DM-15
OEM Interface Manual

1 Overview

The DM-15 module is intended for mounting into an application developer's chassis to provide wireless communication capability for the product. The target chassis could be in a wide variety of forms such as a residential electric meter, a point of sale terminal, an alarm panel, or an automobile console. All initial configuration, mode control, and operational commands are issued to the module over an RS-232 serial port using a flexible AT command format. The module circuitry has been designed to meet the environmental requirements of a large range of commercial and industrial users.

1.1 General

DM-15 is a fully RF shielded PCB assembly with dimensions of approximately 4 x 2 x .7 inches. It has three external interfaces: a 30-pin system connector, a 16-pin accessory connector and a miniature coaxial RF antenna connector.

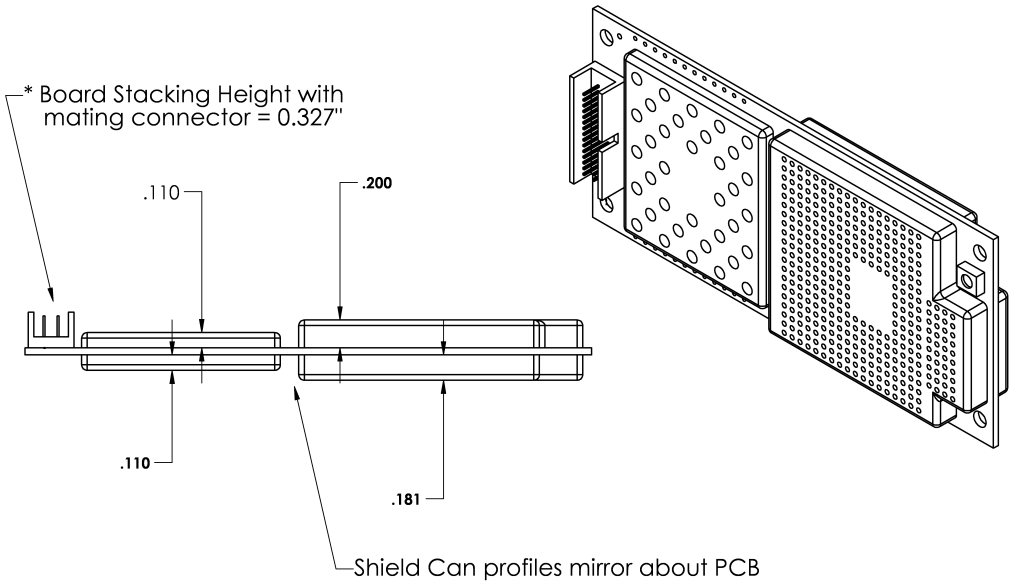


Figure 1.1 -1: DM-15 Module

1.2 Operating Modes

The word "mode", when applied to DM-15 can refer to either software modes or hardware modes. Desired usage can be determined from the context. Software modes are the various ways in which DM-15 can be made to send and receive wireless data. They are described briefly in Section 1.3 below. Hardware modes are the various ways in which the functions of the 30-pin connector can be changed as needed for testing or to configure DM-15 for different applications. Hardware modes are described in more detail in Section 2.

1.3 Software

DM-15 software options can be used to configure the module hardware to operate in a wide variety of cellular voice and data communication modes. The first three software option packages to be delivered for the module are described below.

1. IS-136 rev. B with IS-130/IS-135 asynchronous data and group 3 fax capability - This software provides dual mode AMPS/ TDMA cellular communications over the 800 MHz cellular frequency band. The module automatically switches between the legacy AMPS system and the newer digital IS-136 cellular system based on system availability and/or manual selection by the host application.

2. CDPD release 1.1 capability - The Cellular Digital Packet Data (CDPD) system provides wireless data communication at 19,200 bps using standard TCP/IP communication protocol. As such, it can extend full Internet access to a user's remote mobile platform. The CDPD system operates in the 800 MHz band either sharing a traffic channel with the 800 MHz cellular voice system, or more commonly, being permanently allocated a specific channel for packet data communications. A user is charged for the number of kilobytes transferred rather than for the minutes of connect time as is normally the case for cellular voice and data communications. This allows the user to remain continuously connected to the CDPD network and experience minimal access delay to receive or transmit data.

3. AMPS 553 analog voice with burst data capability – This software option is being offered in response to a need for a voice/data communications capability with high percentage geographical coverage over most of the United States and Canada. The AMPS cellular system using circuit switched data is the only viable option at this time. Although digital cellular systems with data capability are being deployed in several locations around the county, it will be many years if ever before they have the coverage footprint of the existing AMPS system. In addition to providing voice communication services, this software option provides a built-in circuit switched burst data modem over the analog circuit switched cellular network. V.27ter is used to transmit the data, which is heavily encoded to combat the fading in the mobile environment. The burst data is operated in a half duplex mode. The module is capable of transmitting or receiving 250 bytes of data over the analog circuit switched cellular network in less than 5 seconds. The DTMF tones are used to switch between voice and data modes either locally, or by a remote communication center.

All of the software platforms listed above include a serial bus multiplexing protocol capability that can be used by the application developer to create multiple virtual communication channels with the DM-15 module over the single serial port. A common example of the virtual channel application is providing simultaneous transport of mode commands, data traffic, and status messages between the module and the main application control microprocessor.

1.4 Hardware

The next two sections give a top-level overview of DM-15 as seen from the application developer's perspective. Hardware design details inside the DM-15 module are described in the "DM-15 Operational Description".

1.4.1 Mechanical

The DM-15 module has no mechanical elements other that the main PCB assembly. All critical electronic components are shielded using sheet metal cans to prevent internal/external electromagnetic interference from degrading the module's performance and to prevent the module from interfering with other nearby devices. Figure 1.4-1 shows a typical mounting configuration of the module with the main motherboard assembly. The module is plugged into the fixed mating connector and secured with four screws to the standoff components.

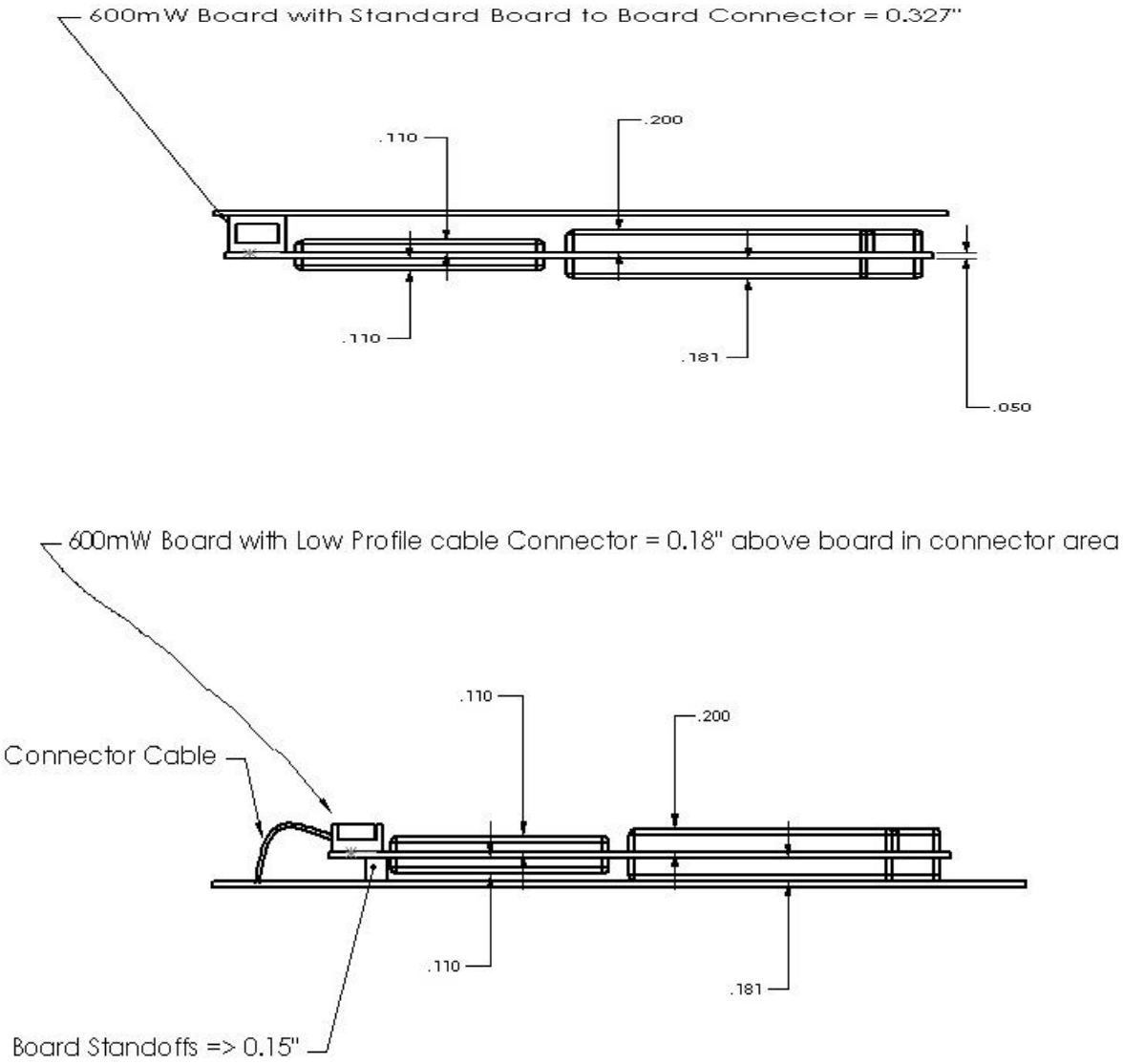


Figure 1.4-1 Module Mounting Configuration

1.4.2 Electrical

Figure 1.4-2 shows an overview of the electrical interface between the DM-15 module and a typical application.

