# 3ctest

automotive EMC solutions

automotive EMC solutions

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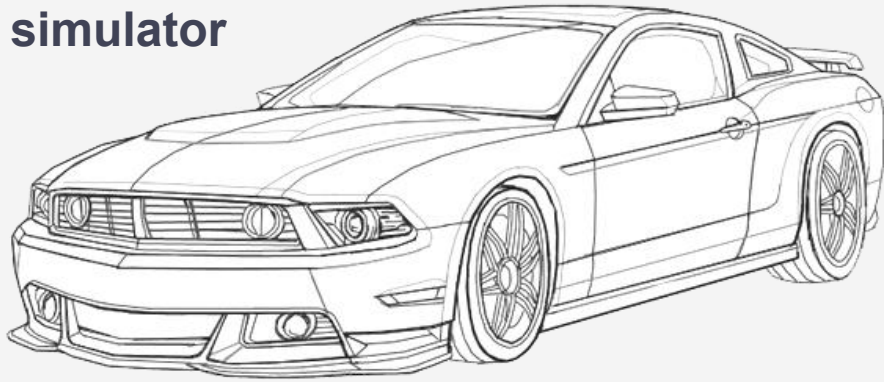
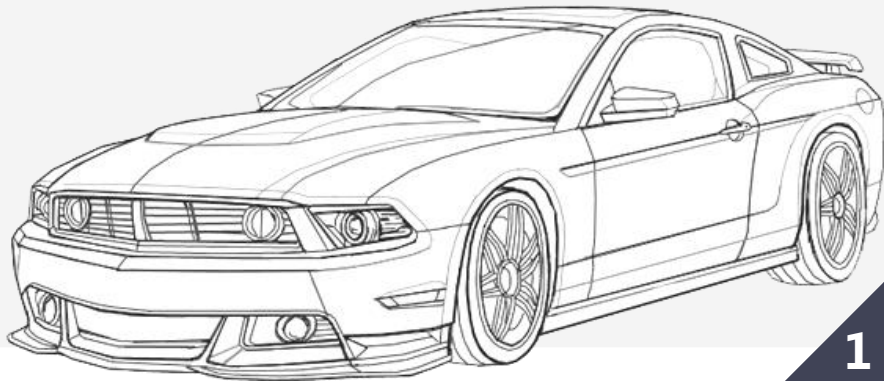


# General description


- Fully automotive EMC testing solutions
- Support numerous international standards and manufacturer standards
- AutoLab PC software provides one-key implementation of standard test and report generation
- Built-in CDN, no need to change DUT connection for waveform switch over
- Built-in protection function, safe and reliable
- Synchronous trigger oscilloscope, dynamic monitoring experiment process



# General description


- Support international standards

  ISO7637-2, ISO16750-2, LV124, SAEJ1113, GB/T21437-2, etc

- Support manufacturer standards

  Chrysler, Ford, BMW, Nissan, GMW, VW, PSA, etc

➢ Equipments are built in ISO7637 and ISO16750 standard library，for other standards, AutoLab PC software needs to be used.

