



AnyDATA
*AnyTime AnyPlace Any Wireless
Data Solutions*

*DTS-800 CDK User Manual
Application Information*

*01-DTS800 CDK-1 X1
April 23, 2001*

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DTS-800 CDK Reference Manual Application Information
01-DT800 CDK-1 X1
Απριλ 23, 2001

Introduction

Τη ΧΔΜΑ δεωελοπιεντ κιτ (ΧΔΚ -800) ισ δεσιγνεδ φορ τηε τεστ ανδ σιμουλατιον οφ τηε ΧΔΜΑ ωιρελεσσ δατα χομμυνηατιονσ. Υσερ χαν χοννεχτ τηε δεωελοπιεντ κιτ το ψουρ Πξε ορ Νοτεβουκ ανδ εασιλψ τεστ τηε ωιρελεσσ χομμυνηατιονσ. Υσερ χαν υσε τηισ το δεωελοπιεντ ψουρ αππλιχατιονσ σοφτωαρε εωεν βεφορε υσερ'σ ωων ηαρδωαρε ισ ρεαδψ. Ιτ αλσο χαν βε υσεδ ασ α δεβυγγινγ δυρινγ υσερ'σ ηαρδωαρε τεστ.

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ΑνψΔΑΤΑ.ΝΕΤ Ινχ. ασσυμεσ νο ρεσπονσιβιλιτη φορ ανψ δαμαγε ορ λοσσ ρεσυλτινγ φρομ τηε μισυσε οφ ιτσ προδυχτσ. ΑνψΔΑΤΑ.ΝΕΤ Ινχ. ασσυμεσ νο ρεσπονσιβιλιτη φορ ανψ λοσσ ορ χλαιμσ βψ τηιρδ παρτιεσ, ωηιχη μαψ αρισε τηρουγη τηε υσε οφ ιτσ προδυχτσ.

ΑνψΔΑΤΑ.ΝΕΤ Ινχ. ασσυμεσ νο ρεσπονσιβιλιτη φορ ανψ δαμαγε ορ λοσσ χαυσεδ βψ τηε δελετιον ορ λοσσ οφ δατα ασ α ρεσυλτ οφ μαλφυνχιονσ ορ ρεπαρισ.

Τηε ινφορματιον δισχυλοσεδ ηερειν ισ τηε εχχλυσιωε προπερτηψ οφ ΑνψΔΑΤΑ.ΝΕΤ Ινχ. ανδ νο παρτ οφ τηισ πυβλιχατιον μαψ βε ρεπροδυχεδ ορ τρανσμιττεδ ιν ανψ φορμ ορ βψ ανψ μεανσ ινχλυδινγ ελεχτρονιχ στοραγε, ρεπροδυχιον, εξεχυτιον ορ τρανσμισσιον ωιτηουτ τηε πριορ ωριττεν χονσεντ οφ ΑνψΔΑΤΑ.ΝΕΤ Ινχ. Τηε ινφορματιον χονταινεδ ιν τηισ δοχυμεντ ισ συβφεχτ το χηανγε ωιτηουτ νοτιχε.

Ρεπροδυχιον, αδαπατιον ορ τρανσλατιον οφ τηισ δοχυμεντ ισ προηιβιτεδ ωιτηουτ πριορ ωριττεν περμισσιον οφ ΑνψΔΑΤΑ.ΝΕΤ Ινχ.

FCC RF Exposure Information

Warning! Ρεαδ τηισ ινφορματιον βεφορε υσινγ τηισ δεωιχε.



In August 1996 the Federal Communications Commission (FCC) of the United States with its action in Report and Order FCC 96-326 adopted an updated safety standard for human exposure to radio frequency electromagnetic energy emitted by FCC regulated transmitters. Those guidelines are consistent with the safety standard previously set by both U.S. and international standards bodies. The design of this device complies with the FCC guidelines and these international standards.



CAUTION

Operating Requirements

- ▶ Τηε υσερ χαν νοτ μακε ανψ χηανγεσ ορ μοδιφιχατιονσ νοτ εξπρεσσυψ αππροωεδ βψ τηε παρτηψ ρεσπονσιβιλε φορ χομπλιανχε, στηερωισε ιτ χουλδ ωοιδ τηε υσερεσ αυτηοριτηψ το οπερατε τηε εθυιπμεντ.
- ▶ Το σατισψψ ΦΧΧ ΡΦ εξποσυρε χομπλιανχε ρεθυιρεμεντσ φορ α μοβιλε τρανσμιττινγ δεωιχε, τηισ δεωιχε ανδ ιτσ αντεννα σηουλδ γενεραλλψ μαινταιν α σεπαρατιον διστανχε οφ 20χμ ορ μορε φρομ α περσον'σ βοδψ.

Special accessories

Ιν ορδερ το ενσυρε τηισ δεωιχε ιν χομπλιανχε ωιτη ΦΧΧ ρεγυλατιον, τηε σπεχιαλ αχχεσσοριεσ αρε προωιδεδ ωιτη τηισ δεωιχε ανδ μυστ βε υσεδ ωιτη τηε δεωιχε ονλψ. Τηε υσερ ισ νοτ αλλοωεδ το υσε ανψ στηερ αχχεσσοριεσ τηαν τηε σπεχιαλ αχχεσσοριεσ γωεν ωιτη τηισ δεωιχε

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Preface

About this Technical Manual

This Manual provides hardware interface and programming information for the DTS-800 CDK CDMA Wireless Data Modem. The manual is divided into the following chapters :

Chapter 1 : Introduction This chapter introduces users to the DTS-800 CDK CDMA Wireless Data Modem basic features and general specifications.

Chapter 2 : PIN Descriptions This chapter lists each DTS-800 CDK pin and its function within the device. The pinout for the modem is listed by numeric sequence.

Chapter 3 : Electrical Specifications This chapter specifies the recommended operating conditions, DC voltage characteristics, I/O timing, and power estimations for the modem. Timing diagrams are also included.

Chapter 4 : Interface Description This chapter details each subsystem or block within the modem and how the subsystem or block interface to external peripherals.

Chapter 5 : Mechanical Specifications This chapter provides package dimensions and outlook features for the modem.

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1 Overview

1.1 Application Descriptions

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

In a continuing effort to simplify the design and reduce the production cost of the Wireless Data Modem. AnyDATA.NET has developed the DTS series. The DTS-800 CDK is AnyDATA.NET 's latest compact Wireless Data Modem operating in Cellular spectrum, also contains complete digital modulation and demodulation system for CDMA standards as specified in IS-95 A/B.