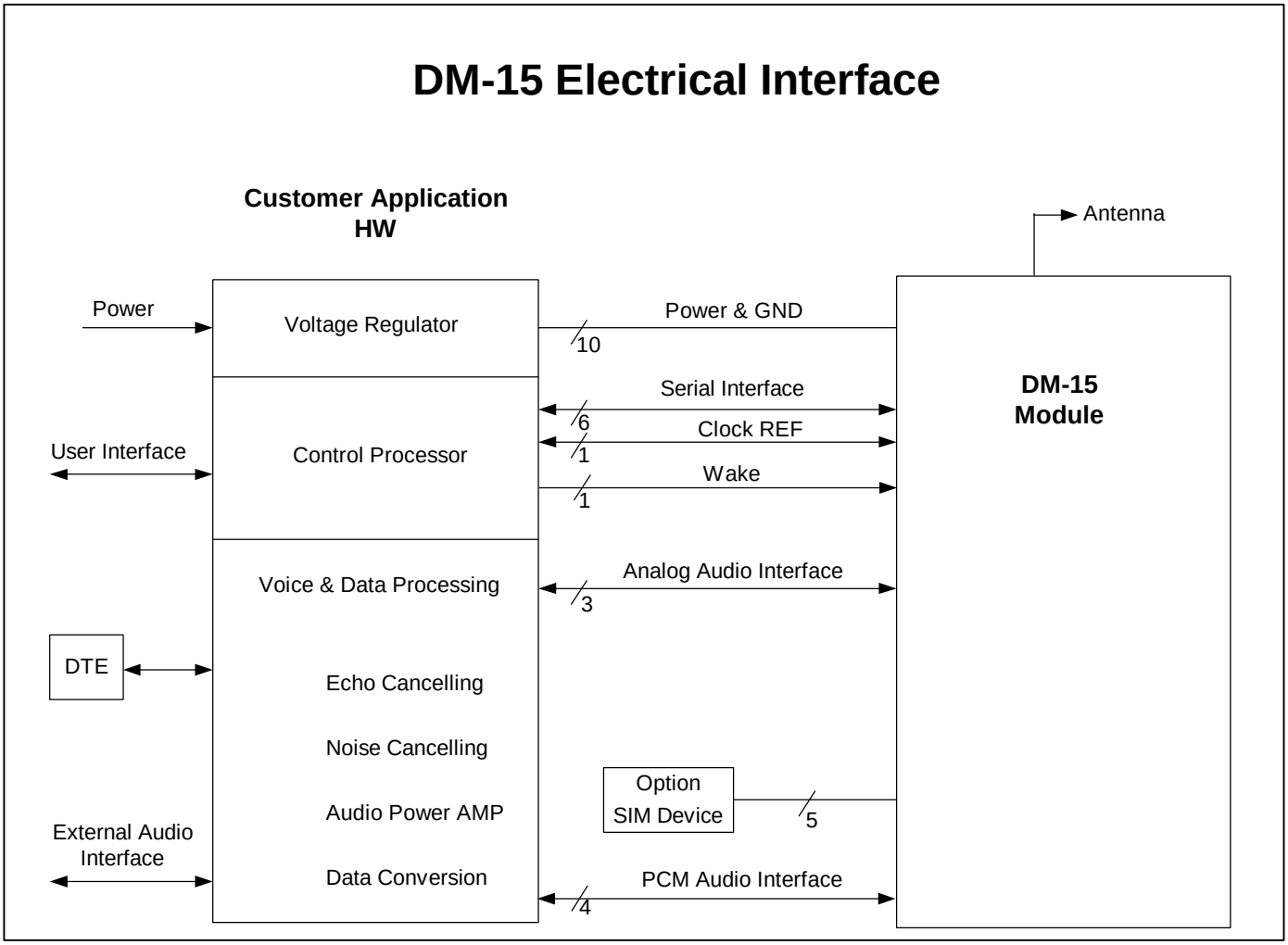


Figure 1.4-2 DM-15 Electrical Interface

1.5 References

1.5.1 External Document Index

- Cellular Digital Packet Data (CDPD) System Specification, Release 1.1, 19 January 1995, CDPD Forum
- IS-130, 800 MHz Cellular Systems TDMA Radio Interface Radio Link Protocol 1, 01 March 1995, EIA/TIA
- IS-135, 800 MHz Cellular Systems TDMA Services Async Data and Fax, April 1995, EIA/TIA
- IS-136.1, Revision A, TDMA Cellular/PCS Radio Interface Mobile Station - Base Station Compatibility Digital Control Channel, October 1996, EIA/TIA
- IS-136.2, Revision A, TDMA Cellular/PCS Radio Interface Mobile Station - Base Station Compatibility Traffic Channels and FSK Control Channel, October 1996, EIA/TIA. Referred to here as 'IS-136'.
- IS-137, Revision A, TDMA Cellular/PCS Radio Interface Minimum Performance Standard for Mobile Stations, July 1996, EIA/TIA. Referred to here as 'IS-137'.

1.6 Test/Certification Requirements

AMPS/DAMPS Configurations	**CDPD Configuration**
FCC Part 22	FCC Part 22
FCC Part 15	Ameritech CDPD Certification
IS-137 Revision A	GTE CDPD Certification
	Bell Atlantic Mobile / Nynex CDPD Certification
	AT&T CDPD Certification

2 Hardware Requirements

2.1 Module Dimensions

The physical dimensions of the DM-15 module are as indicated in the figure shown below. The electrical interconnection to the optional accessory board is made through vertical header pins, which are part of the accessory assembly. Dimensions given for shield-can height and overall module thickness are approximate at this time. Note: All dimensions are in inches.

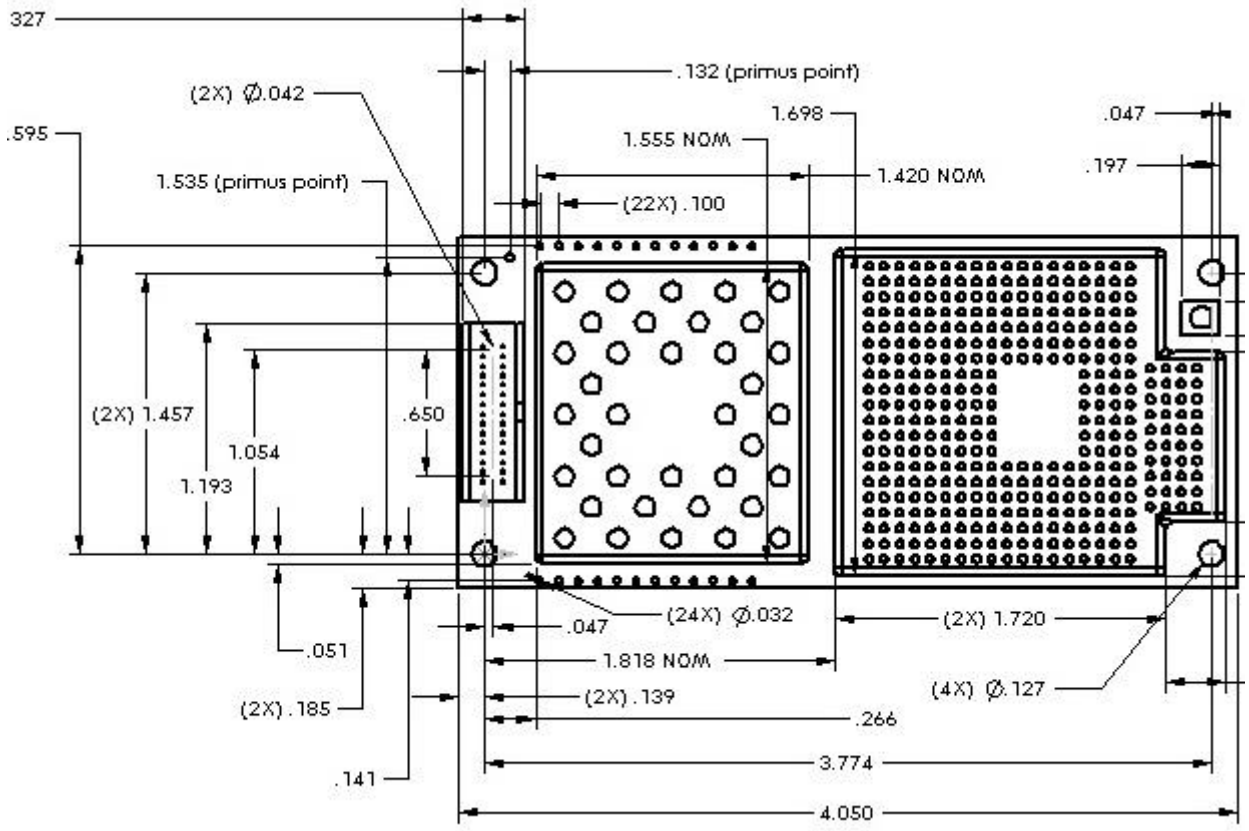


Figure 2.1-1 Module Dimensions

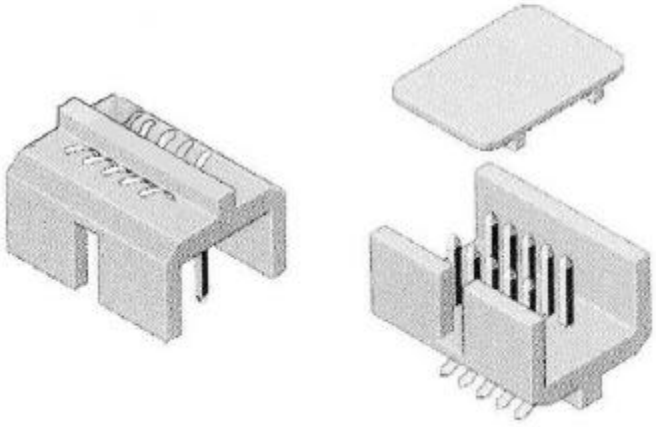
2.2 External Interfaces

Warning : ESD Sensitive Devices* Many of the pins on the external connectors interface directly with integrated circuits within the module. Although all pins are protected against normal ESD events, use appropriate precautions to prevent ESD damage.

2.2.1 System Connector

External interfaces to the module are made primarily through a 30-pin, standard 0.050 inch pitch, ODU header shown below.

