# CDMA DATA TERMINAL

## DTEV-Dual Reference Manual
## Application Information

**November, 21, 2005**
**DTEV-Dual**

**AnyDATA.NET**

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It is advised for the customers to contact our engineers for more information with respect to Keypad, audio interface, RF interface and input power supply before they start an actual design.

OEM integrators and installers are instructed that the phrase 'This device contains transmitter FCC ID: P4M-DTEVDUAL must be placed on the outside of the host.

| | |
|---|---|
|  | **Warning: Exposure to Radio Frequency Radiation**<br>The radiated output power of this device is far below the FCC radio frequency exposure limits. Nevertheless, the device should be used in such a manner that the potential for human contact during normal operation is minimized. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna should not be less than 20cm during normal operation and the gain of the antenna must not exceed 1dBi. |

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# 1. Introduction

## 1.1 Purpose

This manual provides hardware interface and programming information for the DTEV-Dual CDMA Wireless Data Module.

### 1.1.1 Features

1. Support major air interfaces including CDMA2000® 1X, CDMA2000 1xEV-DO Rev. 0, cdmaOne™ IS-95A/B
2. Support Release A of the CDMA2000 1X standard, for voice and multimedia data applications, with offering data transmission up to 153 kbps data in forward and reverse links simultaneously.
3. Support IS-856 1xEV-DO, high-speed peak data rates of 2.4 Mbps on forward link and 153 Kbps on reverse link.
4. Customized AT Command thru RS232
5. Universal serial bus (USB) for faster data transfers between wireless communicators and other data devices
6. Three universal asynchronous receiver transmitter (UART) serial ports
7. R-UIM/USIM controller (via second UART), SIM/R-UIM interface supports global roaming with multiple handsets, simplifying international business travel
8. Multimedia Card (MMC) support to enable the adFdition of high-capacity removable memory for storage of data, plus the transfer of data to and from PCs and wireless devices
9. Parallel LCD interface
10. General-purpose I/O pins
11. Mobile IP and Static IP
12. Secure Sockets Layer (SSL) software gives consumers the confidence of secure transactions and private data.
13. BREW® Binary Runtime Environment for Wireless platform, making it easier for users to find, select, purchase and download
14. Supports Antenna Diversity

### 1.1.2 Applications

1. 2-way Short Message Service ( SMS ) Reception and Transmission
2. Advanced wireless multimedia support for audio e-mail, still image email, video e-mail,...
3. gpsOne® technology support for the mobile location applications and services, including points of local weather and traffic information, personal navigation,.., and Emergency mandates such as the United States FCC E911 mandate.

## 1.2 Organization

This manual will discuss the interface and operation of the module and is divided into the following subsections:

- – Introduces users to the DTEV-Dual CDMA Wireless Data Module's basic features and general specifications.
- – Lists each DTEV-Dual pin and its function within the device. The pinout for the module is listed in numeric sequence.
- – Specifies the recommended operating conditions, DC voltage characteristics, I/O timing, and power estimations for the module. Timing diagrams are also included.
- – Details each subsystem or block within the module and shows how the subsystem or block interfaces with external peripherals.
- – Provides package dimensions for the module.

## 1.3 Revision History

The revision history for this document is shown in Table 1-1.

**Table 1-1 Revision History**

| Version | Date | Description |
|---|---|---|
| V1_X1 | Dec. 2004 | Initial Release. Internal Use Only |
| V1_X2 | Sep. 2005 | 2nd Revision |

## 1.4 References

1. QUALCOMM Incorporated. MSM6500 Mobile Station Modem™: Component Supply Specification. 80-V5775-4 Rev. E, December 20, 2004.
2. QUALCOMM Incorporated. MSM6500™ Mobile Station Modem: Device Specification (Preliminary Information). 80-V5775-1 Rev. F, January 28, 2005.
3. QUALCOMM Incorporated. SURF6500 User Manual. 80-V6503-4, July 19, 2004.

## 1.5 Acronym List

**Table 1-2 Acronym List**

| Term | Definition |
|---|---|
| CDMA | Code-Division Multiple Access |
| CODEC | Coder-Decoder |
| GPIO | General-purpose Input/Output |
| JTAG | Joint Test Action Group (ANSI/ICEEE Std. 1149.1-1990) |
| LCD | Liquid Crystal Display |
| LDO | Voltage Regulator |
| LED | Light Emitting Diode |
| PCB | Printed Circuit Board |
| PCM | Pulse Coded Modulation |
| PCS | Personal Communications Service |
| RF | Radio Frequency |
| Rx | Receive |
| TCXO | Temperature-Controlled Crystal Oscillator |
| Tx | Transmit |
| UART | Universal Asynchronous Receiver Transmitter |

# 2. Overview

## 2.1 Application Descriptions

The CDMA Wireless Data Module is a complex consumer communications instrument that relies heavily on both digital signal and embedded processor technologies. The Wireless Data Modules manufactured by AnyDATA.NET support Code-Division Multiple Access (CDMA). This operates in both the cellular and PCS spectrum band.

In a continuing effort to simplify the design and to reduce the size and production cost of the Wireless Data Module, AnyDATA.NET has successfully developed the DTEV-series. The DTEV-Dual is AnyDATA.NET's latest compact Wireless Data Module operating in the Cellular and PCS spectrum band. DTEV-Dual contains not only a complete digital modulation and demodulation system for CDMA standards as specified in IS-95 A/B, IS-2000 , IS-856 but also GPSOne position location solution which offers wireless callers their location wherever and whenever they need it.

GPSOne is QUALCOMM CDMA Technologies' position location solution. It offers the availability of position location determination in hostile environments (such as indoors) where conventional GPS receivers do not work well.

GPSOne uses a hybrid approach that utilizes signals from the GPS satellite constellation and from CDMA cell sites to determine location. Using the hybrid approach, GPSOne enhances location services availability, accelerates the location determination process, and provides improved accuracy.

The hybrid mode approach for position location uses signals from CDMA cell stations and GPS satellites to compute the user's location. This approach basically takes advantage of an accurate knowledge of GPS system timing on a CDMA mobile station. The knowledge of system timing allows the GPSOne solution to use both the CDMA signal measurements and GPS signal measurements collectively to compute the user's location. It also allows for a central entity, named Position Determination Entity (PDE), to send estimated signal phases to the mobile. This knowledge reduces the time to search the satellite pseudo ranges on the mobile, thus improving the time taken to determine the user's position.

The subsystem in DTEV-Dual includes a CDMA processor MSM6500™ chipset's multimedia support for MP3 player and integrated stereo HiFi audio DAC, 64-polyphony MIDI sound synthesizer and PC-quality wavetable , MMC *Mobile*™ , USB-On-The-Go transceiver, Stereo Wireband Codec for digital music clips.

DTEV-Dual supports CDMA2000 1X, Release A standard, offering data rate of up to 153 kbps on both the forward and reverse links, along with simultaneous voice and data services, and IS-856 1xEV-DO for high speed data rate of 2.4Mbps on forward link and 153Kbps on reverse link.

The fast system in DTEV-Dual includes 256Mbytes NAND Flash Memory and 256Mbytes synchronous high data rate Dynamic RAM.

DTEV-Dual provides an external interface that includes the standard RS-232, Digital Audio, parallel LCD Display, Keypad, Multimedia Card, R-UIM/USIM, USB-OTG, GPIO.

DTEV-Dual has the capability to power down unused circuits in order to dynamically minimize power consumption.

## 2.2 Technical Specifications

### 2.2.1 General Specifications

**Table 2-1 General Specifications**

| Parameters | Descriptions |
|---|---|
| External Access | Code-Division-Multiple-Access (CDMA) |
| CDMA Protocol | IS-95 A/B, IS-126, IS-637A, IS-707A, IS-2000,IS-856 |
| Data Rate<br>CDMA2000 1X<br>1xEV-DO | <br>153 Kbps on both the forward and reverse links<br>Forward link: 2.4 Mbps<br>Reverse link: 153 Kbps |
| System Memory | 256Mbytes SDRAM and 256 Mbytes NAND Flash |
| Transmit/Receive Frequency Interval | 45MHz for Cellular and 80MHz for PCS |
| Vocoder | EVRC, 13kQCELP |
| RF technology | Zero Intermediate Frequency |
| Number of Channel | 832 for Cellular and 42 for PCS |
| Operating Voltage | DC +3.3V ~ +4.5V BATT_INT (Pin88 and 90)<br>DC +4.0V to +5.25V VEXT_DC (Pin87 and Pin89) |
| Current Consumption | 1. VCC applied to VEXT_DC (Pin87 and Pin89)<br>Receive mode: 110mA<br>Sleep mode : less than 10mA<br>Busy mode: 900mA (Max)<br>2. VCC applied to BATT_INT (Pin88 and Pin90)<br>Receive mode : 110mA<br>Sleep mode : less than 1mA<br>Busy mode: 900mA (Max) |
| Operating Temperature | -30ºC ~ +60ºC |
| Frequency Stability | ±300Hz for Cellular and ±150Hz for PCS |
| Antenna | GSC Connector, 50ohm |
| Size | 42mm(W) X 67mm(L) X 3.0mm(H) with case |
| Weight | About 20g (0.7oz) |
| External Interface | RS-232 UART, R-UIM, Parallel LCD, Keypad, MP3, MIDI, MMC<br>*Mobile*™ , USB-On-The-Go, Stereo Wireband Codec, GPIO |
| User Interface Software | BREW support |
| Additional Function | gpsOne position location solution |

