

# **WCDMA Jamming Detection** **Application Note**

**UMTS/HSPA Module Series**

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## About the Document

### History

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# 1 Introduction

A Cellular Communication Jammer can totally paralyze all kinds of mobile and portable phones working in the GSM/WCDMA bands. Quectel standard modules offer jamming detection functionality which allows the unit to sense attempts to disrupt the GSM/WCDMA communication by interference with the signal. Quectel module's sophisticated jamming detection enables enhanced security features and immediate alarm notification if communication interference is detected. This document gives a detailed explanation on how to use the Jamming Detection function of Quectel standard modules.

## 1.1. Scope of Document

Quectel Jamming Detection function is applicable to the following modules:

- UC20 UMTS/HSPA+ series
- UC15 UMTS/HSDPA series

## 2 Jamming Detection Overview

Quectel's Jamming Detection allows the user to identify active jamming of the GSM/WCDMA network. Many alarm, security and life critical operations rely on the use of GSM/WCDMA mobile communications. Criminals and those that intent on preventing time critical messages may use GSM/WCDMA jammers to interfere with normal network operation. Quectel's Jamming Detection can allow Quectel module to detect jamming signals. When jamming is detected, Quectel module sends a notification to MCU, reporting the presence of active jamming of the GSM mobile communication network.



Figure 1: Jamming Application Diagram

### 2.1. Application Overview

Quectel Jamming Detection supports to report the appearance and disappearance of jamming automatically via URC to notify the MCU. Also you can manually query the jamming status by the **QJDR** read command when **AT+QJDR=1** was set before (see Chapter 3.2). The following sections describe how to use these functionalities.

### 2.1.1. Report Jamming Status via URC

After Jamming Detection function is enabled by **AT+QJDR=1**, and URC output is enabled by command **AT+QJDCFG="URC",1**. The Jamming Detection function can work well with the default settings. If jamming is detected, the module will report **" +QJDR: JAMMED"** through URC port. If jamming is removed, the module will report **" +QJDR: NOJAMMING"** through URC port. If URC of this function is not reported, query whether the jamming status is available or not by **"AT+QJDR?"**. For detailed details, please refer to Chapter 4.1.

### 2.1.2. Report Jamming Status via URC Periodically

There are two ways to report URC for indicating jamming status. One is reporting URC only once as described in section 2.1.1; the other is reporting URCs periodically. Firstly, enable the Jamming Detection function of Quectel module by **AT+QJDR=1** and **AT+QJDCFG="URC",1**, and then set the **<period>** by **AT+QJDCFG**. If jamming is detected, the module will report a URC **" +QJDR: JAMMED"** through URC port every **<period>** seconds. If jamming is removed, the module will report **" +QJDR: NOJAMMING"** through URC port. For more details, please refer to Chapter 4.2.

## 2.2. Configure Optimized Detection Parameters

Quectel Jamming Detection supports to optimize the detection conditions by configuring **<mnl>** and other parameters of **AT+QJDCFG**. To detect and report the jamming, some basic conditions are verified.

## 3 AT Commands Description

Quectel Jamming Detection can be configured by **AT+QJDCFG** command and activated by **AT+QJDR** command. If a Cellular Communication Jammer is active in its range, the module can detect and give indication to you via URC.

### 3.1. AT+QJDCFG Jamming Detection Configuration

This command allows module to configure the options of Jamming Detection feature. These options include the Jamming Detection conditions, the Jamming notification methods, etc. Parameters will be automatically saved into NVRAM after being configured successfully.