SMT-Header Series 515, Straight
for surface mounting
2-Row, Grid 1,27 x 2,54 mm

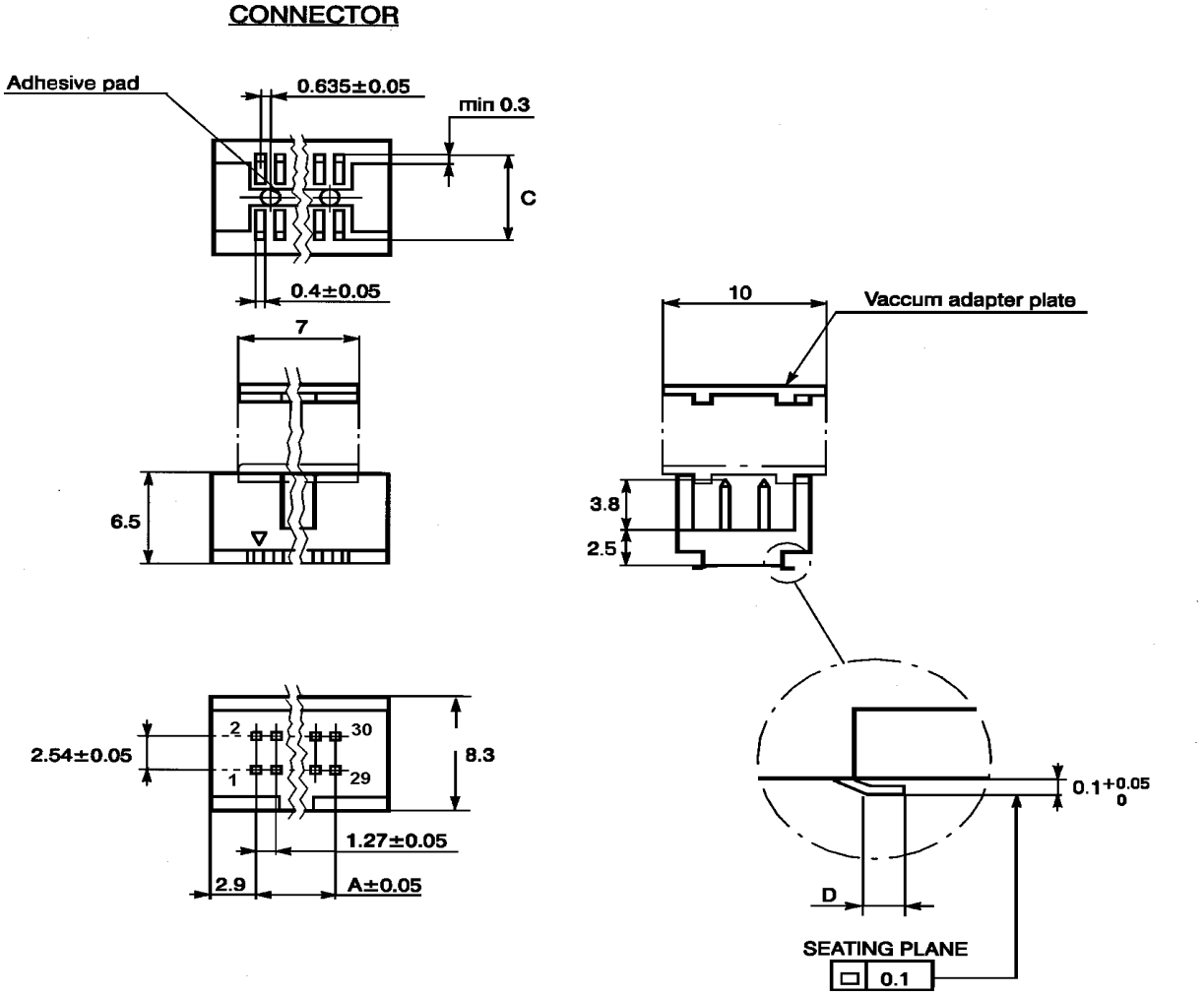


Features

- With vacuum adapter plate
- SMT version

515-568

Figure 2.2-1 System Connector



Position	Part Number	Dim A	Dim B	Dim C	Height in mated condition
30	515.569.035.030.050	17.78	23.58	16.51	8.3 mm

ODU MINI-FIX Mating Connectors

Position	Part Number	Description
30	525.060.035.030.xxx	Flex Cable Socket Connector
30	515.568.730.700.000	Locking Clip, Surface Mount Header to Flex Cable Socket
30	525.031.035.030.xxx	SMT Board to Board Socket Connector

Figure 2.2-2 Connector Details

Table 1.2-1: 30-Pin System Connector Functions

Pin	Signal Name	Description	TYPE
1	GND	Chassis Ground	-
2	GND/AD_in	Chassis Ground (optionally A/D input)	-/I
3	AFMS	Audio from module	O
4	GND	Chassis Ground	-
5	AGND	Analog ground	-
6	ATMS	Audio to module	I
7	OUT2 *	Reserved	O
8	WAKE	Switches the main voltage regulator on/off	I
9	IN2 *	Reserved	I
10	OUT1 *	Reserved	O/I
11	VDD *	Logic reference	O
12	IN1 *	Reserved	I
13	PCMCLK	PCM Clock output	O
14	PCMSYNC	PCM Frame sync	O
15	PCMULD	PCM Voice input	I
16	PCMDLD	PCM Voice output	O
17	GND	Chassis Ground	-
18	GND	Chassis Ground	-
19	DCD/VppFlash	Data Carrier Detect and Flash Programming Voltage Input	O/I
20	REF_CLK	19.44 MHz reference clock output	O
21	CTS	Clear to send	O
22	DTR	Data Terminal Ready	I
23	TD	Serial data to module	I
24	RTS	Request to Send	I
25	VCC_12V	12 vdc supply (needed only for 3 Watt burst applications)	I
26	RD	Serial data from module	O
27	VCC_12V	12 vdc supply (needed only for 3 Watt burst applications)	I
28	VCC_12V	12 vdc supply (needed only for 3 Watt burst applications)	I
29	VCC_5V	6 vdc regulated supply voltage	I
30	VCC_5V	6 vdc regulated supply voltage	I

* Pin used for SIM Interface in GSM based products. Pin function reserved for future use by U.S. products.

Tables 2.2-2, 2.2-3 and 2.2-4 list the pin assignments for the system connector and define the detailed electrical characteristics for each pin.

Table 2.2-2: Signal Description and Details

DGND	This is the supply voltage return (VCC_5V and VCC_12V)		
A/D_in		Minimum	Maximum
	Input voltage for 0000 0000 word		0.05V
	Input voltage for 1111 1111 word	3.25V	
	Linearity	± 0.5 LSB	
	Absolute accuracy	-10mV	+10mV
	Conversion time to within 0.5 bit	5µ sec	
	Input impedance	1MΩ	
	External source impedance		
AFMS	Module audio output Output Impedance (active state) Output Impedance (inactive state) Output Impedance (pwr down state) Drive capacity into 50 Ω Drive capacity into 5 kΩ	(0.3 – 3.5 kHz) Zout < 10 Ω in series with ≥3.3 uF (-20%) Zout < 10 Ω to VDD/2 Zout > 30 kΩ 1.1 V_{P-P} min. 2.0 V_{P-P} min./ 4.0 V_{P-P} max.	
	External Device audio input Input Impedance	Zin > 50 Ω	
	Volume control	± 12 dB from nominal > - 40 dB (mute)	
	Levels to external audio input	28 mVrms nominal 450 mVrms max.	
ATMS	All sources must be AC coupled except for a microphone device. External audio source should be DC coupled in order for module to supply DC power to microphone.		
	External audio source Output impedance (active state) Output impedance (inactive state)	 Zout ≤ 100 Ω Zout > 10 k	
	Module audio input Input impedance Output DC level unloaded for external audio source power	 Zin > 2 kΩ 2.0 V min.	
	Levels from external audio source HGA = 0	45 mVrms nominal 340 mVrms max.	
	Audio input signal is amplified an additional 32 db and a DC bias is provided to the microphone when HGA = 1	1.5 mVrms nominal	
OUT1, OUT2	CMOS open drain output with 1 mA drive (See Table 2.2-3)		
WAKE	TTL compatible active low input (WAKE pin is tied to VCC_5V through 100KΩ resistor, recommend open collector/drain transistor)		
I_01, I_03	CMOS bi-directional, tri-state output with 2mA drive (See Table 2.2-3)		
VDD	2.7 Vdc min 3.4 Vdc nominal 5.5 Vdc max		
PCMCLK	(See Table 2.2-3)		
PCMSYNC	(See Table 2.2-3)		
PCMULD	(See Table 2.2-3)		
PCMDLD	(See Table 2.2-3)		
DCD/VppFlash	(See Table 2.2-3)		
	VppFlash programming voltage. Capability = 60 ma min	11.8 – 12.2 Vdc	
REF_CLK	Frequency	19.44 MHz this output is switchable	
	Output Level	0.7 min 1.0 typ 1.4 max $volts_{p2p}$	
	Harmonic Content	-10dBc max	
RTS, CTS, DTR	(See Table 2.2-3)		
RD,TD	(See Table 2.2-3)		
VCC_12V	13.8 volt ± 20%, 1.5 A max		
VCC_5V	5 volt ± 13.3% regulated, 1A max		

Table 2.2-3: System Connector CMOS Interface Levels

Quantity	Symbol	Limits			Units
		Min	Typ	Max	
High level output voltage (I_{OH}= rated)	V_{OH}	0.9 * VDD		VDD	Volts
Low level output voltage (I_{OL}= rated)	V_{OL}	0		0.1* VDD	Volts
High level input voltage	V_{IH}	0.8 * VDD		VDD	Volts
Low level input voltage	V_{IL}	0		0.2 * VDD	Volts

2.2.2 Accessory Connector

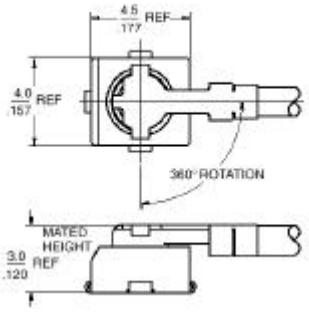
Connections to an optional accessory board are made through a 16-pin accessory connector. Add-on accessories under consideration include a GPS receiver, a Bluetooth transceiver, and a CeBus transceiver

Table 2.2-4: 16-Pin Accessory Connector Functions

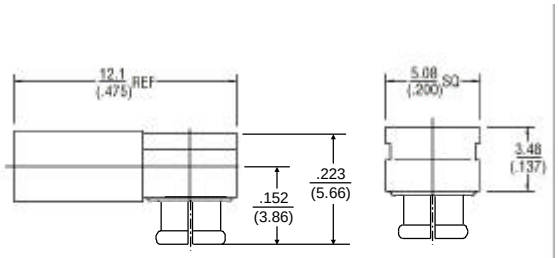
Connector / Pin	Signal Name	Description
X353 / 1	VBATT	5 VDC supply input
X353 / 2	GND	Digital ground
X353 / 3	CLKREQ	Request from accessory to keep providing reference clock
X353 / 4	ARESET	Reset signal to accessory
X351 / 1	ASYNC	Request from accessory for frame sync
X351 / 2	TBD	SPARE
X351 / 3	IU3T	DTMS
X351 / 4	IU3R	DFMS
X351 / 5	ADATAUP	Data to accessory (PCM link)
X351 / 6	APCMSYNC	Sync line (PCM link)
X351 / 7	APCMCLK	Clock line (PCM link)
X351 / 8	ADATDOWN	Data from accessory board (PCM link)
X351 / 9	ASYSCLK	19.44 MHz reference clock to accessory
X351 / 10	AWAKE	Wake-up signal to accessory
X351 / 11	IU2T	IU2T
X351 / 12	IU2R	IU2R

2.2.3 Antenna Connector

Radio frequency (RF) signals from the module to the external, customer-supplied antenna are made through a surface mount, microminiature snap-on M/A-COM connector (P/N 2367-5002-54). A wide variety of compatible mating connectors are available. Pigtail assembly (P/N 9960-2100-24), and the inter-series cable assembly (P/N 9960-4100-XX) from M/A-COM are two options using pre-assembled cables. The cost of these cables varies with quantity and connector type. Another mating option is a right angle crimp jack from M/A-COM that uses standard RG-type coaxial cable. Custom cables assemblies can be then be manufactured to indvidual requirements using standard off-the-shelf coaxial cable and mating connectors (TNC, SMA, etc.) with



Pigtail Assembly



Right Angle Crimp Jack

either RG-178 (P/N 2338-5001-10) or RG-316 (P/N 2338-5002-10) size M/A-COM connectors. The cost of the crimp connector alone is approximately $1.50 USD in quantities of 10,000. Physical dimensions of the two module connector types are shown above. Since the mating connector can rotate through 360°, the application developer has maximum flexibility for routing the RF coax assembly. The total height of the mated pair using M/A-COM pre-assembled RF connectors is 0.12 inches. The mated pair height using the right angle crimp jack is approximately 0.290 inches.

