

AT Command for COFDM Tx module

Version 2.0

Connect computer to our COFDM transmitter control uart (TTL 3.3V) with an USB to TTL uart adaptor. Uart setting: text mode, 9600 baud rate, 8 bit, 1 stop bit, no verification.

AT command

AT command format: start with "AT" and end with "_".

1.1.1 ping

Format	ATDR_
Parameter	No
Function	To detect the module if it is transmitting module or transmitter module
	Transmitter module: "ATDRSUE1 OK"
Type	Inquiry command

1.1.2 set device

Format	ATSD\$(mimo), \$(gi), \$(code_rate), \$(constellation), \$(freq(KHz)), \$(bw(KHz)), \$(tx1_gain), \$(tx2_gain)_ Example: ATSD0,1,0,0,800000,8000,86.0,86.0_
Parameter	Mimo: 0 mimo disable(one antenna); 1 mimo enable(two antennas)
	GI: 0→ 1/32; 1→ 1/16; 2→ 1/8; 3→ 1/4
	Code rate: 0→ 1/2; 1→ 2/3; 2→ 3/4; 3→ 5/6; 4→ 7/8
	Constellation: 0→ QPSK; 1→ QAM16; 2→ QAM64;
	RCB central working frequency: Freq(KHz) 200000~2700000(200MHz~2.7GHz, step: 1KHz)
	RCB bandwidth Bw(KHz) 2000~8000(2MHz~8MHz, step:1KHz)
	Gain of antenna 1: tx1_gain 0.0~89.75dB, step: 0.25dB Gain of antenna 2: Tx2_gain 0.0~89.75dB, step: 0.25dB
Function	Setting of transmitter parameters
Feedback	Example: ATSD0,1,0,0,800000,8000,86.0,86.0_ SISO,GI:1/16,CR:1/2,MOD:QPSK,freq:800000KHz,bw:8000KHz,tx1_gain:86.000000 tx2_gain:86.000000 OK
Comments	Setting command, still valid when stop power or reset About transmitting bitrates: $Rate(Mbps) = (BandWidth(MHz) * 8.0/7.0) / (1+GI) * 1512/2048 * \log_2(\text{constellation point}) * code_rate * 188/204.$

		Required C/N (dB) for BER = 2×10^{-4} after Viterbi QEF after Reed-Solomon (see note 2)			Bitrate (Mbit/s) (see note 3)			
Constel- lation	Code rate	Gaussian Channel (AWGN)	Ricean channel (F ₁)	Rayleigh channel (P ₁)	$\Delta T_U = 1/4$	$\Delta T_U = 1/8$	$\Delta T_U = 1/16$	$\Delta T_U = 1/32$
QPSK	1/2	3,5	4,1	5,9	4,98	5,53	5,85	6,03
QPSK	2/3	5,3	6,1	9,6	6,64	7,37	7,81	8,04
QPSK	3/4	6,3	7,2	12,4	7,46	8,29	8,78	9,05
QPSK	5/6	7,3	8,5	15,6	8,29	9,22	9,76	10,05
QPSK	7/8	7,9	9,2	17,5	8,71	9,68	10,25	10,56
16-QAM	1/2	9,3	9,8	11,8	9,95	11,06	11,71	12,06
16-QAM	2/3	11,4	12,1	15,3	13,27	14,75	15,61	16,09
16-QAM	3/4	12,6	13,4	18,1	14,93	16,59	17,56	18,10
16-QAM	5/6	13,8	14,8	21,3	16,59	18,43	19,52	20,11
16-QAM	7/8	14,4	15,7	23,6	17,42	19,35	20,49	21,11
64-QAM	1/2	13,8	14,3	16,4	14,93	16,59	17,56	18,10
64-QAM	2/3	16,7	17,3	20,3	19,91	22,12	23,42	24,13
64-QAM	3/4	18,2	18,9	23,0	22,39	24,88	26,35	27,14
64-QAM	5/6	19,4	20,4	26,2	24,88	27,65	29,27	30,16
64-QAM	7/8	20,2	21,3	28,6	26,13	29,03	30,74	31,67

NOTE 1: Figures in italics are approximate values.
 NOTE 2: Quasi Error Free (QEF) means less than one uncorrected error event per hour, corresponding to BER = 10^{-11} at the input of the MPEG-2 demultiplexer.
 NOTE 3: Net bit rates are given after the Reed-Solomon decoder.

1.1.3 set gain

Format	ATSG\$(tx1_gain),\$(tx1_gain)_ Example : ATSG85.0,85.0_
Parameter	tx1_gain: gain of antenna 1 tx2_gain: gain of antenna 2
Function	Gain adjusting during working
Feedback	Example: ATSG85.0,85.0_ set gain 85.000000 85.000000 OK
Comments	Setting command, invalid when stop power or reset

1.1.4 set modulation mode

Format	ATSM\$(gi), \$(code_rate), \$(constellation)_ Example:ATSM1,1,2_
Parameter	GI: 0 → 1/32; 1 → 1/16; 2 → 1/8; 3 → 1/4. Code rate: 0 → 1/2; 1 → 2/3; 2 → 3/4; 3 → 5/6; 4 → 7/8 Constellation: 0 → QPSK; 1 → QAM16; 2 → QAM64
Function	Adjusting during working
Feedback	Example: ATSM1,1,2_ GI: 1/16,CR:2/3,MOD:QAM64,OK
Comments	Setting command, invalid when stop power or reset

1.1.5 get device status

Format	ATGD_
Parameter	No
Function	Inquiry transmitter parameters
Feedback	Example: ATGD_ SISO,GI:1/16,CR:1/2,MOD:QPSK,freq:800000KHz,bw:8000KHz,tx1_gain:86.000000 tx2_gain:86.000000 OK
Comments	Inquiry command

