Privoro Privacy Guard
Thermal Safety FAQ

CASE

COVER

Question: Is there a thermal risk for a phone protected by the *Privoro privacy guard*, with the Faraday Cover applied?

Response/Summary:

NO, FOR THE FOLLOWING REASONS:

1. The phone will be in low power, "listen" mode.
2. The iPhone has built in protections against overheating.
3. The Privoro privacy guard provides multiple levels of overheat/thermal protection.

Response/Detail:

NO, FOR THE FOLLOWING REASONS:

1 THE PHONE WILL BE IN LOW POWER, "LISTEN" MODE.

a. Unlike Faraday bags, which typically only provide 40dB–70dB of RF attenuation, the Privoro privacy guard provides a minimum of 110 dB of attenuation.

b. As a result, rather than having a weak connection to a base station (cell tower), the iPhone will have "no signal" and thus it will move to a low power, "sniffing/listen" mode to conserve its battery until such point that it detects a tower broadcast and it can begin its tower selection and connection process. On top of not operating in TX mode, power may be further saved by the use of a timer to trigger listening/sniffing, a feature referred to as power saving mode (PSM).

i. Note: Base stations are responsible for advertising their presence and managing the transmission power of connected cell phones, which allows them to, amongst other things, minimize interference between the multiple phones to which they are connected. Cellular specifications govern and address the situation where cell phones are unable to detect towers and they prevent a phone which cannot detect a tower from needlessly wasting its battery transmitting in the hopes of establishing a connection.

c. Once the Privoro Faraday Cover is removed and a base station can be/is detected, the iPhone will follow standard cell protocol and register with the tower.

2 THE IPHONE HAS BUILT IN PROTECTIONS AGAINST OVERHEATING/FIRE.

a. Per Apple: "If the interior temperature of the device exceeds the normal operating range, the device will protect its internal components by attempting to regulate its temperature."

b. Apple has taken numerous steps to prevent fire and reduce temperature, up to and including providing a warning and shutting off elements of the device (e.g. charging, display, radios, camera flash etc.), or the entire device, until normal operating temperature is reached.

c. Keeping iPhone, iPad, and iPod touch within acceptable operating temperatures.

3 **THE PRIVORO PRIVACY GUARD PROVIDES MULTIPLE LEVELS OF OVERHEATING/FIRE PROTECTION.**

a. The Privoro privacy guard cover is primarily solid aluminum, which would act like a large heat sink (dissipating heat from within the Cover).

b. All of the plastics used in non-aluminum parts of the Privoro privacy guard Case & Cover are rated at V0 flammability meaning they have been tested by 3rd party labs to be self extinguishing.

Response/Technical Specifications:

NO, AS PER THE LTE SPECIFICATION (2G/3G HAS SIMILAR MECHANISMS), THE PHONE WILL NOT BE TRANSMITTING

1) Cell Connection Procedure (summary)
a) Cell Detection/Search
b) Cell Selection/reselection
c) RACH and Completion of Registration
d) < In IDLE >
e) Keep measuring RSRP/RSRQ for the cell it registered
  i) If RSRP/RSRQ is very poor or undetectable, go to step (a) for finding other cell
  ii) if RSRP/RSRQ is measureable, evaluate < Cell Reselection Criteria >
    (1) perform Cell Reselection if the criteria is met
    (2) stay in the current cell if the criteria is not met
f) In essence, LTE Radio Resource Control (RRC) has only two modes: RRC Idle and RRC Connected. If UE (User Equipment (the phone)) is not connected, UE is in the idle mode (from RRC perspective).

2) In the above procedure, only step (c) involves UL (UE TX —> BTS RX). *The scenario of the phone being in the Privoro Faraday Cage is (d), where RSRP/RSRQ is very poor (Srxlev <0).*

3) RSRP Calculation
a) UE Selects PLMN (Public Land Mobile Network (the cell network)) and
b) Initiates request to attach to it.
  i) PLMN *is identified by PLMN identity broadcast* (by cell tower BTS (base transceiver station), *NOT via phone broadcast)* within SIB1 (System Information Block Type 1). SIB1 can broadcast a list of PLMN.
c) BTS transmits SIB1 to UE to receive for *cell selection.*

d) Cell selection allows UE to camp on a cell, and the criteria is specified in TS 36.304
  i) If $Srxlev > 0$
    (1) where $Srxlev = Qrxlevmeas - (Qrxlevmin + Qrxlevminoffset) – Pcompensation$
    (2) $Qrxlevmeas$ = RSRP (reference signal receive power) measured by UE
    (3) $Qrxlevmin$ = minimum required RSRP signaled by SIB1.
    (4) The other parameters can be considered as calibrated offset.
  ii) UE transmits request to BTS for network attachment.
  iii) The key point is that if RSRP is essentially 0 (which would be the case in the Privoro Faraday Cage), then Srxlev will be < 0, which means that cell selection will not be triggered, and hence there is no UE transmission (TX).
  iv) A zero RSRP means the UE does not know whom to send an attachment request. UE remains in RX mode until it sniffs/detects a cell tower signal (SIB1).

SOURCES

a) UMTS Quick Reference, Cell Selection
b) LTE Quick Reference, Cell Reselection
c) LTE University, Expert Opinion
d) LTE4you Blogspot, Cell Reselection explained
e) User Equipment (UE) procedures in idle mode
f) Non-Access-Stratum (NAS) functions related to Mobile Station (MS) in idle mode

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About Privoro: To protect against information gathering by electronic devices, Privoro has assembled a world-class team addressing the highly complex communication and acoustic challenges required to engineer the privacy-guard family of products. Privoro is committed to being the world's leader in privacy and information security solutions, helping people, governments and businesses protect their sensitive information.

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