

# Technical Note

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## IFR 3410 Option 300 waveform information



This document contains information about option  
300 series, pre-loaded ARB files.

Option 300 Series complements Option 5, Arbitrary Waveform Generator (ARB). It enables an instrument to be delivered with its ARB pre-loaded with a suite of example waveform files. This is especially useful for new users of the product, particularly in research and development, as it enables the instrument to be producing digitally modulated signals within seconds of removing it from its packaging.

Pre-loaded suites are available for common applications such as GSM, WLAN, CDMA, TETRA, etc. as follows:

Option 301	CDMA example waveforms - includes 3GPP, CDMA2000 and IS-95
Option 302	Cellular example waveforms - includes GSM/EDGE, IS-136 and PDC
Option 303	PMR example waveforms - includes TETRA and P25
Option 304	Avionics example waveforms - includes VDL mode 2
Option 305	WLAN example waveforms - includes 802.11a and Bluetooth
Option 306	Satellite/Cable example waveforms - includes various QAM formats
Option 307	Digital cordless example waveforms - includes DECT and PHS

Additionally, Option 300 is available, which consists of a selection of waveforms from options 301 to 307, and is intended for instruments used for demonstration or rental purposes.

These options are available free-of-charge but note that they are only available at the time of order. Should the user accidentally (or intentionally) delete one or more of these pre-loaded waveforms, the complete suite is included within IQCreator to enable the waveform(s) to be re-created<sup>1</sup>.

All the waveforms included in this technical note will currently fit into the ARB memory space so it is possible to order options 301 to 307 inclusive. As more options and waveforms are added, this may not be the case. A column in the following tables indicate how many narrow or wide sectors each waveform occupies<sup>2</sup>.

<sup>1</sup>After IQCreator has been successfully installed, all example files are located as \*.aiq files in

c:\Program Files\Aeroflex\IQCreator\Example Files

To generate the \*.aiq file, just click on "Generate AIQ File!" from within IQCreator and browse the appropriate file.

<sup>2</sup>A 3410 is shipped from the factory with the ARB formatted with 40 wide sectors and 60 narrow sectors (20 wide sectors split into 3). Depending on the size of the waveform, it may occupy either 1 narrow, 2 narrow or 1 or more wide sectors. When all narrow sectors have been filled, any remaining wide sectors will be used for smaller waveforms.

## Waveform Name Format

The waveform file name includes as much information about the waveform as possible such that 1) it can be differentiated from other similar waveforms and 2) to provide a meaningful description of its structure and content.

It is constructed in a common format similar to the following example:

**ats\_3gpp\_fdd\_fwd\_tm5\_6dpcp\_2hspdsch\_v5pt8.aiq**

**ats** = Aeroflex Test Solutions.

All example waveforms generated by Aeroflex carry this prefix to enable easy identification from any other similar waveforms that a customer may generate.

**3gpp** = 3rd Generation Partnership Project

This indicates the standard to which the waveform complies.