# General description (Customers)




Richtec TAIWAN OFFICE

ar europe Europe

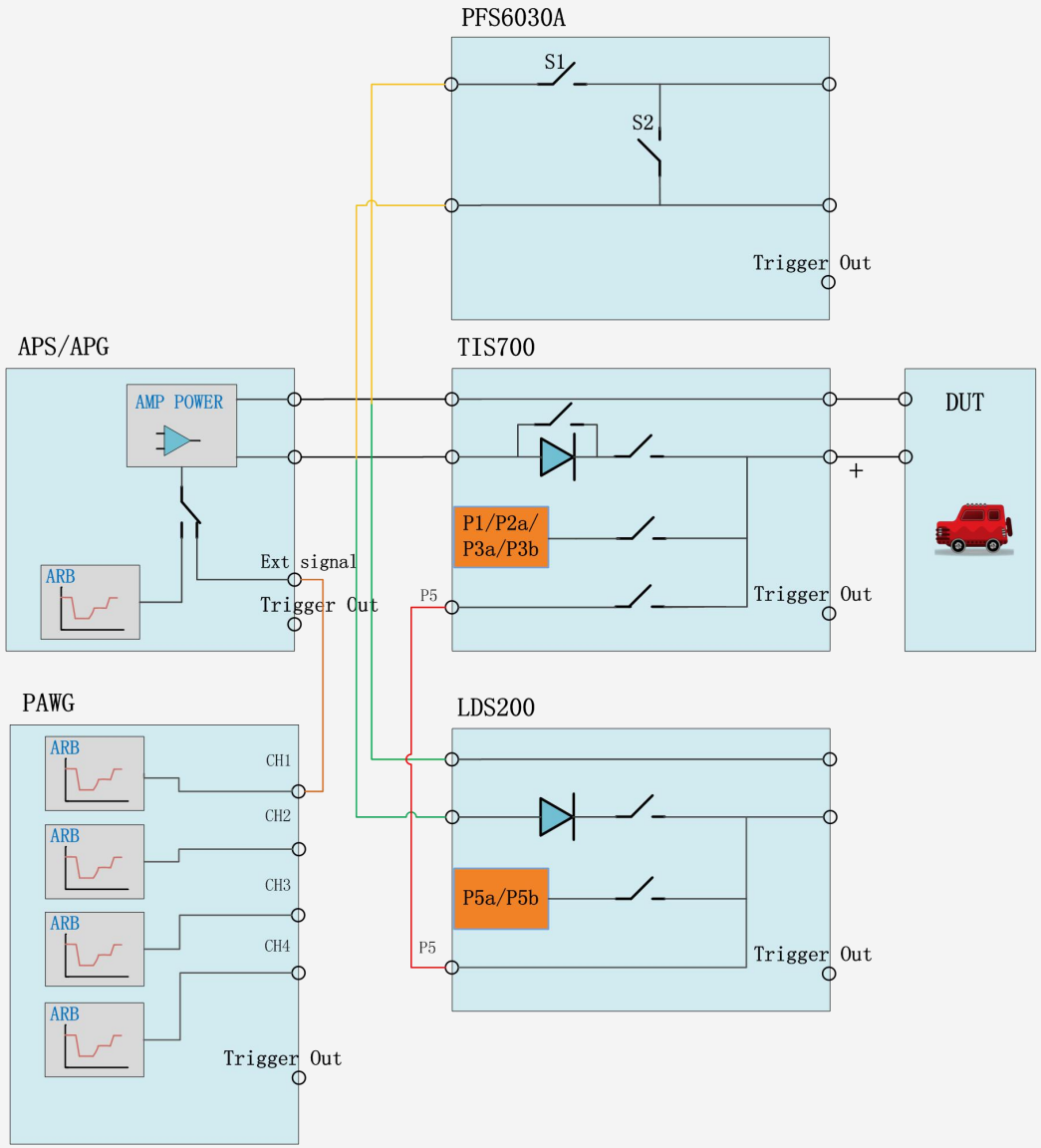
TESTEK Korea

# General description (Customers)


More than 1000 customers in automotive field

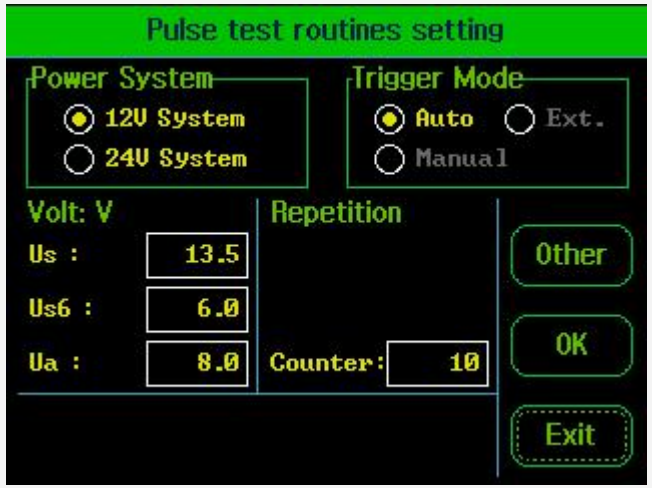
# General description

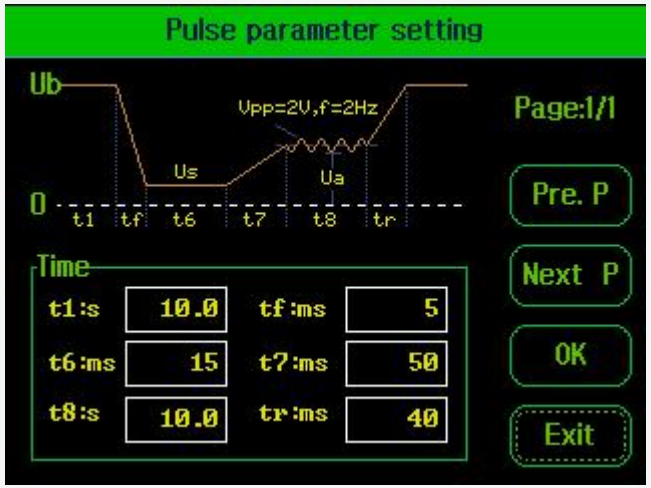
## System connection diagram:



# General description

- Test parameters real-time visible, convenient check
- Parameters setting with reference waveform

