AMDVBFLASH
User Guide

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Revision History

Date	Revision	Changes
June 2022	1.00	Initial version of the document
Feb 2024	1.01	Incremental updates

Table of Contents

OVERVIEW

- AMDVBFlash is a console mode utility for AMD GPU device in a diagnostics environment providing ability to flash the VBIOS.

- AMDVBFlash utility supports erasing and programming video VBIOS on multiple platforms, including
– Windows 64 bit
– Linux

General Notes

- The OEM region is 256 bytes in size at offset 0x1F0000(198KB) of the 2MB SPIROM. IF the OEM size is less than 256 bytes, the tool will pad the remaining space with 0x00 bytes to reach a total of 256 bytes.

SET UP

Tool Execution Step

- **Windows (Windows 64 bit)**
  - Install the amdvbflash installer package
    - This will internally install the required tools driver required to run the tool.
  - From the windows command prompt, go to the installed folder.
    - Tool will be installed under "C:\Program Files\AMD\AMDVbFlash" or
  - Run "amdvbflash.exe" with suitable command line arguments as required.

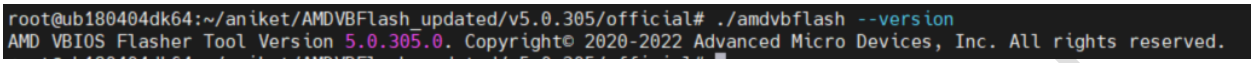
- **Linux**
  - Unzip the tar.gz file to any folder.

- Run "./amdvbflash" with suitable command line arguments as required.

COMMAND LINE OPTIONS

version Command

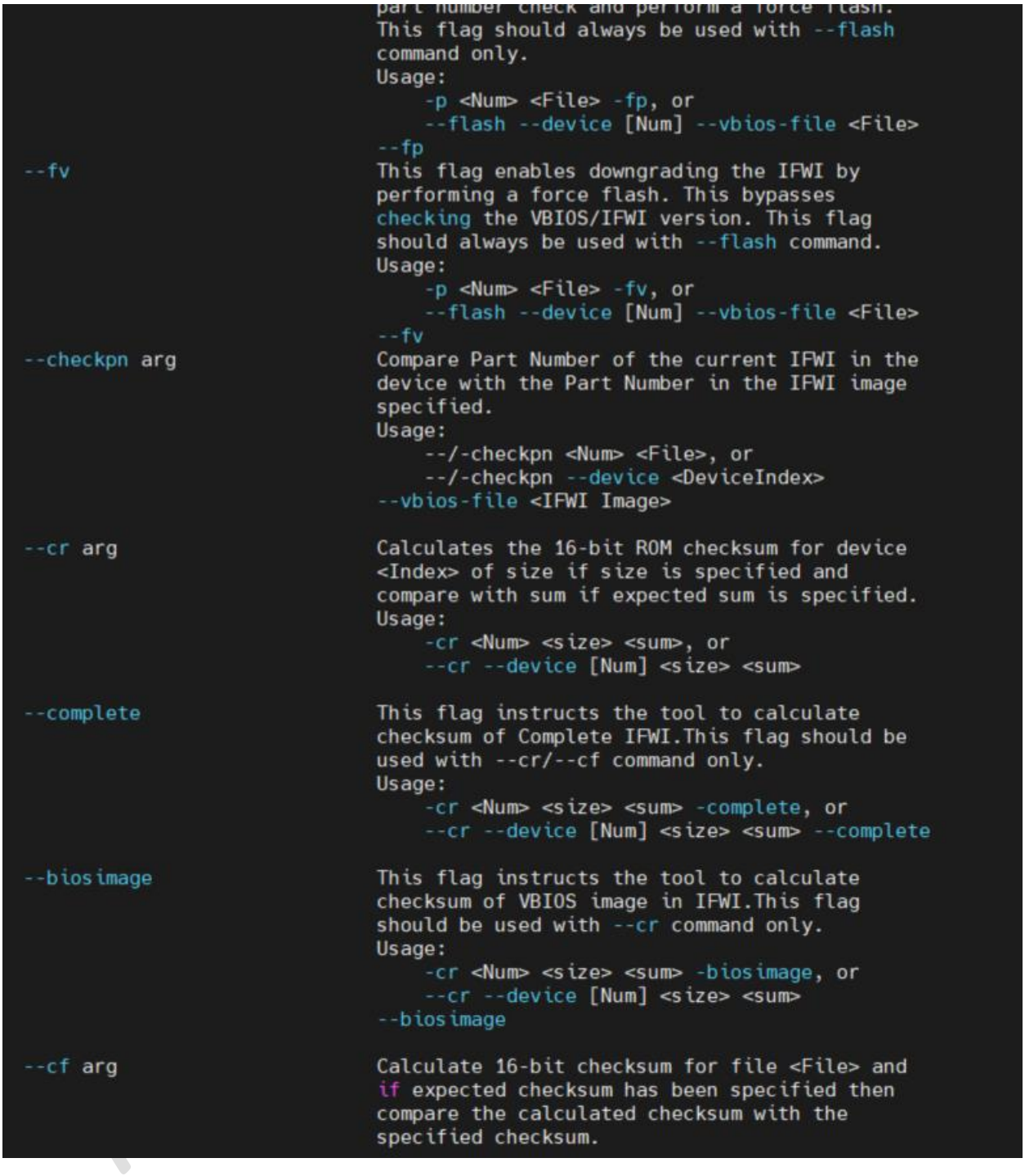
➢ Run amdvbflash –version command to fetch the tool version



