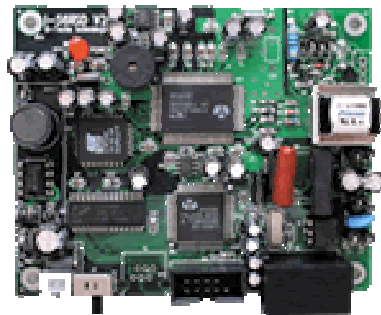


# 56K Industry Modem

Model: LD-E56RS

User's Manual



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## **1. Introduction**

Thank your very much for using the Kocen LD-E56RS. This Modem incorporates the latest technological advancement for you to electronically communicate with other computers, information networks, fax machines or other modems. It embraces most of the industry and commercially popular standards to ensure compatibility with most equipment and application programs. The voice capability renders a wide range of application possibilities from a simple telephone-answering device to a sophisticated voice-mail system.

## **2. What is in Your Modem Package?**

Your LD-E56RS is made up of many components. Make sure you have them all before trying to operate your modem. Your package should include:

- LD-E56RS data/fax/Voice modem
- RJ-11 telephone cord
- AC Power Transformer
- This LD-E56RS Owner’s Manual

## **3. Modem Features**

1. Line rate of 56 Kbps for download.
2. ITU-T V.90 specifications for operation at speed of 56,000 bps.
3. MNP10 dynamic data rate fallback and forward on the run.

4. Software controlled speaker volume.
5. Software selectable flow control.
6. Voice option for voice mail application.
7. Zero-Voltage Modem wake-up function

## 4. Specification

<b>MODEM OPERATION</b>	
Line Rate	0.3, 1.2, 2.4, 4.8, 7.2, 9.6, 12, 14.4, 16.8, 19.2, 21.6, 24, 26.4, 28.8,31.2, 33.6, 56 Kbps
DTE Rate	115200 bps maximum
Compatibility	Bell 103; 212A, ITU-T V.21; V.22; V.23; V.22bis; V.32; V.32bis;V.34;V.90; K56flex
Operation	Half or full-duplex over 2-wire dial-up line, asynchronous
Linking	Auto dial/answer, auto bauding, MNP10 auto fall-back/forward
Flow Control	RTS/CTS, XON/XOFF (software selectable)
Error Correction	ITU-T V.42, MNP4 (auto-match)
Data Compression	ITU-T V.42bis, MNP5 (auto-match)
Dialing method	dtmf tone and puls dial
Receive Sensitivity	-36 dBm
Command Set	Hayes AT and Escape sequence
Memory	1 configuration profiles
<b>FAX OPERATION</b>	
Speed	14400 bps
Compatibility	Group 3 with T.30 protocol over ITU-T V.17; V.21 ch2; V.27ter; V.29
Command Set	TR-29 Class 1
<b>VOICE OPERATION</b>	
PVS	Telephone answering machine (TAM), voice mail system,
Sampling Rate	7.2 Khz using 2 or 4 bits ADPCM; 11.025Khz linear PCM
<b>GENERAL</b>	
Operating systems	Windows®98, Windows®NT4.0, Windows®Me, Windows®2000,Windows®XP,Windows®2003
Computer interface	V.24/RS232 OR TTL 5V Automatic bit rate and data format recognition: Bit rate: 300 –11252 bps, asynchronous Data format: 10/11 bit, parity: even/odd/none ( 7,e,1 7,o,1 8,n,1 8,e,1 ) Handshake: RTS-CTS, XON-XOFF
Power supply	12V DC OR 5V DC
Line Interface	2 x RJ-11 for line and telephone
Operating surveillance	No
Voice Interface	No
Ambient Temperature	-20 to 80°C
Relative Humidity	10 to 95% non-condensing
Power consumption	0.8 W typ., sleep mode: 0.5W typ.

Weight	150g
Dimensions	10.0w x 8.0h x 18.4d cm

## 5. Default Profiles

SETTING	DEFAULT	NVRAM
Auto-answer	Disabled	Yes
Backspace character	08	No
Bell / CCITT compatibility at 1200 bps	Bell 212	Yes
Busy signal detect	Enabled	Yes
Carriage return character	13	No
Line feed character	10	No
Data Set Ready option	Always on	Yes
Data Terminal Ready option	&D2	Yes
Data Terminal Ready pulse width	0.5 seconds	Yes
Echo option	On	Yes
Escape character definition	43 (+++)	Yes
Guard tones	Disabled	Yes
Long space disconnect	Disabled	Yes
Parity	None	Yes
Pulse make / break ratio	39/61	Yes
Responses	Word	Yes
Response enable	All	Yes
RTS-to-CTS delay	10 milliseconds	Yes
Speaker status	On until DCD	Yes
Speaker volume	Low	Yes
Test timer setting	0 second	Yes
Wait for carrier after dialing	50 seconds	Yes
Wait for dial tone	2 seconds	No
Wait for dial tone before dialing	Enabled	Yes
Dial delay pause time	2 seconds	Yes
Wait before accepting carrier detect	0.6 seconds	Yes
Wait before disconnecting	1.4 seconds	Yes
Wait after carrier loss	1.4 seconds	Yes
DTMF tone duration and spacing	95 milliseconds	Yes
Flash (!) dial modifier time	0.7 seconds	No
PSTN attenuation level	-10 dBm	No
Fax attenuation level	-10 dBm	No

## 6. Basic AT Commands

A/ Re-execute Command

The modem repeats the last command line sent by the DTE. Usually used for re-dialing.

**Note:** This command should **not** be terminated by <CR>.

**A Answer**

The modem will go off-hook and attempt to answer an incoming call. Upon successful completion of handshake, the modem will go on-line in answer mode.

**Notes:**

If +FCLASS=0 is selected, the modem will enter the connect state after exchanging carrier with the remote system. If no carrier is detected within the period specified in S7, the modem hangs up. Any character entered while connecting will abort the connection process.

