

## Si4432 AMR 规范测试结果

### 1. 简介

该文档提供了 Si4432-B1 工作在 470 ~ 510 MHz 频段时的一致性测试结果。该结果表明 Si4432-B1 的性能完全遵从了中国 AMR 频段无线技术规范的要求。所有的测试都是采用 ISM-DK3 通过 WDS 来控制 4432-T-B1-D-470 TX/RX Direct Tie 测试板来完成。该测试结果也可通过使用相同的配置和脚本来重现。这些测试配置信息可通过 [www.silabs.com](http://www.silabs.com) 和 EZRadioPRO® Quick Start Guide 来获得。

所有的芯片配置数据直接由寄存器计算表(Excel Register Calculator)计算获得的。如果测试的结果与本测试不一致，请联系客户支持。

### 2. AMR 规范的测试项目

中国的 AMR 测试规范仅涉及有效辐射功率、占用带宽、载波频率误差、杂散发射和边带辐射，不涉及接收灵敏度和选择性或阻塞性能测试要求。该规范的最大输出功率为 +17 dBm。

### 3. AMR 一致性测试结果

Silicon Labs 已经根据 AMR 规范在 470~510 MHz 频段上测试了 Si4432 芯片和 4432-T-B1-D-470 TX/RX Direct Tie 测试板的性能，测试的功率是 +17 dBm。该测试是在华通威测试实验室进行的。

#### 3.1. 测试条件

温度：	15–35 °C
湿度：	30–60 %
气压：	950–1050 mbar
测试电压：	DC 3.3 V

#### 3.2. 测试项目和结果

下面是各测试项及对应的测试的结果，各项测试都满足要求。

##### 3.2.1. 有效辐射功率

有效辐射功率是指对于任何调制方式，在指定的测试条件下在最大场强方向的辐射功率。该限值是 17 dBm。

4432-T-B1-D-470 TX/RX Direct Tie 测试板通过了测试，结果如下：

Test Mode: Tx mode	Measurement method: <input checked="" type="checkbox"/> ERP(Radiated) <input type="checkbox"/> Conducted				
Frequency	Test Result				
	Read Level (dBm)	Factor (dBm)	Measured Power (dBm)	ERP Limit (dBm)	Margin (dBm)
471MHz	-9.82	26.80	16.98	17	0.02
490MHz	-11.10	27.70	16.60	17	0.40
509MHz	-14.46	28.10	13.64	17	3.36
Test Result	Pass				

## 3.2.2. 占用带宽

占用带宽是指在调制的条件下包含 99% 的辐射功率的带宽。在该测试中，调制数据为 PN9 码，数据率是 38.4 kbps，频偏是  $\pm 50$  kHz，调制方式是 GFSK。该要求限值是 200 kHz。

4432-T-B1-D-470 TX/RX Direct Tie 测试板通过了测试，结果如下：

Nominal Frequency (MHz)	EUT Operating Condition		Occupied Bandwidth (kHz)	Limit (kHz)	Result
	Frequency Deviation (kHz)	Data Rate (kbps)			
471	50	38.4	140.281	200	PASS
490	50	38.4	155.311	200	PASS
509	50	38.4	144.289	200	PASS

## 3.2.3. 频率误差

频率误差是指在正常和极端条件下，所测量的未调制载波频率和标称频率之差。该要求限值是 100 ppm。

4432-T-B1-D-470 TX/RX Direct Tie 测试板通过了测试，结果如下：

Nominal Frequency (MHz)	Measurement Frequency (MHz)	Frequency Error (ppm)	Limit (ppm)	Result
471	471.001	21.23	100	PASS
490	490.001	20.41	100	PASS
509	508.997	58.94	100	PASS

### 3.2.4. 杂散发射

杂散发射是指在非有用载频以及其正常测试调制条件下相关边带领域外的无用发射。

最大功率发射时杂散辐射限值：

频率范围 30 MHz ~ 1 GHz 时-36 dBm，频率范围 1 GHz ~ 5 GHz 时-30 dBm；

待机或空闲状态的杂散辐射限值：

频率范围 30 MHz ~ 5 GHz 时-47 dBm。

4432-T-B1-D-470 TX/RX Direct Tie 测试板通过了测试，结果如下：

CH1 471MHz						
Frequency (MHz)	Pol./Ant	Read Level (dBm)	Factor (dBm)	Measurement ERP (dBm)	Limit (dBm)	Margin (dB)
942	H	-96.20	33.88	-62.32	-36	26.32
942	V	-85.75	33.88	-51.87	-36	15.87
1413	V	-63.16	3.84	-59.32	-30	29.32
1413	H	-55.18	5.76	-49.42	-30	19.42
CH2 490MHz						
Frequency (MHz)	Pol./Ant	Read Level (dBm)	Factor (dBm)	Measurement ERP (dBm)	Limit (dBm)	Margin (dB)
980	V	-91.59	34.16	-57.43	-36	21.43
980	H	-96.03	34.16	-61.87	-36	25.87
1470	V	-53.44	3.91	-49.53	-30	19.53
1470	H	-63.03	5.76	-57.27	-30	27.27
CH3 509 MHz						
Frequency (MHz)	Pol./Ant	Read Level (dBm)	Factor (dBm)	Measurement ERP (dBm)	Limit (dBm)	Margin (dB)
--	--	--	--	--	-36	--
1527	V	-49.98	3.88	-46.10	-30	16.10
1527	H	-62.36	3.88	-58.48	-30	28.48
Result		Pass				

注释：(1) 测量值  $ERP = Read\ Level + Factor$

(2) 有效辐射功率是基于参考值的基础上计算得到的。

(3) 上述测量数据中 "--" 表明辐射的读数低于限值 20 dB 或者场强太小而不能测量。

## 3.2.5. 边带辐射

在频率范围内的上边带或下边带处的有效辐射功率不能超过 -30 dBm。

4432-T-B1-D-470 TX/RX Direct Tie 测试板通过了测试，结果如下：

Frequency (MHz)	Read Level (dBm)	Factor (dBm)	Measurement ERP (dBm)	Limit (dBm)	Result
470	-68.11	26.80	-44.70	-30	PASS
510	-68.13	28.10	-40.74	-30	PASS

## NOTES:

## Simplicity Studio

One-click access to MCU tools, documentation, software, source code libraries & more. Available for Windows, Mac and Linux!

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