### 2.2.2 Receiver Specifications

**Table 2-2 Receiver Specifications**

| Parameters | Descriptions |
|---|---|
| Frequency Range | |
| Cellular | 869.04 ~ 893.97 MHz |
| PCS | 1931.25 ~ 1988.75MHz |
| Sensitivity | |
| 1xRTT | Below –104.0 dBm/1.23MHz |
| EVDO | Below –105.5 dBm/1.23MHz |
| Input Dynamic Range | |
| 1xRTT | -25 dBm/1.23MHz ~ -104.0dBm/1.23MHz |
| EVDO | -25 dBm/1.23MHz ~ -105.5dBm/1.23MHz |
| **Single Tone Desensitization**<br>The FER in each test shall not exceed 1.0% with 95% confidence | **1xRTT**<br>Band Classes 0 (-30dBm @900KHz and -30dBm @-900KHz):<br>Below –101.0 dBm/1.23MHz<br>Band Classes 1 (-30dBm @1250KHz and -30dBm @-1250KHz):<br>Below –101.0 dBm/1.23MHz<br>**EVDO**<br>Band Classes 0 (-30dBm @900KHz and -30dBm @-900KHz):<br>Below –102.4 dBm/1.23MHz<br>Band Classes 1 (-30dBm @1250KHz and -30dBm @-1250KHz):<br>Below –102.4 dBm/1.23MHz |
| **Intermodulation Spurious Response Attenuation**<br>(Two interfering CW tones)<br>The FER in each test shall not exceed 1.0% with 95% confidence | **1xRTT**<br>Band Classes 0<br>Two tone (-43 dBm @900KHz and 1700KHz):<br>Below –101.0dBm/1.23MHz<br>Two tone (-32 dBm @900KHz and 1700KHz):<br>Below –90.0dBm/1.23MHz<br>Two tone (-21 dBm @900KHz and 1700KHz):<br>Below –79.0dBm/1.23MHZ<br>Band Classes 1<br>Two tone (-43 dBm @1250KHz and 2050KHz):<br>Below –101.0dBm/1.23MHz<br>Two tone (-32 dBm @1250KHz and 2050KHz):<br>Below –90.0dBm/1.23MHz<br>Two tone (-21 dBm @1250KHz and 2050KHz):<br>Below –79.0dBm/1.23MHZ<br>**EVDO**<br>Band Classes 0<br>Two tone (-43 dBm @900KHz and 1700KHz):<br>Below –102.4dBm/1.23MHz<br>Two tone (-32 dBm @900KHz and 1700KHz):<br>Below –91.4dBm/1.23MHz<br>Two tone (-21 dBm @900KHz and 1700KHz):<br>Below –80.4dBm/1.23MHZ<br>Band Classes 1<br>Two tone (-43 dBm @1250KHz and 2050KHz):<br>Below –102.4dBm/1.23MHz<br>Two tone (-32 dBm @1250KHz and 2050KHz):<br>Below –91.4dBm/1.23MHz<br>Two tone (-21 dBm @1250KHz and 2050KHz):<br>Below –80.4dBm/1.23MHZ |
| Spurious Wave Suppression | Below –80dBc |

### 2.2.3 Transmitter Specifications

**Table 2-3 Transmitter Specifications**

| Parameters | Descriptions |
|---|---|
| Frequency Range | |
| Cellular | 824.04 ~ 848.97 MHz |
| PCS | 1851.25 ~ 1908.75MHz |
| Nominal Max Power | 0.32 W (24.7dBm) |
| Peak Power in Operation Mode | 400mW (26dBm) |
| Minimum Controlled Output Power | Below –50dBm |
| Max Power Spurious | |
| Cellular | 900KHz: Below –42dBc/30KHz<br>1.98MHz: Below –54dBc/30KHz |
| PCS | 1.25MHz: Below –42dBc/30KHz<br>1.98MHz: Below –50dBc/30KHz |

### 2.2.4 gpsOne Receiver Specifications

**Table 2-4 gpsOne Receiver Specifications**

| Parameters | Descriptions |
|---|---|
| Frequency Range | L1, 1575.42 MHz |
| C/A Code | 1.023 MHz Chip Rate |
| Bandwidth | 2.046 MHz |
| Modulation | BPSK |
| Receiver Sensitivity | |
| Without SA message | -149dBm |
| With SA message | -152dBm |
| Interference | |
| at Min At minimum $C/N_0$ (17 dB-Hz) | |
| CW interference | –36dB |
| 1kHz Bandwidth Interference | –17dB |
| $10^{+}$kHz Bandwidth Interference | -7dB |
| VCO Phase Noise | |
| at 100 Hz offset | –50 dBc/Hz |
| at 1 KHz offset | –70 dBc/Hz |
| at 10 KHz offset | -90 dBc/Hz |
| at 100 KHz offset | -115 dBc/Hz |
| at 2 MHz offset | -140 dBc/Hz |

### 2.2.5 Standards

IS-95 A/B, IS-2000, IS-856: Protocol Between MS & BTS

IS-866: 3GPP2 C.S0033-0 Version 2.0: Recommended Minimum Performance Standards for CDMA2000 High Rate Packet Data Access Terminal

IS-96A: Voice Signal Coding

IS-98A: Base MS Function

IS-98E: Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Mobile Stations

IS-126: Voice Loop-Back

IS-637: Short Message Service

IS-707: Data Service

IS-657: packet data

USB 2.0 Specification and OTG Supplement: Exchanging data between a host and peripheral

MMC System Specification 1.4: MultiMediaCard standard

ITU-T G.712: Transmission systems and media, Digital systems and networks

Built-in TCP/IP: AnyDATA proprietary software

## 2.3 Interface Diagram

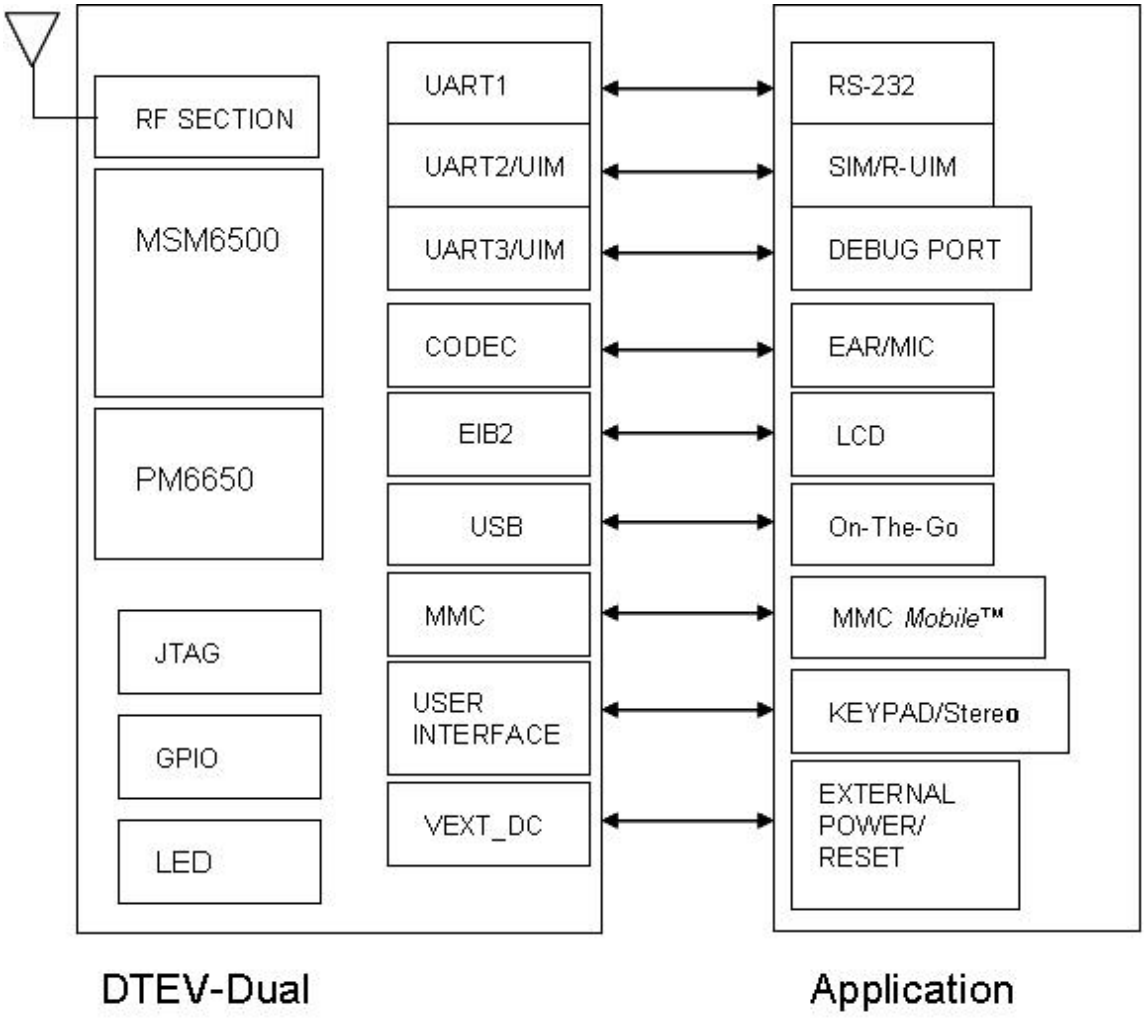



**Figure 2-1 Interface Block Diagram**

# 3. PIN Description

## 3.1 I/O Description Parameters

**Table 3-1 I/O Description Parameters**

| Symbol | Description |
|---|---|
| I | CMOS Input |
| O | Output |
| B | Bi-directional |
| V | Power/Ground |
| IS | Input with Schmitt Trigger |
| BS | Bi-directional Schmitt Trigger |
| PU | Internal Pull-Up |
| PD | Internal Pull-Down |

## 3.2 PIN Names and Pinouts

### 3.2.1 100-Pin Connector

**Table 3-2 100-PIN Connector Pinouts**

| Pin # | Name | Main Function | Dir-Pol | Description |
|---|---|---|---|---|
| 1 | D2[15] | EBI2_DATA15 | B | peripheral data bus |
| 2 | GND | GROUND | V | Signal Ground |
| 3 | D2[14] | EBI2_DATA14 | B | peripheral data bus |
| 4 | GND | GROUND | V | Analog Ground |
| 5 | D2[12] | EBI2_DATA12 | B | peripheral data bus |
| 6 | D2[13] | EBI2_DATA13 | B | peripheral data bus |
| 7 | D2[10] | EBI2_DATA10 | B | peripheral data bus |
| 8 | D2[11] | EBI2_DATA11 | B | peripheral data bus |
| 9 | D2[08] | EBI2_DATA08 | B | peripheral data bus |
| 10 | D2[09] | EBI2_DATA09 | B | peripheral data bus |
| 11 | GND | GROUND | V | Signal ground |
| 12 | GND | GROUND | V | Signal ground |
| 13 | GPIO_39 | UART1_DCD_N | O | Data carrier detect ( UART1 ) |
| 14 | GPIO_64 | UART1_RI_N | O | Ring indicator ( UART1 ) |
| 15 | GPIO_98 | UART1_RFR_N | O | Ready for Receive ( UART1 ) same as RTS |
| 16 | GPIO_95 | UART1_TXD | O | Transmit data ( UART1 ) |
| 17 | GPIO_44 | UART1_DTR | I | Data terminal ready ( UART1 ) |
| 18 | GPIO_96 | UART1_RXD | I | Receive data ( UART1 ) |