**fdd** = Frequency Domain Duplex. This indicates the duplex access method.

**fwd** = Forward (or Downlink) signal

**tm5** = Test Model 5

**6dpcp** = 6 dedicated physical channels

**2hspdsch** = 2 high speed physical downlink shared channels

**v5pt8** = Version 5.8

# Option 300

## Example waveforms - a selection from options 301 to 307

File Name	Sample Rate	Symbol Rate	Crest Factor	ARB Sectors
ats_3gpp_fdd_fwd_interferer.aiq	15,360,000	3,840,000	10.9305	2 narrow
ats_3gpp_fdd_fwd_pilot.aiq	15,360,000	3,840,000	5.20191	2 narrow
ats_3gpp_fdd_fwd_tm1_64ch_sc0_v5pt1.aiq	15,360,000	3,840,000	10.4347	2 narrow
ats_3gpp_fdd_fwd_tm5_14dpch_4hspdsch_v5pt8.aiq	15,360,000	3,840,000	10.075	2 narrow
ats_3gpp_fdd_rev_interferer.aiq	15,360,000	3,840,000	3.46263	2 narrow
ats_4carrier_3gpp_tm1_64ch_v5pt1.aiq	Samples = 460800	46,080,000	11.8149	2 wide
ats_cdma2000_rev_sr1_rc3_fch9600_sch9600.aiq	4,915,200	1,228,800	5.84172	1 wide
ats_is95_fwd_9ch.aiq	4,915,200	1,228,800	10.3594	1 wide
ats_edge_dn_cont.aiq	1,625,000	270,833	3.08624	1 narrow
ats_edge_unframed.aiq	1,625,000	270,833	3.21675	1 narrow
ats_gsm_dn_cont.aiq	1,625,000	270,833	N/A	1 narrow
ats_gsm_unframed.aiq	1,625,000	270,833	N/A	1 narrow
ats_is136_fwd_fr_dcch.aiq	97,200	24,300	3.25504	1 narrow
ats_is136_rev_fr_dcch.aiq	97,200	24,300	2.87666	1 narrow
ats_pdc_fwd_fr_dtch.aiq	168,000	21,000	2.79105	1 narrow
ats_pdc_rev_fr_dtch.aiq	168,000	21,000	2.74653	1 narrow
ats_pdc_unframed.aiq	168,000	21,000	2.79834	1 narrow
ats_tetra_dn_cont.aiq	72,000	18,000	2.87707	1 narrow
ats_tetra_unframed.aiq	72,000	8,000	3.24081	1 narrow
ats_p25_c4fm_std_silence_test_pattern.aiq	76,800	4,800	N/A	1 narrow
ats_p25_c4fm_std_tone_test_pattern.aiq	76,800	4,800	N/A	1 narrow
ats_p25_cqpsk_std_silence_test_pattern.aiq	19,200	4,800	4.26818	1 narrow
ats_p25_cqpsk_std_tone_test_pattern.aiq	19,200	4,800	4.29598	1 narrow
ats_vdl_m2_rtca_do224a.aiq	84,000	10,500	3.29276	1 narrow
ats_vdl_m2_unframed.aiq	84,000	10,500	3.28645	1 wide
ats_80211a_54Mbit_pn15.aiq	60,000,000	20,000,000	9.82288	1 wide
ats_bluetooth_unframed_00001111.aiq	6,000,000	1,000,000	N/A	1 narrow
ats_bluetooth_unframed_01010101.aiq	6,000,000	1,000,000	N/A	1 narrow
ats_bluetooth_unframed_pn9.aiq	6,000,000	1,000,000	N/A	1 narrow
ats_16qam_160000Hz_rrcOpt25.aiq	640,000	160,000	5.82826	1 narrow
ats_256qam_6952000Hz_rrcOpt15.aiq	27,808,000	6,952,000	6.82537	1 wide
ats_64qam_6952000Hz_rrcOpt15.aiq	27,808,000	6,952,000	5.88143	1 wide
ats_phs_all_tch.aiq	1,536,000	192,000	2.70306	1 narrow
ats_phs_unframed.aiq	1,536,000	192,000	2.7984	1 narrow
ats_dect_unframed.aiq	6,912,000	1,152,000	N/A	1 narrow
			Total:	33 narrow 8 wide

