VERIZON

NWF 6500 Operations Manual

Document Revision	Date	Author(s)	Description
A0	Oct. 06, 2014	Chris Kang	Initial release
A1	6/20/16	Tom Kees	Add required MPE comment for FCC

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1. Scope

This document describes the specifications of hardware/firmware/RF/mechanical of the NWF 6500 Board and Unit. The NWF 6500 is a multi-board unit.

2. Reference Documents

SAE J1850	Class B Data Communications Network Interface
SAE J1708	Serial Data Communications Between Microcomputer Systems in Heavy-Duty Vehicle Applications.
ISO 11898-2	Road Vehicles – Controller Area Network Part 2 : High speed medium access unit
SAE J2411	Single Wire CAN Network for Vehicle Applications

3. In-Drive NWF 6500 Design Requirements

General Specifications

Size	76mm x 44mm x 26mm (or smaller)	
Weight	100 grams (or less)	
Input Voltage	+6 to +60Vdc, 60V transient voltage spikes	
Power Consumption	Normal (Key On)	<500mA @ 12Vdc
	Idle (Key Off)	<16mA @ 12Vdc
	Sleep (Key off > 3 days)	<500uA @ 12Vdc
Average Max Power (GSM Xmit)	1.50A @ 12Vdc	
Fault Protection	Reversed battery, over voltage, loss of ground	
Debug Interface	RS-232	
Temperature Range	Operating	-40 to +85C
	Storage	-40 to +105C
Relative Humidity	95% Non-condensing	

GPS Specifications

Receiver	Jupiter SE880
Accuracy	< 2 m accuracy in open sky
Acquisition	Cold Start <5 seconds @ -153dBm sensitivity
	Hot Start < 3 second @ -155dBm
Antenna	TBD -> target for best performance.

Modem Specifications

Modem	Telit LE910, CE910 Dual or UE910 Quad
Antenna	Wide band antenna for LTE/HSPA/1xRTT

850/1900 Band	824~894MHz	1850~1990MHz
Peak Gain	-1.1dBi	-0.1dBi

Regulatory Approvals[1] PTCRB, Verizon, AT&T, Rogers, Telus

[1] RF exposure compliance is demonstrated by MPE calculation at 20 cm separation distance.

Bluetooth Specifications

Transceiver	Internal Bluetooth Transceiver Bluetooth v2.1 + EDR (or better) Class 2
Range	Up to 10m
Antenna	Internal Chip Antenna
Regulatory Approvals	Bluetooth, FCC, Industry Canada

OBD Diagnostic Specifications

OBD2 Physical Layers	SAE J1850PWM (41.6Kbps) SAE J1850 VPW (10.4Kbps) ISO 9141-2 (10.4Kbps) ISO 14230 (KWP 2000 Fast and Slow) ISO 15765 (CAN 250 and 500Kbps, 11 & 29 bit) SAE J2411 Single Wire CAN Network
Heavy duty	SAE J1708 SAE J1939
Connector	SAE J1962 Compliant OBD2 Dongle
Safety	Switchable CAN2 and CAN3 signals for supporting any automobile

Sensors

Accelerometer	3-axis +/-16G
Gyroscope	3-axis

Driver Feedback

LED	RGB LED
Buzzer	80dBA (or better)

Power reserve

Loss of power alert	SMS alert(1500bytes) after power loss detection, 5 seconds minimum.

Expansion

Interface	Serial interface with hardware flow control (TTL levels)
External power	12V @ 1.5A max

Mechanical

Tampering protection

Additional Features

Scan tool detection	Embedded only with harness
Harness detection	Multiple harness types (8+)

4. NWF 6500 HW Design Overview

The NWF 6500's main goals are:

1) Linux Processor
2) Telit Cellular Module, supporting CDMA/GSM
3) GPS
4) Buzzer
5) OBD interface supporting 2nd and 3rd CAN buses
6) Scan Tool Detection
7) Last Gasp power back-up.
8) Side Serial Port for peripherals

4.1 Topology

4.1.1 NWF 6500 Topology

The NWF 6500 contains 2 main boards and 2 daughter boards.