| | | | | |
|---|---|---|---|---|
| 19 | GPIO_97 | UART1_CTS_N | I | Clear to send ( UART1 ) |
| 20 | VREG_UIM | VREG_RUIM | O | +3V power supply to RUIM caed |
| 21 | UIM_P_DATA | UIM_P_DATA | I | Data from RUIM card |
| 22 | UIM_P_RESET | UIM_P_RESET | O | RUIM card reset |
| 23 | UIM_P_CLK | UIM_P_CLK | O | RUIM clock |
| 24 | MMC_DATA | MMC_DATA | B | GPIO_32, MultiMediaCard data |
| 25 | MMC_CLK | MMC_CLK | B | GPIO_31, MMC clock |
| 26 | GPIO_84 | UART3_TXD | O | transmit data, (UART3) DEBUG PORT |
| 27 | MMC_CMD | MMC_CMD | B | GPIO_30, MMC command |
| 28 | GPIO_85 | UART3_RXD | I | receive data, (UART3) DEBUG PORT |
| 29 | VREG_MMC | VREG_AUX1 | O | Linear regulator output intended to power MMC circuits |
| 30 | POWER_ON | POWER_ON | I | POWER ON used only when to use 3.6V 1cell battery. External pull-up required |
| 31 | GPIO_24 | LCD_LED_CONT | O | General purpose input output, LCD LED |
| 32 | GPIO_13 | FLASH_LED_CONT | O | General purpose input output, FLASH LED |
| 33 | GPIO_17 | GPIO_17 | B | General purpose input output |
| 34 | VREG_MSME | VREG_MSME | O | Regulated output of the MSME buck (step-down) SMPS |
| 35 | VREG_AUX2 | VREG_AUX2 | O | Low dropout linear regulator output intended to power WLAN |
| 36 | GND | GROUND | V | Signal ground |
| 37 | GND | GROUND | V | Signal ground |
| 38 | D2[00] | EBI2_DATA00 | B | Data line |
| 39 | D2[01] | EBI2_DATA01 | B | Data line |
| 40 | D2[02] | EBI2_DATA02 | B | Data line |
| 41 | D2[03] | EBI2_DATA03 | B | Data line |
| 42 | D2[04] | EBI2_DATA04 | B | Data line |
| 43 | D2[05] | EBI2_DATA05 | B | Data line |
| 44 | D2[06] | EBI2_DATA06 | B | Data line |
| 45 | D2[07] | EBI2_DATA07 | B | Data line |
| 46 | A2[20] | A2[20] | O | Address line |
| 47 | A2[01] | A2[01] | O | Address line |
| 48 | RESOUT1 | RESOUT1_N | O | Reset Out |
| 49 | LCD2_CS | LCD2_CS_N | O | Peripheral LCD chip select |
| 50 | GPIO23 | LED_FULL_CURRENT | O | GPIO, Full Current LED |

| | | | | |
|---|---|---|---|---|
| 51 | OE2 | OE2_N | O | LCD Output Enable Signal |
| 52 | WE2 | WE2_N | O | LCD Write Enable Signal |
| 53 | GPIO_62 | KEYSENSE0_N | I | Key sense input |
| 54 | GPIO_63 | KEYSENSE1_N | I | Key sense input |
| 55 | GPIO_46 | KEYSENSE2_N | I | Key sense input |
| 56 | GPIO_47 | KEYSENSE3_N | I | Key sense input |
| 57 | GPIO_48 | KEYSENSE4_N | I | Key sense input |
| 58 | GPIO_45 | KYPAD_5 | I | GPIO, Keypad input |
| 59 | GPIO_53 | KYPAD_4 | I | GPIO, Keypad input |
| 60 | GPIO_52 | KYPAD_3 | I | GPIO, Keypad input |
| 61 | GPIO_51 | KYPAD_2 | I | GPIO, Keypad input |
| 62 | GPIO_50 | KYPAD_1 | I | GPIO, Keypad input |
| 63 | GPIO_49 | KYPAD_0 | I | GPIO, Keypad input |
| 64 | GPIO_80 | AUX_PCM_CLK | B | PCM clock for auxiliary CODEC port or IDLE LED output. Default is LED |
| 65 | GPIO_81 | AUX_PCM_SYNC | O | PCM data strobe for auxiliary CODEC port or Traffic LED output. Default is LED |
| 66 | GPIO_82 | AUX_PCM_DIN | I | PCM data input for auxiliary CODEC port or SMS LED output. Default is LED |
| 67 | GPIO_21 | AMUX_IN1 | I | External inputs to the analog multiplexer |
| 68 | GPIO_83 | AUX_PCM_DOUT | O | PCM data output for auxiliary CODEC port |
| 69 | GPIO_05 | AMUX_IN2 | I | External inputs to the analog multiplexer |
| 70 | GPIO_37 | COVER_DET | B | General purpose input output |
| 71 | VIB_DRV_N | VIB_DRV_N | O | VIBRATOR_DRV output |
| 72 | GPIO_42 | PS_HOLD | O | POWER LED Enable |
| 73 | SPK_M | SPRK_OUT_M | O | Speaker driver output (-) |
| 74 | KYD_BAKLIGHT | KEY_BAKLIGHT | O | KYD_BAKLIGHT output |
| 75 | SPK_P | SPRK_OUT_P | O | Speaker driver output (+) |
| 76 | GND | GROUND | V | Signal ground |
| 77 | GND | GROUND | V | Signal ground |
| 78 | EAR_DET | EAR_DET1 | I | GPIO, EAR Jack Detect |
| 79 | HPH_R | HPH_R | O | Stereo headphone output, Right |
| 80 | EAR10_P | EAR10_P | O | Earphone 1 amplifier output (+) |
| 81 | EAR10_M | EAR10_M | O | Earphone 1 amplifier output (-) |
| 82 | MIC1_P | MIC1_P | I | External Mic (+) input |

| | | | | |
|---|---|---|---|---|
| 83 | MIC2_P | MIC2_P | I | Ear Jack Mic (+) input |
| 84 | GND | GROUND | V | Signal Ground |
| 85 | GND | GROUND | V | Signal ground |
| 86 | VPH_PWR | VPH_PWR | O | +3.3V ~ +4.2V power supply to peripheral device |
| 87 | VBATT_DC | VEXT_DC | I | External DC input |
| 88 | VBATT_INT | VBATT_INT | I | Battery input |
| 89 | VEXT_DC | VEXT_DC | I | External DC input |
| 90 | VBATT_INT | VBATT_INT | I | Battery input |
| 91 | GPIO_29 | USB_VBUS | I | +5Vdc input or output depending upon the type of peripheral device connected. Default is input |
| 92 | USB_OE_TP_N | USB_CON_D_M | B | USB differential data minus (-) |
| 93 | USB_SEO_VM | USB_CON_ID | I | Not in use |
| 94 | USB_DAT_VP | USB_CON_D_P | B | USB differential dada minus (+) |
| 95 | MIC1_M | MIC1_M | I | External Mic (-) input |
| 96 | VPH_PWR | VPH_PWR | O | +3.3V ~ +4.2V power supply to peripheral device |
| 97 | HPH_L | HPH_L | O | Stereo headphone output, Left |
| 98 | N.C | GPIO_35 | B | General purpose input output |
| 99 | GND | GROUND | V | Signal ground |
| 100 | GND | GROUND | V | Signal ground |

### 3.2.2 100-Pin Connector Pin-out (Top view)

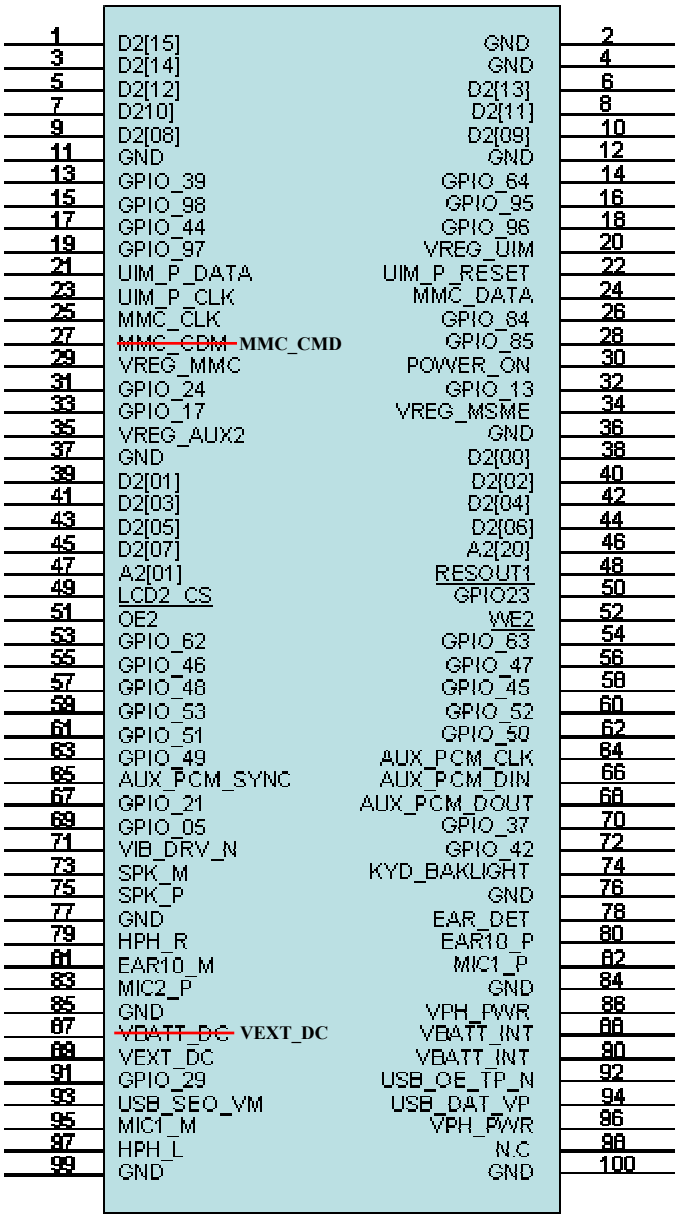



**Figure 3-1 100-PIN Connector Pinouts**

**Notes:**

* Pin16 and Pin18 can be used as a debugging port if USB is used as primary data. We strongly recommend that the user have a 3-pin connector or 3 test points on their board, so that one can easily monitor and diagnose their module.