If +FCLASS=1, the modem will go off-hook in V21 answer mode. It will generate the V21 2100 Hz answer tone for 3 +/- 0.5 seconds, and following a delay of 70 ms, will proceed as if the +FTH=3 command were issued. At any stage up to (but excluding) the +FTH=3 command state, any character will abort the communication.

If +FCLASS=8 (#CLS=8), the modem will go off-hook and a voice session will take place.

Related S-Reg: S0

**Bn CCITT Control**

B0 Connect at V.22 1200 bps

Result codes:

OK n=0

Error Otherwise

**Dn Dial**

Directs the modem to go on-line, dial according to the string entered, and attempt to establish a connection.

The Dial String may consist of any of the characters described below:

T Tone dialing (first character in the string)

P Pulse dialing (first character in the string)

L Redial last dialed number (first character in the string)

0-9 Digits 0 to 9.

\* Asterisk (tone only)

# Hash (tone only)

W Wait for dial tone; the modem will wait for dial tone before dialing the digits following "W". S6 register will be used for timeout. (X3 or higher)

, (Comma); Pause for the time specified by S8 before resuming the dialing

; (Semicolon) Return to command mode after dialing. This allows the user to issue additional AT commands while remaining off-hook. Actual call progress will be entered only after a dial command issued without the ";" terminator.

S=n Dial the number stored in the directory; n=0-3 (see &Z).

! Flash; The modem will go on hook for a time defined by S24.

@ Wait for silence; The modem will wait for at least 5 seconds of silence before resuming the dialing. If no such silence is detected before the expiration of the call abort timer (S7), the modem will terminate with NO ANSWER response (or BUSY if applicable). If answer tone arrives during execution of this parameter, the

modem handshakes. (X3 or higher)

(),< > (space) String format characters – ignored

<i> any other character – ignored.

**Notes:**

If +FCLASS=0 is selected, the modem will attempt to connect with another data modem. The modem will use the time period specified in S6 and S7 as time-outs in the handshake process. If a timeout expires, the modem will go on-hook and respond with NO CARRIER response. The command will be aborted in progress is a DTE character is entered before completion of the handshake.

If +FCLASS=1, the modem will attempt to connect with a fax machine (or modem) by entering the HDLC V21 channel 2 receive state (as if +FRH=3 had been issued).

The command will be aborted upon receipt of a DTE character if the modem has not finished dialing. In this case the modem will go on-hook and return to command mode responding with NO CARRIER message. If the modem has finished dialing, It proceeds as if +FRH=3 command has been issued.

If +FCLASS=8 (#CLS=8), the modem will go off-hook in V21 answer mode. It will decide (based on timers) when the other side answers in voice and a voice session will take place.

Related S-Reg: S5,S6,S7,S16,S22,S28,S56

En Set local echo

The modem enables/disables echo of characters to DTE.

Parameter value is written to S13.

E0 Disable command echo.

E1 Enable command echo.

Result codes:

OK n=0 or 1

Error Otherwise

Related S-Reg: S13

Hn Set ON/OFF hook

H0 Modem hangs up (goes on-hook).

H1 Modem goes off hook.

Result codes:

OK n=0 or 1

Error Otherwise

In Identification/Information

I1 Modem Name, Vendor Name, Modem Version,

for example :

**ModemX**

**ModemWorks Ltd.**

**Ver 1.10**

I2 SW Provider /SW Version, for example

**Smart Link Ltd.**

**Ver 1.20**

I3 Chipset Vendor/Chipset ID, for example

**Chip Vendor Ltd.**

**XY4220**

I4 Modem active profile for example,

Active Profile:

S00=000 S01=000 S02=000 S03=000 S04=000 S05=000 S06=000 S07=000  
S08=000 S00=009 S10=000 S11=000 S12=000 S13=000 S14=000 S15=000  
S16=000 S17=000 S18=000 S01=019 S20=000 S21=000 S22=000 S23=000  
S24=000 S25=000 S26=000 S27=000 S28=000 S29=000 S30=000 S31=000  
S32=000 S33=000 S34=000 S35=000 S36=000 S37=000 S38=000 S39=000  
S40=000 S41=000 S42=000 S43=000 S44=000 S45=000 S46=000 S47=000

I5 Stored profile 0

Active Profile 0:

(Same format as above)

I6 Stored profile 1

Active Profile 1:

(Same format as above)

I7 Display stored pone numbers

(See &Z command)

Ln Speaker volume

Select speaker volume.

L0 Low

L1 Low

L2 Medium

L3 High

Result codes:

OK n=0-3

Error Otherwise

Related S-Reg: S30

Mn Speaker control

Select when the speaker is On/Off.

M0 Speaker always OFF

M1 Speaker ON from start of dialing until receiving carrier

M2 Speaker always ON

M3 Speaker OFF from end of dialing until receiving carrier

Result codes:

OK n=0-3

Error Otherwise

Related S-Reg: S29

Nn Automode control

Enable/Disable Automode detection.

N0 Automode detection disabled. A subsequent handshake will be conducted according to the contents of S32.

N1 Automode enabled. A subsequent handshake will be conducted according to the Automode algorithm.

Result codes:

OK n=0 or 1

Error Otherwise

Related S-Reg: S31

On Returns to on-line data mode

This command is normally used to connect the DTE back after an escape (+++) has been issued.

O0 Return to on-line data mode.

O1 Return to on-line data mode, retrain first.

Result codes:

OK n=0-1

Error Otherwise

P Pulse dialing

Forces pulse dialing. Applies to subsequent dialing commands.

This command holds until the next T dial modifier or T command is received.

The modem will go off hook and attempt to answer an incoming call. Upon successful completion of handshake, the modem will go on-line in answer mode.

Related S-Reg: S16

Q Quiet result codes control

Q0 Enable sending result codes to DTE.