The subsystem within the DTS-800 CDK include a CDMA processor (MSM3000), an integrated CODEC with ear piece and microphone amplifiers, and an RS-232 serial interface supporting forward link MDR data communications of 64kbps.

The DTS-800 CDK provides external interface. External interface includes the standard RS-232, Digital Audio, External On/Off control, LCD Display, Keypad, Ringer extension ports.

The DTS-800 CDK will power down unused circuits in order to dynamically minimize power consumption.

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1.2 Technical Specifications

1.2.1 General Specifications

PARAMETERS	DESCRIPTIONS
External Access	Code-Division-Multiple-Access (CDMA)
CDMA Protocol	IS-95 A/B, IS-98A, IS-126, IS-637A, IS-707A
Data Rate	64Kbps
Transmit/Receive Frequency Interval	45MHz
Band Width	1.23MHz
Operating Voltage	DC 6V \pm 10%
Current Consumption	Stand by mode : Idle (140mA) , Busy mode : 900mA (Max)
Operating Temperature	-30 ~ +60
Frequency Stability	\pm 300Hz
Antenna	Whip Antenna, 50ohm
Size	102 X 80 X 36mm with case
Weight	About 180g
External Interface	RS-232, Digital/Analog Audio, LCD, Keypad, Ringer External On/Off Control

1.2.2 Receive Specifications

PARAMETERS	DESCRIPTIONS
Frequency Range	869.04 ~ 893.97 MHz
Sensitivity	Below -104 dBm
Interference Rejection	Single tone (-30dBm @900KHz) : Below -101dBm Two tone (-43 dBm @900KHz and 1700KHz) : Below -101dBm Two tone (-32 dBm @900KHz and 1700KHz) : Below -90dBm Two tone (-21 dBm @900KHz and 1700KHz) : Below -79dBm
Spurious Wave Suppression	Below -80dBc
Input Dynamic Range	-25 dBm ~ -104dBm

1.2.3 Transmit Specifications

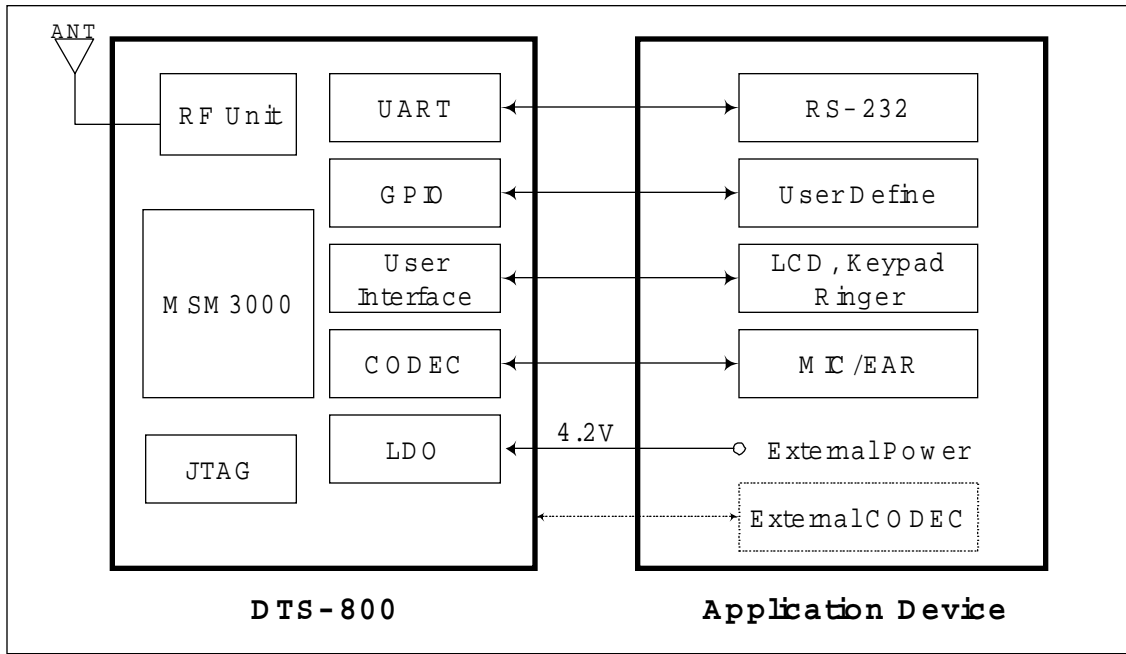
PARAMETERS	DESCRIPTIONS
Frequency Range	824.04 ~ 848.97 MHz
Nominal Power	0.32 W
Minimum Controlled Output Power	Below -50dBm
Max Power Spurious	900KHz : Below -42dBc/30KHz 1.98MHz : Below -54dBc/30KHz

1.2.4 Standards

IS-95 A/B : Protocol Between MS & BTS
 IS-96A : Voice Signal Coding
 IS-98A : Base MS Function
 IS-126 : Voice Loop-Back
 IS-637 : Short Message Service
 IS-707 : Data Service

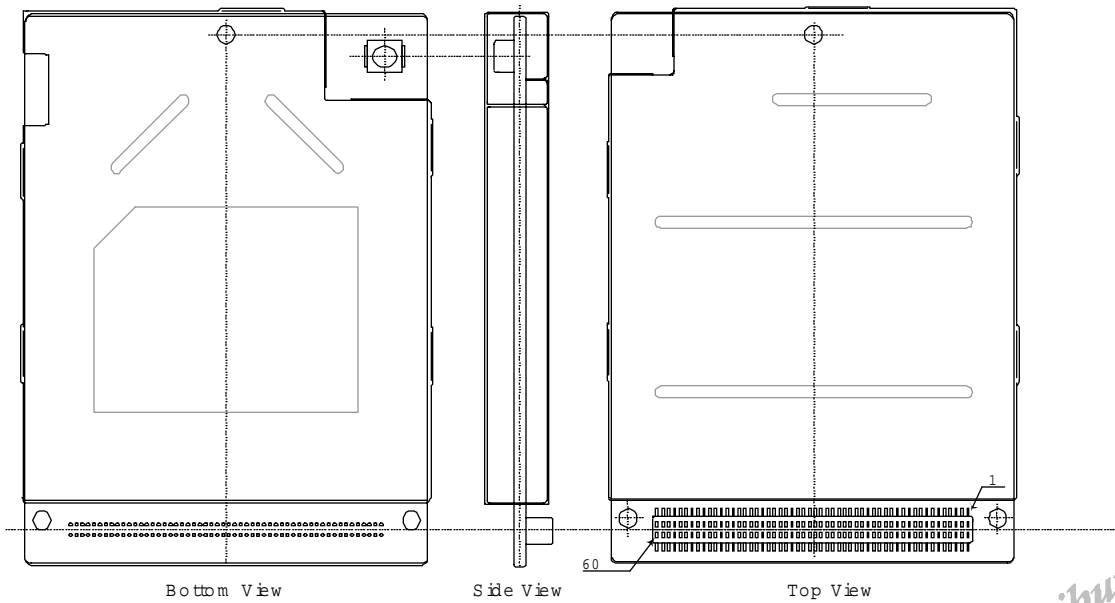
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1.3 Interface Diagram

