



Wireless Communication Terminal Product

无线通信终端产品



“S”标准·新生活
Standard for Life

www.waltek.com.cn



首卷语 Preamble

沃特测试是具有多年产品检测经验的专业第三方检测机构，实验室严格按ISO/IEC17025的要求建立，并取得中国合格评定国家认可委员会(CNAS)认可资质、质量技术监督局实验室资质认定(CMA)的资质、国际电工委员会(IECEE)的CB测试实验室资质(CBTL)以及国家质检总局进出口商品检验鉴定业务(AQSIQ)许可资质。同时，公司还是香港机电工程署EMSD认可核证团体、美国联邦通讯委员会FCC认可实验室、美国消费品安全委员会CPSC认可实验室、美国能源之星Energy Star认可实验室、美国加州能效CEC注册认可实验室，加拿大工业部IC认可实验室，ELI全球高效照明产品认证认可实验室，是UL、Intertek(ETL-SEMKO)、CSA、TÜV Rheinland、TÜV SÜD等国际权威认证机构的战略合作伙伴和数据认可实验室。

公司是中国第三方检测与检验服务的领先机构，其总部位于深圳、在佛山、东莞、中山、苏州、宁波和香港等地分别设立分支机构，拥有产品安全，EMC电磁兼容，性能和能效，化学测试四大领域的测试能力，作为专业性，综合性，公正性的国际化检测机构，我们秉承科学严谨的工作态度，肩负着中国第三方检测行业发展的重任，诚意的协助每一个客户使其产品达到不断更新的国际标准而不懈努力。

Waltek Services Test Group Ltd. is a professional third-party testing and certification organization with multi-year product testing and certification experience, established strictly in accordance with ISO/IEC 17025 requirements, and accredited by CNAS (China National Accreditation Service for Conformity Assessment) AQSIQ, CMA and IECEE for CBTL. Meanwhile, Waltek has got recognition as registration and accreditation laboratory from EMSD (Electrical and Mechanical Services Department), and American Energy star, FCC(The Federal Communications Commission), CPSC(Consumer Product Safety Commission), CEC(California energy efficiency), IC(Industry Canada) and ELI(Efficient Lighting Initiative). It's the strategic partner and data recognition laboratory of international authoritative organizations, such as UL, Intertek(ETL-SEMKO), CSA, TÜV Rheinland, TÜV SÜD, etc.

Waltek Services Test Group Ltd. is one of the largest and the most comprehensive third party testing organizations in China, our headquarter located in Shenzhen and have branches in Foshan, Dongguan, Zhongshan, Suzhou, Ningbo and Hong Kong, Our test capability covered four large fields: safety test, ElectroMagnetic Compatibility(EMC), reliability and energy performance, Chemical test. As a professional, comprehensive, justice international test organization, we still keep the scientific and rigorous work attitude to help each client satisfy the international standards and assist their product enter into globe market smoothly.



沃特资质 / Waltek Qualifications




沃特无线通讯产品测试室可就手机产品全球市场准入提供行业整体解决方案，涵盖国内市场入网、型号核准、欧美市场CE、FCC等法规强制性认证要求，以及GCF、PTCRB、GCF、CTIA、WIFI、蓝牙以及NFC灯技术联盟要求，CCC、中国RoHS等准入要求。

Waltek wireless communication testing laboratory can provide access to global markets for mobile phone products as a whole industry solution, covering access to network of domestic market, type approval, CE & FCC of European & America markets and other requirements of regulatory mandatory certification, as well as GCF, PTCRB, GCF, CTIA, WIFI, Bluetooth, requirements of NFC lamp technological alliance, CCC, China RoHS and other approval requirements.

产品范围 / Product Scopes

手机平板电脑等 2G/3G/4G/5G 移动终端设备	Mobile phone, tablet PC and 2G//3G/4G/5G mobile terminal devices
4G LTE 数据卡, 4G LTE模块	4G LTE data card, 4G LTE module
(通常大部分4G LTE产品都会同时带有2G和3G、蓝牙、WIFI等通讯技术, 同时带有GPS功能。)	(generally, most 4G LTE products have communication technologies 2G 3G and Bluetooth, WIFI, as well as GPS function.)
超宽带产品	Ultra broadband products
ZigBee, Z-Wave	ZigBee, Z-Wave
宽带电力线网络系统	Broadband powerline network system
WI-FI产品(IEEE802.11a/b/g/n/ac无线局域网)	WI-FI product(IEEE802.11a / b / g / n / ac wireless local area network)
蓝牙产品	Bluetooth product
无线射频辨别 (RFID) 系统	Radio frequency identification (RFID) systems
短距无线装置	Short-range wireless device

