

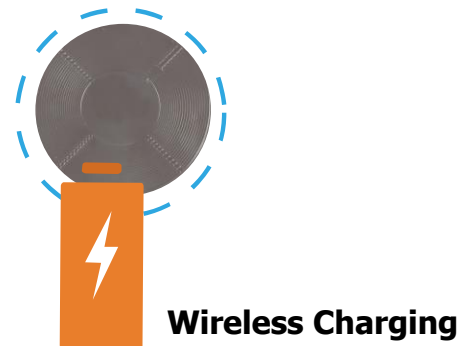
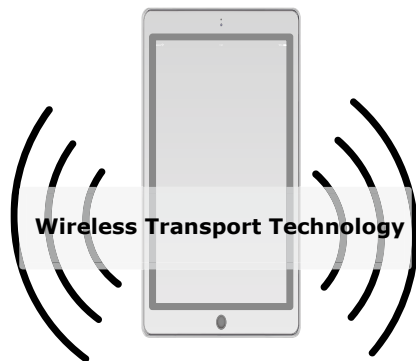


MICROTEST

www.microtest.com.cn  
MICROTEST

# Application Notes

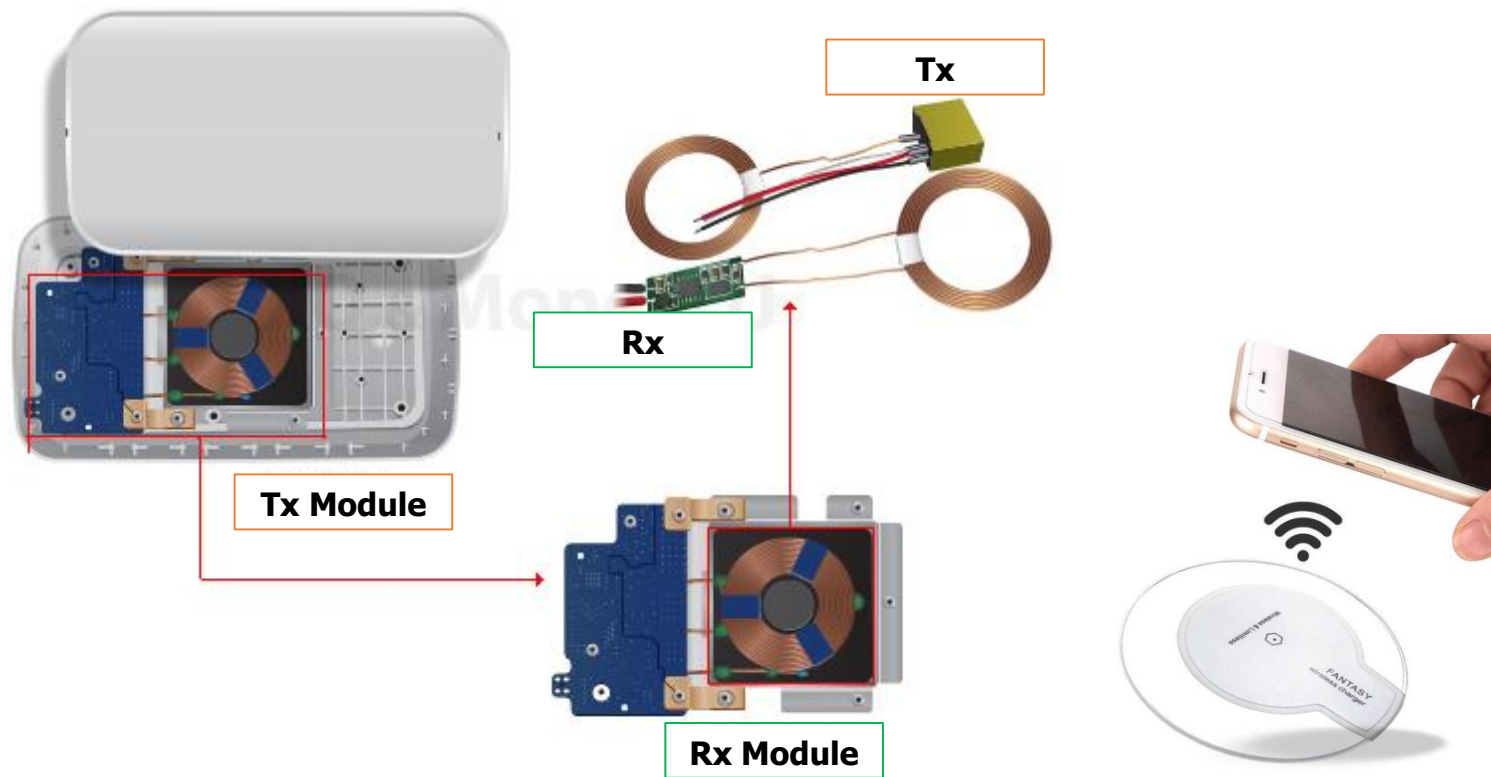
## 无线充电应用于PCB/FPC测量解决方案



## 无线充电的技术架构



无线充电技术利用感应耦合的方式

发射端(充电盘)将能量传输到接收端(手机、耳机、穿戴式电子装置)



# FPC/PCB Test For Wireless Charging / NFC Antenna

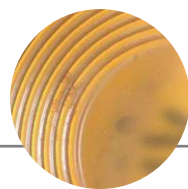
## 无线充电的标准 - 市场上两大主流

Wireless Charging	WPC 		AirFuel 
