

**DEVICE REQUIREMENTS  
ACCESSORIES  
VERSION 24.0**

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Prepared For:

Verizon Wireless

Prepared By:

Device Requirements Group  
Device Marketing

**[Device supplier should contact Device Marketing Product Development for Assistance]**

Revision History

Author	Description of Changes	Date
R. Falkenthal S. Chowdhry	Development	3/30/04
P. Bucci S. Babbar	Updates as per Advanced Devices document synch-up. Added gaming pad as an accessory. Added Bluetooth Requirements. Updated Battery requirements. Clarified holster definitions. Other edits as marked in the document.	06/24/04
K. Chylinski	Updates to include stereo headset, a complete list of accessories, a new charger label, and details on the external antenna.	12/04
K. Chylinski	New desktop charger requirements for EVDO devices (4.7.2.1) Formatting correction Bluetooth stereo headset not used for MOD music playback (4.28.1)	2/05
K. Chylinski	Battery requirement update ( (4.1.7.4,4.3.2.5,4.6.7.5,4.7.5.4) Accessibility reference added (9)	4/05
K. Chylinski, S.Babbar	Bluetooth requirements moved to new VZW Bluetooth Requirements document; Added reference to the VZW Entrance Criteria	7/05
K. Chylinski	Clarified connector reqs and label requirements.	2/06
K. Chylinski	Battery Requirement change (4.1.6. 4.1.7, 4.1.8) Reference (10) Other changes as marked	05/06
K. Chylinski B.Raghavachari	PTC 90°C (4.1.8.4) Added Section 4.25.1 (Bluetooth Headset - Mono and Stereo) Updated References (section 10) Updated references to ExpressCard and PCI Express Mini Card, USB Modems Updated Battery Temperature Safety (section 4.1.7.9) Added reference to Accessory Release Notes Template (Section 1.2)	09/01/06
Arthe Sampath	Bluetooth Headset support for <ul style="list-style-type: none"> <li>- Low Battery interruption</li> <li>- Out of Range Interruption</li> <li>- Paired Device List</li> </ul>	12/06
George Zysman	Added requirements for CTIA Battery Certification Added Global travel charger	3/08
B.	Updated advanced devices references to converged devices	06/08

Raghavachari		
George Zysman Joe Kuhn	Aligned cell, batteries, and charger/adapter sections to CTIA certification process. Added requirement for two-part charger. Clarified maximum circuit and case temperature requirements.	12/08
Joe Kuhn	Added requirement for USB 3.0 support Added requirement for OMTP Common Charging Solution. Removed USB requirement out and added reference to Feature Definitions document (4.24.1) Eco-friendly requirements added (4.5)	6/09
Sunita Babbar Kathy Chylinski	Reference to new Accessory Readiness Review Worksheet (1.2.2) Calls and messaging with charger connected (4.8.5) Eco-Friendly charger update (4.5.1.1) Desktop charger indicator removed (4.6.5)	9/1/09
Joe Kuhn	Added accessory packaging requirement (2.6.2.3) Updated holster battery requirements (4.1.5) Added requirement for 2-port VPC charger (4.4) Updated holster requirements (4.13) Combined PDA Carrying Case and Standard Device case sections into Fitted Carrying Case section (4.14) Updated belt clip requirement (4.14.1) Updated pouch accessory requirement (4.15) Added screen protector requirement (4.17) Added snap-on cover requirement (4.18) Added line level audio accessory cable requirement (4.26.4) Added painting material, process, and reliability test requirements (Appendix B)	12/09
Joe Kuhn	Added reference to Wireless Charging device requirements document	03/10
Joe Kuhn	Updated additional vendor requirements for battery (4.1.6.3)	06/10
S. Babbar	Added Unique Requirements Tag ID. Last Tag used - <VZW-REQS-115-336>	Administrative Updates–June 2010
Kathy Chylinski Joe Kuhn	Sustainability requirements - charger update (4.6.1.1) Updated dual port desktop charger requirements (4.7.2) Updated HFK Fit requirements (4.11.5.4) Obsoleted Tags: 101, 103, 105, 108, 110,133, 194 New Tags: 337-343	09/10
Helen Wang	Updated the Global Desktop and Global Travel Chargers requirements to remove the inbox requirement for the international adaptors (4.6.3.2, 4.7.3) Updated Tags – 106, 135	01/11

	Last Tag Used - 343 EMERGENCY RELEASE for Sections 4.6.3.2 and 4.7.3	
Joe Kuhn	Updated two-part USB/wall charger requirements (4.6.1) Updated sustainability requirements (4.6.1.1) Updated references (10) Last Tag Used – 343	09/11
NanJun Qian	Update charger insertion requirements	03/2012
Shyam T. Shyamalan	Updated a reference link	07/2012
NanJun Qian	Updated Micro-USB charger compatibility requirements . Updated battery charging performance requirements for larger capacity battery	07/2012
NanJun Qian Shyam T. Shyamalan	Clean up for TC mapping and increase Battery Aging requirement for Embedded battery pack to 800 cycles Removed reference to the Hardware quality document	01/2013
NanJun Qian Daniel Nam	Move battery related performance requirements to Power management requirements. Moved wireless charging related requirements Moved Accessory Labeling and Packaging Requirements to Shipping and Delivery requirements	06/2013

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## 1 INTRODUCTION <VZW-REQS-115-1>

Verizon Wireless requires specific sets of accessories for their suite of wireless devices. This document describes the requirements to be met by a wireless device accessory supplier.

All requirements generated, only apply to new product launches. Any running changes or field upgrades need to be handled as special cases under extraordinary circumstances involving coordination with Device Marketing and Network.

### 1.1 GLOSSARY/DEFINITIONS <VZW-REQS-115-2>

This section defines acronyms and terms used throughout the document. For an extended list of Acronyms and Glossary terms refer to Verizon Wireless Glossary.

Term [Abbreviation (if Applicable)]	Definition
A2DP	Advanced Audio Distribution Profile
BT	Bluetooth
C-rate	Unit by which charge & discharge times are scaled
°C	Degrees Centigrade
DTC	Desktop Travel Charger
GAVDP	Generic Audio/Video Distribution Profile
HF	Hands Free
HFK	Hands Free Kit
mA	Milliamps
mV	Millivolts
PPTC	Polymer Positive Temperature Coefficient
PTC	Positive Temperature Coefficient
Vac	Volts Alternating Current
VDC	Volts Direct Current
VPC	Vehicle Power Charger
TC	Travel Charger
XT	Extended Battery

### 1.2 ENTRANCE CRITERIA <VZW-REQS-115-3>

Refer to the Verizon Wireless documents “Verizon Wireless Device Testing Process” and “Verizon Wireless Device Compliance Test Entrance Criteria” for details of submittals of samples to the Accessory Team during the testing process submittal.

### **1.2.1 ACCESSORY RELEASE NOTES <VZW-REQS-115-4>**

All accessories (including new and re-submissions) submitted to Verizon Wireless Product Management Accessory Team shall also include a completed Accessory Release Notes Template. Refer to the Verizon Wireless A003-02DeviceComplianceTestingProcedures document.

### **1.2.2 ACCESSORY READINESS REVIEW <VZW-REQS-115-5>**

The device vendor shall complete the Accessory Readiness Review document that is embedded in the VZW Device Product Development Process document. This will be used by the VZW Product Management Accessory Team for planning/design purposes as it relates to the supplemental accessories for the device.

## 2 USER INTERFACE <VZW-REQS-115-29>

Refer to the “Mobile Station User Interface”, the “Static UI” requirements and Reqs-UserInterface.doc document for further details.

## 3 HARDWARE SPECIFICATIONS <VZW-REQS-115-30>

For all the wired chargers and wireless charging transmitter/ receiver compatibility, certification and performance requirements, please refer to power management requirements Ref 15

### 3.1 VEHICLE POWER CHARGER (VPC) <VZW-REQS-115-69>

#### 3.1.1 MECHANICAL SPECIFICATIONS <VZW-REQS-115-70>

The VPC shall be constructed so that it is durable and safe, especially when used in a mobile environment. All electronic parts shall be enclosed with plastic housing, which protects against electric shock. This product must conform to the California law “Prop 65” (<http://www.oehha.org/prop65.html>) which requires the unit to have less than a certain amount of lead content in the material exposed to a user.

##### 3.1.1.1 CONNECTOR OF PHONE <VZW-REQS-115-71>

The connector from the VPC shall mate with the connector of the phone. See section 4.6.1.2 and VZW Feature Definitions/Requirements “Power Connector” for further requirements.

##### 3.1.1.2 STRAIN RELIEF <VZW-REQS-115-72>

The VPC cord shall have strain relief on both sides. The cord shall have no structural damage due to strain relief and shall sustain electrical continuity when the cable is secured at a tension of 2.25 lbs. The cord shall have no structural damage due to strain relief and shall sustain electrical continuity after being bent at the plug continuously for 2500 cycles. One cycle is equal to two 180° arcs, bringing the cable back to its starting position.

##### 3.1.1.3 CORD TO PLUG <VZW-REQS-115-73>

The Cord shall withstand 12 pounds at the plug without any mechanical damage or electrical discontinuity.

##### 3.1.1.4 CORD TO CONNECTOR <VZW-REQS-115-74>

The Cord shall withstand 8 pounds at the phone connector without any mechanical damage or electrical discontinuity.



### **3.1.1.5 VPC Fit <VZW-REQS-115-75>**

The VPC connector shall fit securely and align with the phone connectors when placed into the connector of the phone. There shall not be any gaps between the plug casing and the phone connector. The connection between the VPC plug and phone connector shall not be loose. The VPC shall be able to withstand at least 10000 insertions and removals of the device.

### **3.1.1.6 DROP TESTING <VZW-REQS-115-76>**

The VPC case must not crack nor must any internal parts become loose nor can any electrical discontinuities exist when dropped from a height of five feet onto a concrete floor 6 times, each time using different orientations. The VPC must meet all specifications after the drop test

### **3.1.1.7 VENDOR REQUIREMENTS <VZW-REQS-115-77>**

#### Vendor Shall Submit

1. Completed evaluation sheet: "Specifications for Vehicle Power Charger"
2. Circuit schematic with all parts labeled
3. Submit five VPCs for evaluation. Please refer to the "Verizon Wireless Device Compliance Test Entrance Criteria" document for any changes in quantity required.

### **3.1.2 ELECTRICAL SPECIFICATIONS <VZW-REQS-115-78>**

#### **3.1.2.1 POWER CHARGER <VZW-REQS-115-79>**

The Vehicle Power Charger (VPC) is used for charging the battery of a cellular phone from the power charger (cigarette lighter) socket of a vehicle. It is to be used with a 12.0-volt vehicle battery, negative ground.

#### **3.1.2.2 INPUT VOLTAGE <VZW-REQS-115-80>**

The VPC operating voltage range is 10.8 Vdc to 24 Vdc. The device shall have an internal fuse. The fuse may be replaceable.

#### **3.1.2.3 REVERSE INPUT VOLTAGE PROTECTION <VZW-REQS-115-81>**

The VPC shall withstand a reverse polarity input voltage. If a fuse is used, it shall blow in order to provide protection. Input voltage: -14.0 Vdc for 30 seconds. Output voltage: Shall not exceed -1 volt.

#### **3.1.2.4 OUTPUT RIPPLE <VZW-REQS-115-82>**

Maximum ripple at the input to the battery protection circuit is 80mVpp.

#### **3.1.2.5 VPC SHORT CIRCUIT <VZW-REQS-115-83>**

The VPC shall survive a thirty-minute short circuit without suffering any permanent damage. When the VPC is shorted, output current flow shall drop to less than 6 mA. The current shall remain at 6mA or less until the short is removed. The VPC must not exceed the 60°C requirement on the circuit, nor the 30°C requirement on the case. When the short is removed, the VPC shall return to normal state and meet all VPC specifications. The VPC should have an

active overcurrent detection safety circuit. Reference regulator comparator in chip will detect a short and the removal of a short on the output of device.

### **3.1.2.6 INPUT CURRENT NO LOAD <VZW-REQS-115-84>**

Input Voltage shall be 12.5 VDC. The VPC shall not draw more than 35mA of current when the output is not connected.