认证及测试类型 / Certification And Testing Types

	FCC (US) /美国 FCC认证
	IC(Canada)/加拿大IC认证
	CE(Canada)欧盟 CE认证
	ACMA(Australia / New Zealand)/澳大利亚/新西兰 ACMA认证
	CCC(china)/中国 CCC认证
	China telecom network license/中国电信进网许可
	China, Hong Kong radio emission type approval OFCA/中国无线电发射型号核准香港 OFCA
	IDA(Singapore)/新加坡IDA通信认证
	NBTC(Thailand)/泰国 NBTC通信认证
	KCC(Korea)/韩国 KCC通信认证
	NCC(Taiwan)/台湾 NCC通信认证
	CU-TR(Russia, Belarus, Kazakhstan)/俄罗斯、白俄罗斯、哈萨克斯坦 CU-TR认证



主要测试项目 / Main Testing Items

沃特2G、3G、4G自动化测试系统介绍

沃特引进基于R&S and Agilent设备基础上集成的自动化测试系统，搭配高低温试验箱和程控电源，可实现全自动化CE和FCC测试，并可实现无人值守操作。ETSI EN 300 328 and ETSI EN 301 893、FCC 15.247 and FCC 15.407自动化测试系统同时，沃特还引进基于Agilent设备基础上集成的自动化测试系统，可实现2.4G(BT and WIFI)、5G WIFI含DFS部分的全自动化测试。涵盖CE和FCC的测试内容。

Waltek 2G,3G,4G automatic testing system introduction

Waltek has introduced integrated automatic testing system based on R&S and Agilent device, combined with high and low temperature test chamber and programmable power supply, which enables fully automation tests of CE and FCC as well as unattended operation.ETSI EN 300 328 and ETSI EN 301 893, FCC 15.247 and FCC 15.407 automation testing system. Meanwhile, Waltek has introduced integrated automatic testing system based on Agilent device, which enables fully automation tests of 2.4G (BT and WIFI) and 5G WIFI with component of DFS. covering the test content of CE and FCC.

按测试内容可以分为以下：

RF 测试

沃特无线通讯产品实验室配备德国 R&S公司的 TS 8950 GW射频一致性测试系统、安捷伦GS-8800射频一致性测试系统、CMW500射频综合测试仪、CMU200射频综合测试仪、CBT射频综合测试仪、SP6010射频综合测试仪、PTW 70WIFI测试仪、射频测试微波暗室以及德国 R&S公司的 TS9976测试系统。

Base on test contents can be divided into the following:

RF testing

Waltek wireless communication laboratory is equipped with TS 8950GW RF conformance test system from Germany R&S company, Agilent GS-8800 RF conformance test system, CMW500 RF Tester CMU200 RF Tester, CBT RF Tester, SP6010 Tester, PTW70WIFI Tester, RF testing anechoic chamber and Germany R&S TS9976 testing system.



EMC测试

实验室配备3m法电波暗室、辐射抗扰度测试用电波暗室、RS TS9975全自动骚扰测试系统(频率范围9kHz~40GHz)、RS Ts9982 抗扰度测试系统(频率范围9kHz-18GHz200V/m)、CI相谐波测试系统(电流可达75A)、EM Testing抗扰度测试系统。

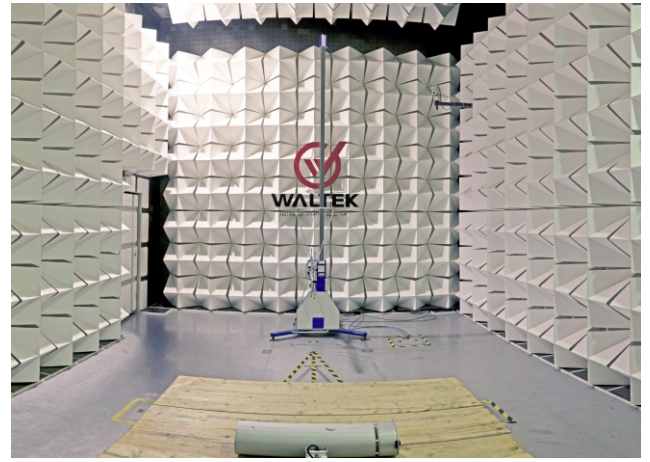
特殊比吸收率测试

SAR的英文全称为Specific Absorption Rate，中文一般称为电磁波吸收比值或比吸收率。是手机或无线产品之电磁波能量吸收比值，SAR的意义为单位质量的人体组织所吸收或消耗的电磁功率，单位为W/kg。