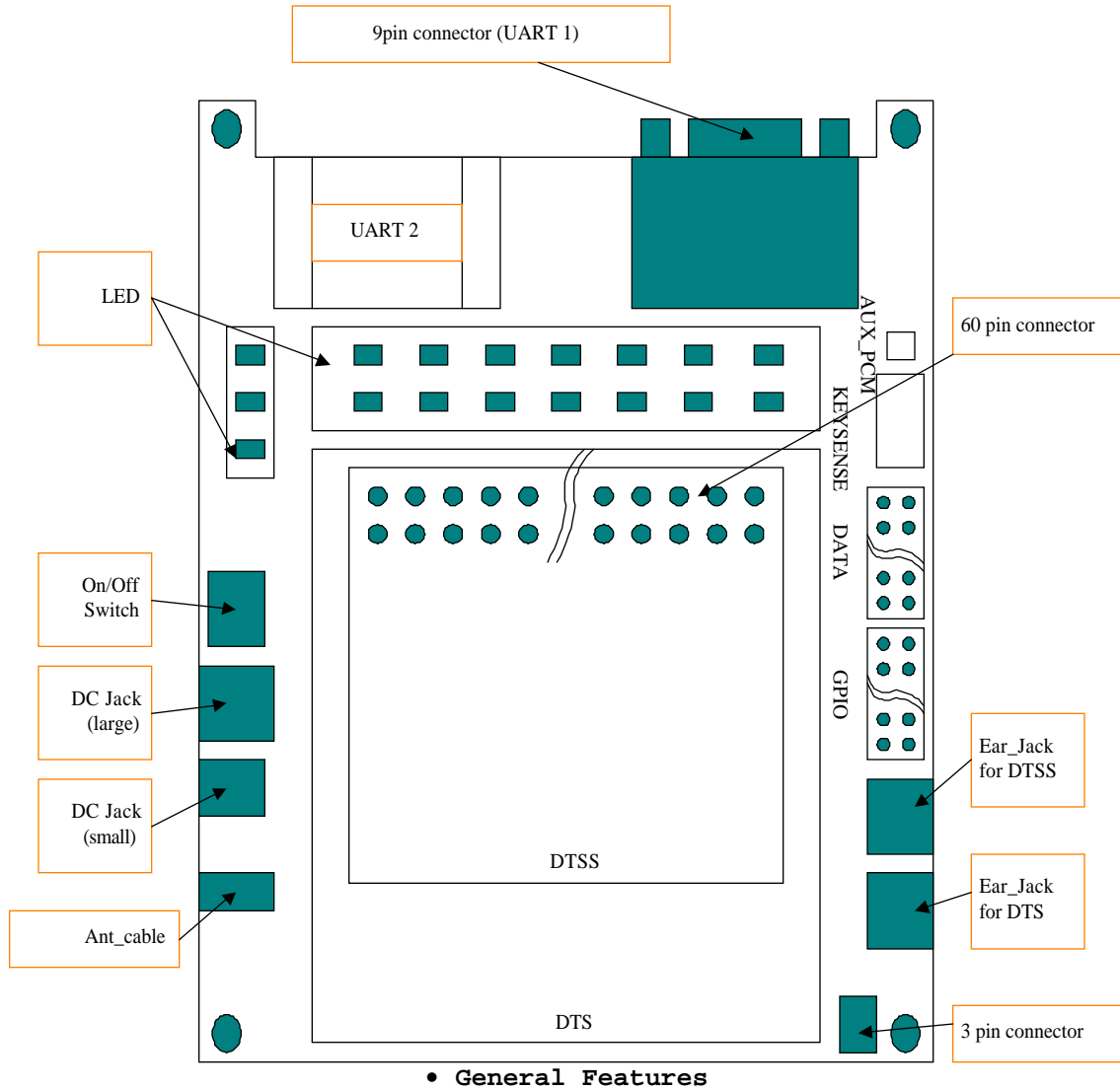


• Interface Block Diagram

1.4 General Features



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2 PIN Description

2.1 I/O Description Parameters

SYMBOL	DESCRIPTIONS
I	COMS Input
O	Output
B	Bi-directional
N	Voltage or Current Level
IS	Input with Schmitt Trigger
BS	Bi-directional Schmitt Trigger
PU	Internal Pull-Up
PD	Internal Pull-Down

2.2 PIN Names and Pinouts

2.2.1 60-Pin Connector

PIN	NAME	TYPE	DESCRIPTION
1	DP_DCD/	O	Data carrier detect
2	DP_RI/	O	Ring indicator
3	DP_RTS/	O	Request to send
4	DP_TXD	O	Transmit data
5	DP_DTR/	I	Data terminal ready
6	DP_RXD	IS	Receive data
7	DP_CTS/	IS	Clear to send
8	GND		Signal ground
9	AUX_PCM_DIN	IS	External CODEC PCM data input
10	GND		Signal ground

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PIN	NAME	TYPE	DESCRIPTION
11	AUX_PCM_DOUT	O	External CODEC PCM data output
12	GPIO_INT0	BS_PU	General purpose in/output by interrupt
13	AUX_PCM_CLK	O	External CODEC PCM clock
14	AUX_PCM_SYNC	O	External CODEC PCM sync.
15	GPIO00(SMS)_(GREEN)	BS_PU	General purpose input output
16	GPIO01(IDLE)_(RED)	BS_PU	General purpose input output
17	GPIO02	BS_PU	General purpose input output
18	GPIO03	BS_PU	General purpose input output
19	GPIO04	BS_PU	General purpose input output
20	GPIO05	BS_PU	General purpose input output
21	GPIO13	BS_PD	General purpose input output
22	GPIO14	BS_PD	General purpose input output
23	RINGER	O	Ringer output
24	D00	B	Data line
25	D01	B	Data line
26	D02	B	Data line
27	D03	B	Data line
28	D04	B	Data line
29	D05	B	Data line
30	D06	B	Data line
31	D07	B	Data line
32	A01	B	Address line
33	RES_OUT/	O	Reset output
34	LCD_CS/	O	LCD chip select
35	RD/	BS	Read enable output
36	LWR/	BS_PU	Write enable output
37	GND		Signal ground
38	GND		Signal ground
39	VEXT_DC	I	External power input
40	VEXT_DC	I	External power input