Help Command

➢ Run amdvbflash (or amdvbflash –h, amdvbflash –help, amdvbflash -?) command to display the help

```
Command line switches for the flash capability:
  -s [ --save ] arg             This flag instructs the tool to save the VBIOS
                                image. This has to be used along-with the
                                --device switch and the --vbios-info. If
                                --vbios-file is not specified then the file
                                name is constructed at run time with the
                                following format [ASIC]_[BDF]_[Index].rom
  -p [ --flash ] arg            Write VBIOS image in file <file> to flash ROM
                                in ASIC <Num>.
                                Usage:
                                    -p <Num> <File>, or
                                    --flash --device [Num] --vbios-file <File>
  --vbios-info                  This flag when used along with --show flag
                                instructs the tool to show the VBIOS
                                Information from the file specified by using
                                the --vbios-file option
  --vbios-file arg              Specify the VBIOS file to work with. This
                                option can be used to save the VBIOS image to
                                this file as well as to read VBIOS image from
                                this file
  --bios-file-info arg          Display the BIOS info in the given file
  --savefile-at-end             This flag instructs the tool to save the whole
                                VBIOS content read from the ROM Controller at
                                the end of read operation. This should always
                                be used only with --save flag. If not used, by
                                default the tool keeps writing ROM contents
                                read in each iteration to the file.
  --save-flashed-bytes          This flag instructs the tool to save the bytes
                                being flashed to the SPIROM to a file for
                                debugging purpose. This will enable the user to
                                additionaly verify what and how many bytes have
                                been written to the SPIROM at the end of flash
                                operation. This flag should always be used with
                                --flash command only. If not used, by default
                                the bytes won't be additionally saved to a
                                file.
  --fa                          This flag enables force flashing the same IFWI
                                version. Should be used with the --flash
                                switch.
                                Usage:
                                    -p <Num> <File> -fa, or
                                    --flash --device [Num] --vbios-file <File>
                                --fa
  --fp                          This flag instructs the tool to bypass BIOS
                                part number check and perform a force flash.
```



```
                                part number check and perform a force flash.
                                This flag should always be used with --flash
                                command only.
                                Usage:
                                    -p <Num> <File> -fp, or
                                    --flash --device [Num] --vbios-file <File>
                                --fp
--fv                            This flag enables downgrading the IFWI by
                                performing a force flash. This bypasses
                                checking the VBIOS/IFWI version. This flag
                                should always be used with --flash command.
                                Usage:
                                    -p <Num> <File> -fv, or
                                    --flash --device [Num] --vbios-file <File>
                                --fv
--checkpn arg                   Compare Part Number of the current IFWI in the
                                device with the Part Number in the IFWI image
                                specified.
                                Usage:
                                    --/-checkpn <Num> <File>, or
                                    --/-checkpn --device <DeviceIndex>
                                --vbios-file <IFWI Image>

--cr arg                        Calculates the 16-bit ROM checksum for device
                                <Index> of size if size is specified and
                                compare with sum if expected sum is specified.
                                Usage:
                                    -cr <Num> <size> <sum>, or
                                    --cr --device [Num] <size> <sum>

--complete                      This flag instructs the tool to calculate
                                checksum of Complete IFWI.This flag should be
                                used with --cr/--cf command only.
                                Usage:
                                    -cr <Num> <size> <sum> -complete, or
                                    --cr --device [Num] <size> <sum> --complete

--biosimage                     This flag instructs the tool to calculate
                                checksum of VBIOS image in IFWI.This flag
                                should be used with --cr command only.
                                Usage:
                                    -cr <Num> <size> <sum> -biosimage, or
                                    --cr --device [Num] <size> <sum>
                                --biosimage

--cf arg                        Calculate 16-bit checksum for file <File> and
                                if expected checksum has been specified then
                                compare the calculated checksum with the
                                specified checksum.
```