Electro Magnetic Compatibility Testing

The laboratory is equipped with 3M method anechoic chamber, radiated immunity test using anechoic chamber, RS TS9975 full auto disturbance test system (range 9kHz~40GHz), RS TS9982 immunity test system (range 9kHz-18GHz200V/m), CI-phase harmonic test system (current up to 75A), EM test system for Testing immunity.



Specific Absorption Rate Testing

SAR is short for Specific Absorption Rate, general called electromagnetic wave absorption ratio or absorption rate in Chinese. It's electromagnetic energy absorption ratio of a mobile phone or wireless products. SAR means electromagnetic power absorbed or consumed by unit mass of body tissue, in units of W / kg.



OTA测试

CTIA(Cellular Telecommunication and Internet Association)制定了OTA(Over The Air)的相关标准。OTA 测试着重进行整机辐射性能方面的测试，这种辐射性能反映了手机的最终发射和接收性能。



音频及声压测试

实音频测试一般包括以下内容:发送灵敏度/频率响应, 发送响度评定值 (SLR), 接收灵敏度/频率响应, 接收响度评定值 (RLR), 侧音掩蔽评定值 (STMR), 接收响度评定值 (MAX), 发送失真, 侧音线性评定值, 回声损耗, 接收失真, 侧音失真, 带外信号, 空闲信道噪音, 环境噪声抑制等。

另外，声压测试也有相应的强制性要求。经常使用耳机以大音量听音乐，会对耳朵构成相当大的伤害。从2004年7月1日起，EN50332(便携式音响设备中耳机的最大声压级之测量及限制标准)已正式作为强制性标准在德国（德国标准为DINEN50332）和欧洲范围内生效实施。

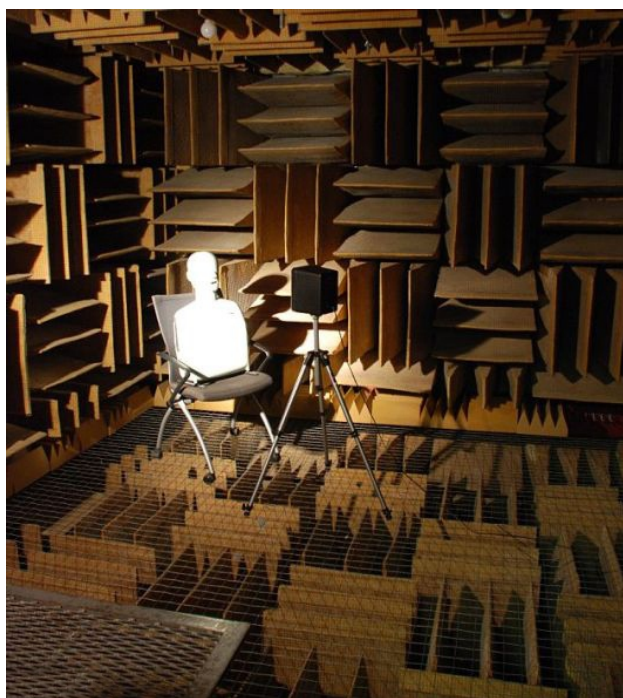
Over-The-Air Technology Testing

CTIA (Cellular Telecommunication and Internet Association) issue relevant standard about OTA (Over The Air). OTA testing focuses on radiation performance testing of the overall unit. This radiation performance reflects the final transmission and reception performance of the phone. The testing method is divided into active and passive test.

Audio And Sound Pressure Testing

Audio testing generally includes the following contents: sending the sensitivity / frequency response, sending loudness rating (SLR), receiving sensitivity / frequency response, receiving loudness rating (RLR), sidetone masking rating (STMR), receiving loudness rating (MAX), the transmission distortion, sidetone linear rating, echo loss, the receiving distortion, sidetone distortion, out-of-band signal, idle channel noise, ambient noise suppression, etc.