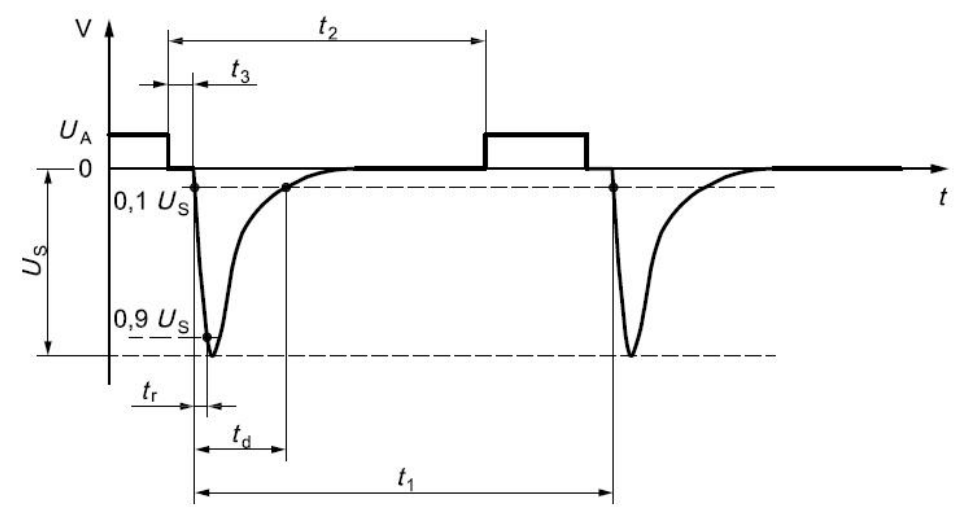



# TIS 700 series: automotive transient immunity test

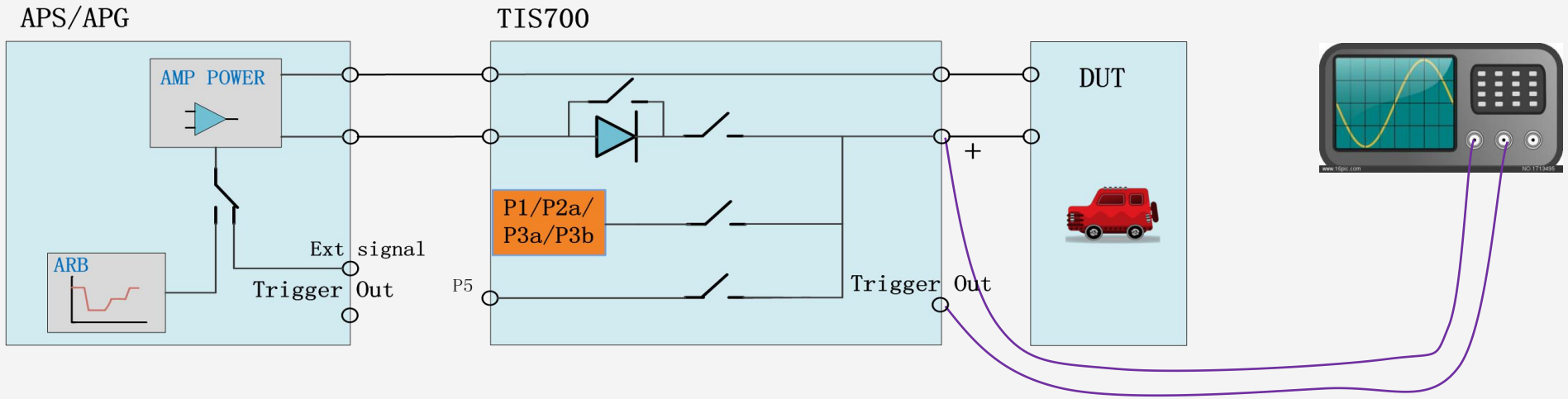
- To simulate the transient conduction coupled disturbance along the supply lines, like ISO7637-2 P1,P2,P3a,P3b
- Internal 60V/30A CDN , up to 200A, it can be used for the whole test system by settings.
- Multiple internal resistance and pulse width to meet different standard requirements

