

# **ARIB Standard Compliance of STD-601 400 MHz**

## **Application note**

Version 1.0 (Apr. 2017)

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**Important notice**

This application note was written in line with the related regulations and standards as of April 2017.

**1. Introduction**

STD-601 400 MHz is designed to meet the requirements of ARIB Standard T67 (STD-T67) Version 1.3. This application note shows the parameter settings, conditions and some test results for STD-601 400 MHz to be compliant with ARIB STD-T67.

This module does not include some functions required in the Standard, such as carrier sensing and interference prevention. You need to satisfy those requirements with your final product.

Note: STD-601 400 MHz module doesn't obtain Technical regulations conformity certification. This application note only shows our own test results, and is not supposed to guarantee the STD-T67 compliance with your product. You need to perform the test by yourself with your final product.

## 2. Parameter settings and conditions

### Setting

- Frequency band: 429 MHz
- RF power: 10mW
- Frequency: 429.1750 to 429.2375 MHz and 429.2500 to 429.7375 MHz
- RF bit rate: 4800 bps

Table.1 Parameters

Command	EEPROM write	Value (Hex)	Remarks
@N	-	01	Frequency band
@P	@H	10	RF Power
@C	@D	01 to 06 07 to 2E	RF Channel
@B	@G	48	RF bit rate

### Conditions

- Channel spacing: 12.5 kHz (Occupied Bandwidth of 8.5 kHz or less)
- Transmission time restriction:
  - 01 to 06 channels: Transmission continuous time: Maximum 40 seconds  
Transmission quiescence time: Minimum 2 seconds
  - 07 to 2E channels: Continuous transmission (Intermittent communication possible)
- Protection of module setting: The customer's software should ensure that the frequency band other than 429 MHz and the RF power other than 10 mW are not selectable by the end user.
- Antenna: The absolute gain of the transmitting antenna shall be 2.14 dB or less.
- Controller: The controller that is designed by the customer shall be equipped with an interference prevention function and a carrier sensing device.
- Others: The customer's final product shall meet all other requirements of ARIB STD-T67, such as housing and marking.

### 3. Test equipment

The test equipment used was our test board TB-STD601 400MHz.

The test board TB-STD601 allows the STD-601 to be used in combination with Arduino MEGA 2560 for simple switching and packet tests. The pre-installed sample program was used for obtaining measurements outlined in this document.

The details for the TB-STD601 is on our web site.



Test board TB-STD601

### 4. Test result

The test results are shown below. The conditions involved an ambient temperature of 25C (+/- 5 degrees), a voltage supply of DC 3.3V and RF bit rate of 4800 bps (max).

#### 4.1 Frequency tolerance

The test was performed under conducted emission and the test board used was the TB-STD601.

Table.2 Frequency tolerance

Setting Freq.	Reading	Tolerance	Limit
429.1750 MHz	429.17502 MHz	+0.05 ppm	+/- 4ppm
429.5000 MHz	429.50070 MHz	+0.16 ppm	+/- 4ppm
429.7375 MHz	429.73757 MHz	+0.16 ppm	+/- 4ppm

#### 4.2 Antenna power

The test was performed under conducted emission and the test board used was the TB-STD601.

Table.3 Antenna power

Setting Freq.	Reading	Limit
429.1750 MHz	9.93 mW	10mW (the tolerance shall be +20% to -50%)
429.5000 MHz	9.84 mW	10mW (the tolerance shall be +20% to -50%)
429.7375 MHz	9.82 mW	10mW (the tolerance shall be +20% to -50%)

#### 4.3 Adjacent-channel leakage power

The test was performed under conducted emission and the test board used was the TB-STD601. PN9-4800bps.

Table.4 Adjacent-channel leakage power

Setting Freq.	Reading		Limit
	Lower (-12.5 kHz)	Upper (+12.5 kHz)	
429.1750 MHz	48.53 dBc	48.87 dBc	40 dBc
429.5000 MHz	48.67 dBc	48.79 dBc	40 dBc
429.7375 MHz	48.82 dBc	48.54 dBc	40 dBc

### 4.4 Occupied bandwidth

The test was performed under conducted emission and the test board used was the TB-STD601. PN9-4800bps.

