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TITLE : INTERNAL PRODUCT SPECIFICATION

## Internal Product Specification for the VT 9109 BLK Basic Phone

### Revision History:

Revision	Description	Page	Effective Date
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## 1. Overview

This specification defines the functional and electrical performance requirements of the VT 9109 900MHz analog cordless telephone. The VT 9109 is intended to be compatible with most type of central office equipment in use in Canada, the United States and South America.

### 1.1. General Description

### 1.2. Regulatory Standards

As a requirement for sale in the United States, the VT 9109 will comply with the electrical specifications defined in the following documents:

- FCC Part 15 Radio Emissions Requirements
- FCC Part 68 Telephone Line Interface Requirements
- UL 1950 Safety Requirements

As a requirement for sale in Canada, the VT 9109 will comply with the electrical specifications defined in the following documents:

- IC RSS-210 Radio Emissions Requirements
- IC CS-03 Telephone Line Interface Requirements
- CSA 225 Safety Requirements

In addition to the above mandatory regulations, the recommendations provided in EIA 470-B will be used as a guideline.

### 1.3. Preliminary Feature List

The VT 9109 will offer many of the same features as the VT 9108.

#### 1.3.1. Basic Features

#### 1.3.2. Unique Features

#### 1.3.3. Features Not Provided

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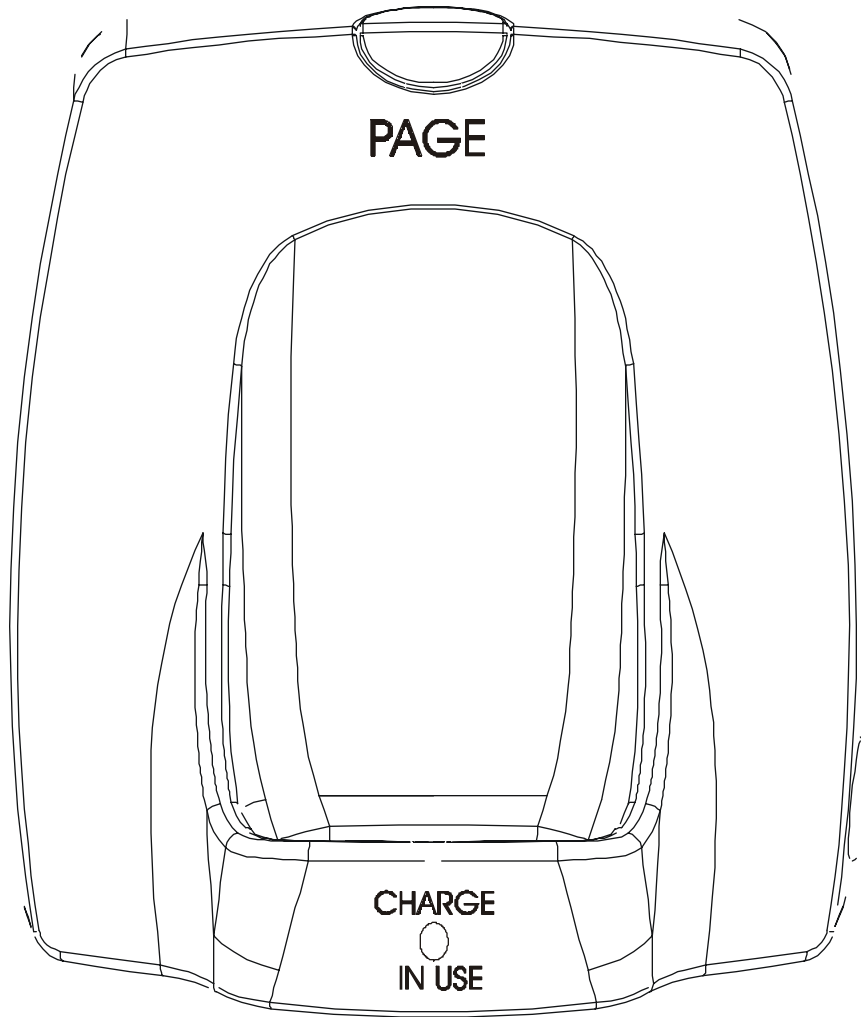


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### 1.4. Cosmetic Styling

Line drawings for the VT 9109 base unit and handset are in the following sections.