# TIS 700: automotive transient immunity test

**Example**：P1 Test Setup



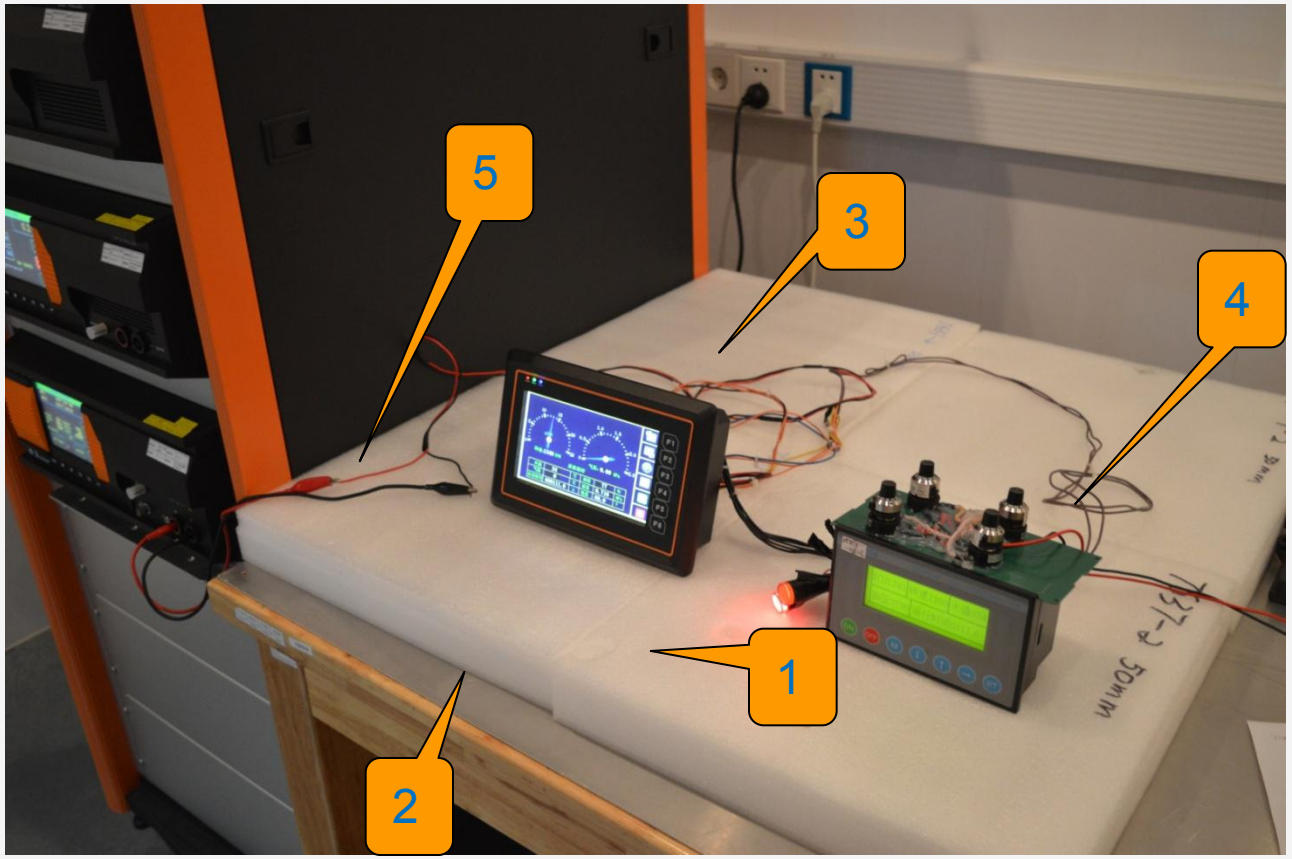

- APS/APG as DUT power supply or using external battery
- Automatic injection waveform as per the selected waveform and parameters after starting test
- Make sure the selected model can withstand a sufficiently large current, because some DUT have a very high current (e.g. Motor load).



# TIS 700: automotive transient immunity test

**Application Example**：Instrument panel

Supply disconnection from inductive loads (e.g. Wiper motor) will bring interferences like ISO7637-2 P1 to other devices. The instrument panel screen may flicker, even communication data abnormal.




1. Support plate, thickness 50 ± 5mm
2. Ground metal plane
3. Vehicle-amounted instrument panel
4. Instrument data simulator
5. Power cord（length 500 ± 100mm for P3a/P3b）

# TIS 700: automotive transient immunity test

## TIS700 series model

According to the current of CDN:

TIS 700 - X X

- None : 60V / 30A
- -60 : 60V / 60A
- -100 : 60V / 100A
- -200 : 60V / 200A

# TIS 700: automotive transient immunity test

| Micro pulse P1/P2a | |
|---|---|
| As per Standard | ISO7637 |
| Pulse amplitude | 30-600V |
| Pulse polarity | Positive/Negative |
| Source Impedance (Ri) | 2Ω, 4Ω, 10Ω, 30Ω，50Ω |
| Pulse rise time | 0.5~1us，1.5~3us, no load |
| Pulse duration time | 50us, 12us,1ms, 2ms, 1.5ms, 0.2ms，0.3ms，0.5ms +/-20% |
| Pulse interval time | 0.2s - 60s |
| Numbers of pulse | 1 - 9999 |
| Power of EUT | Max.60V/200A |
| Trigger mode | Auto, Manual, Outside trigger |