Q1 Disable sending result codes to DTE.

Result codes:

OK n=0 or 1

Error Otherwise

Related S-Reg: S14

S Read/Write S-Register

This command has a few derivatives:

Sn=v Sets the value v (decimal) to S-register n (v=0-255)

Sn? Displays the value of S-register in decimal format (3 digits)

**Note:** Some registers are read-only

Result codes:

OK All parameters valid

Error Invalid S register or value. Trying to write to a read-only register

T Tone dialing

Forces tone dialing. Applies to subsequent dialing commands.

This command holds until the next T dial modifier or T command is received.

This command changes S14 to reflect the current dialing mode.

Related S-Reg: S16

Vn Verbose/Numeric result codes

Select the time of result messages sent to the DTE.

For a list of result codes and verbal messages see X command.

V0 Short form (numeric) result codes to be sent to DTE.

V1 Long form (verbose) result codes to be sent to DTE.

Result codes:

OK n=0 or 1

Error otherwise

Related S-Reg: S15

Xn Extended result codes

Select the subset of result codes to be used by the modem to the DTE.

If the modem is in fax mode (+FCLASS=1), the only message sent to indicate connection is "CONNECT" without a speed indication.

X0 Supported messages: OK, CONNECT, RING, NO CARRIER and ERROR, Blind call enabled.

X1 Supported messages: OK, CONNECT xxxx, RING, NO CARRIER and ERROR, Blind call enabled.

X2 Same as X1 + NO DIAL TONE message, Blind call disabled

X3 Same as X1 + BUSY message, Blind call enabled.

X4 All messages supported, Blind call disabled (see list below).

**Notes:**

W, @ dial modifiers are ignored in X1, X2

S6 (Wait before dial) is ignored in X2, X4 if no W is specified in dial string

S6 is set to 0 means a blind call

**Table 1 – Result Codes**

Result Message	X0	X1	X2	X3	X4
0 OK	*	*	*	*	*
1 CONNECT	*	*	*	*	*
2 RING	*	*	*	*	*
3 NO CARRIER	*	*	*	*	*
4 ERROR	*	*	*	*	*
5 CONNECT 1200	1	*	*	*	*
6 NO DIAL TONE	3	3	*	3	*
7 BUSY	3	3	3	*	*
8 NO ANSWER	3	3	3	*	*
9 CONNECT 0300	1	*	*	*	*
10 CONNECT 0600	1	*	*	*	*
11 CONNECT 2400	1	*	*	*	*
12 CONNECT 4800	1	*	*	*	*
13 CONNECT 7200	1	*	*	*	*
27 CONNECT 9600	1	*	*	*	*
14 CONNECT 12000	1	*	*	*	*
15 CONNECT 14400	1	*	*	*	*
16 CONNECT 16800	1	*	*	*	*
17 CONNECT 19200	1	*	*	*	*
18 CONNECT 21600	1	*	*	*	*
19 CONNECT 24000	1	*	*	*	*
20 CONNECT 26400	1	*	*	*	*
21 CONNECT 28800	1	*	*	*	*
22 CONNECT 31200	1	*	*	*	*
23 CONNECT 33600	1	*	*	*	*
24 CONNECT 34800	1	*	*	*	*
25 CONNECT 40000	1	*	*	*	*
26 CONNECT 42000	1	*	*	*	*
28 CONNECT 44000	1	*	*	*	*
29 CONNECT 46000	1	*	*	*	*
30 CONNECT 48000	1	*	*	*	*
31 CONNECT 50000	1	*	*	*	*
32 CONNECT 52000	1	*	*	*	*
33 CONNECT 54000	1	*	*	*	*
34 CONNECT 56000	1	*	*	*	*
35 CONNECT 57600	1	*	*	*	*

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36	CONNECT 115200	1	*	*	*	*
	<b>Result Message</b>	<b>X0</b>	<b>X1</b>	<b>X2</b>	<b>X3</b>	<b>X4</b>
	<b>Code</b>					
37	CONNECT 230400	*	*	*	*	
38	CONNECT 460800	1	*	*	*	*
39	CONNECT 921600	1	*	*	*	*
40	CONNECT 32000	*	*	*	*	
41	CONNECT 34000	1	*	*	*	*
42	CONNECT 36000	1	*	*	*	*
43	CONNECT 38000	*	*	*	*	*
44	CONNECT 58000	*	*	*	*	*
45	CONNECT 60000	*	*	*	*	*
46	CONNECT 28000	*	*	*	*	*
47	CONNECT 29333	*	*	*	*	*
48	CONNECT 30666	*	*	*	*	*
49	CONNECT 33333	*	*	*	*	*
50	CONNECT 34666	*	*	*	*	*
51	CONNECT 37333	*	*	*	*	*
52	CONNECT 38666	*	*	*	*	*
53	CONNECT 41333	*	*	*	*	*
54	CONNECT 42666	*	*	*	*	*
55	CONNECT 45333	*	*	*	*	*
56	CONNECT 46666	*	*	*	*	*
57	CONNECT 49333	*	*	*	*	*
58	CONNECT 50666	*	*	*	*	*
59	CONNECT 53333	*	*	*	*	*
60	CONNECT 54666	*	*	*	*	*
70	FAX	*	*	*	*	*
71	DATA	*	*	*	*	*
100	VCON	4	4	4	4	*
101	DELAYED	4	4	4	4	*
102	BLACKLISTED	4	4	4	4	*
66	COMPRESSION: CLASS 5	-	*	*	*	*
67	COMPRESSION: V.42BIS	-	*	*	*	*
69	COMPRESSION: NONE	-	*	*	*	*
76	PROTOCOL: NONE	-	*	*	*	*
77	PROTOCOL: LAPM	-	*	*	*	*

78	PROTOCOL: MNP	-	*	*	*	*
1021	MODULATION: V.21	-	*	*	*	*
1022	MODULATION: V.22	-	*	*	*	*
1032	MODULATION: V.32	-	*	*	*	*
1034	MODULATION: V.34	-	*	*	*	*
1103	MODULATION: B103	-	*	*	*	*
1122	MODULATION: V.22BIS	-	*	*	*	*
1132	MODULATION: V.32BIS	-	*	*	*	*
1134	MODULATION: V.34BIS	-	*	*	*	*
1212	MODULATION: B212	-	*	*	*	*
+F4	+FCERROR	*	*	*	*	*

<\*> message will be generated when n has been selected

<i> message will be replaced by message <I> when n has been selected

<-> message will not be generated when n has been selected.