2.3 Electrical Performance

Electrical performance parameters are valid only when the terminating impedance at the output of the antenna connector exhibits a VSWR of less than 2:1 for all phase angles in the frequency band of operation. High VSWR loads at the antenna connector adversely affect current consumption, linearity, and power efficiency of the module and may prevent operation or cause internal damage.

The RF performance of the DM-15 fully meets the following specifications:

IS-136 TDMA Cellular mode – Per IS-137 specification
553 AMPS Cellular mode – Per IS-19 specification
CDPD Mode – Per Cellular Digital Packet Data (CDPD) System Specification, Release 1.1, 19 January 1995,

2.4 Mobile Station Power Class

The module is able to operate in several modes and different output power levels. Typical applications require output power levels similar to those in a handheld cellular phone (600 mW nominal) which is considered a power class IV unit for dual mode operation. It is possible to increase the output power level to that of a class I unit (4 W nominal) during the 5 second analog burst data ode. Table 2.4-1 below shows the nominal output power levels (Effective Radiated Power, assuming an antenna system gain of 1 dBd (2.5 dBd antenna gain with 1.5 dB cable loss)).

Table 2.4-1: Mobile Station Nominal Power Levels

	Mobile Station Power Level (dBW)										
	0	1	2	3	4	5	6	7	8	9	10
Class I, AMPS	6	2	-2	-6	-10	-14	-18	-22	-22	-22	-22
Class II, AMPS	-2	-2	-2	-6	-10	-14	-18	-22	-27±3	-32±4	-37±5
Class II TDMA	2	2	-2	-6	-10	-14	-18	-22	-27±3	-32±4	-37±5
Class IV, TDMA	-2	-2	-2	-6	-10	-14	-18	-22	-27±3	-32±4	-37±5
Class IV, PCS	-2	-2	-2	-6	-10	-14	-18	-22	-28±3	-33±4	-38±5

*Note: Output power levels maintained within range of +2 / -4 dB for PL0-7
Power levels 8-10 are valid for digital mode only, maintained within range of +2 / -6 dB

2.5 Power Consumption

2.5.1 Transmit/Talk Mode

DC current in mA		AMPS Mode	IS-136 Mode	CDPD Mode
600 mWatt	Peak	617	590	590
	RMS	617	355	355
3 W Burst	Peak	1810	-	-

2.5.2 Standby Mode

DC current in mA	AMPS Mode	IS-136 Mode	CDPD Mode
RMS	36	15	15

2.5.3 Sleep Mode (Minimum DC Power consumption)

A power down or "sleep mode" is available in which the module is placed in a low power consumption state under control of the host application. In this mode, the unit consumes approximately TBD uA of current as measured from the VCC_5V supply input on pin 1 of the system connector. A logic level "0" on pin 19 of the system connector returns the unit to full operation although there may be a significant delay while the module reestablishes registration with the cellular network

2.6 Reliability

2.6.1.1 Overall Reliability

Module reliability performance is a function of the specific module application. Reliability prediction data will be provided for each customer application.

2.6.1.2 30 Pin Connector Reliability

Durability: 200 mating cycles minimum

2.6.1.3 Antenna Connector Reliability

Durability: 50 cycles minimum

2.7 Environmental Requirements

2.7.1.1 Temperature Ranges

The module will function within specified performance parameters over the temperature range of -40°C to +70°C.

2.7.1.2 Thermal Shock (DUT non-operational)

Temperature Class I : -40° to +85°C
20 thermal shock cycles over temperature profile

2.7.1.3 Moisture Resistance (DUT non-operational)

Maximum temperature 55°C

2.7.1.4 Electrostatic Discharge

ISO 7816-1. Direct discharge to all external connections.

2.7.1.5 Electromagnetic Field Interference

FCC Part 15

2.7.1.6 System Connector Insertion Inversion

System connector is keyed to prevent incorrect installation

2.7.1.7 Mechanical Vibration (DUT operational)

Vibration Class I (Instrument panel mountings)
Vibration Class II.A (Overhead console mountings)
5 Hz to 1000 Hz
Vertical, lateral, & fore/aft axis - 20 hours per axis

2.7.1.8 Mechanical Shock (DUT non-operational)

4 half-sine wave shocks of 20 g's with 13 msec duration in three mutually perpendicular planes

2.7.1.9 Crash Shock (DUT operational)

1000 G's with **11** msec duration

3 External Control/Interface

3.1 Introduction

DM-15 interfaces with external controlling devices via an RS-232 serial port on the 30-pin system connector. This section defines the interface protocol between the controlling device and DM-15 over the serial port. *Future versions of this document will also include the interface definition between various external accessories and DM-15 over the accessory connector.*

The primary message transport mechanism across the system connector interface uses the AT command format. However, other transport mechanisms, for example, a packet protocol based messaging mechanism, may also be supported per customer specifications.

Information about AT commands and responses for various Ericsson products are available in two formats: (1) AT Command Ensembles, and (2) Product Design Documents. An " AT Command Ensemble" is a group of AT commands that have a specific purpose such as factory test, mode control, phonebook management, etc. Product Design Documents specify the subsets of AT commands in various ensembles applicable to a particular product. A separate "Product Design Document" will be generated for each product.

The AT command descriptions included in this document are intended only to give an overview of the command functions available, and are not intended to be adequate for software design purposes. The appropriate set of AT Ensemble Documents will be provided to the application developer under a separate non-disclosure agreement as part of the Product Design Document. Note AT*E commands are Ericsson defined commands that may be used by the customer.

3.1.1 Common AT Command Ensembles

- C1 Basic AT Syntax and Procedures (Revision B)
- C2/C/E Control and Identification (Revision A)
- C9 Mode Management (Revision PC2)
- C50 Time Independent Escape Sequence (Revision A)
- C53 Enhanced Mode Management (Revision B)
- C55 Phonebook Group Management for RTP Phones (Revision B)
- C56 Microsoft Windows Compatibility (Revision B)
- C57 Phonebook for DAMPS and WSC Phones (Revision PB2)
- C58 SMS for DAMPS and WSC Phones (Revision B)
- C59 Autodialer – Voice Call Control for DAMPS and WCS Phones (Revision B)
- AC12 Basic Vehicle Handsfree (Revision A)
- AS51 AMPS Modem with Multi-mode Phone Compatibility (Revision A)
- AC50 Phone Management PC Software (Revision PB1)
- S50 First generation IS-135 DAMPS Data/Fax (Revision C)
- S54 Test Commands for DAMPS Phones (Revision A)

Ensemble C2, Control and Identification

AT Command	Description
AT	Check communication between module and host
ATZ	Reset to default configuration
AT&F	Set to factory-defined configuration
AT+CGMI AT+CGMI=?	Read module manufacturer identification
AT+CGMM AT+CMMM=?	Read module model identification
AT+CGMR AT+CGMR=?	Read module revision identification
AT*	List all supported AT commands
AT*ESIR	Read module system interface release

Ensemble C9, Mode Management

AT Command	Description
AT+WS46 = <n> AT+WS46? AT+WS46=?	Sets the cellular protocol mode
AT*EMSH = <n> AT*EMSH? AT*EMSH=?	Configuration mode switch/ handoff indications. If set to on, an unsolicited result code (ECMSH indication) will be sent when mode switch or hand-off (cell transition) occurs
AT*EMSO = <n> AT*EMSO? AT*EMSO=?	Configuration mode switch indications. If set to on, an unsolicited result code (ECMSH indication) will be sent only when mode switch occurs

Ensemble C50, Time Independent Escape Sequence

AT Command	Description
ATS2 = <n> ATS2?	Escape character value
ATS12 = <n> ATS12?	Escape prompt delay timer value
AT*Q[<n>] AT*Q?	Configure CONNECT <text>

Ensemble C53, Enhanced Mode Management

AT Command	Description
AT+CFUN=[<fun>[,<rst>]] AT+CFUN? AT+CFUN=?	Set functionality of the module.
AT+CPAS=[n] AT+CPAS? AT+CPAS=?	Current activity status of the module.
AT*EPLST=[<mode>][,<mode>]…[,<mode>] AT*EPLST? AT*EPLST=?	Set a prioritized list for scanning and connecting to different systems for a mobile originated call.
AT*EWS46D=<default> AT*EWS46D? AT*EWS46D=?	Configure the default-operating mode of the module.
AT+CPIN="<old_pin>","<new_pin>" AT+CPIN? AT+CPIN=?	Configure the Personal Identification Number of the module.
AT+CMEE=[<n>] AT+CMEE? AT+CMEE=?	Enable and Disable the reporting of module equipment errors.
AT*ECAM=<onoff> AT*ECAM? AT*ECAM=?	Enable and disable the return of on-going call events/status.

Ensemble C55, Phonebook Group Management

AT Command	Description
AT*ERPGL=<mode>[,<group_index>] AT*ERPGL=?	List the phonebook groups or members of groups.
AT*ERPGM=<mode>,<tag>,<value>[,<tag>,<value>[….]] AT*ERPGM=?	Add or delete members of a phonebook group or delete or create a phone group.
AT*ERPGSO=<mode>,<group_index>[,<tag>,<value>[….]] AT*ERPGSO=?	Set or read the settable options of a phone book group.