# TIS 700: automotive transient immunity test

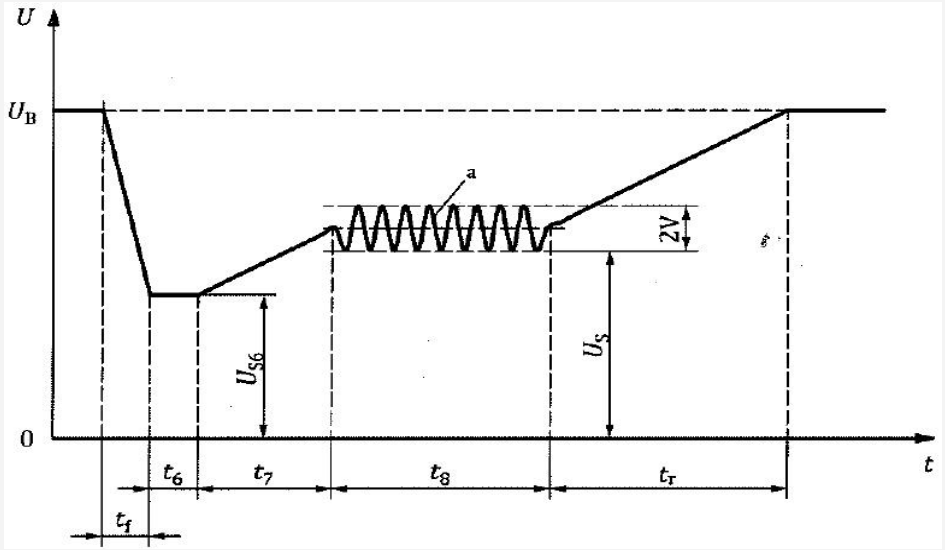
| EFT/Burst Pulse 3a/3b | |
|---|---|
| As per Standard | ISO7637 |
| Pulse amplitude | 25-700V |
| Pulse polarity | Positive/Negative |
| Impedance (Ri) | 50Ω |
| Pulse rise time | 5 ns ± 30% |
| Pulse duration time | 150 ns ± 45 ns |
| Numbers of pulse | 1 – 200 |
| Pulse interval time | 50ms - 999ms |
| Pulse frequency | 0.1 kHz - 200 kHz |
| Test time | 1s - 50000s |
| Power of EUT | Max.60V/200A |
| Trigger mode | Auto, Manual, Outside trigger |

# APS/APG series: environmental conditions of power supply test

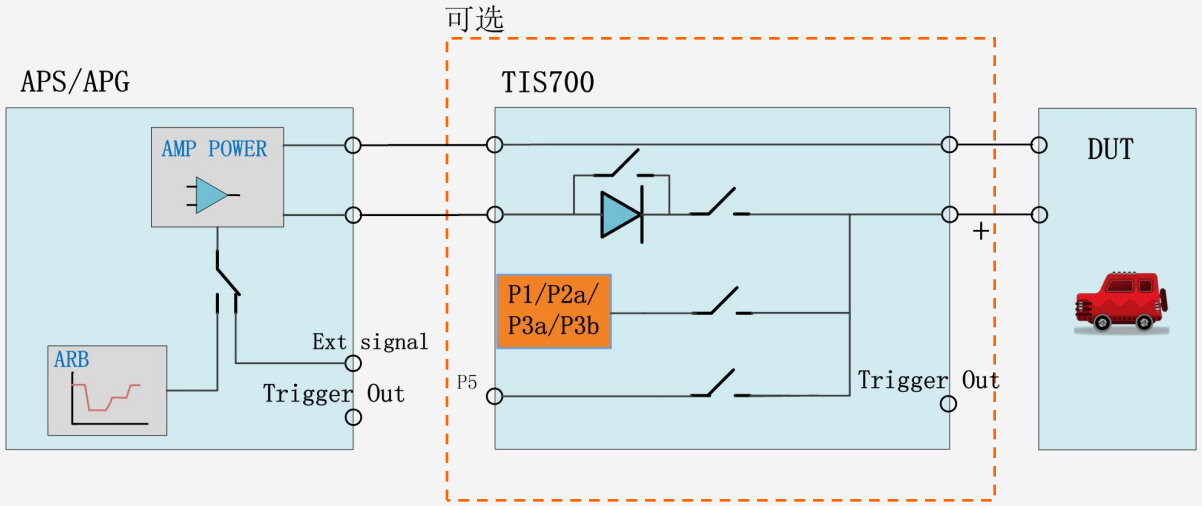
- To simulate environmental conditions and testing for different electrical load, e.g. ISO16750,LV124, etc
- APS series with current up to 30A, voltage up to 60V
- APG series with current up to 200A， voltage up to 60V
- Different impulse current to meet many types of test equipments
- Internal waveform generator, support any standard waveform with AutoLab software editing frequency <30KHz
- Support external arbitrary waveform generator(PAWG) input in order to complete more complex and higher frequency standard waveforms
- For voltage 40V,current <15A， DCP auxiliary power source is not needed.
- Internal spike pulse generation circuit to meet similar GMW3172 standard requirements