### **3.1.2.7 DEAD PHONE BATTERY <VZW-REQS-115-85>**

Upon connection, the VPC shall immediately be able to make and hold a call for a minimum of fifteen minutes with a dead battery connected to the mobile. A battery is considered dead when the voltage is 3.00 volts or less.

### **3.1.2.8 CHARGING TIME PERFORMANCE <VZW-REQS-115-86>**

See Section 8.1 Charging Time Performance for requirements.

### **3.1.2.9 TEMPERATURE REQUIREMENTS <VZW-REQS-115-87>**

Normal operating temperature range is -25°C to 60°C. At room temperature (23°C), the maximum surface temperature of the circuit (chip) is 60°C. At room temperature (23°C), the maximum case temperature shall not exceed 30° C.

### **3.1.2.10 GROUNDING <VZW-REQS-115-88>**

The VPC shall have a minimum of two grounding points and shall be electrically connected to the circuit.

### **3.1.2.11 LOADED POWER UP <VZW-REQS-115-89>**

The VPC shall power-up reliably and not sustain any permanent damage due to inrush currents. The unit shall power-up normally and attain its rated voltage within 14 ms.

### **3.1.2.12 CONDUCTED AND RADIATED EMISSIONS <VZW-REQS-115-90>**

The VPC shall meet FCC Part 15 of CFR47 (Class B levels) specifications for conducted and radiated emissions when connected the phone.

### **3.1.2.13 ELECTROSTATIC DISCHARGING <VZW-REQS-115-91>**

There shall be no component damage or miss-operation when an electrostatic contact discharge of up to 8kV is applied to the VPC at a repetition rate of ten discharges at each voltage, alternating between positive and negative pulses. The VPC must also have no component damage or miss-operation when an air discharge of up to 15kV is applied to the VPC at a repetition rate of ten discharges at each voltage, alternating between positive and negative pulses. See Device Compliance Testing Procedures document for discharge voltage step details. Reference: IEC 61000-4-2 international standards.

### **3.1.3 TESTABILITY <VZW-REQS-115-92>**

As defined in “Verizon Wireless Device Testing Process”, and “Verizon Wireless Device Compliance Testing Procedures”.

## **3.2 VPC WITH SECONDARY USB PORT—OPTIONAL <VZW-REQS-115-93>**

The 2-port VPC shall consist of two charging outputs for the purpose of charging a cell phone battery and/or a variety of low powered electronics (ie., GPS, MP3 player, digital camera, Bluetooth devices, etc.) simultaneously. The 2-port VPC shall comply with all VPC requirements noted in section 4.3 above unless otherwise indicated below .

### **3.2.1 MECHANICAL SPECIFICATIONS <VZW-REQS-115-94>**

The 2-port VPC shall consist of a permanently affixed cable as the primary output and shall have an integrated Type-A USB receptacle to serve as the secondary output. The primary port shall connect to the plastic housing of the VPC (in accordance with the Mechanical Specifications as outlined in section 4.3 above) and terminate with the appropriate electrical connector, as required, to support the cellular device. The secondary Type A-USB receptacle shall accommodate any standard USB 2.0 compliant charging cable .

### **3.2.2 ELECTRICAL SPECIFICATIONS <VZW-REQS-115-95>**

#### **3.2.2.1 OUTPUT REQUIREMENTS <VZW-REQS-115-96>**

The 2-port VPC should have no less than 2.0 Amps shared between both outputs. The VPC shall have a power management design that shares the current between the primary and secondary outputs .

#### **3.2.2.2 TEMPERATURE REQUIREMENTS <VZW-REQS-115-97>**

At room temperature (23°C), the maximum surface temperature of the circuit (chip) is 70°C. At room temperature (23°C), the maximum case temperature shall not exceed 40° C .

## **3.3 HANDS FREE VPC - OPTIONAL <VZW-REQS-115-98>**

The hands free VPC, also known as portable HFK, shall meet VPC power requirements. This unit must have an external microphone & be full duplex. Refer to Verizon Wireless Device Compliance Testing Procedures and Audio Documents for Requirements and Test Plans.

## 3.4 TRAVEL/WALL CHARGER / POWER SUPPLY <VZW-REQS-115-99>

### 3.4.1 TWO-PART USB/WALL CHARGER <VZW-REQS-115-100-SEP2011>

The device shall be fully compliant with the requirements defined in [Common Charging Solution as defined in the OMTP Common Charging and Local Data Connectivity, Version 1.1 recommendation](#). The Common Charging Solution is comprised of the following elements:

- Common Power Supply/Charger (CPS). The CPS will plug into the wall and provide a USB 2.0 Standard-A receptacle. The CPS will support an input operating voltage range of 90.0Vac to 264Vac with an input operating frequency of 47Hz to 63Hz.
- Common Detachable Cable (CDCable). A cable with one USB 2.0 Micro-B plug and one USB 2.0 Standard-A plug
- Charging and Local Data Connector (CLD). The device shall support a USB 2.0 Micro receptacle for connecting the charging solution.

As an alternative to the Common Charging Solution, a device with a USB 3.0 port shall support a two-part USB 3.0/Wall Charger solution. The charging solution shall be designed and implemented with approval from the VZW Device Marketing Product Development Team during the Feature Lockdown process.

#### 3.4.1.1 SUSTAINABILITY REQUIREMENTS <VZW-REQS-115-337-SEP2011>

The charger is required to have high efficiency. After the device is charged and while the device is connected, The Charger shall consume standby power of less than or equal to 0.03 Watt.

#### 3.4.1.2 CHARGER COMPATIBILITY REQUIREMENTS

##### 3.4.1.2.1 Mechanical Compatibility Requirements

The Micro-USB charging connector(receptacle) shall be implemented in line with the physical characteristics for USB Micro-B or Micro-AB receptacle(s) as defined in “Universal Serial Bus Micro-USB Cables and Connectors Specification v1.01” Chapter 4 [2].

The Micro-USB charger included in the box shall be implemented in line with the physical characteristics for USB Micro-A or Micro-B plug as defined in “Universal Serial Bus Micro-USB Cables and Connectors Specification v1.01” Chapter 4 [2].

##### 3.4.1.2.2 Battery Charging Compatibility Requirements

[The device shall be fully compliant with USBIF Battery Charging Specification Revision 1.2 plus errata, published on Oct. 12, 2011.](#)

### **3.4.2 AC CHARGER – OPTIONAL IF DEVICE IS SOLD WITH TWO-PART CHARGER IN BOX <VZW-REQS-115-102>**

The device shall support an AC charger that plugs into the wall and, via a cord and connector, either plugs into the device's bottom port, a desktop charger, or plugs into a desktop holder. The AC charger provides a standard or trickle charge to the battery.

#### **3.4.2.1 SUSTAINABILITY REQUIREMENTS <VZW-REQS-115-340>**

Refer to section 4.6.1.1

### **3.4.3 TRAVEL CHARGER– OPTIONAL IF DEVICE IS SOLD WITH TWO-PART CHARGER IN BOX <VZW-REQS-115-104>**

[The device shall support a Travel charger that plugs into the wall and, via a cord and connector, either plugs into the device's bottom port, a desktop charger, or plugs into a desktop holder. The travel charger provides a rapid charge to the battery.](#)

#### **3.4.3.1 SUSTAINABILITY REQUIREMENTS <VZW-REQS-115-341>**

Refer to section 4.6.1.1

### **3.4.3.2 GLOBAL TRAVEL CHARGER – FOR GLOBAL DEVICES <VZW-REQS-115-106-JAN2011>**

[The global travel charger is a standard travel charger. The Global Travel Charger shall be able to operate globally, and it shall be designed to work with off the shelf international adaptors, i.e Continental European, Australia/New Zealand/China and Great Britain/Hong Kong ungrounded international plug adaptors. The international adaptors are not required in the box.](#)

Device vendors shall approve their travel charger solution with Verizon Wireless Device Product Development Marketing Group.

### **3.4.4 BATTERY ONLY CHARGER - OPTIONAL <VZW-REQS-115-107>**

The battery only charger is molded plastic that holds a standard and/or extended battery and has the capability of charging the battery via a travel or AC charger.

#### **3.4.4.1 SUSTAINABILITY REQUIREMENTS <VZW-REQS-115-342>**

Refer to section 4.6.1.1

### **3.4.5 BATTERY WALL CHARGER - OPTIONAL <VZW-REQS-115-109>**

The battery wall charger is molded plastic that holds a standard and/or extended battery and plugs directly into the wall.

### **3.4.5.1 SUSTAINABILITY REQUIREMENTS <VZW-REQS-115-343>**

Refer to section 4.6.1.1

### **3.4.6 MECHANICAL SPECIFICATIONS <VZW-REQS-115-111>**

The charger is used for charging the battery of a device from the AC power outlet. The charger shall be constructed so that it is durable and safe. All electronic parts shall be enclosed with plastic housing, which protects it against electric shock. This product must conform to the California law “Prop 65” (<http://www.oehha.org/prop65.html>) which requires the unit to have less than a certain amount of lead content in the material exposed to a user.

#### **3.4.6.1 CONNECTOR OF PHONE <VZW-REQS-115-112>**

The connector from the charger shall mate with the connector(receptacle) of the phone. See section 4.6.1.2 and VZW Feature Definitions/Requirements “Power Connector” for further requirements.

#### **3.4.6.2 STRAIN RELIEF (IF APPLICABLE) <VZW-REQS-115-113>**

Chargers with a cord shall have strain relief on both sides. The cord shall have no structural damage due to strain relief and shall sustain electrical continuity when the cable is secured at a tension of 2.25 lbs. The cord shall have no structural damage due to strain relief and shall sustain electrical continuity after being bent at the plug continuously for 2500 cycles. One cycle is equal to two 180° arcs, bringing the cable back to its starting position.

#### **3.4.6.3 DROP TESTING <VZW-REQS-115-114>**

The charger case must not crack nor must any internal parts become loose nor can any electrical discontinuities exist when dropped from a height of five feet onto a concrete floor 6 times, each time using different orientations. The charger must meet all specifications after the drop test.

#### **3.4.6.4 CORD TO PLUG (IF APPLICABLE) <VZW-REQS-115-115>**

For chargers with a cord, the Cord shall withstand 12 pounds at the plug without any mechanical damage or electrical discontinuity.

#### **3.4.6.5 CORD TO CONNECTOR (IF APPLICABLE) <VZW-REQS-115-116>**

For chargers with a cord, the cord shall withstand 8 pounds at the phone connector without any mechanical damage or electrical discontinuity.

#### **3.4.6.6 CHARGER FIT <VZW-REQS-115-117>**

The charger connector shall fit securely and align with the phone connectors when placed into the connector of the phone. There shall not be any gaps between the plug casing and the phone connector. The connection between the chargers, plug and phone connector shall not be loose. The charger shall be able to withstand at least 10000 insertions and removals of the device.

### 3.4.6.7 VENDOR REQUIREMENTS <VZW-REQS-115-118>

#### Vendor Shall Submit

1. Completed evaluation sheet: “Specifications for Travel Chargers”. See reference 7 in section 10.
2. Circuit schematic with all parts labeled
3. Submit five chargers for evaluation. Please refer to the “Verizon Wireless Device Compliance Test Entrance Criteria” document for any changes in quantity required.
4. The mechanical size information of Device Micro-USB charging connector(receptacle) and In-box USB Charger Micro-A and Micro-B plugs shall be submitted at phase 1 submission.
5. The compliance evidences for USBIF Battery Charging Specification Revision 1.2 shall be submitted at phase 1 submission  
[http://www.usb.org/developers/devclass\\_docs/USB\\_Battery\\_Charging\\_1.2.pdf](http://www.usb.org/developers/devclass_docs/USB_Battery_Charging_1.2.pdf)

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### 3.4.7 ELECTRICAL SPECIFICATIONS <VZW-REQS-115-119>

#### 3.4.7.1 INPUT VOLTAGE <VZW-REQS-115-120>

Operating voltage range is 85.0 Vac to 135.0 Vac. Input operating frequency is 50/60 hertz  $\pm$  3Hz. The device must have an internal fuse. The charger must have a transient voltage suppressor device.

#### 3.4.7.2 GLOBAL TRAVEL CHARGER – INPUT VOLTAGE <VZW-REQS-115-121>

Operating voltage range is 85.0Vac, 120Vac and 264Vac with an input operating frequency of 47Hz to 63Hz  $\pm$  3Hz (44Hz to 66Hz). The device must have an internal fuse.

#### 3.4.7.3 OUTPUT VOLTAGE <VZW-REQS-115-122>

Device output voltage has a tolerance of  $\pm$  1.0V at maximum rated output current.

#### 3.4.7.4 OUTPUT RIPPLE <VZW-REQS-115-123>

Maximum ripple at the input to the battery protection circuit is 80 mVpp.

#### 3.4.7.5 SHORT CIRCUIT <VZW-REQS-115-124>

The charger shall survive an indefinite short circuit without suffering any damage, and recover without having to power cycle. The charger shall not exceed the 60°C requirement on the circuit. The charger shall not exceed the 30°C requirement on the case. The charger should have an active over current detecting safety circuit. When the short is removed, the charger shall meet all charger specifications.

#### 3.4.7.6 CHARGING TIME PERFORMANCE <VZW-REQS-115-125>

See Section 8.1Charging Time Performance for requirements.

### **3.4.7.7 TEMPERATURE REQUIREMENTS <VZW-REQS-115-126>**

Normal operating temperature range of the charger is –25°C to 60°C. At room temperature (23°C), the maximum surface temperature of the circuit (chip) is 60°C. At room temperature (23°C), the maximum case temperature shall not exceed 30° C.

### **3.4.7.8 LOADED POWER-UP <VZW-REQS-115-127>**

The charger shall power-up reliably and not sustain any permanent damage due to inrush currents. The unit shall power-up normally and attain its rated voltage within 14 ms .

### **3.4.7.9 CONDUCTED AND RADIATED EMISSIONS <VZW-REQS-115-128>**

The charger must meet the FCC's Rules and Regulations, Part 15 (Class B levels) (47CFR Part 15) specifications for conducted and radiated emissions when connected to the phone .

### **3.4.7.10 ELECTROSTATIC DISCHARGING <VZW-REQS-115-129>**

There shall be no component damage or miss-operation up to 8kV contact voltage discharge. Both positive and negative polarity pulses shall be used for a total of ten pulses at each voltage tested. The tests shall be repeated for air discharge of up to 15kV. Both positive and negative polarity pulses shall be used for a total of ten pulses at each voltage tested. See Device Compliance Testing Procedures document for discharge voltage step details. Reference: IEC 61000–4-2 international standards .

### **3.4.8 TESTABILITY <VZW-REQS-115-130>**

As defined in “Verizon Wireless Device Testing Process”, and “V Verizon Wireless Device Compliance Testing Procedures

## **3.5 DESKTOP CHARGER -OPTIONAL FOR LOW & MID TIER, REQUIRED FOR OTHERS <VZW-REQS-115-131>**

### **3.5.1 SINGLE PORT DESKTOP CHARGER <VZW-REQS-115-132>**

A single port desktop charger is molded plastic capable of holding and charging a device with an attached standard or extended battery. Optionally the front port is also capable of holding and charging a standard or extended battery without the phone.

The desktop charger may be sold with a travel or AC charger, or has a built in charger with cord.

### **3.5.2 DUAL PORT DESKTOP CHARGER – REQUIRED FOR LTE HANDSETS, OPTIONAL FOR OTHERS <VZW-REQS-115-338>**

A dual port desktop charger is molded plastic with a front port capable of holding and charging a device with an attached standard or extended battery. It also has a second port used to charge a



standard or extended battery without a phone. Optionally the front port is also capable of holding and charging a standard or extended battery without the phone.

The desktop charger may be sold with a travel or AC charger, or has a built in charger with cord.

### **3.5.2.1 DUAL PORT DESKTOP CHARGER (1xEV-DO DEVICES ONLY) <VZW-REQS-115-134>**

All 1xEV-DO devices shall support a dual port desktop charger that also consists of a USB connection between the charger and PC. The connection between the device and the desktop charger is via the bottom port. This desktop charger will be sold with a CD for installation and operation with the PC.

Note that desktop chargers may accommodate the standard or extended battery via a port swivel, plastic molding, or any other method devised by the vendor.

Refer to the VZW Feature Definitions document for further detail on USB connection for data connectivity.

### **3.5.3 GLOBAL DESKTOP CHARGER <VZW-REQS-115-135-JAN2011>**

The global desktop charger is a standard desktop charger with a dual port design. The global desktop charger shall be able to operate globally, and it shall be designed to work with off the shelf international adaptors, i.e Continental European, Australia/New Zealand/China and Great Britain/Hong Kong ungrounded international plug adaptors. The international adaptors are not required in the box.. Power is provided to the unit via a compact travel charger that plugs into the base and can be removed for travel.

Device vendors must approve their compact travel charger solution with Verizon Wireless Device Product Development Marketing Group.

### **3.5.4 MECHANICAL SPECIFICATIONS <VZW-REQS-115-136>**

The Desktop charger (DTC) is used for charging the battery pack of a cellular phone from the A.C. power outlet. The DTC must be constructed so that it is durable and safe, especially when used in a mobile environment. All electronic parts are to be enclosed with plastic housing, which protects it against electric shock. This product must conform to the California law "Prop 65" (<http://www.oehha.org/prop65.html>) which requires the unit to have less then a certain amount of lead content in the material exposed to a user .

#### **3.5.4.1 DUAL PORT DESKTOP CHARGER <VZW-REQS-115-137>**

This product shall have a dual pocket enabling the user to charge two batteries simultaneously (one can be the phone itself). It must come with or be able to use the power supply in the handset box and must charge each battery in accordance with the inbox charger requirements .

##### **3.5.4.1.1 Battery Fit in DTC <VZW-REQS-115-138>**

The battery shall fit securely in the DTC ports, with no gaps that would cause a loose fit. The battery connectors shall align with the DTC connectors when placed into either receptacle of the DTC. The Phone and the battery shall be easily inserted and removed from both ports on the DTC and shall not require any tools to do so.

#### **3.5.4.2 DESKTOP CHARGER WITH EMBEDDED SPEAKERPHONE <VZW-REQS-115-139>**

This product is not required for in the box or future purchase. If an OEM elects to develop this, it must meet Travel Charger power supply requirements. Refer to Section 4.4, Verizon Wireless Device Compliance Testing Procedures and Audio Documents for Requirements and Test Plans.

#### **3.5.4.3 CONNECTOR OF PHONE <VZW-REQS-115-140>**

The connector from the DTC must mate with the connector of the phone. See section 4.6.1.2 and VZW Feature Definitions/Requirements “Power Connector” for further requirements.

#### **3.5.4.4 STRAIN RELIEF <VZW-REQS-115-141>**

The DTC cord shall have strain relief on both sides. The cord shall have no structural damage due to strain relief and shall sustain electrical continuity when the cable is secured at a tension of 2.25 lbs. The cord shall have no structural damage due to strain relief and shall sustain electrical continuity after being bent at the plug continuously for 2500 cycles. One cycle is equal to two 180° arcs, bringing the cable back to its starting position .

#### **3.5.4.5 DROP TESTING <VZW-REQS-115-142>**

The DTC case must not crack nor must any internal parts become loose nor can any electrical discontinuities exist when dropped from a height of five feet onto a concrete floor 6 times, each time using different orientations. The DTC must meet all specifications after the drop test .

#### **3.5.4.6 CORD TO PLUG <VZW-REQS-115-143>**

The Cord shall withstand 12 pounds at the plug without any mechanical damage or electrical discontinuity .

#### **3.5.4.7 CORD TO CONNECTOR <VZW-REQS-115-144>**

The cord shall withstand 8 pounds at the phone connector without any mechanical damage or electrical discontinuity .

#### **3.5.4.8 DTC FIT <VZW-REQS-115-145>**

The phone shall fit securely in the DTC, with no gaps that would cause a loose fit. The phone connectors shall align with the DTC connectors when placed into the receptacle of the DTC. The phone shall be easily inserted and removed from the DTC receptacle and shall not require any tools to do so. The DTC shall be able to withstand at least 10000 insertions and removals of the device .

#### **3.5.4.9 VENDOR REQUIREMENTS <VZW-REQS-115-146>**

Vendor Shall Submit

1. [Completed evaluation sheet: “Specifications for Global Desktop Chargers”](#)
2. [Circuit schematic with all parts labeled](#)
3. [Submit five DTCs for evaluation. Please refer to the “Verizon Wireless Device Compliance Test Entrance Criteria” document for any changes in the quantity required.](#)

### **3.5.5 ELECTRICAL SPECIFICATIONS <VZW-REQS-115-147>**

#### **3.5.5.1 INPUT VOLTAGE <VZW-REQS-115-148>**

Operating voltage range is 85.0Vac, 120Vac and 264Vac with an input operating frequency of 47Hz to 63Hz  $\pm$  3Hz (44Hz to 66Hz). The device must have an internal fuse or positive temperature co-efficient (PTC). The DTC must have a transient voltage suppressor device.

#### **3.5.5.2 OUTPUT VOLTAGE <VZW-REQS-115-149>**

[Device output voltage  \$\pm\$  1.0V at maximum current.](#)

#### **3.5.5.3 OUTPUT RIPPLE <VZW-REQS-115-150>**

[Maximum output ripple is 80 mVpp.](#)

#### **3.5.5.4 DTC SHORT CIRCUIT <VZW-REQS-115-151>**

[The DTC shall survive an indefinite short circuit without suffering any damage and recover without having to power cycle. The DTC shall not exceed the 60°C temperature requirement on the circuit \(chip\), and the 30°C requirement on the case. When the short is removed, the DTC shall still meet all specifications.](#)

#### **3.5.5.5 CHARGING TIME PERFORMANCE <VZW-REQS-115-152>**

See Section 8.1 Charging Time Performance for requirements.

#### **3.5.5.6 TEMPERATURE REQUIREMENTS <VZW-REQS-115-153>**

[Normal operating temperature range is  \$-25^{\circ}\text{C}\$  to  \$60^{\circ}\text{C}\$ . At room temperature \( \$23^{\circ}\text{C}\$ \), the maximum surface temperature of the circuit \(chip\) is  \$60^{\circ}\text{C}\$ . At room temperature \( \$23^{\circ}\text{C}\$ \), the maximum case temperature shall not exceed  \$30^{\circ}\text{C}\$ .](#)

#### **3.5.5.7 LOADED POWER-UP <VZW-REQS-115-154>**

[The DTC shall power-up reliably and not sustain any permanent damage due to inrush currents. The unit shall power-up normally and attain its rated voltage within 14 ms.](#)

#### **3.5.5.8 CONDUCTED AND RADIATED EMISSIONS <VZW-REQS-115-155>**

[The DTC must meet the FCC’s Rules and Regulations, Part 15 \(Class B levels\) \(47CFR Part 15\) specifications for conducted and radiated emissions when connected to the phone.](#)

### **3.5.5.9 ELECTROSTATIC DISCHARGING <VZW-REQS-115-156>**

There shall be no component damage or miss-operation up to 8kV contact voltage discharge. Both positive and negative polarity pulses shall be used for a total of ten pulses at each voltage tested. The tests shall be repeated for air discharge of up to 15kV. Both positive and negative polarity pulses shall be used for a total of ten pulses at each voltage tested. See Device Compliance Testing Procedures document for discharge voltage step details. Reference: IEC 61000-4-2 international standards.

### **3.5.6 TESTABILITY <VZW-REQS-115-157>**

As defined in “Verizon Wireless Device Testing Process”, and “Verizon Wireless Device Compliance Testing Procedures

## **3.6 WIRELESS CHARGING**

### **3.6.1 TRANSMITTER <VZW-REQS-196-35>**

#### **3.6.1.1 MECHANICAL SPECIFICATIONS <VZW-REQS-196-36>**

The transmitter shall comply with the mechanical requirements identified in the WPC Wireless Power Transfer System Description version 1.1.1.

The transmitter shall comply with the mechanical requirements identified in the WPC Wireless Power Transfer System Description version 1.1.1

##### **3.6.1.1.1 Industrial Design Approval <VZW-REQS-196-37>**

The transmitter industrial design shall be approved by Verizon.

##### **3.6.1.1.2 Positioning Design <VZW-REQS-196-188-DEC2010>**

The transmitter shall employ one of the following positioning designs:

- a free-positioning design compliant with the Type B2 design specified in the WPC Wireless Power Transfer System Description.
- a guided-positioning design compliant with the Type A1 design specified in the WPC Wireless Power Transfer System Description.

The positioning design shall be approved by Verizon Wireless Device Marketing at feature lockdown.

##### **3.6.1.1.3 Number of Concurrently Charged Devices <VZW-REQS-196-39>**

The number of devices the wireless charger base is capable of charging concurrently shall be determined by Device Marketing product management at feature lockdown.

#### 3.6.1.1.4 Number of Transmitters <VZW-REQS-196-40>

The charger base design shall employ one transmitter for each concurrently charged device.

##### *3.6.1.1.4.1 Power Transfer Independent of Number of Charged Devices <VZW-REQS-196-41>*

The power transmitted to a receiver shall not depend on the number of receivers that are concurrently charged by the transmitter. In other words, a receiver will not get less power when a second receiver is placed on the surface of the transmitter.

#### 3.6.1.1.5 Housing <VZW-REQS-196-42>

The transmitter shall be constructed so that it is durable and safe. All electronic parts shall be enclosed with plastic housing, which protects it against electric shock.

#### 3.6.1.1.6 Power Port <VZW-REQS-196-43>

The transmitter shall have a power port for connecting an external AC/DC adapter/power supply.

#### 3.6.1.1.7 Labelled Indicator Lights <VZW-REQS-196-44>

All indicator/LED lights on the transmitter device shall be labeled (Text or Verizon approved icons)

#### 3.6.1.1.8 Readily-Visible Indicator Lights <VZW-REQS-196-45>

Indicator lights on the transmitter device shall be readily visible (99% human observer detection in less than 250 milliseconds at 12 feet with an ambient illumination level of 550 foot-candles)

#### 3.6.1.1.9 Indicator Light Slow Flash Rate <VZW-REQS-196-46>

Indicator lights shall support a slow flash where the flash rate is 0.5 Hz with a duty cycle of 50%.

#### 3.6.1.1.10 Shielding <VZW-REQS-196-53>

The transmitter shall comply with the shielding requirements identified in the WPC Wireless Power Transfer System Description.

#### 3.6.1.1.11 Transmitter Placement <VZW-REQS-196-54>

It must be possible to place a power transmitter on top of a metallic table without notably impacting transmitter functionality.

#### 3.6.1.1.12 Drop Testing <VZW-REQS-196-55>

The charger case must not crack nor must any internal parts become loose nor can any electrical discontinuities exist when dropped from a height of five feet onto a concrete floor 6 times, each time using different orientations. The charger must meet all specifications after the drop test.

#### 3.6.1.1.13 Vendor Requirements <VZW-REQS-196-57>

Vendor Shall Submit

6. Completed Accessory Hardware & Software Release Notes template. .
7. Circuit schematic with all parts labeled

8. [Submit five chargers for evaluation. Please refer to the “Verizon Wireless Device Compliance Test Entrance Criteria” document for any changes in quantity required.](#)

### **3.6.1.2 ELECTRICAL SPECIFICATIONS <VZW-REQS-196-58>**

[The transmitter shall comply with the electrical requirements identified in the WPC Wireless Power Transfer System Description.](#)

#### **3.6.1.2.1 Power Signal Frequency <VZW-REQS-196-61>**

[The operating frequency of the transmitter Power Signal shall be within the range specified in the WPC Wireless Power Transfer System Description.](#)

#### **3.6.1.2.2 Power Adapter--Input Voltage <VZW-REQS-196-62>**

[Operating voltage range is 85.0Vac, 120Vac and 264Vac with an input operating frequency of 47Hz to 63Hz  \$\pm\$  3Hz \(44Hz to 66Hz\). The device must have an internal fuse](#)

#### **3.6.1.2.3 Normal Operation During Power Fluctuations <VZW-REQS-196-63>**

[The transmitter shall continue to operate normally in the event of power fluctuations or brown-outs \( \$\pm\$  5% of the Input Voltage\)](#)

#### **3.6.1.2.4 Adapter Shutdown With Out-Of-Range Voltage <VZW-REQS-196-64>**

[In the event that the Input Voltage is outside the range specified, the power adapter shall shut down gracefully.](#)

#### **3.6.1.2.5 UL Certification <VZW-REQS-196-65>**

[The transmitter shall be UL 60950 listed and certified.](#)

#### **3.6.1.2.6 Dead Phone Battery <VZW-REQS-196-66>**

[It must be possible to charge a device with a dead battery. A battery is considered dead when the voltage is 3.00 volts or less.](#)

#### **3.6.1.2.7 Electrostatic Discharging <VZW-REQS-196-69>**

[There shall be no component damage or miss-operation up to 8kV contact voltage discharge. Both positive and negative polarity pulses shall be used for a total of ten pulses at each voltage tested. The tests shall be repeated for air discharge of up to 15kV. Both positive and negative polarity pulses shall be used for a total of ten pulses at each voltage tested. See Device Compliance Testing Procedures document for discharge voltage step details. Reference: IEC 61000-4-2 international standards.](#)

#### **3.6.1.2.8 Safety <VZW-REQS-196-70>**

[The power transmitter must be able to positively identify a compliant power recipient to prevent accidental power transmission into non-compliant products.](#)  
[The transmitter shall comply with the receiver detection requirements identified in the WPC Wireless Power Transfer System Description.](#)

### 3.6.1.2.9 Leakage <VZW-REQS-196-71>

The transmitter must detect and limit parasitic power leakage to prevent unwanted heating of materials placed on the transmitter surface during charging. Parasitic power leakage occurs when the magnetic induction field is absorbed in coils or metal objects that are placed close to a receiver.

### 3.6.1.2.10 Interference with Communication in the Receiver <VZW-REQS-196-72>

A power transmitter shall not interfere with 802.11, Bluetooth, Zigbee, DECT, GSM, UMTS, CDMA, LTE, digital TV, NFC, and GPS communication by recipients.

### 3.6.1.2.11 Interference with Non-Compliant Objects <VZW-REQS-196-73>

A power transmitter shall not destroy credit cards, smartcards, RFID tags, or NFC cards, placed on its surface, or in the vicinity of a power recipient.

A power transmitter shall not destroy data storage in memory cards, hard disk drives, or magnetic tapes.

A power transmitter shall not generate heat in non-compliant objects that are placed on the surface.

## 3.6.2 RECEIVER <VZW-REQS-196-74>

The handset shall incorporate a wireless charging receiver into the back cover of the handset. The back cover with embedded receiver shall be available as an optional accessory to the standard back cover.

### 3.6.2.1 MECHANICAL SPECIFICATIONS <VZW-REQS-196-75>

The receiver shall comply with the mechanical requirements identified in the WPC Wireless Power Transfer System Description.

#### 3.6.2.1.1 Alignment Aid <VZW-REQS-196-76>

The receiver shall include a carbon steel based magnetic attractor as specified in the WPC Wireless Power Transfer System Description.

#### 3.6.2.1.2 Shielding <VZW-REQS-196-77>

The receiver shall provide shielding on the top face (device facing side) of the receiver coil to minimize magnetic field impacts. The shielding area shall be at least 20% larger than the area subscribed by the outer dimensions of the receiver coil.

#### 3.6.2.1.3 Cover Fit <VZW-REQS-196-78>

The cover must snap onto the device and be able to withstand every day use without coming off the device. The cover shall not interfere with the operation of the phone; for example, using the headset, all speakers, side buttons, the camera lens and access to removable memory cards, if applicable. The user must be able to install the snap-on cover without using a tool. If possible, a



slot must be placed on the snap on cover in which the user can use a coin to easily remove the cover. The cover material should be made of hard plastic or silicone.

### **3.6.2.2 ELECTRICAL SPECIFICATIONS <VZW-REQS-196-79>**

The receiver shall comply with the electrical requirements identified in the WPC Wireless Power Transfer System Description.

#### **3.6.2.2.1 Output Voltage <VZW-REQS-196-80>**

The receiver shall provide an output voltage of 5 V  $\pm$ 1 V to the battery charging subsystem.

#### **3.6.2.2.2 Output Ripple <VZW-REQS-196-81>**

Maximum output ripple is 80 mVpp.

#### **3.6.2.2.3 Electrostatic Discharging <VZW-REQS-196-86>**

There shall be no component damage or miss-operation up to 8kV contact voltage discharge. Both positive and negative polarity pulses shall be used for a total of ten pulses at each voltage tested. The tests shall be repeated for air discharge of up to 15kV. Both positive and negative polarity pulses shall be used for a total of ten pulses at each voltage tested. See Device Compliance Testing Procedures document for discharge voltage step details. Reference: IEC 61000-4-2 international standards.

#### **3.6.2.2.4 Safety <VZW-REQS-196-87>**

The power recipient must be able to positively identify a compliant power transmitter to prevent out-of specification power transmission from a non-compliant product.

#### **3.6.2.2.5 Power Signal Validation <VZW-REQS-196-88>**

The receiver shall detect a valid Power Signal (to avoid damage from other magnetic fields) by monitoring the following items:

- Operating Frequency of Power Signal
- DC voltage at rectification circuit output
- Power Signal changes in response to Control Error packets

If any of the above items are out of range, the receiver shall issue an End Power Transfer packet and open its Output Load Disconnect switch to protect the Output Load.

#### **3.6.2.2.6 Leakage <VZW-REQS-196-89>**

Magnetic flux leakage into batteries shall be limited.

### **3.6.2.3 COMMUNICATIONS INTERFACE <VZW-REQS-196-90>**

#### **3.6.2.3.1 Charge Status <VZW-REQS-196-91>**



The receiver shall monitor the device battery percentage of charge, and shall send this information to the transmitter via the Charge Status packet.

#### 3.6.2.3.2 Power Transfer Control <VZW-REQS-196-92>

The receiver shall monitor the Output Load of the device and use this data to control the power received from the transmitter.

The receiver shall use the Control Error packet to communicate the required adjustment to the transmitter.

#### 3.6.2.3.3 Power Signal Validation <VZW-REQS-196-93>

The receiver shall detect a valid Power Signal (to avoid damage from other magnetic fields) by monitoring the following items:

- Operating Frequency of Power Signal
- DC voltage at rectification circuit output
- Power Signal changes in response to Control Error packets

If any of the above items are out of range, the receiver shall issue an End Power Transfer packet and open its Output Load Disconnect switch to protect the Output Load.

#### 3.6.2.4 TRANSMITTER INTEROPERABILITY <VZW-REQS-196-94>

The receiver shall be able to charge in single and multi-device transmitters.

The receiver shall be able to charge in guided-positioning and free-positioning transmitters.

### 3.7 SYNC/DOCKING CRADLE - CONVERGED DEVICES ONLY <VZW-REQS-115-159>

The sync/docking cradle is molded plastic with a single port that can accommodate an converged device, has the ability to transfer data via a serial or USB connector, and has charging capability via a travel charger. Refer to the Converged Devices Requirements. Device charging requirements are specified in section 4.6.2.1.

#### 3.7.1 MECHANICAL SPECIFICATIONS <VZW-REQS-115-160>

##### 3.7.1.1 CONNECTOR OF PHONE <VZW-REQS-115-161>

The connector from the desktop holder must mate with the connector of the phone. See VZW Feature Definitions/Requirements “Power Connector” for further requirements.

##### 3.7.1.2 FIT <VZW-REQS-115-162>

The converged device shall fit securely in the molded plastic, with no gaps that would cause a loose fit. The converged device connectors shall align with the connectors when placed into the receptacle of the holder. The converged device shall be easily inserted and removed from the

molded plastic and shall not require any tools to do so. The sync/docking cradle shall be able to withstand at least 10000 insertions and removals of the device.

### **3.7.1.3 DROP TESTING <VZW-REQS-115-163>**

The molded plastic must not crack nor must any internal parts become loose nor can any electrical discontinuities exist when dropped from a height of five feet onto a concrete floor 6 times, each time using different orientations. The holder must meet all specifications after the drop test.

## **3.7.2 ELECTRICAL SPECIFICATIONS <VZW-REQS-115-164>**

### **3.7.2.1 INPUT VOLTAGE <VZW-REQS-115-165>**

Operating voltage range is 85.0Vac, 120Vac and 264Vac with an input operating frequency of 47Hz to 63Hz  $\pm$  3Hz (44Hz to 66Hz). The device must have an internal fuse or positive temperature co-efficient (PTC). The sync/docking cradle must have a transient voltage suppressor device.

### **3.7.2.2 OUTPUT VOLTAGE <VZW-REQS-115-166>**

Device output voltage  $\pm$  1.0V at maximum current.

### **3.7.2.3 OUTPUT RIPPLE <VZW-REQS-115-167>**

Maximum output ripple is 80 mVpp.

### **3.7.2.4 SHORT CIRCUIT <VZW-REQS-115-168>**

The Sync/Docking cradle shall survive an indefinite short circuit without suffering any damage and recover, and without having to power cycle. The Sync/Docking cradle shall not exceed the 60°C requirement on the circuit (chip), or the 30°C requirement on the case. When the short is removed, the Sync/Docking cradle shall still meet all specifications.

### **3.7.2.5 CHARGING INDICATOR <VZW-REQS-115-169>**

There shall be a charging indicator on the Sync/Docking cradle. An LED indicator shall show the color “Red” when charging and the color “Green” when charging is complete.

### **3.7.2.6 CHARGING TIME PERFORMANCE <VZW-REQS-115-170>**

See Section 8.1 Charging Time Performance for requirements.

### **3.7.2.7 TEMPERATURE REQUIREMENTS <VZW-REQS-115-171>**

Normal operating temperature range is  $-25^{\circ}\text{C}$  to  $60^{\circ}\text{C}$ . At room temperature ( $23^{\circ}\text{C}$ ), the maximum surface temperature of the circuit (chip) is  $60^{\circ}\text{C}$ . At room temperature ( $23^{\circ}\text{C}$ ), the maximum case temperature shall not exceed  $30^{\circ}\text{C}$ .

### **3.7.2.8 LOADED POWER-UP <VZW-REQS-115-172>**

The Sync/Docking cradle shall power-up reliably and not sustain any permanent damage due to inrush currents. The unit shall power-up normally and attain its rated voltage within 14 ms.

### **3.7.2.9 CONDUCTED AND RADIATED EMISSIONS <VZW-REQS-115-173>**

The Sync/Docking cradle must meet the FCC's Rules and Regulations, Part 15 (Class B levels) (47CFR Part 15) specifications for conducted and radiated emissions when connected to the phone.

### **3.7.2.10 ELECTROSTATIC DISCHARGING <VZW-REQS-115-174>**

There shall be no component damage or miss-operation up to 8kV contact voltage discharge. Both positive and negative polarity pulses shall be used for a total of ten pulses at each voltage tested. The tests shall be repeated for air discharge of up to 15kV. Both positive and negative polarity pulses shall be used for a total of ten pulses at each voltage tested. See Device Compliance Testing Procedures document for discharge voltage step details.  
Reference: IEC 61000-4-2 international standards.

### **3.7.3 TESTABILITY <VZW-REQS-115-175>**

As defined in "Verizon Wireless Device Testing Process", and "Verizon Wireless Device Compliance Testing Procedures".

## **3.8 DEVICE AND CHARGING SYSTEM REQUIREMENTS <VZW-REQS-115-176>**

### **3.8.1 INPUT <VZW-REQS-115-177>**

The system, consisting of the phone, battery pack and charger must filter input rush current, to prevent damage to the phone's charge control or the battery pack's safety circuitry.

### **3.8.2 OVERVOLTAGE <VZW-REQS-115-178>**

The phone shall withstand the maximum voltage from the charger under a single fault condition, to prevent a cascading failure through the system to the battery pack or cell.

### **3.8.3 OVERCURRENT <VZW-REQS-115-179>**

The phone shall limit current so that the battery is not charged with a current greater than the maximum specified charge current under normal charge conditions and under maximum faulted charge current from the charger.

### **3.8.4 DISCHARGE PROTECTION <VZW-REQS-115-180>**

The system shall shut down the device when the battery voltage falls below a value specified by the manufacturer.

### **3.8.5 PHONE CALLS AND MESSAGING WITH DEAD BATTERY <VZW-REQS-115-181>**

When connected to a charger, i.e. VPC, wall charger, travel charger, etc, and either under conditions of Section 4.10.4, or when the battery has been removed, the device shall be able to

- make and hold a call
- compose, send, receive, and read SMS, EMS and MMS messages

### **3.8.6 SYSTEM CHARGE TIME PERFORMANCE <VZW-REQS-115-182>**

A system using an 850 mAh battery or one with less smaller capacity shall be charged to 95% of full capacity within three hours.

A system using a battery with capacity greater than 850mAh and up to 2100mAh shall be charged to 95% of full capacity within 4.5 hours.

A system using a battery with capacity greater than 2100mAh shall be targeting to 95% of full capacity within 6 hours.

## **3.9 HANDS FREE KIT <VZW-REQS-115-183>**

### **3.9.1 HANDS FREE VPC - OPTIONAL <VZW-REQS-115-184>**

See Hands Free VPC in section 4.4 of this document for details.

### **3.9.2 UNIVERSAL HF KIT - OPTIONAL <VZW-REQS-115-185>**

The universal HFK consists of a full duplex external speakerphone and microphone, which plugs into the 2.5mm headset jack. Refer to Verizon Wireless Device Compliance Testing Procedures and Audio Documents for Requirements and Test Plans.

### **3.9.3 HANDS FREE KIT INSTALLED – REQUIRED FOR HIGH VOLUME DEVICES, MID TIER AND ABOVE <VZW-REQS-115-186>**

The Hands Free Kit (HFK) installed consists of a microphone, speakerphone, cables, charger, and cradle/hang up cup. It is preferred that the HFK be external RF antenna capable. Refer to sections 4.10.5 and 4.10.6 of this document for requirements.

### **3.9.4 HANG UP CUP - OPTIONAL <VZW-REQS-115-187>**

The hang up cup is an HFK cradle that attaches to an existing installed HFK. Refer to section of 4.10.5.3 this document for requirements.

## **HANDS FREE KITS SHALL BE EASY TO INSTALL.**

### **3.9.5 MECHANICAL SPECIFICATIONS <VZW-REQS-115-188>**

#### **3.9.5.1 HFK MOUNT <VZW-REQS-115-189>**

The HFK shall be easy to Mount. The HFK shall support some type of swivel mount so that the swivel can be orientated to point it at the customer. The HFK dash mount shall be mounted with the normal 4 hole pattern that will line up with a Panavise in-dash mount (inch and a half by an inch and an eighth). See the embedded Specification sheet for dimensions.

#### **3.9.5.2 CABLE REQUIREMENTS <VZW-REQS-115-190>**

The HFK cables shall not be strained when mounting the HFK.

##### **3.9.5.2.1 Cable Lengths <VZW-REQS-115-191>**

The HFK shall support all of the following cables and they shall be the following minimal lengths:

Speaker: 8ft

Microphone: 8ft

Power: 10ft

Data: 8ft

Curl Cord: Plug into data cable

##### **3.9.5.2.2 Electrical Cables and Connectors: Color Codes <VZW-REQS-115-192>**

The electrical cables and connectors shall be clearly labeled and identifiable. They shall be easy to connect and install. The following color codes for the electrical cables are required:

Green: Ignition sense

Orange: Entertainment mute

Red: Positive primary lead

Black: Ground lead to vehicle chassis

#### **3.9.5.3 HFK CRADLE <VZW-REQS-115-193>**

The HFK shall support a Placid Cradle. The cradle shall support both the standard and extended battery sizes that attach to the device. The HFK shall have a dummy plug to accommodate the curl cord when not plugged into a headset (this will keep the curl cord from touching the carpet and picking up moisture that will corrode the connector and possibly damage the handset).

#### **3.9.5.4 HFK FIT <VZW-REQS-115-339>**

The phone shall fit securely in the HFK. The placid cradle shall allow the curl cord to plug into the handset without obstruction. The phone connectors shall align with the HFK connectors when placed into the receptacle of the HFK. The phone shall be easily inserted and removed

from the cradle of the HFK with one hand and shall not require any tools to do so. The HFK shall be able to withstand at least 500 insertions and removals of the device.

For LTE handsets, mount solution must not obstruct “view” of primary or secondary cameras while in use.

### **3.9.5.5 HFK CHARGING INDICATOR <VZW-REQS-115-195>**

This product shall support a Charging Indicator. Refer to the DTC Charging Indicator requirements, section 4.5.

### **3.9.5.6 DEVICE KEYPAD LIGHTS <VZW-REQS-115-196>**

Device Keypad Lights shall be on when the device is in use with the HFK. Handset backlighting shall be on at all times when plugged into the HFK.

### **3.9.5.7 PRIVACY <VZW-REQS-115-197>**

The HFK shall support privacy mode. Privacy Mode allows the user to pickup a handset to have a private conversation by transferring the audio path from the HFK external speakerphone to the handset speaker.

#### **3.9.5.7.1 Privacy to Hands Free (HF) <VZW-REQS-115-198>**

The call shall switch to the audio path from the handset speaker to the HF external speakerphone when handset is hung up

## **3.9.6 ELECTRICAL SPECIFICATIONS <VZW-REQS-115-199>**

### **3.9.6.1 POWER CHARGER <VZW-REQS-115-200>**

HFK shall meet VPC power and charging requirements in section 4.2.

### **3.9.6.2 SIGNAL OPTIMIZATION <VZW-REQS-115-201>**

HFK shall have an external RF port to maximize for 10db gain. Refer to Verizon Wireless Device Compliance Testing Procedures Document for Requirements and Test Plans.

### **3.9.6.3 HFK POWERED ON <VZW-REQS-115-202>**

The battery shall charge while the device is in the cradle of the HFK and the HFK is on.

#### **3.9.6.3.1 Ignition Sense Wire is connected <VZW-REQS-115-203>**

The HFK shall always switch on when the ignition is powered on.

#### **3.9.6.3.2 Ignition Sense Wire is not connected <VZW-REQS-115-204>**

The HFK shall switch on when the external switch is turned on.

### **3.9.6.4 HFK POWERED OFF <VZW-REQS-115-205>**

The battery shall not charge while the device is in the HFK cradle and the HFK is off.

#### **3.9.6.4.1 Ignition Sense Wire is connected <VZW-REQS-115-206>**

The HFK shall switch off when the ignition is powered off.

#### **3.9.6.4.2 Ignition Sense Wire is not connected <VZW-REQS-115-207>**

The HFK shall switch off when the external switch is turned off.

### **3.9.6.5 AUDIO QUALITY <VZW-REQS-115-208>**

The HFK shall support full duplex. Audio quality shall meet or exceed Verizon Audio Requirements in all scenarios. There shall be no word clipping experienced by either party. There shall be no operational differences between high background noise and none. Please refer to the Audio requirements document for more details.

### **3.9.6.6 VENDOR REQUIREMENTS <VZW-REQS-115-209>**

Vendor Shall Submit

1. Completed evaluation sheet: "HFK Testing"
2. Circuit schematic with all parts labeled.
3. Submit five HFKs for evaluation.

Please refer to the VZW "A003-01 Verizon Device Testing Process document" for any changes in quantity of HFKs required.

### **3.9.7 TESTABILITY <VZW-REQS-115-210>**

As defined in "Verizon Wireless Device Testing Process", and "Verizon Wireless Device Compliance Testing Procedures"

## **3.10 EXTERNAL SPEAKER PHONE – OPTIONAL <VZW-REQS-115-211>**

The external speakerphone, also known as a plug-in speakerphone, is not required for in the box or future purchase. If an OEM elects to develop this, it shall meet Verizon Wireless' Audio Quality requirements in section 4.7. Refer to Audio Documents for Requirements and Test Plans.

## **3.11 HEADSET <VZW-REQS-115-212>**

All devices will be headset capable.

### **3.11.1 MONO HEADSET <VZW-REQS-115-213>**

The device shall support a mono quality headset accessory to be offered to Verizon Wireless for distribution consideration. Please refer to the Audio requirements document for details.

### **3.11.2 STEREO HEADSET - REQUIRED THAT THE DEVICE SUPPORTS <VZW-REQS-115-214>**

The device shall support a stereo quality headset accessory to be offered to Verizon Wireless for distribution consideration. Please refer to the Audio requirements document for details.

### **3.11.3 FM RADIO HEADSET – OPTIONAL <VZW-REQS-115-215>**

The FM radio headset works as a device headset and has a radio built in to the cord or earpiece. Unlike other headsets, the FM radio headset plugs into the external RF connector. FM radio headset requirements are not provided by VZW. Please refer to the Audio requirements document for details.

### **3.11.4 HEARING AID HEADSET - OPTIONAL <VZW-REQS-115-216>**

The hearing aid headset is made for the hearing impaired and is compatible with hearing aid devices. Please refer to the Audio requirements document for details.

## **3.12 HOLSTER <VZW-REQS-115-217>**

### **3.12.1 MECHANICAL SPECIFICATIONS <VZW-REQS-115-218>**

#### **3.12.1.1 HOLSTER MOVEMENT <VZW-REQS-115-219>**

A holster shall be supported that swivels 90 degrees in either direction from an upright position and locks in a minimum of two positions from either movement of the 90 degrees.

#### **3.12.1.2 PHONE ACCESS <VZW-REQS-115-220>**

A holster shall be supported that allows the user to quickly pop out the phone or answer the phone. The holster shall not interfere with the operation of the phone ex: charging the device, using the headset and access to removable memory cards, if applicable.

#### **3.12.1.3 HOLSTER FIT <VZW-REQS-115-221>**

The holster shall support both the standard and extended battery sizes that attach to the device. The holster shall support the devices' faceplates. The holster shall not damage the device's finish while the device in the holster or while the device is being placed in or removed from the holster.

## **3.13 FITTED CARRYING CASE <VZW-REQS-115-222>**

A fitted carrying case is required for standard and PDA devices. All cases shall support both the standard and extended battery sizes that attach to the device. The case shall support the devices' faceplates and shall not interfere with the operation of the phone ex: charging the device, using the headset, all speakers, side buttons, the camera lens and access to removable memory cards, if



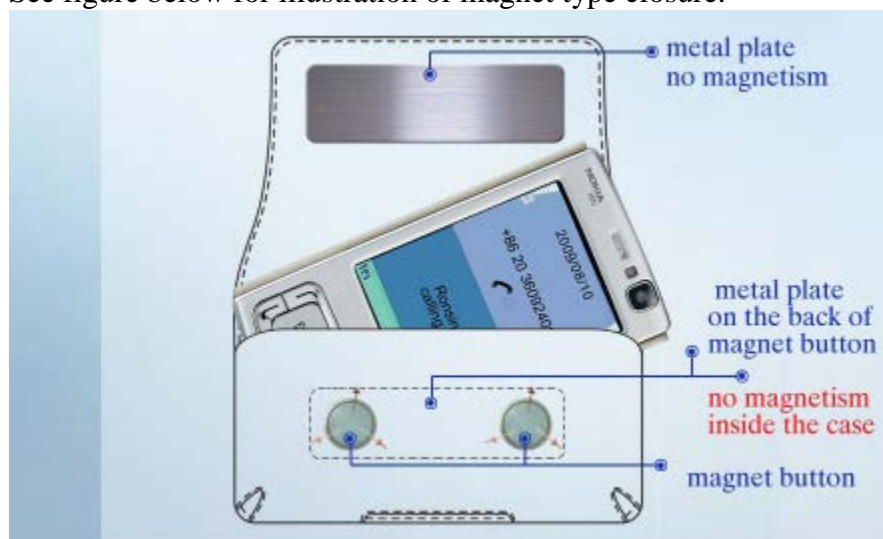
applicable. There shall not be any gaps that could prevent or obstruct the handset shut off device (ex: pin on the inside of the clam) to shut down handset. The material should be made of top grain leather, top grade lambskin, polyurethane, nylon, neoprene or other types of fabric.

### 3.13.1 BELT CLIP <VZW-REQS-115-223>

The fitted device case shall support a belt clip. The belt clip shall be either a full swivel clip, a partial swivel clip, or a spring-loaded stationary clip, based on direction from the accessory team. The full swivel belt clip shall allow the unit to spin a full 360 degrees and lock in a minimum of 5 different locations. The partial swivel belt clip shall allow the unit to spin 180 degrees. If the belt clip is covered in material, the material must be glued from the inside of the belt clip, and a metal cap must be placed on the end of the belt clip to prevent the material from fraying.

### 3.14 POUCH <VZW-REQS-115-224>

The pouch protects the device and is designed so that the device slips inside via an opening in the top. The material should be made of top grain leather, top grade lambskin, polyurethane, nylon, neoprene or other type of fabric. The pouch must have a flap or strap that is secured by either a magnet or some other type of closure to securely keep the phone in the pouch while being worn. See figure below for illustration of magnet type closure.



### 3.15 FACEPLATES - OPTIONAL <VZW-REQS-115-225>

#### 3.15.1 BAR STYLE DEVICES <VZW-REQS-115-226>

Faceplates shall be available covering the front panel of the device. The user must be able to install the faceplate without using a tool. Associated colors, themes, textures shall be offered to Verizon Wireless for distribution consideration.

#### 3.15.2 CLAM STYLE DEVICES <VZW-REQS-115-227>

Faceplates shall be available covering the front panel of the device when in the closed position. The user must be able to install the faceplate without using a tool. Associated colors, themes, textures shall be offered to Verizon Wireless for distribution consideration.

### **3.16 SCREEN PROTECTORS—OPTIONAL <VZW-REQS-115-228>**

A screen protector shall be available to protect a device's display from dust and scratches. The screen protector shall not interfere with the device's keypad or other buttons. The screen protector shall not interfere with any functionality of the screen not including the touch screen functionality. The user must be able to install the screen protector without using a tool. The screen protector must be able to withstand every day use without coming off the device. The screen protector shall not leave any residue on the device screen.

#### **3.16.1 PRIVACY SCREEN PROTECTOR <VZW-REQS-115-229>**

A privacy screen protector shall be available to prevent other users from viewing the contents of the screen. The privacy screen shall offer privacy of 180 degrees vertically or horizontally based on the device orientation. The privacy screen protector shall not interfere with the device's keypad or other buttons. The privacy screen protector shall not interfere with any functionality of the screen including the touch screen functionality. The user must be able to install the screen protector without using a tool. The privacy screen protector must be able to withstand every day use without coming off the device. The privacy screen protector shall not leave any residue on the device screen.

### **3.17 SNAP-ON COVER – OPTIONAL <VZW-REQS-115-230>**

A snap-on cover shall be available to protect the device housing. The cover must snap onto the device and be able to withstand every day use without coming off the device. The cover shall not interfere with the operation of the phone ex: charging the device, using the headset, all speakers, side buttons, the camera lens and access to removable memory cards, if applicable. The user must be able to install the snap-on cover without using a tool. If possible, a slot must be placed on the snap on cover in which the user can use a coin to easily remove the cover. The cover material should be made of hard plastic or silicone.

### **3.18 HAND STRAP - OPTIONAL <VZW-REQS-115-231>**

The hand strap shall be easy to attach securely to the device. The hand strap shall be durable and flexible so that the device is supported.

### **3.19 CONNECTIVITY KITS – IF APPLICABLE <VZW-REQS-115-232>**

Refer to the Connectivity Requirements document.

### **3.20 EXTERNAL ANTENNA - REQUIRED FOR PCMCIA, EXPRESSCARDS, PCI EXPRESS MINI CARDS, USB MODEMS <VZW-REQS-115-233>**

For PCMCIA, ExpressCard, PCI Express Mini Card, USB Modem devices, the device vendor shall provide specifications on the maximum number of insertions, connector type and cable type-gauge for the external antenna. The maximum number of insertions must record any loss of fingers from the antenna cable connector.

The antenna cable connector must avoid any leakage points at the connection and must connect securely into the PCMCIA, ExpressCard, PCI Express Mini Card or USB Modem.

The external antenna must be able to stand in a stable upright position.

Device vendors must approve their solution with Verizon Wireless Device Product Development Marketing Group. For more information pertaining to the approval process, please refer to the Verizon Wireless Device Testing Process document.

### **3.21 PORTABLE EXTERNAL KEYBOARD <VZW-REQS-115-234>**

The device shall support a Portable External Keyboard accessory to be offered to Verizon Wireless for distribution consideration. Refer to the Converged Devices Requirements.

### **3.22 PORTABLE EXTERNAL KEYPAD <VZW-REQS-115-235>**

The device shall support a Portable External keypad accessory to be offered to Verizon Wireless for distribution consideration. This accessory is a miniature QWERTY keyboard that slides onto the phone or plugs in to the external RF connector via a cord. Refer to the Converged Devices Requirements.

### **3.23 PORTABLE EXTERNAL MOUSE <VZW-REQS-115-236>**

The device shall support a Portable External Mouse accessory to be offered to Verizon Wireless for distribution consideration. Refer to the Converged Devices Requirements.

### **3.24 ADAPTERS AND CONVERTERS <VZW-REQS-115-237>**

#### **3.24.1 AC/DC ADAPTER – OPTIONAL <VZW-REQS-115-238>**

An AC/DC Adapter connects to a DC device such as a VPC and converts AC power to DC. The AC/DC Adapter plugs into the wall. This product must be a UL/ETL approved device.

### **3.24.2 2.5 TO 3.5 ADAPTER <VZW-REQS-115-239>**

The 2.5mm to 3.5mm adapter should interface with the specialized connector to allow 3.5mm stereo headsets to be used for higher quality audio playback. The adapter must be designed with a right-angled 2.5mm (Stereo 4 pole) plug that attaches to a cord no longer than 2.5 inches that has a 3.5mm stereo mini jack at the end.

The left channel audio from the 2.5mm plug shall be wired to the tip of the 3.5mm stereo mini jack. The right channel audio from the 2.5mm plug shall be wired to the ring of the 3.5mm stereo mini jack. The sleeve of the 3.5mm stereo mini jack shall be ground.

To function properly, the device's 2.5mm plug must meet Verizon's stereo requirements. Refer to Verizon Wireless Accessory Requirements for further details.

#### **3.24.2.1 CONNECTOR <VZW-REQS-115-240>**

The 2.5 to 3.5 mm adapter shall withstand 8 pounds at the phone connector without any mechanical damage or electrical discontinuity.

## **3.25 CONNECTORS/CABLES <VZW-REQS-115-241>**

### **3.25.1 USB <VZW-REQS-115-242>**

See the VZW Feature Definitions document for information.

### **3.25.2 PST <VZW-REQS-115-243>**

For PST testing, USB 1.1, 2.0 or OTG Compliant Data Cables that support a USB 2.0 hub such as the Belkin 7-port USB 2.0 Hub (F5U237) is required. All cables shall be shielded. The ends of the data cable that connect to the phones must clearly indicate which end is up. The data cable shall have a charger input compatible with the commercially available chargers to power the device. The USB cables supplied shall support external power.

### **3.25.3 Y DATA CABLE <VZW-REQS-115-244>**

The device shall support a cable that consists of a USB connector, an external RF connector, and an AC charger that plugs into the wall. Please refer to AC charger requirements in section 4.6 of this document and USB cable requirements in the VZW Feature Definitions document for details.

### **3.25.4 LINE LEVEL AUDIO ACCESSORY CABLES <VZW-REQS-115-245>**

### 3.25.4.1 USB TO 3.5MM CABLE <VZW-REQS-115-246>

The device shall support a cable that consists of a USB 2.0 Micro-B connector that plugs into the device and a 3-conductor 3.5mm stereo connector that plugs into a line level input jack on an audio accessory.

When connected between the accessory and the device, the cable shall present a fixed resistance value of 28.7K  $\Omega$  +/- 1% to the device over the ID pin.

The electromechanical interfaces for the 3.5mm stereo connector/plug shall conform to the Japanese Industrial Standard, JIS C 6560-1994 or latest revision.

The cable shall support the following pinout configuration:

USB Pin Name	USB Pin Number	Connected To	3.5mm Pin Name	3.5mm Pin Number	Comment
GND	5	→	Sleeve	3	Ground
ID	4	Not connected			
D+	3	→	Ring	2	Right Channel
D-	2	→	Tip	1	Left Channel
VCC	1	Not connected			

### 3.25.4.2 USB TO RCA CABLE <VZW-REQS-115-247>

The device shall support a Y cable that consists of a USB 2.0 Micro-B connector that plugs into the device and two 2-conductor RCA connectors that plug into line level, right and left channel input jacks on an audio accessory.

When connected between the accessory and the device, the cable shall present a fixed resistance value of 28.7K  $\Omega$  +/- 1% to the device over the ID pin.

The cable shall support the following pinout configuration:

USB Pin Name	USB Pin Number	Connected To	RCA Pin Name	Comment
GND	5	→	Red and White Shield Grounds	Ground
ID	4	Not connected		
D+	3	→	Red Signal (center pin)	Right Channel
D-	2	→	White Signal (center pin)	Left Channel
VCC	1	Not connected		

### **3.25.5 MECHANICAL REQUIREMENTS <VZW-REQS-115-248>**

#### **3.25.5.1 CONNECTOR <VZW-REQS-115-249>**

The cable shall withstand 8 pounds at the phone connector without any mechanical damage or electrical discontinuity.

#### **3.25.5.2 STRAIN RELIEF <VZW-REQS-115-250>**

Cables shall have strain relief on both sides. The cord shall have no structural damage due to strain relief and shall sustain electrical continuity when the cable is secured at a tension of 2.25 lbs. The cord shall have no structural damage due to strain relief and shall sustain electrical continuity after being bent at the plug continuously for 2500 cycles. One cycle is equal to two 180° arcs, bringing the cable back to its starting position.

### **3.25.6 ELECTRICAL REQUIREMENTS <VZW-REQS-115-251>**

#### **3.25.6.1 CHARGING TIME PERFORMANCE <VZW-REQS-115-252>**

For Y Data Cable, see Section 8.1 Charging Time Performance for requirements.

### **3.26 DOCKING STATION - OPTIONAL <VZW-REQS-115-253>**

The device shall support a Docking Station accessory to be offered to Verizon Wireless for distribution consideration. Refer to the Converged Devices Requirements.

### **3.27 BLUETOOTH ACCESSORIES <VZW-REQS-115-254>**

Please refer to VZW Bluetooth Device Requirements for Marketing Requirements, Profile Specifications and other VZW specific requirements for Bluetooth requirements including, but not limited to:

- Mono Headset
- Stereo Headset
- Hands-free kit
- Dial Up Networking
- Data file transfer
- Data synchronization
- Modem
- Keyboard
- Printing

For specialty (PDAs, Smartphones) and converged devices – also refer to VZW Converged Device Requirements.

#### **3.27.1 BLUETOOTH HEADSET - MONO AND STEREO <VZW-REQS-115-255>**

Bluetooth headsets will be shipped with discovery mode on. From the first time that the Bluetooth headset is powered on, until the headset is paired for the first time, the headset will be in discovery mode. After the first successful pairing of the Bluetooth headset, the headset will return to its idle state.

If the user wants to discover and pair the same Bluetooth headset after the first successful pairing, the user must follow the headset vendor designed procedure to place the Bluetooth headset into discovery mode.

### **3.27.1.1 PAIRED DEVICE LIST <VZW-REQS-115-256>**

The Bluetooth headset shall store a minimum of 8 devices in their Paired Device List, i.e. the headset shall not lose the link key of 8 previously paired devices due to insufficient memory.

### **3.27.1.2 INTERRUPTIONS <VZW-REQS-115-257>**

#### **3.27.1.2.1 Low Battery Interruption <VZW-REQS-115-258>**

The Bluetooth headset shall provide an audible notification (vendor defined) if the battery capacity of the headset is below 10%.

If a paired and connected Bluetooth headset cannot support audio for a voice call due to low battery, then the headset shall relinquish the connection to the device and power down. Refer to Bluetooth Requirements for device notification.

#### **3.27.1.2.2 Weak Signal Interruption <VZW-REQS-115-259>**

The Bluetooth headset shall provide an audible beep (vendor defined) if the headset is reaching out of range limits.

### **3.27.2 BLUETOOTH STEREO HEADSET (IF APPLICABLE) <VZW-REQS-115-260>**

The device shall support a stereo quality headset accessory to be offered to Verizon Wireless for distribution consideration. Please refer to the Audio requirements document for details.

#### **3.27.2.1 MASS MARKET DEVICES (IF APPLICABLE) <VZW-REQS-115-261>**

Profiles to be supported on the device and headset are based on version 1.2:

- A2DP Profile
- GAVDP

#### **3.27.2.2 CONVERGED DEVICES (IF APPLICABLE) <VZW-REQS-115-262>**

Profiles to be supported on the device and headset are based on version 1.2:

- A2DP Profile
- GAVDP

For specialty (PDAs, Smartphones) and converged devices – refer to Verizon Wireless Converged Device Requirements.

**3.27.2.3 BLUETOOTH STEREO HEADSET AND HANDSET INTERACTION <VZW-REQS-115-263>**

Both the Bluetooth stereo headset and the device shall provide an audible or vibrate alert when the device is receiving a terminating call. The audible alert shall not violate the Verizon Wireless Audio Requirements.

**3.27.3 BLUETOOTH MINISD I/O CARDS <VZW-REQS-115-264>**

The device shall support a Bluetooth MiniSD I/O cards accessory to be offered to Verizon Wireless for distribution consideration. Refer to the Converged Devices Requirements.

**3.28 WIFI MINISD I/O CARDS <VZW-REQS-115-265>**

The device shall support a WiFi miniSD I/O cards accessory to be offered to Verizon Wireless for distribution consideration. Refer to the Converged Devices Requirements.

**3.29 GAMING PAD / UNIT - OPTIONAL <VZW-REQS-115-266>**

The gaming pad / unit attaches to a mobile device and is used to improve the user experience in gaming. Contact Accessory Product Management team for approval or distribution consideration by Verizon Wireless.

**3.30 STYLUS - OPTIONAL <VZW-REQS-115-267>**

The stylus is a pointer accessory used to select items on a touch screen. Contact Accessory Product Management team for approval or distribution consideration by Verizon Wireless.

**4 SOFTWARE SPECIFICATIONS <VZW-REQS-115-268>****4.1 DEVICE BASED <VZW-REQS-115-269>**

N/A

**4.2 DEVICE TO/FROM ACCESSORIES AND ASSOCIATED DEVICES BASED <VZW-REQS-115-270>**

N/A

**4.3 NETWORK TO/FROM DEVICE BASED <VZW-REQS-115-271>**

N/A



## **5 SCENARIOS <VZW-REQS-115-272>**

### **5.1 NETWORK & DEVICE MESSAGE TRANSMISSION & RETRIEVAL <VZW-REQS-115-273>**

N/A

### **5.2 DEVICE TO DEVICE (PEER TO PEER) - INTERACTIONS <VZW-REQS-115-274>**

Refer to the Mobile Station UI and the Static UI Requirement documents for details on how accessories interact and are presented to the user with the device.

#### **5.2.1 BATTERY INTERRUPTIONS <VZW-REQS-115-275>**

##### **5.2.1.1 LOW BATTERY WARNING <VZW-REQS-115-276>**

Refer to the “Style Guide” and “Informative Notification” in the Mobile Station UI Requirements for the “Battery Low” user interaction.

#### **5.2.2 CHARGERS <VZW-REQS-115-277>**

The following scenarios are applicable for all types of chargers: VPC, AC, travel, battery only, battery wall, desktop, global desktop, installed HFK, universal HFK, and hands-free VPC.

##### **5.2.2.1 Device is Off - Plug in Charger <VZW-REQS-115-278>**

The phone shall acknowledge the presence of the Charger. Refer to the “Style Guide” and the Mobile Station UI Requirements for what is displayed to the user.

##### **5.2.2.2 Device is Off - Remove Charger <VZW-REQS-115-279>**

The phone shall acknowledge the removal of the Charger. Refer to the “Style Guide” and the Mobile Station UI Requirements for what is displayed to the user.

##### **5.2.2.3 Device is Off – Charging <VZW-REQS-115-280>**

The phone shall acknowledge that the battery is being charged. Refer to the “Style Guide” and the Mobile Station UI Requirements for what is displayed to the user.

##### **5.2.2.4 Device is Off – Plug in Incompatible Charger <VZW-REQS-115-280>**

If the device detects that the charger that is plugged in is not compatible with the device, a message shall be shown to the user. Refer to the Smartphone UI Requirements for what is displayed to the user for detailed message.

#### **5.2.2.5 Device is Off – Plug in Slow Rate Charger <VZW-REQS-115-280>**

If the device detects that the dedicated charger (not USB port on PC) that is plugged in is not matching the charging rate of In-box charger and will take longer time to fully charge the battery, a message shall be shown to the user. Refer to the Smartphone UI Requirements for what is displayed to the user for detailed message.

#### **5.2.2.6 Device is Off - Charge is Complete <VZW-REQS-115-281>**

The phone shall acknowledge that the battery is fully charged. Refer to the “Style Guide” and the Mobile Station UI Requirements for what is displayed to the user.

#### **5.2.2.7 Device is On - Plug in Charger <VZW-REQS-115-282>**

The phone shall acknowledge the presence of the Charger. Refer to the “Style Guide” and the Mobile Station UI Requirements for what is displayed to the user.

#### **5.2.2.8 Device is On - Remove Charger <VZW-REQS-115-283>**

The phone shall acknowledge the removal of the Charger. Refer to the “Style Guide” and the Mobile Station UI Requirements for what is displayed to the user.

#### **5.2.2.9 Device is On – Charging <VZW-REQS-115-284>**

The phone shall acknowledge that the battery is being charged. Refer to the “Style Guide” and the Mobile Station UI Requirements for what is displayed to the user.

#### **5.2.2.10 Device is On – Charge is Complete <VZW-REQS-115-285>**

The phone shall acknowledge that the battery is fully charged. Refer to the “Style Guide” and the Mobile Station UI Requirements for what is displayed to the user.

#### **5.2.2.11 Device is On – Plug in Incompatible Charger <VZW-REQS-115-280>**

If the device detects that the charger that is plugged in is not compatible with the device, a message shall be shown to the user. Refer to the Smartphone UI Requirements for what is displayed to the user for detailed message.

#### **5.2.2.12 Device is On – Plug in Slow Rate Charger <VZW-REQS-115-280>**

If the device detects that the dedicated charger (not USB port on PC) that is plugged in is not matching the charging rate of In-box charger and will take longer time to fully charge the battery, a message shall be shown to the user. Refer to the Smartphone UI Requirements for what is displayed to the user for detailed message.

### **5.3 ERROR CONDITIONS AND CAUSE CODES <VZW-REQS-115-286>**

Error messages shall be user-friendly and be representative of the error conditions. Vendors must have error messaging to indicate functionality failures of accessories when connected to the device. For example: failure of Bluetooth discovery and pairing failures.

### **5.4 INTERRUPTIONS <VZW-REQS-115-287>**

Refer to the “Feature Interaction Matrix” in the A002- Feature Definitions document for details on how interruptions are handled, specifically how they are prioritized and what type of notifications are presented to the user.

#### **5.4.1 BATTERY INTERRUPTIONS <VZW-REQS-115-288>**

##### **5.4.1.1 LOW BATTERY WARNING <VZW-REQS-115-289>**

Refer to the “Style Guide” and “Informative Notification” in the Mobile Station UI Requirements for the “Battery Low” user interaction.

