



**Smart Link Modems  
AT Commands Set And  
S-Registers**

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## AT Commands

Modem operation is controlled by AT commands. These AT commands include the following:

- Basic AT commands, for example ATDT123
- Extended AT Commands for example AT&E,AT\A,AT%C,AT+MS
- S-Register commands, for example ATS32=8
- Fax Class 1 commands, for example AT+FTM
- Voice commands, for example AT#VTX

The command syntax and operation guidelines for each command category are described in the following sections.

A command line is a string of characters sent from a DTE (Terminal or Data Terminal Equipment) to the DCE while the DCE is in command state. Command lines have a prefix, a body and a terminator. The prefix consists of the ASCII characters **AT** or **at**. The body consists of printable ASCII characters. Space characters other than <CR> (See register S3), and <BS> (See register S5) are ignored. <CR> is command terminator.

Characters preceding the AT prefix are ignored.

## AT Command Guidelines

- Basic AT commands consist of single ASCII characters, which may be preceded by a prefix character, for example **&**, and followed by a decimal number, for example **AT&W1**.
- Missing decimal parameters are interpreted as 0. For example, if you type **ATH**, the command **ATH0** is assumed.
- Fax commands are preceded with the **+F** characters and terminated by semicolon (;) or <CR> character.
- The modem supports editing command lines by recognizing the <BS> character.
- The AT command sequence may be followed by any number of commands in sequence, with the exception of commands Z, D or A, where all characters following on the same command line will be ignored.

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- When a syntax error is found in the command line, an ERROR response will be returned to the DTE. Execution of commands D and A will be aborted if another character is entered before completion of the handshake.
- When the modem has entered on-line data mode, it is possible to break the data transmission in order to issue more AT commands. This is done by the DTE sending a sequence of three escape characters (defined in S2, '+' by default).

### AT Command Set

The modem will comply with the commands listed below. Parameters applicable to each command are listed below. Default factory configuration settings are marked by an asterisk \*.

Features marked with (-) are not yet available in **Modio** current version.

### 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

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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:**

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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**

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- 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 S09=009  
S10=000 S11=000 S12=000 S13=000 S14=000  
S15=000 S16=000 S17=000 S18=000 S19=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 profile numbers  
(See &Z command)
- Ln Speaker volume  
Select speaker volume.  
L0 L  
L1 Low  
\* L2 Medium  
L3 High  
Result codes:  
OK n=0-3  
Error Otherwise  
Related S-Reg: S30

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- 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.

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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

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**Table 1 - Result Codes**

Result Message Code	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	*	*	*
36	CONNECT 115200	1	*	*	*
<b>Result Message</b>	<b>X0</b>	<b>X1</b>	<b>X2</b>	<b>X3</b>	<b>X4</b>

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Code						
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	*	*
102	BLACKLISTED	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	-	*	*	*	*

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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 <l> 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).  
&A7 Add transmit rate indicator (TXRATE).  
For example:  
TXRATE 26400  
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

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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
- &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

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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

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\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

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### 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	<b>Test mode</b>	<b>Auxiliary Registers Setup</b>
	%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
	%T91	V.21 Channel 1 mark answer S53=3, S143=0

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%T90	V.23 Channel mark origin	S53=2
%T91	V.23 Channel mark answer	S53=2
%T90	V.22 1200 origin	S53=5
%T91	V.22 1200 answer	S53=5
%T90	V.22bis/V.34 origin (<=19200)	S53=6, S52=0/1
%T91	V.22bis/V.34 answer (<=19200)	S53=6, S52=0/1
%T90	V.32/V.34 origin	S53=7, S52=0/1
%T91	V.32/V.34 answer	S53=7, S52=0/1
%T90	V.32bis/V.34 origin	S53=9, S52=0/1
%T91	V.32bis/V.34 answer	S53=9, S52=0/1
%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
%T91	V.34 ans signaling (>=21600)	S53=14
%T90	V.34bis org signal (>=31200)	S53=18
%T91	V.34bis ans signal (>=31200)	S53=18

**Note:** In order to use AT%T commands, the "TestDrv.vxd" driver must be present in the system. This driver is supplied only for OEM qualification use.

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### 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

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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**

**+FCLAS** Sets Data/Fax Class1/Voice (0,1,8) mode.  
**S=<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.  
**<value>** ERROR is issued if modem is on-hook.

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

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146 V.17 14400 bps short  
+FTM=? Return "24, 4, 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  
<value> modulation .  
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  
<value> modulation .  
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 duration 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 duration 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:

<b>No.</b>	<b>Called</b>	<b>Blocked</b>	<b>Phone</b>
Index number	# of calls	' ' (blank)	Phone
		- 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

<b>No.</b>	<b>Called</b>	<b>Blocked</b>	<b>Phone</b>
1	5	*	t1234
2	3		t5678

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

<b>No.</b>	<b>Called</b>	<b>Blocked</b>	<b>Phone</b>
1	5	2min	t1234
2	3		t5678

## AT# Commands - Voice Modem Support

**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> - 4 (ADPCM), 8,16 (PCM)]  
#VBS? Returns the current setting  
#VBS=? Returns "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

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- #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

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- #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 |

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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

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#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

## **AT#UD Command – Modem Diagnostics Support**

#UD Returns diagnostics data

### **Description**

#UD is an action command. It does not take parameters. It shall be the last command in the command line.