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PIN	NAME	TYPE	DESCRIPTION
41	GPIO30	BS	General purpose input output
42	GPIO29	BS	General purpose input output
43	GPIO22	BS_PD	General purpose input output
44	GPIO21	BS_PD	General purpose input output
45	GPIO20	BS_PD	General purpose input output
46	GPIO19	BS_PD	General purpose input output
47	GPIO18	BS_PD	General purpose input output
48	GPIO_INT3	BS_PU	General purpose in/output by interrupt
49	GPIO_INT1	BS_PU	General purpose in/output by interrupt
50	KEYSENSE0/	IS_PU	Key sense input
51	KEYSENSE1/	IS_PU	Key sense input
52	KEYSENSE2/	IS_PU	Key sense input
53	KEYSENSE3/	IS_PU	Key sense input
54	KEYSENSE4/	IS_PU	Key sense input
55	LCD_E	O	LCD read enable
56	A00	B	Address line
57	A02	B	Address line
58	A03	B	Address line
59	GND		Signal ground
60	VEXT DC	I	External power input

2.2.2 Analog Audio Signals

NAME	TYPE	DESCRIPTION
MIC+	I	Microphone audio input
MIC-	IS	Ear/microphone set detect
EAR	O	Ear audio output
GND_A		Audio ground

2.3 60-PIN Connector Pinouts (Top view)

1 DP_DCD/	2 DP_RI/
3 DP_RTS/	4 DP_TXD
5 DP_DTR/	6 DP_RXD
7 DP_CTS/	8 GND
9 AUX_PCM_DIN	10 GND
11 AUX_PCM_DOUT	12 GPIO_INT0
13 AUX_PCM_CLK	14 AUX_PCM_SYNC
15 GPIO00	16 GPIO01
17 GPIO02	18 GPIO03
19 GPIO04	20 GPIO05
21 GPIO13	22 GPIO14
23 RINGER	24 D00
25 D01	26 D02
27 D03	28 D04
29 D05	30 D06
31 D07	32 A01
33 RES_OUT/	34 LCD_CS/
35 RD/	36 LWR/
37 GND	38 GND
39 VEXT_DC	40 VEXT_DC
41 GPIO30	42 GPIO29
43 GPIO22	44 GPIO21
45 GPIO20	46 GPIO19
47 GPIO18	48 GPIO_INT3
49 GPIO_INT1	50 KEYSENSE0/
51 KEYSENSE1/	52 KEYSENSE2/
53 KEYSENSE3/	54 KEYSENSE4/
55 LCD-E	56 A00
57 A02	58 A03
59 GND	60 VEXT_DC

• 60-PIN
Pinouts

Connector

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3 Interface Descriptions

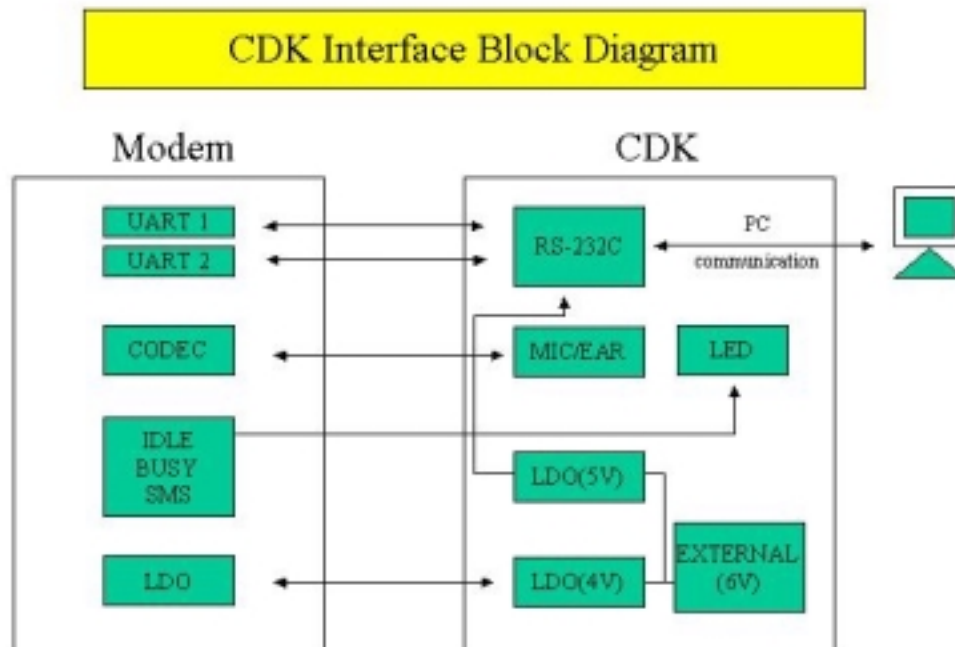
3.1 Overview

This chapter covers information needed to design the DTS-800 CDK into a subscriber unit application. In addition, this chapter describes some of internal blocks of the device necessary for complete understanding of the various interfaces.

This chapter discusses the interface to the major blocks of the DTS-800 CDK as shown in below

Figures. These blocks include :

- (CODEC Interface
- (UART Interface
- (General Purpose Interface
- (User Interface
- (JTAG Interface



- Interface Block Diagram

3.2 CODEC Interface

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The CODEC Interface configured by internal and external figures.

If use internal CODEC Interface, additional glue logic is not necessary. The modem provides very simple audio interface.

Otherwise, An external CODEC is necessary support for car-kit system. The modem provides PCM CODEC Interface.

3.2.1 Internal CODEC Interface

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

The audio interface includes the amplification stages for both the microphone and earphone. The interface supports one differential microphone input and one differential earphone output.