Ensemble C56, Microsoft Windows Compatibility

AT Command	Description
ATI[<value>] ATI=?	Provide information to Windows to enable a Unimodem modem ID to be derived.

Ensemble C57, Phone Book for DAMPS and WSC Phones

AT Command	Description
AT+CPBS=”<storage>” AT+CPBS? AT+CPBS=?	Select phonebook memory storage
AT+CPBR=<index1>[,<index2>][,”<pin>”] AT+CPBR=?	Read phonebook entries
AT+CPBF=”<findtext>”[,”<pin>”] AT+CPBF=?	Find phonebook entries
AT+CPBW=[<index>][,”<number>”[,<type>[,”<text>”[,”<pin>”]]]] AT+CPBW=?	Write & delete phonebook entry
AT+CSCS=[”<chset>”] AT+CSCS? AT+CSCS=?	Select TE character set
AT*ERERS=[<n>] AT*ERERS=?	Extended information responses
AT+CDNN=”[<id>]” AT+CDNN? AT+CDNN=?	Set/Read user name (device nickname)
AT+GSN AT+GSN=?	Request product serial number identification
AT+CIMI AT+CIMI=?	Request international mobile subscriber identification
AT*EMOD AT*EMOD=?	Read module model identifier and description
AT+CMIN AT+CMIN=?	Read mobile identification number
AT*ESCN=<mode>,”<pin>”[,<indexn>][,”<asn>”,”<vercode>”[,<send order>][,"<cc_name>"]] AT*ESCN=?	Read/set calling card parameters
AT*ERCF=<mode>,”<pin>”,<indexn>,[<flow1>,<flow2>,<flow3>,<flow4>,<flow5>] AT*ERCF=?	Read/set calling card flow order
AT*ECDF=<mode>,”<pin>”,<indexn>,[<dflow1>,<dflow2>,<dflow3>,<dflow4>,<dflow5>] AT*ECDF=?	Read/set calling card domestic flow order
AT*ECIF=<mode>,”<pin>”,<indexn>,[<iflow1>,<iflow2>,<iflow3>,<iflow4>,<iflow5>] AT*ECIF=?	Read/set calling card international flow order

Ensemble C58, SMS for DAMPS and WSC Phones

AT Command	Description
AT+CSCA="<sca>",[<type>] AT+CSCA? AT+CSCA=?	Set the default message-center address in *R-Data* messages that carry SMS messages from the mobile termination.
AT+CUDAH=<type> AT+CUDAH? AT+CUDAH=?	Set default user-destination address info of *R-Data* messages used to carry *SMS Submit* messages to the message center.
AT+CSDCA="<tag>" AT+CSDCA? AT+CSDCA=?	Set the default call-back alpha tag used in *SMS Submit* messages sent to the message center.
AT+CSDCN=<enable>,"<address>",[<type>] AT+CSDCN? AT+CSDCN=?	Set the default call-back number used in *SMS Submit* messages sent to the message center.
AT+CSDDA=<message>,[<udheader>] AT+CSDDA? AT+CSDDA=?	Set the default *SMS Delivery Ack* message sent to the message center with a SMS DELIVERY ACK sent by the MT in response to a mobile terminated SMS DELIVER.
AT+CSDDD=<enable>,<type>,<time>,[<offset>],[<daylight>] AT+CSDDD? AT+CSDDD=?	Set the default deferred-delivery time used in *SMS Submit* messages sent to the message center.
AT+CSDH=<value> AT+CSDH? AT+CSDH=?	Control the presentation of SMS and R-Data header information in the following SMS result codes: +CSTD, +CSLM, and +CSRM.
AT+CSDM=<index> AT+CSDM=?	Delete a short message stored in the mobile termination.
AT+CSDPI=<enable>,<pres> AT+CSDPI? AT+CSDPI=?	Set the default presentation indicator used in *SMS Submit* messages sent to the message center.
AT+CSDSH=<smheader> AT+CSDSH? AT+CSDSH=?	Set the default short-message header used in *SMS Submit* messages sent to the message center. Urgent, privacy, ack, update, etc.
AT+CSDUH=<udheader> AT+CSDUH? AT+CSDUH=?	Set the default user-data header of *SMS Submit* and *SMS Manual Ack* messages sent to the message center. Encoding method.
AT+CSDVP=<enable>,<type>,<time>,[<offset>],[<daylight>] AT+CSDVP? AT+CSDVP=?	Set the default validity period used in *SMS Submit* messages sent to the message center.
AT+CSLM=[<in>],[<out>],[<hold>],[<canned>],["<pin>"] AT+CSLM=?	List short messages stored in the mobile termination.
AT+CSMA=<index>,[<message>],[<udheader>],[<res_code>],[<msg_ref>],[<mc_adrs>],[<da>],[<dsa>] AT+CSMA=?	Originate an *SMS Manual Ack* message to the message center.
AT+CSME=<value> AT+CSME? AT+CSME=?	Control the coding of messages that contain user data with IRA characters are reported in the +CSTD result code and the +CSLM, +CSRC, +CSRM information responses.
AT+CSMH=<index>,["<da>"],[<type>] AT+CSMH=?	Originate, from the Hold Box, an *SMS Submit* message to the message center. Optionally, a new destination address < da> parameter can be supplied to send the message to a party other than the original recipient.
AT+CSMS=<value> AT+CSMS? AT+CSMS=?	Select the short-message service to be used by the mobile termination. This command enables an application to differentiate between a GSM SMS AT command interface and a DAMPS SMS AT command interface.
AT+CSPC=<value>, "<pin>" AT+CSPC? AT+CSPC=?	Control delivery and retrieval of private short messages.
AT+CSRC=<index> AT+CSRC=?	Recall a canned message that the user may originate from the mobile-termination keypad. The canned message may form the user-data content of an *SMS Submit*

	message or an *SMS Manual Ack* message.
AT+CSRI=<delivery>,[<store>] AT+CSRI? AT+CSRI=?	Control delivery of unsolicited SMS result codes and the associated storage of mobile-terminated short messages.
AT+CSRM=<index>,["<pin>"] AT+CSRM=?	Read a short message stored in the mobile termination.
AT+CSSC=<message>,[<index>],[<udheader>] AT+CSSC=?	Store a canned message that the user may originate from the mobile-termination keypad. The canned message may form the user-data content of an *SMS Submit* message or an *SMS Manual Ack* message.
AT+CSSM="<da>",<message>,[<index>],[<msg_ref>],[<type>],[<udheader>],[<smsheader>],[<tag><value>] AT+CSSM=?	Originate an *SMS Submit* message to the message center.
AT+CSWH="<da>",<message>,[<index>],[<msg_ref>],[<type>],[<udheader>],[<smsheader>],[<tag> <value>],… AT+CSWH=?	Store an *SMS Submit* message in the Hold Box within MT memory.
AT*ELSI=[“<pin>”] AT*ELSI=?	List short messages that are saved in the In Box of the mobile termination.
AT*EMSI=<index> AT*EMSI=?	Mark short messages as saved in the In Box of the mobile termination.
AT*EMEMUSED[=<selection>] AT*EMEMUSED=?	Read percentage of memory used by SMS and phonebook.

Ensemble C59, Autodialer – Voice Call Control for DAMPS and WSC

AT Command	**Description**
ATA	Answer an incoming voice call.
ATH[<value>]	Hang-up a voice call.
ATD <dial_string> [<overdial>][;] [ATD [<overdial>][;]]	Originate a voice call with optional DTMF overdial.
ATD> ["<storage>"]<n>[;]	Originate a voice call from the phonebook.
ATD![<data >][;]	Hook flash and indicate digital data available.
AT*ERVNOK=<value> AT*ERVNOK? AT*ERVNOK=?	When enabled, OK is not returned when a semicolon does not terminate ATD. This enables autodialers such as ACT! to work correctly.
AT*ERDCC AT*ERDCC? AT*ERDCC=?	Tell the module to use the selected internal calling card configuration to make the next call either with ATD or AT+CDV.
AT+CLCK=”<fac>”,<mode>,[,”<pin>”] AT+CLCK=?	Used to unlock incoming or outgoing call restrictions for the execution of the very next ATD, AT+CDV or ATA. The AT+CLCK returns to its default value after issuance of the next ATD, AT+CDV or ATA.

3.1.2 IS-136 AMPS/DAMPS Ensembles

IS-136 functionalities are exposed to the external controller based on the following Ericsson AT interface ensembles:

- All Common Ensembles Listed in Section 3.1.1
- S50 First Generation IS-136-350 DAMPS Data/Fax
- S54 Test Commands for DAMPS Phones
- AC12 Basic Vehicle HandsFree
  Note: inclusion of this feature in DM-15 is to be determined
- AC50 Phone Management PC Software
- AS51 AMPS Modem with Multimode Phone Compatibility
  Note: inclusion of this feature in DM-15 is to be determined

The following table provides brief descriptions of the commands defined in these ensembles:

Ensemble S50, First Generation IS-136-350 DAMPS Data/Fax

AT Command	Description
ATA	Answer a mobile-terminated call.
ATD	Originate a call.
ATE[<value>]	Enable and disable echoing of command characters.
ATH	Disconnect the call.
ATL[<value>]	Speaker volume control - does nothing.
ATM[<value>]	Speaker mode – does nothing
ATO[<value>]	Return the MT and BMI data parts to *Online Data State.* It is an async- data command.
ATQ[<value>]	Enable and disable result codes suppression.
ATS0=<value> ATS0?	Enable and disable automatic answer.
ATS3=<value> ATS3?	Define the IA5 character used to terminate command lines.
ATS4=<value> ATS4?	Define the IA5 character used in the header and trailer of MT and BMI responses.
ATS5=<value> ATS5?	Define the IA5 character used to delete the preceding character in a command line.
ATS6=<value> ATS6?	Pause Before Blind Dialing.
ATS7=<value> ATS7?	Set the maximum number of seconds the BMI DCE will try to set up a connection with another DCE.
ATS8=<value> ATS8?	Set the number of seconds that the BMI DCE will pause, during dialing, upon encountering a comma in the dial string.
ATS10=<value> ATS10?	Set the duration of received-line-signal loss that the BMI DCE will tolerate. It is an async-data command.
ATV=<value>	Set the response format: header content, trailer content, and terse or verbose result codes.
ATX=<value>	Enable or disable busy-tone detection.
ATZ[<value>]	Hard reset the MT to its default settings, and if a call is active, disconnects the call.
AT&C[<value>]	Set how circuit 109 behaves in response to received line signals.
AT&D[<value>]	Set how the MT responds to circuit 108/2 – Data Terminal ready.
AT&F[<value>]	Reset the MT and BMI DCE to their default settings.
AT+CBC AT+CBC? AT+CBC=?	Store the battery-connection status and the battery-charge level.
AT+CCS? AT+CCS=?	Store the radio-interface V.42 *bis* compression parameters for the current call.
AT+CGCAP AT+CGCAP=?	Return the BMI's capabilities.
AT+COS==[<SC>],[<BW>],[<FCS>],[<PM>]	Specify the service to be requested for mobile-originated calls.