	Standard	v1.2.4	v1.3
Technical	<5W	5W-30W	16W-50W
Frequency	100~205kHz		6.78MHz
Communication	ASK/FSK		Bluetooth 2.4GHz
Charge Mode	Magnetic Induction		Magnetic Resonance
Charging Distance	< 5mm		30-50mm
Equipment amount	1		n
efficient	40~70%		30~60%

# FPC/PCB Test For Wireless Charging / NFC Antenna

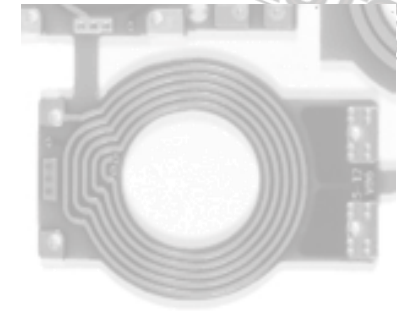
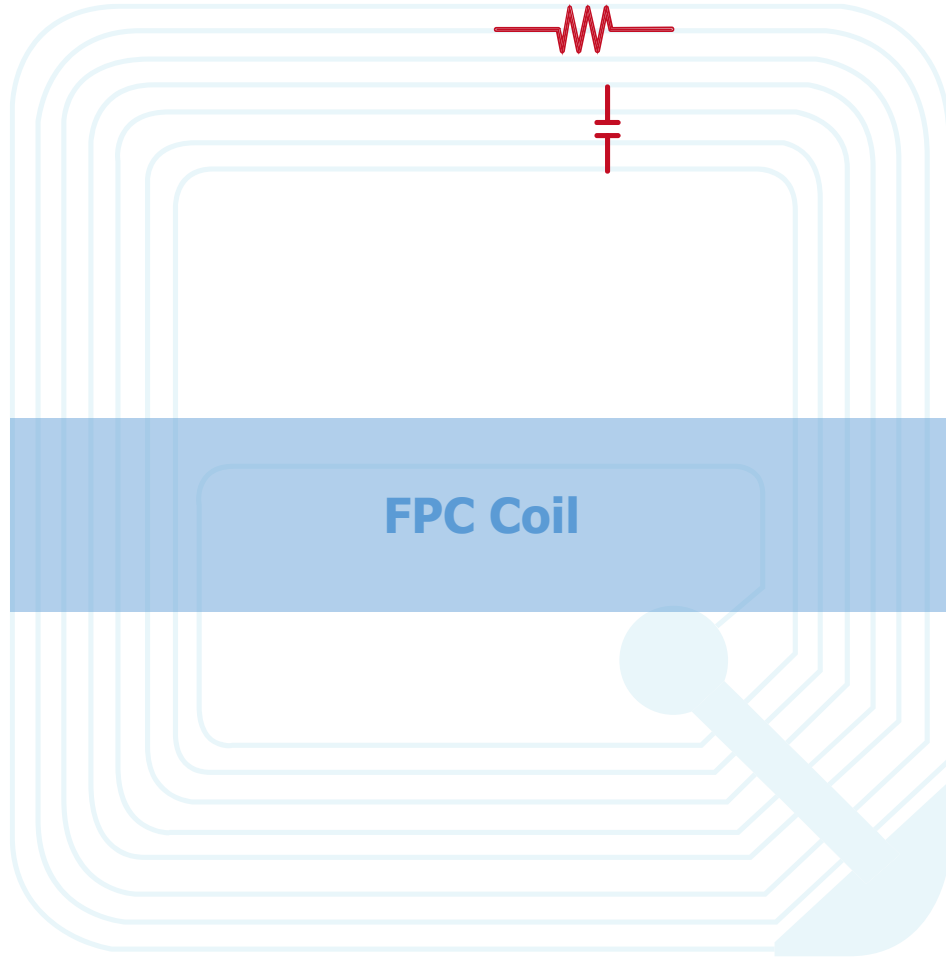
Rx 通常采用柔性电路板制成



