OMA download

Customization Guide Document

Programming Guide

Customer Support

MT6000

Doc No:	CS6000-L5A-PGD-V2.0EN
Version:	V2.0
Release date:	2016-08-29
Classification:	internal

Keywords
OMA Download

MediaTek Inc.

Postal address
No. 1, Dusing 1st Rd. , Hsinchu Science Park, Hsinchu City, Taiwan 30078

MTK support office address
No. 1, Dusing 1st Rd. , Hsinchu Science Park, Hsinchu City, Taiwan 30078

Internet
http://www.mediatek.com/

Document Revision History

Revision	Date	Author	Description
V1.0	2011-04-12	Xiaoshuai Li	Initial Draft.
V2.0	2015-11-30	Juan Xie	Update for UI and source code

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1 Introduction

☞ [Random filler text. Not intended for actual reading.] Must keep the chapter even it have empty content.

1.1 Purpose

This document provides the user guidelines for the OMA Download and associated modules. It describes how to download a OMA media file on the Android platform. This manual also elaborates the mechanism required to use the OMA object.

[Random filler text. Not intended for actual reading.] This section should describe about the following items:

- What does this document provide?
- What should the reader get after reading the document?
- Any concrete outcome (gains, or applications) can get after step-by-step following the document?

1.2 Who Should Read This Document

This document is primarily intended for:

- Engineers with technical knowledge of the DownloadProvider and OMA DRM.
- Customers who integrate the OMA Download with user-defined applications

2 References

☞ [Random filler text. Not intended for actual reading.] Must keep the chapter even it have empty content.

3 Definitions

☞ [Random filler text. Not intended for actual reading.] Must keep the chapter even it have empty content.

4 Abbreviations

Please note the abbreviations and their explanations provided in Table 4-1. They are used in many fundamental definitions and explanations in this document and are specific to the information that this document contains.

Table 4-1. Abbreviations

Abbreviations	Explanation
MTK	MediaTek, Asia's largest fabless IC design company.
OMA	Open Mobile Alliance
DRM	Digital Rights Management

☞ [Random filler text. Not intended for actual reading.] Must keep the chapter even it have empty content.

5 Overview

This chapter first gives a brief description of the modules of the system and the relationship of the modules.

5.1 Architecture

The working flow of OMA Download is shown below:

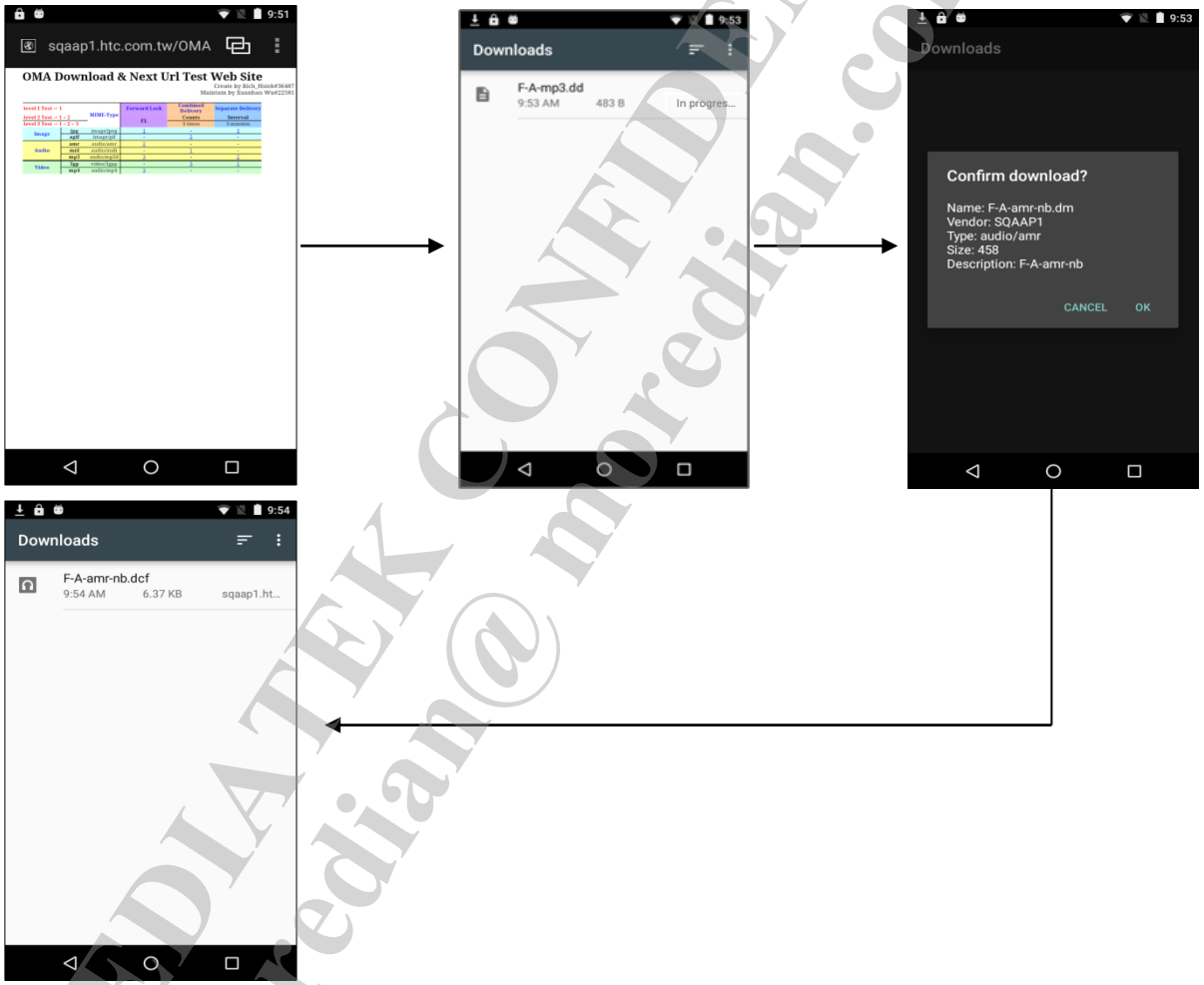


Figure 5-1. Main flows of OMA Download.

5.2 Source Code Organization

The OMA Download is integrate to DownloadProvider. All the source code is under *packages/providers/DownloadProvider/src/com/android/providers/downloads*. And the source code for UI operation is under *packages/providers/DownloadProvider/ui/src/com/android/providers/downloads/ui*

6 Download for Description File

6.1 Descriptor

The descriptor is presented by a description file which suffix is .dd. It is a xml file. The Downloading of the file is same as other ordinary files and is stored on sdcard. After the file is download successfully, it will be parsed by program.

6.1.1 Parse Description File

There are three classed used to parse description xml file. They are OmaDescription.java, OmaDownload.java, OmaStatusHandlers.java.

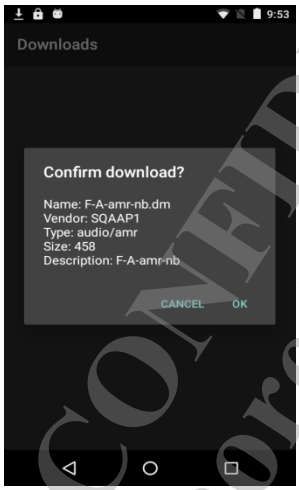
A function is export to application to parse xml file:

```
/**
* This method parses an xml file into a provided component.
@param  ddUrl  the URL of the download descriptor file
@param  file  the file containing the XML to be parsed
@param  component  the component to which the parsed xml data should be
added
@return  the status code (success or other error code)
*/
protected static int parseXml (URL ddUrl, File file, OmaDescription
component)
```

7 OMA Download Confirm Dialog

7.1 Show File Information

Because of OMA download need show description information to user, we need to add a AlertDialog in download UI. The follow picture show the description information on AlertDialog.



The related modified code is as follow:

```
private void handleOmaDownload() {
        String whereClause = null;
        if (Downloads.Impl.OMA_DOWNLOAD_SUPPORT) {
            whereClause = "(" + Downloads.Impl.COLUMN_STATUS + " == '" +
            Downloads.Impl.STATUS_NEED_HTTP_AUTH + "') OR (" +
            Downloads.Impl.COLUMN_STATUS + " == '" +  ...
            ...
        }
        ...
        try{
            if (Downloads.Impl.OMA_DOWNLOAD_SUPPORT) {
            cursor = getContentResolver().query(……);
            ...
            if (cursor != null) {
                showAlertDialog(cursor);
            }
            ...
        }
```

```
}
private void showAlertDialog(Cursor cursor) {
    for(cursor.moveToFirst(); !cursor.isAfterLast();cursor.moveToNext()){
        ...
        popAlertDialog(omaDownloadID, null, title.toString(),
             message.toString(), showReason);
        ...
    }
}
```

8 Report Status to Server

When download media object successfully or occur exception, the program will send a request to web server. This is install notify. The follow code shows how to send the request:

```
if (Downloads.Impl.OMA_DOWNLOAD_SUPPORT &&((mInfoDelta.mErrorMsg != null
&&
mInfoDelta.mErrorMsg.equals(Downloads.Impl.OMADL_OCCUR_ERROR_NEED_NOTIFY)
) || Downloads.Impl.isStatusError(mInfoDelta.mStatus) &&
mInfoDelta.mStatus == 1 && mInfoDelta.mOmaDownloadInsNotifyUrl != null) {
    int notifyCode = OmaStatusHandler.SUCCESS;
    URL notifyUrl = null;
    notifyUrl = new URL(state.mOmaDownloadInsNotifyUrl);
    switch (mInfoDelta.mOmaDownloadStatus) {
        case Downloads.Impl.OMADL_STATUS_ERROR_INVALID_DESCRIPTOR:
            notifyCode = OmaStatusHandler.INVALID_DESCRIPTOR;
            break;
        case Downloads.Impl.OMADL_STATUS_ERROR_ATTRIBUTE_MISMATCH:
            notifyCode = OmaStatusHandler.ATTRIBUTE_MISMATCH;
            break;
        case Downloads.Impl.OMADL_STATUS_ERROR_INSUFFICIENT_MEMORY:
            notifyCode = OmaStatusHandler.INSUFFICIENT_MEMORY;
            break;
        case Downloads.Impl.OMADL_STATUS_ERROR_INVALID_DDVERSION:
            notifyCode = OmaStatusHandler.INVALID_DDVERSION;
            break;
        default:
            notifyCode = OmaStatusHandler.DEVICE_ABORTED;
            break;
    }
    notifyOMADownloadWebServerErrorStatus(notifyUrl, notifyCode);
 }

private notifyOMADownloadWebServerErrorStatus(URL notifyUrl, int
notifyCode) {
    ...
}
```

The status code which send to web server is as follow:

```
    static final int ATTRIBUTE_MISMATCH = 905;
```

```
    static final int DEVICE_ABORTED = 952;
    static final int INSUFFICIENT_MEMORY = 901;
    static final int INVALID_DDVERSION = 951;
    static final int INVALID_DESCRIPTOR = 906;
    static final int LOADER_ERROR = 954;
    static final int LOSS_OF_SERVICE = 903;
    static final int NON_ACCEPTABLE_CONTENT = 953;
    static final int SUCCESS = 900;
    static final int USER_CANCELLED = 902;
```

9 Format Reference (Remove before Release Document)

Normal text is Calibri, 10-point font. (Simplified Chinese text, if necessary, is 宋體, 10-point.) (Traditional Chinese text, if necessary, is 新細明體, 10-point.) Paragraph is justified with a 1.25 line spacing. The first line of a paragraph does not have a hanging indent. Headings are all black so that printed documents do not have faded heading text.

Page margins are 2.54 cm all around (top, bottom, left, right).

[Random filler text. Not intended for actual reading.] Excerpt from Sherlock Holmes. He had risen from his chair and was standing between the parted blinds gazing down into the dull neutral-tinted London street. Looking over his shoulder, I saw that on the pavement opposite there stood a large woman with a heavy fur boa round her neck, and a large curling red feather in a broad-brimmed hat which was tilted in a coquettish Duchess of Devonshire fashion over her ear.

9.1 Heading 2, Calibri 14-Point Font, Bold Text

9.1.1 Heading 3, Calibri 12-Point Font, Bold Text

[Random filler text. Not intended for actual reading.] Excerpt from Sherlock Holmes. The man who entered was a sturdy, middle-sized fellow, some thirty years of age, clean-shaven, and sallow-skinned, with a bland, insinuating manner, and a pair of wonderfully sharp and penetrating gray eyes. He shot a questioning glance at each of us, placed his shiny top-hat upon the sideboard, and with a slight bow sidled down into the nearest chair.

9.1.1.1 Heading 4, Calibri 11-Point Font, Bold Text

[Random filler text. Not intended for actual reading.] Excerpt from Sherlock Holmes. It was a consider-

able sum, for people in their position, and the loss of it would have made a serious difference. It was worth an effort to preserve it.

9.1.1.2 Heading 4, Calibri 11-Point Font, Bold Text

9.1.1.2.1 Heading 5, Calibri 10-Point Font, Bold Text

[Random filler text. Not intended for actual reading.] Excerpt from Sherlock Holmes. The daughter was of a good, amiable disposition, but affectionate and warm-hearted in her ways. so that it was evident that with her fair personal advantages, and her little income, she would not be allowed to remain single long.

9.1.1.2.2 Heading 5, Calibri 10-Point Font, Bold Text

9.1.1.2.2.1 Heading 6, Calibri 10-Point Font, Plain Text

[Random filler text. Not intended for actual reading.] Excerpt from Sherlock Holmes. Our visitor had recovered something of his assurance while Holmes had been talking, and he rose from his chair now with a cold sneer upon his pale face.

9.1.1.2.2.2 Heading 6, Calibri 10-Point Font, Plain Text

[Random filler text. Not intended for actual reading.] Excerpt from Sherlock Holmes. He took two swift steps to the whip, but before he could grasp it there was a wild clatter of steps upon the

stairs, the heavy hall door banged, and from the window we could see Mr. James Windibank running at the top of his speed down the road.

9.1.1.2.3 Heading 5, Calibri 10-Point Font, Bold Text

[Random filler text. Not intended for actual reading.] Excerpt from Sherlock Holmes. My suspicions were all confirmed by his peculiar action in typewriting his signature, which, of course, inferred that his handwriting was so familiar to her that she would recognize even the smallest sample of it. You see all these isolated facts, together with many minor ones, all pointed in the same direction

10 Definitions for Document Components (Remove before Release Document)

10.1 Revision History

All revved documents contain a Revision History written by the editor during initial proof and verified by the editor during final proof. Remember to list only changes of technical significance or changes, such as renumbering figures, that affect the overall layout of the data sheet.

- The page numbers in Revision Histories refer to the current version of the data sheet, not to the preceding version.
- If a change occurs over a range of pages, include only the first page on which the change occurs; do not use ranges of pages.
- The format for the date of the Revision History is the international date format: yyyy-mm-dd, with a 0 in front of the single-digit month. Ensure that the date is the same as the one in the pub code.
- Capitalize section names as they are capitalized in the data sheet, i.e., uppercase or title case.
- Revision Histories from previous revisions remain in the data sheet throughout subsequent revisions. Never edit a previous Revision History in a released data sheet.

10.2 Figures

Figures are centered, with no border, using the formatting style “Figure.” Keep with next, so that figures and their captions are not separated. Style following is “Figure Caption”.

Figure captions are located below the image, using the formatting style “Figure Caption”. The caption is centered, bold, and italicized, in title case. Line spacing is 1.25 lines, with 0 points before and after the paragraph. The chapter number precedes the figure number, separated by a hyphen. Style following is “Normal”.

Figure 10-1. Title-Cased Caption Text. Centered.

[Random filler text. Not intended for actual reading.] Excerpt from Sherlock Holmes. On the evening of the crime, he returned from the club exactly at ten. His mother and sister were out spending the evening with a relation. The servant deposed that she heard him enter the front room on the second floor, generally used as his sitting-room. She had lit a fire there, and as it smoked she had opened the window.

Figure 10-2a. Sleepy. b. Tired.

[Random filler text. Not intended for actual reading.] Excerpt from Sherlock Holmes. A minute examination of the circumstances served only to make the case more complex. In the first place, no reason could be given why the young man should have fastened the door upon the inside.

Figure 10-3. Chipmunks and Flowers and Alligators

[Random filler text. Not intended for actual reading.] Excerpt from Sherlock Holmes. One summer night, a few months after my marriage, I was seated by my own hearth smoking a last pipe and nodding over a novel, for my day's work had been an exhausting one. My wife had already gone upstairs, and the sound of the locking of the hall door some time before told me that the servants had also retired. I had risen from my seat and was knocking out the ashes of my pipe when I suddenly heard the clang of the bell.

[Random filler text. Not intended for actual reading.] Excerpt from Sherlock Holmes. I looked at the clock. It was a quarter to twelve. This could not be a visitor at so late an hour. A patient evidently, and possibly an all-night sitting. With a wry face I went out into the hall and opened the door. To my astonishment it was Sherlock Holmes who stood upon my step.

10.3 Tables

10.3.1 Tables in General

Tables are centered on the page, with a no border, using the formatting style “Figure.” Style following is “Normal”. Outer border width is 1.5 points, and inner gridlines are 0.5 points. Column headings are bold and centered. Generally, the leftmost column is left-aligned; other columns are centered for data or left-aligned for descriptions. Table contents are *not* fully justified, because typically the cell contents are too sparse and leave awkward white space if justified. Formatting style is “Table Grid.”

Table captions are located above the chart, using the formatting style “Table Caption”. The caption is centered, bold, and italicized, in title case. Line spacing is 1.25 lines, with 0 points before and after the paragraph. The chapter number precedes the figure number, separated by a hyphen. Keep with next, so that figures and their captions are not separated. Style following is “Normal Tableau”.

Table 10-1. Sample Table.

Top leftmost column	Column	Heading	Bold
Content, left aligned			Middle aligned for all cells, for row header and general table cells.
Content			
Parameter			

10.3.2 Register Tables

Register tables follow the same rules as regular tables, with additional guidelines. Register tables are produced using either the defined menu selections or the Excel-to-Word converter (written by DH). Register names are bold. Name and Type cells for a register spanning multiple bits are merged; reset cells are left unmerged. Reserved bits are shaded gray (15%). Bit values start at the most significant bit. Borders for register descriptions are solid, gray (25%).

Table 10-2. Sample Register Table

(Address) 04000 H **(Short Name)** G_CONFIG **(Full Name)** GRAPHICS CONFIGURATION REGISTER **(Reset Value)** AXXXX21C

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	G_RST[1:0]		CQ_RST[1:0]												ENG_LP	SHT_CMDQ
Type	R/W		R/W												R/W	R/W
Reset	1	0	1	0											0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name					COMP_LP	SDFIFO_THRS[1:0]		DRAM Q_MODE	REQ_INTVAL[1:0]		CMDFIFO_THRS[1:0]		POST_THRS[1:0]		INT_MASK	EN_DRAMQ
Type					R/W	R/W		R/W	R/W		R/W		R/W		R/W	R/W
Reset					0	0	1	0	0	0	0	1	1	1	0	0

(Register description)

Bit Field	Name	Description
31:30	G_RST[1:0]	software graphics engine reset flag 0x3: reset graphics engine others: reserved
29:28	CQ_RST[1:0]	software command queue reset flag 0x3: reset command queue others: reserved
17	ENG_LP	graphics engine advanced low power enable flag 0: disable advanced low power mode (reset value) 1: enable advanced low power mode
16	SHT_CMDQ	graphics short command queue enable flag 0: disable short command queue mode 1: enable short command queue mode
11	COMP_LP	compression module low power flag 0: low power mode disabled 1: low power mode enabled
10:9	SDFIFO_THRS[1:0]	source/destination FIFO request threshold selection Read request issued if the number of valid data is less than selected threshold. Small selection will request data more frequently but with fewer burst data. 0x0: threshold=2 0x1: threshold=4 (reset value) 0x2: threshold=5

(Address) 04000 H	(Short Name) G_CONFIG	(Full Name) GRAPHICS CONFIGURATION REGISTER	(Reset Value) AXXXX21C
		0x3: threshold=6	
8	DRAMQ_MODE	DRAM queue mode select flag 0: cyclic buffer mode. When the end of cyclic buffer is reached by the read pointer, it will wrap around to the start of cyclic buffer. 1: single buffer mode. HW r/w pointers will reset before fetching commands.	
7:6	REQ_INTVAL[1:0]	request interval selection flag It decides how long the interval is to stop the current DRAM request. Only effective as rectangle fill. 0x0: no interval 0x1: after 32 times of OWs 0x2: after 16 times of OWs 0x3: after 8 times of OWs	
5:4	CMDFIFO_THRS[1:0]	command FIFO read request threshold selection Read request is issued if the number of data in FIFO is less than selected threshold. The request stops when either it fully fills the FIFO or all of the commands are fetched. 0x0: threshold=3 0x1: threshold=4 (reset value) 0x2: threshold=5 0x3: threshold=6	
3:2	POST_THRS[1:0]	post-write FIFO request threshold selection write request issued if the number of valid data is more than selected threshold. Small selection will issue write request more frequently but with fewer burst-write data. 0x0: threshold=1 0x1: threshold=2 0x2: threshold=4 0x3: threshold=6 (reset value)	
1	INT_MASK	graphics interrupt mask flag 0: disable interrupt (reset value) 1: enable interrupt	
0	EN_DRAMQ	DRAM command queue enable flag 0: disable DRAM command queue (reset value) 1: enable DRAM command queue	

10.3.2.1 Register Table Definitions

The following abbreviations are defined for register types:

- **R/W:** Read Write. The field can be accessed both in write and read mode.
- **RO**: Read Only. The field can be accessed in read mode only. A write with one or zero has no effect.
- **WO:** Write Only. The field can be accessed in write mode only. A read has no effect and return zero.
- **RC:** Read Clear. The field can be accessed in read mode only. A read clears the bit if set. A write with one or zero has no effect.
- **RS**: The field can be accessed in read mode only. A read sets the bit if not set. A write with one or zero has no effect.
- **WS:** Write Set.
- **WC:** Write Clear.
- **I/O:** Input and Output

It should be noted that the abbreviations shall be clearly defined in the documents for clarification.

The following abbreviations are defined for reference register types:

- **R/W1S**: Read and write 1 set. The field can be accessed in both read and write mode. Setting this bit provokes certain functions in the circuit. A write with zero has no effect.
- **R/W0C**: Read and write 0 clear. The field can be accessed in both read and write mode. A write with zero clears the bit if set. A write with one has no effect.
- **R/W1C**: Read and write 1 clear. The field can be accessed in both read and write mode. A write with one clears the bit if set. A write with zero has no effect.
- **R/WaC**: Read and write with auto clear. The field can be accessed in both read and write mode. Setting this field provokes certain functions in the circuit. It is automatically cleared when the function is completed.

10.4 Outlines

Eight levels of the bullet outline are defined:

- Bullet outlines have alternating bullets. Odd-numbered levels have square bullets to match the corporate PowerPoint template.
  - Even-numbered levels have en-dash bullets. Alternating bullet styles allow the reader to distinguish the outline level easily.
    - Third level of the outline.
      - Fourth level of the outline
        - Fifth level of the outline.
          - Sixth level of the outline
            - Seventh level of the outline
              - Eighth level of the outline

Numbered outlines have not been defined.

10.5 Code Excerpts

Documents may include segments of code, using formatting style “Code Excerpts.” Text for code excerpts are in Lucida Console, 8-point font. Lucida Console is a fixed-width font and therefore lines up characters. The font allows for at least 80 characters across the page. Uppercase letter O and number 0 are easily distinguishable, as are lowercase L and number 1. Paragraph is indented 0.85 cm, with a left tab set at 1.59 cm and default tab stops at 1.27 cm.

```
      1     2     3     4     5     6     7     8
12345678901234567890 12345678901234567890123456789012345678901234567890123456789012345678901234567890

static int __stdcall cb_download_bloader_init(void *usr_arg)
{
#if 0
        tboot_1 *t=(tboot_1 *)usr_arg;

        t->progress_hint = "Download BootLoader now...";
        t->progress_forecolor = 0x00A00070;
        t->progress_percentage = 0;
        t->progress_finished_bytes = 0;

        t->bUpdateFinishBytes = true;
        t->SyncInitProgress();
#endif
   return 0;
}
```

11 Writing Guidelines (Remove before Release Document)

The following style guidelines are based on the RFWS Communications Services Editorial Style Guide.

11.1 Grammar

11.1.1 Tense and Voice

Generally, use the present tense. Use past and future tense only when they are needed. For example:

Future tense unnecessary: The address will automatically increment with each 12-bit data word. Instead write: The address automatically increments with each 12-bit data word.

Avoid using the conditional tense if it is not necessary. For example:

Conditional: The output could become too large if the input is not regulated. Unconditional: The output will become too large if the input is not regulated.

Do not use the second person the word “you,” although imperative statements are acceptable. In that usage, “you" is understood but not stated. For example:

Note that the part….. Ensure that the pins…..

Passive voice is acceptable when the doer of the action is unknown or is less important than the action itself. For example:

The AD8345 modulator can be used as the IF transmit modulator in digital communications systems such as GSM and PCS transceivers.

11.1.2 General Issues

Parts with multiple versions use a plural verb. For example:

The AD5401/AD5404/AD5406 are/have/contain/support……, and so on.

Avoid using unnecessary possessives. For example:

The phrase “Due to the nature of the VCA’s performance versus gain…..” should be “Due to the nature of the VCA performance versus gain….” VCA is a modifier, not an owner.

11.1.3 Misplaced and Dangling Modifiers

To avoid confusion, make sure that the word “only” is placed close to the word that it actually modifies.

Compare the difference in meaning that the placement of the word “only” makes in the following sentences:

A 3-wire or 4-wire serial data bus **only** enables interfacing with microcontrollers.
A 3-wire or 4-wire serial data bus enables **only** interfacing with microcontrollers.
A 3-wire or 4-wire serial data bus enables interfacing with microcontrollers **only**.
Data can **only** be loaded to the part while CD_DAC is low.
Data can be loaded to the part **only** while CD_DAC is low.

Example of dangling and nondangling modifiers:

Dangling: To implement power-down mode on the AD1234, the word length can be changed to 8 bits by setting bit WL1 = 0 and WL0 = 0 in CRA.
Nondangling: To implement power-down mode on the AD1234, change the word length to 8 bits by setting bit WL1 = 0 and WL0 = 0 in CRA.

11.1.4 Indefinite Articles with Acronyms

When choosing the indefinite article to precede an acronym, keep in mind how the acronym is pronounced. The beginning sound, rather than the letter per se, of the oral version determines whether to use “a” or “an.”

For example:

a FET (pronounced f_t)
a DAC (pronounced d_c)
an LED (pronounced el ee dee)
an SMR (pronounced ess em ar)
a 6-lead package
an 8-lead package

11.2 Labeling Figures and Graphs

- Labels are uppercased.
- Units of measure are in the same case that they are in for text. For example, mV, mA, and Hz.
- Units of measure have no space before them. Note that in text, captions, and tables, there *is* a space before a unit of measure.
- Use spaces around operator signs such as =, +, and –, which is the same style used for text.
- Use plus signs only if a similar item uses a minus or plus/minus sign.
- Spell out ordinal numbers (first, second, third) if there is room. Use uppercase as with all labels.
- Axis labels
  - Plus signs aren't necessary along axes of graphs, even if there are minus signs on the same axis.
  - On the X and Y axis labels, the units of measure go in parentheses.

11.3 Captioning for Figures and Tables

- Use title case.
- Avoid hyphenated word breaks at the end of lines, if possible.
- Captions do not need a period at end unless a sentence follows as part of the caption.
- Units of measure in captions should have a space before them, just like in text, but unlike how units of measure are presented within figures.
- All figure captions within a document should be unique.

11.4 Units of Measure and Numbers

11.4.1 Abbreviations

- Capitalize letters based on names (e.g., V (volts), A (amperes), Hz (hertz)). Not s (second). Metric abbreviation are both.
- Little b for bit, big B for byte.

11.4.2 Units of Measure

In text, there is *always* a space between a number and the unit of measure. For example:

0 V–5 V or 0 V to 5 V

In figures, there is *never* a space between a number and the unit of measure. For example:

0V–5V or 0V TO 5V

In both text and figures, there must always a unit of measure and corresponding number for each value. The only exception is 4–20 mA or 4 to 20 mA. The mA is used only with the second number. For example:

5 V (in text) 0V–5V (in figures)

When referring to a generic unit of measure in text, i.e., without associating the unit with a specific numeric value, spell out the unit. You can also include the corresponding abbreviation in parentheses. For example:

A sound wave is measured in decibels (dB).

Note that “mil” and “mm” are not equivalent units of measure. A mil (this is not an abbreviation) is 1/1000 of an inch. There are 1000 mils in an inch. The term “mm” means millimeter, of 1/1000 of a meter. There are 25.4 mm (millimeters) in an inch. So mm is approximately 40 times larger than a mil.

11.4.3 Numerals vs. Number Words

Spell out the numbers one to nine in text unless they refer to a unit of measure or to a value. Numbers 10 and up are written as numerals. This applies to both cardinal (1, 2, 3) and ordinal (1st, 2nd, 3rd) numbers.

For example:

8 LSB, 4 LSB the first four bits of data a 4-bit DAC the 15th bit is the LSB 4-channel audio four I/O audio channels set the pin to 0 the zero crossing signal; one clock cycle

Spell out numbers, including numbers one through nine, at the beginning of sentences. However, numerals should always be used in compound adjectives with the words phase, bit, byte, lead, pin, wire, and channel. For example:

Incorrect Usage	Correct Usage
2-channel amplifiers use… Four-bit DACs can…	The 2- channel amplifier uses… A 4-bit DAC can… The part comes in a 4-lead package.

Incorrect Usage	Correct Usage
	Four bits of data comprise….

Gain is a value and is expressed as a numeral, even though it does not have a unit of measure per se. For example:

This amplifier produces a gain of 6.

11.4.3.1 Numbers in the Features List

Use numerals rather than number words. Begin list items with numerals unless they are followed by another number.

For example:

1 on-chip and 2 remote temperature sensors 2-wire and 3-wire fan speed measurement Controls and monitors up to 4 fan speeds Three 12-bit DACs

Consider the use of hyphen:

The 8-bit bus has 8 bits.

11.4.3.2 Ranges of Values

In text, use the word “to” rather than an en dash to represent a range between two values. For example:

5 V to 10 V

In tables, use the word “to” if there is enough space. If not, use the en dash with no spaces around it. For example:

5 V–10 V

In figures, always use the en dash with no spaces around it. Note that in figures, there is no space between the number and unit of measure. For example:

5V–10V

11.4.3.3 Bits

A range of bits may be designated in any of the following formats. Ensure consistent usage within a data sheet.

Bits D2–D7
Bits D2 to D7
Bits D2:D7
Bits D7:D2

11.5 Words and Phrases to Avoid

- Redundancy is acceptable. It is okay to repeat information more than once for the sake of making a point and to make absolutely sure that the reader does not miss it. However, avoid putting the same information in more one place.
- Part numbers go from lowest to highest in multipart products, for example, MT6223/MT6225/MT6268. If you come across a data sheet that does not follow this convention, consult your manager. This is a marketing issue.
- Always write out the full part name, even in figures. For example:

Correct: AD2345/AD2346/AD2357
Incorrect: AD2345/6/7, AD2345/2346/2347

- Use the word “and” instead of an ampersand (&).
- Em dashes do not have spaces around them.
- When resistors, capacitors, transistors (et al) are numbered, the numbers are not subscripted. For example, C1, C2, R1, R2, Q1, Q2.
- Use _-_ instead of the words “sigma-delta” in all places, unless requested by the originator. Note that it is spelled out in the Document->Summary->Title box of the PDF file because symbols can’t be used there, and also so customers can search on it.
- URLs and email addresses are roman text, i.e., no italic, in data sheets. In VIS (visual identity system) documents, they are italicized.
- It is okay to mention websites other than MTK, but do not link them, i.e., keep the online reader on the MTK website only.

- *etc* and *and so on* because they are weak. Try to write around it; many times the meaning is really
- *now* (It’s not incorrect, but *next*, *under these circumstances*, and *then* sound better.
- *later in this data sheet* — Refer to the specific section name.

- *Please*—Not necessary.
- *Wish*—Use *want* instead.
- *Successfully*—Success is assumed.
- *above* and *below* since they are subject to page breaks. Use instead *previous* or *preceding* and *following*. If referring to a specific figure, table, or section, use the caption number or heading name instead of above or below. For example:

Incorrect: The above table shows…..
Correct: Table III shows…
Incorrect: For more details, see the section below.
Correct: For more details, refer to the Serial Interface section.
Correct: For more details, refer to the following section.

- *As*—Use *because* instead. Use *since* if it indicates time. For example:

Incorrect: Use care when handing dynamite as it might explode.
Correct: Use care when handing dynamite because it might explode.

- *Hence*—Use *therefore* instead.
- *Minus* input/output—Use *negative* input/output instead because it is the opposite of *positive* input/output.
- *Irregardless*—Does not exist. Use "regardless."

- *I/p and o/p*—Use *input* and *output* instead. Inform the originator of this change.
- Avoid abbreviating commonly used words. Pot is a potentiometer and specs are specifications.
- Avoid using clichés, jargon, and idioms. For example:

Avoid	Use Instead
avoid like the plague	avoid
up front	at the beginning of the process
Get, for example in *the register gets read* gets moved	 *the register is read* *is moved*
rule of thumb	rule
ends up	becomes or results in

12 Equations and Referencing (Remove before Release Document)

The sample equations have been formatted so that the equation is placed inside an invisible table to push the equation number to the right margin and balanced with an equal width left margin to keep the equation centered.

12.1 Sample equations

$$y = \cosh(x) \quad (1)$$

$$y = \sinh(x) \quad (2)$$

12.2 Sample references

I'd like to reference equation (1) and equation (2).