# Option 301

## CDMA example waveforms

File Name	Sample Rate	Symbol Rate	Crest Factor	ARB Sectors
<b>3GPP</b>				
ats_3gpp_fdd_fwd_interferer.aiq	15,360,000	3,840,000	10.9305	2 narrow
ats_3gpp_fdd_fwd_pilot.aiq	15,360,000	3,840,000	5.20191	2 narrow
ats_3gpp_fdd_fwd_tm1_16ch_v5pt1.aiq	15,360,000	3,840,000	10.4224	2 narrow
ats_3gpp_fdd_fwd_tm1_32ch_v5pt1.aiq	15,360,000	3,840,000	11.4311	2 narrow
ats_3gpp_fdd_fwd_tm1_64ch_sc0_v5pt1.aiq	15,360,000	3,840,000	10.4347	2 narrow
ats_3gpp_fdd_fwd_tm2_v5pt1.aiq	15,360,000	3,840,000	9.13482	2 narrow
ats_3gpp_fdd_fwd_tm3_16ch_v5pt1.aiq	15,360,000	3,840,000	12.3358	2 narrow
ats_3gpp_fdd_fwd_tm3_32ch_v5pt1.aiq	15,360,000	3,840,000	11.9306	2 narrow
ats_3gpp_fdd_fwd_tm5_14dpch_4hspsdsch_v5pt8.aiq	15,360,000	3,840,000	10.075	2 narrow
ats_3gpp_fdd_fwd_tm5_30dpch_8hspsdsch_v5pt8.aiq	15,360,000	3,840,000	11.0405	2 narrow
ats_3gpp_fdd_fwd_tm5_6dpch_2hspsdsch_v5pt8.aiq	15,360,000	3,840,000	9.21599	2 narrow
ats_3gpp_fdd_rev_dpch.aiq	15,360,000	3,840,000	3.48798	2 narrow
ats_3gpp_fdd_rev_dpch_hsdpcch.aiq	15,360,000	3,840,000	4.1046	2 narrow
ats_3gpp_fdd_rev_interferer.aiq	15,360,000	3,840,000	3.46263	2 narrow
ats_3gpp_fdd_rev_prach.aiq	15,360,000	3,840,000	3.78615	2 narrow
ats_4carrier_3gpp_tm1_64ch_v5pt1.aiq	Samples = 460800	46,080,000	11.8149	2 wide

tm = test model

dpch = dedicated physical channel

hspsdsch = high speed physical downlink shared channel

prach = physical random access channel

sc = scrambling code

## CDMA2000

ats_cdma2000_rev_sr1_rc3_fch1500_dcch9600.aiq	4,915,200	1,228,800	7.01869	1 wide
ats_cdma2000_rev_sr1_rc3_fch9600_sch153600.aiq	4,915,200	1,228,800	6.26241	1 wide
ats_cdma2000_rev_sr1_rc3_fch9600_sch76800.aiq	4,915,200	1,228,800	5.934	1 wide
ats_cdma2000_rev_sr1_rc3_fch9600_sch9600.aiq	4,915,200	1,228,800	5.84172	1 wide

sr = spreading rate

rc = radio configuration

fch = fundamental channel

sch = supplementary channel

dcch = dedicated control channel

## IS95

ats_is95_fwd_9ch.aiq	4,915,200	1,228,800	10.3594	1 wide
ats_is95_fwd_9ch_hcf.aiq	4,915,200	1,228,800	13.0778	1 wide

hcf = high crest factor

Total: 30 narrow 8 wide

# Option 302

## Cellular example waveforms

File Name	Sample Rate	Symbol Rate	Crest Factor	ARB Sectors
ats_edge_dn_cont.aiq	1,625,000	270,833	3.08624	1 narrow
ats_edge_unframed.aiq	1,625,000	270,833	3.21675	1 narrow
ats_gsm_dn_cont.aiq	1,625,000	270,833	N/A	1 narrow
ats_gsm_unframed.aiq	1,625,000	270,833	N/A	1 narrow
ats_is136_fwd_fr_dcch.aiq	97,200	24,300	3.25504	1 narrow
ats_is136_fwd_fr_dtch.aiq	97,200	24,300	3.25506	1 narrow
ats_is136_fwd_fr_dtch_dpc.aiq	97,200	24,300	3.2552	1 narrow
ats_is136_fwd_hr_dcch.aiq	97,200	24,300	2.87666	1 narrow
ats_is136_rev_fr_dcch.aiq	97,200	24,300	2.87666	1 narrow
ats_is136_rev_fr_dtch.aiq	97,200	24,300	3.25533	1 narrow
ats_is136_rev_hr_dtch.aiq	97,200	24,300	2.8771	1 narrow
ats_is136_unframed.aiq	97,200	24,300	3.24084	1 narrow
ats_pdc_fwd_fr_dtch.aiq	168,000	21,000	2.79105	1 narrow
ats_pdc_rev_fr_dtch.aiq	168,000	21,000	2.74653	1 narrow
ats_pdc_unframed.aiq	168,000	21,000	2.79834	1 narrow