AT+COS? AT+COS=?	
AT+CQD=<value> AT+CQD? AT+CQD=?	Set the number of seconds the BMI and MT will stay connected to each other without the BMI receiving an AT command.
AT+CRC=<value> AT+CRC? AT+CRC=?	Enable and disable cellular result codes.
AT+CSM? AT+CSM=?	Store the values of information elements received in the *Service Menu* message.
AT+CSQ? AT+CSQ=?	Store a signal-quality measure and BER (Bit Error Rate) for the radio channel to which the MT is tuned.
AT+CSS? AT+CSS=?	Store the frequency band and SID (System Identification) of the serving system.
AT+CTA=[<EN>],[<BW>],[<FCS>],[<PM>] AT+CTA? AT+CTA=?	Specify the attributes to be requested for mobile-terminated async-data calls.
AT+CTD=[<EN>],[<BW>],[<FCS>],[<PM>] AT+CTD? AT+CTD=?	Specify the attributes to be requested for mobile-terminated DADS calls.
AT+CTF=[<EN>],[<BW>],[<FCS>],[<PM>] AT+CTF? AT+CTF=?	Specify the attributes to be requested for mobile-terminated fax calls.
AT+CTS=[<EN>],[<BW>] AT+CTS? AT+CTS=?	Specify the attributes to be requested for mobile-terminated STU-III calls
AT+CTV=[<EN>],[<BW>],[<PM>] AT+CTV? AT+CTV=?	Specify the attributes to be requested for mobile-terminated voice calls.
AT+DR=[<value>] AT+DR? AT+DR=?	Enable or disable data-compression reporting. It is an async-data command.
AT+DS=[<direction>],[<negotiation>],[<max_dict>],[<max_string>] AT+DS? AT+DS=?	Control V.42 *bis* compression between the MT and the far-end DCE. It is an async- data command.
AT+EB=[<selection>],[<timed>],[<dfl_length>] AT+EB? AT+EB=?	Control *break* handling at the MT. It is an async-data command.
AT+EFCS=[<value>] AT+EFCS? AT+EFCS=?	Specify whether a 16-bit or 32-bit Frame Check Sequence (FCS) will be used for V.42 links between the BMI DCE and the far-end DCE. It is an async-data command.
AT+ER=[<value>] AT+ER? AT+ER=?	Enable or disable error-control reporting. It is an async-data command.
AT+ES=[<orig_rqst>],[<orig_fbk>],[<ans_fbk>] AT+ES? AT+ES=?	Control V.42 error-control negotiation between the BMI DCE and the far-end DCE. It is an async-data command.
AT+ETBM=[<Tx_buf>],[<Rx_buf>],[<timer>] AT+ETBM? AT+ETBM=?	Control the handling of data buffers upon call termination. It is an async-data command.
AT+FAA=<value> AT+FAA? AT+FAA=?	Enable or disable adaptive answer.
AT+FAP=<sub>,<sep>,<pwd> AT+FAP? AT+FAP=?	Indicate the capability of the DTE to accept T.30 SUB, SEP, or PWD frames.
AT+FBO=<value> AT+FBO?	Set bit transmission order on the PSTN interface.

AT+FBO=?	
AT+FBU=<value> AT+FBU? AT+FBU=?	Enable or disables HDLC frame reporting.
AT+FCC=[<VR>],[ ],[<WD>],[<LN>],[<DF>],[<EC>],[<BF>],[<ST>],[<JP>] AT+FCC? AT+FCC=?	Set the T.30 parameters for the current session.
AT+FIS=[<VR>],[ ],[<WD>],[<LN>],[<DF>], [<EC>],[<BF>],[<ST>],[<JP>] AT+FIS? AT+FIS=?	Set the T.30 parameters for the current session.
AT+FCLASS=<value> AT+FCLASS? AT+FCLASS=?	Select the service for mobile-originated and mobile-terminated calls.
AT+FCQ=<rq>,<tq> AT+FCQ? AT+FCQ=?	Control copy-quality checking and correction.
AT+FCR=<value> AT+FCR? AT+FCR=?	Indicate whether or not the DTE can receive fax data.
AT+FCS? AT+FCS=?	Provide the negotiated T.30 parameters for the current session.
AT+FCT=<value> AT+FCT? AT+FCT=?	Specifie how long the BMI DCE will wait for a command after it has transmitted or received a fax page.
AT+FDR AT+FDR? AT+FDR=?	Request the BMI DCE receive a page.
AT+FDT AT+FDT=?	Request the BMI DCE transmit a page.
AT+FEA=<value> AT+FEA? AT+FEA=?	Enable and disable octet-alignment of EOL markers in received fax data.
AT+FFC=<vrc>,<dfc>,<lnc>,<wdc> AT+FFC? AT+FFC=?	Enable and disable mismatch checking and conversion of transmitted fax data. Checking and conversion shall be disabled.
AT+FFD="<value>" AT+FFD? AT+FFD=?	Set the file-transfer diagnostic message sent to the remote fax machine.
AT+FHS? AT+FHS=?	Return a valid, but meaningless value — nominally, the hangup cause for the last call.
AT+FIE=<value> AT+FIE? AT+FIE=?	Specify whether procedure-interrupt requests from the remote fax machine will be accepted.
AT+FIP[=<value>] AT+FIP=?	Initialize Class-2 parameters to default values.
AT+FKS AT+FKS=?	Disconnect the fax call in an orderly fashion.
AT+FLI="<value>" AT+FLI? AT+FLI=?	Set the ID to be used in the T.30 CSI or TSI messages.
AT+FLO=<value> AT+FLO? AT+FLO=?	Specify the type of flow control.
AT+FLP=<value> AT+FLP? AT+FLP=?	Indicate whether or not the DTE has a document to poll.
AT+FMS=<value> AT+FMS? AT+FMS=?	Specify the lowest negotiable speed for a fax call.
AT+FND=<value> AT+FND? AT+FND=?	Specify the type of message data being transmitted during a call: standard data or non-standard data.

AT+FNR=<rpr>,<tpr>,<idr>,<nsr> AT+FNR? AT+FNR=?	Control the reporting of messages generated during T.30 Phase-B negotiations.
AT+FNS="<value>" AT+FNS? AT+FNS=?	Set the content of the non-standard-facilities frame.
AT+FPA="<value>" AT+FPA? AT+FPA=?	Set the selective-polling address sent to the remote fax machine.
AT+FPI="<value>" AT+FPI? AT+FPI=?	Set the polling ID to be used in the T.30 CIG message.
AT+FPP=<value> AT+FPP? AT+FPP=?	Enable or disable the packet protocol.
AT+FPR=<value> AT+FPR? AT+FPR=?	Set the data-port rate for fax operations.
AT+FPS=<value> AT+FPS? AT+FPS=?	Indicate the end-of-page status.
AT+FPW="<value>" AT+FPW? AT+FPW=?	Set the password sent to the remote fax machine.
AT+FRQ=<pgl>,<cbl> AT+FRQ? AT+FRQ=?	Set the thresholds that are used for the copy-quality-checking procedure.
AT+FRY=<value> AT+FRY? AT+FRY=?	Specify a retry count for partial pages in ECM mode.
AT+FSA="<value>" AT+FSA? AT+FSA=?	Set the destination subaddress sent to the remote fax machine.
AT+FSP=<value> AT+FSP? AT+FSP=?	Indicate whether or not the DTE wants to be informed when the remote fax machine has a document to be polled.
AT+GCAP AT+GCAP=?	Return the MT's capabilities.
AT+GMI AT+GMI=?	Return the MT manufacturer code.
AT+GMM AT+CMM=?	Return the MT model number.
AT+GMR AT+CMR=?	Return the MT software and firmware vintage numbers.
AT+ICF=[<value>] AT+ICF? AT+ICF=?	Specify the character framing used at the MT data port.
AT+IFC=[<MT_by_DTE>],[<DTE_by_MT>] AT+IFC? AT+IFC=?	Set the flow-control operation of the MT data port.
AT+ILRR=[<value>] AT+ILRR? AT+ILRR=?	Enable or disable reporting of the MT data-port rate. It is an async-data command.
AT+IPR=[<rate>] AT+IPR? AT+IPR=?	Specify the data-port rate.
AT+MR=[<value>] AT+MR? AT+MR=?	Enable or disable reporting of modulation carrier and rate. It is an async-data command.
AT+MS=[<carrier>],[<automode>],[<min_rate>], [<max_rate>] AT+MS? AT+MS=?	Select modulation, enables or disables automatic negotiation, and sets the minimum and maximum data rates. It is an async-data command.

AT+MV18AM="<value>" AT+MV18AM? AT+MV18AM=?	Set the V.18 answering machine
AT+MV18P=[<probe1>],[<probe2>]… AT+MV18P? AT+MV18P=?	Set the order of V.18 probes sent during automoding answer
AT+MV18R=[<value>] AT+MV18R? AT+MV18=?	Enable or disables V.18 reporting. It is an async-data command.
AT+MV18S=[<mode>],[<dflt_ans>],[<fbk_time>],[<ans_msg>] AT+MV18S? AT+MV18S=?]	Control V.18 operation.
<**CAN**>	Aborts transmission or reception of a fax page. It is a bi-directional fax command that appears inband within fax data.
<DC1>	
<**DC2**>	Indicates the DTE is ready to receive a fax page. It is a user-to-network fax command that appears inband within fax data.
<DC3>	
<**DLE**><**DLE**>	Is used for <**DLE**> transparency. It is a bi-directional fax command that appears inband within fax data.
<**DLE**><**ETX**>	Is used for two purposes: to indicate the end of a fax page and to acknowledge a <**CAN**>. It is a bi-directional fax command that appears inband within fax data.
<**DLE**>O	Is used as an error marker in fax data delivered to the DTE. It indicates an overrun in the BMI DCE buffers. It is a network-to-user fax command that appears inband within fax data.
<DLE><ppm>	Indicates the end of a page and the DTE's intentions for subsequent actions. It is a user-to-network fax command that appears inband within fax data.
<DLE><SUB>	Is used for <DLE><DLE> transparency. It is a bi-directional fax command that appears inband within fax data.