In addition, sound pressure testing also has related mandatory requirements. Frequently using headphones to listen loud music, would bring considerable damage for ears. Since July 1, 2004, EN50332 (Sound System Equipment: Headphones and Earphones Associated with Portable Audio Equipment - Maximum Sound Pressure Level Measurement Methodology and Limit Considerations) has formally came into effect as a mandatory standard in Germany (German standard DINEN50332) and Europe.



主要热门产品测试项目解析 / Analysis for Testing Project of Popular Product

2G产品测试标准与主要测试项目简析

GSM (全球移动通信系统, 最初集团专用移动), 是由欧洲电信标准协会 (ETSI) 开发的标准来描述第二代 (2G) 移动电话使用数字蜂窝网络, 第一部署在芬兰中的协议1991年7月[2]2014年它已成为移动通信的默认全球标准 - 有超过90%的市场份额, 在全球219个国家和地区经营。

2G网络开发作为替换为第一代 (1G) 模拟蜂窝网络和GSM标准最初描述为全双工语音电话优化的数字, 电路交换网络。这扩大了时间, 以包括数据通信, 第一电路交换通过GPRS (通用分组无线业务) 和EDGE (增强型数据速率GSM演进或EGPRS) 的运输, 然后通过分组数据传输。



2G Products Testing Standard and Analysis for Main Testing Project

GSM (Global System for Mobile Communications, originally Group Special Mobile), is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe protocols for second-generation (2G) digital cellular networks used by mobile phones, first deployed in Finland in July 1991.[2] As of 2014 it has become the default global standard for mobile communications - with over 90% market share, operating in over 219 countries and territories.[3]

2G networks developed as a replacement for first generation (1G) analog cellular networks, and the GSM standard originally described a digital, circuit-switched network optimized for full duplex voice telephony. This expanded over time to include data communications, first by circuit-switched transport, then by packet data transport via GPRS (General Packet Radio Services) and EDGE (Enhanced Data rates for GSM Evolution or EGPRS).

主要测试项目 CE R&TTE standards (ETSI EN 301 511)	
Conducted spurious emissions - MS allocated a channel	传导杂散 (基站连接模式)
Conducted spurious emissions - MS in idle mode	传导杂散 (基站空闲模式)
Radiated spurious emissions - MS allocated a channel	辐射杂散 (基站连接模式)
Radiated spurious emissions - MS in idle mode	辐射杂散 (基站空闲模式)
Transmitter - Frequency error and phase error	频率误差和相位误差
Transmitter - Frequency error under multipath and interference conditions	多路径干扰下的频率误差
Transmitter output power and burst timing - MS with external antenna	功率和包络时间
Transmitter - Output RF spectrum	输出射频频谱
Frequency error and phase error in GPRS multislot configuration	GPRS多时隙频率误差和相位误差
Transmitter output power in GPRS multislot configuration - MS with external antenna connector	GPRS多时隙输出功率
Output RF spectrum in GPRS multislot configuration	GPRS多时隙频谱
Receiver Blocking and spurious response - speech channels	语音模式的接收阻塞和杂散响应
Frequency error and Modulation accuracy in EGPRS Configuration	增强型GPRS的频率误差和调制
Frequency error under multipath and interference conditions in EGPRS Configuration	增强型GPRS的多路径干扰
EGPRS Transmitter output power	增强型GPRS的输出功率
Output RF spectrum in EGPRS configuration	增强型GPRS的频谱
Blocking and spurious response in EGPRS configuration	增强型GPRS的接收阻塞和杂散响应



3G WCDMA产品测试标准与主要测试项目简析

W-CDMA或WCDMA（宽带码分多址），以及UMTS-FDD，UTRA-FDD，或IMT-2000 CDMA直接扩频是在3G移动通信网络中找到的空中接口标准。它支持传统的蜂窝语音，文本和彩信服务，而且还可以进行高速数据，使移动运营商能够提供更高带宽的应用，包括流媒体和宽带互联网接入。

3G WCDMA Products Testing Standard and Analysis for Main Testing Project

W-CDMA or WCDMA (Wideband Code Division Multiple Access), along with UMTS-FDD, UTRA-FDD, or IMT-2000 CDMA Direct Spread is an air interface standard found in 3G mobile telecommunications networks. It supports conventional cellular voice, text and MMS services, but can also carry data at high speeds, allowing mobile operators to deliver higher bandwidth applications including streaming and broadband Internet access.