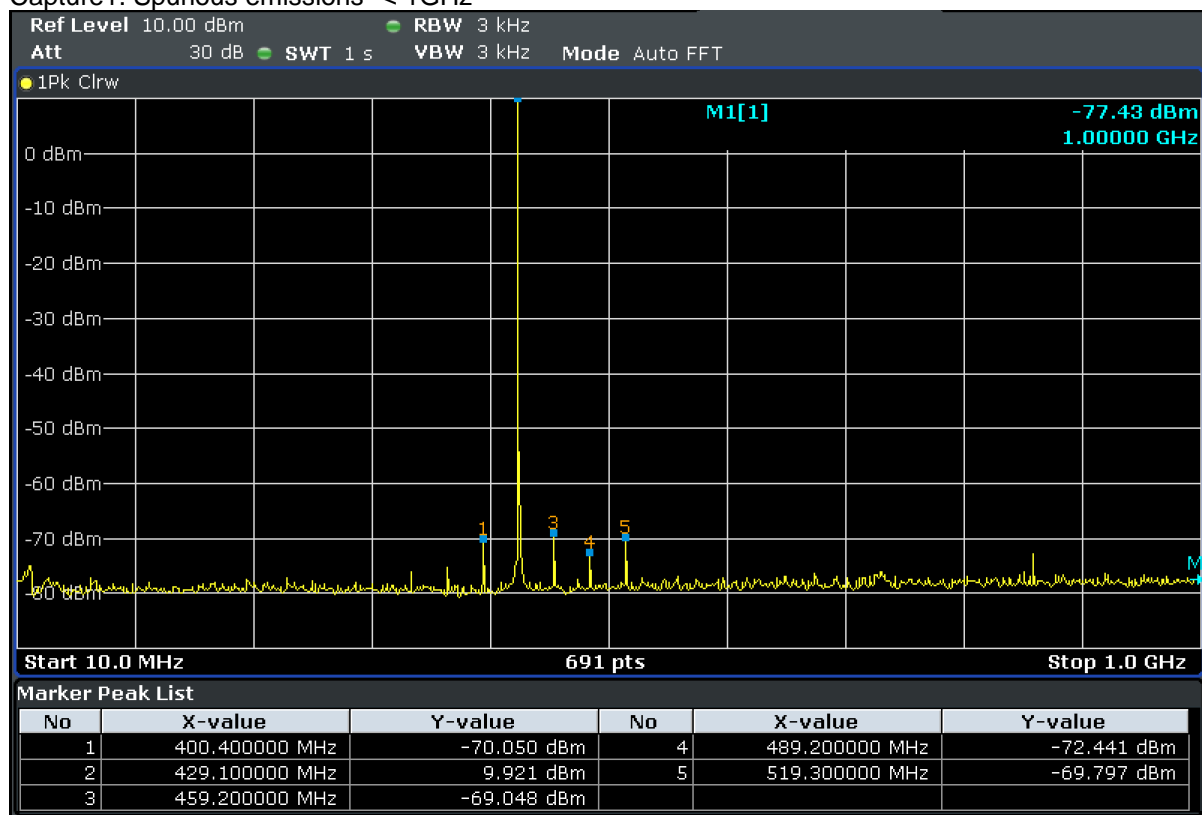
Table.5 Occupied bandwidth

Setting Freq.	Reading	Limit
429.1750 MHz	8.18 kHz	8.5 kHz
429.5000 MHz	8.25 kHz	8.5 kHz
429.7375 MHz	8.18 kHz	8.5 kHz