感应线圈 发送端Tx	感应线圈 接收端 Rx
<p>发送端的感应线圈因需要提供较大功率，因此电感量设计比接收端大，因此感应线圈通常采用漆包线绕组而成</p>	<p>FPC / PCB</p> <p>穿戴式电子装置外观尺寸整体趋势走向微型化</p> <p>设计无线充电的功能时，通常在穿戴式电子装置设备中之接收端的感应线圈采用<b>FPC</b>制成</p> <p>因铜箔材料与蚀刻制成不良，导致线圈特性被破坏</p> 

# FPC/PCB Test For Wireless Charging / NFC Antenna

影响无线充电的效率因数有哪些？

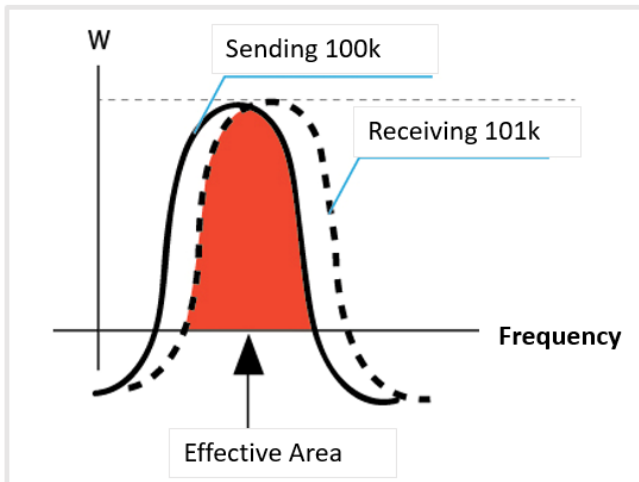


蚀刻时间不足可能导致线圈导线之间的距离变宽，此时铜箔上的寄生电容变大

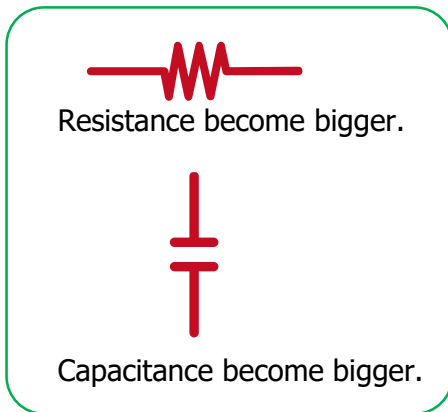
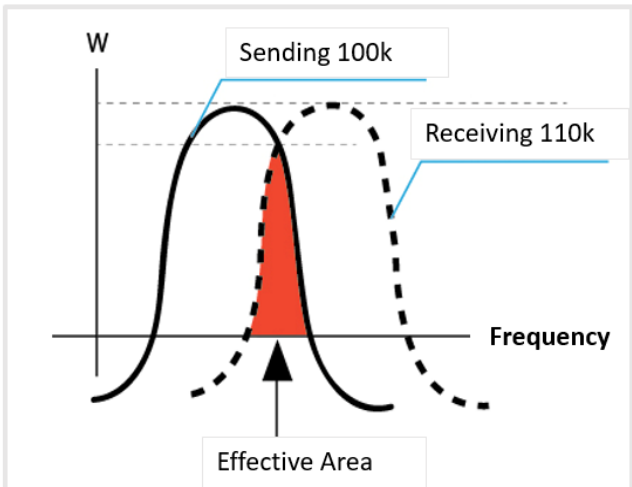
Etching process not well, wires will become slender.

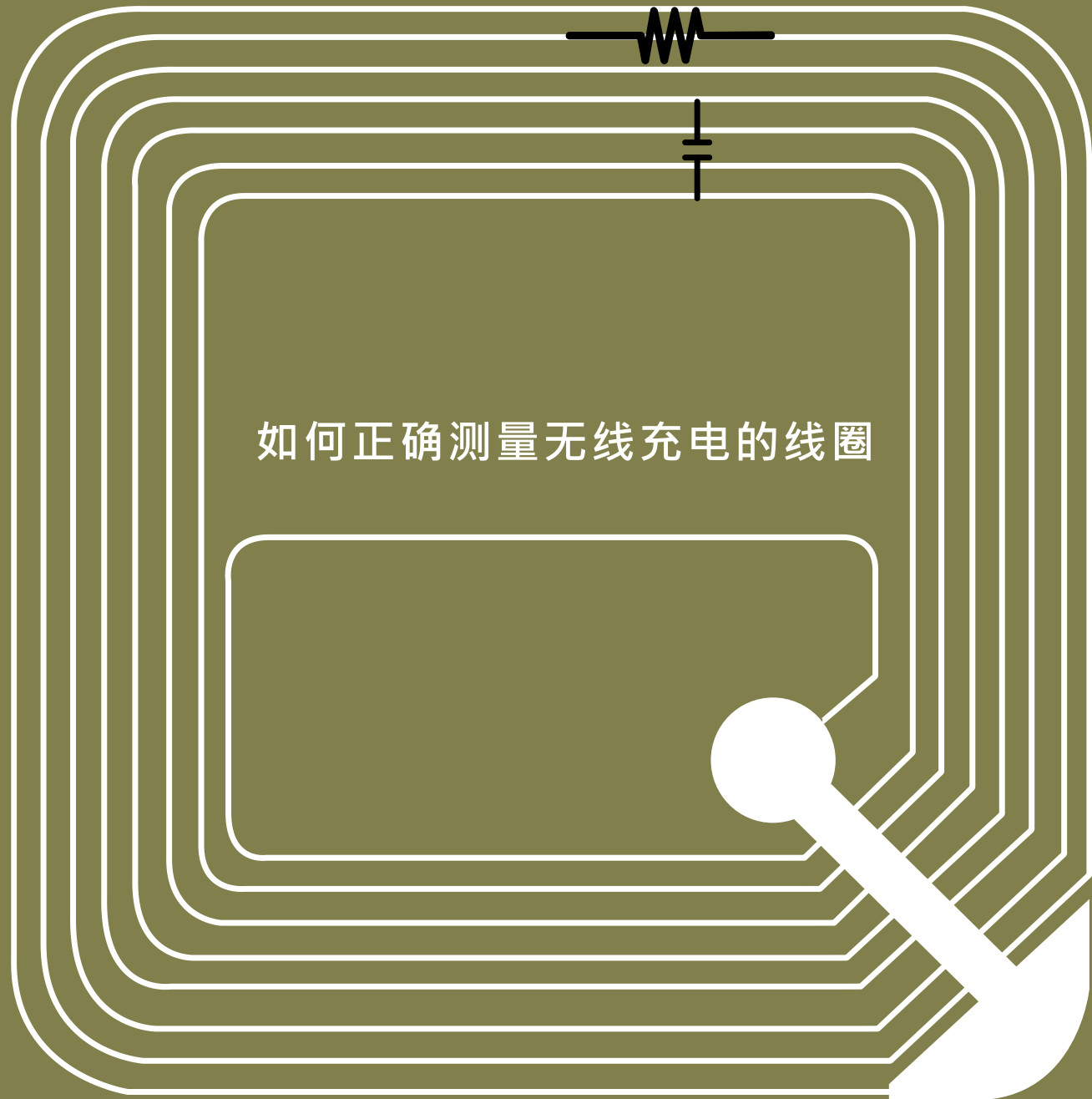
Resistance become bigger.

