

FAT File System Test Suite User Guide

Version 1.10

For use with FAT File System Test Suite versions 2.06 and above

Date: 21-Mar-2016 15:35

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1 System Overview

1.1 Introduction

This guide is for those who want to test an HCC Embedded FAT file system.

This test suite allows you to test many file system functions, including the following:

- File creation and writing.
- Checking file content.
- Handling of "a", "a+", "w", and "w+" files.
- Concurrent access with "r" files.
- Formatting.
- Power failure.
- Finding and seeking.
- Renaming.
- Bad block detection.
- Partitions.
- Finding and deletion of Shift JIS Japanese character set files.
- File and directory operations with Shift JIS characters.

1.2 Feature Check

The main features of the module are the following:

- It provides a full test capability for HCC Embedded FAT file systems.
- It conforms to the HCC Advanced Embedded Framework.
- It can be used with or without an RTOS.
- It conforms to the HCC Coding Standard.

1.3 Packages and Documents

Packages

The table below lists the packages that you need in order to use this module.

Package	Description
<code>hcc_base_docs</code>	This contains the two guides that will help you get started.
<code>fs_fat_test</code>	The FAT file system test package.

Documents

For an overview of HCC file systems and guidance on choosing a file system, see [Product Information](#) on the main HCC website.

Readers should note the points in the [HCC Documentation Guidelines](#) on the HCC documentation website.

HCC Firmware Quick Start Guide

This document describes how to install packages provided by HCC in the target development environment. Also follow the *Quick Start Guide* when HCC provides package updates.

HCC Source Tree Guide

This document describes the HCC source tree. It gives an overview of the system to make clear the logic behind its organization.

HCC FAT File System Test Suite User Guide

This is this document.

1.4 Change History

This section includes recent changes to this product. For a list of all the changes, refer to the file **src/history/fat/fat_test.txt** in the distribution package.

Version	Changes
2.06	Eliminated warnings.
2.05	Added new test cases to f_dotest() to verify new handling of "a", "a+", "w" and "w+" files, and also concurrent access with "r" files.
2.04	Introduced psp_stdio: psp_sprintf() is now used instead of sprintf() .
2.03	Added new test cases to f_renaming() .
2.02	Fixed conditional compilation. Added f_seteof() test.

2 Source File List

This section describes all the source code files included in the system. These files follow the HCC Embedded standard source tree system, described in the *HCC Source Tree Guide*. All references to file pathnames refer to locations within this standard source tree, not within the package you initially receive.

Note: Do not modify any files except the configuration file and PSP files.

2.1 API Header File

The file `src/api/api_fat_test.h` should be included by any application using the system. This is the only file that should be included by an application using this module. For details of the functions, see [API](#).

2.2 Configuration File

The file `src/config/config_fat_test.h` contains all the configurable parameters of the system. Configure these as required. This is the only file in the module that you should modify. For details of these options, see [Configuration Options](#).

2.3 Source Code File

The file `src/fat/test/fat_test.c` contains the source code. **This file should only be modified by HCC.**

2.4 PSP Files

These files in the directory `src/psp/target/fat_test` provide functions and elements that the core code needs to use, depending on the hardware. Modify these files as required for your hardware; see [Setting up Your Drive](#).

File	Description
<code>fat_testport.c</code>	Source code.
<code>fat_testport.h</code>	Header file.

2.5 Version File

The file `src/version/ver_fat_test.h` contains the version number of this module. This version number is checked by all modules that use this module to ensure system consistency over upgrades.

3 Configuration Options

Set the system configuration options in the file `src/config/config_fat_test.h`. This section lists the available configuration options and their default values.

Note: The first two options only apply if `USE_MALLOC` is set.

FN_MAXVOLUME

The number of volumes. This is only needed for library builds. The default value is 3.

TEST_MALLOC_MAXFILES

Set this to 1 if you want to check the maximum number of files. The default value is 0.

TEST_FULL_COVERAGE

Set this to 1 if you want to check full coverage. The default value is 0.

This test also checks bad block handling and failures on the test drive. Note that this test needs more memory to run.

MAX_BUFFERSIZE

The size of the buffer used for test functions. A smaller buffer size results in fewer tests. Valid values are: 256, 512, 1024, 2048, 8192, 16384 and 32768. The default value is 16384.

- For the *f_writing* test set at least 2560.
- For the *f_seekpos* test set at least 8192 bytes. Lower values will result in fewer *f_seeking* tests.

RIT_NUM_OF_RECORDS

The number of RIT tests. The default value is 100.

TEST_OPEN_NONSAFE

Set this if non-safe open needs to be tested. (This is only valid if safe mode is allowed). The default value is 0.

4 Running Tests

This section shows to run a test.

4.1 f_dotest Function

Use this function to run tests on a volume.

Format

```
void f_dotest ( uint32_t vol_id )
```

Arguments

Argument	Description	Type
vol_id	The ID of the volume to test.	uint32_t

Return Values

Return value
None.

4.2 Setting up Your Drive

Editing `fat_testport.c`

To set up your drive for testing, modify the two lines in the PSP template file `fat_testport.c` described below.

- Line 41 initially appears as shown below. Edit this line to include the api file for the drive you want to test.

```
#include "../../../api/api_mdriver_ram.h"
```

- Line 67 initially appears as shown below. Edit this line to change `ram_initfunc` to the `init()` function of the drive that you want to test. This should be exposed in the api file included at line 41.

```
ret = f_initvolume( (int)vol_id, ram_initfunc, vol_id );
```

This table shows examples of the `init()` functions used for the main drive types:

Drive type	Function
RAM	<code>ram_initfunc()</code>
Compact Flash (CFC)	<code>cfc_initfunc()</code>
MMC	<code>mmc_initfunc()</code>
Mass Storage	<code>mst_initfunc()</code>

These can be seen in the `f_initvolume()` function.

Selecting Functions to Print Test Results

The `f_dump()` and `f_result()` functions in `fat_testport.c` call `printf()` to output the test results. You can replace these `printf()` calls with calls to appropriate functions that output to your required location.

4.3 Starting the Test

Use the function `f_dotest()` to run the tests on the specified volume. The following example code shows how to do this:

```
{  
  
    fs_init();      /* Initialize the file system */  
  
    fs_start();    /* Start the file system */  
  
    f_enterFS();   /* Register the task with the file system */  
  
    f_dotest( 0 ); /* Execute the test suite on the first volume */  
  
    .....  
  
}
```

5 Integration

The test suite is designed to be as open and as portable as possible. No assumptions are made about the functionality, the behavior, or even the existence, of the underlying operating system. For the system to work at its best, perform the porting outlined below. This is a straightforward task for an experienced engineer.

5.1 PSP Porting

The Platform Support Package (PSP) is designed to hold all platform-specific functionality, either because it relies on specific features of a target system, or because this provides the most efficient or flexible solution for the developer.

The test suite makes use of the following standard PSP functions:

Function	Package	Element	Description
psp_getrand()	psp_base	psp_rand	Gets a random number.
psp_memset()	psp_base	psp_string	Sets the specified area of memory to the defined value.
psp_sprintf()	psp_base	psp_stdio	Prints a string.
psp_strlen()	psp_base	psp_string	Gets the length of a string.
psp_strncmp()	psp_base	psp_string	Compares two strings of defined length.