#### 1.4.1. Base Unit Line Drawing



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**1.4.2. Handset Line Drawing**

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## 2. Functional Layout

### 2.1. Handset Functional Layout

- Ref. 1.4.2. Handset Line Drawing

#### 2.1.1. Handset LED Indicators

**Phone LED** - this LED illuminate steadily when the handset is in the PHONE mode. It will flash in cadence with an incoming ring from the PSTN line. It will flash quickly when the handset is in the MEM mode. It will flash slowly when a low battery condition in the handset is detected.

#### 2.1.2. Handset Key Descriptions

**<PHONE> key** - this key is used to enter the PHONE mode. If the handset is already in the PHONE mode, pressing this key will generate a hook-flash on the PSTN line.

**<OFF> key** - this key is used to exit all modes of operation and return the handset and base unit to the STANDBY mode.

**<CHAN> key** - this key is used to initiate a channel change to the next available RF channel. This key is only active in the PHONE mode; it has no function in the STANDBY mode.

**<VOL> key** - this key is used to select ear piece volume level. This key is only active in the PHONE mode; it has no function in the STANDBY mode.

**<MEM> key** - this key is used to enter the memory-dialling mode for dialling speed dial numbers. The sequence used is <PHONE> <MEM> digit key, where digit key is one of 0-9.

**<REDIAL/PAUSE> key** - this key is used to dial the contents of the redial buffer and active in the PHONE mode if no other dialling keys have been pressed. Pause can also be added into the memory by pressed this key after any number entry in MEM mode.

**<Tone/\*> key** - this key is used to initiate temporary DTMF dialling. This function is only active in the PHONE mode, and only if the default dialling method is pulse. This key is used to select the Tone dialling in MEM mode.

**<#> key** - this key is used to select Pulse dialling in MEM mode.

**<Ringer> Switch** - the switch is selected to ON, ring sound during incoming ringing. The switch is selected to OFF, no ring sound during incoming ringing.

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## 2.2. Base Unit Functional Layout

- Ref. 1.4.1. Base Unit Line Drawing

### 2.2.1. Base Unit LED Indicators

**Charge/ In Use LED** - this LED illuminates steadily when the handset is resting in the base unit cradle and the handset battery is being charged. And it will flash in cadence with an incoming ring. This LED also flashes momentarily immediately after the handset is cradled to indicate that initialisation (synchronise RF channel) is in progress. This LED illuminates steadily when the handset out off cradle and in PHONE mode.

### 2.2.2. Base Unit Key Descriptions

**<PAGE> key** - this key is used to enter the PAGE mode. In the PAGE mode, the handset will emit a series of rings. Pressing the <PAGE> key a second time (while in the PAGE mode) will terminate PAGE mode, stopping the handset rings. The PAGE mode will also be terminated automatically after 120 seconds (the STANDBY mode) or one page tone (the PHONE mode) is heard at the handset. This key is inactive if the handset is resting in the base unit cradle.