## 影响无线充电的效率因数有哪些？



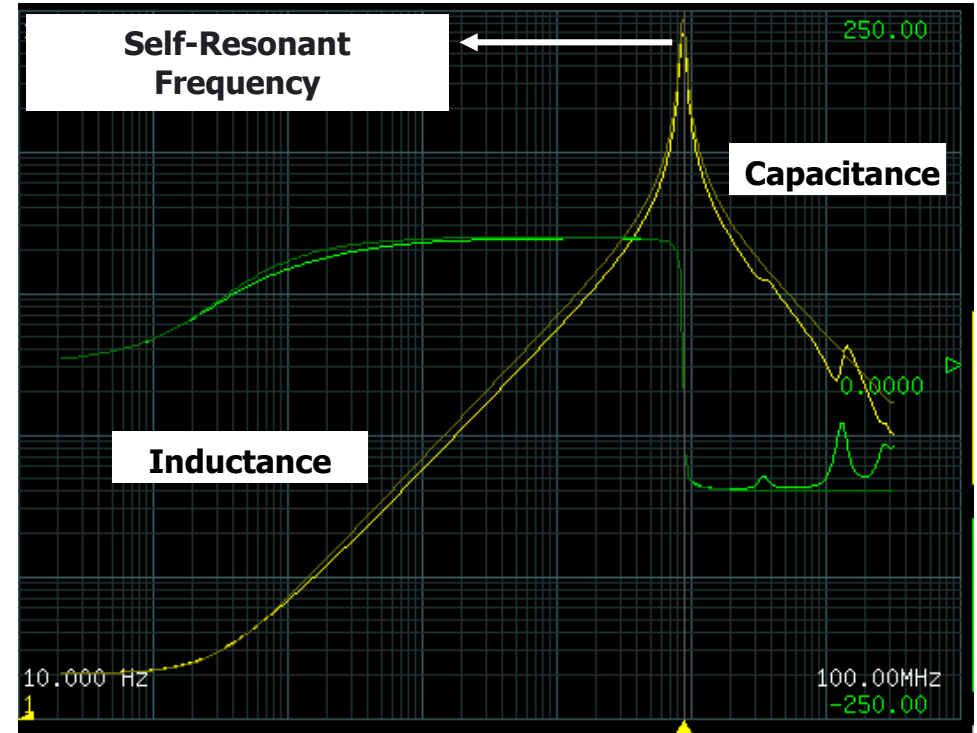
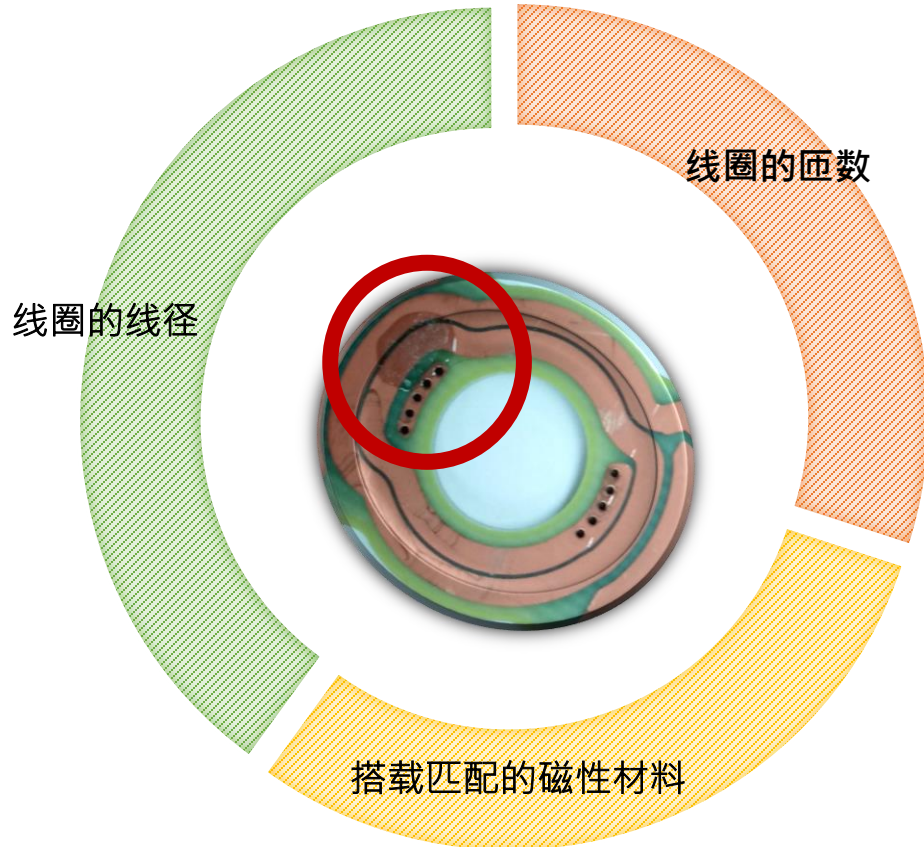
Rx与Tx谐振频率越近，传输的效率越好





如何正确测量无线充电的线圈

