value must be among 4, 8, 16 and 32.

Signed or Unsigned 0 means signed, and 1 means unsigned.

Sample Rate Describe the sample rate of streaming data.



7 User Defined Instrument (UDI)

This block stores the extra sample bank for synthesizing. It has one block header and one data trunk. Data trunk size must be less than 8K bytes.

7.1 Block Header

Block ID (4 Byte)	Block Size (4 Byte)	Block Type (2 Byte)	Trunk Number (2 Byte)
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Block ID

This DWORD is always "VMIB"(0x42494d56)

Block Size

The size varies depending on the number of bytes contained in the block.

Block Type

It is always 0, because there is only one data trunk in this block.

Trunk Number

This word simply defines the number of data trunk that follow the block header. It is always 1.

7.2 Data Trunk



Chuck ID

This DWORD is always " DTrk" (0x6b725444)

Chunk Size

The size varies depending on the number of bytes following the trunk header. (Trunk header is the "Data Trunk ID" and "Trunk Size".)

Bank Data NOT DEFINED IN THIS DOCUMENT.



This block stores the control data. It has one block header and one event trunk.

8.1 Block Header

Block ID (4 Byte)	Block Size 4 Byte)	Block Type (2 Byte)	Trunk Number (2 Byte)
----------------------	--------------------------	---------------------------	-----------------------------

Block ID

This DWORD is always "VMKB"(0x424b4d56)

Block Size

The size varies depending on the number of bytes contained in the block.

Block Type

It is always 0, because there are always one trunks in this block.

Trunk Number

This word simply defines the number of event trunk that follow the block header. It is always one.

8.2 Event Trunk

EventTruckTrunk IDSize(4 Byte)(4 Byte)	Event Data
--	------------

Chuck ID

This DWORD is always " ETrk" (0x6b725445)

Chunk Size

The size varies depending on the number of bytes following the trunk header. (Trunk header is the "Event Trunk ID" and "Trunk Size".)

Event Data

Contain the VMD CONTROL message generating from general MIDI message.

VMD Control Message

1	Delta time L_7 bit					
0	Delta time H_7 bit					
1	1 1 1 1 1 1 1					1
FF Message						

FF Message

ID	Len	Description							
ID		Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0

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8	1	Motor		Motor	Led	Blue on	Green	Red on
		Flg		on	Flag		on	
9	1	Motor		Motor	Led	Blue off	Green	Red off
		Flg		off	Flag		off	

This block stores the comments including file title, file author and so on. It has one block header and at least one comment trunk. All of the data is stored in Unicode.

9.1 Head Block

Block ID (4 Byte)	Block Size (4 Byte)	Block Type (2 Byte)	Trunk Number (2 Byte)
----------------------	---------------------------	---------------------------	-----------------------------

Block ID

This DWORD is always "VMCB"(0x42434d56)

Block Size

The size varies depending on the number of bytes contained in the block.

Block Type

It is always 1, because there are at least two trunks in this block.

Trunk Number

This word simply defines the number of event trunk that follow the block header. It is always more than two.

9.2 Title Trunk

Chuck ID

```
This DWORD is always " TTrk" (0x6b725454)
```

Chunk Size

The size varies depending on the number of bytes following the trunk header. (Trunk header is the "Trunk ID" and "Trunk Size".)

Comment Define the author of this file.

9.3 Author Trunk

Chuck ID

Chunk Size

The size varies depending on the number of bytes following the trunk header. (Trunk header is the "Trunk ID" and "Trunk Size".)

Comment

Define the title of this file.

9.4 Comment Trunk

Comment Trunk ID (4 Byte)	Truck Size (4 Byte)	Comment
---------------------------------	---------------------------	---------

Chuck ID

```
This DWORD is always " CTrk" (0x6b725443)
```

Chunk Size

The size varies depending on the number of bytes following the trunk header. (Trunk header is the "Trunk ID" and "Trunk Size".)

Comment Define the other comments of this file. Such as date, copyright and so on.

10.1 Block ID

ID	Description
VMHB	Vmd head block
VMXB	Index head block
VMMB	Midi block head
VMSB	Stream block head
VMEB	User defined sound effect block head
VMIB	User defined instrument block head
VM3B	Mp3 block head
VMKB	Control block head
VMLB	Lyric block head
VMPB	Picture block head
VMCB	Comment block head
ETrk	Event track head
DTrk	Data track head
TTrk	Title track head
ATrk	Author track head
CTrk	Comment track head

11 References

- [1] The Complete MIDI 1.0 Detailed Specification v96.1(second edition), 2001.
- [2] Extensible Music File(XMF) specification v.1.01, 2003.7.
- [3] Downloadable sounds 2.1 specification, 2004.10.
- [4] General MIDI 2 specification v1.1, 2003.9.
- [5] DLS/XMF format for Mobile Devices, 2004.9.