LEAVE UNUSED PINS OPEN AT ALL TIMES

# 4. Interface Descriptions

## 4.1 Overview

This chapter covers information required to convert the DTEV-Dual into a subscriber unit application. In addition, some of the internal blocks of the device are described. Understanding these internal blocks is necessary for one to completely grasp the functions of the various interfaces.

This chapter discusses the interface to the major blocks of the DTEV-Dual as shown in the following figure. These blocks include:

- Power Up
- Power Down Registration Protocol for CDMA device
- Stereo Wideband CODEC Interface
- UART Interface
- General Purpose Interface
- User Interface
- External Bus Interface II
- USB Interface
- LED Interface
- RF Interface

## 4.2 Powering Up the Module

There are two ways to power up the module and customers may choose one of the two ways to power up DTEV-Dual module.

### 4.2.1 External Supply

If the customers don't need to save current in sleep mode, which is around 10mA, supplying voltage to VEXT_DC (Pin 87 and Pin89) is recommended. When the input voltage from +4V to +5.25V is supplied, DTEV-Dual will automatically start its power-on process and finish it within 2 seconds. In this case, using a regulator with an enable pin is highly recommended so that the customer can reset the module using the enable pin if software lock-up symptoms are found.

If a customer needs to use charging circuit built in the module**,** apply +5.0V DC to VEXT_DC(Pin87 and Pin89) and connect a +3.6V 1-cell lithium-ion battery to BATT_INT(Pin88 and 90).

**Table 4-1 Eternal Supply Pinouts**

| Pin # | Pin Name | Main Function | Type | Description |
|---|---|---|---|---|
| 87 | VEXT_DC | VEXT_DC | I | External DC input |
| 89 | VEXT_DC | VEXT_DC | I | External DC input |

### 4.2.2 Keypad Power On and Supply Input to BATT_INT

If the customers need to get their device to operate in a very low sleep current mode, supplying voltage to BATT_INT (Pin 88 and 90) is recommended.

When the input voltage from +3.3V to +4.5V is supplied to BATT_INT (Pin88 and 90) and POWER_ON goes to Low from High, power on sequence is initialed. For a successful power on sequence, POWER_ON(Pin30) must stay Low for more than 500msec and less than 2sec).

To power off the module, have POWER_ON(Pin 30) stay low for more than 2sec and less than 4sec and then the voltage in BATT_INT may or may not be removed.

If Vcc is supplied thru a regulator or a DC/DC converter to BATT_INT(Pin88 and 90), using one with an enable pin is highly recommended so that the customer can shut off the power to the module using the enable pin if software lock-up symptoms are found. If the modem is locked up, low assertion of POWER_ON (Pin 30) won't power on or off the module. If Vcc is supplied directly from a battery, having a FET between the output of a battery and VBATT_INT(Pin88 and Pin90) is recommended that the customer can shut off the power to DTEV-Dual using the FET switch.

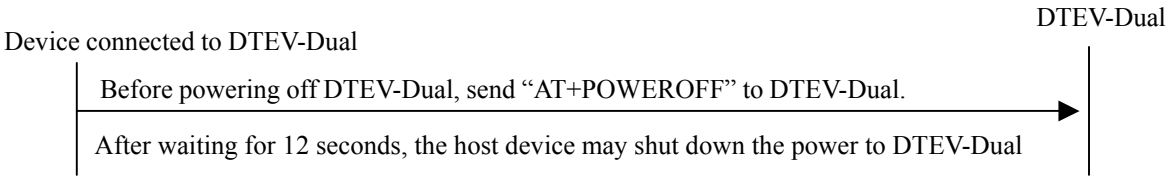
**Table 4-2 Battery Supply Pinouts**

| Pin # | Pin Name | Main Function | Type | Description |
|---|---|---|---|---|
| 88 | VBATT_INT | VBATT_INT | I | Battery plus (+) input |
| 90 | VBATT_INT | VBATT_INT | I | Battery plus (+) input |
| 30 | POWER_ON | POWER_ON | I | POWER ON used only when to use +3.6V 1-cell battery. External pull-up to +3V to +4.5V thru 100kohm resistor. |

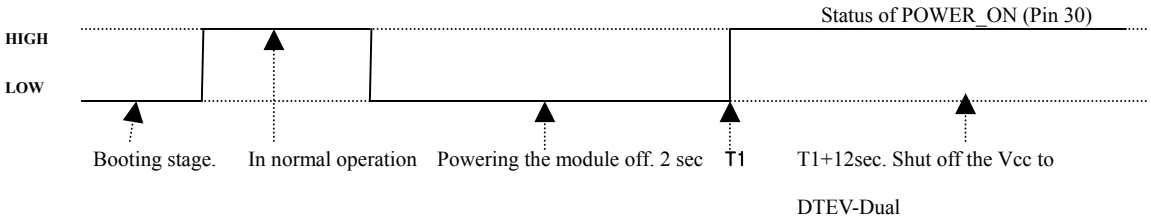
## 4.3 Power Down Registration Protocol for CDMA device

Before DTEV-Dual is powered off, it has to send power down registration message to the CDMA base station to help the base station to maximize its capacity. Depending on air interface environment, it may take up to 12 seconds according to CDMA technical standard.

### 4.3.1 Using AT command (When Vcc is applied to VEXT_DC)




### 4.3.2 Using POWER_ON (Pin 30) (Only when Vcc is applied to BATT_INT)



## 4.4 Stereo Wideband CODEC Interface

With the integrated microphone and earpiece amplifier including CODEC, the DTEV-Dual module interfaces directly, either differential or single-ended, to the microphone and earpiece.

The audio features in the module are

- Two microphone inputs
- Two earphone outputs and one auxiliary audio output.

### 4.4.1 Microphone and earphone Interface

The module contains analog audio interface circuitry. The contained audio interface supports all of the required conversation and amplification stages for the audio front end.

The audio interface includes the amplification stages for both the microphone and earphone.

The module supports audio outputs with its variable gain audio as volume control can be used for audio alerts or speaker phone. The speaker driver has programmable gain, turn-on time, and muting, and operates as a differential device delivering a volume-controlled 500mW to an external 8-Ohm speaker.

The EAR10 and MIC1P are typically used for the handset ear-piece/mic.

The EAR_JACK+ and MIC2P are typically used for the ear-jack.

**Table 4-4.1 Analog Audio Pinouts**

| Pin # | Pin Name | Main Function | Type | Description |
|---|---|---|---|---|
| 73 | SPK_M | SPRK_OUT_M | O | Loud speaker output (-) |
| 75 | SPK_P | SPRK_OUT_P | O | Loud speaker output (+) |
| 80 | EAR10_P | EAR10_P | O | Ear-piece output (+) |
| 81 | EAR10_M | EAR10_M | O | Ear-piece output (-) |
| 82 | MIC1_P | MIC1_P | I | Mic. (+) input |
| 95 | MIC1_M | MIC1_M | I | Mic. (-) input |
| 78 | EAR_DET | EAR_DET1 | I | EAR/MIC Set Detect* |

* EAR_DET checks to see if a headset has been connected to the ear-jack. When there is no headset connected to the ear-jack, the audio path thru an ear-jack is disconnected and ear-piece/mic. is connected. Setting EAR_DET to **HIGH** disconnects ear-jack and connects ear-piece/mic.

**Table 4-4.1.1Speaker Driver Performance Specifications**

| Parameter | Comments | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|---|
| Input frequency range | | 0.20 | | 20 | kHz | |
| Input resistance | Differential | 60 | 72 | 86 | k | |
| Input drive level | | | | | $V_{RMS}$ | |
| Output power ($P_{rated}$) | THD < 0.5% | | 500 | | mW | 2 |
| Power efficiency at $P_{rated}$ | | 50 | | | % | |
| Programmable amplifier gain | | -16 | | +12 | dB | 3 |
| Amplifier gain error | | -1 | | +1 | dB | |
| Amplifier gain flatness | 20 Hz to 20 kHz | -0.5 | | +0.5 | dB | |
| Output referred noise | $V_{in}$ = 0V, | | | | | 4 |
| G = -16 dB | 20 Hz – 20 kHz, | | 16 | | $V_{RMS}$ | |
| G = -12 dB | 8 ohm Load | | 16 | | $V_{RMS}$ | |
| G = -8 dB | | | 17 | | $V_{RMS}$ | |
| G = -4 dB | | | 18 | | $V_{RMS}$ | |
| G = 0 dB | | | 23 | | $V_{RMS}$ | |
| G = +4 dB | | | 30 | | $V_{RMS}$ | |
| G = +8 dB | | | 44 | | $V_{RMS}$ | |
| G = +12 dB | | | 66 | | $V_{RMS}$ | |
| Output bandwidth at $P_{rated}$ | 8 load, 12dB gain | | 20 | | kHz | 5 |
| Output offdet voltage | | -40 | | +40 | mV | 6 |
| THD + noise | | | | 5 | % | |
| Power supply rejection ratio | $V_{in}$ = 0V, | | | | | |
| F = 20 Hz to 100 Hz | $V_{DD}$ = 3.6V + 100 $mV_{RMS}$ | | 55 | | dB | |
| F = 100 Hz to 5 kHz | | | 65 | | dB | |
| F = 5 kHz to 15 kHz | | | 55 | | dB | |
| F = 15 kHz to 20 kHz | | | 50 | | dB | |
| Turn-on time delay | | | | | | 7 |
| Short delay | | | 10 | 12.5 | ms | |
| Long delay | | | 100 | 125 | ms | |
| Pop and click levels | During power, gain, mute transitions | | 11 | | $mV_{PK}$ | 8 |
| Mute suppression | $V_{in}$ = 2 $V_{RMS}$ | 80 | | | dB | |
| Quiescent current | | | | 6.2 | mA | 6 |

### 4.4.2 Stereo Headphone Interface

**Table 4-4.2 Stereo Headphone Interface**

| Pin # | Pin Name | Main Function | Type | Description |
|---|---|---|---|---|
| 83 | MIC2_P | MIC2_P | I | Ear-Mic Jack input * |
| 78 | EAR_DET | EAR_DET1 | I | EAR/MIC Set Detect ** |
| 79 | HPH_R | HPH_R | O | Stereo headphone output, Right |
| 97 | HPH_L | HPH_L | O | Stereo headphone output, Left |

Note:

* MIC2, along with being a microphone input, checks to see if the user has pressed the headset key, which allows the user to connect to or disconnect from a call. This pin is internally pulled high and is therefore normally in the high state. To activate this input and connect to or disconnect from a call, the user must set the MIC2 pin to a low state for 100ms to 200ms.