## 影响无线充电感应线圈SRF的关键因素





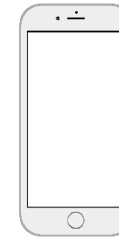
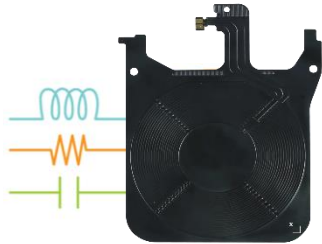
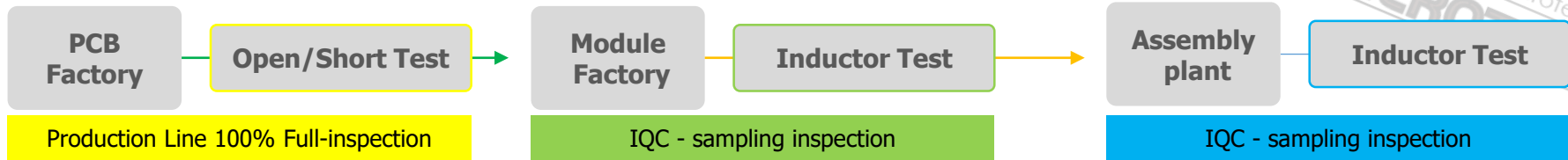
板厂通常采用『四线式阻值电测』方式进行线圈FPC板品