- CPU board
  - Linux Processor and Memory
  - Bluetooth Radio
  - GPS Receiver
  - Side serial port
- Cell Board
  - Cellular module
  - OBD Interfaces
  - Main Switching regulators
  - Super caps to support last gasp
- Buzzer Board
  - Just contains a buzzer

- GPS Antenna board
    - Contains a GPS patch antenna

4.2 Mechanical Housing

- The housing shall be ABS plastic.

4.3 Block Diagram

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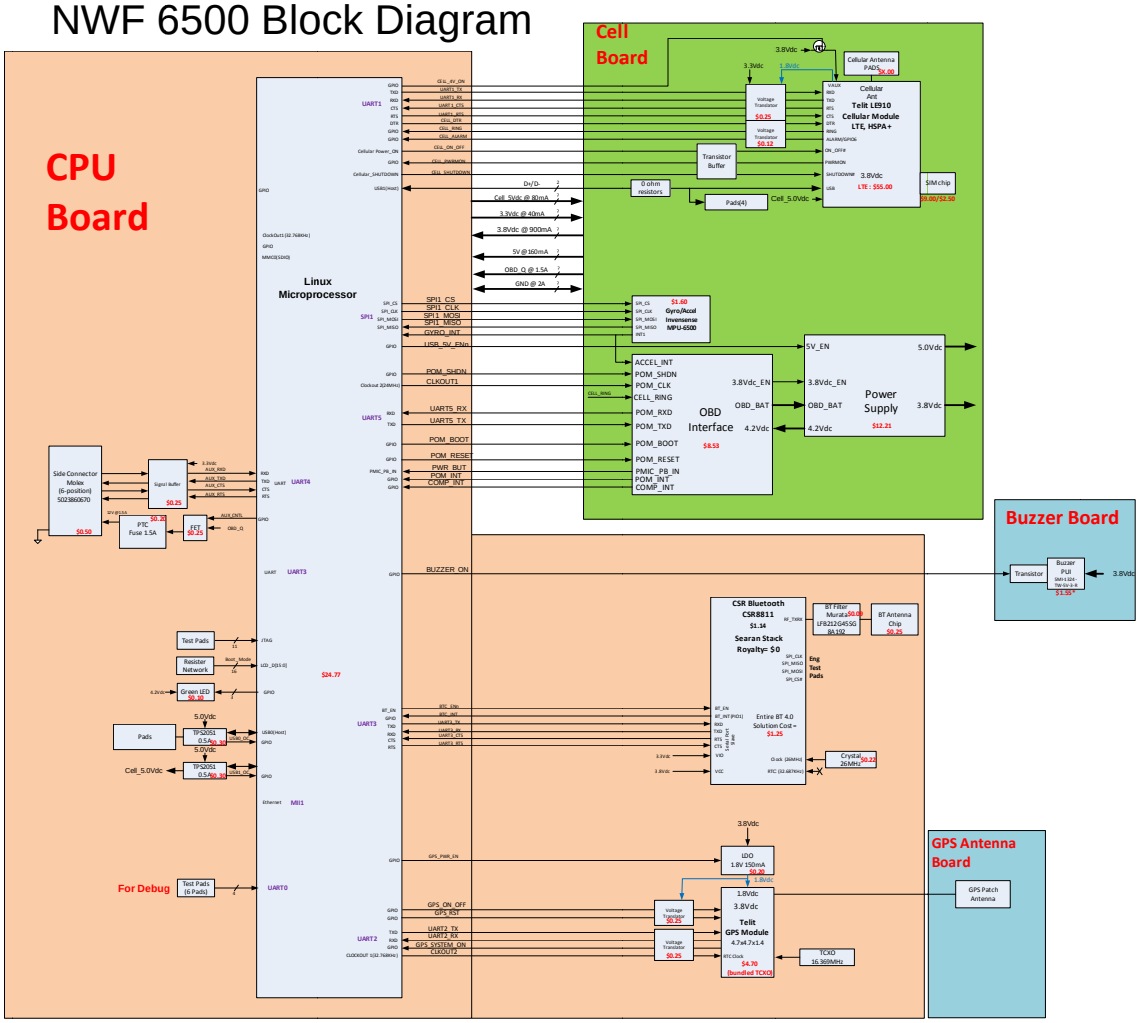
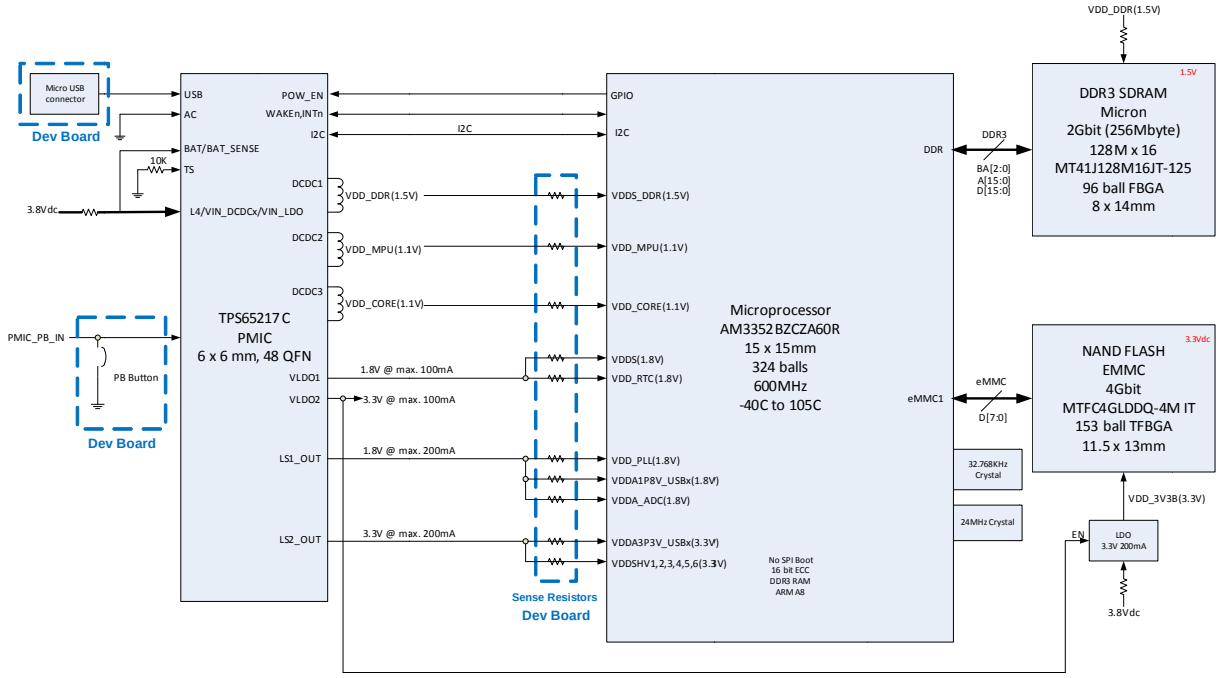
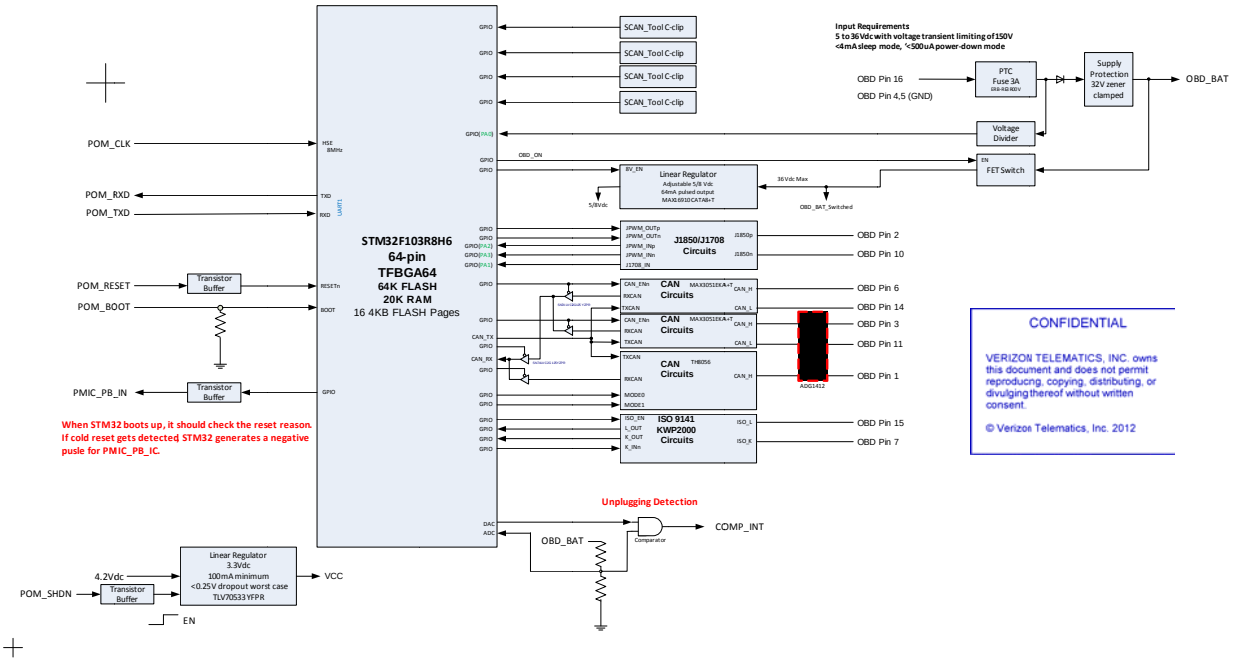
NWF 6500 Block Diagram



