Generic MPF iMX6/iMX28 BBT B User Manual

This is a Multiple Partition format scheme compatible with iMX6 & iMX28 setup. Any bad blocks within the first two partitions (FCB & DBBT) are ignored. The rest of partitions use "Skip bad block" method within each partition. Any bad block found within any of the partitions (3...16) will not cause relocation to the starting block of the follow up partitions. This is for special page layout 4096+256.

Relevant User Options

The following special features on the special features tab apply to this scheme. The default values might work in some cases but please make sure to set the right value according to your system.

Please note only the below special feature items are related to this scheme and ignore any others. If any of below items doesn't exist, please check whether the right version has been installed or contact Data I/O for support by submitting Device Support Request through this address: http://www.dataio.com/support/dsr.asp

Bad Block Handling Type: "Generic MPF iMX6/iMX28 B", Default: None"

Spare Area: "Disabled", Default = Disabled"

PartitionTable File: YourPartitionTable.mbn file

Note – iMX6/iMX28 datasheet suggest allocating the FIRST partition for FCB blocks and the SECOND partition for DBBT blocks. Since the iMX6/iMX28 datasheet recommends that any bad blocks within these TWO partitions should be ignored, so the BBM algorithm will ignore any bad blocks within the first TWO partitions.

As an example, when there are four copies of FCB (occupying blocks 0..3) and block # 1 is bad, as a result, only blocks 0, ~~1,~~ 2, & 3 will contain ~~four~~ three copies of FCB tables.

iMX FCB Copies "4, Default = 4"

The data at page 0 of the binary image starting at offset 0x00 will be duplicated in the blocks 0 thru 3 of the NAND device.

iMX DBBT Create? "Enabled, Default = Disabled"

When this option is enabled, Discovered Bad Block Tables (DBBT) are added.

iMX DBBT Copies (if enabled) "4, Default = 4"

Four copies of DBBT table (including CRC and ECC) will be generated and programmed into the NAND device.

iMX DBBT Starting Page #: "1, Default = 100"

This is the page # of the (1st) DBBT Start Page. The follow up (n-1) three copies of DBBTs will be located at this page number **plus** the **S**tride count (64). i.e. The second

and the follow up (n-1) copies of DBBT tables will be located at page #s 65 (1 + 64), 129 (1 + 64 + 64), and 173 (1 + 64 + 64 + 64).
Note – In general, per the iMX6 datasheet, the **first** partition is allocated for FCB copies and the **second** partition is used for DBBT copies. For this reason, by default, this value is set to "0x100" making the DBBT tables start in the (2nd partition) 4th block (4 x 64 = 256 = 0x100) and thru block # 7.
WHEN it is desired to place FCB & DBBT tables in the same blocks (FCBs and DBBTs share the same blocks), usage of this value, allows the flexibility. As an example, when this value is set to "1", it will make the four copies of FCBs and DBBTs be located at:
FCBs: Block 0, page **0**, block 1, page **0**, block 2, page **0**, & block 3, page **0**
DBBTs: Block 0, page **1**, block 1, page **1**, block 2, page **1**, & block 3, page **1**

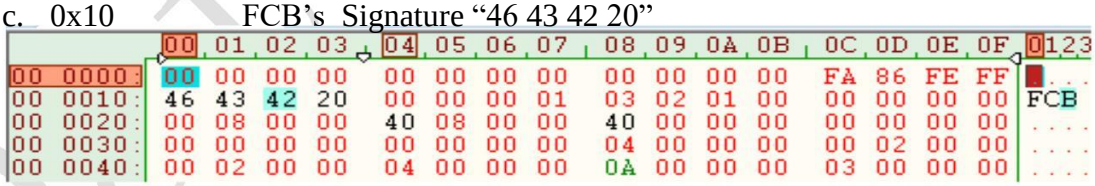
iMX FW Starting Block #: "4, Default = 8"

This FW starting block # has to be greater or equal to FCB & DBBT blocks. For example, if the FCB and DBBT tables (share &) occupy blocks 0 thru 3, then this value has to be 4 or greater in order to preserve the FW contents.

