OpenBMIP Standard

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Revision History

The following table shows all revisions for this document. To determine if this is the latest revision, check the Technical Assistance Center (TAC) Web site. Refer to *Getting Help* on page xvi for TAC access information.

Revision	Date	Updates
1.0-6.0	2011-2012	Internal versions
7.0	Dec 14, 2012	First public release
7.1	February 4, 2013	Minor edits: remove “optional” nature of some messages
7.2	February 13, 2013	Incorporate internal and customer reviews: Major cleanup and consistency check Delete redundant and incorrect message charts; add Table 1 as a clearer format description; add worked example.
7.3	February 19, 2013	Additional error codes Additional command codes to get/set timeouts Added a table of commands in numerical order Clarified Band Select Logic Cleaned up acronyms & Glossary
7.4	February 22, 2013	Clarified terminator character in string data Removed spaces from XML format
7.5	February 25, 2013	Internal only release.
7.6	March 12, 2013	Revised error codes Corrected 2.2 timeout error code description Deleted get/set timeout commands Clarified CMD_SEQ behavior
7.7	March 26, 2013	Revised error codes Corrected 2.2 timeout error code description Deleted get/set timeout commands Clarified CMD_SEQ behavior Revised Get Band Selection response strings

7.8	May 19, 2013	Added GPOWERAMP and SPOWERAMP commands. Clarified file transfer timeout behavior.
7.9	July 18, 2013	Corrected codes for GPOWERAMP and SPOWERAMP commands.
7.91	Aug 27, 2013	Corrected header in Table 4 Corrected ID items in Section 3.2: BUC Part Number (BPN) , BUC Manufacturer ID (MID) , BUC Serial Number (BSN) , BUC Functional ID (FID) Added descriptions of the XML fields
7.92	Sep 04, 2013	1. 2.2.1 Time outs: BUC vendor to specify timeout if 5 seconds impractical. 2. 2.2.5 RSP_CODE: Change “0x08: File receive fail” to “0x08:File transfer fail” Add “Unimplemented” RSP_CODE. 3. 2.2.6 CMD_VERS: Add “BUC should interoperate with previous versions.” 4. 2.5.1.2.1 Header Deconstruction: Change “RESP_CODE” to “RSP_CODE” 5. 2.7 Command Syntax: Change “14 Set Calibration File” to “14 Get Calibration File” 6. 2.7.3 Get Heartbeat: Change the example of Response DATA to "{BSN=A12345A33,TEMP=+48.8,FSTATUS=lolock,fannormal,outputmute,normaltemp}” 7. 2.7.10 Get Fault Status: Change the example of Response DATA to {lolock,fannormal,outputmute,normaltemp} Separate statuses in the same category by "/" such as “lolock/lounlock,fannormal/fanstanby/fanfailed, ??? 8. 2.7.11 Get Latched Status: Change the example of Response DATA to "{lounlock,fannormal,outputmute,normaltemp}” Define which statuses the BUC should latch.
8	Sep 24, 2013	Change factory calibration procedure and XML file format to add detector reading with power amp disabled.
8.1	Sep 25, 2013	Corrected missing references in 2.7
8.2	Oct 22, 2013	Deleted reference to OpenAMIP in GPOWERAMP command description
8.3	Nov 8, 2013	Added option to compress file using zlib/gzip Added note to select peaks & troughs of gain vs frequency curve
8.4	Nov 11, 2013	Rephrased note to select peaks & troughs of gain vs frequency curve, and endpoints.
8.5	Nov 11, 2013	Added clarification to ADC slope.
8.6	Nov 13, 2013	Added clarification to Kermit description.
8.7	Jan 27, 2013	Added requirement to support both SW upgrade and downgrade to 2.7.15.1.3.1 Software Upgrade Procedure Added requirement to validate the SW package
8.8	Apr 04, 2014	Deleted TFTP from Ethernet implementation

8.9	Apr 11, 2014	Section 3.2 Table 5: Deprecated freq_step_size; steps are permitted to be non-uniform. Section 3.2 Table 5: Clarified detector monotonicity.
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9.1	Apr 29, 2014	Section 2.2.5: Removed incorrect code for “invalid FCS”.
9.2	May 29, 2014	Section 2.7.15.2.5: Corrected file transfer diagram (“STARTFILETRANSFER” -> “SENDFILE”)
9.3	Feb 19, 2015	Section 3.2 Table 5: Added “buc_cutoff_frequency_mhz” parameter; increased <num_temps> maximum to 5.
9.4	April 1, 2015	Section 3.2 Table 5: Changed description for <buc_cutoff_frequency_mhz> for consistency and correctness against actual implementation.
A (9.4)	August 14, 2015	First release of the OpenBMIP Standard document in the iDirect Technical Publications template. Minor changes that do not affect the technical content.
B (9.5)	August 18, 2017	Updated for 9.5: Added information about the BUC Test application and source code, and BUC Simulator and source code, to *Kermit* on page 23. Add support for BUC Simulator in section *Update Simulator* on page 24. Minor changes which do not affect the technical content.

Contents

Revision History iii

Figures x

Tables xi

About xiii

Purpose xiii

Disclaimer xiii

Certification xiv

Audience xiv

Contents xiv

Standards Reference xiv

Document Conventions xv

Getting Help xvi

Chapter 1 Introduction 1

1.1 Scope 1

1.1.1 Tailoring 1

1.2 Terminal Overview 1

1.3 BUC Functional Requirements to Support OpenBMIP 2

Chapter 2 Protocol Specification 5

2.1 Introduction 5

2.2 Frame Description 6

2.2.1 Time Outs 6
2.2.2 Empty Message 6
2.2.3 TYPE 7
2.2.4 CMD_CODE 7
2.2.5 RSP_CODE 7
2.2.6 CMD_VERS 7
2.2.7 CMD_SEQ 8
2.2.8 DATA_LEN 8
2.2.9 DATA 8
2.2.10 FCS 8
2.3 IETF RFC-1055 SLIP Protocol 8
2.4 Client/Server Interaction Sequence Diagram 9
2.5 A Worked Example 10
2.5.1 Construction of Set band selection command 10
2.5.1.1 Command raw byte sequence 11
2.5.1.2 Header Deconstruction 11
2.5.1.3 Data Payload 11
2.5.1.4 Frame Check Sequence 11
2.5.1.5 Expected BUC Response 12
2.6 Physical Layer 12
2.6.1 Serial RS-422 Mode 13
2.6.1.1 Communication Parameters 13
2.6.1.2 Data Ordering 13
2.6.2 Ethernet Mode 13
2.7 Command Syntax 14
2.7.1 Get Product ID 15
2.7.2 Get PA Power 16
2.7.3 Get Heartbeat 16
2.7.4 Get Band Selection 17
2.7.5 Set Band Selection 17
2.7.6 Get Power Amp State 18
2.7.7 Set Power Amp State 19

2.7.8 Get Local Oscillator 19
2.7.9 Set Local Oscillator 19
2.7.10 Get Fault Status 19
2.7.11 Get Latched Fault Status 20
2.7.12 Reset Status Latch 20
2.7.13 Get Software Version 20
2.7.14 BUC Reset 21
2.7.15 File Transfer 21
2.7.15.1 Define Transfer Type 21
2.7.15.2 Execute Transfer 23
2.7.16 Update Simulator 24
2.7.17 Vendor Specific Commands 24

Chapter 3 Calibration 27
3.1 Calibration Algorithm 27
3.2 Calibration File Format 30

Figures

Figure 1-1. BUC and Modem Connections 2
Figure 2-1. Client-Server Interaction Sequence 10
Figure 2-2. UDP Ethernet Packet Format 13
Figure 2-3. BUC Serial Number with Embedded Date Code and Revision. 15
Figure 2-4. BUC Functional ID 16
Figure 3-1. Typical Gain vs Temperature for 2, 3, and 4 Points 28
Figure 3-2. BUC Calibration Process 29

Tables

Table 2-1. MIP Message Format 6
Table 2-2. Commands in Numerical Order 14
Table 2-3. Band Select Logic 17
Table 2-4. Power Amp Logic 18
Table 3-1. Calibration File Values 30

About

Purpose

This document describes the OpenBMIP administrative interface between the modem and block up converter (BUC) components of a satellite terminal. The most important function of this interface is to enable calibration of the terminal's transmitted power for regulatory compliance. This enables a terminal integrator to provide a seamless installation process, with respect to transmitter power calibration.

This standard may be tailored to the application by selection of interface type (RS-422 serial or Ethernet). It is also designed to be extensible for vendor-specific enhancements.

This interface is intended for setup, calibration, and installation purposes. It is not intended for continuous operation while the BUC is transmitting live data. The messages described here are typically exchanged:

- When a BUC is first installed into a terminal,
- When the terminal is first powered on, and
- Before the terminal begins transmission to connect to a satellite network.

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Audience

The intended audience for this document is an engineering team responsible for integrating a satellite modem with a Block Up Converter (BUC), or a team designing a compliant BUC or modem.

Contents

This document contains the following major sections:

- *Introduction*

  This chapter gives an introduction about OpenBMIP.

- *Protocol Specification*

  This chapter describes the protocol specifications, message types, and syntax.

- *Calibration*

  This chapter explains how the BUC is calibrated.

Standards Reference

- IETF RFC 1055 Serial Line IP
- IETF RFC 1171 Point-to-Point Protocol
- IETF RFC 1700 Assigned Numbers
- IETF RFC 1952 GZIP file format specification version 4.3
- Kermit

Document Conventions

This section illustrates and describes the conventions used throughout this document.

Convention	Description	Example
Command	Used when the user is required to type a command at a command line prompt or in a console.	Type the command: **cd /etc/snmp/**
Terminal Output	Used when showing resulting output from a command that was entered at a command line or on a console.	**crc report all** 8350.3235 : DATA CRC [1] 8350.3502 : DATA CRC [5818] 8350.4382 : DATA CRC [20]
Screen Reference	Used when referring to text that appears on the screen on a Graphical User Interface (GUI). Used when specifying names of commands, menus, folders, tabs, dialogs, list boxes, and options.	1. To add a remote to an inroute group, right-click the Inroute Group and select **Add Remote**. The **Remote** dialog box has a number of user-selectable tabs across the top. The **Information** tab is visible when the dialog box opens.
Hyperlink	Used to show all hyperlinked text within a document or external links such as web page URLs.	For instructions on adding a line card to the network tree, see *Adding a Line Card* on page 108.

WARNING: A warning highlights an essential operating or maintenance procedure, practice, condition, or statement which, if not strictly observed, could result in injury, death, or long term health hazards.

CAUTION: A caution highlights an essential operating or maintenance procedure, practice, condition, or statement which, if not strictly observed, could result in damage to, or destruction of, equipment or a condition that adversely affects system operation.

NOTE: A note is a statement or other notification that adds, emphasizes, or clarifies essential information of special importance or interest.

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1 Introduction

This chapter contains the following sections:

- *Scope* on page 1
- *Terminal Overview* on page 1
- *BUC Functional Requirements to Support OpenBMIP* on page 2

1.1 Scope

This document describes a monitoring and control interface between the modem and block up converter (BUC) components of a satellite terminal. The most important function of this interface is to enable calibration of the terminal's transmitted power for regulatory compliance.

1.1.1 Tailoring

OpenBMIP may be tailored to fit the application. For example, systems with a fixed BUC local oscillator frequency may be implemented without support for the Set Local Oscillator command.

In order to allow different BUC vendors to provide the end user with a richer command set beyond those required by the monitoring and control interface, the protocol allows for the definition of vendor-specific commands (see *File Transfer* on page 21).

1.2 Terminal Overview

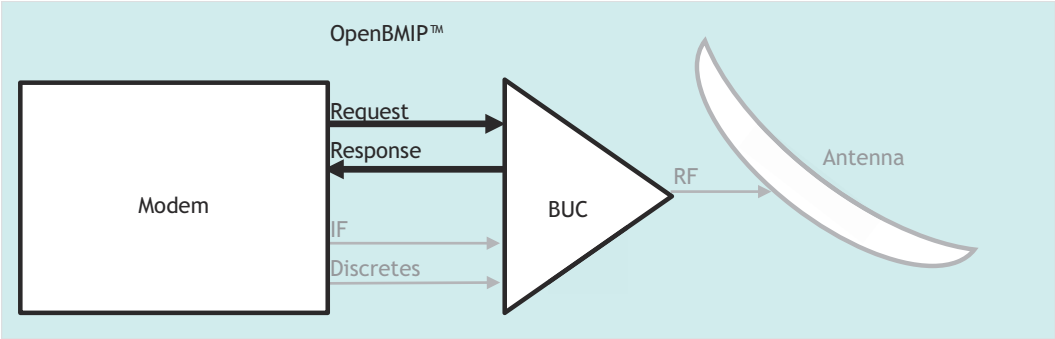
The modem:

- acts as a satellite modem,
- coordinates with the satellite network to provide monitoring and control functions,
- provides IF, reference frequency, and control signals to the BUC,
- reads gain calibration data from the BUC and from other sources, and
- adjusts its IF level to produce the correct RF power level at the BUC output for satellite link operation.

The BUC:

- upconverts the IF from the modem to the required satellite uplink frequency (RF),
- amplifies the upconverted RF power with fixed gain, and
- interacts with the modem to enable calibrated control of the RF output power.

Figure 1-1. BUC and Modem Connections



1.3 BUC Functional Requirements to Support OpenBMIP

A typical BUC implementation incorporates the following key functions to support calibrated operation using the OpenBMIP protocol:

- an RF RMS power detector (typically placed at the input of the final power amp, but may be implemented at another appropriate point in the signal chain to support a fully calibrated power level, from IF input to RF output of the BUC),
- a temperature sensor to support temperature correction of calibrated values,
- a microcontroller with these interfaces and features:
  - one-time-programmable memory to store ID numbers,
  - factory-programmable memory (read-only in the field) to store calibration data,
  - analog to digital converters for the power detector and the temperature sensor, and
  - a physical layer interface (serial or Ethernet) for connection to the modem.

OpenBMIP may be implemented as either an RS-422 serial connection, or a UDP connection through the CX780 modem's Ethernet connector.

The BUC EEPROM must have enough memory to store the following information:

- In a one-time-programmable (OTP) page (see *Get Product ID* on page 15)
  - BUC Part Number (BPN)
    - 13 bytes; unused trailing bytes filled with "x"
  - BUC Manufacturer ID (MID)
    - 2 bytes
  - BUC Serial Number (BSN) with date code and Revision; per 2.7.1

    - 9 bytes
  - BUC Functional ID (FID) per Figure 2-3
    - 6 bytes; for example: 5W, 29.0-30.0GHz, Standard:: ' 050300
- In an erasable page (with lock feature)
  - Calibration file (XML Format)
  - Check Sum

NOTE: It is anticipated that some applications of this interface will allocate functionality to other system components. For example, the microcontroller and EEPROM might not be co-located with the BUC. Such differences should be implemented so they are transparent from the perspective of the modem.

2 Protocol Specification

This chapter contains the following sections:

- *Introduction* on page 5
- *Frame Description* on page 6
- *IETF RFC-1055 SLIP Protocol* on page 8
- *Client/Server Interaction Sequence Diagram* on page 9
- *A Worked Example* on page 10
- *Physical Layer* on page 12
- *Command Syntax* on page 14

2.1 Introduction

The purpose of this protocol is to provide specifications for communication between the satellite router (client) and BUC (server) using a monitoring and control interface.

This protocol is a Client-Server protocol. The Client is the satellite router; the Server is the BUC. Only one router at a time is connected to a BUC. The router always initiates communication with the BUC. The BUC never transmits without receiving a request from the router.

2.2 Frame Description

Table 2-1 shows the structure of an OpenBMIP message.

Table 2-1. MIP Message Format

	Bit							
Byte	7	6	5	4	3	2	1	0
0	TYPE	CMD_CODE						
1	RSP_CODE					CMD_VERS		
2	CMD_SEQ(high byte)							
3	CMD_SEQ(low byte)							
4	DATA_LEN(high byte) DATA_LEN = M							
5	DATA_LEN(low byte)							
6	DATA BYTE 0							
7	DATA BYTE 1							
…	…							
n-4	DATA BYTE M-1 (ASCII NULL character)							
n-3	FCS(high byte) FCS is computed from bytes 0…n-4							
n-2	FCS(low byte)							
n-1	END (0xC0)							

All message fields are binary, with the exception of the DATA field, which is NULL-terminated ASCII, including the representation of decimal or hexadecimal numbers.

2.2.1 Time Outs

If the recipient receives message characters, with more than 2 seconds elapsed between characters, it should time out and assume a connection fault has occurred. In the case of the BUC (server), it should send RSP_CODE 0x02 (see *RSP_CODE* on page 7). There is no concept of a message queue in OpenBMIP; the client (modem) must wait for a response before sending another message to the server (BUC). This provides natural throttling of flow rate. If no response is received within 5 seconds, the client should time out and assume a connection fault. During a file transfer, if the router does not acknowledge a message from the BUC within 5 seconds, the BUC should time out and send a message with RSP_CODE = 0x08. If 5 seconds is impractical, the BUC vendor should specify what the BUC file transfer timeout is. The same rules apply during a file transfer.

2.2.2 Empty Message

If the recipient receives an END character (0xC0), but has not received corresponding prior message characters, it should silently ignore it. This is a standard part of the SLIP protocol (see *IETF RFC-1055 SLIP Protocol* on page 8).

2.2.3 TYPE

One bit is used to identify whether the message is a command or response.

- 0x0: command
- 0x1: response

2.2.4 CMD_CODE

Seven bits are used; there are up to 128 command codes. Codes are assigned as follows:

- 0x00 to 0x5E: assigned by iDirect
- 0x60 to 0x7F: available for third-party use

2.2.5 RSP_CODE

Five bits are used; there are up to 32 response codes. The server responds to every command with either a failure or success. Other error codes can be defined per command as required.

The following values are defined:

- 0x00: Failure (of a type not in the list below)
- 0x01: Success
- 0x02: Message receipt timeout
- 0x03: Invalid command sequence number (future use)
- 0x04: Invalid FCS detected in modem command
- 0x05: Incompatible command version
- 0x06: Invalid third-party command
- 0x07: Data length and data field size mismatch
- 0x08: File transfer fail
- 0x09: BUC Input Buffer Overrun
- 0x0A: Modem Command Data Field Error
- 0x0B: Upgrade fail
- 0x1E: Unimplemented command
- 0x1F: Unrecognized command

2.2.6 CMD_VERS

Three bits are used to identify the version of the protocol. The current protocol is version 2 and subsequent versions will be one up. If the BUC supports at least the same version as the router, it will be compatible; otherwise it should report an error. The BUC should provide backward compatibility for versions 0 through 2.

2.2.7 CMD_SEQ

Sixteen bits are used; this is the command sequence number used to match requests to responses. The command sequence number starts with 0 for the initial command and is incremented by one for each additional command. After the value reaches 0xff 0xff, it wraps to 0x00 0x00. The BUC response should echo the CMD_SEQ value from the command it is responding to. In the case of a timeout, the BUC should use the most recent received CMD_SEQ value. The BUC is not required to detect CMD_SEQ errors; this error code is reserved for future use.

2.2.8 DATA_LEN

Sixteen bits are used; this is the message length in bytes excluding the header. This is the length of the ASCII DATA field, including its NULL (0x00) terminator.

2.2.9 DATA

This is ASCII data; its content and length are command-dependent. It is terminated with an ASCII NULL (0x00) character, and maximum length is 247. Therefore, to send the hexadecimal value 0xABC, one sends four bytes: 65, 66, 67, 0. To send the decimal value 123, one sends four bytes: 49, 50, 51, 0. The DATA field is case insensitive, for hexadecimal values, filenames, or any other content. Only the following characters are allowed in the DATA field (in addition to the NULL terminator at the end):

{0123456789abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ,._=+-}

2.2.10 FCS

Sixteen bits are used for the Frame Check Sequence (FCS); this is computed with the algorithm used by PPP for its FCS calculation. Refer to RFC-1171 for a sample implementation (http://tools.ietf.org/html/rfc1171#page-44). The FCS is calculated from all bytes which precede the FCS.

2.3 IETF RFC-1055 SLIP Protocol

The message is packaged and transmitted using escape sequence insertion and checks in accordance with IETF RFC-1055 SLIP protocol. Refer to RFC-1055 for a sample implementation in the C programming language. This sample algorithm explains the steps to send a message:

Optionally, send an initial END (0xC0) byte to flush out any data that may have accumulated in the receiver due to line noise. The initial END byte does not count toward CMD_SEQ, DATA_LEN, or FCS values. The receiver should silently ignore an END with no corresponding message.

- Construct the message, including DATA_LEN and FCS. The DATA_LEN and FCS computed values are unaffected by the substitutions below, but they may themselves be subject to substitution.
- For each byte in the message make the following substitutions:
  - 0xC0 becomes 0xDB 0xDC
  - 0xDB becomes 0xDB 0xDD

- any other value is unchanged

- Send the final END (0xC0) byte. ***The final END byte does not count toward DATA_LEN or FCS values***.
- Apply the above substitutions after constructing the message, so that DATA_LEN and FCS are unaffected.

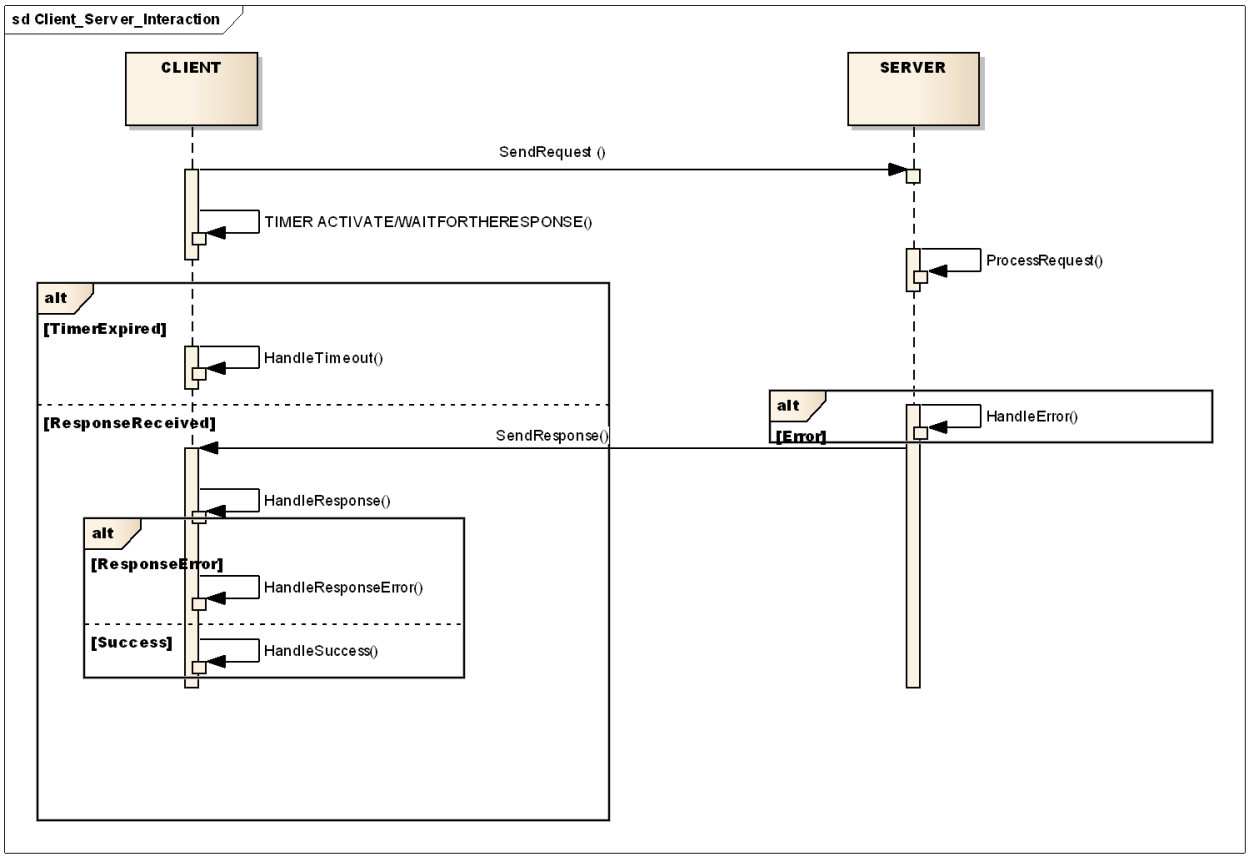
To receive a message:

- Receive the message, including DATA_LEN and FCS. The DATA_LEN and FCS computed values are unaffected by the substitutions below, but they may themselves be subject to substitution.
- For each byte received make the following substitutions:
  - 0xDB 0xDC becomes 0xC0
  - 0xDB 0xDD becomes 0xDB
  - any other value is unchanged
- Receive the final END (0xC0) byte. ***The final END byte does not count toward DATA_LEN or FCS values***.
- Compare the FCS computed, with the FCS received; send an "Invalid FCS" response code if computed FCS does not match received FCS.

2.4 Client/Server Interaction Sequence Diagram

Figure 2-1 shows a sample interaction between the client (CM) and the server (BUC) represented as a sequence diagram. As can be seen from the sequence diagram, it is expected that the CM is always the client while the BUC is always the server.

Figure 2-1. Client-Server Interaction Sequence



2.5 A Worked Example

In this example, the modem commands the BUC to Set band selection, followed by Get band selection.

2.5.1 Construction of Set band selection command

Objective of message: Set band select to low band

2.5.1.1 Command raw byte sequence

Header	Data	FCS	END
0x7 0x0 0x0 0x1 0x0 0x8	0x6c 0x6f 0x77 0x62 0x61 0x6e 0x64 0x0	0x5a 0x73	0xc0

2.5.1.2 Header Deconstruction

2.5.1.2.1 Header Deconstruction by Field

TYPE: 0 => COMMAND

CMD_CODE: 7 => SBANDSEL

RSP_CODE: 0

CMD_VERS: 0

CMD_SEQ: 1

DATA_LEN: 8

2.5.1.2.2 Header Deconstruction by Bit

Byte	Bit							
0	0	0	0	0	0	1	1	1
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	1
4	0	0	0	0	0	0	0	0
5	0	0	0	0	1	0	0	0

2.5.1.3 Data Payload

lowband + NULL => {'l','o','w','b','a','n','d',0}

2.5.1.4 Frame Check Sequence

0x5a73

2.5.1.5 Expected BUC Response

2.5.1.5.1 Response Raw Byte Sequence

Header	Data	FCS	END
0x87 0x8 0x0 0x1 0x0 0x0		0xee 0x00	0xc0

2.5.1.5.2 Header Deconstruction

2.5.1.5.2.1 Header deconstruction by field

TYPE: 1 => RESPONSE

CMD_CODE: 7 => SBANDSEL

RSP_CODE: 0

CMD_VERS: 0

CMD_SEQ: 1

DATA_LEN: 0

2.5.1.5.2.2 Header deconstruction by bit

Byte	Bit							
0	1	0	0	0	0	1	1	1
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	1
4	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0

2.5.1.5.3 Data Payload

Empty

2.5.1.5.4 Frame Check Sequence

0xee00

2.6 Physical Layer

OpenBMIP may be used with either serial RS-422 or Ethernet as the physical layer.

2.6.1 Serial RS-422 Mode

2.6.1.1 Communication Parameters

This mode is used for the data transmission at the physical layer; settings are:

Serial Communication Settings	
Baud Rate	38400
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None
Handshaking	None

2.6.1.2 Data Ordering

For serial transfers, bits are sent beginning with Bit 7 (MSB) for any given byte. So, in order of transmission, a message is sent over the serial interface as follows:

(Byte 0, Bit 7), (Byte 0, Bit 6), … , (Byte 0, Bit 0), (Byte 1, Bit 7), …, (Byte n-1, Bit 0)

2.6.2 Ethernet Mode

The purpose of this protocol is to provide specification for communication between the modem (client) and BUC Proxy (server) using an Ethernet Interface. The BUC Proxy will communicate with the BUC and provide responses to the modem.

The Modem sends OpenBMIP messages to the BUC's IPv4 address (defined in a separate terminal-specific document), on UDP port 6001. For file transfers, the modem sends Kermit Over TCP/IP commands to the BUC's IPv4 address on TCP port 1649. The BUC accepts a connection from one client at a time. The modem always initiates the connection, similar to the Serial protocol.

The OpenBMIP commands described in *Command Syntax* on page 14 will be sent via UDP. Each UDP packet contains a single command or a response. Figure 2-2 shows the UDP packet structure:

Figure 2-2. UDP Ethernet Packet Format

The OpenBMIP Frame format in Figure 2-2 is specified in *Frame Description* on page 6. The interaction sequence between the client and server has been specified in *Client/Server Interaction Sequence Diagram* on page 9. All commands operate the same as with a serial connection; except for those related to file transfer (see *File Transfer* on page 21).

2.7 Command Syntax

The following sections detail individual commands and their responses. The DATA and Response DATA are shown as example strings enclosed in curly braces: {sample}. Each string should also include a NULL terminator, not shown. If the Command DATA or Response DATA string is blank, the NULL terminator is still included.

Table 2-2. Commands in Numerical Order

CMD_CODE	Section	Function Name
1	*2.7.10 Get Fault Status* on page 19	GFAULTSTATUS
2	*2.7.2 Get PA Power* on page 16	GPAPOWER
3	*2.7.1 Get Product ID* on page 15	GPRODUCTID
4	*2.7.3 Get Heartbeat* on page 16	GHEARTBEAT
5	*2.7.8 Get Local Oscillator* on page 19	GLOSCILLATOR
6	*2.7.4 Get Band Selection* on page 17	GBANDSEL
7	*2.7.5 Set Band Selection* on page 17	SBANDSEL
8	*2.7.9 Set Local Oscillator* on page 19	SLOSCILLATOR
9	*2.7.12 Reset Status Latch* on page 20	RSTATUSLATCH
10	*2.7.15.2.2 Send File* on page 23	SENDFILE
11	*2.7.15.2.4 Kermit File Transfer Status* on page 23	STATUSKERMITFILE
12	*2.7.15.2.3 Receive File* on page 23	RECEIVEFILE
13	*2.7.13 Get Software Version* on page 20	GSOFTWAREVER
14	*2.7.15.1.1 Get Calibration File* on page 21	GCALIBFILE
15	*2.7.15.1.2 Set Calibration File* on page 21	SCALIBFILE
16	*2.7.15.1.3 Prepare For Upgrade* on page 22	PREP_UPGRADE
17	*2.7.14 BUC Reset* on page 21	BUC_RST
18	*2.7.11 Get Latched Fault Status* on page 20	GLFAULTSTATUS
19	*2.7.6 Get Power Amp State* on page 18	GPOWERAMP
20	*2.7.7 Set Power Amp State* on page 19	SPOWERAMP
21	*2.7.16 Update Simulator* on page 24	UPDATESIM

2.7.1 Get Product ID

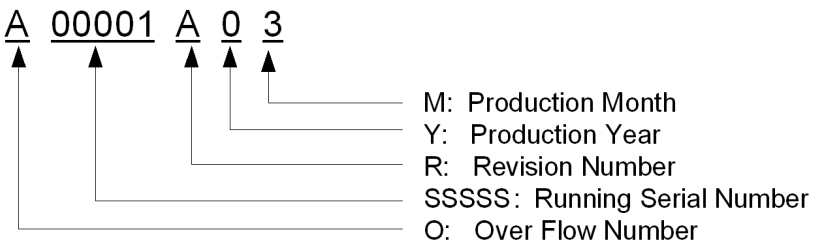
This command is used to query the BUC EEPROM contents. The contents of the response from the BUC should follow the format and response information as described below.

Command Description:	Echo manufacturer name and BUC model number
CMD_CODE:	3
Function Name:	GPRODUCTID
Command DATA:	{}
Response DATA:	{BPN=1234567890xxx,MID=mm,BSN=A12345A33,FID=050300}

The BUC identifiers are:

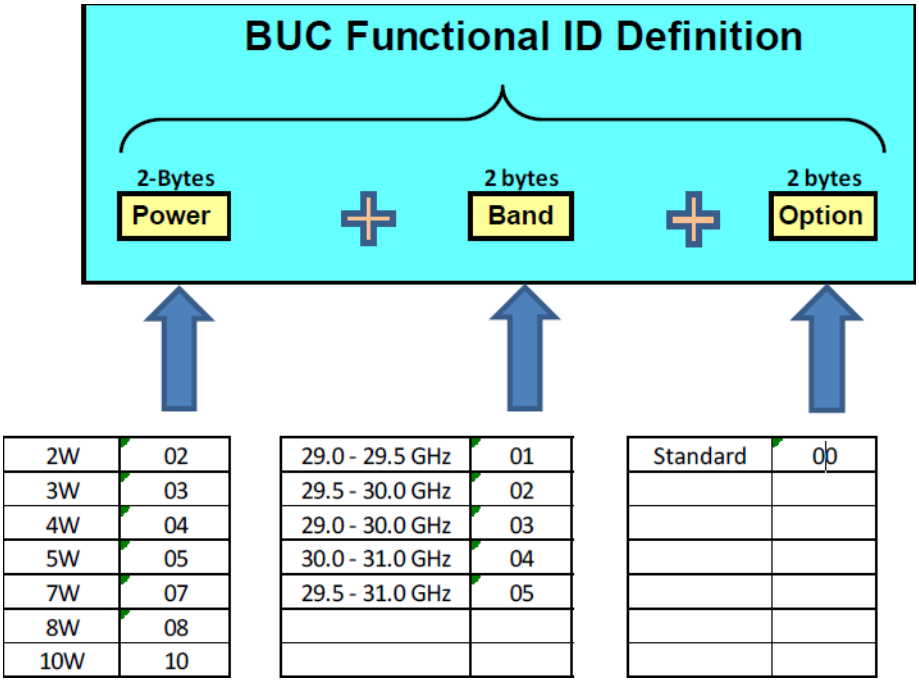
- BUC Part Number (BPN) assigned by iDirect if used with iDirect routers
  - 13 bytes; unused trailing bytes filled with "x"
- BUC Manufacturer ID (MID) assigned by iDirect
  - 2 bytes
- BUC Serial Number (BSN) Must be unique; see suggested example in Figure 2-3
  - 9 bytes
- BUC Functional ID (FID) per Figure 2-4
  - 6 bytes; Example: 5W, 29.0-30.0GHz, Standard:: --> 050300

Figure 2-3. BUC Serial Number with Embedded Date Code and Revision



O: Overflow Number – Alphabet (1 character)
"A" to "Z", e.g.: A99999 → B00001
SSSSS: Running Serial Number – Number (5 digits)
"00001" to "99999"
R: Revision Number – Alphabet (1character)
"A" to "Z"
Y: Production Year – Number (1 digit)
Calendar Number, e.g.: 2011:1, 2012=2, 2013=3....
M: Production Month- AlphaNumeric (1 character)
"1" to "9" and "X" as October, "Y" as November, "Z" as December

Figure 2-4. BUC Functional ID



2W	02
3W	03
4W	04
5W	05
7W	07
8W	08
10W	10

29.0 - 29.5 GHz	01
29.5 - 30.0 GHz	02
29.0 - 30.0 GHz	03
30.0 - 31.0 GHz	04
29.5 - 31.0 GHz	05

Standard	00

2.7.2 Get PA Power

Command Description: Echo raw power in terms of digital voltage with the resolution as specified in the calibration file

CMD_CODE: 2

Function Name: GPAPOWER

Command DATA: {}

Response DATA: {ABC} ASCII representation of hex value from A to D converter

NOTE: This function should operate correctly even if the final power amp stage is disabled by the Keyline discrete or by the Set Power Amp State command.

2.7.3 Get Heartbeat

This command will be used for heartbeat purposes.

Command Description: Echo S/N with embedded MFG date code, temperature and fault status

CMD_CODE: 4

Function Name: GHEARTBEAT

Command DATA: {}

Response DATA: {BSN=A12345A33,TEMP=+48.8,FSTATUS=lolock,fannormal, outputmute,normaltemp}

For FSTATUS definitions, see *Get Fault Status* on page 19.

2.7.4 Get Band Selection

Command Description: Get IF Harmonic Filter Selection

CMD_CODE: 6

Function Name: GBANDSEL

Command DATA: {}

Response DATA: {lowband,gpio_0,serial_0,tone_1}

Response DATA is as shown in Table 2-3.

Explanation of control states:

If the GPIO is left unconnected (floating) GPIO defaults to 0, highband (wideband).

If no serial port command is received, serial defaults to highband (wideband).

If no 27MHz tone is received, tone defaults to highband (wideband).

If any input requires lowband, the BUC operates in lowband.

Table 2-3. Band Select Logic

State No.	Band Select Control Signal			Response DATA
	GPIO	Serial Port	27MHz Tone	
0	0 or float	highband or unspecified	absent	highband,gpio_0,serial_0,tone_0
1	0	highband	present	lowband,gpio_0,serial_0,tone_1
2	0	lowband	absent	lowband,gpio_0,serial_1,tone_0
3	0	lowband	present	lowband,gpio_0,serial_1,tone_1
4	1	highband	absent	lowband,gpio_1,serial_0,tone_0
5	1	highband	present	lowband,gpio_1,serial_0,tone_1
6	1	lowband	absent	lowband,gpio_1,serial_1,tone_0
7	1	lowband	present	lowband,gpio_1,serial_1,tone_1

2.7.5 Set Band Selection

This command is used to select the BUC Band Filter using the monitoring and control interface. It should be noted that this is only one of the methods by which band selection can

be commanded. The BUC may also support selection by Tone or using a discrete signal (GPIO). The selection criterion to be followed by the BUC when one or more of these methods are used is as explained in *Get Band Selection* on page 17.

Command Description: Set IF Harmonic Filter Selection

CMD_CODE: 7

Function Name: SBANDSEL

Command DATA: {highband}

Response DATA: {}

2.7.6 Get Power Amp State

Command Description: Get state of final power amplifier

CMD_CODE: 19

Function Name: GPOWERAMP

Command DATA: {}

Response DATA: {enabled,gpio_0,BMIP_0}

Response DATA is as shown in Table 2-4.

Explanation of control states:

- If the GPIO Keyline discrete is not connected, the Keyline interface defaults to enable the BUC PA.
- If no OpenBMIP command is received to say otherwise, OpenBMIP defaults to enable the BUC PA.
- Once an OpenBMIP command disables the BUC PA, it is disabled until re-enabled by another command - regardless of the state of the discrete.
- If the discrete is in the state which disables the BUC PA, the PA is disabled - regardless of any commands received.
- If the PA is disabled by any inputs, it remains disabled until all inputs re-enable it.
- Hardware discrete GPIO Keyline definition: RS-422 differential signal; PA On:: [Float/Open inputs] or (A-B) > 0.2V; PA Standby:: (A-B) < -0.2V

Table 2-4. Power Amp Logic

State No.	Control Source		Response DATA
	Keyline	OpenBMIP	
0	PA On	enabled or unspecified	enabled,gpio_0,BMIP_0
1	PA On	disabled	disabled,gpio_0,BMIP_1
2	PA Standby	enabled	disabled,gpio_1,BMIP_0

Table 2-4. Power Amp Logic

3	PA Standby	disabled	disabled,gpio_1,BMIP_1

2.7.7 Set Power Amp State

This command is used to enable or disable the final power amp in the BUC, using the OpenBMIP interface. It should be noted that this is only one of the methods by which pwer amp state can be commanded. The BUC may also support selection by OpenAMIP (in terminals configured with a common controller for the BUC and the antenna) or using a discrete signal (GPIO) known as “Keyline.” The selection criterion to be followed by the BUC when one or more of these methods are used is as explained in *Get Band Selection* on page 17.

Command Description: Set state of final power amplifier

CMD_CODE: 20

Function Name: SPOWERAMP

Command DATA: {enabled}

Response DATA: {}

2.7.8 Get Local Oscillator

Command Description: Get the Local Oscillator Frequency

CMD_CODE: 5

Function Name: GLOSCILLATOR

Command DATA: {}

Response DATA: {28.05GHz}

2.7.9 Set Local Oscillator

This command is not used for a fixed-frequency BUC.

Command Description: Set the Local Oscillator Frequency

CMD_CODE: 8

Function Name: SLOSCILLATOR

Command DATA: {28.05GHz}

Response DATA: {}

2.7.10 Get Fault Status

Command Description: Display the fault status within the BUC; display current faults and latched faults (faults that have previously occurred but have not been cleared)

CMD_CODE: 1

Function Name:	GFAULTSTATUS
Command DATA:	{}
Response DATA:	{lolock,fannormal,outputmute,normaltemp} Any valid comma-separated combination of: lolock/lounlock, fannormal/fanstandby/fanfailed, outputnormal/outputoverdriven/outputmute, normaltemp/overtemp

NOTE: "fanstandby" means the fan(s) are purposely off to self-warm the BUC at low ambient temperature.

2.7.11 Get Latched Fault Status

Command Description:	Request the latched faults within the BUC. Request only latched faults, i.e., faults that have previously occurred but have not been cleared.
CMD_CODE:	18
Function Name:	GLFAULTSTATUS
Command DATA:	{}
Response DATA:	{outputoverdriven}

For status definitions, see *Get Fault Status* on page 19. The following faults should be latched: lounlock, fanfailed, outputoverdriven, overtemp.

2.7.12 Reset Status Latch

This command resets the fault status. Any fault event will be latched and readable, until the BUC receives this command. If the fault condition is persistent, this command will have no effect.

Command Description:	Clear all latched status
CMD_CODE:	9
Function Name:	RSTATUSLATCH
Command DATA:	{}
Response DATA:	{}

2.7.13 Get Software Version

Command Description:	Get the version number
CMD_CODE:	13
Function Name:	GSOFTWAREVER
Command DATA:	{}

Response DATA: {03.0123}

2.7.14 BUC Reset

Command Description: Reset the BUC

CMD_CODE: 17

Function Name: BUC_RST

Command DATA: {}

Response DATA: {}

2.7.15 File Transfer

2.7.15.1 Define Transfer Type

There are two file types to be transferred: calibration files in XML format (see *Calibration File Format* on page 30) and software upgrade files in vendor-defined format. A file transfer is always initiated by the modem, using GCALIBFILE (see *Get Calibration File* on page 21), SCALIBFILE (see *Set Calibration File* on page 21), or PREP_UPGRADE (see *Prepare For Upgrade* on page 22). Next, the file transfer is performed (see *Set Calibration File* on page 21).

File names consist only of the characters allowed in the DATA field (see *DATA* on page 8), excluding comma. Filenames do not include any path name. Filenames are case-insensitive.

2.7.15.1.1 Get Calibration File

Command Description: Prepare BUC to send the calibration file

CMD_CODE: 14

Function Name: GCALIBFILE

Command DATA: {}

Response DATA: {buc.cal,6123} file name and file size (in bytes)

NOTE: After response, perform the file transfer (See *Execute Transfer* on page 23)

2.7.15.1.2 Set Calibration File

Command Description: Prepare BUC to receive the calibration file

CMD_CODE: 15

Function Name: SCALIBFILE

Command DATA: {buc.cal,6123} file name and file size (in bytes)

Response DATA: {}

NOTE: After response, perform the file transfer (See *Execute Transfer* on page 23)

2.7.15.1.3 Prepare For Upgrade

Command Description:	Prepare BUC to receive a software upgrade
CMD_CODE:	16
Function Name:	PREP_UPGRADE
Command DATA:	{buc.sw,127383} file name and file size (in bytes)
Response DATA:	{}

NOTE: After response, perform the file transfer (See *Execute Transfer* on page 23)

2.7.15.1.3.1 Software Upgrade Procedure

Both upgrades and downgrades must be supported. The BUC software must take measures to ensure that an invalid software image may not be used for a software upgrade. A successful Kermit transfer is necessary but not sufficient. The BUC software must ensure that the payload of the Kermit transfer is valid for the model of BUC being upgraded and that using that image will allow the BUC to start in a valid operating mode.

The serial protocol supports upgrading the software on the BUC. In order to perform a software upgrade of the BUC, the following procedure is performed:

- CM sends the PREP_UPGRADE command that specifies the filename used for upgrade and also its size in bytes.
- The BUC responds (see *RSP_CODE* on page 7) with RSP_CODE = 1 if it is ready to accept the upgrade; 0 if not ready.
- If a RSP_CODE = 0 is received, the satellite router retries the upgrade after a configurable timeout (default 30s).
- If a RSP_CODE = 1 is received, the satellite router starts a file transfer of the file with the name specified in the previous command.
- If the file transfer fails, the CM retries the file transfer after a configurable timeout (default 30s).
- If the file transfer succeeds, the satellite router resets the BUC using the BUC Reset command.
- The BUC is expected to boot with the new software version after the reset.
- The satellite router will restart communications with the BUC after a configurable timeout (default 60s).

2.7.15.2 Execute Transfer

2.7.15.2.1 Kermit

File Transfer uses Kermit, a combined network and serial communication software package offering a consistent, transport-independent, cross-platform approach to connection establishment, terminal sessions, file transfer, file management, character-set translation, numeric and alphanumeric paging, and automation of file transfer and management, dialogs, and communication tasks through its built-in scripting language.

Not all implementations of Kermit in the field behave identically. To ensure compatibility with iDirect terminals, iDirect has produced an application to test the OpenBMIP and Kermit performance of a BUC. This application functions correctly with basic Kermit implementations as well as the more complex additions to the original design. The BUC Test application is available from iDirect along with its source code. A BUC simulator is also available along with its source code.

2.7.15.2.2 Send File

Command Description:	Start the file transfer
CMD_CODE:	10
Function Name:	SENDFILE
Command DATA:	{buc.cal,6123} file name and file size (in bytes)
Response DATA:	{}

2.7.15.2.3 Receive File

Command Description:	Receive a file
CMD_CODE:	12
Function Name:	RECEIVEFILE
Command DATA:	{buc.cal,6123} file name and file size (in bytes)
Response DATA:	{}

2.7.15.2.4 Kermit File Transfer Status

Command Description:	Status of the latest Kermit file transaction
CMD_CODE:	11
Function Name:	STATUSKERMITFILE
Command DATA:	{buc.cal} file name
Response DATA:	{}

2.7.15.2.5 Kermit File Transfer Sequence, Modem to BUC

```
modem -------------- [SENDFILE] ----------->BUC
modem <-------------- [SENDFILE, 1] -----------BUC
modem -------------- [Kermit -s powercal.xml] ----------->BUC
modem -------------- [STATUSKERMITFILE] ----------->BUC
```

```
modem <-------------- [STATUSKERMITFILE, 1] -----------BUC
```

2.7.15.2.6 Kermit File Transfer Sequence, BUC to Modem

```
modem -------------- [RECEIVEFILE] ----------->BUC
modem <-------------- [RECEIVEFILE, 1] -----------BUC
modem -------------- [Kermit -r powercal.xml] ----------->BUC
modem -------------- [STATUSKERMITFILE] ----------->BUC
modem <-------------- [STATUSKERMITFILE, 1] -----------BUC
```

2.7.16 Update Simulator

A software-only simulator is available in order to provide for software development and system testing without requiring an actual BUC. This simulator does not have any method for measuring the transmit output power and frequency or for monitoring the control lines from each remote. Because of this, a method by which the simulator can be informed of the remote state must be provided. This message provides everything the simulator needs in order to test One Touch Calibration (OTC) and normal BUC operation.

Command Description:	Update the simulator
CMD_CODE:	21
Function Name:	UPDATESIM
Command DATA:	{1200.0,-25.0,BPSK,1,1,0}
	Command data fields in order:
	IFL Frequency (MHz),
	Transmit power output (dBm),
	Modulation (BPSK or QPSK)
	Keyline enable state (1 = enable, 0 = disable)
	Reference enable state (1 = enable, 0 = disable)
	Tone enable state (1 = lowband, 0 = highband)
Response DATA:	{ABC} ASCII representation of hex value from A to D converter

2.7.17 Vendor Specific Commands

In order to allow different BUC vendors to provide the end user with a richer command set beyond those required by the monitoring and control interface, the protocol allows for the definition of vendor-specific commands.

All command codes 0x60 to 0x7E shall be reserved for use by the vendor. The Manufacturer_ID field is the binary representation of the MANUFACTURER_ID assigned to the vendor. This ID is as specified in Section 2.7.1. The vendor is free to use any internal format for the commands in the vendor specific portion after the first two fields, as shown in the command format. It is suggested that these vendor-specific commands be provided as ASCII strings.

Example Client Message:

CMD_CODE (0x60 to 0x7E)	MANUFACTURER_ID	CMD_LEN	Vendor-specific Command (MAX LEN = 255 Bytes) (Preferably an ASCII String)

Example Server Message:

CMD_CODE (0xE0 to 0xFE)	MANUFACTURER_ID	CMD_LEN	Vendor-specific Command (MAX LEN = 255 Bytes) (Preferably an ASCII String)

3 Calibration

This chapter contains the following sections:

- Calibration Algorithm
- Calibration File Format

3.1 Calibration Algorithm

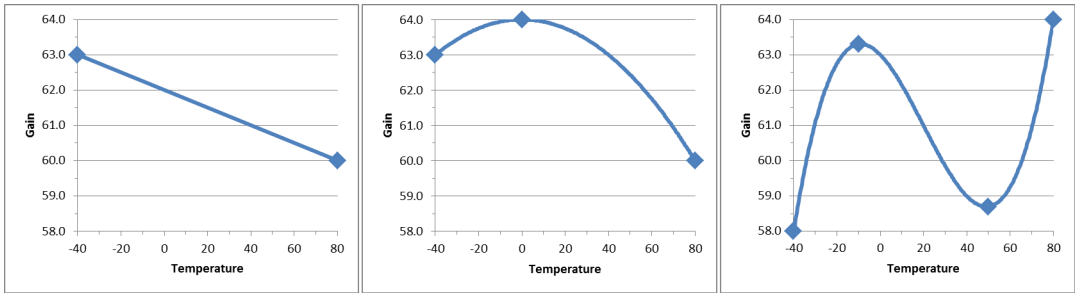
The calibration procedure as indicated below should be run by the BUC manufacturer. The BUC output power is factory-calibrated with IF stimulus at three temperature points: minimum operating temperature, maximum operating temperature, and nominal or average operating temperature. The BUC is calibrated at Maximum Output Power (MOP), [MOP-4dB], and [MOP-8dB] for better linearity interpolation by the modem. For maximum interpolation accuracy, the raw hex bits power reading from the ADC should be linear to BUC output power expressed in dB. The resultant calibration data is stored so the modem can electronically retrieve it via OpenBMIP query.

If the BUC supports a band-select filter, the filter should be configured to its low-band setting for all frequencies less than or equal to the transition frequency. The filter should be configured to its high-band (or wide-band) setting for all frequencies greater than the transition frequency. This will ensure consistent operation with the modem.

The BUC Calibration process is shown in Figure 3-1. Measurements are made at each point identified by target power level "p", modulation type "m", frequency "f", and temperature "t". At each measurement point, power is externally measured at the IF input, and at the RF output. Additionally, the BUC's internal detector analog to digital converter (ADC) is read with the BUC power amp enabled, and with the BUC power amp disabled. Finally, the BUC's internal temperature sensor (which should be thermally close to the power amp and power detector) is read. It is desirable to read the power detector and the temperature sensor as rapidly as possible (allowing for detector settling time) to minimize temperature changes between the associated readings.

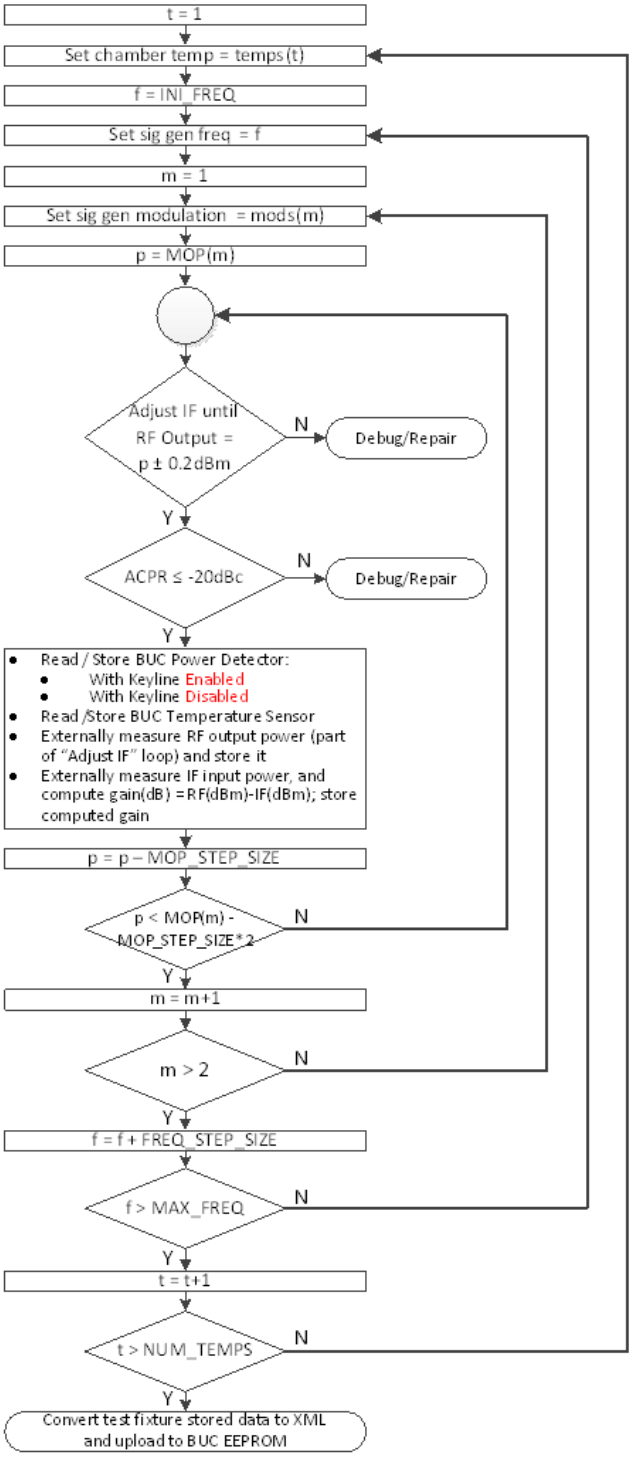
The measurement temperatures should be selected to include any peaks or troughs in the gain versus temperature curve, to minimize error in interpolation. In all cases, the endpoints (minimum and maximum operating temperatures) should be included, but data will be linearly extrapolated if temperatures beyond those in the CAL file are reported by the BUC. The following cases are anticipated:

Figure 3-1. Typical Gain vs Temperature for 2, 3, and 4 Points



NOTE: The temperatures t=1, t=2, and t=3 indicated in Figure 3-2 are for reference; systems may calibrate at the temperatures appropriate for the application. The nominal Maximum Output Power (MOP) indicated in the figure is for reference; systems may implement the MOP appropriate to the application. Other details, such as the frequency calibration points chosen, may be tailored for the application. The file format described in *Calibration File Format* on page 30 must be used in all implementations.

Figure 3-2. BUC Calibration Process



Example (maritime application):
Test chamber ambient temperatures temps(t):
t= 1:: +25 °C
t= 2:: -40 °C
t= 3:: +73 °C
t= 4:: (optional, e.g. -20 °C)
...

f in MHz, for example:
950, 1000, ..1950

mods(m):
m=1: BPSK
m=2: QPSK
m=3: 8PSK (Future)
Note:
8PSK is not required at this time

MOP(m) ≥ +37dBm for Q/8PSK
MOP(m) ≥ +36dBm for BPSK

Note:
BUC Detector Reading (HEX value) slope may be either positive or negative, but must change monotonically with increasing power, over the calibrated range, plus a margin of +0.75/-2.0dB.

3.2 Calibration File Format

The calibration file that will be retrieved from the BUC by the CM should bind to the following xml file format. The BUC manufacturer may optionally choose to compress the calibration file in GZIP format (see IETF RFC 1952, listed in the Standards References). The filename shall end with ".xml" if it is XML and ".gz" if it is a GZIP-compressed file containing the XML file.

In the sample calibration file shown below, only the characters enclosed within the demarcation characters need to be presented as-is. The demarcation characters are "<>" and "</>" respectively. The other information that is presented in this sample calibration file format are all "values" and not string constants. These need to be replaced with the actual measured values of that particular variable. The "values" are indicated as SOME_VARIABLE_NAME in the following format. These can be decimals, floats or strings as required; see Table 3-1 for descriptions.

Table 3-1. Calibration File Values

Name Of Value In Sample Format	Example Value	Units
<vendor_id>	99	BUC Manufacturer ID (MID) unique in network
<model_number>	1234567890xxx	BUC Part Number (BPN)
<serial_number>	A12345A33	BUC Serial Number (BSN)
<functional_id>	050300	BUC Functional ID (FID)
<max_operating_point>	33.0	dBm (for QPSK; nominal)
<back_off_step_size>	4	dB; difference between power steps
<initial_freq>	950	MHz
<freq_step_size>	50	MHz NOTE: freq_step_size is deprecated; the modem will ignore this value. Because each frequency is explicitly listed, the file is permitted to contain non-uniform steps. One typical use for this feature is to add finer steps to accommodate discontinuities in the frequency response, such as at the band select filter breakpoint.
<max_freq>	1950	MHz

Table 3-1. Calibration File Values (continued)

<buc_cutoff_frequency_mhz>	1350.0	MHz; Decision point for the BUC's internal 2nd-harmonic filter. When transmitting an IF frequency **less than or equal to** this value, the remote will set the filter to lowband; frequency **greater than** this value will set the BUC's filter to highband. If this value is absent, the remote will assume: mean(max_freq, min_freq) - 100MHz If the BUC does not have a switchable filter, this value can be set to equal <max_freq>.
<adc_res>	12	Bits; 12 bits is currently supported
<adc_slope>	-1	-1 or +1. "+1" means that a higher power output will produce a higher ADC number. Slope may be mildly nonlinear but must be monotonic, over the calibrated range, plus a margin of +0.75/-2.0dB.
<num_temps>	3	Number of temperature points, maximum **5**.
<mod_type>	1	1 (BPSK), 2 (QPSK), 3 (8PSK), 4(16PSK), 5(32PSK), 6(16QAM), 7(32QAM); 1 & 2 must be supported; 1, 2, and 3 are supported by the remote.
<freq>	950	MHz, IF input
<pout>	33.0	dBm, externally measured output
<pout_det>	7F5	Raw hex bits from ADC, PA enabled
<pout_det_dis>	82E	Raw hex bits from ADC, PA disabled
<gain>	62.4	dB, Externally measured gain
<buc_temp>	57.6	Degrees C near PA & detector

A generic sample BUC Calibration file is shown below.

NOTE: The Vendor_ID, MODEL_NUMBER, SERIAL NUMBER, FUNCT_ID definition/format can be found in *Get Product ID* on page 15. All items in UPPER CASE will be replaced with specific values.

```
<buc_cal_file>
  <vendor_id>MID</vendor_id>
  <model_number>BPN</model_number>
  <serial_number>BSN</serial_number>
```

```
<functional_id>FID</functional_id>
<max_operating_point>MOP</max_operating_point>
<back_off_step_size>MOP_STEP_SIZE</back_off_step_size>
<initial_freq>INI_FREQ</initial_freq>
<freq_step_size>FREQ_STEP_SIZE</freq_step_size>
<max_freq>MAX_FREQ</max_freq>
<buc_cutoff_frequency_mhz>CUTOFF</buc_cutoff_frequency_mhz>
<adc_res>ADC_RES_IN_BITS</adc_res>
<adc_slope>ADC_SLOPE</adc_slope>
<num_temps>NUM_TEMPS</num_temps >
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      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <pout>MOP-MOP_STEP_SIZE</pout>
      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <pout>MOP-MOP_STEP_SIZE*2</pout>
      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <buc_temp>BUC_TEMPERATURE</buc_temp>
```

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<pow_set>
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  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE*2</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
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  <pout>MOP</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE*2</pout>
  <pout_det>DET_ADC_HEX</pout_det>
```

```
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    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*4</freq>
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    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
```

```
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
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    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*6</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
```

```
      <pout>MOP-MOP_STEP_SIZE</pout>
      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <pout>MOP-MOP_STEP_SIZE*2</pout>
      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <buc_temp>BUC_TEMPERATURE</buc_temp>
   </pow_set>
   <pow_set>
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      <pout>MOP</pout>
      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <pout>MOP-MOP_STEP_SIZE</pout>
      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <pout>MOP-MOP_STEP_SIZE*2</pout>
      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <buc_temp>BUC_TEMPERATURE</buc_temp>
   </pow_set>
   <pow_set>
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      <pout>MOP</pout>
```

```
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
    </pow_set>
    <pow_set>
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        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
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    </pow_set>
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  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE*2</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
  <freq>INITIAL_FREQ+FREQ_STEP_SIZE*11</freq>
  <pout>MOP</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE*2</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
```

```
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
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    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*13</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
```

```
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*14</freq>
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    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
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    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
```

```
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
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</pow_set>
<pow_set>
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    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
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    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
```

```
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
    </pow_set>
    <pow_set>
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        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
    </pow_set>
    <pow_set>
```

```
        <freq>INITIAL_FREQ+FREQ_STEP_SIZE*19</freq>
        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
    </pow_set>
    <pow_set>
        <freq>INITIAL_FREQ+FREQ_STEP_SIZE*20</freq>
        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
```

```
        <buc_temp>BUC_TEMPERATURE</buc_temp>
      </pow_set>
    </modulation_setting>
    <modulation_setting>
      <mod_type>2</mod_type>
      <pow_set>
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        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
      </pow_set>
      <pow_set>
        <freq>INITIAL_FREQ+ FREQ_STEP_SIZE*2</freq>
        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
```

```
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+ FREQ_STEP_SIZE*3</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+ FREQ_STEP_SIZE*4</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
```

```
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*5</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+2 * FREQ_STEP_SIZE*6</freq>
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```
      <pout>MOP</pout>
      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <pout>MOP-MOP_STEP_SIZE</pout>
      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <pout>MOP-MOP_STEP_SIZE*2</pout>
      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <buc_temp>BUC_TEMPERATURE</buc_temp>
   </pow_set>
   <pow_set>
      <freq>INITIAL_FREQ+ FREQ_STEP_SIZE*7</freq>
      <pout>MOP</pout>
      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <pout>MOP-MOP_STEP_SIZE</pout>
      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <pout>MOP-MOP_STEP_SIZE*2</pout>
      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <buc_temp>BUC_TEMPERATURE</buc_temp>
```

```
</pow_set>
<pow_set>
  <freq>INITIAL_FREQ+FREQ_STEP_SIZE*8</freq>
  <pout>MOP</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE*2</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
  <freq>INITIAL_FREQ+2 * FREQ_STEP_SIZE*9</freq>
  <pout>MOP</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE*2</pout>
  <pout_det>DET_ADC_HEX</pout_det>
```

```
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+ FREQ_STEP_SIZE*10</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+ FREQ_STEP_SIZE*11</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
```

```
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
    </pow_set>
    <pow_set>
        <freq>INITIAL_FREQ+ FREQ_STEP_SIZE*12</freq>
        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
    </pow_set>
    <pow_set>
        <freq>INITIAL_FREQ+FREQ_STEP_SIZE*13</freq>
        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
```

```
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*14</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*15</freq>
    <pout>MOP</pout>
```

```
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
    </pow_set>
    <pow_set>
        <freq>INITIAL_FREQ+FREQ_STEP_SIZE*16</freq>
        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
    </pow_set>
```

```
<pow_set>
  <freq>INITIAL_FREQ+FREQ_STEP_SIZE*17</freq>
  <pout>MOP</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE*2</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
  <freq>INITIAL_FREQ+FREQ_STEP_SIZE*18</freq>
  <pout>MOP</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE*2</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
```

```
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*19</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*20</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
```

```
            <pout>MOP-MOP_STEP_SIZE*2</pout>
            <pout_det>DET_ADC_HEX</pout_det>
            <pout_det_dis>DET_ADC_HEX</pout_det_dis>
            <gain>GAIN_IN_DB</gain>
            <buc_temp>BUC_TEMPERATURE</buc_temp>
        </pow_set>
    </modulation_setting>
</temperature1>
<temperature2>
    <modulation_setting>
        <mod_type>1</mod_type>
        <pow_set>
            <freq>INITIAL_FREQ</freq>
            <pout>MOP</pout>
            <pout_det>DET_ADC_HEX</pout_det>
            <pout_det_dis>DET_ADC_HEX</pout_det_dis>
            <gain>GAIN_IN_DB</gain>
            <pout>MOP-MOP_STEP_SIZE</pout>
            <pout_det>DET_ADC_HEX</pout_det>
            <pout_det_dis>DET_ADC_HEX</pout_det_dis>
            <gain>GAIN_IN_DB</gain>
            <pout>MOP-MOP_STEP_SIZE*2</pout>
            <pout_det>DET_ADC_HEX</pout_det>
            <pout_det_dis>DET_ADC_HEX</pout_det_dis>
            <gain>GAIN_IN_DB</gain>
            <buc_temp>BUC_TEMPERATURE</buc_temp>
        </pow_set>
        <pow_set>
            <freq>INITIAL_FREQ+FREQ_STEP_SIZE</freq>
```

```
        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
    </pow_set>
    <pow_set>
        <freq>INITIAL_FREQ+FREQ_STEP_SIZE*2</freq>
        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
```

```
</pow_set>
<pow_set>
  <freq>INITIAL_FREQ+FREQ_STEP_SIZE*3</freq>
  <pout>MOP</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE*2</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
  <freq>INITIAL_FREQ+FREQ_STEP_SIZE*4</freq>
  <pout>MOP</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE*2</pout>
  <pout_det>DET_ADC_HEX</pout_det>
```

```
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*5</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*6</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
```

```
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*7</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*8</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
```

```
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*9</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*10</freq>
    <pout>MOP</pout>
```

```
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
    </pow_set>
    <pow_set>
        <freq>INITIAL_FREQ+FREQ_STEP_SIZE*11</freq>
        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
    </pow_set>
```

```
<pow_set>
  <freq>INITIAL_FREQ+FREQ_STEP_SIZE*12</freq>
  <pout>MOP</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE*2</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
  <freq>INITIAL_FREQ+FREQ_STEP_SIZE*13</freq>
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  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE*2</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
```

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    <gain>GAIN_IN_DB</gain>
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    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
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    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
```

```
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
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    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*17</freq>
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    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
```

```
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*18</freq>
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    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
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<pow_set>
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```

```
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            <gain>GAIN_IN_DB</gain>
            <pout>MOP-MOP_STEP_SIZE</pout>
            <pout_det>DET_ADC_HEX</pout_det>
            <pout_det_dis>DET_ADC_HEX</pout_det_dis>
            <gain>GAIN_IN_DB</gain>
            <pout>MOP-MOP_STEP_SIZE*2</pout>
            <pout_det>DET_ADC_HEX</pout_det>
            <pout_det_dis>DET_ADC_HEX</pout_det_dis>
            <gain>GAIN_IN_DB</gain>
            <buc_temp>BUC_TEMPERATURE</buc_temp>
        </pow_set>
        <pow_set>
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            <pout>MOP</pout>
            <pout_det>DET_ADC_HEX</pout_det>
            <pout_det_dis>DET_ADC_HEX</pout_det_dis>
            <gain>GAIN_IN_DB</gain>
            <pout>MOP-MOP_STEP_SIZE</pout>
            <pout_det>DET_ADC_HEX</pout_det>
            <pout_det_dis>DET_ADC_HEX</pout_det_dis>
            <gain>GAIN_IN_DB</gain>
            <pout>MOP-MOP_STEP_SIZE*2</pout>
            <pout_det>DET_ADC_HEX</pout_det>
            <pout_det_dis>DET_ADC_HEX</pout_det_dis>
            <gain>GAIN_IN_DB</gain>
            <buc_temp>BUC_TEMPERATURE</buc_temp>
        </pow_set>
    </modulation_setting>
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    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
  </pow_set>
  <pow_set>
    <freq>INITIAL_FREQ+ FREQ_STEP_SIZE*2</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
```

```
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+ FREQ_STEP_SIZE*3</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+ FREQ_STEP_SIZE*4</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
```

```
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
    </pow_set>
    <pow_set>
        <freq>INITIAL_FREQ+FREQ_STEP_SIZE*5</freq>
        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
    </pow_set>
    <pow_set>
        <freq>INITIAL_FREQ+2 * FREQ_STEP_SIZE*6</freq>
        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
```

```
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+ FREQ_STEP_SIZE*7</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*8</freq>
```

```
      <pout>MOP</pout>
      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <pout>MOP-MOP_STEP_SIZE</pout>
      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <pout>MOP-MOP_STEP_SIZE*2</pout>
      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <buc_temp>BUC_TEMPERATURE</buc_temp>
   </pow_set>
   <pow_set>
      <freq>INITIAL_FREQ+2 * FREQ_STEP_SIZE*9</freq>
      <pout>MOP</pout>
      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <pout>MOP-MOP_STEP_SIZE</pout>
      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <pout>MOP-MOP_STEP_SIZE*2</pout>
      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <buc_temp>BUC_TEMPERATURE</buc_temp>
```

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</pow_set>
<pow_set>
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  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE*2</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
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  <pout>MOP</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE*2</pout>
  <pout_det>DET_ADC_HEX</pout_det>
```

```
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
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    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
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    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*13</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
```

```
      <gain>GAIN_IN_DB</gain>
      <pout>MOP-MOP_STEP_SIZE*2</pout>
      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <buc_temp>BUC_TEMPERATURE</buc_temp>
   </pow_set>
   <pow_set>
      <freq>INITIAL_FREQ+FREQ_STEP_SIZE*14</freq>
      <pout>MOP</pout>
      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <pout>MOP-MOP_STEP_SIZE</pout>
      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <pout>MOP-MOP_STEP_SIZE*2</pout>
      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <buc_temp>BUC_TEMPERATURE</buc_temp>
   </pow_set>
   <pow_set>
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      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
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```
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*16</freq>
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    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*17</freq>
    <pout>MOP</pout>
```

```
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
    </pow_set>
    <pow_set>
        <freq>INITIAL_FREQ+FREQ_STEP_SIZE*18</freq>
        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
    </pow_set>
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<pow_set>
  <freq>INITIAL_FREQ+FREQ_STEP_SIZE*19</freq>
  <pout>MOP</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE*2</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
  <freq>INITIAL_FREQ+FREQ_STEP_SIZE*20</freq>
  <pout>MOP</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE*2</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
```

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            <gain>GAIN_IN_DB</gain>
            <buc_temp>BUC_TEMPERATURE</buc_temp>
          </pow_set>
        </modulation_setting>
      </temperature2>
      <temperature3>
        <modulation_setting>
          <mod_type>1</mod_type>
          <pow_set>
            <freq>INITIAL_FREQ</freq>
            <pout>MOP</pout>
            <pout_det>DET_ADC_HEX</pout_det>
            <pout_det_dis>DET_ADC_HEX</pout_det_dis>
            <gain>GAIN_IN_DB</gain>
            <pout>MOP-MOP_STEP_SIZE</pout>
            <pout_det>DET_ADC_HEX</pout_det>
            <pout_det_dis>DET_ADC_HEX</pout_det_dis>
            <gain>GAIN_IN_DB</gain>
            <pout>MOP-MOP_STEP_SIZE*2</pout>
            <pout_det>DET_ADC_HEX</pout_det>
            <pout_det_dis>DET_ADC_HEX</pout_det_dis>
            <gain>GAIN_IN_DB</gain>
            <buc_temp>BUC_TEMPERATURE</buc_temp>
          </pow_set>
          <pow_set>
            <freq>INITIAL_FREQ+FREQ_STEP_SIZE</freq>
            <pout>MOP</pout>
            <pout_det>DET_ADC_HEX</pout_det>
            <pout_det_dis>DET_ADC_HEX</pout_det_dis>
```

```
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*2</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*3</freq>
```

```
        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
    </pow_set>
    <pow_set>
        <freq>INITIAL_FREQ+FREQ_STEP_SIZE*4</freq>
        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
```

```
</pow_set>
<pow_set>
  <freq>INITIAL_FREQ+FREQ_STEP_SIZE*5</freq>
  <pout>MOP</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE*2</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
  <freq>INITIAL_FREQ+FREQ_STEP_SIZE*6</freq>
  <pout>MOP</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE*2</pout>
  <pout_det>DET_ADC_HEX</pout_det>
```

```
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*7</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*8</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
```

```
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
    </pow_set>
    <pow_set>
        <freq>INITIAL_FREQ+FREQ_STEP_SIZE*9</freq>
        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
    </pow_set>
    <pow_set>
        <freq>INITIAL_FREQ+FREQ_STEP_SIZE*10</freq>
        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
```

```
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*11</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*12</freq>
    <pout>MOP</pout>
```

```
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
    </pow_set>
    <pow_set>
        <freq>INITIAL_FREQ+FREQ_STEP_SIZE*13</freq>
        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
    </pow_set>
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<pow_set>
  <freq>INITIAL_FREQ+FREQ_STEP_SIZE*14</freq>
  <pout>MOP</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE*2</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
  <freq>INITIAL_FREQ+FREQ_STEP_SIZE*15</freq>
  <pout>MOP</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE*2</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
```

```
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*16</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*17</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
```

```
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*18</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*19</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
```

```
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
      </pow_set>
      <pow_set>
        <freq>INITIAL_FREQ+FREQ_STEP_SIZE*20</freq>
        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
      </pow_set>
    </modulation_setting>
    <modulation_setting>
      <mod_type>2</mod_type>
      <pow_set>
```

```
        <freq>INITIAL_FREQ+ FREQ_STEP_SIZE</freq>
        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
    </pow_set>
    <pow_set>
        <freq>INITIAL_FREQ+ FREQ_STEP_SIZE*2</freq>
        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
```

```
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+ FREQ_STEP_SIZE*3</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+ FREQ_STEP_SIZE*4</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
```

```
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
    </pow_set>
    <pow_set>
        <freq>INITIAL_FREQ+FREQ_STEP_SIZE*5</freq>
        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
    </pow_set>
    <pow_set>
        <freq>INITIAL_FREQ+2 * FREQ_STEP_SIZE*6</freq>
        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
```

```
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+ FREQ_STEP_SIZE*7</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*8</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
```

```
      <gain>GAIN_IN_DB</gain>
      <pout>MOP-MOP_STEP_SIZE</pout>
      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <pout>MOP-MOP_STEP_SIZE*2</pout>
      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <buc_temp>BUC_TEMPERATURE</buc_temp>
   </pow_set>
   <pow_set>
      <freq>INITIAL_FREQ+2 * FREQ_STEP_SIZE*9</freq>
      <pout>MOP</pout>
      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <pout>MOP-MOP_STEP_SIZE</pout>
      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <pout>MOP-MOP_STEP_SIZE*2</pout>
      <pout_det>DET_ADC_HEX</pout_det>
      <pout_det_dis>DET_ADC_HEX</pout_det_dis>
      <gain>GAIN_IN_DB</gain>
      <buc_temp>BUC_TEMPERATURE</buc_temp>
   </pow_set>
   <pow_set>
      <freq>INITIAL_FREQ+ FREQ_STEP_SIZE*10</freq>
```

```
        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
    </pow_set>
    <pow_set>
        <freq>INITIAL_FREQ+ FREQ_STEP_SIZE*11</freq>
        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
```

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</pow_set>
<pow_set>
  <freq>INITIAL_FREQ+ FREQ_STEP_SIZE*12</freq>
  <pout>MOP</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE*2</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
  <freq>INITIAL_FREQ+FREQ_STEP_SIZE*13</freq>
  <pout>MOP</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE</pout>
  <pout_det>DET_ADC_HEX</pout_det>
  <pout_det_dis>DET_ADC_HEX</pout_det_dis>
  <gain>GAIN_IN_DB</gain>
  <pout>MOP-MOP_STEP_SIZE*2</pout>
  <pout_det>DET_ADC_HEX</pout_det>
```

```
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*14</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*15</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
```

```
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
    </pow_set>
    <pow_set>
        <freq>INITIAL_FREQ+FREQ_STEP_SIZE*16</freq>
        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
    </pow_set>
    <pow_set>
        <freq>INITIAL_FREQ+FREQ_STEP_SIZE*17</freq>
        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
```

```
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*18</freq>
    <pout>MOP</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <pout>MOP-MOP_STEP_SIZE*2</pout>
    <pout_det>DET_ADC_HEX</pout_det>
    <pout_det_dis>DET_ADC_HEX</pout_det_dis>
    <gain>GAIN_IN_DB</gain>
    <buc_temp>BUC_TEMPERATURE</buc_temp>
</pow_set>
<pow_set>
    <freq>INITIAL_FREQ+FREQ_STEP_SIZE*19</freq>
    <pout>MOP</pout>
```

```
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
    </pow_set>
    <pow_set>
        <freq>INITIAL_FREQ+FREQ_STEP_SIZE*20</freq>
        <pout>MOP</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <pout>MOP-MOP_STEP_SIZE*2</pout>
        <pout_det>DET_ADC_HEX</pout_det>
        <pout_det_dis>DET_ADC_HEX</pout_det_dis>
        <gain>GAIN_IN_DB</gain>
        <buc_temp>BUC_TEMPERATURE</buc_temp>
    </pow_set>
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        </modulation_setting>
      </temperature3>
    </buc_cal_file>
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