#### AT+QJDCFG Jamming Detection Configuration

Test Command  
**AT+QJDCFG=?**

Response  
**+QJDCFG: "urc",(0,1)**  
**+QJDCFG: "period",(0-120)**  
**+QJDCFG: "mnl",(0-31)**  
**+QJDCFG: "minch",(0-254)**  
**+QJDCFG: "maxrscp",(-85~-60)**  
**+QJDCFG: "maxecio", (20-70)**  
**+QJDCFG: "minsqual",(-30~10)**  
**+QJDCFG: "maxsrlev", (25-60)**  
**+QJDCFG: "pscanfinelev",(-500~800)**

OK

Read Command  
**AT+QJDCFG?**

Response  
**+QJDCFG: "urc",<value>**  
**+QJDCFG: "period",<value>**  
**+QJDCFG: "mnl",<value>**  
**+QJDCFG: "minch",<value>**  
**+QJDCFG: "maxrscp",<value>**  
**+QJDCFG: "maxecio",<value>**  
**+QJDCFG: "minsqual",<value>**  
**+QJDCFG: "maxsrlev",<value>**  
**+QJDCFG: "pscanfinelev",<value>**

OK



Write Command  
**AT+QJDCFG=<type>,<value>**

Response  
**OK**  
or  
**ERROR**

## Parameters

<b>&lt;type&gt;</b>	String type, define the name of settings type
<b>&lt;value&gt;</b>	Digital type, define the value of type
"urc"	URC defines the type of jamming detection report. When set to '1', the detection report will be pushed to the URC port. When set to '0', the detection report will not be pushed to the URC port. Default value: 0. Range: 0,1
"period"	Period of URC of auto jamming detection report. When set to '0', no periodic reporting. Default value: 0. Range: 0-120, unit: s
"mnl"	The maximum jamming signal strength threshold (For GSM network only). Default value: 17. Range: 0-31
"minch"	The minimum channel number which is jammed (For GSM network only). Default value: 5. Range: 0-254
"minch"	The minimum channel number which is jammed (For GSM network only). Default value: 5. Range: 0-254
"maxrscp"	The maximum RSCP threshold (For WCDMA network only). Default value: -80. Range: -85~-60
"maxecio"	The maximum ECIO threshold (For WCDMA network only). Default value: 40. Range: 20-70
"minsqual"	The minimum S_QUAL threshold (For WCDMA network only). Default value: -5. Range: -30~10
"maxsrlevel"	The maximum S_RXLEV threshold (For WCDMA network only). Default value: 30. Range: 25-60
"pscanfinelev"	Considered very good signal power threshold while power scanning (For WCDMA network only). Default value: 100. Range: -500~800

## 3.2. AT+QJDR Jamming Detection Report

Jamming Detection can be activated by QJDR command. Parameters will be automatically saved into NVRAM after being configured successfully.

### AT+QJDR Jamming Detection Report

Test Command  
**AT+QJDR=?**

Response  
**+QJDR: (0,1)**  
  
**OK**

Read Command

**AT+QJDR?**

Response

If <mode> was set to "1" which means enable the jamming detection function, return:

**+QJDR: NOJAMMING**

or

**+QJDR: JAMMED**

**OK**

If <mode> was set to "0" which means disable the jamming detection function, return:

**+QJDR: 0**

**OK**

Write Command

**AT+QJDR=<mode>**

Response

**OK**

**ERROR**

## Parameters

<b>&lt;mode&gt;</b>	Disable or enable the jamming detection function
<u>0</u>	Jamming Detection function is disabled (default is 0)
1	Jamming Detection function is enabled
About URC description, please refer to Chapter 3.3	

## 3.3. URC Description

### 3.3.1. Disturbed Indicator

If the module detects a Jammer, it will send the URC "**+QJDR: JAMMED**" to the serial port.

#### Indication of Jammer Presence

**+QJDR: JAMMED**

### 3.3.2. Jammer Removal Indicator

If the Jammer was removed then it will send the message "**+QJDR: NOJAMMING**" to the serial port.

#### Indication of Jammer Removal

**+QJDR: NOJAMMING**

## 4 Example

### 4.1. Report Jamming via URC

```
AT+QJDR=1           //Enable Jamming Detection.  
OK  
AT+QJDCFG="URC",1   //Enable URC output.  
OK
```

In normal condition:

```
AT+QJDR?           //Query the current jamming status.  
+QJDR: NOJAMMING   //In normal condition, no jamming is detected.  
OK
```

In a jamming environment, please refer to Chapter 2.2.

```
+QJDR: JAMMED       //The URC will be reported automatically. Jamming has been detected.  
  
AT+QJDR?           //Query the current jamming status.  
+QJDR: JAMMED       //In a jamming environment, jamming is detected.  
OK
```

If jammer is removed:

```
+QJDR: NO JAMMING   //The URC is reported automatically. No jamming is detected.  
  
AT+QJDR?           //Query the current jamming status.  
+QJDR: NOJAMMING   //No jamming is detected.  
OK
```

### 4.2. Report Jamming via URC Periodically

```
AT+QJDR=1           //Enable Jamming Detection.  
OK  
AT+QJDCFG="URC",1   //Enable URC output  
OK  
AT+QJDCFG="period",5 //Set the <period> as 5. URC will be reported every 5 seconds.
```

OK

In a jamming environment, please refer to Chapter 2.2.

```
+QJDR: JAMMED           //The URC will be reported automatically every 5 seconds. Jamming has
                        been detected.
...
+QJDR: JAMMED           //The URC will be reported automatically every 5 seconds. Jamming has
                        been detected.
....
```

If jammer is removed:

```
+QJDR: NOJAMMING        //The URC is reported automatically. No jamming is detected.

AT+QJDCFG="period",0    //Disable reporting URC periodically.
OK
```

### 4.3. Enable and Disable Jamming Detection

```
AT+QJDR=?               //Test mode.
+QJDR: (0,1)

OK
AT+QJDR?                //Query the current jamming status.
+QJDR: NOJAMMING        //No jamming detected.
OK
AT+QJDR=1               //Enable Jamming Detection function.
OK

//Turn on jammer.

+QJDR: JAMMED           //The jammer has been detected and then jamming is reported.

//Turn off jammer.

+QJDR: NOJAMMING        //Report that the jammer have been removed.
AT+QJDR=0               //Disable Jamming Detection function.
OK
```

### 4.4. Configure Jamming Detection

```
AT+QJDCFG=?             //Test command
+QJDCFG: "urc",(0,1)
```

```

+QJDCFG: "period",(0-120)
+QJDCFG: "mnl",(0-31)
+QJDCFG: "minch",(0-254)
+QJDCFG: "maxrscp",(-85~-60)
+QJDCFG: "maxecio",(20-70)
+QJDCFG: "minsqual",(-30~10)
+QJDCFG: "maxsrxlev",(25-60)
+QJDCFG: "pscanfinelev",(-500~800)

OK
AT+QJDCFG? //Query the current parameter configuration.
+QJDCFG: "urc",0 //The default configuration of <urcenable> is 0. It represents that reporting
jamming status via URC is disabled.
+QJDCFG: "period",0 //The default value of the <period> is 0. It represents that reporting jamming
status via URC periodically is disabled.

+QJDCFG: "mnl",17
+QJDCFG: "minch",5
+QJDCFG: "maxrscp",-80
+QJDCFG: "maxecio",40
+QJDCFG: "minsqual",-5
+QJDCFG: "maxsrxlev",30
+QJDCFG: "pscanfinelev",100
OK
AT+QJDCFG="URC",1 //Enable URC output
OK
AT+QJDCFG="period",5 //Set <period> is 5. It represents that jamming status is reported via URC
through serial port every 5 seconds.

OK
AT+QJDCFG="mnl",16 //Set <mnl> as 16.
OK
AT+QJDCFG="minch",6 //Set <minch> as 6.
OK
AT+QJDR=1 //Enable Jamming Detection function.
OK

//Turn on jammer

+QJDR: JAMMED //Jamming has been detected and reported.

//Turn off jammer

+QLJDR: NOJAMMING //Report that the jammer has been removed.
AT+QJDR=0 //Disable Jamming Detection function.
OK

```

# 5 Appendix A Reference

Table 1: Terms and Abbreviations

Abbreviation	Description
BSIC	Base Station Identity Code
RSSI	Received Signal Strength Indication
URC	Unsolicited Result Code
MNL	Maximum Noise Level
MINCH	Minimum Channel Number