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### 3. Operating Modes

The VT 9109 has a number of operating modes, including:

- STANDBY
- PHONE
- MEM
- RINGING
- PAGE
- PHONE/PAGE
- MEM/PAGE
- MEM/RINGING

These operating modes can be triggered by any of the following events:

- pressing keys on the handset
- receiving an incoming call from the PSTN
- pressing the <PAGE> button on the base unit
- replacing the handset on the cradle
- removing the handset from the cradle
- a timeout (where appropriate)

For this section, the following definitions apply:

- *Number Keys* = { <1> <2> <3> <4> <5> <6> <7> <8> <9> <0> }
- *DTMF Keys* = { <1> <2> <3> <4> <5> <6> <7> <8> <9> <0> <\*> <#> }
- *Dialling Keys* = { <1> <2> <3> <4> <5> <6> <7> <8> <9> <0> <\*> <#> <REDIAL> <MEM> }

#### 3.1. STANDBY Mode

The STANDBY mode is the idle mode of the VT 9109. In this mode, both the base unit and handset RF transmitters are turned off, the base unit has released the PSTN connection, and the handset goes into a sleep sub-mode to conserve battery power. The handset 'wakes up' (turns on its receiver) periodically to check for an incoming RF link (incoming PSTN call or Page signal).

When in the STANDBY mode:

- <PHONE> - causes the VT 9109 to go to the PHONE mode
- <CHAN> - this key is locked out
- <OFF> - series of on hook data send to base and maintains VT 9109 in the STANDBY mode
- Dialling Keys** - these keys are locked out
- <REDIAL> - this key is locked out
- <MEM> - causes the VT 9109 to go to the MEM mode
- Ringling** - causes the VT 9109 to go to the RINGING mode
- <PAGE> - causes the VT 9109 to go to the PAGE mode
- On Cradle** - maintains the VT 9109 in the STANDBY mode
- Off Cradle** - maintains the VT 9109 in the STANDBY mode

#### 3.2. PHONE Mode

The PHONE mode is the main operating mode of the VT 9109. In this mode, a RF link is established between the handset and the base unit; the base unit has seized the PSTN connection; and both transmit and receive audio path open for voice communication. Dialling is also possible while in the PHONE mode.

Pressing the <CHAN> key causes the VT 9109 to seek a new RF channel for operation (refer to section 4.3 for more details).

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Placing the handset into the base unit cradle will automatically release the PSTN connection, and return the phone to the STANDBY mode (*auto hang-up*).

When in the PHONE mode:

- <PHONE> - causes the base unit to generate a hook flash to the PSTN
- <CHAN> - causes the VT 9109 to change to a new RF channel
- <OFF> - causes the VT 9109 to return to the STANDBY mode
- Dialling Keys** - cause the base unit to dial the corresponding digits
- <REDIAL> - dials the content of redial buffer
- <MEM> - this key work with digit key for memory dialling
- Ringing** - invalid condition
- <PAGE> - causes the VT 9109 to go to the PHONE/PAGE mode
- On Cradle** - causes the VT 9109 to return to the STANDBY mode
- Off Cradle** - invalid condition

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### 3.2.1. Dialing Methods

The VT 9109 supports three dialling methods: pulse, tone (DTMF), and temporary DTMF. The pulse or tone dialling mode can be set as the default dialling method by programming on the handset unit.

Temporary DTMF dialling mode is only available when the default method is set to pulse. In that case, pressing the <Tone/\*> key on the handset will initiate temporary DTMF dialling such that all subsequent digits dialled will be in DTMF (including <\*> and <#>). Temporary DTMF dialling will continue until the VT 9109 returns to the STANDBY mode, at which point the default pulse dialling resumes.

During DTMF dialling, the <Tone/\*> key will dial the DTMF <\*> digit. During Pulse dialling, the <#> key has no function and will be ignored (even though a key-beep will be generated at the handset).

### 3.2.2. Redial Buffer

The redial buffer stores the first 32 digits of the number dialled during the previous call. The number may have been dialled using the DTMF keys, the <REDIAL> key, the memory dialling feature, or any allowable combination of these.

The contents of the redial buffer can be dialled to the PSTN by pressing the <REDIAL> key immediately following the <Phone> key. The redial buffer becomes invalid as soon as any of the DTMF keys is pressed, or if the memory dialling feature is used and cannot be accessed until the phone returns to the STANDBY mode.