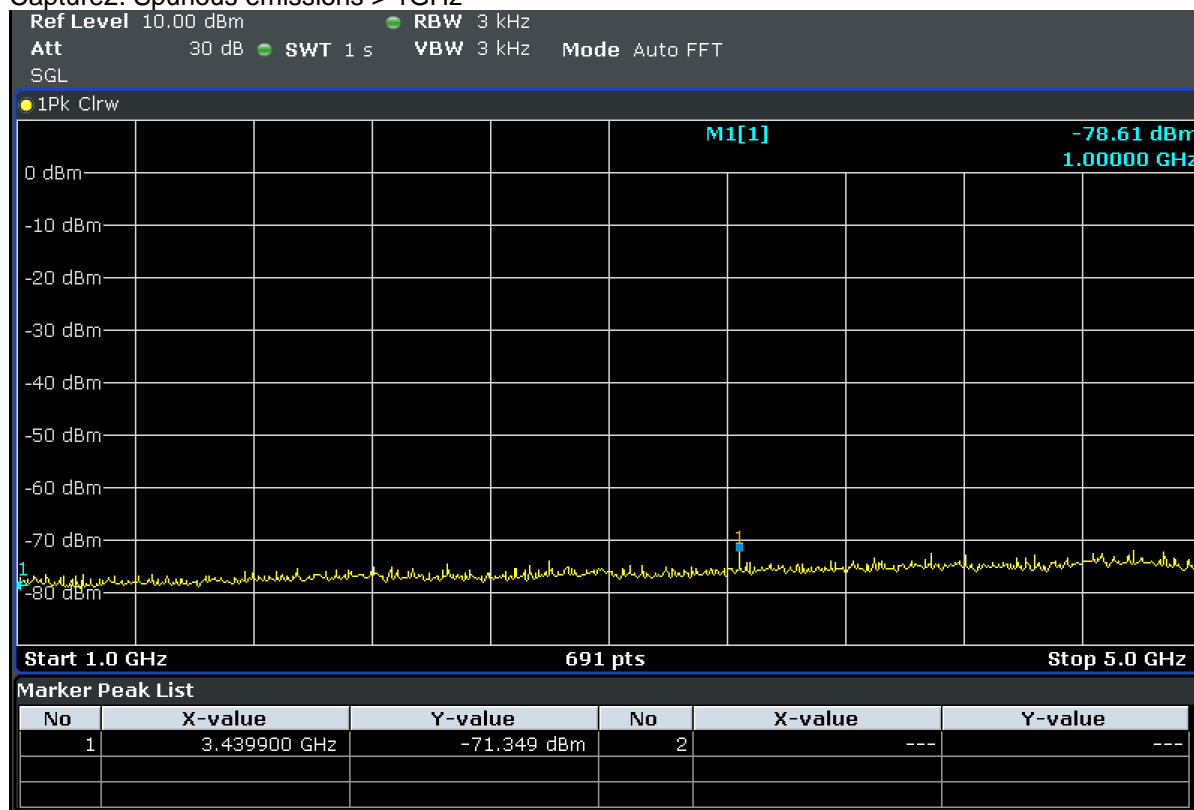
### 4.5 Spurious emission or unwanted emission

The test was performed in conducted emission and the test board used is TB-STD601. PN9-4800bps.

Capture1. Spurious emissions < 1GHz



Capture2. Spurious emissions > 1GHz



The spurious emissions should be 2.5 uW or lower.

### 4.6 Limit on Secondary Radiated Emissions

The limit on secondary radiated emissions radiated from the receiving equipment should be 4 nW or lower.

## 5 Additional functions required

In addition to the radio characteristics, some functions and conditions are required by the STD-T67. This document describes two representative functions, carrier sensing and Interference prevention.

### 5.1 Carrier sensing device

The STD-T67 requires user to perform carrier sensing before transmission to assess the presence of a radio signal on the selected channel.

It is not allowed to start transmission if carrier sensing detects the voltage induced in an antenna of gain 2.14 dBi is at 7uV or more.

STD-601 module doesn't have the carrier sensing device.

However, you can check the received signal strength level with the RSSI acquisition command ('@R' command), which makes it possible to implement the carrier sensing device into your product.

### 5.2 Interference prevention function

The STD-T67 requires the function of 1 or 2 below as the interference prevention function.

- 1) Function for automatically transmitting or receiving an identification sign in the radio equipment of a radio station used primarily on the same premises
- 2) Function for enabling the user to switch frequencies or easily deactivate radio-frequency transmission

The requirement function is dependent on whether the product connects to a telecommunications circuit or not. Regarding the details, please refer to the standard and the regulation.

Regarding the details of the above functions, together with other requirements and conditions, please refer to the STD-T67 and the related regulations.



**Revision history**

Version	Date	Description	Remark
0.95	Apr. 2017	Draft in English version	
1.0	Apr. 2017	Checked and uploaded to web	

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