1.1.6 set encoder

Format	ATSE\$(mode),\$(\$rt),\$(\$bitrate),\$(\$gop),\$(\$audio) _ Example:ATSE0,0,0.0,0,0_
Parameter	Mode: 0→ h264; 1→h265
	rt: 0→ normal latency; 1→low latency.(using all-P frame with Intra-refresh for low latency)
	Bitrate: 0→ let system decide; >0 specify bitrate(float)
	I frame gop: 0→ let system decide; >0 specify gop
	Audio function. Audio: 0→ disable; 1→ enable
Function	Video and audio encoder setting
Feedback	Example: ATSE0,0,0.0,0,0_ MODE:0,RT:0,bitrate: 0.0Mbps,gop:0,audio:0,OK
Comments	Setting command, still valid when stop power or reset Only SUE5SA/SUE5/SUE6 support low latency

1.1.7 get encoder

Format	ATGE_
Parameter	No
Function	Inquiry video/audio encoder parameters
Feedback	Example: ATGE_ MODE:0,RT:0,bitrate:4.0Mbps,gop:10,audio:0,aes:0,OK
Comments	1. Inquiry command 2. aesParameter: 0→ disable AES; 1→ enable AES

1.1.8 get input

Format	ATGI_
Parameter	No
Function	Inquiry input video parameters
Feedback	Example: ATGI_ input_size:1080p,input_rate: 60fps,sensor_type:hDMI,OK
Comments	Inquiry command

1.1.9 set input

Format	ATSI\$(input_size) ,\$(input_rate) _ Example: ATSI1080,25_
Parameter	input_size: 0 → let system detect; >0 → specify input size input_rate: 0 → let system detect; >0 → specify input fps
Function	Inform to video encoder on the input video
Feedback	Example: ATSI1080,25_ input_size:1080p, input_rate: 25fps,OK
Comments	<ol style="list-style-type: none"> 1. Default status is 0(let system detect), return to default setting command: ATSI0,0_ 2. Sometimes the system can't detect the input video correctly and need to use this command to inform to video encoder on the input video. 3. Setting command, still valid when stop power or reset.

1.1.10 set output

Format	ATSO\$(output_size) ,\$(output_rate) _ Example: ATSO720,30_
Parameter	Set HDMI output resolution (720 , 1080) HDMI output support 720P50, 720P60, 1080P(24, 25, 30, 50,60)
Function	Set HDMI output
Feedback	Example: ATSO720,30_ output_size:720p, output_rate: 30fps, OK
Comments	<ol style="list-style-type: none"> 1. output_size <= input_size; output_rate<=input rate 2. Setting command, still valid when stop power or reset

1.1.11 set user

Format	ATSU\$(vin),\$(ain) _ Example:ATSU0,1_
Parameter	Inform the video encoder to get video from: vin: 0→ let system detect; 1→ force cvbs input; 2→ force hdmi/sdi input Inform the audio encoder to get video from: ain: 0→ let system detect; 1→ force analog audio input
Function	Setting input video/audio source
Feedback	Example: ATSU0,1_ ATSU0,1 OK
Comments	Setting command, still valid when stop power or reset.

1.1.12 get user

Format	ATGU _ Example:ATGU_
Parameter	No
Function	Inquiry input video/audio source setting
Feedback	Example: ATGU_ ATGU0,1 OK
Comments	Inquiry command, please see “ATSU” command for parameters meaning

1.1.13 set password

Format	ATSP\$(password), \$(password) _ Example: ATSP123456,123456_
Parameter	AES password: 6 digits(ASCII) AES password: 6 digits(ASCII) (again to confirm)
Function	Setting the password for Tx or Rx module
Feedback	Example: ATSP123456,123456_ ATSP123456 OK
Comments	1. When the password is "000000", AES is disable 2. Setting command, still valid when stop power or reset.

1.1.14 set data transfer

Format	ATST\$(baud rate), \$(parity) _ Example:ATST115200,0_
Parameter	Data uart baud rate: 1200、2400、4800、9600、19200、38400、57600、115200 parity: 0: None; 1:Odd; 2:Even
Function	Setting data uart
Feedback	Example: ATST115200,0_ ATST115200,0 OK
Comments	Setting command, still valid when stop power or reset.

1.1.15 get data transfer

Format	ATGT_
Parameter	No
Function	Inquiry data uart setting
Feedback	Example: ATGT_ ATGT115200,0 OK
Comments	Inquiry command

1.1.16 set gain adjust

Format	ATSAD\$(freq),\$(adjust) _ Example:ATSAD700000,2.5_
Parameter	wireless central working frequency: Freq(KHz) 200000~2700000(200MHz~2.7GHz, step: 1KHz) Adjust value(dB): ATSD cmd will subtract this value to set wireless gain
Function	Specify adjust value for wireless gain setting using by ATSD cmd
Feedback	Example: ATSAD700000,2.5_ freq:700000,adjust:2.50 OK
Comments	Setting command, still valid when stop power or reset.

1.1.17 get gain adjust

Format	ATGAD[\$(freq)]_ Example:ATGAD700000_
Parameter	wireless central working frequency: Freq(KHz) 200000~2700000(200MHz~2.7GHz, step: 1KHz) When no parameter provide, it will list all the freq have adjust value.
Function	Inquiry adjust value for wireless gain setting using by ATSD cmd
Feedback	Example: ATGAD700000_ freq:700000,adjust:2.50 OK ATGAD_ freq:700000 750000 OK
Comments	Inquiry command.