主要测试项目 CE R&TTE standards (ETSI EN 301 908-1、ETSI EN 301 908-2)	
Radiated emissions (UE)	辐射（用户端设备）
Control and monitoring functions (UE)	控制和监控功能
Transmitter maximum output power	最大发射功率
Transmitter spectrum emission mask	发射频谱
Transmitter spurious emissions	发射杂散
Transmitter minimum output power	最小发射功率
Receiver Adjacent Channel Selectivity (ACS)	接收邻道选择性
Receiver blocking characteristics	接收阻塞响应
Receiver spurious response	接受响应
Receiver intermodulation characteristics	接收互调特性
Receiver spurious emissions	接收杂散
Transmitter Adjacent Channel Leakage power Ratio (ACLR)	发射机邻道泄漏功率比



4G LTE产品测试标准与主要测试项目简析

E-UTRA是3GPP的长期演进（LTE）移动网络升级路径的空中接口。它是一个缩写演进的UMTS陆地无线接入，也称为上的长期演进（LTE）的[1]也被称为在3GPP早期草稿的演进通用陆地无线接入（E-UTRA）的3GPP工作项LTE规范[1]，E-UTRAN是演进UMTS陆地无线接入网络的首字母缩略词，并且是E-UTRA的UE和e节点B的组合。

它是意味着是一个替换在3GPP规定的UMTS和HSDPA / HSUPA技术的无线接入网络标准释放5和超越。与HSPA，LTE的E-UTRA是一个完全新的空中接口系统，无关的，不符合W-CDMA。它提供了更高的数据速率，更低延迟和被用于分组数据进行了优化。它使用的OFDMA的无线接入的上行链路上的下行链路使用SC-FDMA。试验开始于2008年。

4G LTE的主要制式有：

FDD-LTE --- 基于频分技术的4G制式，主要用于欧洲和美洲大部分地区；

TDD-LTE --- 基于时分技术的4G制式，主要用于亚洲的某些地区，如中国移动等；

4G LTE的频道目前有44个，主要的频道有FDD-LTE (Band 1 ~ Band 32)，TDD-LTE (Band 33 ~ Band 44)。市场上大部分4G LTE产品会同时包含3个Band，个别大厂商会包含4-5个Band。

4G LTE Products Testing Standard and Analysis for Main Testing Project

E-UTRA is the air interface of 3GPP's Long Term Evolution (LTE) upgrade path for mobile networks. It is an acronym for evolved UMTS Terrestrial Radio Access, also referred to as the 3GPP work item on the Long Term Evolution (LTE)[1] also known as the Evolved Universal Terrestrial Radio Access (E-UTRA) in early drafts of the 3GPP LTE specification.[1] E-UTRAN is the initialism of Evolved UMTS Terrestrial Radio Access Network and is the combination of E-UTRA, UEs and ENodeBs.

It is a radio access network standard meant to be a replacement of the UMTS and HSDPA/HSUPA technologies specified in 3GPP releases 5 and beyond. Unlike HSPA, LTE's E-UTRA is an entirely new air interface system, unrelated to and incompatible with W-CDMA. It provides higher data rates, lower latency and is optimized for packet data. It uses OFDMA radio-access for the downlink and SC-FDMA on the uplink. Trials started in 2008.

4G LTE Main Formats :

FDD-LTE---4G system based on frequency division technology, mainly used in most parts of Europe and the Americas;

TDD-LTE---4G system based on technology, mainly used in some parts of Asia, such as China Mobile and so on;

4G LTE currently has 44 channels. The main channels are FDD-LTE (Band 1 ~ Band 32) and DD-LTE (Band 33 ~ Band 44). Most 4G LTE products on the market contain three Bands simultaneously, while products containing 4-5 Band made by several individual manufacturers.

主要测试项目 CE R&TTE standards (ETSI EN 301 908-1、 EN 301 908-13)	
Radiated emissions (UE)	辐射（用户端设备）
Control and monitoring functions (UE)	控制和监控功能
Transmitter maximum output power	最大发射功率
Transmitter spectrum emission mask	发射频谱
Transmitter spurious emissions	发射杂散
Transmitter minimum output power	最小发射功率
Receiver Adjacent Channel Selectivity (ACS)	接收邻道选择性
Receiver blocking characteristics	接收阻塞响应
Receiver spurious response	接受响应
Receiver intermodulation characteristics	接收互调特性
Receiver spurious emissions	接收杂散
Transmitter Adjacent Channel Leakage power Ratio (ACLR)	发射机邻道泄漏功率比



蓝牙、WIFI的测试和简介

蓝牙是短距离传输模式,蓝牙耳机如果离手机很近的话,一般其的功率等级也就在2或3,和GSM主频信号强度相比,蓝牙部分引起的电磁波辐射是比较小的。

WIFI跟蓝牙类似,也是近距离传输模式,且一般为传输数据时使用,通常不会紧贴人体,特别不会靠近头部,所以电磁波辐射总量很小。

Introduction for Bluetooth and WIFI Testing

Bluetooth is a short-range transmission mode. If bluetooth headset is close to the phone, its power class is 2 or 3 in general. Compared with GSM dominant frequency signal strength, electromagnetic radiation caused by the Bluetooth part is relatively small.