It is possible to dial further digits after the <REDIAL> key is pressed, either using the DTMF keys, or memory-dialling feature. Any suffix digits (including memory dialling) will be appended to the redial buffer.

The redial buffer is stored in the RAM of MCU and will be erased if MCU is reset.

### 3.2.3. Memory Dialing

Numbers can be dialled out from any of the 10 speed dial memories by pressing the <MEM> key, followed by the number key corresponding to the desired memory location. After the <MEM> key is pressed, only the number keys (memory locations), the <Phone> key (hook flash) and the <OFF> key (return to the STANDBY mode) will be accepted - the remaining keys on the handset will be locked-out. There is 6 s timeout on the memory-dialling mode.

It is possible to dial digits before and after using the memory dialling feature; these digits can be dialled using the DTMF keys, the <REDIAL/PAUSE> key, or the memory dialling feature.

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### 3.3. MEM Mode

The VT 9109 supports three programming sub-modes: speed dial programming, tone/pulse select programming. The speed dial programming sub-mode is used to program a number into one of the 10 speed dial memory locations; tone/pulse select programming is used to select tone dialling or pulse dialling on base.

When in the main MEM mode:

- <PHONE> - causes the VT 9109 to go to the PHONE mode
- <CHAN> - this key is locked out
- <OFF> - causes the VT 9109 to go to the STANDBY mode (*sad tone*)
- Number Keys** - cause the VT 9109 to go to speed dial MEM sub-mode
- <\*> **Keys** - cause the VT 9109 to go to the tone/pulse select MEM sub-mode
- <REDIAL>, <MEM>, <VOL> **Keys** - these keys are locked out
- Ringing** - causes the VT 9109 to go to the RINGING mode
- <PAGE> - causes the VT 9109 to go to the PAGE mode
- On Cradle** - causes the VT 9109 to return to the STANDBY mode (*sad tone*)
- Off Cradle** - invalid condition
- 6s Timeout** - returns the VT 9109 to the STANDBY mode (*sad tone*)

When in the speed dial MEM sub-mode:

- <PHONE> - causes the VT 9109 to go to the PHONE mode (*sad tone*)
- <CHAN> - this key is locked out
- <OFF> - causes the VT 9109 to go to the STANDBY mode (*sad tone*)
- DTMF Keys** - enter the number to be stored
- <REDIAL> - this key is locked out
- <MEM> - and press MEM location number, the number to be stored, return VT 9109 to the STANDBY mode (*happy tone*)
- <VOL> - this key is locked out
- Ringing** - causes the VT 9109 to go to the RINGING mode
- <PAGE> - causes the VT 9109 to go to the PAGE mode
- On Cradle** - returns VT 9109 to return to the STANDBY mode (*sad tone*)
- Off Cradle** - invalid condition
- 6s Timeout** - returns the VT 9109 to the STANDBY mode (*sad tone*)

When in the tone/pulse select MEM sub-mode:

- <PHONE> - causes the VT 9109 to go to the PHONE mode (*sad tone*)
- <CHAN> - this key is locked out
- <OFF> - causes the VT 9109 to go to the STANDBY mode (*sad tone*)
- <\*, <#> **Keys** - select tone mode or pulse mode dialling on base
- Number Keys** - these keys are locked out
- <MEM> - selection stored, return VT 9109 to the STANDBY mode (*happy tone*)
- <REDIAL>, <VOL> **Keys** - these keys are locked out
- Ringing** - causes the VT 9109 to go to the RINGING mode
- <PAGE> - causes the VT 9109 to go to the PAGE mode
- On Cradle** - causes the VT 9109 to return to the STANDBY mode (*sad tone*)
- Off Cradle** - invalid condition
- 6s Timeout** - returns the VT 9109 to the STANDBY mode (*sad tone*)

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### 3.3.1. Speed Dial Programming

The VT 9109 has 10 speed dial memory locations, accessed by the digit keys 0 to 9. Each location can hold up to 20 digits.