NAME	DESCRIPTION	CHARACTERISTIC
MIC +	MIC Input	Analog Input
MIC -	EAR/MIC Set Detect	Logic Input
EAR	Earphone Output	Analog Output
GND_A	Audio Ground	

- **Analog Audio Pinouts**

3.2.2 External CODEC Interface

The PCM CODEC interface used to car-kit audio system. This interface is optional item. External CODEC interface signals are below :

NAME	DESCRIPTION	PINOITS
AUX_PCM_CLK	PCM Clock	13'th of 60-Pin Connector
AUX_PCM_DIN	PCM Data Input	9'th of 60-Pin Connector
AUX_PCM_DOUT	PCM Data Output	11'th of 60-Pin Connector
AUX_PCM_SYNC	PCM Sync.	14'th of 60-Pin Connector

- **Digital CODEC Pinouts**

3.3 UART Interface

The Universal Asynchronous Receiver Transmitter (UART) communicates with serial data that conforms the RS-232 Interface protocol. The modem provides 3.0V CMOS level output and 3.0V CMOS switching input level. And all inputs have 5.0V tolerance but 3.0V or 3.3V CMOS logic compatible signals are highly recommended.

All the control signals of the RS-232 signals are active low, but data signals of RXD, and TXD Are active high.

The UART has a 64byte transmit (TX) FIFO and a 64byte receive (RX) FIFO. The UART Features hardware handshaking, programmable data sizes, programmable stop bits, and odd, even, no parity. The UART operates at a 115.2kbps maximum bit rate.

NAME	DESCRIPTION	CHARACTERISTIC
DP_DCD/	Data Carrier Detect	Network connected from the modem
DP_RI/	Ring Indicator	Output to host indicating coming call
DP_RTS/	Request to Send	Ready for receive from host
DP_TXD	Transmit Data	Output data from the modem
DP_DTR/	Data Terminal Ready	Host ready signal
DP_RXD	Receive Data	Input data to the modem
DP_CTS/	Clear to Send	Modem output signal
GND	Signal Ground	Signal ground

• **UART Interface Pinouts**

3.4 General Purpose Interface

The general purpose interface consist of 18 user-definable bi-directional, 3 user-definable interrupt input pins.

Each GPIO pin can be configured as input interrupt source. Also some GPIO pins can be used to output control pin from the modem. The user can define these pins properly

NAME	TYPE	CHARACTERISTIC
GPIO00	BS_PU	Configured as a pull-up, Bi-directional
GPIO01	BS_PU	Configured as a pull-up, Bi-directional
GPIO02	BS_PU	Configured as a pull-up, Bi-directional
GPIO03	BS_PU	Configured as a pull-up, Bi-directional
GPIO04	BS_PU	Configured as a pull-up, Bi-directional
GPIO05	BS_PU	Configured as a pull-up, Bi-directional
GPIO13	BS_PD	Configured as a pull-down, Bi-directional
GPIO14	BS_PD	Configured as a pull-down, Bi-directional
GPIO18	BS_PD	Configured as a pull-down, Bi-directional
GPIO19	BS_PD	Configured as a pull-down, Bi-directional
GPIO20	BS_PD	Configured as a pull-down, Bi-directional
GPIO21	BS_PD	Configured as a pull-down, Bi-directional
GPIO22	BS_PD	Configured as a pull-down, Bi-directional
GPIO29	BS	Bi-directional
GPIO30	BS	Bi-directional
GPIO_INT0	BS_PU	Configured as a pull-up, Bi-directional
GPIO_INT1	BS_PU	Configured as a pull-up, Bi-directional
GPIO_INT3	BS_PD	Configured as a pull-down, Bi-directional

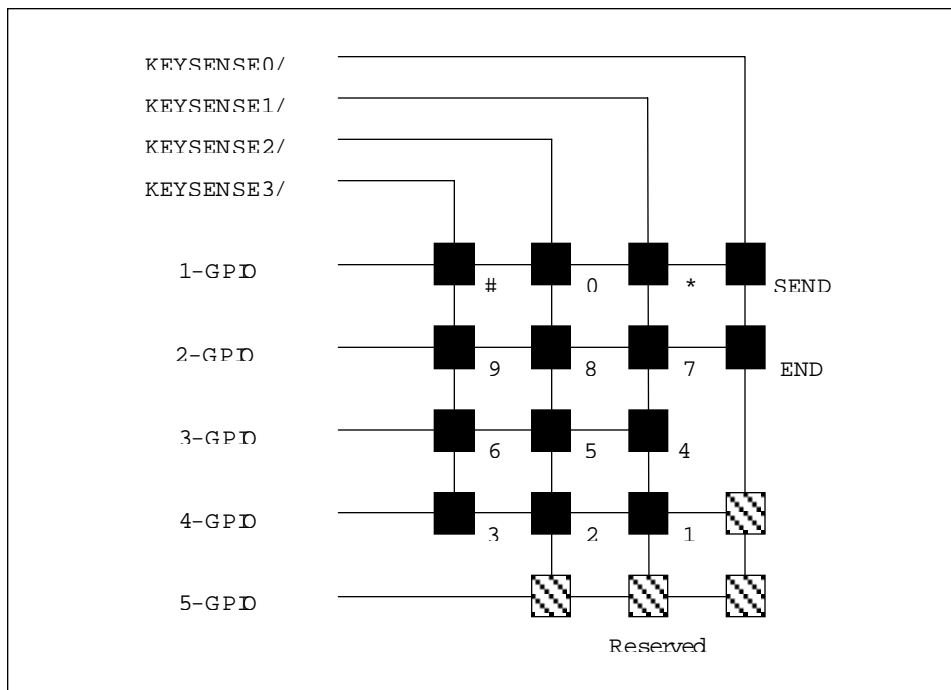
• **General Purpose Interface Pinouts**

3.5 User Interface

3.5.1 Key Pad

The key pad interface is consists of 4X5 matrix pattern. 5-KEYSENSE/[4:0] pins can be used to connect a matrix key pad to the modem. But all pins are not necessary, just 4-KEYSENSE/ pins are used. KEYSENSE/ pins are active low.