Similar with Bluetooth, WIFI is also close range transmission mode, typically used when transferring data. Usually it's not close to the body, especially not close to the head, so the total amount of electromagnetic radiation is very small.

(1) 2.4G的BT和WIFI的测试 (ETSI EN 300 328 v1.8.1 and v1.9.1)

RF output power	功率	BT	WIFI
Duty Cycle, Tx-sequence, Tx-gap	占空比、发射序列和发射间隙	N/A	WIFI
Dwell time, Minimum Frequency Occupation and Hopping Sequence	占用时间、最小频率占用、跳频序列	BT	N/A
Hopping Frequency Separation	调频间隔	BT	N/A
Medium Utilisation (MU) factor	补偿因子	N/A	WIFI
Adaptivity	自适应性	N/A	WIFI
Occupied Channel Bandwidth	占用带宽	N/A	WIFI
Transmitter unwanted emissions in the out-of-band domain	带外发射杂散	BT	WIFI
Transmitter unwanted emissions in the spurious domain	杂散	BT	WIFI
Receiver spurious emissions	接收杂散	BT	WIFI
Receiver Blocking	接收阻塞	N/A	WIFI

(2) 5G WIFI的分段和DFS测试

Band 1: 5150-5250 MHz
Band 2: 5250-5350 MHz (DFS band)
Band 3: 5470-5725 MHz (DFS band)

ETSI EN 301 893

Carrier frequencies	占用频率
Occupied Channel Bandwidth	占用带宽
RF output power, Transmit Power Control (TPC) and power density	功率、功率控制、功率谱密度
Transmitter unwanted emissions outside the 5 GHz RLAN bands	5G带外杂散
Transmitter unwanted emissions within the 5 GHz RLAN bands	5G带内杂散
Receiver spurious emissions	接收杂散
Dynamic Frequency Selection (DFS) *	动态频率选择 (雷达测试) *
Adaptivity (channel access mechanism)	自适应性

Note:

1.测试项目和要求

Table D.1 DFS requirement values	
Parameter	Value
Channel Availability Check Time	60s (see note 1)
Minimum Off-Channel CAC Time	6 minutes (see note 2)
Maximum Off-Channel CAC Time	4 hours (see note 2)
Channel Move Time	10s
Channel Closing Transmission Time	1s
Non-Occupancy Period	30minutes
NOTE 1: For channels whose nominal bandwidth falls completely or partly within the band 5600 MHZ, the Channel Availability Check Time shall be 10 minutes.	
NOTE 2: For channels whose nominal bandwidth falls completely or partly within the band 5600 MHZ, the Off-Channel CAC Time shall be within the range 1 hour to 24hours.	

2.产品分类和测试项目

Requirement	DFS operational mode		
	Master	Slave device transmitter power < 200mW EIRP	Slave device transmitter power ≥ 200mW EIRP
Channel Availability Check	√	Not required	Not required
Off-Channel CAC	√	Not required	Not required
In-Service Monitoring	√	Not required	√
Channel Shutdown	√	√	√
Non-Occupancy Period	√	Not required	√
Uniform Spreading	√	Not required	Not required

GPS部分测试

GPS定位的主要类型是接收，需要按照ETSI EN 300 440做接收部分的测试即可。

杂散发射接收机

限制：任何杂散发射的功率在范围25MHz到1 GHz之间不得超过2 nW，且不得超过20 nW在1 GHz频率以上。

NFC部分测试

近场通信（英语：Near Field Communication，NFC），又称近距离无线通信，是一种短距离的高频无线通信技术，允许电子设备之间进行非接触式点对点数据传输，在十厘米（3.9英寸）内交换数据。