○质测量，真的可以完全把关电感特性？



**OPEN / SHORT**

## FPC/PCB Test For Wireless Charging / NFC Antenna



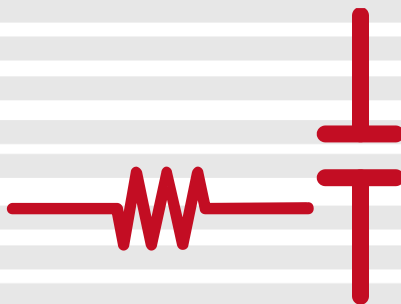
PCB/FPC工厂通常会采用测试开路与短路的方式进行线圈板检测 (利用**Dedicated**电测机测试阻值) 是无法完全掌握无线充电线圈板的电感特性

因线圈板线路是一条线径绕组成环状形式呈电感特性，自身为短路状态 **Dedicated**电测机并无法测试内部短路

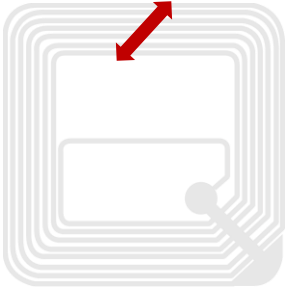
因此最常见的客诉问题 → 板厂交货给下游模组厂 → 常在功能测试阶段被发现线圈不良导致充电功能**NG**

**MICROTEST 9332 提供一次可测试多组线圈的电感特性  
( $L_s$ /ACR/DCR/Q)**

并可搭载气动式复合式治具支持板厂一向惯用的多联板测试



# FPC/PCB Test For Wireless Charging / NFC Antenna

 <p>测量设备</p>	<p>PCB多通道电感阻抗测试</p> 	<p>LCR Meter</p> 	<p>Dedicated电测机</p> 
<p>测量聚焦</p>	 <p>测试单一回路的电感阻抗特性</p>	 <p>测试两条相邻之间的线路是否开路/短路</p>	
<p>测量参数</p>	<p>电感量/交流电阻/直流电阻/品质因数</p>	<p>四线/二线式阻值 开路/短路</p>	

## FPC制程中最常见的不良问题

FPC自身为可弯曲特性，在制程中遇到高温导致板子弯曲可能呈现微短不良，导致整体电感阻抗特性偏移

当下游模组厂对板厂提出要求进行

『线圈板的电感阻抗测试，采用**100%全检**时』



通常模组厂提出线圈板的检测规范  
要求检测下列参数

频率 (Hz) : 100k/200k/13.56M(NFC)

参数 : Ls / Rs / DCR / Q

# FPC/PCB Test For Wireless Charging / NFC Antenna

9332是采用LCR Meter测量技术 / 一次可测试32组线圈的电感阻抗参数



PCB multi-channel coil impedance tester 9332



Fixture



PC Link Software

測試項目設定	PCB# 1/9		
檔案: DEMO	1/6		
Pin+	1	1	1
Pin-	2	2	2
參數	LS	Rs	DCR
頻率	100.00 k	100.00 k	100.00 k
電壓	1.00 V	1.00 V	1.00 V
標準	799.67nH	211.46mΩ	203.50mΩ
上限	879.63nH	232.60mΩ	223.85mΩ
下限	719.70nH	190.31mΩ	183.15mΩ
速度	Max	Max	Max

Multi-Step Setting (List Mode)