Related S-Reg: S56

Yn Select default configuration

Select the default user defined configuration.

**Note:** The default configuration is not loaded by Yn (See Zn)

Y0 Select user template 0

Y1 Select user template 1

Y2 Select factory setting 0

Y3 Select factory setting 1

Related S-Reg: S161

Zn Select user defined configuration

Select the user defined configuration.

Z0 Select default user template (as defined by Yn)

Z1 Select user template 0

Z2 Select user template 1

Z3 Select factory setting 0 (&F0)

Z4 Select factory setting 1 (&F1)

Result codes:

OK n=0-5

Error Otherwise

Related S-Reg: S59

## **AT& Commands**

**&An** Connect message format

Select the format of the CONNECT message.

**&A0** no extra messages besides CONNECT xxxxx

**&A1** Add Modulation indicator:

V.21/ V.22/ V.22BIS/ V.32/ V.32BIS/ V.34/  
V.34BIS/ B103/ B212

For example:

Modulation: V.34

**&A2** Add Error Detection Protocol and Data Compression indicators.

For example:

Protocol: LAPM/MNP/NONE

Compression: CLASS 5/V.42BIS/NONE

**&A3** Add Modulation Indicator + Error Detection Protocol + Data Compression indicators (see above).

Related S-Reg: S70, S71

**&Cn** Control Carrier Detect (CD,RLSD) behavior

Controls the RLSD output behavior.

**&C0** RLSD is assumed to be ON all the time

**&C1** RLSD follows the carrier state

Result codes:

OK n=0 or 1

Error Otherwise

Related S-Reg: S60

**&Dn** Controls DTR behavior (NA)

Controls the DTR output behavior.

**Note:** This command is supported for compatibility.

It has no significance in Modio environment.

**&D0** DTR is taken to be ON all the time

**&D1** DTR drop causes entry to command mode without disconnect

**&D2** DTR follows DTR circuit definition

**&D3** DTR drop causes software reset (as in Z0)

Result codes:

OK n=0-3

Error Otherwise

Related S-Reg: S63

**&En** Connect message speed source

Select the requested source for the speed field in the CONNECT message.

&E0 DCE Speed

&E1 DTE Speed

**Note:** Since a virtual port is involved, the DTE is not bound by any UART limitation, and may be theoretically set as high as 921600.

DTE speed is supported for compatibility only. It bears little significance in Modio environment.

Related S-Reg: S71

&Fn Sets factory configuration

Select one of the factory settings.

&F0 Select factory setting 0

&F1 Select factory setting 1

Result codes:

OK n=0-1

Error Otherwise

Related S-Reg: S59

&Hn Sets flow control

Select the user defined configuration.

&H0 Flow control disabled (NA)

&H1 "HW" flow control RTS/CTS (emulation)

Result codes:

OK n=0-1

Error Otherwise

Related S-Reg: S62

&In Dial-up mode

&I0 Disabled auto Dial-up

&I1 Auto dial-up to dial a number"&z0"

&I2 Auto dial-up to dial a number"&Z0"、"&Z1"、"&Z2"、"&Z3"

&Ln **&Ln - Leased Line Operation**

This command requests leased line or dial-up operation. This command is provided for compatibility only; no mode change is performed, dial-up operation continues. The OK response is returned for a valid parameter, but no other action is performed.

The parameter value, if valid, is written to S27 bit 2.

&L0 Requests dial-up operation. Dial-up operation continues.

Result Codes:

OK n = 0.

ERROR            Otherwise.

&L1                **Leased Line**

&Kn    Same as %Cn

&Pn    Set pulse dial make/break ratio

&P0    US & Canada 39%/61% (10 pps)

&P1    UK & Hong Kong 33%/67% (10 pps)

&P2    Same as 0, except at 20 pps

&P3    Same as 1, except at 20 pps

Result codes:

OK    n=0-3

Error Otherwise

Related S-Reg: S28

&Rn    Controls RTS behavior

Controls the RTS output behavior.

**Note:** This command is supported for compatibility.

It has no actual effect

&R0    RTS ignored

&R1    Modem receives data only on RTS (NA)

Result codes:

OK    n=0 or 1

Error Otherwise

Related S-Reg: S61

&Sn    Controls DSR behavior

**Note:** This command is supported for compatibility.

It has no actual effect.

&S0    DSR override (is assumed to be ON all the time)

&S1    DSR follows circuit definition

Result codes:

OK    n=0 or 1

Error Otherwise

Related S-Reg: S64

&V    Display Active profile, Stored Profiles, Stored Phone Numbers  
(Equivalent to I4-I7 combined)

&Wn    Writes current configuration

&W0    Write to template 0

&W1    Write to template 1

Result codes:

OK n=0-1

Error Otherwise

Written to registry.

&Zn Stores dial string  
Stores/Displays dial string (up to 47 characters)  
&Zn=s Store dial string (n=0-4)  
&Zn=L Store the last dialed string (n=0-4)  
&Zn? Display the nth string  
&ZL? Display the last dialed string  
Written to registry.