这个技术由免接触式射频识别（RFID）演变而来，由飞利浦、诺基亚和索尼共同研制开发，其基础是RFID及互连技术。近场通信是一种短距高频的无线电技术，在13.56MHz频率运行于20厘米距离内。其传输速度有106 Kbit/秒、212 Kbit/秒或者424 Kbit/秒三种。目前近场通信已通过成为ISO/IEC IS 18092国际标准、EMCA-340标准与ETSI TS 102 190标准。NFC采用主动和被动两种读取模式。

目前手机上应用的一般为近场耦合天线，属被动式。由于13.56Mhz波长很长，且读写距离很短，合适的耦合方式是磁场耦合，线圈是合适的耦合方式。由于手机之类的消费型产品有很高的外观要求，因此天线一般需要内置。但是天线内置后，天线就必须贴近主板或电池（都含有金属导体成分）。这样设计的后果是，天线会在导体表面产生涡流来削弱天线的磁场。因此，业界在手机中通常采用磁性薄膜（如TDK等公司生产）贴合FPC方式来做天线。



GPS Testing

The main type of GPS is reception. The test for reception part should be conducted according to ETSI EN 300 440.

Receiver Spurious emission

Limit: The power of any spurious emission shall not exceed 2 nW in the range 25 MHz to 1 GHz and shall not exceed 20 nW on frequencies above 1 GHz.



NFC Part Testing

Near field communication (NFC), also known as short-range wireless communications, is a short-range high-frequency wireless communication technology, allowing for non-contact point-to-point data transmission between electronic devices, swapping data within ten centimeters (3.9 inches).

This technology evolves from contact-free radio frequency identification (RFID), jointly researched and developed by Philips, Nokia and Sony, which is based on RFID and interconnection technologies. NFC is a short-range high-frequency radio technology, operating under 13.56MHz frequency within 20 cm distance. There three kinds of transmission speed 106 Kbit / sec, 212 Kbit / sec and 424 Kbit / sec. Currently NFC has been adopted as ISO / IEC IS 18092 international standard, EMCA-340 standard and ETSI TS 102 190 standard. NFC adopts active and passive reading mode.

Currently, near-field coupling antenna is usually used on mobile phone, belonging to passive type. Since 13.56Mhz wavelength is very long and its reading distance is very short, the suitable coupling type is magnetic field and coil is the suitable coupling. As consumer products like mobile phone have a high appearance requirements, so that the antenna generally requires built-in. But after the antenna is built in, the antenna must be close to the motherboard or battery (both containing a metal conductor component). The consequence of this design is that the antenna will produce eddy currents in the conductive surface to weaken the magnetic field of the antenna. Therefore, in the mobile phone industry, it generally uses magnetic film together with FPC to do antennas(such as TDK and other companies).

Wireless power transmission (WPT)

Table 1 Distinction between WPT systems cases with regard to the communication technology

WPT Cases(see note 3)	RE-D article 3.2	RE-D article 3.1b	EMC-D
1: only energy transmission, no data communication	N/A	N/A	CENELEC EN 55011 [i.7] Group 2 (or more specific CENELEC standard if applicable), see note 1
2: energy transmission and data communication in frequency ranges covered by the present document	ETSI EN 303 417 (the present document)	ETSI EN 301 489-1 [i.8] ETSI EN 301 489-3 [i.9]	N/A
3: energy transmission in frequency ranges covered by the present document and data communication in different frequency ranges	Based on the communication function, this case is a "combined equipment" according to RED (see ETSI EG 203 367 [i.5]). Therefore, two options for homologation could be used: <ul style="list-style-type: none"> • Option 1: energy transmission frequencies (the present document), data communication frequencies: related ETSI standard • Option 2: energy transmission frequencies CENELEC EN 55011 [i.7] (see note 1 and note 2), data communication frequencies: related ETSI standard 		
NOTE 1: WPT systems are expected to be included in future revision of CENELEC EN 55011 [i.7]. NOTE 2: CENELEC EN 55011 [i.7] are to be listed under the related articles in the OJEU for RE-D. NOTE 3: The division into these three cases could change once ITU has finalized their work on WPT-systems in response to Question ITU-R 210-3/1 and WRC 19 Agenda Item 9.1, Issue 9.1.6 [i.11].			

ETSI EN 303 417涉及的情况2和情况3的无线充电系统:

1) 具有附加通信能力的无线充, 用于与接收部分一起控制充电功能。

2) 接收器, 其将接收到的能量提供给电池并且执行用于电池状态和充电操作的控制/监视功能。

组合的两个部分除了功率传输模式之外还能够发送和接收数据, 例如, 以控制电池状态并优化传输模式。

这些无线电设备类型能够在表2规定的30 Mhz以下的允许频段内工作。

本文件涵盖固定系统, 移动和便携式系统。

本文件的限制和频率范围基于2013/752 / EU [i.2]和ERC / REC 70-03 [i.1]。

The present document covers wireless power transfer systems according to cases 2 and 3 of Table 1, i.e. systems which consist of:

1) A power transmitter, with additional communication capability to control the charge function in conjunction with the receiving part. The power transmitter could also be named as charger.

2) A receiver, which supplies the received energy to a battery and performs a control/supervision function for the battery status and charge operation. apply to the charger function as for Case 1 above.

Both parts in combination are able to transmit and receive data in addition to the power transfer mode e.g. to control the battery status and to optimize the transfer mode.

These radio equipment types are capable of operating in the permitted frequency bands below 30 MHz as specified in Table 2.

The present document covers fixed systems, mobile and portable systems.

The limits and the frequency ranges of the present document are based on 2013/752/EU [i.2] and ERC/REC 70-03 [i.1].



Table 2: WPT devices within the permitted frequency bands below 30 MHz

	Frequency Bands	Applications
Transmit and Receive	19 kHz to 21 kHz	WPT systems
Transmit and Receive	59 kHz to 61 kHz	WPT systems
Transmit and Receive	79 kHz to 90 kHz	WPT systems
Transmit and Receive	100 kHz to 119 kHz	WPT systems
Transmit and Receive	119 kHz to 140 kHz	WPT systems
Transmit and Receive	140 kHz to 148,5 kHz	WPT systems
Transmit and Receive	148,5 kHz to 300 kHz	WPT systems
Transmit and Receive	6765 kHz to 6795 kHz	WPT systems

注1：表2中列出的范围也用于SRD，电感器件，通用型。

注2：应该注意的是，表2代表了欧盟和CEPT国家最广泛执行的立场。在编制本文件时，所有频段的频率使用条件在欧盟协调一致。

注3：此外，应该注意的是，其他频段可能在低于30 MHz频率范围内的国家/地区可用。
本文件涵盖了附件A中确定的条件下2014/53 / EU指令第[i3]条第3.2条的基本要求。

NOTE 1: Ranges listed in Table 2 are also used for SRD, inductive devices, generic use.

NOTE 2: It should be noted that Table 2 represents the most widely implemented position within the European Union and the CEPT countries. At the time of preparation of the present document the frequency usage condition for all frequency bands were harmonised in the European Union.

NOTE 3: In addition, it should be noted that other frequency bands may be available in a country within the frequency range below 30 MHz.

The present document contains covers the essential requirements of article 3.2 of Directive 2014/53/EU [i.3] under the conditions identified in annex A.

SAR (特殊吸收比率)测试

外电磁场的作用下，人体内将产生感应电磁场。由于人体各种器官均为有耗介质，因此体内电磁场将会产生电流，导致吸收和耗散电磁能量。生物剂量学中常用SAR来表征这一物理过程。SAR的意义为单位质量的人体组织所吸收或消耗的电磁功率，单位为W/kg。

SAR (Specific Absorption Rate) Testing

Under the influence of external electromagnetic field, the human body will produce electromagnetic induction. Various human organs are lossy dielectric, so the electromagnetic field inside human body will produce electromagnetic current, resulting in the absorption and dissipation of electromagnetic energy. SAR is used commonly to characterize the physical process in biological dosimetry. SAR means unit mass amount of electromagnetic power absorbed or consumed by human tissue, in units of W / kg.

$$SAR = (\sigma |E|^2) / \rho$$

Where:

σ = conductivity of the tissue (S/m)

ρ = mass density of the tissue (kg/m)

E = RMS electric field strength (V/m)

电磁兼容EMC (EN 301489-1/-X)

辐射骚扰RE;	Radiated Disturbance
传导骚扰CE;	Conducted Disturbance
静电抗扰ESD;	Electrostatic Discharge Immunity
雷击抗扰SURGE;	Lightning Surge Immunity
脉冲群抗扰EFT;	Electric Fast Transient/Burst Immunity
电压跌落DIP;	Voltage Dip
辐射抗扰RS;	Radiated Immunity
传导抗扰CS;	Conducted Immunity
谐波闪烁H/F;	Harmonic Current Flicker



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