Display Information Command (-i)

- Display all AMD graphic cards information detected on the system
- General graphic cards information

COMMAND:

amdvbflash -i <Num>

amdvbflash --show --device <Num>

Display information of all the AMD adapter on the system or for specific adapter <Num> if specified.

```
root@ub180404dk64:~/aniket/AMDVBFlash_updated/v5.0.305/official# ./amdvbflash -i
SNo BDF           DID ASIC      SPIROM          Size Test BIOS P/N
___ ____________ ____ ________ _________ ________ ____ ________________
  0 0000:03:00.0 73f0 Navi33    GD25Q16E    0x200000 Pass 113-D7460101
  1 0000:06:00.0 73f0 Navi33    GD25Q16E    0x200000 Pass 113-D7460101
```

```
root@ub180404dk64:~/aniket/AMDVBFlash_updated/v5.0.305/official# ./amdvbflash -i 1
SNo BDF           DID ASIC      SPIROM          Size Test BIOS P/N
___ ____________ ____ ________ _________ ________ ____ ________________
  1 0000:06:00.0 73f0 Navi33    GD25Q16E    0x200000 Pass 113-D7460101
```

Display Information Command (-ai)

- Advanced graphic cards information
- Displays other details like Product name, Config file, Version, date and time information along with all UEFI GOP Driver image information

COMMAND:

amdvbflash -ai <Num>

amdvbflash --show --advanced --device <Num>

Display advanced information of all the AMD adapter on the system or for specific adapter <Num> if specified.

```
root@ub180404dk64:~/aniket/AMDVBFlash_updated/v5.0.305/official# ./amdvbflash -ai 0

Adapter 0 (0x0000:03:00.0)
    ASIC Family                   Navi33
    Flash Type                    GD25Q16E
    Product Name                  D746_XT_A0_8GB_Bringup_NAVI33_Test_00479.sbin
    Bios Config File              NAVI33.bin
    Bios P/N                      113-D7460101
    Bios Version                  022.003.000.047.000001
    Bios Date                     03/29/22 11:51:32

Image 0 -- Offset 0x0000
_____________________
  ROM header contents:
    Signature                     0xaa55
    PCIR Offset                   0x03ac
  PCI Data Structure:
    Signature                     PCIR
    Vendor ID                     0x1002
    Device ID                     0x73f0
    PCI Revision                  0x0
    Image Size                    0x3400
    Code Revision                 0x1603
    Indicator                     0x0     (Not Last Image)
    Code Type                     0x0     (Intel IA-32, PC-AT compatible)
    Legacy BIOS File Name         NAVI33.bin
    Legacy BIOS Part Number       113-D7460101
    Legacy BIOS Build Number      00009903
    Legacy BIOS Change List       0000
    Binary BIOS Identifier (IDTF) 0x80d4b29e

Image 1 -- Offset 0x3400
_____________________
    Signature                     0xaa55
    PCIR Offset                   0x001c
  PCI Data Structure:
    Signature                     PCIR
    Vendor ID                     0x1002
    Device ID                     0x73f0
    PCI Revision                  0x0
    Image Size                    0xae00
    Code Revision                 0x0000
    Indicator                     0x0     (Last Image)
    Code Type                     0x0     (EFI)
    Image Size                    0x00000ef1
    Compression Type              0x0     (Compressed)
    MachineType                   0x8664  (X64 Machine Type)
    Subsystem                     0x0b    (EFI Boot Service Driver)
```

```
 EFI Image Offset              0x5c     (abs: 0x4345c)
UEFI IDs from EFI_PCI_EXPANSION_ROM_HEADER
 UEFI Source Revision          GOP AMD REV: 000.000.000.022.003
 UEFI Source Change List       0000
 UEFI BIOS Build Number        9903
GOP Driver Info:
 Machine Type Code             0x8664   (AMD64 (K8))
 Authenticode Signed           false
 GOP Image Size                0x13460   (77KB)
 Driver Name                   AMD GOP X64 Rel Driver Rev.3.3.4.Feb 24 2022.23:00:30
 UEFI Major Revision           0x0
 UEFI Minor Revision           0x0
 UEFI Fix Revision             0x0
 Legacy Major Version          0x0
 Legacy Minor Version          0x0
 GOP AMD Build
 GOP AMD CL
 GOP BIOS Identifier (IDTF)    0xdeadbeef
 Driver Carries legacy tables  false
```

Save VBIOS Command (-s)

- Save the VBIOS image from the ROM to a specified file.

COMMAND:

amdvbflash -s <Num> <File>

amdvbflash --save --device <Num> --vbios-file <File>

Read the VBIOS image into file <File> to save the ROM contents in Adapter <Num>

```
root@ub180404dk64:~/aniket/AMDVBFlash_updated/v5.0.305/official# ./amdvbflash -s 0 D746101.sbin
VBIOS Image of Size: 0x200000 Saved.
```

Program VBIOS Command (-p)

- Program VBIOS image into the ROM
- Flash VBIOS at specific graphic card

COMMAND:

amdvbflash -p <Num> <File>

amdvbflash --flash --device <Num> --vbios-file <File>

Write VBIOS image in file <File> to flash ROM in Adapter <Num>

```
root@ub180404dk64:~/aniket/AMDVBFlash_updated/v5.0.305/official# ./amdvbflash -p 0 D746_XT_A0_8GB_Bringup_NAVI33_Test_00479.sbin
Existing VBIOS version:          022.003.000.047.000001
VBIOS version To be flashed:     022.003.000.047.000001
----------------------------
Existing VBIOS part number:      113-D7460101
VBIOS part number To be flashed: 113-D7460101
----------------------------
Existing VBIOS SSID:             0xE41
SSID To be flashed:              0xE41
----------------------------
Flashed: 0x200000 Bytes Successfully.

Please REBOOT the System to Complete VBIOS Update.
```

Get VBIOS File information Command (--bios-file-info)

- Fetch detailed bios file information for the IFWI file provided by user

COMMAND:

amdvbflash --bios-file-info <File>

```
root@ub180404dk64:~/aniket/AMDVBFlash_updated/v5.0.305/official# ./amdvbflash --bios-file-info D746101.sbin
    Product Name                 D746_XT_A0_8GB_Bringup_NAVI33_Test_00479.sbin
    Bios Config File             NAVI33.bin
    Bios P/N                     113-D7460101
    Bios Version                 022.003.000.047.000001
    Bios Date                    03/29/22 11:51:32

Image 0 -- Offset 0x0000
________________
  ROM header contents:
    Signature                    0xaa55
    PCIR Offset                  0x03ac
  PCI Data Structure:
    Signature                    PCI
    Vendor ID                    0x1002
    Device ID                    0x73f0
    PCI Revision                 0x0
    Image Size                   0x3400
    Code Revision                0x1603
    Indicator                    0x0     (Not Last Image)
    Code Type                    0x0     (Intel IA-32, PC-AT compatible)
    Legacy BIOS File Name        NAVI33.bin
    Legacy BIOS Part Number      113-D7460101
    Legacy BIOS Build Number     00009903
    Legacy BIOS Change List      0000
    Binary BIOS Identifier (IDTF) 0x80d4b29e

Image 1 -- Offset 0x3400
________________
    Signature                    0xaa55
    PCIR Offset                  0x001c
  PCI Data Structure:
    Signature                    PCIR
    Vendor ID                    0x1002
    Device ID                    0x73f0
    PCI Revision                 0x0
    Image Size                   0xae00
    Code Revision                0x0000
    Indicator                    0x0     (Last Image)
    Code Type                    0x0     (EFI)
    Image Size                   0x00000ef1
    Compression Type             0x0     (Compressed)
    MachineType                  0x8664  (X64 Machine Type)
    Subsystem                    0x0b    (EFI Boot Service Driver)
    EFI Image Offset             0x5c    (abs: 0x4345c)
```

```
UEFI IDs from EFI_PCI_EXPANSION_ROM_HEADER
  UEFI Source Revision          GOP AMD REV: 000.000.000.022.003
  UEFI Source Change List       0000
  UEFI BIOS Build Number        9903
GOP Driver Info:
  Machine Type Code             0x8664   (AMD64 (K8))
  Authenticode Signed           false
  GOP Image Size                0x13460   (77KB)
  Driver Name                   AMD GOP X64 Rel Driver Rev.3.3.4.Feb 24 2022.23:00:30
  UEFI Major Revision           0x0
  UEFI Minor Revision           0x0
  UEFI Fix Revision             0x0
  Legacy Major Version          0x0
  Legacy Minor Version          0x0
  GOP AMD Build
  GOP AMD CL
  GOP BIOS Identifier (IDTF)    0xdeadbeef
  Driver Carries legacy tables  false
```

Get IFWI Version Information (--ifwi-version)

- Fetch IFWI Version (BIOS Part Number information) from where the dGPU is booted from.

COMMAND:

amdvbflash --show --ifwi-version --device <adapter_number>

```
C:\Users\Administrator\Desktop\aniket\amdvbflash\sanitycheck>amdvbflash.exe --show --ifwi-version --device  0
AMD IFWI Flasher Tool Version 5.0.707.0-External. Copyright┬⌐ 2020-2024 Advanced Micro Devices, Inc. All rights reserved.

Detecting AMD GPU/APU. Please wait...
113-D7120201-000
```

amdvbflash --show --ifwi-version --device <adapter_number> --silent

Only displays the ifwi partnumber information and removes all other tool console output for easier parsing of actual value.

```
C:\Users\Administrator\Desktop\aniket\amdvbflash\sanitycheck>amdvbflash.exe --show --ifwi-version --device 0 --silent
113-D7120201-000
```

Compare Checksum Command (-cf/-cr)

- Compare the VBIOS image and ROM content checksum

COMMAND:

amdvbflash -cf <File> [Sum]

Calculate 16-bit checksum for <File>. Checksum for the file is compared to [Sum] which is the expected checksum.

amdvbflash -cr <Num> [Size] [Sum]

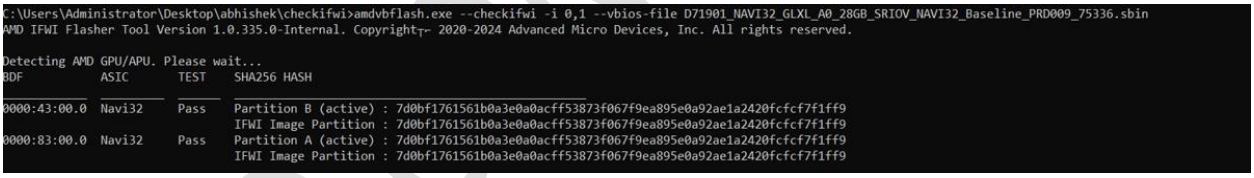
Calculate 16-bit ROM checksum for adapter <Num> and compare it to the [Sum] specified. This command is the same as -cb if [Size] is specified.