#### **5.4.2 CHARGERS <VZW-REQS-115-290>**

The following scenarios are applicable for all types of chargers: VPC, AC, travel, battery only, battery wall, desktop, global desktop, installed HFK, universal HFK, and hands free VPC.

##### **5.4.2.1 While Air Link is Active - Plug in Charger <VZW-REQS-115-291>**

The connection shall not be interrupted. There shall be no degradation in audio quality.

##### **5.4.2.2 While Air Link is Active - Remove Charger <VZW-REQS-115-292>**

The connection shall not be interrupted. There shall be no degradation in audio quality.

##### **5.4.2.3 While Air Link is Active – Charging <VZW-REQS-115-293>**

The connection shall not be interrupted. There shall be no degradation in audio quality.

##### **5.4.2.4 While Air Link is Active – Charge is Complete <VZW-REQS-115-294>**

The connection shall not be interrupted. There shall be no degradation in audio quality.

##### **5.4.2.5 While Device In Use / Air Link is not Active - Plug in Charger <VZW-REQS-115-295>**

Data shall not be lost

**5.4.2.6 While Device In Use / Air Link is not Active - Remove Charger <VZW-REQS-115-296>**

Data shall not be lost.

**5.4.2.7 While Device In Use / Air Link is not Active – Charging <VZW-REQS-115-297>**

Data shall not be lost.

**5.4.2.8 While Device In Use / Air Link is not Active – Charge is Complete <VZW-REQS-115-298>**

Data shall not be lost.

**5.4.3 HEADSETS <VZW-REQS-115-299>**

The following scenarios are applicable for all types of headsets: mono, stereo.

**5.4.3.1 While Air Link is Active - Plug in Headset <VZW-REQS-115-300>**

The headset shall take priority seamlessly of the audio path. There shall be no degradation in audio quality. The connection shall not be interrupted.

**5.4.3.1.1 Clam Style Device <VZW-REQS-115-301>**

The connection shall not be interrupted when the clam device is closed.

**5.4.3.2 While Air Link is Active - Remove Headset <VZW-REQS-115-302>**

The headset shall release priority seamlessly of the audio path.

**5.4.3.2.1 Clam Style Device is Open <VZW-REQS-115-303>**

There shall be no degradation in audio quality. The connection shall not be interrupted.

**5.4.3.2.2 Clam Style Device is Closed <VZW-REQS-115-304>**

There shall be no degradation in audio quality. The connection shall not be interrupted.

**5.4.3.3 While Device In Use / Air Link is not Active - Plug in Headset <VZW-REQS-115-305>**

Data shall not be lost.

**5.4.3.4 While Device In Use / Air Link is not Active - Remove Headset <VZW-REQS-115-306>**

Data shall not be lost.

**5.4.4 HFK INTERRUPTIONS <VZW-REQS-115-307>**

The device shall maintain connectivity when on an active call in all the following scenarios. There shall be no degradation in audio quality during and after the following interruptions.

#### **5.4.4.1 HFK POWER OFF TO ON <VZW-REQS-115-308>**

An air link shall stay up when the ignition goes from off to on.

#### **5.4.4.2 HFK POWER ON TO OFF <VZW-REQS-115-309>**

An air link shall stay up when the ignition goes from on to off.

#### **5.4.4.3 DEVICE IS INSERTED INTO THE CRADLE <VZW-REQS-115-310>**

An air link shall stay up when the device is inserted into the cradle.

#### **5.4.4.4 DEVICE IS REMOVED FROM THE CRADLE <VZW-REQS-115-311>**

An air link shall stay up when the device is removed from the cradle.

#### **5.4.4.5 PRIVACY TO HANDS FREE (HF) <VZW-REQS-115-312>**

An air link shall stay up when the device is switched from privacy mode to HF.

#### **5.4.4.6 HANDS FREE (HF) TO PRIVACY <VZW-REQS-115-313>**

An air link shall stay up when the device is switched from HF to privacy mode.

## **6 PROVISIONING <VZW-REQS-115-314>**

### **6.1 FACTORY <VZW-REQS-115-315>**

N/A

### **6.2 KEYPAD <VZW-REQS-115-316>**

N/A

### **6.3 OTA <VZW-REQS-115-317>**

N/A

### **6.4 TOOL <VZW-REQS-115-318>**

N/A

## **7 PERFORMANCE <VZW-REQS-115-319>**

### **7.1 CHARGING TIME PERFORMANCE <VZW-REQS-115-320>**

Applicable to all accessories capable of charging, i.e. VPC, AC Chargers, Battery Only Chargers, Battery Wall Chargers, Travel Chargers, Desktop Chargers, Global Desktop Chargers, Installed Hands Free Kits, Universal Hands Free Kits, Sync Cradle or Cables and Y Data Cables

## 8 ACCESSIBILITY <VZW-REQS-115-321>

For accessory accessibility interactions, refer to the VZW Feature Definitions document.

## 9 REFERENCES <VZW-REQS-115-322-SEP2011>

### Industry Standards References

1. UL 1642
2. NU 3090
3. IEC 61000-4-2 international standards
4. [www.bluetooth.org](http://www.bluetooth.org): Bluetooth\_11\_Profiles\_Book; Bluetooth Specifications Book
5. UL 1310
6. UL 2089
7. UL 2054
8. IEC 60950
9. IEC 61960-1
10. IEC 62133
11. IEEE-1725
12. CTIA Battery Program Management Document - Revision 2.3, October, 2008
13. CTIA Certification Requirements for Battery System Compliance to IEEE 1725 – October 2008
14. OMTP Common Charging and Local Data Connectivity, Version 1.1, June 8, 2010.

### Verizon Wireless Specific Documentation References

1. A002-FeatureDefinitions.doc
2. A003-01Verizon Device Testing Process.doc
3. A003-02DeviceComplianceTestingProcedures.doc
4. Reqs-Audio.doc
5. AudioTestPlan.doc
6. Reqs-Mobile Station User Interface.zip
7. Reqs-Static UI.doc
8. Reqs-Connectivity.doc
9. Reqs-DataRequirements.doc
10. Reqs-ConvergedDevices.doc
11. Reqs- \_Device\_Compliance\_Test\_Entrance\_Criteria
12. Accessory Release Notes Template embedded in the Release Notes Section of A003-02 DeviceComplianceTestingProcedures.doc
13. VZW\_Glossary
14. DeviceProductDevelopmentProcess
15. Reqs\_PowerManagement.doc

## 10 APPENDIX A – ACCESSORY TYPE INDICATION <VZW-REQS-115-323>

Antenna	ANT
Battery Only Charger	BOC
Battery Wall Charger	BWC
Belt Clip	BC
Case	CAS
Desktop Charger	DTC
Desktop Holder	DTH
Dummy phone / Mock up	MOC
Extended Battery	BATX
Faceplate	FP
FM Headset	FM
Hang up cup (Installed kits)	CUP
Holster	HOL
Installed Hands-Free kit	HFK
Keyboard	KBD
Portable Hands-Free kit	PHF
Standard Battery	BATS
Stereo Headset	SHS
Stylus	STY
Travel Charger	TVL
USB Cradle	USC
USB Docking Station	UDS
USB Sync Cable	USB
Vehicle Power Charger	VPC

## 11 APPENDIX B – ACCESSORY PAINTING MATERIALS, PROCESS, AND RELIABILITY TESTING REQUIREMENTS <VZW-REQS-115-324>

### 11.1 PAINTING MATERIALS <VZW-REQS-115-325>

Painting materials covered in these requirements include prime paint, thinner, printing ink, firming agent, and finish paint.

### **11.1.1 ROHS-COMPLIANT MATERIALS <VZW-REQS-115-326>**

Suppliers shall use all ROHS compliant materials.

### **11.1.2 MATERIAL RECORDS <VZW-REQS-115-327>**

Upon reception of painting materials, suppliers shall check all the points including but not limited to the following items.

- Brand name
- Batch number
- Validation period
- Color
- Specific gravity
- Viscosity
- Gloss
- Packaging
- Peeling Test
- Abrasion Test
- Impregnant Test

The suppliers should develop written standards of key parameters of the painting materials. Upon Verizon Wireless request, the suppliers should provide comparison between written standards and actual testing results.

### **11.1.3 RECORD RETENTION <VZW-REQS-115-328>**

Suppliers shall keep the check records for at least 1 year.

## **11.2 PAINTING PROCESS CHECKS <VZW-REQS-115-329>**

During the painting process, suppliers shall perform the checks identified in the following sections.

### **11.2.1 INCOMING PLASTIC MATERIAL CHECK <VZW-REQS-115-330>**

Suppliers shall perform a mandatory quality check for each batch of incoming plastic materials. The preferred standard is MIL-STD-105E, IL=II, AQL (MAJ=1.0; MIN=2.5). All the records should be maintained for at least 1 year.

### **11.2.2 PAINTING FIXTURE CHECK <VZW-REQS-115-331>**

Suppliers should use fixtures in the painting process. The quality engineer should check at least 5 pieces of fixtures before each shift of production. The check points should include at least fibre or hair, and distortion. All the records should be maintained for at least 1 year.



### 11.2.3 PRE-CLEANING <VZW-REQS-115-332>

Suppliers shall use effective methods to conduct pre-cleaning in order to avoid impurities on the surface.

### 11.2.4 FAI <VZW-REQS-115-333>

Suppliers shall conduct FAI (First Article Inspection) checks as follows:

- Functional Test: 3 pieces for each shift of production;
- Appearance Check: 20 pieces for each shift of production;
- Dimension: 2 pieces for each shift of production;
- All the records should be maintained for at least 1 year.

### 11.2.5 PATROL CHECK <VZW-REQS-115-334>

Suppliers shall conduct patrol checks as follows:

- Functional Test: 3 pieces every 4 hours.
- Appearance check: 20 pieces per hour.
- All the records should be maintained for at least 1 year.

### 11.2.6 FINAL QUALITY CHECK <VZW-REQS-115-335>

Suppliers shall perform a final quality check. The preferred standard is MIL-STD-105E, IL=II, AQL (MAJ=1.0; MIN=2.5). All the records should be maintained for at least 1 year.

## 11.3 TESTING REQUIREMENTS <VZW-REQS-115-336>

Painting materials shall meet the following testing requirements.

#	Test Item	Test Method	Requirement
1	Paint Thickness	- Cross-section - Optical microscope	- Conform to product SPEC
2	R.C.A. Abrasion Test	- 11/16 inch x 8 inch paper tape - 175g load force	- 200 cycles w/o any visible wear
3	Pad Print/Logo Abrasion Test	- 11/16 inch x 8 inch paper tape - 175g load force	- 200 cycles w/o any visible wear
4	Color Difference	- Spectrophotometer	- Delta E < 1.0
5	Gloss Test	- 60 degree gloss meter	Conform to product SPEC - Lo: 15+/-5 - Mid: 30+/-5 - Hi: 80+
6	Paint Adhesion	- Space: ASTM D 3359-97 - Tape: 3M610 - Eraser press for 10 seconds - Tear down at 90° angle	- Small flakes of the coating are detached along the edges and at intersection of cuts; the area affected is 5-10% of the lattice.
7	Hardness Test	- HB Pencil - 1 Kg load - 45° angle	- No discoloration, no crinkle - No distinct press mark (≤0.1mm)
8	MEK Test	- 25C, 50%	- No any visible change in appearance

		- 30 cycles on painted surface with MEK by cotton swab	
9	Alcohol Test	- 200 gram - 95% alcohol - Distance of each cycle: 30 cm - Cycle: 200	- No Discoloration, no wear
10	Dimensional	- Fit test with phone	- Conform to product SPEC.
11	Cosmetic Inspection	- Visual check under adequate lighting 1000 Lux - Double confirm under MacBeth color booth with CWF (2) lighting.	No scratches, burs, extrusion, dirty points, distortion, color difference and shrinkage, etc.
12	Suntan Lotion Test	- Apply generous coating Coppertone sport SPF30 with a paint brush evenly across the entire phone surface.	- No cosmetic defects
13	Thermal Shock	- -40°C, 1 hr and +85°C, 1 hr for 12 cycles.	- No cosmetic or functional defects