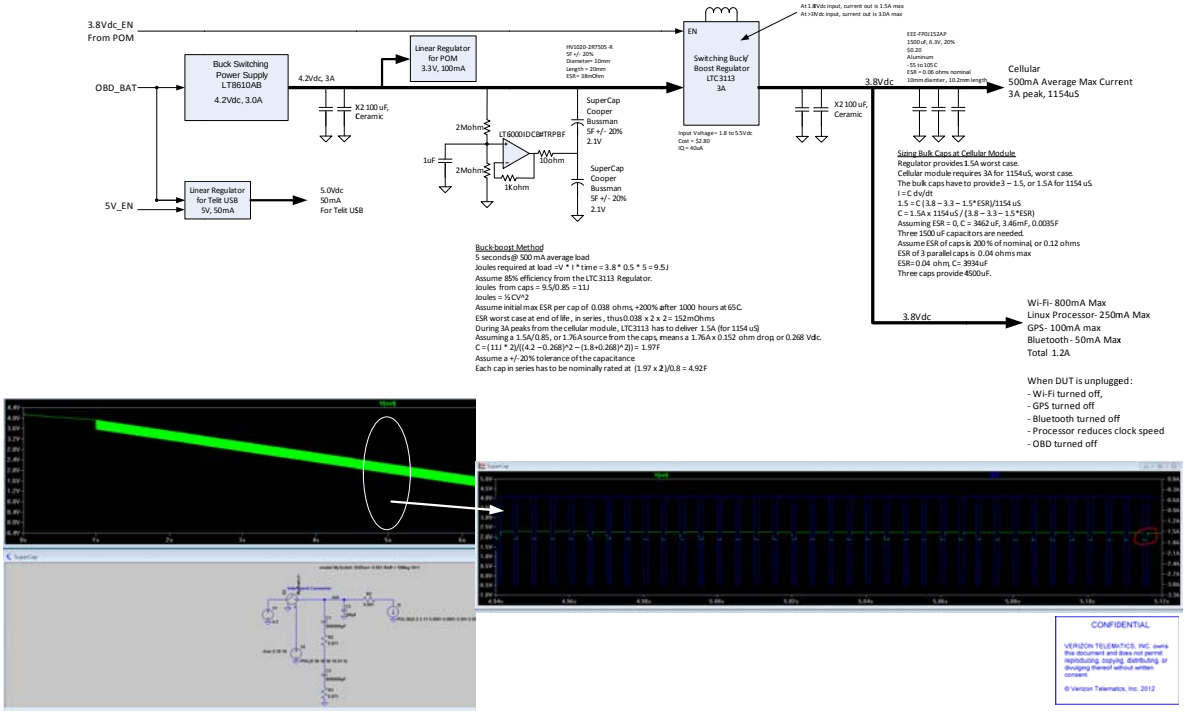
NWF 6500 Linux Processor Block Diagram



NWF 6500 OBD Interface Block Diagram



NWF 6500 Power Supply Block Diagram



4.4 PCB Organization

The NWF 6500 will contain several PCBs, with the cellular and CPU PCBs with the following stack-up.

Stack-up