## **AT Commands - Error correction control**

\An Maximum MNP block Size  
    \A0 64 characters maximum block size  
\*     \A1 128 characters maximum block size  
    \A2 192 characters maximum block size  
    \A3 256 characters maximum block size  
Result codes:  
OK n=0-3  
Error Otherwise  
Related S-Reg: S<basereg+1> of V.42 registers

\Bn Transmit break to remote (-)  
In non-error correction mode, the modem will transmit a break signal to the remote modem with a length of n\*100ms. If a number above 9 is entered, 9 is used.  
Result codes:  
OK if connected in data modem mode  
Error if not connected or if connected in fax modem mode

\Kn Break Control (-)  
Controls the response of the modem to a break received from DTE or a remote modem or the \Bn command.  
The behavior parameter is written to Sxx  
    \K0 Enter on-line command mode, no break sent to remote modem  
    \K1 Clear data buffers and send break to remote modem  
    \K2 Same as 0  
    \K3 Send break to remote modem immediately  
    \K4 Same as 0

\* \K5 Send a break to remote modem in sequence with transmitted data

Related S-Reg: S<basereg+x> of V.42 registers

Result codes:

OK n=0-5

Error Otherwise

\Nn Error correction operating mode

\N0 Normal (Speed buffering) - No error correction

\N1 Direct (pass-through) 128 characters maximum block size

\N2 Reliable (error correction) mode. The Modem will attempt LAPM and then MNP

\N3 Auto reliable mode. Same as \N2, but will fall back to Normal

\N4 LAPM error correction mode only, hang up upon failure.

\N5 MNP error correction mode only, hang up upon failure.

Result codes:

OK n=0-5

Error Otherwise

Related S-Reg: S<basereg> of V.42 registers

## AT% Commands

**%Cn** Compression control

%C0 Disable data compression

%C1 Enable MNP5 data compression

%C2 Enable V.42bis data compression

%C3 Enable MNP5/V.42bis data compression

Result codes:

OK n=0-3

Error Otherwise

Related S-Reg: S<basereg+2> of V.42 registers

**%En** Line quality monitor control

Controls whether or not the modem will automatically monitor the line quality and request a retrain (%E1), or fall back when quality is insufficient or fall forward when line quality improves (%E2).

%E0 Disable line quality control

%E1 Enable line quality control and auto retrain

%E2 Enable line quality control and fallback/forward

Result codes:

OK n=0-3

Error Otherwise

Related S-Reg: S39

**%Tn**

**Test**

**Auxiliary Registers Setup**

**mode**

%T23 - Generate DTMF 0-9

%T32

%T33 Generate DTMF \*

%T34 Generate DTMF #

%T35 - Generate DTMF A-D

%T38

%T39 V.25 Answer Tone (2100Hz)

%T40 V.25 Calling Tone (1300Hz)

%T41 Fax Calling Tone (1100Hz)

%T42 1800Hz Guard Tone

%T90 V.21 Channel 1 mark origin S53=3, S143=0 S53=3, S143=0

%T91 V.21 Channel 1 mark answer

%T90	V.23 Channel mark origin	S53=2	S53=2
%T91	V.23 Channel mark answer		
%T90	V.22 1200 origin	S53=5	S53=5
%T91	V.22 1200 answer		
%T90	V.22bis/V.34 origin (<=19200)	S53=6, S52=0/1	S53=6, S52=0/1
%T91	V.22bis/V.34 answer (<=19200)		
%T90	V.32/V.34 origin	S53=7, S52=0/1	S53=7, S52=0/1
%T91	V.32/V.34 answer		
%T90	V.32bis/V.34 origin	S53=9, S52=0/1	S53=9, S52=0/1
%T91	V.32bis/V.34 answer		
%T91	V.21 channel 2 mark	S53=3, S143=1	
%T76	V.27 2400 signaling		
%T77	V.27 4800 signaling		
%T78	V.29 7200 signaling		
%T79	V.29 9600 signaling		
%T80	V.17 12000 signaling		
%T81	V.17 12000 signaling		
%T90	V.34 org signaling (>=21600)	S53=14	S53=14
%T91	V.34 ans signaling (>=21600)		
%T90	V.34bis org signal (>=31200)	S53=18	S53=18
%T91	V.34bis ans signal (>=31200)		

**Note:** For running AT%T Commands, The test DP driver must be present (This driver is supplied for OEM qualification usage)

## AT+MS Command

+MS Modulation select

This command selects the modulation, optionally enables/disables Automode, and optionally specifies the lowest and highest connection rates.

The command format is:

**AT+MS= [<mod>][,<automode>][,<min\_rate>][,<max\_rate>]]]]**

<mod> a decimal number specifying the preferred modulation (automode enabled), or the modulation (automode disabled).

<automode> 0/1 Automode disabled/enabled

<min\_rate> minimum rate for connection. If lower than the actual minimum rate for the selected modulation, the actual lowest supported rate will be taken.

<max\_rate> maximum rate for connection. If higher than the actual maximum rate for the selected modulation, the actual highest supported rate will be taken.

Table 2 - +MS command parameters

<mod>	Modulation	Possible rates
22	V.22	1200
122	V.22bis	2400,1200
32	V.32	9600, 4800
132	V.32bis	14400, 12000, 9600, 7200, 4800
34	V.34	33600, 31200, 28800, 26400, 24000, 21600, 19200,16800, 14400, 12000, 9600
56	K56Flex	32000,34000,36000 ..... ,56000
90	V.90	29333, 30666,32000 ..... ,56000
212	Bell 212	1200
103	Bell 103	300

Examples:

AT+MS=34,0,4800,33600 V.34, No Automode, Min. speed 4800, Max speed 33600

AT+MS=,1 Automode

AT+MS=32,1,,14400 V.32 Automode, Max speed 14400 (min speed as before)

Factory Settings: 90,1,300,56000

The requested modulation scheme will be written to S32

The requested min rate will be written to S33

The requested max rate will be written to S34

The actual rate may be read from S35

The actual modulation scheme may be read from S37

(The codes as specified in the Xn command)

Other derivatives of the +MS command:

AT+MS? report current MS settings (e.g. 34,1,9600,33600)

AT+MS=? list the supported values +MS:(22,122.....), (0,1), (300-33600), (300-33600)

Result codes:

OK Syntax OK

Error Otherwise

Related S-Reg: S31-S37

## AT+F Commands - Fax Support

+FCLASS Sets Data/Fax Class1/Voice (0,1,8) mode.