Ensemble S54, Test Commands for DAMPS Phones

AT Command	**Description**
AT*TEMS AT*TEMS=?	SWITCH TO TEMS COMMAND PROTOCOL
AT*PINT AT*PINT=?	SWITCH TO PINT COMMAND PROTOCOL
AT*ETEST AT*ETEST=?	SWITCH TO ERICSSON TERMINAL PROTOCOL

Ensemble AC50, Phone Management PC Software

AT Command	Description
AT*ERRLC AT*ERRLC=?	Read last call
AT*ERRCT=<total>,<type> AT*ERRCT=?	Read call totals
AT*ERRGRS=<screen>,[<tag> <value>],[<tag><value>]…. AT*ERRGRS? AT*ERRGRS=?	Greeting set
AT*ERMAR="<pin>" AT*ERMAR=?	Master reset
AT*ERINRES=<mode>,"<pin>" AT*ERINRES=? AT*ERINRES?	Incoming call restrictions
AT*EROTRES=<mode>,"<pin>" AT*EROTRES=? AT*EROTRES?	Outgoing call restrictions
AT*ERPHLK=<mode>,"<pin>" AT*ERPHLK=? AT*ERPHLK?	Power-on phone lock
AT*ERIN=<sound type>[,<call type>][,"<storage>",<index>]] AT*ERIN=? AT*ERIN?	Ring set for incoming Voice, Data, and Fax
AT*ERIP=<volume>,<sou nd type> AT*ERIP=?	Play back sound type
AT+CVIB=<mode> AT+CVIB=?	Set internal vibrator mode
AT*ESMA=<mode>,<option> AT*ESMA=? AT*ESMA?	Set message alert sound
AT*ERSAT=<mode> AT*ERSAT=? AT*ERSAT?	Setting access tone to alert user when MS is connected to a cellular system
AT*ERSCON=<contrast> AT*ERSCON=? AT*ERSCON?	Set the phone contrast. The Contrast function sets the text-to-background contrast for visibility.
AT*ELAN="<code>" AT*ELAN=? AT*ELAN?	Select which language to use in the interface.
AT*ESAM=<mode>[,<option>] AT*ESAM=? AT*ESAM?	Set the answer mode
AT*ERAPD=<mode>,<setting> [,"<code>"] AT*ERAPD=? AT*ERAPD?	Auto area code/prefix dialing
AT*ERSSSD=<mode>,<option> AT*ERSSSD=? AT*ERSSSD?	Set and enable/disable speed/super dial mode
AT*ERSAR=<mode> AT*ERSAR=? AT*ERSAR?	Set auto retry
AT*COPS=[<mode>[,<form at>[,"<oper>"]]]	Operator selection
AT*ERPRF=<mode>[,<index>, ["<name>"]] AT*ERPRF=?	Set or list User Profiles
AT*ERPRFS AT*ERPRFS=?	Profile reset
AT*ERPRAU=<mode> AT*ERPRAU=? AT*ERPRAU?	Profile auto activate

AT*ERCONDF=<mode> AT*ERCONDF=? AT*ERCONDF?	Force MS into Data/fax mode
AT*ERDFS=<mode> AT*ERDFS=? AT*ERDFS?	Deactivate the ringer of incoming Data/fax when MS is not connected to a PC
AT*ERMSG=<mode>,<n> AT*ERMSG=? AT*ERMSG?	Message alert configuration

3.1.3 CDPD Ensembles

Note: This section is preliminary. Current version of DM-15 does not have CDPD capability.

CDPD functionalities are exposed to the external controller based on the following Ericsson AT interface ensembles:

- Common Ensembles (Refer to section 3.1.1)
- S151 Card Phone commands
- S152 CDPD test commands (available in future versions of this Document)
- S154 Card Phone V.80 support

Ensemble S151 "Card Phone" commands

AT Command	Description
AT*EBPCN	Configure Binary Property Change Result Codes.
AT*EPRIVT	Configure privacy tone to beep when TDMA voice privacy is requested but not granted.
AT*ECRES	Restrict the following TDMA call types: [<restrict_in>], [<restrict_out>], [<restrict_out_cc>], [<restrict_out_900>], [<restrict_out_int>], [<restrict_out_oper>], [<restrict_out_xspeed>], [<restrict_out_ldist>], [<restrict_out_ldist_xspeed>], [<restrict_out_local_800>], [<restrict_out_local_800_mem>]
AT*EDORV	Treat Unidentified Calls As Data, Fax or Voice.
AT*EHFMICG	Set External Handsfree microphone gain.
AT*EHFVOL	Set handsfree earpiece volume.
AT*ERCNT	Reset counters: Reset the Total call time counter. Reset the Total home time counter. Reset the Analog call counter. Reset the Analog home counter. Reset the Digital call counter. Reset the Digital home counter. Reset the CDPD Kbyte counter.
AT+CTD	Restrict incoming voice calls.
AT+CTF	Restrict incoming fax calls.
AT+CTA	Restrict incoming async data calls.
AT*ESMM	Set minute minder on/off.
AT+CGSN	ESN.
AT+WPREG	User manually establishes an Internet connection.
AT+WP179	User manually establishes an Internet connection.
AT+WS198	User manually establishes an Internet connection.
AT+WS180	Automatic CDPD power conservation.
AT*ESMM	Set minute minder on/off.
AT+WPCHAN	CDPD initial channel selection.
AT+WPSPNI	Store the CDPD service provider network ID.
AT+WPSPI	Service provider lockout.
AT+WS197	Select NEI for registration.
AT+WS198	CDPD initial acquisition timer.
AT+WS45	Set DTE-DCE interface protocol during on-line data mode and on-line command mode.
AT+WPDEST	Store the primary CDPD IP address.
AT+WS174	Scan preference.
AT+WS175	CDPD sleep idle time.
AT+WPNEI	Configure the network entity identifiers.
AT+WPNEILIST	List all network entity identifiers.
AT+WPSTATE	Display CDPD status information.
AT+WS46	Set the mode.
AT*TEMS	Change to the TEMS command protocol on the system bus.
AT*EPLST	Set a priority list for scanning and contact when the phone is placed into multi-scan mode.
AT+COS	Specify the service to be requested for mobile-originated calls.
AT+CRC	Enable/disable cellular result codes.
AT+CGMR	Request the revision number.
AT+CPWD	Change the password.
ATZ	Reset the configuration to default parameter values.
AT+CLCK	Lock groups of AT commands to user access levels.
AT*EPWERSAVE	Configure the power save level of the PC card.
AT*EHFVOL	Set the earpiece volume level.

AT*ECRAT	CDPD channel registration attempt timer.
AT*ECHTO	CDPD channel hop time out value.
AT*EIACTO	CDPD intra-area cell transfer time out
AT*ECDEL	CDPD error logging.
AT*ECDTL	CDPD trace logging.
AT*ESEID	Store CDPD EID.
AT*ECDEN	CDPD encryption.
AT*ECDMCL	CDPD minimum carrier level.
AT*ECDCLT	CDPD carrier loss timer.
AT*ECDBEC	CDPD block error count.
AT*ECDBLERT	CDPD block error time threshold.
AT*ECDCGC	CDPD congestion count.
AT*ECGCT	CDPD congestion count threshold timer.
AT*EMDLPT	CDPD MDLP transmit window size.
AT*EMDLPR	CDPD receive window size.
AT*EACKT	CDPD acknowledgement timer.
AT*ERET	CDPD acknowledgement timer.
AT*ERET	CDPD retransmission timer.
AT*ECDIRT	CDPD identity request retransmission timer.
AT*EMTTEIR	CDPD maximum transmission for TEI request.
AT*ECDPRT	CDPD packet reassembly timer.
AT*EERCODE	Error code return.
AT+IBC	The command is used to turn on/off the V.80 In-Band Control Service. Additionally, this command is used to enable/disable V.24 status reports using V.80.
AT*EV80ISID	The action command is used to query the range of <ISID> parameter values accepted by the DCE. An <ISID> is assigned to each information stream supported by the DCE with the exception of the V.24 Information Stream

Ensemble S154, Card Phone V.80 Support

AT Command	Description
AT+IBC AT+IBC=? AT+IBC?	In-band control service
AT*EV801SID	V.80 information stream ID values

3.1.4 OEM Module Ensemble

Additional AT commands and responses were developed to meet OEM module customers' needs. These functionalities are grouped in five categories: hardware control, 3-watt burst modem over AMPS voice channel, NAM programming via AT command, miscellaneous, and customer specific.

Hardware Control

AT Command	Description
AT*EPSRC	Select the PCM clock source
AT*EGPO	Set System Connector General Purpose Digital Output
AT*EGPI	Read System Connector General Purpose Digital Input

3-Watt Burst Modem over AMPS voice channel

This section describes the AT commands to use burst modem service/features.

Note: This technology is being designed. The AT commands will be available in future versions of this document

NAM Programming

AT Command	Identification Name	Description
AT*NAENC	Address Encoding flag	Select either TBCD or IA5 encoding
AT*NAKEY	A-key	Program the value of A-key
AT*NAMID	NAM ID	Select personal NAM1 or NAM2
AT*NAOLC	ACCOLC	4-bit. Overload controls access attempts by the mobile station.
AT*NBAND	Band Order	Select the bands to be used.
AT*NDSN see also AT+GSN	ESN	32-bit factory set number. Used in the Authentication process
AT*NDSN	MS Manufacturer Code	Part of ESN
AT*NEMER	Emergency numbers	Display and enter the emergency number dial strings
AT*NEXAD	EX	1-bit Access method. Used to determine if the extended address word is used in access attempts.
AT*NFTAG	Favored Alpha Tag	Display and enter the Favored Alpha Tag string.
AT*NGRP	User Group Block	User Group ID
AT*NHTAG	Home Alpha Tag	Display and enter the Home Alpha Tag string.
AT*NIPCH	First Paging Channel	11-bit. Identify first paging channel at Home
AT*NLCS	Last Channel Used flag	Display and set/clear the flag controlling the use of the last accessed channel to start a new scan.
AT*NLOC	Local Control Option	Enable/disable local control option
AT*NMIN	MIN	Mobile Station Identification Number (MIN) is a 34-bit MSID sent over the air interface and is derived from the 10 digit network address used in world zone 1. The AT*NMIN command provides for entering the 10 digit number.
AT*NNTAG	Neutral Alpha Tag	Display and enter the Neutral Alpha Tag string.
AT*NPRASID	Associated Non-Public SID	Display and enter the associated PSID or RSID
AT*NPRMCC	Mobile Country Code	Mobile Country Code may be included in system broadcast information in support of international applications of IS-136 and international roaming. 3
AT*NPRSID	Non-Public PSID/RSID Value	16-bit
AT*NPRSIDT	Non-Public PSID/RSID Type	PSID or RSID
AT*NPRSOC	Non-Public SOC	A specific system operator.
AT*NPRTAG	Non-Public PSID/RSID Alphanumeric Name	To supply an Alphanumeric PSID/RSID to the user.
AT*NSEL	Select Telematics NAM or Personal NAM for admin.	Display and selection of NAM to be administered by subsequent AT*N commands
AT*NSID	Home SID	15-bit. SID is broadcast to provide support for system discrimination
AT*NSOC	SOC	A specific system operator.
AT*NSPCH	Secondary paging channel	Display and select the secondary paging channel