** EAR_DET checks to see if a headset has been connected to the ear-jack. When there is no headset connected to the ear-jack, the audio path thru an ear jack is disconnected. When a headset is connected to the ear-jack, audio path is opened. To simulate a headset connected to the ear-jack, the user must apply **LOW** signal to the EAR_DET pin for as long as the user wants the audio path thru ear-jack to be kept open

### 4.4.3 Digital PCM Interface

The Digital PCM CODEC interface is used for the car-kit audio system. This interface is optional. External CODEC interface signals are listed below:

**Table 4-4.3 Digital CODEC Pinouts**

| Pin # | Pin Name | Main Function | Type | Description |
|---|---|---|---|---|
| 64 | GPIO_80 | AUX_PCM_CLK | B | PCM clock for auxiliary CODEC port |
| 65 | GPIO_81 | AUX_PCM_SYNC | O | PCM data strobe for auxiliary CODEC port |
| 66 | GPIO_82 | AUX_PCM_DIN | I | PCM data input for auxiliary CODEC port |
| 68 | GPIO_83 | AUX_PCM_DOUT | O | PCM data output for auxiliary CODEC port |

This feature is not implemented but can be added, please contact ed@anydata.com for technical support.

### 4.4.4 Stereo DAC Interface

DTEV-Dual supports DAC interface to an external stereo DAC for playing stereo sound or music (MP3 and MIDI, for example). This interface consists of four signals: serial bit clock (SDAC_CLK), left/right select (SDAC_L_R_N), serial data (SDAC_DOUT), and master clock (SDAC_MCLK).

**Table 4-4.4 Stereo DAC Pinouts**

| Pin # | Pin Name | Main Function | Type | Description |
|---|---|---|---|---|
| 64 | GPIO_80 | AUX_PCM_CLK | O | SDAC_SCK |
| 65 | GPIO_81 | AUX_PCM_SYNC | O | SDAC_L_R_N |
| 66 | GPIO_82 | AUX_PCM_DIN | O | SDAC_MCLK |
| 68 | GPIO_83 | AUX_PCM_DOUT | O | SDAC_DOUT |

This feature is not implemented but can be added, please contact ed@anydata.com for technical support

## 4.5 UART Interface

The Universal Asynchronous Receiver Transmitter (UART) communicates with serial data that conforms to the RS-232 Interface protocol. The module has 3 UARTs which provides 2.85 V CMOS level outputs and 2.85V CMOS input levels. All the control signals of the RS-232 are active low, however the data signals, RXD and TXD, are active high.

UART1 which has 512 bytes for Tx and Rx FIFO, supports high speed data communication up to 230.4kbps, program download and diagnostic monitor function.

UART2 and 3 which 64 bytes for T/Rx FIFO, support low speed data communication up to 115.2kbps, program download and diagnostic monitor function.

The UART features hardware handshaking, programmable data sizes, programmable stop bits, and odd, even, no parity.

### 4.5.1 UART1 interface

**Table 4-5.1 UART1 Interface Pinouts**

| Pin # | Pin Name | Main Function | Type | Description |
|---|---|---|---|---|
| 13 | GPIO_39 | UART1_DCD_N | O | Data carrier detect control input ( UART1 ) |
| 14 | GPIO_64 | UART1_RI_N | O | Ring indicator control input ( UART1 ) |
| 15 | GPIO_98 | UART1_RFR_N | O | Ready for Receive ( UART1 ) |
| 16 | GPIO_95 | UART1_TXD | O | Transmit data output ( UART1 ) |
| 17 | GPIO_44 | UART1_DTR | I | Data terminal ready control output ( UART1 ) |
| 18 | GPIO_96 | UART1_RXD | I | Receive data input ( UART1 ) |
| 19 | GPIO_97 | UART1_CTS_N | I | Clear to send control input ( UART1 ) |

Leave unused Pins open.

This feature is not implemented but can be added, please contact ed@anydata.com for technical support.

### 4.5.2 UART2 R-UIM interface

The UART2 supports R-UIM interface.

**Table 4-5.2 UART2 Interface Pinouts**

| Pin # | Pin Name | Main Function | Type | Description |
|---|---|---|---|---|
| 20 | VREG_UIM | VREG_UIM | O | +3.0V power supply to RUIM card |
| 21 | UIM_P_DATA | UIM_P_DATA | I | Data from RUIM card |
| 22 | UIM_P_RESET | UIM_P_RESET | O | RUIM card reset |
| 23 | UIM_P_CLK | UIM_P_CLK | O | RUIM clock |

Leave unused Pins open.

If a customer wants to use R-UIM card, UART2 can't be used as UART.

This feature is not implemented but can be added, please contact ed@anydata.com for technical support.

### 4.5.3 UART3 Debug Port Interface

The UART3 is used to monitor and diagnose the status of the DTEV-Dual. It is strongly recommended for the user to have the following UART3 pins connected to an extra connector or to test points, in order to easily troubleshoot any problems with the module.

**Table 4-5.3 UART3 Interface Pinouts**

| Pin # | Pin Name | Main Function | Type | Description |
|---|---|---|---|---|
| 26 | GPIO_84 | UART3_TXD | O | Transmit data output, DEBUG PORT |
| 28 | GPIO_85 | UART3_RXD | I | Receive data input , DEBUG PORT |
| 16 | GPIO_95 | UART1_TXD | O | Transmit data output, DEBUG PORT |
| 18 | GPIO_96 | UART1_RXD | I | Receive data input , DEBUG PORT |

**If USB is used for primary data, use Pin16 and Pin18 for debugging.**

If UART1 is used for primary data and USB is not used, use Pin26 and 28 for debugging.

Leave unused Pins open.

This feature is not implemented but can be added, please contact ed@anydata.com for technical support.

### 4.5.4 USB Interface

The module contains Universal Serial Bus (USB) interface to provide an efficient interconnect between the mobile phone and a personal computer (PC).It can act as a USB peripheral device, supporting low speed 1.5 Mbps and full speed 12Mbps connections. In host mode, the module supplies VBUS with +5Vdc at up to 25mA.

This module is USB V1.1 comparable.

**Table 4-5.4 USB Interface Pinouts**

| Pin # | Pin Name | Main Function | Type | Description |
|---|---|---|---|---|
| 91 | GPIO_29 | USB_VBUS | I | +5Vdc input or output depending upon the type of peripheral device connected. Default in input. |
| 92 | USB_OE_TP_N | USB_CON_D_M | B | Differential Data minus (-) |
| 93 | USB_SE0_VM | USB_CON_ID | I | Not in use |
| 94 | USB_DAT_VP | USB_CON_D_P | B | Differential Data plus (+) |

USB host feature is not implemented, please contact ed@anydata.com for technical support.

## 4.6 General Purpose Interface

The general purpose interface is user-definable bi-directional pin. It can be configured as an interrupt source. In addition, the GPIO pin can be used as output control pin from the module. The user can define this pin properly as following.

**Table 4-6 General Purpose Interface Pinouts**

| Pin # | Pin Name | Main Function | Type | Description |
|---|---|---|---|---|
| 33 | GPIO_17 | GPIO_17 | B | Programmable pull.<br>This pin can be programmed to No Pull, Pull Up, or Pull Down. |
| 98 | NC | GPIO_35 | B | Programmable pull.<br>This pin can be programmed to No Pull, Pull Up, or Pull Down. |

## 4.7 User Interface

### 4.7.1 Keypad

The keypad interface consists of a 5 X 6 matrix pattern. The 5-KEYSENSE/[4:0] pins are used to connect a matrix keypad to the module. The KEYSENSE/ pins are active low.

The 6-KEYPAD pins are necessary to construct the other side of the matrix. These KEYPAD pins must be active high in order for the keypad matrix to work properly. The general keypad matrix is shown below:

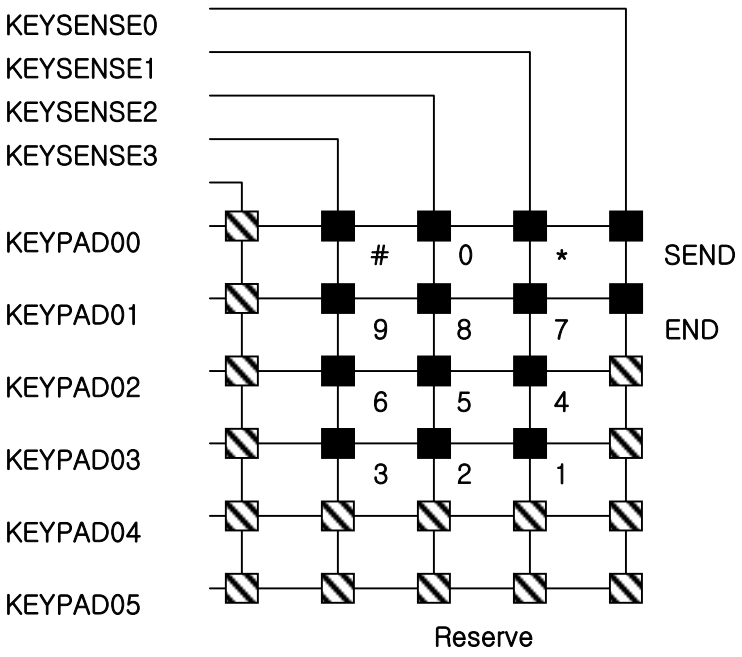



**Figure 4-7.1 Keypad Matrix**

**Table 4-7.1.1 Keysense GPIO Pinouts**

| Pin # | Pin Name | Main Function | Type | Description |
|---|---|---|---|---|
| 53 | GPIO_62 | KEYSENSE0_N | I | Key sense input |
| 54 | GPIO_63 | KEYSENSE1_N | I | Key sense input |
| 55 | GPIO_46 | KEYSENSE2_N | I | Key sense input |
| 56 | GPIO_47 | KEYSENSE3_N | I | Key sense input |
| 57 | GPIO_48 | KEYSENSE4_N | I | Key sense input |

**Table 4-7.1.2 Keypad GPIO Pinouts**

| Pin # | Pin Name | Main Function | Type | Description |
|---|---|---|---|---|
| 58 | GPIO_45 | KYPAD_5 | I | GPIO, Keypad input |
| 59 | GPIO_53 | KYPAD_4 | I | GPIO, Keypad input |
| 60 | GPIO_52 | KYPAD_3 | I | GPIO, Keypad input |
| 61 | GPIO_51 | KYPAD_2 | I | GPIO, Keypad input |
| 62 | GPIO_50 | KYPAD_1 | I | GPIO, Keypad input |
| 63 | GPIO_49 | KYPAD_0 | I | GPIO, Keypad input |

**DTMF**

When key is pressed, CDMA Module generates standard DTMF tone and sends it to the local audio path (speaker). If the Mobile station is in traffic state, the CDMA Module sends DTMF Message to the Base Station and to the local audio path (speaker) at the same time. The network will deliver the analog DTMF tone or DTMF Message to its final destination.