=<value> +FCLASS=<value>

[<value> - 0,1,8 (Data/Fax Class1/Voice)]

Result codes:

OK Syntax OK

Error Otherwise

+FCLASS? Returns the current setting

Related S-Regs: S32, S150

+FAE Data/Fax Auto Answer

+FAE=<value> [<value> - 0,1 (Data/Fax Class1)]

+FAE? Returns the current setting

Related S-Regs: S151

+FTS= Stops transmission and waits.

<value> Terminates transmission and waits for <value>\*10ms interval before responding with OK. ERROR is issued if the modem is on-hook.

+FTS? Returns the current setting

+FRS= Receives Silence.

<value> Report back to DTE with OK after <value>\*10ms silence interval has been detected. The command is aborted if any character is received from the DTE (The response will still be OK). ERROR is issued if modem is on-hook.

+FRS? Returns the current setting

+FTM= Transmits data according to the defined modulation. ERROR is issued if modem is on-hook.

<value>	Value	Modulation
	24	V.27 ter 2400 bps
	48	V.27 ter 4800 bps
	72	V.29 7200 bps
	73	V.17 7200 bps long
	74	V.27 7200 bps short
	96	V.29 9600 bps
	97	V.17 9600 bps long
	98	V.17 9600 bps short
	121	V.17 12000 bps long
	122	V.17 12000 bps short
	145	V.17 14400 bps long
	146	V.17 14400 bps short

+FTM=? Return "24, 48, 72, 73, 74, 96, 97, 98, 121, 122, 145, 146"

+FRM= Receives data according to the defined modulation

<value> (See Values above)

ERROR is issued if modem is on-hook.

+FRM=? Return "24, 48, 72, 73, 74, 96, 97, 98, 121, 122, 145, 146"

see +FTM

+FRH=        Receives data using HDLC protocol and the defined modulation .

<value>     ERROR is issued if modem is on-hook.

<value> - 3 (V.21 channel 2 300 bps)

+FRH=?     Return "3"

+FTH=        Transmits data using HDLC protocol and the defined modulation .

<value>     ERROR is issued if modem is on-hook.

<value> - 3 (V.21 channel 2 300 bps)

+FTH=?     Return "3"

## AT\* Commands – Black List Support

**Note:** The following command will always return OK as a result code.

\*B Return Blacklisted numbers

Blacklisting is a country dependent parameter.

When no time-out is defined:

When a number is unsuccessfully called x successive times, it is blocked altogether, until next system reset.

Further calls will return **BLACKLISTED** code.

When time-out is defined:

When a number is unsuccessfully called x successive times, it is blocked temporarily until the time-out expires.

Calls within the time-out period will return **DELAYED** code.

Format:

No.	Called	Blocked	Phone
Index	# of calls	' ' (blank)	Phone number
		- not blocked	
		(number still candidate for blacklist)	
		or	
		'*' (asterisk) - blacklisted/blocked	
		or	
		'Xmin' - # of min to time-out – delayed	

**Example 1:** No time-out defined. Full blocking occurs

No.	Called	Blocked	Phone
1	5	*	t1234
2	3		t5678

**Example 2:** Time-out defined. Delay scheme used.

No.	Called	Blocked	Phone
1	5	2min	t1234
2	3		t5678

## AT# Commands - Voice Modem Support

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**Note:** All the following commands will return OK as a result code (or ERROR if the parameters are faulty), unless stated otherwise.

#BDR= Sets DTE Baud Rate  
<value> <value> - DTE Baud rate (0-48) \*2400

#CID= Enables the Caller ID feature in any mode  
<value> #CID=0 - Disable Caller ID  
#CID=1 - Enable Caller ID (Verbose)  
#CID=2 - Enable Caller ID (Numeric)  
Writes the value to Sreg  
Related S-Reg: S75

#RG= Sets receive gain level (effects the AUDIO IN level)  
<value> <value> - 0-7fff

#TL= Sets transmit level (effects the AUDIO OUT level)  
<value> <value> - 0-7fff

#CLS= Same as +FCLASS=<value>  
<value> Sets Data/Fax Class1/Voice (0,1,8) mode.  
Related S-Regs: S32, S150

#VBS Bits per sample (ADPCM or PCM).  
#VBS=<value> [<value> - 2,4 (ADPCM), 8,16 (PCM)]  
#VBS? Returns the current setting  
#VBS=? Returns "2,4,8,16"  
Related S-Regs: S76

#VBT Sets Beep tone timer for generating tones and DTMF.  
#VBT=<value> [<value> - 0-40 (\* 1/10 ms)]  
#VBT? Returns the current setting  
#VBT=? Returns "0-40"  
Related S-Regs: S77

#VIP Initializes Voice Parameters  
Related S-Regs: S75-S89

#VIT Sets Inactivity timer.  
#VIT=<value> [0-255 (\* 1/10 ms)]  
#VIT? Returns the current setting  
#VIT=? Returns "0-255"  
Related S-Regs: S19

#VLS Voice Source selection.  
#VLS=<value>  
0 - Telephone Line Select (Go on hook)

2 - Speakers  
3 - Microphone  
4 - Telephone Line Select + Samples routed to/from  
Speakers/Mic in TX/RX modes

6 - Speakerphone

#VLS? Returns the current setting

#VLS=? Returns "0,2,3,4,6"

Result codes:

OK n=0, 4, 6

VCON n=2, 3

ERROR Otherwise

(For 0, 4, 6, VCON will be issued upon line connection)

Related S-Regs: S78

#VRA Ringback Goes Away Timer (originate).