Compare IFWI partition (--checkifwi)

- Compare SHA256 hash value of active partition of the specified device with the SHA256 has value of the partition in the IFWI image specified.

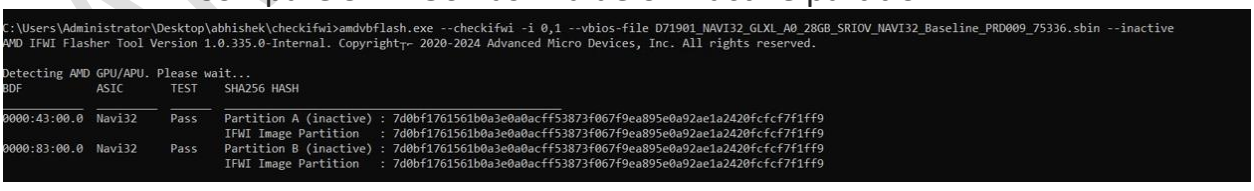
COMMAND:

amdvbflash --checkifwi --device <adapter_number> --vbios-file <IFWI Image>



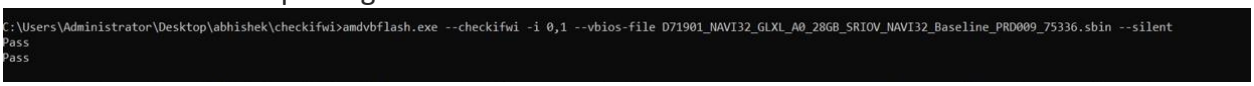
amdvbflash --checkifwi --device <adapter_number> --vbios-file <IFWI Image> --inactive

Compare SHA256 hash value of inactive partition.



amdvbflash --checkifwi --device <adapter_number> --vbios-file <IFWI Image> --silent

Only displays the main result and removes all other tool console output for easier parsing of actual value.



Flash an Empty/Corrupted SPIROM via tool

This sequence is only applicable for Navi3x and above program.

Precondition:

- Empty/Corrupted SPIROM.
- The display should be driven by the integrated GPU(iGPU) or another dGPU.

Steps to recover:

1. Flash via AMDVBFlash – this step will directly write the “recovery IFWI” to SPIROM.
2. Perform a power cycle. After the power cycle, the user needs to reflash the IFWI image to ensure the underlying firmware can validate all the necessary signatures.
3. Flash again via AMDVBFlash – in this step we usually use the same IFWI image as in step#1 above, although it’s not mandatory to do so.
4. Perform power cycle.

Power cycle steps:

1. Shut down the system.
2. Turn off or unplug the power supply.
3. Press and hold the power button on your system until all the LED on board turn off. This will flush out any lingering power. Alternatively, you can wait for 3 minutes to clear any lingering power.
4. Power the system back on.

Return Codes

Decimal Base	Description
0	Success
1	Generic error
2	Operation aborted
3	Invalid handle
4	Insufficient memory to perform the operation
5	Invalid argument was provided to a function call
6	The pointer is null

7	An attempt was made to access element outside the available size
8	Access is denied to the requested resource
9	Functionality not implemented
10	The requested interface is not available
11	An unexpected error occured
12	Invalid command line option
13	Incorrect boost any cast operation
14	Timeout
15	Memory copying failure
16	Exported function not available
17	Key is already present in the map
18	The datatype of value being read from the Windows Registry does not match with the actual DataType of the Registry value
19	Reserved
20	File related error
21	Zlib related error
22	Cryptography related error
23	Driver related error
24	Big Number Arithmetic related error
25	Curl related error
26	EULA not accepted
27	Windows Registry error
28-49	Reserved
50	SMC related error
51	SBDF related error
52	PSP related error
53	Generic error
54	Flash related error
55	I2C errors
56	FRU/RMFW related error
57	Signature verification failed
58	RAS related error