This feature is not implemented but can be added, please contact **ed@anydata.com** for technical support. .

### 4.7.2 MultiMediaCard controller

DTEV-Dual contains a MultiMediaCard (MMC) controller that provides a link between the ARM bus master and the MultiMediaCard bus for storing digital music, games, address books and photos**.** The SD card supports a 1-bit SD bi-directional bus mode. SD bus pins are CLK, CMD and DAT in 1-bit mode and CLK, CMD, and DAT[0:3] in 4-bit mode. The MultiMediaCard also supports the 1-bit bi-directional MMC bus mode that has CLK, CMD, and DAT bus pins. The CMD and DAT pins are bi-directional on the SD 1-bit, SD 4-bit, and MMC 1-bit. DTEV-Dual can't support SD 4-bit mode. MMC version 3.31 is supported for the ROM class and R/W MMCs. SD Memory Card Physical Layer Specification Version 1.01 is supported in SD bus mode.

**Table 4-7.2 MultiMediacatd Controller Pinouts**

| Pin # | Pin Name | Main Function | Type | Description |
|---|---|---|---|---|
| 24 | MMC_DATA | MMC_DATA | B | GPIO_32, MultiMediaCard data |
| 25 | MMC_CLK | MMC_CLK | O | GPIO_31, MMC clock |
| 27 | MMC_CMD | MMC_CMD | B | GPIO_30, MMC command |
| 29 | VREG_MMC | VREG_MMC | O | +2.85V |
| 35 | VREG_AUX2 | VREG_AUX2 | O | +2.85V |
| 68 | GPIO_INT22 | SD_DETECT | I | SD/MMC detect. Low detection |

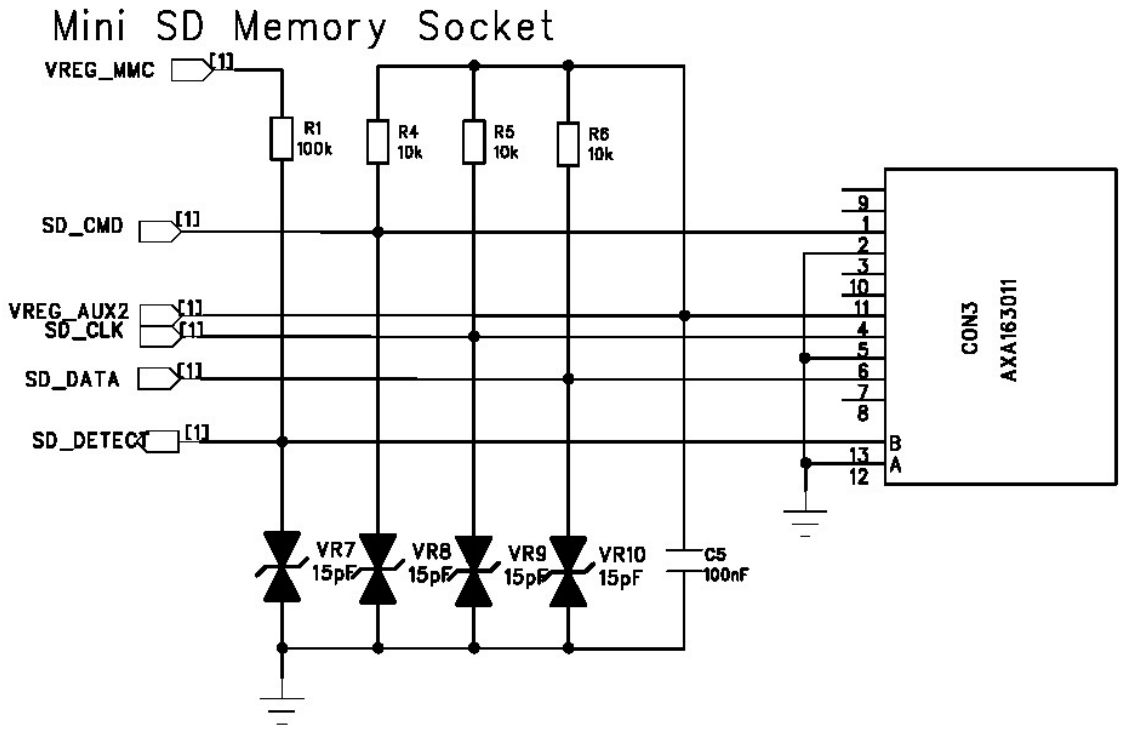



**Figure 4-7.2 MMC Bus Circuitry Diagram**

This feature is not implemented but can be added, please contact ed@anydata.com for technical support.

### 4.7.3 Vibration Motor Driver

DTEV-Dual supports silent incoming-call alarms with its vibration motor driver.

**Table 4-7.3.1 Vibration Motor Driver Pinouts**

| Pin # | Pin Name | Main Function | Type | Description |
|---|---|---|---|---|
| 71 | VIB_DRV_N | VIB_DRV_N | O | VIBRATOR_DRV output |

**Table 4-7.3.2 Vibration motor driver performance specifications**

| Parameter | Comments | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|---|
| Output voltage ($V_m$) error | $V_{DD} \geq 3.2V$; $I_m$=0 to 175mA; | | | | | 1 |
| Gain error | $V_m$ setting = 1.2 to 3.1V | -6 | | +6 | % | |
| Offset error | | -60 | | +60 | mV | |
| Short circuit current | VIB_DRV_N (pin25) = $V_{DD}$ | 225 | | 500 | mA | |
| Driver bias current | $I_m$= 175mA | | 78 | | | 2 |
| Driver leakage current | | | | 100 | nA | |

Notes:

1. The vibration motor driver circuit is a low-side driver. The motor is connected directly to $V_{DD}$ and the voltage across the motor is : $V_m = V_{DD} - V_{out}$ where $V_{out}$ is the PM6650 voltage at pin25 (VIB_DRV_N).
2. Driver bias current is the change in $I_{DD}$ when the motor driver is turned on less the motor current.

This feature is not implemented but can be added, please contact **ed@anydata.com** for technical support.

### 4.7.4 LED Interface

**Table 4-7.4 LED Pinouts**

| PIN NUMBER | USE | REMARK |
|---|---|---|
| 64 | Idle LED | High Enable, High indicates "The device is in CDMA service area" |
| 65 | Traffic LED | High Enable, High indicates "The device is in CDMA Traffic state" |
| 66 | SMS LED | High Enable High indicates "The device has received SMS message |
| 72 | Power On LED | High Enable High indicates "The device is turned on" |

Above pins can not drive LED directly. Must use driver ICs to drive LEDs

## 4.8 External Bus Interface II ( or LCD Interface )

The External bus interface II supports the parallel LCD interfaces. The port mapped or memory mapped (16-bit interface and 8-bit devices) parallel LCD device could be connected to chip select LCD2_CS_N in EBI2. The maximum address space per chip select is 2 Megabyte. Direct access to the LCD driver is not applicable.

**Table 4-8 LCD Interface Pinouts**

| Pin # | Pin Name | Main Function | Type | Description |
|---|---|---|---|---|
| 1 | D2[15] | EBI2_DATA15 | B | Data line |
| 3 | D2[14] | EBI2_DATA14 | B | Data line |
| 5 | D2[12] | EBI2_DATA12 | B | Data line |
| 6 | D2[13] | EBI2_DATA13 | B | Data line |
| 7 | D2[10] | EBI2_DATA10 | B | Data line |
| 8 | D2[11] | EBI2_DATA11 | B | Data line |
| 9 | D2[08] | EBI2_DATA08 | B | Data line |
| 10 | D2[09] | EBI2_DATA09 | B | Data line |
| 38 | D2[00] | EBI2_DATA00 | B | Data line |
| 39 | D2[01] | EBI2_DATA01 | B | Data line |
| 40 | D2[02] | EBI2_DATA02 | B | Data line |
| 41 | D2[03] | EBI2_DATA03 | B | Data line |
| 42 | D2[04] | EBI2_DATA04 | B | Data line |
| 43 | D2[05] | EBI2_DATA05 | B | Data line |
| 44 | D2[06] | EBI2_DATA06 | B | Data line |
| 45 | D2[07] | EBI2_DATA07 | B | Data line |
| 46 | A2[20] | A2[20] | O | Address line |
| 47 | A2[01] | A2[01] | O | Address line |
| 49 | LCD2_CS | LCD2_CS_N | O | Peripheral LCD Chip Select |
| 48 | RESOUT1 | RESOUT1_N | O | Reset Out |
| 51 | OE2 | OE2_N | O | Output Enable Signal |
| 52 | WE2 | WE2_N | O | Write Enable Signal |

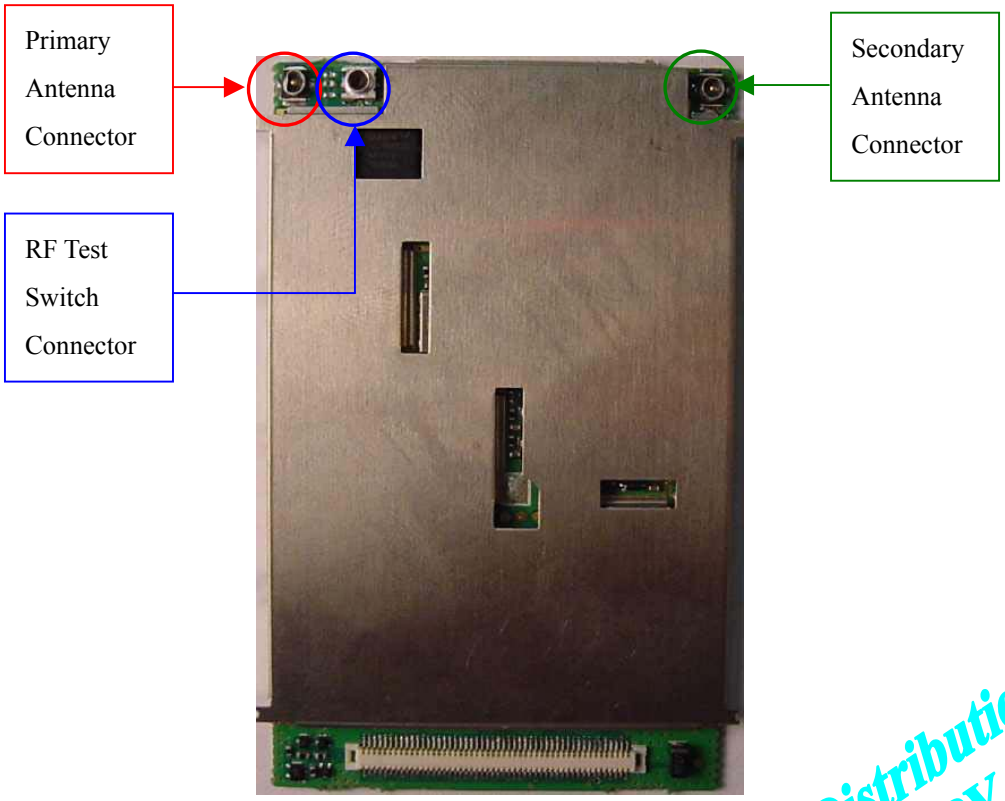
This feature is not implemented but can be added, please contact ed@anydata.com for technical support.