# APS/APG series: environmental conditions of power supply test

**Example**：Start-up waveform Test Setup

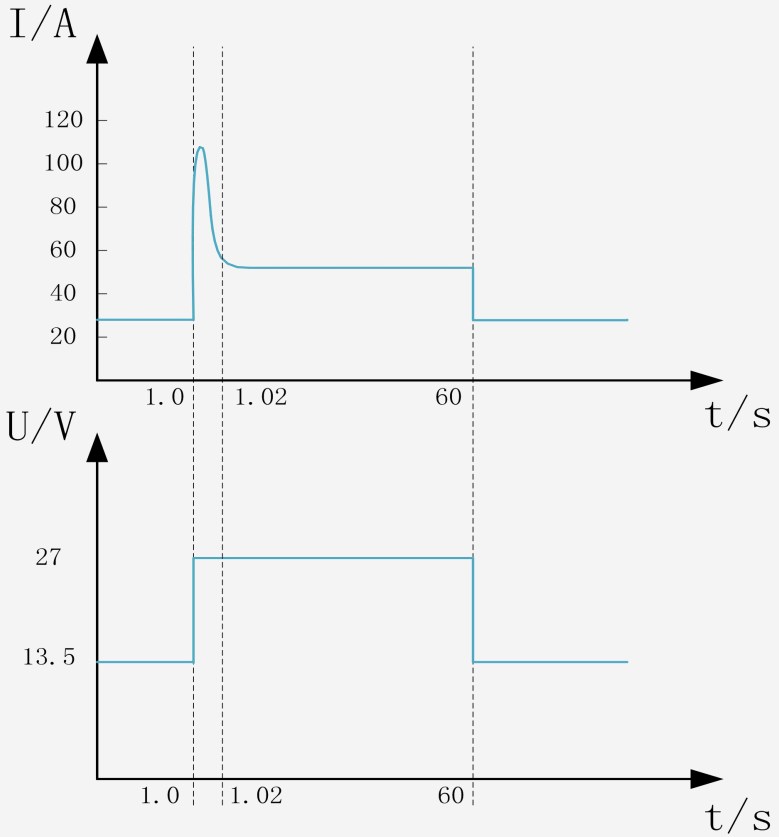



- Connect DUT directly to APS/APG output or TIS700 CDN output
- Optional for internal waveform generator or using external waveform generator injection, e.g. PAWG100
- Determine DUT impulse current and select correct APS/APG model



# APS/APG series: environmental conditions of power supply test

**Application Example 1：** Cooling fan




**Perform ISO16750 over voltage test :** the current is 24A under rated voltage 13.5V, when the voltage jumps to 27V from 13.5V, the impulse current can be up to 110V with pulse width 20ms, then stabilize to be 48A.

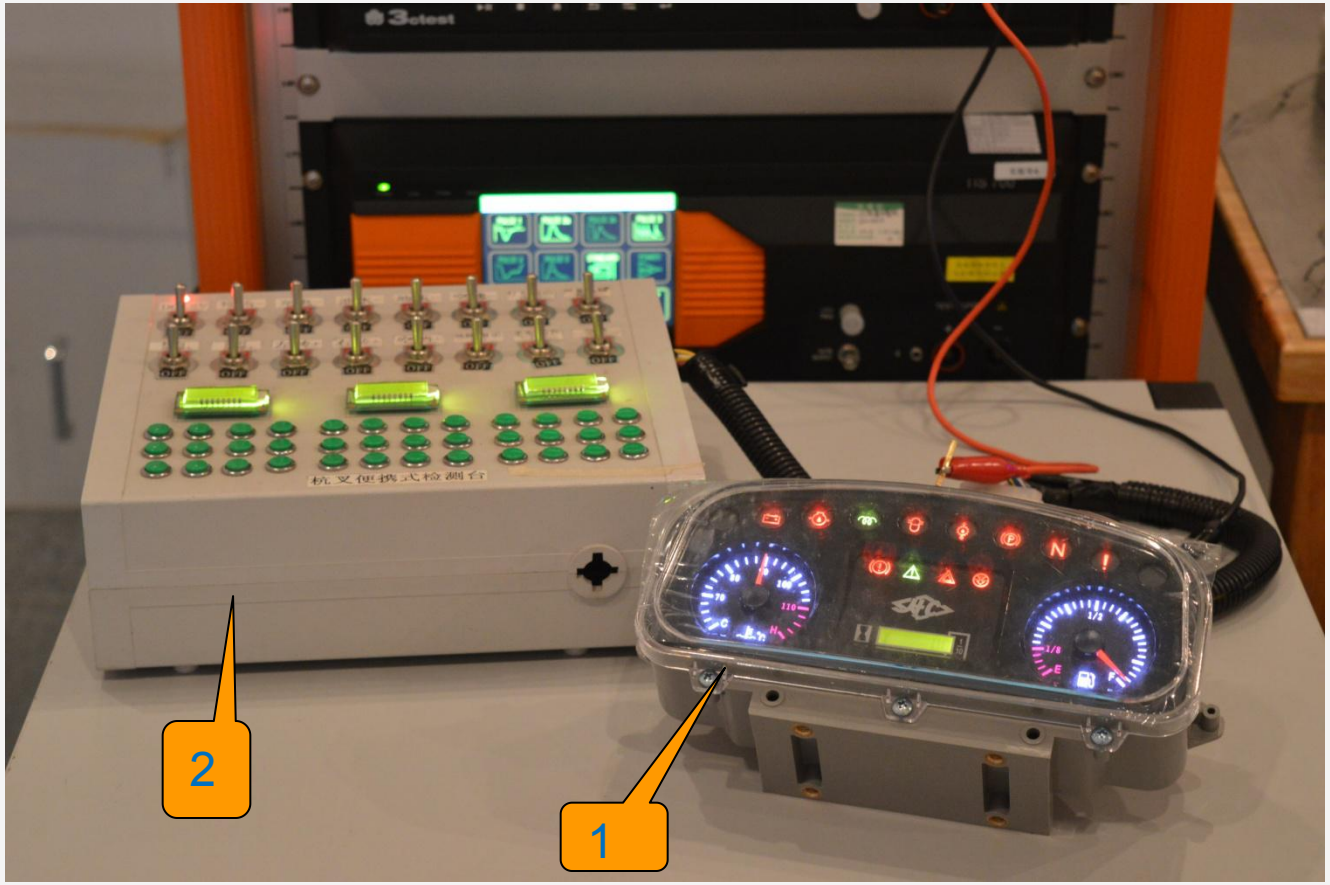
Usually, motors or other inductive loads has this feature. Products with a large energy storage capacitor also have a high impulse current in the instant of power on.