5-GPIO pins are necessary to make other side of matrix, 5-GPIO pins are must active high. The general key pad matrix are below :



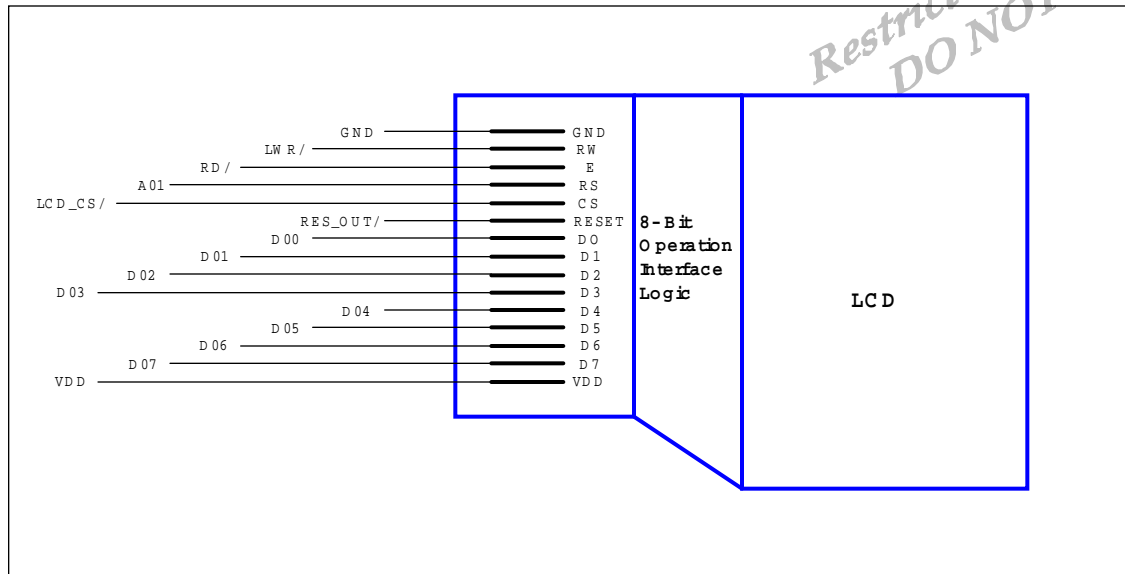
- Keypad Matrix

3.5.2 LCD

The modem supports CLD interface. The LCD interface composed of 15-signal.

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Direct access to LCD driver is not applicable, 8-bit operation interface logic is needed.
LCD interface block diagram is below :



- LCD Interface Block Diagram

NAME	TYPE	DESCRIPTION
LWR/	BS_PU	LCD RW pin out from the modem
RD/	BS	LCD E pin out from the modem
A01	B	LCD RS pin out from the modem
LCD_CS/	O	LCD Chip Select pin out from the modem
RES_OUT/	O	LCD Reset from the modem
D00 ~ D07	O	LCD Data Lines from the modem
VDD		LCD Power Supply
GND		LCD Signal Ground

- LCD Interface Signals

3.5.3 Ringer

The Ringer provides Ringer output to drive the sound transducer on the host. It alarms the voice call events and key tone if key pad is connected.

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4 Electrical Specifications

4.1 DC Electrical Specifications

4.1.1 Absolute Maximum Ratings

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

Absolute Maximum Ratings are limiting values, and are considered individually. While All other parameters are within their specified operating ranges. Functional operation of the modem under any of the conditions in the Absolute Maximum Ratings table is not implied.

PARAMETER	MIN	MAX	UNITS
Storage Temperature	-40	+80	
Voltage On Any Input or Output Pin	-0.5	+3.7	V
Supply Voltage		+7.0	V
Initializing Current	100		mA
Drop	No damages after 60-Inch drop over concrete floor		

- **Absolute Maximum Ratings**

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4.1.2 Recommended Operating Conditions

PARAMETER	MIN	MAX	UNITS
Supply Voltage	+5.0	+7.0	V
Operating Temperature	-30	+60	
Operating Humidity	95%(50) Relative Humidity		

4.1.3 Power Consumption

CONVERSATION (Busy)	STANDBY	
	Idle	Sleep
900mA (MAX)	130mA	20mA

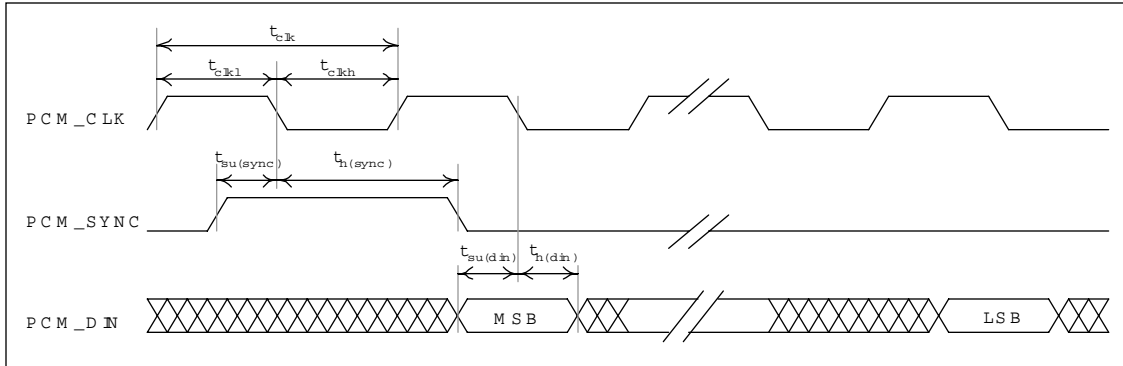
4.1.4 Serial Interface Electrical Specifications

PARAMETER	MIN	MAX	UNITS
Input High Voltage	+2.0	+3.7	V
Input Low Voltage	-0.5	+0.8	V
Output High Voltage	+2.4		V
Output Low Voltage		+0.4	V

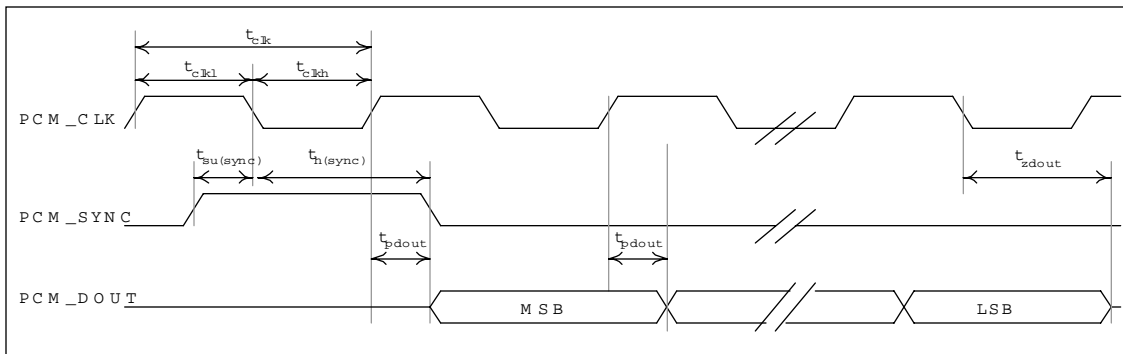
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4.2 Timing characteristics