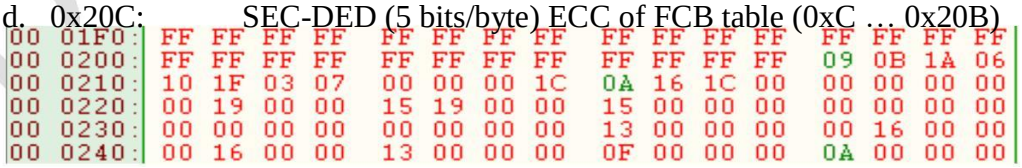
iMX DBBT last partition included in DBBT = " 4 " , Default is " 4 "
Default value 4 means DBBT only cover partition2&3, as partition0&1bad block corresponding data are dropped. Partition over or equals 4 is not covered in DBBT.

Image Preparation: The binary image file consists of three separate areas including **FCB table**, **DBBT table**, and Firmware (**FW**/**User area**). Padding of "FF" should be used between the different sections. Users should not include the DBBT tables in the image as they are generated at run time during the device programing step.

1. **FCB Table:** The FCB table (one copy) must be included in the binary image file at address offset of 0x00 and consists of:
   a. 0x00: 12 bytes of "00"
   b. 0x0C: 32-bit Check Sum of address 0x10 thru 0x20B (of FCB table)
   c. 0x10 FCB's Signature "46 43 42 20"

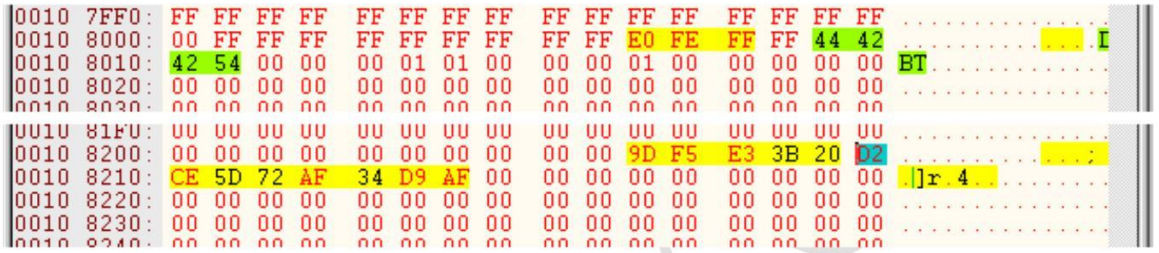


   d. 0x20C: SEC-DED (5 bits/byte) ECC of FCB table (0xC … 0x20B)

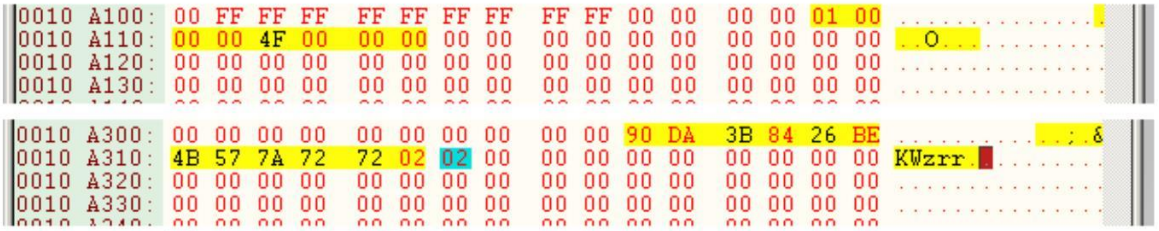


Note – During the programming operation, the Data I/O's programmer will re-calculate and verify the Checksum & the ECC values. If the recalculated values do not match the FCB table contents, the image file will get rejected.
TLWin will duplicate this FCB table (n) four times into blocks 0 thru 4.

2. **DBBT:** DBBT area consists of two sections of the “header” and the actual Table added TLWin software will generate (n) four copies of DBBT table (& its BCH-ECC/Checksum) consisting of two separate sections (pages). These tables will be added only if it is enabled by the Special Features options.
    a. **0x84000-page 0:** Blocks # 4 thru 7 will contain the signature and bad block counts. .



    b. **0x84000-page 4:** The bad block Counts and list of Discovered Bad Blocks are stored in page four of each programmed device.