This value is used during call progress to detect a voice answer.

This is the interval between ringback ending and voice answer determined.

#VRA=<value> [0-255 (\*1/10 MS)]

#VRA? Returns the current setting

#VRA=? Returns "0-255"

Related S-Regs: S79

#VRN Ringback Never Came Timer (originate)

This value is used during call progress to detect a voice answer.

This is the interval without detection of ringback before voice answer is determined.

#VRN=<value> [0-255 (\*1/10 MS)]

#VRN? Returns the current setting

#VRN=? Returns "0-255"

Related S-Regs: S80

#VRX Go to Voice Receive Mode.

Result codes:

CONNECT Data may be sent

ERROR VLS=0, 4, 6 and line not connected

**Note:** Any input from the terminal will abort Voice Receive Mode

#VSD Enables/Disables silence deletion (voice receive, ADPCM) (-)

#VSD=<value> [0,1 - Disable/Enable]

#VSD? Returns the current setting

#VSD=? Returns "0,1"

Related S-Regs: S81

#VSP Sets Silence Period (voice receive, ADPCM)

#VSP=<value> [0-255 (\*1/10 ms)]

#VSP? Returns the current setting

#VSP=? Returns "0,255"

Related S-Regs: S83

#VSR Sets Sample Rate (PCM, ADPCM)

#VSR=<value> [7200, 11025, 8000]

#VSR? Returns the current setting

#VSR=? Returns "7200, 11025, 8000"

Only 7200 is currently supported

Related S-Regs: S91

#VSS Sets Silence Sensitivity (voice receive, ADPCM) (-)

#VSS=<value> [0-3] (0-Disable, 3-allow noisy conditions)

#VSS? Returns the current setting

#VSS=? Returns "0-3"

Related S-Regs: S82

#VTD Sets DTMF reporting capabilities in Voice Transmit, Receive, and Voice Online Command Modes.

#VTD=<value><value><value> [0-3F]

#VTD? Returns the current setting

#VTD=? Returns "<0-3F>,<0-3F>,<0-3F>"

Bit Settings

Bit Description

0 Disable/Enable DTMF detection

1 Disable/Enable V.25 1300 Hz detection

2 Disable/Enable T.30 1100 Hz detection (Fax)

3 Disable/Enable V.25/T.30 2100 Hz detection (Modem)

4 Disable/Enable Bell 2225 Hz detection

5 Disable/Enable Busy/Dial tone detection

6-7 reserved

Related S-Regs: S84-S86

#VTM Enables timing mark placement.

#VTM=<value> [0-10 (\* 1/10 ms)]

#VTM? Returns the current setting

#VTM=? Returns "0-10"

Related S-Regs: S87

#VTS Generates a tone signal.

#VTS= [x,y,z] | {x,z} | x, ...

[x,y,z]

x represents the first frequency (Hz)

y represents second frequency (Hz)

z represents the duration (in 100 ms units)

{x,z}

DTMF Digits with Variable Duration.

x represents the DTMF digit (0-9,A-D,\*,#)

z represents the duration (in 100 ms units)

DTMF Digits, with duration defined by #VBT. This is represented by a value x (non-bracketed) corresponding to a DTMF digit (0-9,A-D,\*,#, !).

Note: '!' stands for flash.

#VGT Sets Playback Volume [Default 192]

#VGT=<value> [0-255 (\*1/10 ms)]

#VGT? Returns the current setting

#VGT=? Returns "0-255"

Related S-Regs: S74

#VTX Go to Voice Receive Mode

Result codes:

CONNECT Data may be sent

ERROR VLS=0, 4, 6 and line not connected

#SPK Sets Full Duplex Speakerphone parameters

#SPK=<mute>,<speaker>,<mic>

<mute> 0 Microphone Mute

\* 1 Microphone On (default)

2 Room Monitor (mic on Max, Speaker off)

<speaker> 0-15 - 2-30 dB attenuation

\* 5 - (Default)

16 - speaker mute

<mic> 0 - 0 dB gain

\* 1 - 6 dB gain (Default)

2 - 9 dB gain

3 - 12 dB gain

Related S-Regs: S88-S90

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## AT#UD Command - Modem Diagnostics Support

**Note:** All the following commands will return OK

#UD Returns diagnostics data

Format:

TBD

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## S-Registers

The S-Registers are summarized in the following table. Registers denoted with a \* may be customized using the PTT Wizard Tool.

#### Factory defaults

Factory defaults are stored in the Windows OS registry. They are loaded at initialization time or by AT commands (&F,Z). In addition the designated default profile (as specified by the Yn command) is subsequently loaded.

The defaults shown are of the Smart Link factory settings 0 and 1.

## S-Register Summary

Note: This S-register List is not to be used as is by End Users and in End User's manuals.

For end users the contents of the first 24 S-registers should suffice.

S#	Function	Range	Units	PW	Default	AT Command
S0	Rings to Auto-Answer	0-255	rings		0	A
S1	Ring Counter	0-255	rings		0	
S2	Escape Character	0-255	ASCII		43	
S3	CR Character	0-255	ASCII		13	
S4	LF Character	0-255	ASCII		10	
S5	BS Character	0-255	ASCII		8	
S6	Wait Time for Dial Tone (Also wait before Blind Dialing)	2-255	s	*	2	D
S7	Wait Time for Carrier	1-255	s	*	60	D
S8	Pause Time for Dial (,)	0-255	s		2	D
S9	Carrier Detect Response Time	1-255	0.1s		6	
S10	Carrier Loss Disconnect Time	1-255	0.1s	*	7	
S11	DTMF Tone duration	50-255	0.001s	*	100	D
S12	<b>Reserved</b>					
S13	Echo	0-1			1	E
S14	Quiet	0-1			0	Q

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S15	Verbose	0-1			1	V
S16	Pulse/ Tone	0-1		*	1	T,P,D
S17	Reserved					
S18	Test Timer	0-255	s		0	&T
S19	System Inactivity Timer	0-255	min		0	
S20	Reserved					
S21	Break Length	0-9	100ms		9	\B
S22	Origin/Answer	0-1			0	
S23	XOFF Character (NA)	0-127	ASCII		19	
S24	Flash Timer	0-255	10 ms		20	

**Important Note: The following S-register List is only to be used by OEMs.**

For end users, the contents of the first 24 S-registers should suffice.