In response to this command, the modem report one or more lines of information text as defined below, and terminated by <CR><LF>.

Each information text line is formatted as follows, including one or more key=value pairs:

DIAG <token key=value [[key=value] [key=value]] ...>

Character	description
DIAG	5 characters, hex: 44, 49, 41, 47, 20
<	left angle bracket (less than sign), hex: 3C
Token	unique 32-bit hexadecimal string 2A4D3263
Space	space character, hex 20
Key	One or two digit hexadecimal number, see Table 1
=	equal sign, hex: 3D
Value	any string as defined below (Tables 1-3, etc.)
>	right angle bracket (greater than sign), hex: 3E

**Table 1 - AT#UD Last Call Status Report Format**

Key	value(s)	Definition
0	2 digits	Diagnostic Command Specification revision number, digit.digit
1	Table 2	Call Setup Result code
2	Table 3	Multi-media mode
3	Table 4	DTE-DCE intermode
4	String	V.8 CM octet string, same format as V25ter Annex A, in quotes
5	String	V.8 JM octet string, same format as V25ter Annex A, in quotes
6-F		Reserved for call negotiation reports
10	0-2F	Received signal power level, in -dBm (0-43)
11	0-1F	Transmit signal power level, in -dBm (e.g.0-17)
12	0-64	Estimated noise level, in -dBm (e.g.10-90)
13	0-FF	Normalized Mean Squared error, 100 (0x64) = min inter-symbol distance
14	0-3F	Near echo loss, in units of dB (Note 4)
15	0-3F	Far echo loss, in units of dB (Note 4)
16	0-3F	Far echo delay, in units of ms (Note 4)
17	0-FFF	Round Trip delay, in units of ms (Note 4)
18	Table 5	V.34 INFO bit map (Note 4)
19-1F		Reserved for modulation setup and training reports (Note5)
20	Table 6	Transmit Carrier Negotiation Result (Note6)
21	Table 6	Receive Carrier Negotiation Result (Note6)
22	0-1F40	Transmit Carrier symbol rate (0-8000) in symbol/s
23	0-1F40	Receive Carrier symbol rate (0-8000) in symbol/s
24	0-FA0	Transmit Carrier frequency (0-4000) in Hz (Note 7)
25	0-FA0	Receive Carrier frequency (0-4000) in Hz (Note 7)
26	0-FA00	Initial transmit carrier data rate (0-64000) in bit/s
27	0-FA00	Initial receive carrier data rate (0-64000) in bit/s
28-2F		reserved
30	0-FF	Temporary carrier loss event count
31	0-FF	Carrier Rate re-negotiation event count
32	0-FF	Carrier Retrains requested
33	0-FF	Carrier Retrain requests granted
34	0-FA00	Final transmit carrier data rate in bit/s
35	0-FA00	Final receive carrier data rate in bit/s
36-3F		reserved
40	Table 7	Protocol Negotiation Result (Note8)
41	0-400	Error Control frame size in bytes
42	0-FF	Error control link timeouts in transmission
43	0-FF	Error control link NAKs received
44	Table 8	Compression Negotiation Result
45	0-800	Compression dictionary size in bytes
46-4F		reserved
50	0-2	Transmit flow control: 0 = off; 1 = DC1/DC3; 2 = V.24 ckt 106/133
51	0-2	Receive flow control: 0 = off; 1 = DC1/DC3; 2 = V.24 ckt 106/133
52	0-FFFFFFFF	Transmit characters sent from DTE (Note8)
53	0-FFFFFFFF	Received characters sent to DTE (Note8)
54	0-FFFF	Transmit characters lost (data overrun errors from DTE) (Note9)
55	0-FFFF	Received characters lost (data overrun errors to DTE) (Note9)
56	0-FFFFFFFF	Transmit I-Frame count, if error control protocol running (Note8)
57	0-FFFFFFFF	Received I-Frame count, if error control protocol running (Note8)
58	0-FFFF	Transmit I-Frame error count, if error control protocol running (Note9)
59	0-FFFF	Received I-Frame error count, if error control protocol running (Note9)

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5A-5F		Reserved
60	Table 9	Termination Cause
61	0-FF	Call Waiting event count
62-7F		Reserved for future versions of this specification
80-FF		Reserved for manufacturer proprietary keys