dcch = dedicated control channel

dtch = dedicated traffic channel

fr = full rate

hr = half rate

Total: 15 narrow

# Option 303

## PMR example waveforms

File Name	Sample Rate	Symbol Rate	Crest Factor	ARB Sectors
ats_tetra_dn_cont.aiq	72,000	18,000	2.87707	1 narrow
ats_tetra_unframed.aiq	72,000	18,000	3.24081	1 narrow
ats_p25_c4fm_calibration_test_pattern.aiq	76,800	4,800	N/A	1 narrow
ats_p25_c4fm_std_interference_test_pattern.aiq	76,800	4,800	N/A	1 narrow
ats_p25_c4fm_std_silence_test_pattern.aiq	76,800	4,800	N/A	1 narrow
ats_p25_c4fm_std_tone_test_pattern.aiq	76,800	4,800	N/A	1 narrow
ats_p25_cqpsk_calibration_test_pattern.aiq	19,200	4,800	4.74213	1 narrow
ats_p25_cqpsk_std_interference_test_pattern.aiq	19,200	4,800	4.86474	1 narrow
ats_p25_cqpsk_std_silence_test_pattern.aiq	19,200	4,800	4.26818	1 narrow
ats_p25_cqpsk_std_tone_test_pattern.aiq	19,200	4,800	4.29598	1 narrow

Total: 10 narrow

# Option 304

## Avionics example waveforms

File Name	Sample Rate	Symbol Rate	Crest Factor	ARB Sectors
ats_vdl_m2_rtca_do224a.aiq				
Delay=26				
UpProf=cos2				
DownProf=cos2				
UpProfDur=15				
DownProfDur=15	84,000	10,500	3.29276	1 narrow
ats_vdl_m2_unframed.aiq	84,000	10,500	3.28645	1 wide

Total: 1 narrow 1 wide

# Option 305

## WLAN example waveforms

File Name	Sample Rate	Symbol Rate	Crest Factor	ARB Sectors
ats_80211a_54Mbit_pn15.aiq [Ramp] Delay=2100 UpProf=fast DownProf=fast UpProfDur=600 DownProfDur=600	60,000,000	20,000,000	9.82288	1 wide
ats_bluetooth_unframed_00001111.aiq	6,000,000	1,000,000	N/A	1 narrow
ats_bluetooth_unframed_01010101.aiq	6,000,000	1,000,000	N/A	1 narrow
ats_bluetooth_unframed_pn9.aiq	6,000,000	1,000,000	N/A	1 narrow
			Total:	3 narrow 1 wide

# Option 306

## Satellite/Cable example waveforms

File Name	Sample Rate	Symbol Rate	Crest Factor	ARB Sectors
ats_16qam_160000Hz_rrcOpt25.aiq	640,000	160,000	5.82826	1 narrow
ats_256qam_5360537Hz_rrcOpt12.aiq	21,442,148	5,360,537	6.97413	1 narrow
ats_256qam_6952000Hz_rrcOpt15.aiq	27,808,000	6,952,000	6.82537	1 wide
ats_64qam_5056941Hz_rrcOpt18.aiq	20,227,764	5,056,941	5.77503	1 narrow
ats_64qam_6952000Hz_rrcOpt15.aiq	27,808,000	6,952,000	5.88143	1 wide
			Total:	3 narrow 2 wide

# Option 307

## Digital cordless example waveforms

File Name	Sample Rate	Symbol Rate	Crest Factor	ARB Sectors
ats_phs_all_tch.aiq	1,536,000	192,000	2.70306	1 narrow
ats_phs_unframed.aiq	1,536,000	192,000	2.7984	1 narrow
ats_dect_unframed.aiq	6,912,000	1,152,000	N/A	1 narrow
			Total:	3 narrow

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