S#	Function	Range	Units	PW	Default	AT Command
S25	Delay to DTR Off (NA)	0-255	0.01ms		5	
S26	RTS to CTS delay (NA)	0-255	0.01ms		1	
S27	Auto Answer clear timeout	0-255	s		8	
S28	Pulse Set/Break Ratio	0-4			0	&P,P,D
S29	Speaker Control	0-3			1	M
S30	Speaker Volume	0-3			2	L
S31	Automode Select	0-1			1	+MS

S#	Function	Range	Units	PW	Default	AT Command
S33	Requested MIN Speed		bps Code			+MS
S34	Requested		bps			+MS

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	MAX Speed		Code			
S35	Actual Speed after CONNECT (See Xn )		bps Code			
S36	Current Data Pump Status		Mod Code			
S37	Actual Modulation (DP)		Mod Code			
S38	Actual Rx Speed		bps Code			
S39	Line Quality Control	0-2			2	%E
S40	Reserved					
S41	Received Signal Level				0	
S42	SNR		dB			
S43	Result Codes control				0	X
S44	Reserved					
S45	Transmit Gain Level	0-10	-dBm		3	
S46- S49	Reserved					
S50- S55	Reserved for Test					&T
S56	Extended Code	0-4			4	X
S57	Reserved					
S58	Reserved					
S59	Current Setting	0-5			3	Z, &F
S60	CD	0-1			1	&C
S61	RTS	0-1			0	&R
S62	Flow Control	0-3			1	&H
S63	DTR	0-3			0	&D

S#	Function	Range	Units	PW	Default	AT Command
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S64	DSR	0-1			0	&S
S65	Reserved					
S66	Circuit 106 (RTS)	0-1			0	
S67	Circuit 107 (DSR)	0-1			0	
S68	Circuit 109 (CD)	0-1			0	
S69						
S70	CONNECT message format	0-1			0	&A
S71	CONNECT msg speed source (DCE/DTE)	0-1			0	&E
S72	Handset Record Gain	0 - 255		*	80	
S73	Reserved				3	
S74	Playback Volume	0-255			153	#VGT
S75	CID Enable	0,1			0	#CID
S76	ADPCM Bits Per Sample	4,8,16			4	#VBS
S77	Beep Tone Timer	0-40	1/10 s		10	#VBT
S78	Line Selection Duration		0,2,3,6		0	#VLS
S79	Ring Goes Away Timer	0-255	1/10 s		70	#VRA
S80	Ring Never Came Timer	0-255	1/10 s		70	#VRN
S81	Silence Detect Enable	0,1			0	#VSD
S82	Silence Detect Sensitivity	0-3			2	#VSS
S83	Silence Detect Duration	0-255	1/10 s		55	#VSP

S#	Function	Range	Units	PW	Default	AT Command
S84	Dtmf Tone Reports Cap0	0-3F			0	#VTD
S85	Dtmf Tone Reports Cap1	0-3F			0	#VTM
S86	DTMF Tone Reports Cap2	0-3F			0	#VTM
S87	Time Mark Placement	0-255	1/10 s		0	#VTM
S88	SPK <mute>	0-2			1	#SPK
S89	SPK <speaker>	0-15			5	#SPK
S90	SPK <mic>	0-3			1	#SPK
S91	Voice Sample Rate	1,2		1	0	#VSR
S92	Answer Delay	0-255	s	*	2	
S93- S99	Reserved for Diagnostics					
S100- S137	Reserved for V42					\A,\N, %C
S138	Mic Gain	0-255				
S139	Line record Gain	0-255				
S140- S142	Reserved					
S143	Reserved for Test					
S141- S143	Reserved					
S143	Test auxiliary	0-1			0	%T
S144-	Reserved					

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S145						
S146	Pulse make Ratio	0-100	%	*	39	&P
S147	Pulse PPS	10,20	pps	*	10	&P
<b>S#</b>	<b>Function</b>	<b>Range</b>	<b>Units</b>	<b>PW</b>	<b>Default</b>	<b>AT Command</b>
S148	Pulse Pause	0-255	10ms	*	80	
S149	Pulse Refresh	0-100	ms	*	0	
S150	FCLASS Value	0,1,8			0	+FCLASS
S151	FAE Value	0,1			0	+FAE
S152	Line Out Gain	0-255				
S153	Spk Out Gain	0-255				
S154	HSet Out Gain	0-255				
S155- S160	Reserved					
S161	Default Setting	0-1			2	Y
S162	Country Type	0-25			1	
S163- S169	Reserved					
S170- S174	Debug Registers					
S175- S179	Reserved					
S180- S191	Reserved for Diagnostics					
S192	Reserved					
S193	Processor Type	0-100			0	
S194-	Reserved				2	

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S196						
S197	HW Diag					
S198	STRM Diag	0/1			0	*B
S199	Port Diag	0/1			0	*B
S200	Blacklist Enable	0/1		*	0	*B

<b>S#</b>	<b>Function</b>	<b>Range</b>	<b>Units</b>	<b>PW</b>	<b>Default</b>	<b>AT Command</b>
S201	Blacklist Dial Attempts	0-255		*	5	*B
S202	Min Time between calls	0-255	Sec	*	5	*B
S203	Blacklist Time Out	0/1		*	0	*B