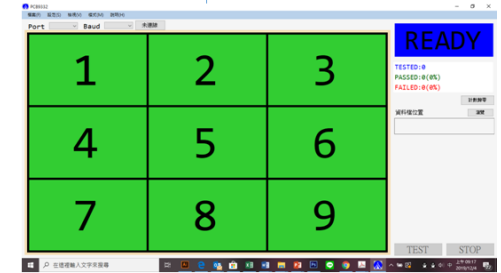
DEMO	P:	18	F:	0	清除計數
PIN ( 3- 4 )	LS	214.54	nH	OK #9	1
PIN ( 1- 2 )	LS	800.72	nH	OK #9	2
PIN ( 1- 2 )	Z	545.79	mΩ	OK #9	3
PIN ( 3- 4 )	Z	135.41	mΩ	OK #9	4
PIN ( 1- 2 )	DCR	203.5	mΩ	OK #9	5
PIN ( 3- 4 )	DCR	484.4	uΩ	OK #9	6

PASS

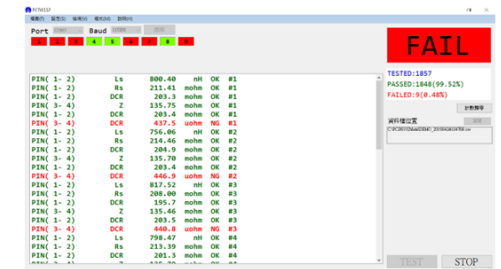
PASS / FAIL ( Panel multi-board electrical test)

PCB composite fixture

electro pneumatic type



Operators have intuitive and simple layout screen



Test Report (CSV into Excel)

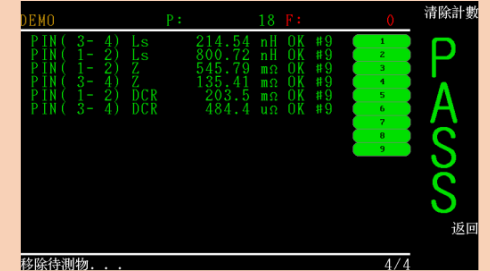
# FPC/PCB Test For Wireless Charging / NFC Antenna

## 9332

提供单组测试满足进料检验部门  
同时也提供多联板测试模式，符合PCB/FPC厂生产效率



IQC



Production Line Test

Panel multi-board electrical test



LAN

USB Host

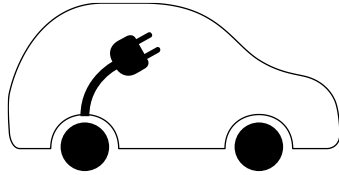
RS-232

Handler

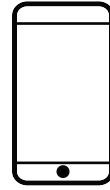
EXT. I/O

# FPC/PCB Test For Wireless Charging / NFC Antenna

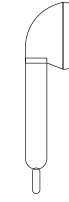
## Model 9332 产品应用



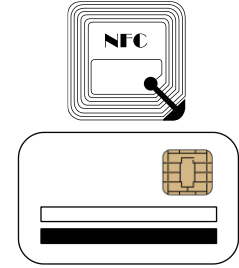
Power For EV



Wireless Charging






TWS



Near-field communication , NFC




# FPC/PCB Test For Wireless Charging / NFC Antenna

部门	研发	生产线	验证单位
使用者	工程师	生技/品保	<b>IQC</b> 进料检验
设备	阻抗分析仪	<b>PCB多通道线圈阻抗测试仪</b>	
型号	<b>6632</b>	<b>9332</b>	
			
测量参数	<p><b>SRF / Z / Ls / DCR / Q / Rs</b>  <b>for Coil</b>  <math>\mu_r'</math> <math>\mu_r''</math> for Ferrite materials  <b>Equivalent Circuit Analysis</b>  <b>DC Bias Current (I sat/ I rms)</b>  <b>option 6223</b></p>	<p><b>Ls / Q / DCR / Rs</b></p>	<p><b>Ls / Q / DCR / Rs</b></p>

研發部門 6632測量無線充電感應線圈FPC



生產線 9332檢測無線充電感應線圈FPC



益和测量仪 原厂  
sales@Microtest.com.tw



## Application Notes

Date 2020.12