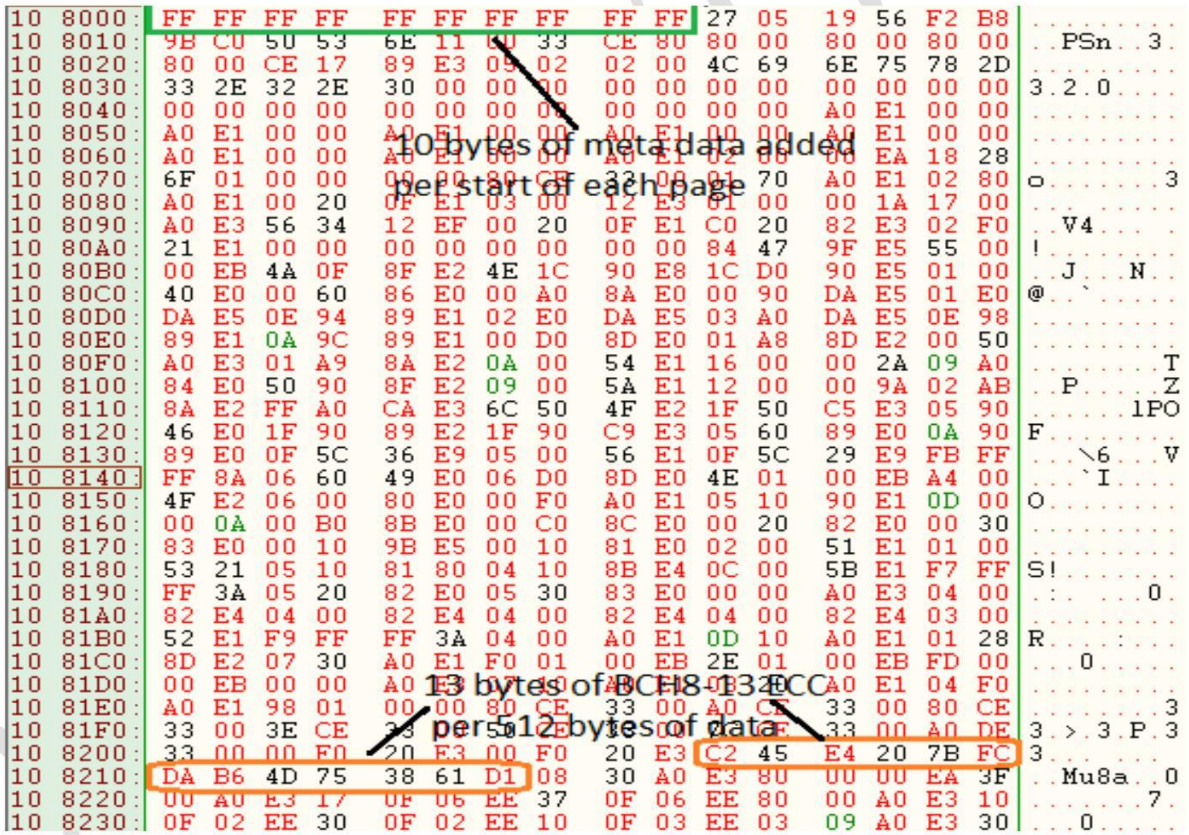


    TLWin software will duplicate this DBBT table (n) four times into blocks 4 thru 7.
    NOTE – The DBBT table header is generated by TLWin software and the user should not have added it to the image file.
    NOTE – When FCB and DBBT tables share the same blocks, (i.e. setting DBBT Start Page to “1”) then FCBs reside in page # 0 while the DBBTs (two sections) reside in page #s 1 & 5.

3. **FW & Other Binary Data:** The FW and other image data should start at an address beyond the FCB & DBBT tables. For example address 0x10,000 is used when FW Starting Block # is 8.) This area data and should not include any spare area or ECC data. TLWin will reformat these pages and add BCH8-13 ECC data.

```
000ffff0h: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF ; ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
00100000h: 27 05 19 56 F2 B8 9B C0 50 53 6E 11 00 33 CE 80 ; '..Vò¸›ÀPSn..3Î€
00100010h: 80 00 80 00 80 00 80 00 CE 17 89 E3 05 02 02 00 ; €.€.€.€.Î.‰ã....
00100020h: 4C 69 6E 75 78 2D 33 2E 32 2E 30 00 00 00 00 00 ; Linux-3.2.0.....
00100030h: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ; ................
00100040h: 00 00 A0 E1 00 00 A0 E1 00 00 A0 E1 00 00 A0 E1 ; .. á.. á.. á..
00100050h: 00 00 A0 E1 00 00 A0 E1 00 00 A0 E1 00 00 A0 E1 ; .. á.. á.. á..
00100060h: 02 00 00 EA 18 28 6F 01 00 00 00 00 80 CE 33 00 ; ...ê.(o.....Î3.
00100070h: 01 70 A0 E1 02 80 A0 E1 00 20 0F E1 03 00 12 E3 ; .p á.€ á. .á...ã
```