So for this product, APS/APG more than 50A and impulse current >110A should be selected.

# APS/APG series: environmental conditions of power supply test

**Application Example 2**：Instrument panel

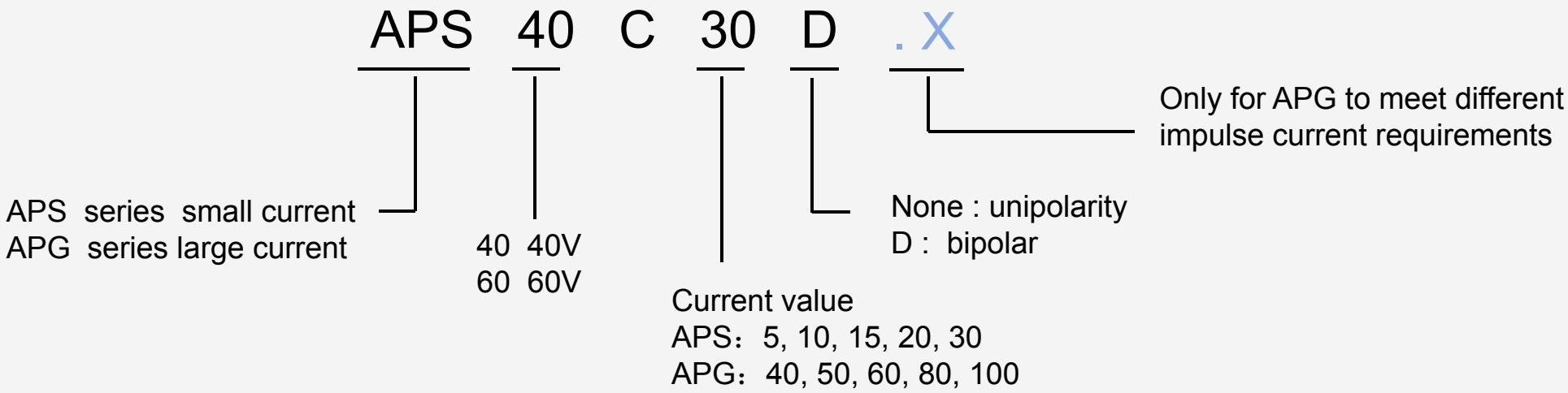
The voltage reduction affected by the internal combustion engines starting may lead to the instrument power off and can't be restarted again.




1. Instrument panel
2. Instrument data simulator

# APS/APG series: environmental conditions of power supply test

## APS /APG series



# APS series power supply (models)

| Generator & power amplifier | DC mains | Parameters |
|---|---|---|
| APS ( unipolarity) | | |
| APS 40C05 | Built-in | DC 40V 5A max 15A@500ms |
| APS 40C10 | Built-in | DC 40V 10A max 15A@500ms |
| APS 40C15 | Built-in | DC 40V 15A max 15A continuous |
| APS 40C20 | DCP 40C20 | DC 40V 20A max 30A @500ms |
| APS 40C30 | DCP 40C30 | DC 40V 30A max 60A@500ms |
| APS ( Bipolar) | | |
| APS 40C05D | DCP 40C05D | DC 40V 5A max 30A@500ms |
| APS 40C10D | DCP 40C10D | DC 40V 10A max 30A@500ms |
| APS 40C15D | DCP 40C15D | DC 40V 15A max 30A@500ms |
| APS 40C20D | DCP 40C20D | DC 40V 20A max 60A@500ms |
| APS 40C30D | DCP 40C30D | DC 40V 30A max 60A@500ms |