To MEM a speed dial number:

1. Press the <MEM> key on the handset. The PHONE LED on the handset will flash to indicate the VT 9109 is in the MEM mode.
2. Dial the number to be stored in the memory location. Numbers are stored in volatile memory on Handset.
3. Press the <MEM> key on the handset.
4. Enter the memory location to be used for storing the number (0 to 9).
5. The phone will store the digits in the volatile memory on Handset, terminate the MEM mode, and return to the STANDBY mode. A *happy tone* will be emitted from the handset to indicate successful programming of the number.

Any of the DTMF dialling keys can be used to store numbers in the speed dial memory independent of the default dialling method. If the default dialling method is pulse when using the speed dial number, the digit <#> will be ignored and the digit <\*> will initiate temporary DTMF dialling.

A pause can be inserted into a memory location by pressing the <REDIAL/PAUSE> digit after the pause is required for two (2) seconds. A key-beep will be heard with the <REDIAL/PAUSE> key-press, and then again after two (2) seconds; the second key-beep indicates that a pause has been programmed.

### 3.3.2. Tone/Pulse Select Programming

The VT 9109 supports tone mode dialling and pulse mode dialling on base unit. The tone/pulse select is programmed as follows:

1. Press the <MEM> key on the handset. The PHONE LED on the handset will flash to indicate the VT 9109 is in the MEM mode.
2. Press the <\*> keys to go to the tone/pulse select MEM sub-mode.
3. Press <\*> key to select tone mode dialling or press <#> key to select pulse mode dialling.
4. Press the <MEM> key on the handset. The phone will store the selection in the volatile memory on Handset, terminate the MEM mode, and return to the STANDBY mode. A *happy tone* will be emitted from the handset to indicate successful programming of the selection.



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### 3.4. RINGING Mode

The RINGING mode occurs when a valid ring signal is applied to the base unit from the PSTN connection. The base unit establishes a RF link to the handset, and sends commands to the handset causing it to ring (if the ringer is turned off, the handset will not ring).

If the handset is away from the base unit cradle, pressing PHONE key on the handset (except <OFF>) will cause the VT 9109 to go off-hook and answer the incoming call.

When in the RINGING mode:

<PHONE> - causes the VT 9109 to go to the PHONE mode

**Other Keys** – these keys are locked out

### 3.5. PAGE Mode

The PAGE mode only occurs if the handset is in the STANDBY mode, the handset is away from the base unit cradle, and the <PAGE> button on the base unit is pressed. In the PAGE mode, the handset emits a series of page tones for 120 seconds; the page tones can be turned off by either pressing the <PHONE> key on the handset, or the <PAGE> key on the base unit.

When in the PAGE mode:

<PHONE> - causes the VT 9109 to go to the PHONE mode

<CHAN> - this key is locked out

<OFF> - this key is locked out

**Dialling Keys** - these keys are locked out

<VOL> - this key is locked out

**Ringling** - causes the VT 9109 to go to the RINGING mode

<PAGE> - causes the VT 9109 to return to the STANDBY mode

**On Cradle** - causes the VT 9109 to return to the STANDBY mode

**Off Cradle** - invalid condition

**120s Page Timeout** - returns the VT 9109to the STANDBY mode

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## 4. RF Link Operation

### 4.1. Security Code

1 to 65536 digits possible security codes automatically programmed each time when the Handset is placed in the charge cradle.

### 4.2. RF Channel Selection

#### 4.2.1. Manual Channel Selection

The user can change the channel manually by pressing the Channel key.

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## 5. Power Management

The VT 9109 is powered by a battery pack in the handset and by AC power in the base unit.

### 5.1. *Battery*

A 3.6V 600mAH Ni-CA ( AA size & with plug) recharge battery is used on the Handset.

### 5.2. *Low Battery Indication*

In Phone mode, when low battery is detected, the Phone LED flashes and handset beeps. After about 3 min, the handset will power down.

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