Miscellaneous

AT Command	Description
AT&V	Display Configuration Parameters
AT*ESMUND	Display number of Unread SMS Messages
AT*EVMUNRD	Display number of Unread Voice Mail Messages
AT*ERSTCT	Reset Call Counters and Timers
AT*EKRC	Display the KRC Information
AT*EUNSOL	Control Unsolicited Messages
AT*NSERV	Display current Service State
AT*ECLOG	Control Call Logging
AT*ECURTAG	Display current Alpha tag
AT*ERD	Resume dialing
AT*ESMSHDR	Display SMS Header
AT*ECRES	Call Restrictions
AT*EFPCS	Force Preferred Call State
AT*NAUD	Control Audio Paths

Customer Specific

AT Command	Description
AT*TELU	Enter the Telular protocol mode
AT*EBMOPT	Set the Win 4 scanning algorithm option and the power limit option
AT+CMGR	Read a message from the telematics In-Box.
At+CMTI	Unsolicited message. Report the receipt of a burst message from the telematics call center. The storage space is returned as "" and index parameter is always reported as zero during telematics mode.
AT+CMT	Unsolicited message. Report receipt of message from call center. This message reports the length of the message and returns the message content.
AT+CNMI	Control delivery of unsolicited result codes and associated storage of mobile terminated messages (CMTI/CMT)
AT+CMGS	Write a message to telematiocs out-box and sends the message to the call center

4 Safety

4.1 Exposure to Radio Frequency Signals

This OEM module is a low power radio transmitter and receiver. The module is not designed as or to be configured as a hand held device. Use as a portable transmitter will require separate FCC approval for SAR compliance. Typical usage of this OEM module includes:

- remote electrical meter reading
- telematic communication for vehicles
- fixed wireless terminals

Warning:

1. At no time is the antenna to be located closer than 20 centimeters to a normally occupied location.
2. At no time should an antenna system with greater than 1.0 dB gain be used with this module in any normally occupied area. The recommended antenna system configuration is a standard automotive antenna with 2.5 dB antenna gain and 1.5 dB cable loss.

4.2 Module Operation

Safe and efficient use of this module requires a properly terminated antenna. DO NOT operate the module with a damaged or missing antenna, replace a damaged or missing antenna immediately otherwise damage to the module may result and could violate FCC regulations. DO NOT operate this device within 6 inches of a person unless proper shielding from the antenna is installed.

4.3 Posted Facilities

Do not operate this device where posted notices require wireless devices to be turned off.

4.4 Electronic Devices

Most electronic equipment is shielded from RF signals. However, certain electronic equipment may not be shielded properly against RF signals.

Pacemakers

The Health Industries Manufacturers Association recommends that a minimum separation of six (6) inches be maintained between a wireless transmitter and a pacemaker to avoid potential interference with the pacemaker. These recommendations are consistent with the independent research and recommendations of Wireless Technology Research. Persons with Pacemakers should always keep the antenna/module more than 6 inches from their pacemaker when the module is on; if you have a reason to suspect that interference is taking place, turn off the module immediately.

Hearing Aids

Some digital wireless devices may interfere with some hearing aids.

Other Medical Devices

If you use any other type of personal medical device in the presence of this transceiver, consult the manufacturer of your device to determine if it is adequately shielded from external RF energy. Your physician may be able to assist you in obtaining this information.

4.5 Blasting Areas

To avoid interfering with blasting operations, turn your module off when in a "blasting area" or in areas posted: "Turn off two-way radio". Obey all signs and instructions.

4.6 Potentially Explosive Atmospheres

Turn your module off when in any area with a potentially explosive atmosphere and obey all signs and instructions. Sparks in such areas could cause an explosion or fire resulting in bodily injury or even death.

Areas with a potentially explosive atmosphere are often, but not always, clearly marked. They include such areas as gasoline stations; below deck on boats; fuel or chemical storage or transfer facilities; vehicles using liquefied petroleum gas (such as propane or butane); areas where the air contains chemicals or particles, such as grain dust or metal powders; and any other area where you would normally be advised to turn off your vehicle engine.

4.7 Vehicles

RF signals may affect improperly installed or inadequately shielded electronic systems in motor vehicles. Check with the manufacturer or its representative regarding your vehicle. You should also consult the manufacturer of any equipment that has been added to your vehicle.

4.8 For Vehicles Equipped with an Airbag

An airbag inflates with a great force. Do not place objects including both installed or portable wireless equipment in the area over the airbag or in the airbag deployment area. If in-vehicle wireless equipment is improperly installed and the airbag inflates, serious injury could result.

4.9 Responsible Use

OEM Manufacturers providing telematic devices for vehicular use are encouraged to incorporate the following CTIA guidance for safe and responsible wireless phone use into their user's manuals:

A Guide to Safe and Responsible Wireless Phone Use

TENS OF MILLIONS OF PEOPLE IN THE U.S. TODAY TAKE ADVANTAGE OF THE UNIQUE COMBINATION OF CONVENIENCE, SAFETY AND VALUE DELIVERED BY THE WIRELESS TELEPHONE. QUITE SIMPLY, THE WIRELESS PHONE GIVES PEOPLE THE POWERFUL ABILITY TO COMMUNICATE BY VOICE--ALMOST ANYWHERE, ANYTIME--WITH THE BOSS, WITH A CLIENT, WITH THE KIDS, WITH EMERGENCY PERSONNEL OR EVEN WITH THE POLICE. EACH YEAR, AMERICANS MAKE BILLIONS OF CALLS FROM THEIR WIRELESS PHONES, AND THE NUMBERS ARE RAPIDLY GROWING.

But an important responsibility accompanies those benefits, one that every wireless phone user must uphold. When driving a car, driving is your first responsibility. A wireless phone can be an invaluable tool, but good judgment must be exercised at all times while driving a motor vehicle--whether on the phone or not.

The basic lessons are ones we all learned as teenagers. Driving requires alertness, caution and courtesy. It requires a heavy dose of basic common sense---keep your head up, keep your eyes on the road, check your mirrors frequently and watch out for other drivers. It requires obeying all traffic signs and signals and staying within the speed limit. It means using seatbelts and requiring other passengers to do the same.

But with wireless phone use, driving safely means a little more. This brochure is a call to wireless phone users everywhere to make safety their first priority when behind the wheel of a car. Wireless telecommunications is keeping us in touch, simplifying our lives, protecting us in emergencies and providing opportunities to help others in need. When it comes to the use of wireless phones, safety is your most important call.

Wireless Phone "Safety Tips"
Below are safety tips to follow while driving and using a wireless phone, which should be easy to remember.

1. **Get to know your wireless phone and its features such as speed dial and redial.** Carefully read your instruction manual and learn to take advantage of valuable features most phones offer, including automatic redial and memory. Also, work to memorize the phone keypad so you can use the speed dial function without taking your attention off the road.

2. **When available, use a hands free device.** A number of hands free wireless phone accessories are readily available today. Whether you choose an installed mounted device for your wireless phone or a speaker phone accessory, take advantage of these devices if available to you.

3. **Position your wireless phone within easy reach.** Make sure you place your wireless phone within easy reach and where you can grab it without removing your eyes from the road. If you get an incoming call at an inconvenient time, if possible, let your voice mail answer it for you.

4. **Suspend conversations during hazardous driving conditions or situations.** Let the person you are speaking with know you are driving; if necessary, suspend the call in heavy traffic or hazardous weather conditions. Rain, sleet, snow and ice can be hazardous, but so is heavy traffic. As a driver, your first responsibility is to pay attention to the road.

5. **Do not take notes or look up phone numbers while driving.** If you are reading an address book or business card, or writing a "to do" list while driving a car, you are not watching where you are going. It's common sense. Don't get caught in a dangerous situation because you are reading or writing and not paying attention to the road or nearby vehicles.

6. **Dial sensibly and assess the traffic;** if possible, place calls when you are not moving or before pulling into traffic. Try to plan your calls before you begin your trip or attempt to coincide your calls with times you may be stopped at a stop sign, red light or otherwise stationary. But if you need to dial while driving, follow this simple tip--dial only a few numbers, check the road and your mirrors, then continue.

7. **Do not engage in stressful or emotional conversations that may be distracting.** Stressful or emotional conversations and driving do not mix--they are distracting and even dangerous when you are behind the wheel of a car.

Make people you are talking with aware you are driving and if necessary, suspend conversations, which have the potential to divert your attention from the road.

8. **Use your wireless phone to call for help.** Your wireless phone is one of the greatest tools you can own to protect yourself and your family in dangerous situations--with your phone at your side, help is only three numbers away. Dial 9-1-1 or other local emergency number in the case of fire, traffic accident, road hazard or medical emergency. Remember that it is a free call on your wireless phone!

9. **Use your wireless phone to help others in emergencies.** Your wireless phone provides you a perfect opportunity to be a "Good Samaritan" in your community. If you see an auto accident, crime in progress or other serious emergency where lives are in danger, call 9-1-1 or other local emergency number, as you would want others to do for you.

10. **Call roadside assistance or a special wireless non-emergency assistance number when necessary.** Certain situations you encounter while driving may require attention but are not urgent enough to merit a call for emergency services. But you still can use your wireless phone to lend a hand. If you see a broken-down vehicle posing no serious hazard, a broken traffic signal, a minor traffic accident where no one appears injured or a vehicle you know to be stolen, call roadside assistance or other special non-emergency wireless number.

Careless, distracted individuals and people driving irresponsibly represent a hazard to everyone on the road. Since 1984, the Cellular Telecommunications Industry Association and the wireless industry have conducted educational outreach to inform wireless phone users of their responsibilities as safe drivers and good citizens. As we approach a new century, more and more of us will take advantage of the benefits of wireless telephones. And, as we take to the roads, we all have a responsibility to drive safely.