**Table 2 - Call Setup Result Codes**

Code	Definition
0	No previous call (modem log has been cleared since any previous calls)
1	No dial tone detected
2	Reorder signal detected, network busy
3	Busy signal detected
4	No recognized signal detected (e.g. no signal, or nothing recognizable)
5	Voice detected * if this is a voice modem operating in voice mode (e.g. +FCLASS=8.0)
6	Text telephone signal detected (see V.18)
7	Data Answering signal detected (e.g. V.25 ANS, V.8 ANSam)
8	Data Calling signal detected (e.g. V.25 CT, V.8 CI)
9	Fax Answering signal detected (e.g. T.30 CED, DIS)
A	Fax Calling signal detected (e.g. T.30 CNG)
B	V.8bis signal detected
C-F	Reserved

**Table 3 – Multimedia modes**

Code	Definition
0	Data Only
1	FAX Only
2	Voice Only * if voice mode supported (e.g. V.253, IS-101)
9	Video-telephony, H.324
A	Other V.80 call

**Table 4 – DTE-DCE modes**

Code	Definition
0	Async data
1	V.80 transparent synchronous mode
2	V.80 framed synchronous mode
3-F	Reserved

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**Table 5 – V.34 INFO bit report (applicable only to V.34 or V.90 calls)**

bits	Source bits	Definition
31-30	INFO0 bit 20; 0	
20-29	INFOc bits 79-88	
16-19	INFOc bits 26-29 or 35-38 or 44-47 or 53-56- or 62-65 or 71-74	Pre-emphasis field, selected by the symbol rate chosen
12-15	INFOa bits 26-29	
10-11	MP bit 50; 0	
0-9	INFOa bits 40-49	

**Table 6 - gstnModulationSchemeActive from 3.7.2/V.58**

Value	Description
0	V.17 (G3 Fax call)
1	V.21
2	V.22
3	V.22bis
4	V.23
A	V.32
B	V.32bis
C	V.34
E	V.90 Issue 1 (asymmetric)
81	"K56FLEX™"
82	"V.FC"
83	"V.32terbo"
84	Bell 212A (if modem supports B212A)
85	Bell 103 (if modem supports B103)

**Table 7 - errorControl Active from 3.5.2/V.58**

Value	Description
0	Disable/none
1	V.42 LAPM
2	V.42 Alterative protocol (MNP™)

**Table 8 - compressionActive from 3.2.2/V.58**

Value	Description
0	None
1	V.42bis
80	MNP5™

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**Table 9- callCleared**

Value	Description	Notes
0	CauseUnidentified	Call setup issues
1	No Previous call	
2	Call is still in progress	
3	Call Waiting signal detected	
4	Delayed	Same as value 2A, CallAttemptsLimitExceeded
A	NMSinitiatedDialCall	-- Network Management System
B	NMSinitiatedLeasedLineRestoral	
C	NMSinitiatedRedial	
D	NMSinitiatedDialDisconnect	
14	PowerLoss	DCE
15	EquipmentFailure	
16	FrontPanelDisconnectRequested	If there is a front panel with this control
17	FrontPanelLeasedLineRestoral	
18	AutomaticLeasedLineRestoral	
19	InactivityTimerExpired	
1E	cct116RestoralRequest	DTE Interface
1F	cct108isOffInhibitsDial	
20	cct108turnedOff	This is hangup with &D2
28	NoNumberProvided	Prohibited by some national regulations
29	BlacklistedNumber	
2A	CallAttemptsLimitExceeded	Same as "Delayed", see ETS 300 001
2B	ExtensionPhoneOffHook	If extension detection supported
2C	CallSetupFailTimerExpired	e.g. S7 timeout
2D	IncomingCallDetected	If incoming call while sending dial command.
2E	LoopCurrentInterrupted	
2F	NoDialTone	
30	VoiceDetected	
31	ReorderTone	
32	SitTone	
33	EngagedTone	
34	LongSpaceDisconnect	And if modem program to abort on long space
3C	CarrierLost	Signal Converter
3D	TrainingFailed	
3E	NoModulationinCommon	
3F	RetrainFailed	
40	RetrainAttemptCountExceeded	
41	GstnClearardownReceived	
42	FaxDetected	If this was not a fax call attempt (note 10)
46	InTestMode	Test
47	IntrusiveSelfTestInitiated	
50	AnyKeyAbort	Call Control
51	DteHangupCommand	If ATH was used to terminate the previous call.
52	DteResetCommand	If ATZ was used to terminate the previous call.
5A	FrameReject	Error Control
5B	NoErrorControlEstablished	Error control was required
5C	ProtocolViolation	
5D	n400exceeded	
5E	NegotiationFailed	
5F	DisconnectFrameReceived	
60	SabmeFrameReceived	
64	LossOfSynchronization	Data Compression

## 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

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

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<b>S#</b>	<b>Function</b>	<b>Range</b>	<b>Units</b>	<b>PW</b>	<b>Default</b>	<b>AT Command</b>
S12	Reserved					
S13	Echo	0-1			1	E
S14	Quiet	0-1			0	Q
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	