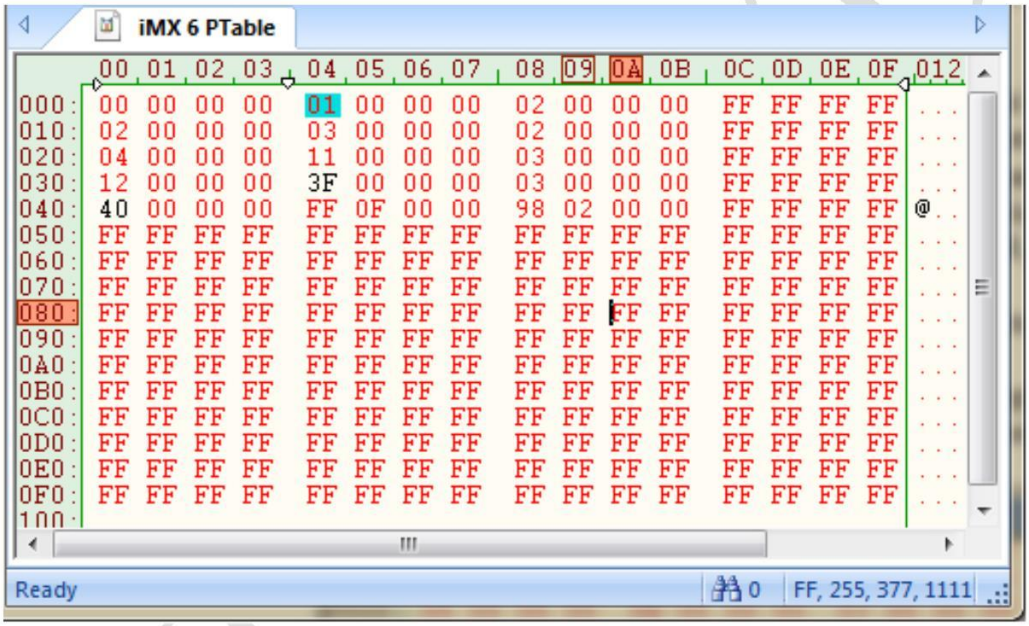
Note – TLWin software will rearrange each page (2048 KB) of data by adding 10 bytes of Meta bytes and 13 bytes of ECC per 512 bytes of data.



Partition Table Format Partition.mbn

- A binary file of YourFile.MBN with fixed length of 256 bytes.
- Organization: 16 rows x 4 columns. Each table item is 32-bits, little endian byte ordering.

- Each row of the table describes configuration for one partition. Up to 16 partitions can be used.
- Partition configuration:
    i. **Start Adr**: address of start of partition in flash blocks. The programmer will set the file read pointer and the programmer write pointer to Start Adr. If Start Adr is 0xFFFFFFFF, skip to the next partition.
    ii. **End Adr**: last valid block in the current partition. The last data block programmed must be equal to or less than **End Adr**, otherwise the programmer will reject the flash device.
    iii. **Actual Data Length**: number of blocks of data to read from the input file and write to the flash in the current partition.
    iv. **Note**: For optimal option, the following example should be used and the 3rd to the last partitions should be adjusted as needed.



Important NOTE: The partition table must allocate the **first** two partitions for FCB and DBBT tables. When the FCB and DBBT tables share the same blocks, still two partitions should be allocated for them. As an example, when FCB copies is 4, and DBBT copies is 4, and they share the same blocks, then Partition # 1 should be 0..1, and size of 2 while the partition # 2 would be 2..3 and size of 2.

This document Version #: V1.0

- Used iMX28 User Guide and added support to allow FCB and DBBT tables share the same blocks.

Date: 11/17/2020

Appendix

You can get the file "Description of common NAND Special Features.pdf" from
http://ftp.dataio.com/FCNotes/BBM/