## 4.9 Antenna Interface

DTEV-Dual supports antenna diversity for CDMA signal reception, MS-Assisted GPS, MS-Based GPS, simultaneous GPS, standalone GPS using secondary RF chain.

**Table 4-9 Required Antenna Type**

| INTENDED OPERATION | PRIMARY ANTENNA | SECONDARY ANTENNA | REMARK |
|---|---|---|---|
| - CDMA with Diversity<br>- GPS | 800/1900MHz Dual Band | 800/1900/1575MHz Tri Band | CDMA Diversity and GPS support |
| - CDMA with Diversity<br>- No GPS support | 800/1900MHz Dual Band | 800/1900MHz Dual Band | Optimized for CDMA Signal Reception |
| - CDMA without Diversity<br>- GPS | 800/1900MHz Dual Band | 1575.42MHz Single Band | Optimized for GPS Signal Reception |



# 5. Electrical Specifications

## 5.1 DC Electrical Specifications

### 5.1.1 Absolute Maximum Ratings

Operating the module under conditions that exceed those listed in the Absolute Maximum Ratings table may result in damage to the module.

Absolute Maximum Ratings should be considered as limiting values. The module may not function properly and should not be operated if any one of the parameters is not within its specified operating range.

**Table 5-1 Absolute Maximum Ratings**

| PARAMETER | | MIN | MAX | UNITS |
|---|---|---|---|---|
| Storage Temperature | | -50 | +85 | ℃ |
| Voltage apply to any Input or output pin | | -0.5 | +3.5 | V |
| Supply Voltage | VEXT_DC | -0.5 | +5.5 | V |
| | VBATT_INT | -0.5 | +4.5 | V |
| | USB_VBUS | -0.5 | +5.25 | V |
| Initializing Current | | 250 | | mA |
| Drop | | No damages after 60-Inch drop over concrete floor | | |

### 5.1.2 Recommended Operating Conditions

**Table 5-1.2 Recommended Operating Conditions**

| PARAMETER | | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|
| Supply Voltage | VEXT_DC | +4.0 | +5.0 | +5.25 | V |
| | VBATT_INT | +3.3 | +4.0 | +4.5 | V |
| | USB_VBUS | +4.4 | +5.0 | +5.25 | V |
| Operating Temperature | | -30 | | +60 | ℃ |
| Operating Humidity | | 95% (50°C) Relative Humidity | | | |

### 5.1.3 Power Consumption

**Table 5-1.3 Power Consumption**

| CONVERSATION (Busy) | STANDBY | |
|---|---|---|
| | Rx | Sleep |
| 900mA (MAX) | 110mA | VEXT_DC : 10mA<br>BATT_INT : 1mA |

### 5.1.4 Serial Interface Electrical Specifications

**Table 5-1.4 Serial Interface Electrical Specifications**

| PARAMETER | DESCRIPTION | MIN | MAX | UNITS |
|---|---|---|---|---|
| VIH | High-level input voltage, CMOS/Schmitt | 1.7 | 3.3 | Volts |
| VIL | Low-level input voltage, CMOS/Schmitt | –0.3 | 0.94 | Volts |
| VOH | High-level output voltage, CMOS | 2.25 | **2.85** | Volts |
| VOL | Low-level output voltage, CMOS | 0 | 0.45 | Volts |

### 5.1.5 Multi-Purpose Pin Specifications

#### 5.1.5.1 Multi-Purpose Pin Configured

**Table 5-1.5.1 Multi-Purpose Pin Configured**

| PARAMETER | DESCRIPTION | MIN | MAX | UNITS |
|---|---|---|---|---|
| VIH | High-level input voltage | 1.7 | 3.0 | Volts |
| VIL | Low-level input voltage | –0.3 | 0.94 | Volts |
| VOH | High-level output voltage | 2.25 | 2.85 | Volts |
| VOL | Low-level output voltage | 0 | 0.45 | Volts |

#### 5.1.5.2 Multi-Purpose Pin Configured as a Bidirectional I/O

**Table 5-1.5.2 Multi-Purpose Pin Configured as a Bidirectional I/O**

| PARAMETER | MIN | MAX | UNITS |
|---|---|---|---|
| Nominal pull-up resistance | 1 | 30 | K Ohm |
| Resistor tolerance | –20 | 20 | % |
| Propagation delay | 20 | NA | ns |

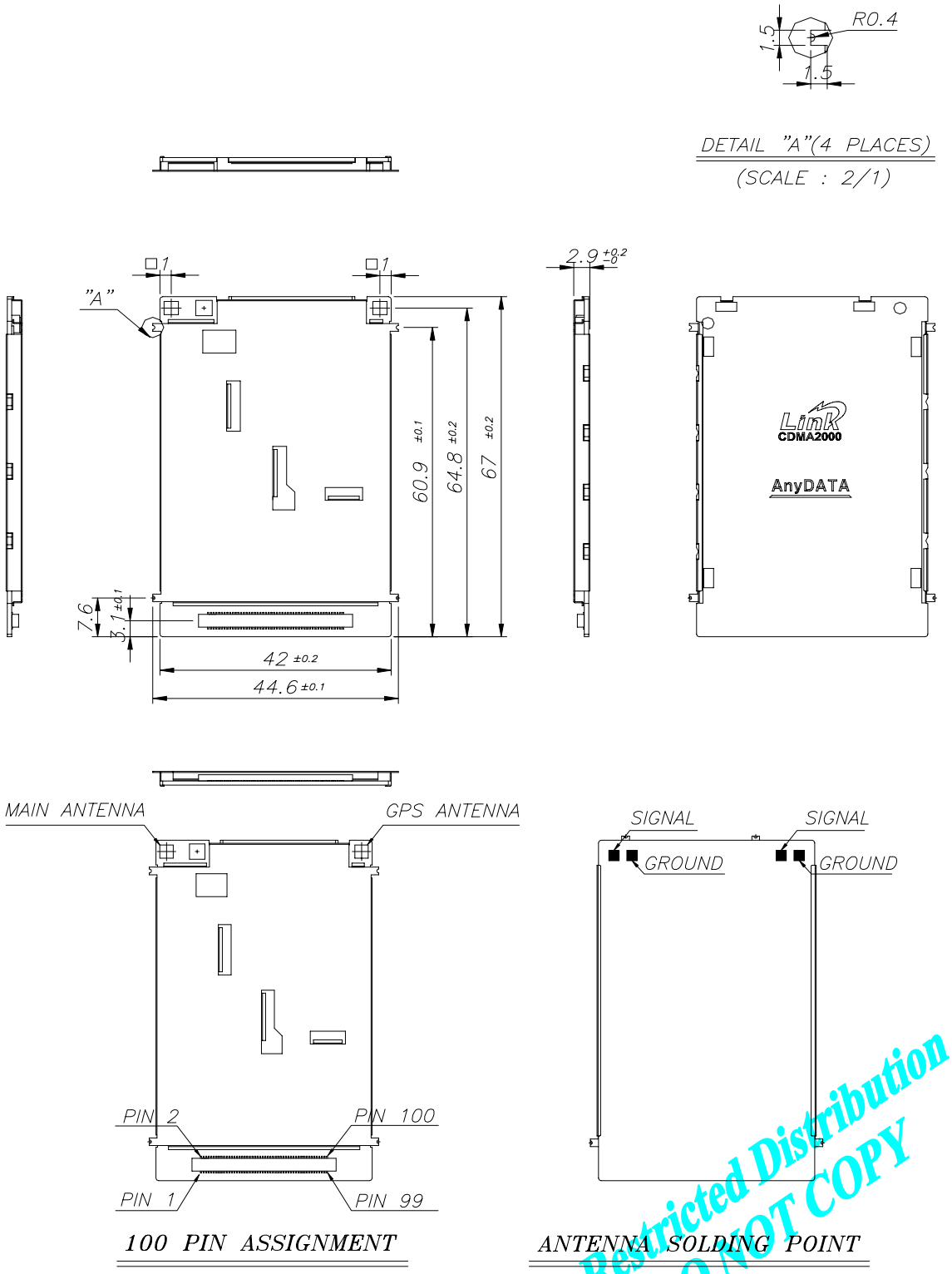
#### 5.1.5.3 Multi-Purpose Pin Configured as an analog

**Table 5-1.5.3 Multi-Purpose Pin Configured as an analog**

| PARAMETER | MIN | MAX | UNITS |
|---|---|---|---|
| Input current | NA | 100 | nA |
| Input capacitance | NA | 5 | pF |
| Output voltage error | NA | 0.7 | % |
| Load capacitance | 25 | NA | pF |