4.2.1 External CODEC Timing



• External PCM CODEC to Modem timing



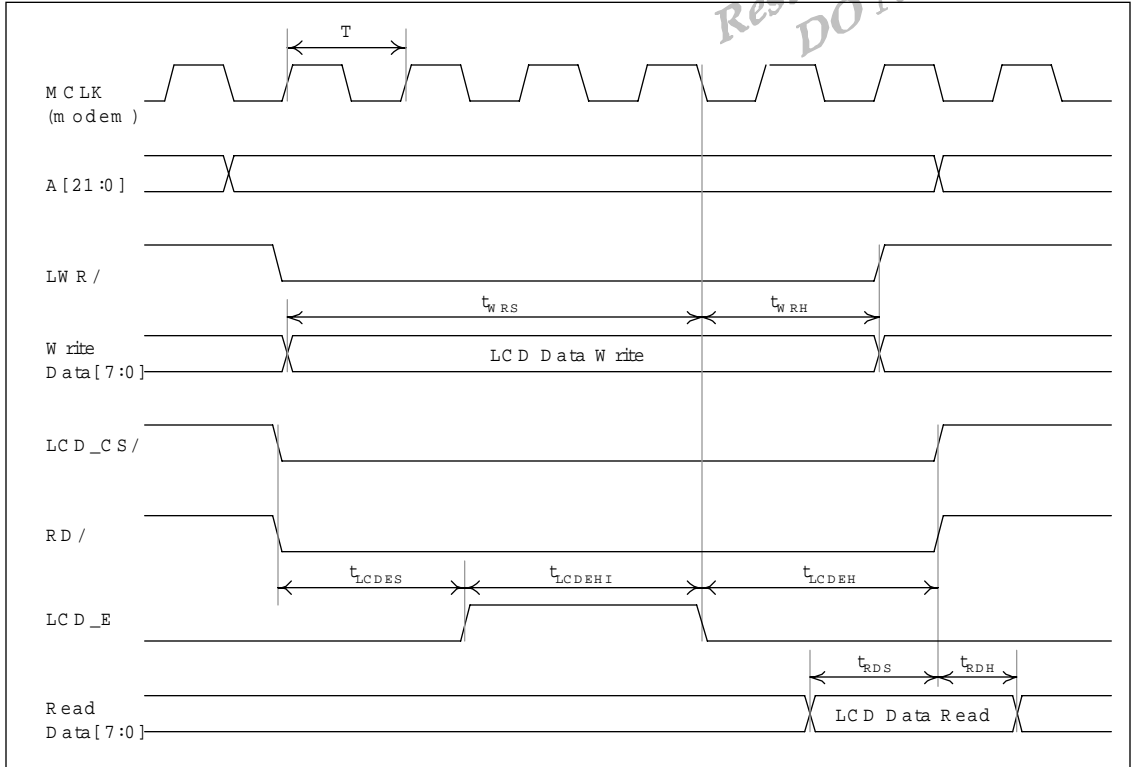
• Modem to External PCM CODEC timing

PARAMETER	DESCRIPTION	MIN	TYP.	MAX	UNIT
t_{clk}	PCM-CLK cycle time	400	500		ns
t_{clk1}	PCM-CLK low time	200	250		ns
t_{clkh}	PCM-CLK high time	200	250		ns
$t_{su(sync)}$	PCM_SYNC setup time to PCM_CLK falling		150		ns
$t_{h(sync)}$	PCM_SYNC hold time after PCM_CLK falling		350		ns
$t_{su(din)}$	PCM_DIN setup time to PCM_CLK falling	50			ns
$t_{h(din)}$	PCM_DIN hold time after PCM_CLK falling	10			ns
t_{pdout}	Delay from PCM_CLK falling to PCM_DOUT			50	ns

• External PCM CODEC Parameters

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4.2.2 LCD Timing



• LCD Timing

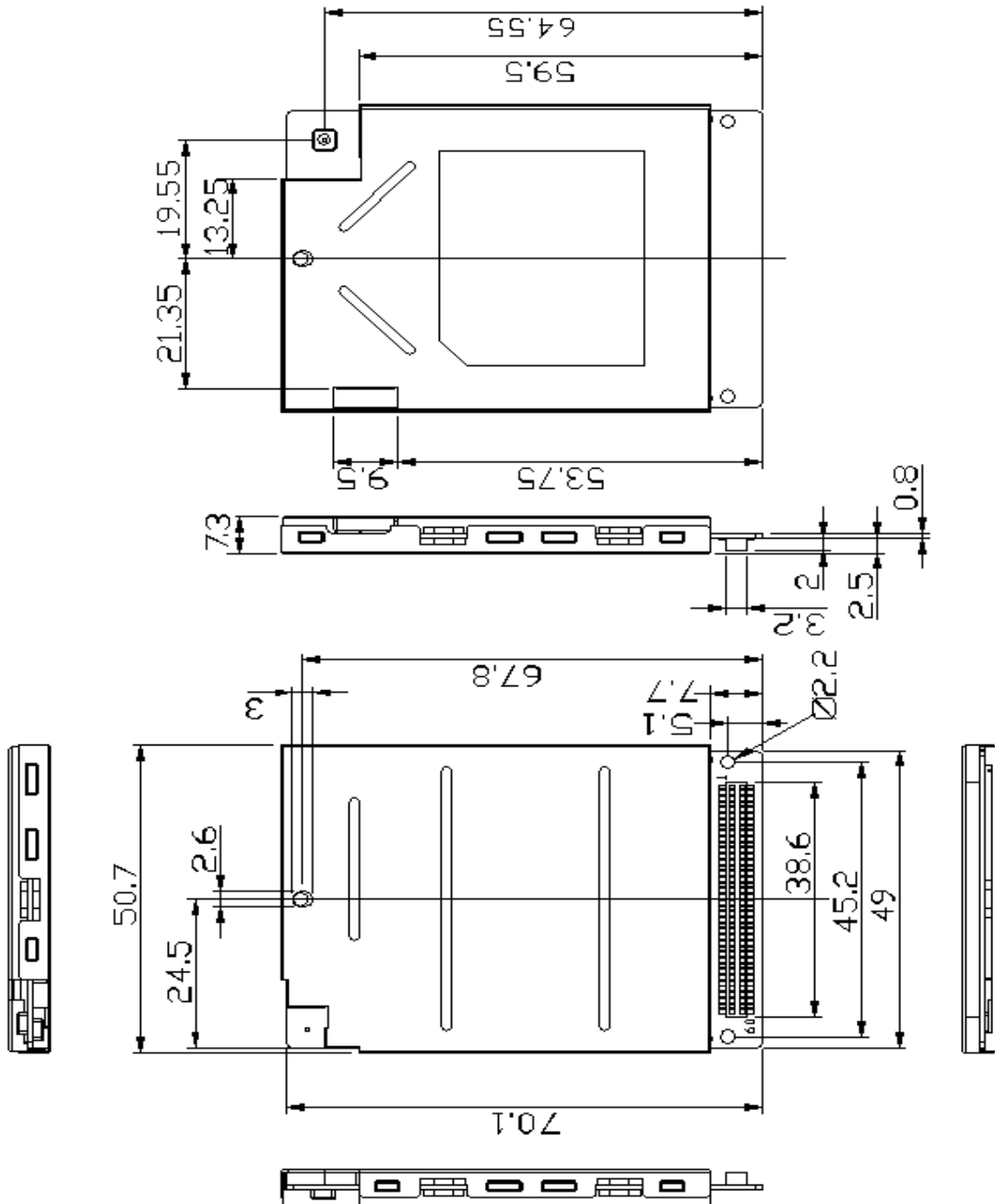
PARAMETER	DESCRIPTION	MIN	MAX	UNIT
t_{LCDES}	LCD_CS/ active to LCD_E active			ns
t_{LCDEHI}	Pulse width if LCD_E active			ns
t_{LCDEH}	LCD_E inactive to LCD_CS/ inactive (write)			ns
t_{LCDEHR}	LCD_E inactive to LCD_CS/ inactive (Read)			
t_{RDS}	Read data setup			ns
t_{RDH}	Read data hold			ns
t_{WRS}	Write data setup to LCD_E inactive			ns
t_{WRH}	Write data hold from LCD_E inactive			ns