# APG series power supply (models)

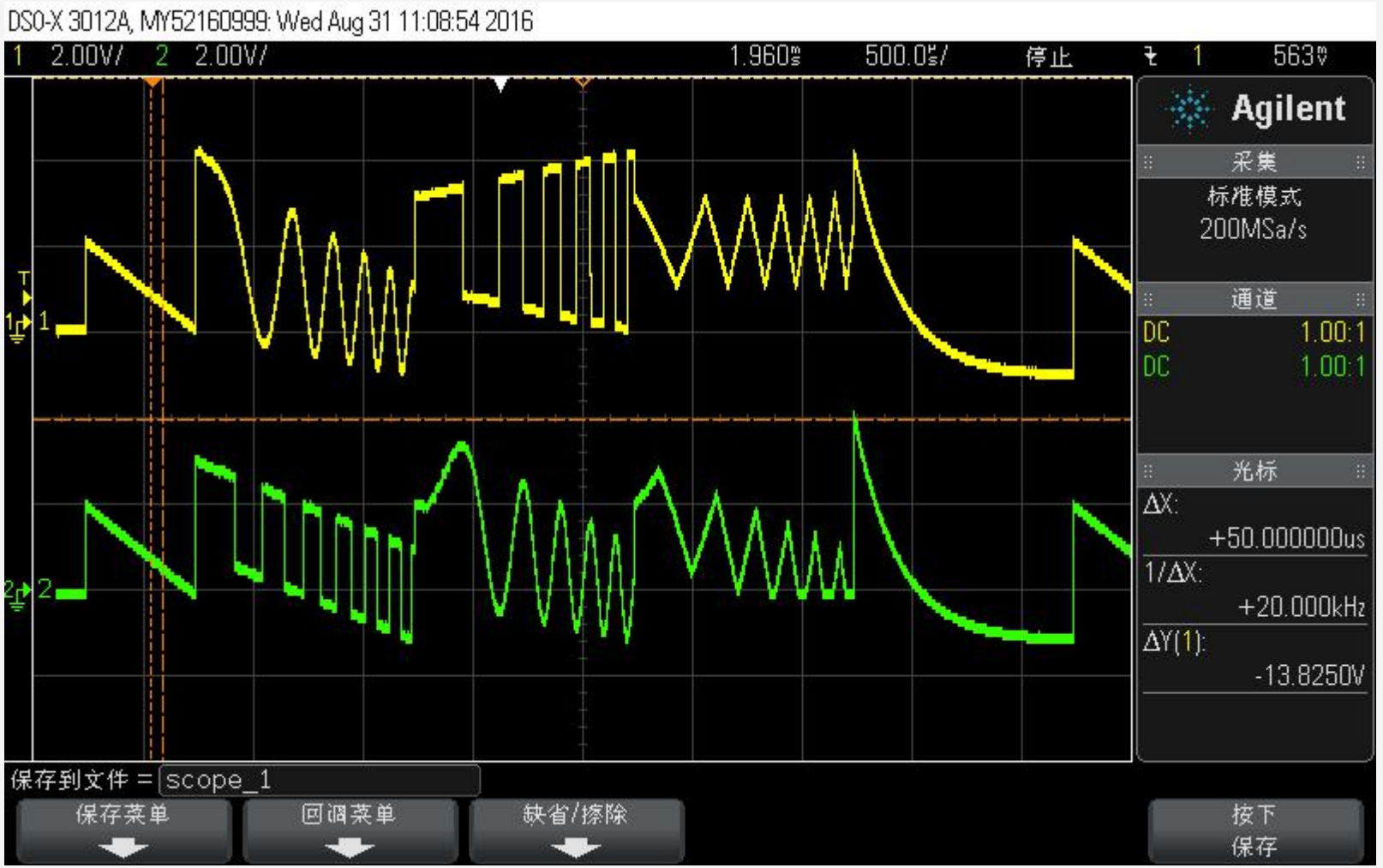
| Models | Parameters | Size |
|---|---|---|
| APG40C40 | Rated 40V 40A max.60A@500ms | 19inch /8U |
| APG40C50 | Rated 40V 50A max.60A@500ms | 19inch /8U |
| APG40C60.1 | Rated 40V 60A max.60A continuous | 19inch /8U |
| APG40C60.2 | Rated 40V 60A max.120A@500ms | 19inch /22U |
| APG40C60.3 | Rated 40V 60A max.160A@500ms | 19inch /22U |
| APG60C40 | Rated 60V 40A max.80A@500ms | 19inch /22U |
| APG60C50 | