



G7M Signal Generator

SCPI Programming Guide

VERSION 2.4

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Micran, Research & Production Company

Contents

<u>*CLS</u>	
<u>*ESR?</u>	
<u>*IDN?</u>	
<u>*OPC?</u>	
<u>*RST?</u>	
<u>*STB?</u>	
<u>*TRG</u>	
ABORt	1.
INITiate	2.
<u>INITiate:CONTInuous</u>	2.1.
<u>INITiate:CONTInuous[:ALL]</u>	2.1.1.
<u>INITiate[:IMMEDIATE]</u>	2.2.
<u>INITiate[:IMMEDIATE][:ALL]</u>	2.2.1.
OUTPut	3.
<u>OUTPut[:STATe]</u>	3.1.
[SOURce]	4.
<u>[SOURce]:FREQuency</u>	4.1.
<u>[SOURce]:FREQuency[:CW FIXed]</u>	4.1.1.
<u>[SOURce]:FREQuency:CENTer</u>	4.1.2.
<u>[SOURce]:FREQuency:MODE</u>	4.1.3.
<u>[SOURce]:FREQuency:SPAN</u>	4.1.4.
<u>[SOURce]:FREQuency:START</u>	4.1.5.
<u>[SOURce]:FREQuency:STOP</u>	4.1.6.
<u>[SOURce]:LIST</u>	4.2.
<u>[SOURce]:LIST:DWELL</u>	4.2.1.
<u>[SOURce]:LIST:DWELL:POINTs?</u>	4.2.1.1.
<u>[SOURce]:LIST:MODE</u>	4.2.2.
<u>[SOURce]:LIST:FREQuency</u>	4.2.3.
<u>[SOURce]:LIST:FREQuency:POINTs?</u>	4.2.3.1.
<u>[SOURce]:LIST:POWer</u>	4.2.4.
<u>[SOURce]:LIST:POWer:POINTs?</u>	4.2.4.1.
<u>[SOURce]:POWer</u>	4.3.
<u>[SOURce]:POWer[:LEVel]</u>	4.3.1.
<u>[SOURce]:POWer[:LEVel][:IMMEDIATE]</u>	4.3.1.1.

[SOURce]:POWER[:LEVel][:IMMediate][:AMPLitude]	4.3.1.1.1.
[SOURce]:POWER:ALC	4.3.2.
[SOURce]:POWER:ALC[:STATe]	4.3.2.1.
[SOURce]:POWER:ATTenuation	4.3.3.
[SOURce]:POWER:ATTenuation:AUTO	4.3.3.1.
[SOURce]:POWER:CENTer	4.3.4.
[SOURce]:POWER:MODE	4.3.5.
[SOURce]:POWER:SPAN	4.3.6.
[SOURce]:POWER:START	4.3.7.
[SOURce]:POWER:STOP	4.3.8.
[SOURce]:PULM	4.4.
[SOURce]:PULM:POLarity	4.4.1.
[SOURce]:PULM:STATe	4.4.2.
[SOURce]:PULM:SOURce	4.4.3.
[SOURce]:PULM:INTernal	4.4.4.
[SOURce]:PULM:INTernal:PERiod	4.4.4.1.
[SOURce]:PULM:INTernal:PWIDth	4.4.4.2.
[SOURce]:ROSCillator	4.5.
[SOURce]:ROSCillator:SOURce	4.5.1.
[SOURce]:ROSCillator:EXTernal	4.5.2.
[SOURce]:ROSCillator:EXTernal:FREQuency	4.5.2.1.
[SOURce]:SWEep	4.6.
[SOURce]:SWEep:DWELL	4.6.1.
[SOURce]:SWEep:STEP	4.6.2.
[SOURce]:SWEep:POINTs	4.6.3.
STATus	5.
STATus:OPERation	5.1.
STATus:OPERation:CONDition?	5.1.1.
STATus:OPERation:ENABLE	5.1.2.
STATus:OPERation[:EVENT]?	5.1.3.
STATus:QUEStionable	5.2.
STATus:QUEStionable:CONDition?	5.2.1.
STATus:QUEStionable:ENABLE	5.2.2.
STATus:QUEStionable[:EVENT]?	5.2.3.
SYSTem	6.
SYSTem:ERRor	6.1.
SYSTem:ERRor[:NEXT]?	6.1.1.

<u>SYSTem:VERsion?</u>	6.2.
<u>TRIGger</u>	7.
<u>TRIGger:AUXiliary</u>	7.1.
<u>TRIGger:AUXiliary:DURation</u>	7.1.1.
<u>TRIGger:AUXiliary:INTerval</u>	7.1.2.
<u>TRIGger:AUXiliary:OPOLarity</u>	7.1.3.
<u>TRIGger:AUXiliary[:OUTPut]</u>	7.1.4.
<u>TRIGger:AUXiliary[:OUTPut][:ENABLE]</u>	7.1.4.1.
<u>TRIGger:AUXiliary:PULSe</u>	7.1.5.
<u>TRIGger:AUXiliary:PULSe:PERiod</u>	7.1.5.1.
<u>TRIGger:AUXiliary:PULSe:WIDTh</u>	7.1.5.2.
<u>TRIGger[:SEQUence]</u>	7.2.
<u>TRIGger[:SEQUence][:IMMEDIATE]</u>	7.2.1.
<u>TRIGger[:SEQUence]:SLOPe</u>	7.2.2.
<u>TRIGger[:SEQUence]:SOURce</u>	7.2.3.
<u>UNIT</u>	8.
<u>UNIT:POWER</u>	8.1.
<u>SCPI Errors Description</u>	

IEEE 488 Common Commands

1. *CLS

(Write-only) Clears the instrument status byte by emptying the error queue and clearing all event registers. Also cancels any preceding *OPC command or query.

2. *ESR?

(Read-only) This query returns the decimal sum of the bits set in the Standard Event Status Register.

3. *IDN?

(Read-only) This query requests an identification string from the signal generator. The IDN string consists of the following information: *Micran,<model number>,<serial number>,<software version>*.

4. *OPC?

(Read-only) Returns an ASCII "+1" when all pending overlapped operations have been completed.

5. *RST?

(Read-only) Executes a device reset and cancels any pending [*OPC](#) command or query.

6. *STB?

(Read-only) This command reads the decimal sum of the bits set in the Status Byte register.

7. *TRG

(Write-only) The Trigger (TRG) command triggers the device if BUS is the selected trigger source, otherwise, *TRG is ignored. For more information on triggers; refer to [TRIGger\[:SEQuence\]:SOURce](#).

1. ABORt commands

(Write-only) This command causes the List or Step sweep in progress to abort. If [INITiate:CONTInous\[:ALL\]](#) is set to ON, the sweep will immediately re-initiate. The pending operation flag affecting [*OPC?](#) will undergo a transition once the sweep has been reset.

2. INITiate commands

2.1. INITiate:CONTinuous

2.1.1. INITiate:CONTinuous[:ALL] <bool>

(Write-only) This command selects either a continuous or single List or Step sweep. Execution of this command does not affect a sweep in progress.

Parameters

<bool> Allowed values:

- ON
- OFF

2.2. INITiate[:IMMediate]

2.2.1. INITiate[:IMMediate][:ALL]

(Write-only) This command arms a single sweep when BUS, EXternal is the trigger source selection, or arms and starts a single sweep when trigger mode is IMMediate.

3. OUTPut commands

The output control of the microwave.

3.1. OUTPut[:STaTe] <bool>

(Write or Read) This command enables or disables the RF output.

Parameters

<bool> Output state.

Allowed values:

- **ON**
- **OFF**

Default value: **OFF**

4. SOURce commands

Controls the settings of the source.

4.1. [SOURce]:FREQuency

Controls the settings of the source frequency.

4.1.1. [SOURce]:FREQuency[:CW | FIXed] <num>

(Write-only) This command sets the signal generator output frequency for the CW frequency mode.

Parameters

<num> Fixed frequency

Supported units: **Hz, kHz, MHz, GHz**

Allowed values:

- **DEFault**
- **MINimum**
- **MAXimum**

Default value: **10 MHz**

4.1.2. [SOURce]:FREQuency:CENTer <freq>

(Write or Read) This command sets the center frequency.

Parameters

<freq> Supported units: **Hz, kHz, MHz, GHz**

Allowed values:

- **DEFault**
- **MINimum**
- **MAXimum**

4.1.3. [SOURce]:FREQuency:MODE <char>

(Write-only) This command sets the frequency mode of the signal generator.

Parameters

<char> The frequency mode of the signal generator.

Allowed values:

- **CW** - fixed frequency mode
- **FIXed** - fixed frequency mode (same as CW)
- **SWEep** - stepped frequency sweep
- **LIST** - frequency list sweep

Default value: **CW**

4.1.4. [SOURce]:FREQuency:SPAN <freq>

(Write or Read) This command sets the frequency span of sweep.

Parameters

<freq> Supported units: **Hz, kHz, MHz, GHz**

Allowed values:

- **DEFault**
- **MINimum**
- **MAXimum**

4.1.5. [SOURce]:FREQuency:STARt <num>

(Write or Read) This command sets the start frequency of sweep.

Parameters

<num> Start frequency.

Supported units: **Hz, kHz, MHz, GHz**

Allowed values:

- **DEFault**
- **MINimum**
- **MAXimum**

4.1.6. [SOURce]:FREQuency:STOP <num>

(Write or Read) This command sets the stop frequency of sweep.

Parameters

<num> Stop frequency.

Supported units: **Hz, kHz, MHz, GHz**

Allowed values:

- **DEFault**
- **MINimum**
- **MAXimum**

4.2. [SOURce]:LIST

Subsystem specifies the list sweep parameters.

4.2.1. [SOURce]:LIST:DWELL <num>

(Write-only) This command sets the dwell time for points in the current list sweep. Supports one point only.

Parameters

<num> Dwell time.

Supported units: **S**

4.2.1.1. [SOURce]:LIST:DWELL:POINTS?

(Read-only) This command queries the signal generator for the number of dwell points.

4.2.2. [SOURce]:LIST:MODE <char>

(Write-only) This command sets the operating mode for the current list or step sweep.

Parameters

<char> Allowed values:

- **AUTO** - enables the selected sweep type to perform a sweep of all

points

- **MANual** - enables you to select an individual sweep point, generator moves to next point after trigger event only

4.2.3. [SOURce]:LIST:FREQuency <num> ,<...>

(Write-only) This command sets the frequency values for the current list sweep points.

Parameters

<num>	Frequency
<...>	next frequencies

4.2.3.1. [SOURce]:LIST:FREQuency:POINts?

(Read-only) This command queries the current list sweep file for the number of frequency points.

4.2.4. [SOURce]:LIST:POWer <num> ,<...>

(Write-only) This command sets the amplitude for the current list sweep points.

Parameters

<num>	Power value
<...>	next power values

4.2.4.1. [SOURce]:LIST:POWer:POINts?

(Read-only) This command queries the number of power points in the current list sweep file.

4.3. [SOURce]:POWer

Subsystem of management of source signal power.

4.3.1. [SOURce]:POWer[:LEVel]

4.3.1.1. [SOURce]:POWer[:LEVel][:IMMediate]

4.3.1.1.1. [SOURce]:POWer[:LEVel][:IMMediate][:AMPLitude] <num>

(Write-only) Sets the power source level.

Parameters

<num> Source power.

Supported units: **DBM, W**

Allowed values:

- **DEFault**
- **MINimum**
- **MAXimum**

Default value: **-60**

4.3.2. [SOURce]:POWer:ALC

4.3.2.1. [SOURce]:POWer:ALC[:STATe] <bool>

(Write or Read) This command enables or disables the automatic leveling control (ALC) circuit. G7M doesn't allow to disable ALC circuit, -224 (Illegal parameter value) error will be raised if user attempts set OFF.

Parameters

<bool> ALC state.

Allowed values:

- **ON**
- **OFF**

Default value: **ON**

4.3.3. [SOURce]:POWer:ATTenuation <num>

(Write-only) This command sets the signal generator's attenuator level.

Parameters

<num> Attenuator level.

Supported units: **DB**

Allowed values:

- **MINimum**
- **MAXimum**

4.3.3.1. [SOURce]:POWER:ATTenuation:AUTO <bool>

(Write-only) Sets attenuator automatic mode.

Parameters

<bool> Automatic mode.

Allowed values:

- **ON**
- **OFF**

4.3.4. [SOURce]:POWER:CENTer <num>

(Write-only) Sets the power sweep center power.

Parameters

<num> Center power.

Supported units: **DBM**

Allowed values:

- **DEFault**
- **MINimum**
- **MAXimum**

4.3.5. [SOURce]:POWER:MODE <state>

(Write-only) This command sets the power mode.

Parameters

<state> Power mode.

Allowed values:

- **FIXed** - fixed power mode

- **SWEep** - stepped power sweep
- **LIST** - power list sweep

Default value: **FIXed**

4.3.6. [SOURce]:POWer:SPAN <num>

(Write-only) Sets the power sweep span power.

Parameters

<num> Span power. Actual achievable leveled power depends on frequency.

Supported units: **DBM**

Allowed values:

- **DEFault**
- **MINimum**
- **MAXimum**

4.3.7. [SOURce]:POWer:START <num>

(Write-only) This command sets the signal power of the first sweep point.

Parameters

<num> Start power.

Supported units: **DBM**

Allowed values:

- **DEFault**
- **MINimum**
- **MAXimum**

4.3.8. [SOURce]:POWer:STOP <num>

(Write-only) This command sets the signal power of the last sweep point.

Parameters

<num> Stop power.

Supported units: **DBM**

Allowed values:

- **MINimum**
- **MAXimum**

4.4. [SOURce]:PULM

Determines the parameters of the modulation.

4.4.1. [SOURce]:PULM:POLarity <char>

(Write-only) This command selects the polarity of the output pulse signal.

Parameters

<char> Pulse polarity.

Allowed values:

- **NORMal** - without inversion
- **INVerted** - inverted

Default value: **NORMal**

4.4.2. [SOURce]:PULM:STATe <bool>

(Write-only) This command enables or disables pulse modulation for the selected path.

Parameters

<bool> Modulation state.

Allowed values:

- **ON**
- **OFF**

Default value: **OFF**

4.4.3. [SOURce]:PULM:SOURce <char>

(Write-only) This command sets the source for pulse modulation.

Parameters

<char> Pulse modulation source.

Allowed values:

- **INTernal** - internal source
- **EXTernal** - external source

4.4.4. [SOURce]:PULM:INTernal

This subsystem sets parameters of pulse signal.

4.4.4.1. [SOURce]:PULM:INTernal:PERiod <num>

(Write-only) This command sets the pulse period for the internally generated pulse.

Parameters

<num> Period.

Value range: **40ns ÷ 4s**

4.4.4.2. [SOURce]:PULM:INTernal:PWIDth <num>

(Write-only) This command sets the pulse width for the internally generated pulse signal.

Parameters

<num> Width.

Value range: **20ns ÷ 4s**

4.5. [SOURce]:ROSCillator

Reference oscillator settings.

4.5.1. [SOURce]:ROSCillator:SOURce <char>

(Write-only) Defines source of the reference frequency.

Parameters

<char> Reference oscillator's type.

Allowed values:

- **INTernal** - internal
- **EXTernal** - external

Default value: **INTernal**

4.5.2. [SOURce]:ROSCillator:EXTernal

4.5.2.1. [SOURce]:ROSCillator:EXTernal:FREQuency <num>

(Write-only) Tells the analyzer the frequency of the external reference.

Parameters

<num> External reference frequency.

Default value: **10 MHz**

4.6. [SOURce]:SWEep

Sweep parameters.

4.6.1. [SOURce]:SWEep:DWELL <num>

(Write-only) This command sets the dwell time for a step sweep.

Parameters

<num> Dwell time.

Allowed values:

- **DEFault**
- **MINimum**
- **MAXimum**

Default value: **0**

4.6.2. [SOURce]:SWEep:STEP <num>

(Write-only) This command sets frequency step. Relates with SPAN and POINTs values by means $STEP = SPAN / (POINTS - 1)$ expression.

Parameters

<num> Frequency step.

Supported units: **Hz, kHz, MHz, GHz**

Allowed values:

- **DEFault**
- **MINimum**
- **MAXimum**

4.6.3. [SOURce]:SWEep:POINts <num>

(Write-only) This command enables to define the number of points in a step sweep.

Parameters

<num> Points number.

Allowed values:

- **DEFault**
- **MINimum**
- **MAXimum**

Value range: **1 ÷ 5001**

Default value: **5001**

5. STATus commands

Manages and provides settings related to system G7M.

5.1. STATus:OPERation

(Write-only) Subsystem to control operation status register.

5.1.1. STATus:OPERation:CONDition?

(Read-only) This query returns the decimal sum of the bits in the Standard Operation Condition register.

5.1.2. STATus:OPERation:ENABLE

(Write-only) This command enables bits in the Standard Operation Event Enable register.

5.1.2. STATus:OPERation:ENABLE?

(Read-only) This query reads bits in the Standard Operation Event Enable register.

5.1.3. STATus:OPERation[:EVENT]?

(Read-only) This query returns the decimal sum of the bits in the Standard Operation Event register.

5.2. STATus:QUEStionable

(Write-only) Subsystem to control status register data out signal.

5.2.1. STATus:QUEStionable:CONDition?

(Read-only) This query returns the decimal sum of the bits in the Data Questionable Condition register.

5.2.2. STATus:QUEStionable:ENABLE

(Write-only) This command enables bits in the Data Questionable Event Enable register.

5.2.2. STATus:QUEStionable:ENABLE?

(Read-only) This query reads bits in the Data Questionable Event Enable register.

5.2.3. STATus:QUEStionable[:EVENT]?

(Read-only) This query returns the decimal sum of the bits in the Standard Operation Event register.

6. SYSTem commands

Controls and queries settings that affect the G7M system.

6.1. SYSTem:ERRor

6.1.1. SYSTem:ERRor[:NEXT]?

(Read-only) This query returns the most recent error message from the signal generator error queue.

6.2. SYSTem:VERSion?

(Read-only) This command returns the SCPI version number with which the signal generator complies.

7. TRIGger commands

Subsystem is used for trigger configuration.

7.1. TRIGger:AUXiliary

7.1.1. TRIGger:AUXiliary:DURation <num>

(Write-only) Specifies the width of the output pulse, which is the time that the aux trigger output will be asserted.

Parameters

<num> Duration value in seconds.

Supported units: **S**

Value range: **1 us ÷ 255 us**

Default value: **10 us**

7.1.2. TRIGger:AUXiliary:INTerval <char>

(Write-only) Defines when (on what event) the signal of synchronization is formed at the synchronization output.

Parameters

<char> Trigger OUT mode.

Allowed values:

- **POINT** - PLL lock
- **SWEEP** - sweep start
- **AUXiliary** - relay TRIGGER IN
- **PULSE** - pulse gen

Default value: **POINT**

7.1.3. TRIGger:AUXiliary:OPOLarity <char>

(Write-only) Sets polarity of a signal at the synchronization output.

Parameters

<char>

Allowed values:

- **NEGative**
- **POSitive**

Default value: **POSitive**

7.1.4. TRIGger:AUXiliary[:OUTPut]

Configuration of the auxiliary trigger outputs.

7.1.4.1. TRIGger:AUXiliary[:OUTPut][:ENABLE] <bool>

(Write-only) Turns ON / OFF the trigger output. Trigger interval is configured by [TRIGger:AUXiliary:INTerval](#).

Parameters

<bool>

Allowed values:

- **ON**
- **OFF**

Default value: **OFF**

7.1.5. TRIGger:AUXiliary:PULSe

Interanl pulse generator settings.

7.1.5.1. TRIGger:AUXiliary:PULSe:PERiod <num>

(Write-only) Sets the pulse-period (high + low level widths) for the pulse generator

Parameters

<num>

Pulse period in seconds.

Supported units: **S**

7.1.5.2. TRIGger:AUXiliary:PULSe:WIDTh <num>

(Write-only) Sets the pulse width (high level width).

Parameters

<num> Pulse width in seconds.

Supported units: **S**

7.2.1. TRIGger[:SEQuence][:IMMediate]

Command provides a single-pass round of waiting signal start. If the device is not in a start waitstate, the error -211, «Trigger ignored» will be created.

7.2.2. TRIGger[:SEQuence]:SLOPe <char>

(Write or Read) This command sets the polarity of an external signal at the TRIG IN connector.

Parameters

<char> External trigger pulse polarity.

Allowed values:

- **NEGative**
- **POSitive**

Default value: **POSitive**

7.2.3. TRIGger[:SEQuence]:SOURce <char>

(Write-only) This command sets the sweep trigger source for a List or Step sweep.

Parameters

<char> Trigger source.

Allowed values:

- **BUS** - enables source triggering using the *TRG
- **IMMediate** - internal source sends continuous trigger signals (trigger IN disabled)
- **EXTernal** - auxiliary trigger IN

Default value: **IMMediate**

8. UNIT commands

Units of measure of device parameters.

8.1. UNIT:POWer <char>

(Write-only) This command selects units of measure for a power values.

Parameters

<char> Units.

Allowed values:

- **DBM** - dBm
- **W** - Watts

Default value: **DBM**

SCPI Errors Description

Error Code	Error String	Description
(+)0	"No error"	No error
-108	"Parameter not allowed"	More parameters were received than expected for the command. You may have entered an extra parameter, or added a parameter to a command that does not accept a parameter
-109	"Missing parameter"	Fewer parameters were received than expected for the command. You may have omitted one or more parameters that are required for this command
-113	"Undefined header"	A command was received that is not valid for the instrument. You may have misspelled the command, it may not be a valid command, or you may have the wrong interface selected. If you are using the short form of the command, remember that it may contain up to four letters
-121	"Invalid character in number"	Indicates an invalid character for the data type being parsed was encountered. For example, an alpha in a decimal numeric or a "9" in octal data.
-123	"Exponent too large"	Indicates the magnitude of an exponent was greater than 32000, see IEEE 488.2, 7.7.2.4.1.
-128	"Numeric data not allowed"	Indicates that a legal numeric data element was received, but the device does not accept one in this position for the header.
-131	"Invalid suffix"	A suffix was incorrectly specified for a numeric parameter. You may have misspelled the suffix. For example, SENS:FREQ 200KZ
-138	"Suffix not allowed"	A suffix was received following a numeric parameter which does not accept a suffix. For example, INIT:CONT 0Hz
-211	"Trigger ignored"	Indicates that GET, *TRG or TRIG:IMM was received but was ignored because the device was not in the wait-for-trigger state
-213	"Initiation ignored"	Init ignored.
-221	"Settings conflict"	This message means that command has been received and processed successfully, but will be ignored due to conflicting settings
-222	"Data out of range"	A numeric parameter value is outside the valid range for the command

-224	"Illegal parameter value"	Illegal parameter value. A discrete parameter was received which was not a valid choice for the command. You may have used an invalid parameter choice. For example, TRIG:SOUR EX
-226	"List not same length"	This occurs when frequency and dwell time lists do not correspond in length, for example
-310	"System error"	System error
-350	"Queue overflow"	The error queue is full and another error has occurred which could not be recorded
-365	"Time out error"	Operation timeout.
104	"Ethernet connection is closed"	Ethernet connection is closed
106	"Source power unlevel"	Source power is not stabilized
109	"ADC overload"	ADC overload
117	"Specified power is not reached"	Specified power is not reached
120	"Not enough frequency resolution"	Not enough frequency resolution
206	"Read timeout"	Read timeout
207	"Write timeout"	Write timeout
223	"Unknown software error"	Unknown software error
225	"Operation canceled"	Operation canceled
226	"Connection lost"	Device connection lost
306	"PLD error"	PLD error
307	"LO1 no PLL"	LO1 no phase lock loop
310	"Digital synchronization timeout"	Digital synchronization timeout

311	"Synthesizer timeout"	Synthesizer timeout
315	"EPROM error"	Electrically Erasable Programmable Read-Only Memory error
316	"EPROM mismatch"	Electrically Erasable Programmable Read-Only Memory mismatch
319	"LVDS timeout"	Low-voltage differential signaling timeout
320	"LVDS device missing"	Low-voltage differential signaling device missing
321	"LVDS device register missing"	Low-voltage differential signaling device register missing
324	"Invalid file format"	Invalid file format
325	"LVDS packets duplication"	Low-voltage differential signaling packets duplication
326	"Synthesizer mode error"	Synthesizer mode error
328	"External reference oscillator lock detect failed"	External reference oscillator lock detect failed
329	"Synthesizer lock detect failed"	Synthesizer lock detect failed
556	"Internal request failed"	Internal request failed
557	"File system error"	File system error
558	"Path not found"	Path not found
559	"File name not found"	File name not found
560	"Read file error"	Read file error
561	"Write file error"	Write file error

562	"Access denied"	Access denied
563	"CRC error"	Cyclic Redundancy Check error
565	"Not enough space"	Not enough space
566	"File size is too small"	File size is too small
568	"XML node not found"	XML node not found
573	"Out of memory"	Out of memory
575	"Device load interrupt"	Device load interrupt
577	"Internal request timeout"	Internal request timeout
579	"Invalid frequency"	Invalid frequency