# 6. Mechanical Dimensions

## 6.1 DTEV-Dual Outline



4 solder points in red circles MUST be soldered to PCB GND in the host device

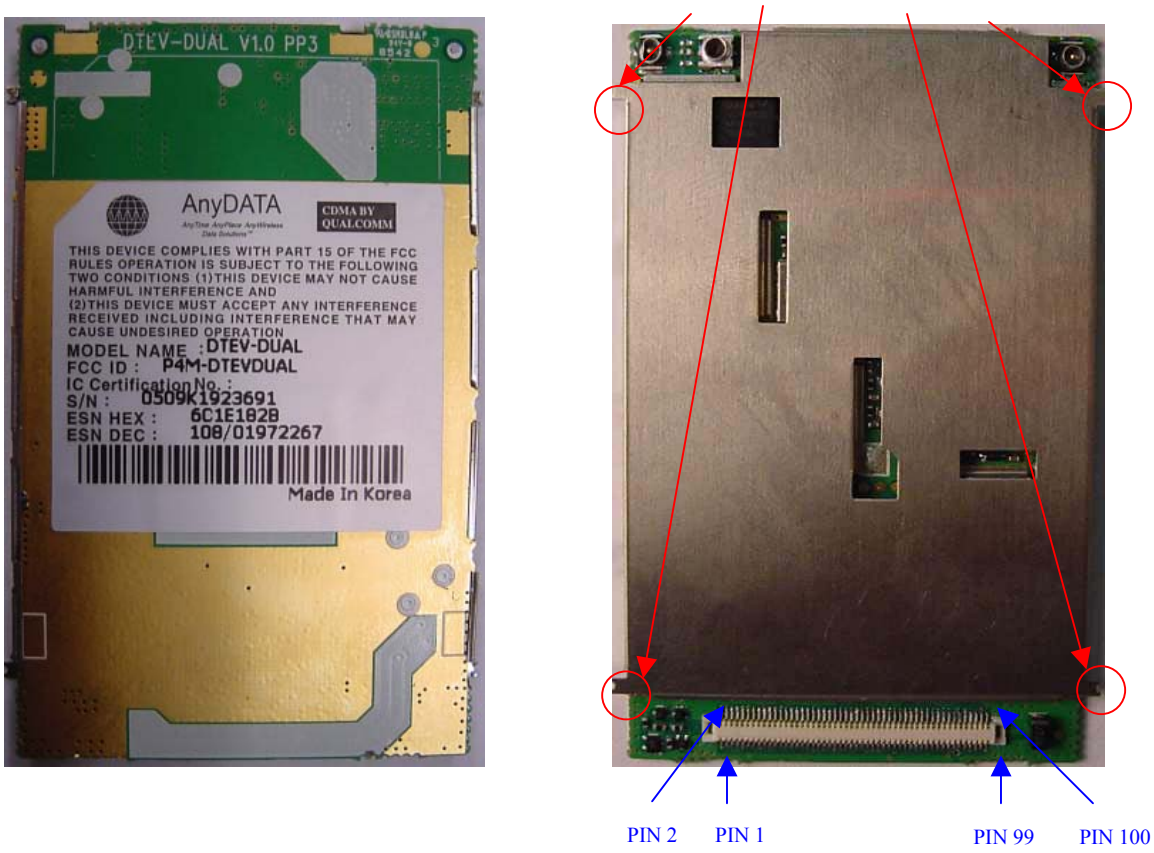



**Figure 6-1 DTEV-Dual Outline**

## 6.2 100-Pin Connector Mechanical Dimension

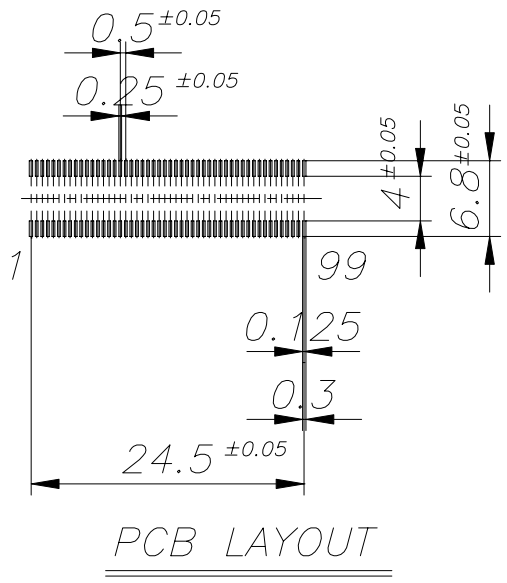



**Figure 6-2 100-pin Connector**

**Counter-Part** (the 100-pins socket connector (not in DTEV-Dual)):

Part Name: Socket pin connector (0.5mm pitch, straight, dual row)

Part Number: AXK5F00545J

Manufacture : NAIS

Note: For more information on the 100-pins socket connector,

Please visit http://www.nais-e.com/ , click connector, and "NARROW PITCH(0.5mm) CONNECTORS P5 SERIES P5KF"

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## 6.3 RF Connector

### 6.3.1 Cable Assembly, Sunridge Corp. Part

**6.3.1.1 Bulkhead SMA Type cable :** MCB2G-RH-59-**LLL**-SMAJB101

(Example, MCB2-RH-59-**080**-SMAJB101, **80mm-long RF cable**)

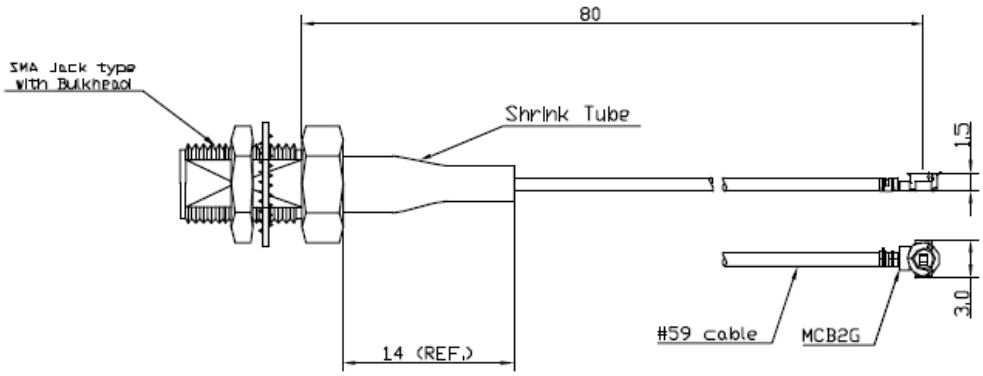


**Figure 6-3.1.1 Bulkhead SMA Type cable**

**6.3.1.2 PCB mountable right angle SMA cable :** MCB2G-RH-59-**LLL**-SMAJX103

(Example, MCB2G-RH-59-**100**-SMAJX103, **100mm-long RF cable**)

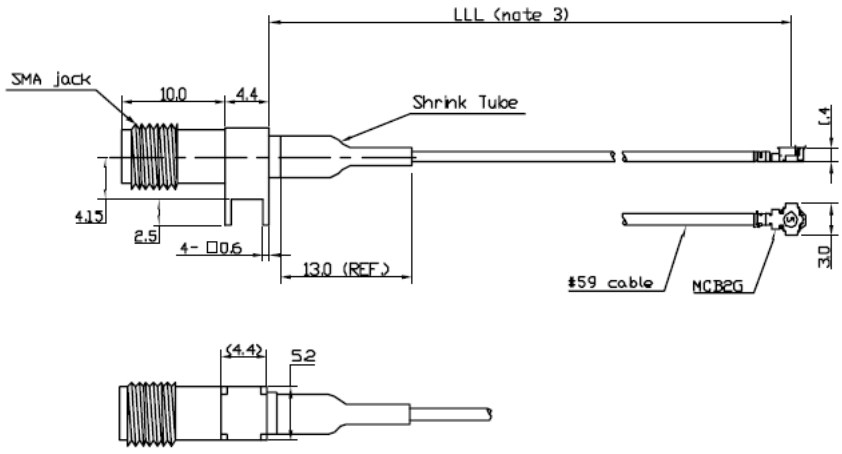


**Figure 6-3.1.2 PCB mountable right angle SMA cable**

**6.3.1.3 Contact Info**.

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### 6.3.2 Murata Part

Our part number : MM9329-2700.

Counter part number : MXTK92( )( )(  )

Please, visit http://www.murata.com and search for MXTK92 in product search engine

Part Numbering

Coaxial Connectors (Chip Type Receptacle)

(Part Number) MM ❶ | 7329 ❷ | -27 ❸ | 00 ❹ | R ❺ | A1 ❻

❶Product ID

| Product ID | |
|---|---|
| MM | Microwave Coaxial Connectors (Chip Type Receptacle) |

❷Series

| Code | Series |
|---|---|
| 3325 | BFA Type Straight |
| 3326 | BFA Type Right Angle |
| 7329 | FSC Type |
| 8430 | SWD Type |
| 9329 | GSC Type |

❸Individual Specification Code (1)

| Code | Individual Specification Code (1) |
|---|---|
| -25 | Discrete Terminal |
| -26 | Switch Connector SMD Type |
| -27 | Connector SMD Type |

❹Individual Specification Code (2)

| Code | Individual Specification Code (2) |
|---|---|
| 00 | Serial |

❺Package Product ID

| Code | Package Product ID |
|---|---|
| B | Bulk |
| R | Reel |

❻Package Detail

| Code | Package Detail |
|---|---|
| A1 | FSC, SWD, GSC Type 1000pcs./Reel (ø178mm) |
| B3 | SWD Type, 3000pcs./Reel (ø330mm) |
| B4 | FSC Type, 4000pcs./Reel (ø330mm) |
| B5 | GSC Type, 5000pcs./Reel (ø330mm) |

Coaxial Connectors (with Cable)

(Part Number) MX ❶ | FG ❷ | 76 ❸ | ❹ | ❺ | ❻

❶Product ID

| Product ID | |
|---|---|
| MX | Coaxial Connectors (with Cable) |

❷Connector (1)

| Code | Connector (1) |
|---|---|
| FG | FSC Type for 76 Cable |
| FK | FSC Type for 81 Cable |
| TK | GSC Type |
| YH | BFA Type |

❸Cable

| Code | Cable |
|---|---|
| 62 | 0.8D, PE, Double Shield Line |
| 63 | 0.8D, PE, Single Shield Line |
| 75 | 0.8D, FEP, Double Shield Line |
| 76 | 0.8D, FEP, Single Shield Line |
| 81 | 0.4D, FEP, Single Shield Line |
| 88 | 0.4D, PFA, Single Shield Line, Single Line |
| 92 | 0.4D, PFA, Single Shield Line, Spiral |

❹Connector (2)

| Code | Connector (2) |
|---|---|
| FG | FSC Type for 76 Cable |
| FK | FSC Type for 81 Cable |
| TK | GSC Type |
| YH | BFA Type |
| XX | None Connector |

❺Length

Expressed by four figures. The unit is mm. From first to third figures are significant, and the fourth figure expresses the number of zeros which follow the three figures.

Ex.)

| Code | Length |
|---|---|
| 5000 | 500mm = 500 x $10^0$ |
| 1001 | 1000mm = 100 x $10^1$ |

❻Individual Specification Code

Expressed by two figures.

# 7. Application Schematic

**Figure 7 Application Schematic**

# 8. Module Picture

**Figure 8 Module Picture**