



Kensington®

Product Engineering Specification Codename:ET-Visor K33440

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Prepared By	Matthew Hoag
Reviewed By	Betsy Diaz
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Revision History

Modified By	Date	Revision	Reason for Change
Matt Hoag	January 11, 2008	0.1	First Draft
Gary Wong	January 22, 2008	0.2	Detail BT behaviour
Matt Hoag	January 25, 2008	0.3	Updated charging scheme
Matt Hoag	Feb 22, 2008	0.4	Released to Primax for comments
Matt Hoag	March 12, 2008	0.5	Updated configuration & components
Matt Hoag	March 27, 2008	0.6	Updated Speaker spec
Matt Hoag	April 28, 2008	0.7	Updated QA section
Matt Hoag	May 28, 2008	0.8	Updated for Tooling release 2.3 Swap button function clarified 2.4 LED behaviour changed
		1.0	Released
		1.1	Modified

Product Information

Product Name	Codename: ET_Visor - Bluetooth Visor Car Hands free Kit
Product Description	Visor Mounted BT Handsfree kit
Product Number	K33440
Product Manager	Kevin Ngo
Project Manager	Matthew Hoag

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1.0 Introduction

ET-Visor is a Bluetooth enabled automotive speaker phone which is visor mounted. The controls on the product & the pairing process is "Smart Made Simple"

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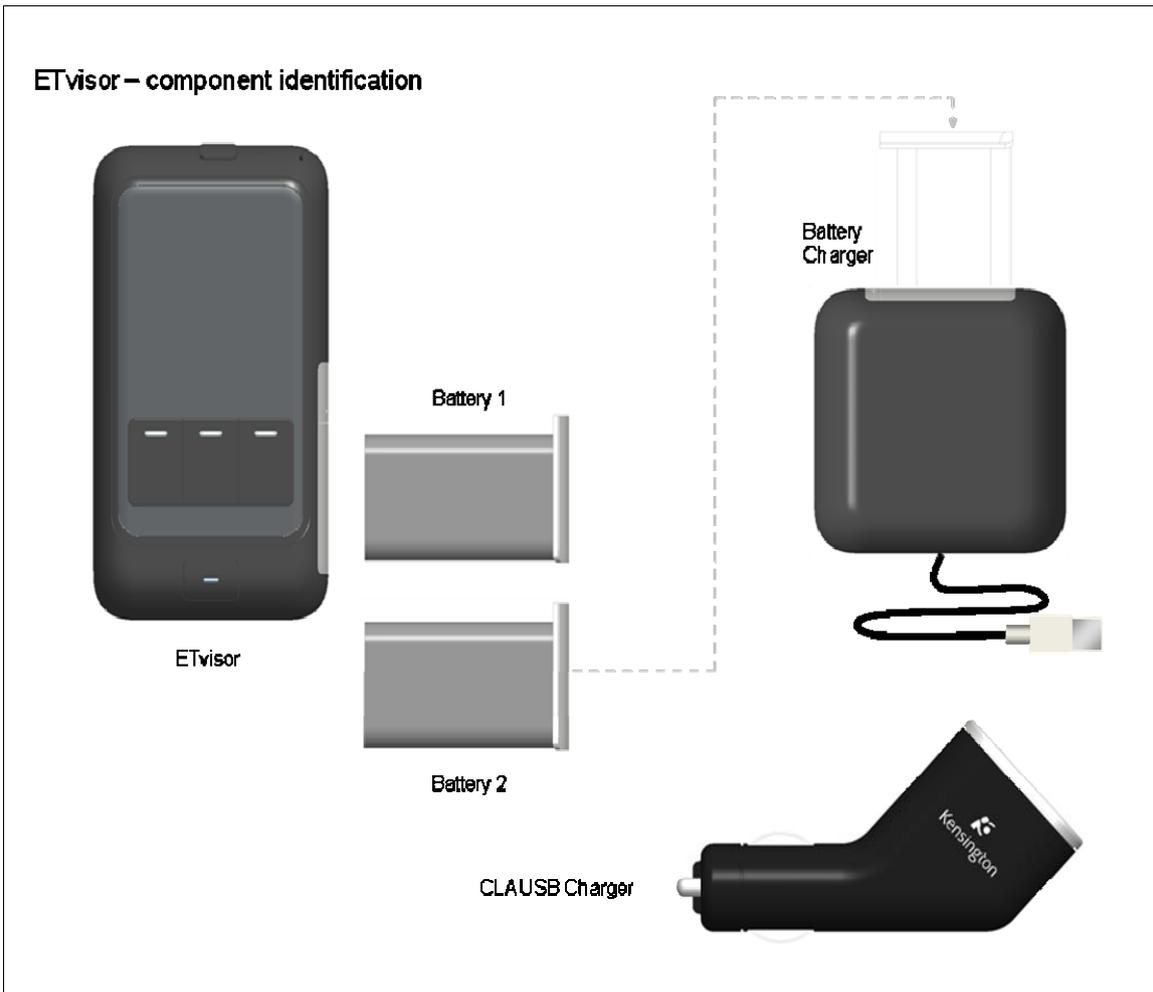


Figure 1 – Preliminary product images

1.1 Scope

This document outlines the Electrical Specifications, ID Considerations, Mechanical Specifications and Tooling Requirements necessary to produce the product.

1.2 Purpose

1.3 Reference

- a) *Product Requirement Document, V1*
- b) KTG-QA-G005-03 – Kensington Environmental Test Specification, April 18, 2007, Revision 0.3
- c) *Other reference documents*

1.4 Acronyms

Table 1 - Acronyms

Acronym	Description
ESD	Electrostatic Discharge
EMC	Electro Magnetic Compatibility
FCC	Federal Communication Commission

2.0 Functional Specifications

2.1 General Description

ET is a hands free speakerphone that allows a user to answer/make a phone call without needing to access the phone itself through Bluetooth. ET uses a rechargeable battery that allows up to one week of average talk/standby time without needing another recharge.

2.2 System Diagram

BT Visor Handsfree

Major components;
 -BC05 BT Module
 -NiMH Charging Circuitry

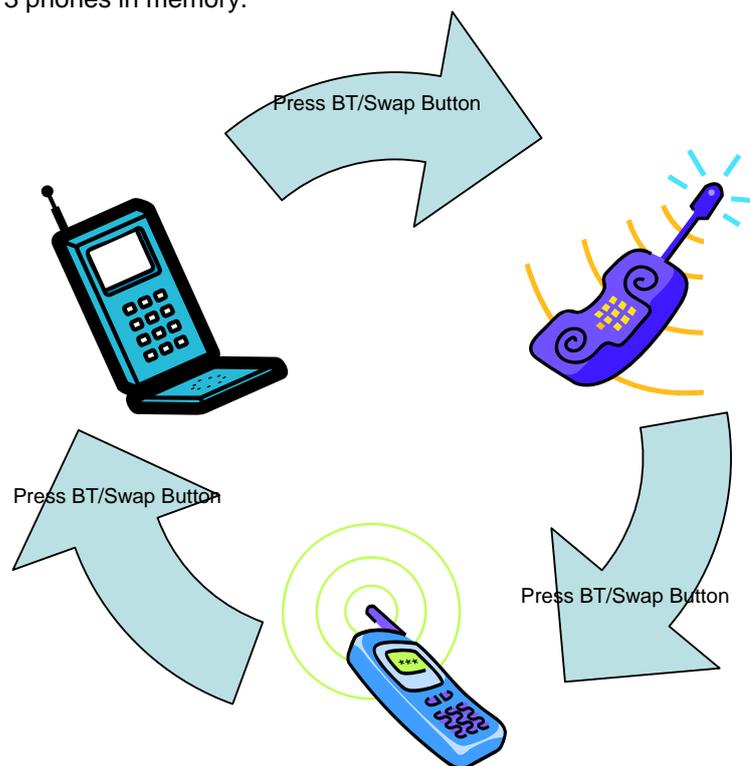
Product ships with two swappable battery packs

CLA USB Power adapter (Product K33410 Supplied by Everwin)
 -iPhone charging circuitry

USB Powered Batter Charger
 -NiMH charging circuitry

2.3 Button Functions

1. -Speed dial buttons: x 3
 - a. -When on a call, if the user presses & holds a speed dial button, the number for that call is stored in memory.
 - b. -When not in a call, if the user briefly presses the speed dial button, that number will be dialed by the cell phone and the call will be connected to the BT handsfree kit.
 - c. If an incoming call is from one of the Speed dial numbers, the LED behind the speed dial button will flash.
 - d. These buttons can be used to answer an incoming call with a short single press.
2. -Call/Answer & -Call End (One button)
3. -Volume slider (rheostat)
4. -Power
5. -Pair / Driver Swap
 - a. Press and hold to start pairing process with a new phone.
 - b. Quick press to disconnect from currently paired phone & attempt to reconnect with the next phone in the buffer. Unit will be able to seamlessly cycle through the 3 phones in memory.



See interface specification for more detailed description of button functions & actions.

2.4 Display Functions

Indicators LED location shown below. Colour spec detailed in Interaction spec.
 POWER LED HAS BEEN DELETED & FUNCTIONALITY HAS BEEN MOVED TO A TWO COLOUR LED AT THE PHONE ICON

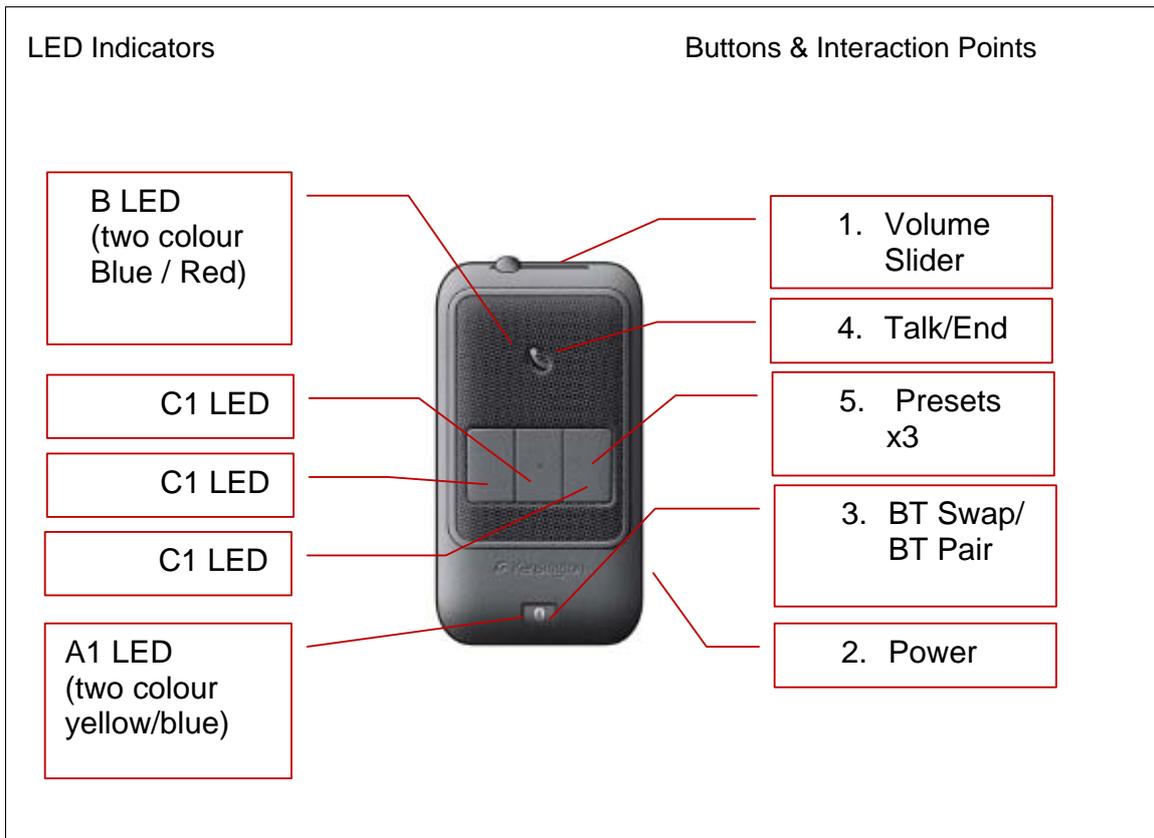


Figure 2 – Interaction Key

3.0 Electrical Specifications

This product is a standard BT handsfree visor product with a few additional features.

3.1 General Description

Firmware is to be written to follow requirements of interaction spec with the smarts to store 3 individual presets for each paired phone.

For example, PhoneA presets could be different from PhoneB. The firmware will be smart enough to remember the BT Phone ID and allocate the separate memory location for presets for that phone. Therefore, there are actually 9 presets stored in the device.

Whenever a BT phone with an ID already listed in the device, it is moved to the top of the list and the corresponded presets are loaded. When a phone ID not listed in the device is paired, the memory location for the one on the bottom of the list will be used overwriting the old ID and clearing all presets while moving the phone ID to the top of the list.

3.2 Interface Description

See in appendix

3.3 Power Requirements

Talk time: up to 6 hours

Standby time: up to 7 days.

Power provided by a user-replaceable NiMH battery 800mAh

Recharging circuitry for NiMH battery is included in CLA battery charger.

USB port on CLA charger must meet iPhone power requirements listed in 3.8

3.4 BT Requirements

Chipset: CSR BC05

BT 2.1

Paired devices limited to 3 phones. One at a time

3.5 Audio Requirements

- Audio Out: Speaker
 - Power (minimum) : 1W continuous, 1.5- 2W peak.
 - Sensitivity (SPL): min 82 +/- 3dB
 - Impedance: 8 Ohm +/- 15%
 - Lowest resonant frequency [Fo]: 280 – 480 Hz
 - Effective frequency Range (minimum): Fo – 10kHz
 - THD < 5%
 - Recommended speaker VECO P40DS08G-3-75ND
- Audio In: measurement method tbd
 - Generally the intent is to filter out all external noise factors including but not limited to:
 - Road Noise
 - Car Noise
 - Wind Noise
 - Tire Noise
 - Echo

- Other ambient noises
- The prime audio solution (firmware based) for ET will be provided by Primax
- Echo rejection: >42 dB
- Convergence in presence of back ground noise: < 1.0 sec
- Noise Cancellation: 12 dB
- No Distortion or speech clipping
- Comfort noise injection for natural sounding conversations
- Enhanced Non-linear processor for suppression of residual echo
- Microphone:
 - Omni directional microphone to be used
 - To be isolated via a rubber “boot” to prevent vibration transmission
 - Not to be rigidly mounted to the PCB, should be mounted to the plastics and attached to the PCB via flying leads
 - RF filtering a must to reduce TDMA noise issues
 - 6mm diameter microphone to be used
 - Microphone SNR to be min 55 dB
 - The microphone is to be located on the front face plate for optimum user orientation.
 - Sensitivity greater than -45 dBV at 1KHz
 - Reference Microphone:
 - [Kingstate Microphone with flying leads.](#)
 - [KECC2244WBL-G9U](#)

3.6 Recharging requirements.

Visor BT handsfree Product will ship along with:

- 2 rectangular NiMH battery packs with contacts (no flying leads)
- USB battery charger
- CLA – USB power adapter

3.7 Battery Pack Specifications

- Must meet 3.3 Power requirements
- Rectangular battery enclosed in plastic (user replaceable)
- Clean look. Shrink wrapped battery packs are not acceptable.
- 800mAh
- NiMH Chemistry

3.8 USB Battery Charger:

- Includes NiMH charging circuit for Battery pack.
- Includes cavity to accept NiMH Battery Pack

3.9 CLA USB Power adapter Specifications:

- Plugs into 12V power socket of car
- Fused 2AMPS SMT Quick burn
- Includes USB Power circuit which meets the following iPhone 5V power requirements (Kensington will provide proven reference design to meet these requirements:
In order to reduce PCB space an SMT type fuse it to be used, rated to 2 Amps.

- The CLA power supply for the USB shall meet the following technical requirements:
 - a. Input Surge
 - 1. While the circuit is operating at MAX load and Min load the line voltage is switched to the surge voltage
 - a. 12Vdc to 40Vdc for 16msec, back to 12Vdc. Repeated 5 times at 50% duty cycle
 - 2. There shall be no component damage, Voltage / logic signals shall remain within specified limits, No loss of performance and no permanent damage.
 - b. Identity line Signals (USB)
 - 1. With no load on the circuit measure the voltages on D+ and D-
 - 2. The voltage must fall within the below limits
 - a. D+ : 1.91V to 2.12V
 - b. D-: 1.91V to 2.12V
 - c. Load / Line / Regulation
 - 1. While the load on one output is increased in steps to a predetermined table, the output voltage deviations are noted. Test is repeated for different input voltages
 - 2. Output Voltage range
 - a. Vmin=4.85v
 - b. Vnom=5.0v
 - c. Vmax=5.25v

Input Voltage (Vdc)	Regulation (V)				
	0.0A	0.25A	0.50A	0.70A	1.0A
10V				Na	Na
12V				Na	Na
14V				Na	Na

- d. Dynamic Line Response
 - 1. The PSU is subject to a +2Vdc line variation. The output loads are chosen to give the worst case condition. No load capacitors shall be used.
 - 2. The PSU should not undershoot or overshoot beyond the regulation limits (4.85Vmin, 5.25 Vmax)
- e. Turn off/on Characteristics
 - 1. All timing are to measured with a 5uF capacitive loading and 12V DC input voltage.
 - a. Turn-on delay after DC input applied: T1<4.0 sec at which point the output voltage must have stabilized between 4.85 and 5.25 V DC.
 - b. Output rise time (10% to 90% regulation): T2 <20ms
 - 2. All parameters must be within specification
 - a. The output voltage overshoot upon the application or removal of the input voltage shall be less than 10% above the nominal voltage.
 - b. There must be a smooth and continuous ramp of the DC output voltage from 10% to 90% of its final set point within the regulation band, while loaded as specified in

section 3.3.b. No voltage of opposite polarity shall be present on any output during turn-on or turn off.

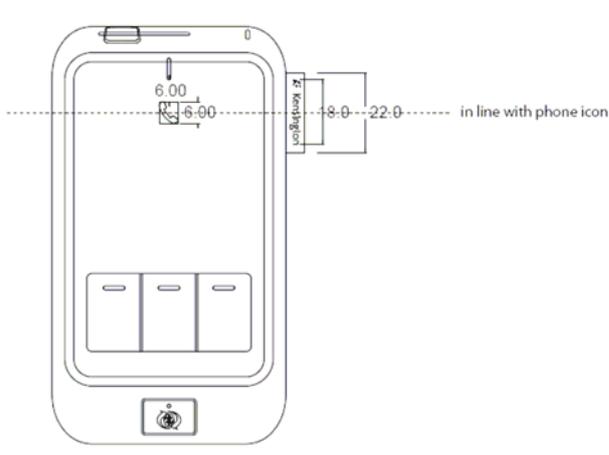
- f. Fuse Protection
 - 1. A fuse must be present at the input of the circuit so as to protect the circuit under any fault condition.
- g. Short Circuit
 - 1. A short circuit is defined as less than 0.01 Ohm resistance between the output terminals. The PSU is submitted to a short circuit at minimum load
 - 2. The output shall Hiccup or Foldback if any of the outputs are shorted to the secondary common. No damage shall result. Output shall recover after the short is removed.
- h. Overcurrent:
 - 1. The load is increased on one output from its maximum value to an estimated over current value in several steps at a rate of 0.1 A/sec. The test is repeated at different input voltages.
 - 2. Overload currents applied to each tested output rail will cause the output to trip before they reach any point of damage to the circuit. For testing purposes the overload currents should be ramped at a minimum rate of 0.1 A/sec starting at full load.
 - 3. The limit during overload condition also applies to any single fault condition.

4.0 Mechanical Specifications

Describe product mechanical specifications in this section, such as product Industrial Design, dimension, mechanical construction design, mechanical components design and assemble, product housing, color and finish, and so on. 3D design images are preferred to show the details of the design. You may add sub-sections as needed.

4.1 Industrial Design Considerations

- To be provided by Kensington in K33440 CMF document
- Product Branding (ET_logotag_033108.ai) – Stitched logo tag



4.2 Component and Assembly Specifications

-Recommended configuration to be provided by Kensington during on going discussion between Kensington's ME department and the supplier's ME resource.

4.3 Bill of Materials

For a detailed Bill of Materials refer to the document BOM-K33440-REV_A

4.4 Material Specifications

See CMF

4.5 Tooling Specifications

4.6 Compliance and Recycling Requirements

4.7 Product Labelling Requirements

- Regulatory info will be pad printed on the rear of the product.

5.0 Software Specifications

5.1 General Specifications

N/A

5.2 Compatibility Requirements

Mobile phones supporting Bluetooth 1.2 specification and Handsfree or Headset profiles.

5.3 Installation Requirements

N/A

6.0 Product Packaging, Labelling and Documentation

Describe product packaging, labelling and documentation requirement in this section. You may add sub-sections as needed. In this section, you may need to specify the specifications for packaging material, provide the BOM of the packaging and photos or drawing of the assembly components of the packaging. You may also need to specify the requirement of using Kensington Logo and product labels on packaging.

6.1 Packaging Name

6.2 Box Structure Materials Specifications

6.3 Bill of Materials of Packaging

6.4 Sample Photo of Prior Design



K33408.ppt

6.5 Sample Photo and/or Drawing of ALL die cut components

Insert photos and/or drawings here.

6.6 Sample Photo and/or Drawing of Assembly of all Component parts

Insert photos and/or drawings here.

7.0 Environmental Specifications

This product shall comply with, at least but not limited, the environmental specifications selected in this section.

Please refer to the reference b) which is the “KTG-QA-G005-xx – Kensington Environmental Test Specification” document for the details of each test case. The ‘xx’ here means the latest revision of this document.

For this product the temperature range will be -20°C - +60°C

Environmental test cases selection table

Test Case No.	Test Case Name	Mandatory Test	Optional Test	Comments
1	Drop test without package	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2	Drop test with package	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3	Vibration test without package	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4	Vibration test with package	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
5	Shock without package	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
6	High temperature (operating) test	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
7	Low temperature (operating) test	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
8	Thermal shock test	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
9	High temperature (storage) test	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
10	Low temperature (storage) test	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
11	Humidity cycling (storage) test	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
12	Switch life cycle test	<input type="checkbox"/>	<input type="checkbox"/>	
13	Key/Button life cycle test	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
14	Scroll Wheel life cycle test	<input type="checkbox"/>	<input type="checkbox"/>	
15	Battery cover/door endurance test	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
16	Insert parts endurance test	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
17	Cable bending strength test	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
18	Cable pull strength test	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
19	Cable and part joint strength test	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
20	Paint surface chemical resistance test	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
21	Paint surface abrasion test	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
22	Paint surface adhesive ability test	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
23	Surge voltage test	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
24	Supply voltage fluctuation test	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
25	Reverse voltage test	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
26	ESD test (Direct Discharge)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
27	ESD test (Indirect Discharge)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
28	ESD test (Actual Use)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

Note:

- Mandatory Test: tests must be conducted on this product.
- Optional Test: tests are optional to this product.

8.0 Regulatory Requirements

8.1 Region Regulatory Requirements

Product manager shall select the corresponding marketing area for this product to insure that region regulatory compliance requirements are met for the following target markets.

Project managers shall request contract manufacturers to complete the [Product Compliance Certification Summary KTG-QA-S001](#) by the end of the final design stage.

- Africa - List countries: _____
- Asia - List countries: _Hong Kong, Japan, Malaysia, Singapore
- Australia
- Canada
- Europe - All European Union countries requiring CE mark
- Europe – Other Non European Union countries - List countries: _____
- South America - List countries: _____
- USA
- Mexico
- Middle East - List countries: _____
- Russia
- Other countries: _____

8.2 Environmental & Energy Compliance Requirements

Please select from the following list for the Environmental & Energy Compliance required for this product. If there is other requirement, please add description below.

- RoHS Directive 2002/95/EC (Europe)
- WEEE Directive 2002/96/EC (Europe)
- Energy Star (USA)
- Lead-Free (USA)

8.3 OEM Specific Requirements

- Dell Specific Requirements
- HP Specific Requirements
- Apple Specific Requirements
- Other, *please specify ...*

9.0 Quality Requirements

Please describe the quality requirement for this product below. The example subsections are given as a reference. Author may change these subsections or add more requirements according to the corresponding product.

9.1 Design Workload

This product is designed to be capable of operating 24 hours a day, 365 days a year under the specified environmental conditions defined in section 7.1 and 7.2.

9.2 Reliability Requirements

The reliability of this product shall be measured by MTBF (mean time between failures). It is the average time that this product is being used under its specific operating conditions before a failure occurs since last failure happened. It is measured in hours.

The MTBF of this product is > ?????? hours.

Note: The MTBF value is related to product design and manufacturing. It can be estimated based on the life accelerated tests. So when the product is in pre-production phase, the product life accelerated tests must be applied to ensure the required MTBF value is achievable.

9.3 Acceptance Quality Level

The MIL-STD-105E shall be used as the standard of making the random sampling inspections for product manufacturing. The minimum Acceptance Quality Level for this product is defined as following:

Critical defects: no critical defect is acceptable

Major defects: AQL

Minor defects: AQL

The author should define the AQL value based on the product characteristics.

Defects Classification:

Critical: likely to result in unsafe condition or contravene mandatory regulation (no critical defect is accepted).

Major: reduces the usability of the product or is an obvious appearance defect.

Minor: doesn't reduce the usability of the product, but is a defect beyond the defined quality standard.

The author can define these three types of defects in more detailed if it is necessary.

10.0 Approval

After this document has been reviewed by all related manager and engineers listed below, and the document has been refined based on review comments, this document should be signed and approved by all required approvers.

Approvals						
	Department Approval required if checked	Name	Signature	Approved	Rejected*	Date
<input type="checkbox"/>	Project Manager			<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	Product Manager			<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	Operation Manager			<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	Product Development			<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	Senior Design Engineer			<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	Quality Assurance			<input type="checkbox"/>	<input type="checkbox"/>	

* If someone rejected the approval, please describe the reason here.

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.