• LCD Timing Parameters

; κ, I, ν ισ αντεγερ λοωερ τηνν 16, MXAK ισ αντερναλ Χλοκ οφ μοδεμ

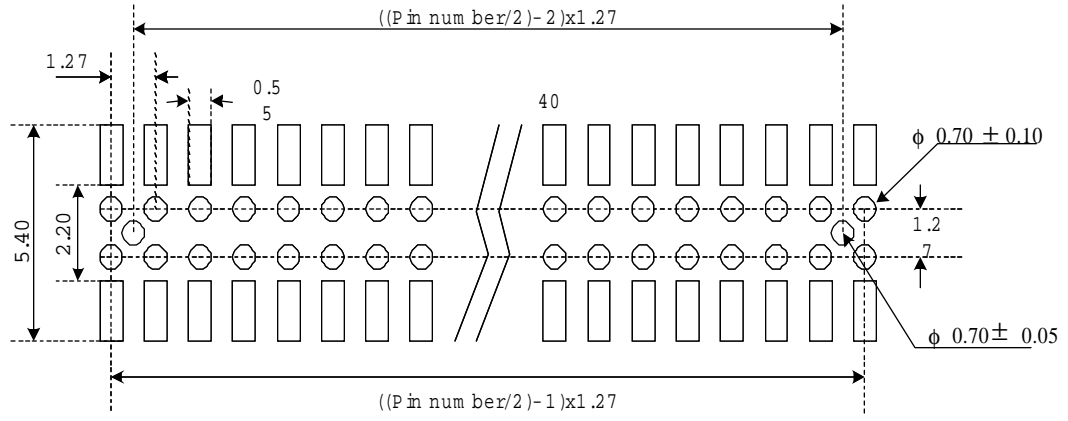
5 Mechanical Dimensions

5.1 DTS-800 CDK Outline

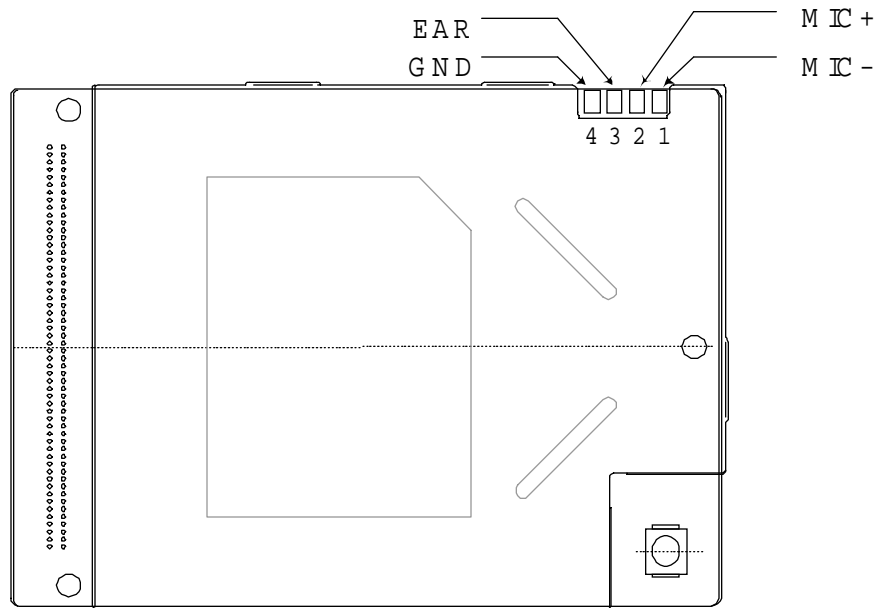


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5.2 60-Pin Connector Mechanical Dimension



5.3 Analog Audio Pin-Out



6. FCC Notice

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 or more of the following measures:

- Περιοριεντ ορ ρελοχατε τη ρεχειπινηγ αντεννα.
- Ινχρεασε τη σεπαρατιον βετωεεν τη εθυιπιμεντ ανδ ρεχειπωερ.
- Χοννεχτ τη εθυιπιμεντ ιντο αν ουτλετ ον α χιρχυιτ διφφερεντ φρομ τηατ το ωηιχη τη ρεχειπωερ ισ χοννεχτεδ.
- Χονσυλτ τη δεαλερ ορ αν εξπεριενχεδ ραδιο/Τς τεχνηνιχιαν φορ ηελπ.

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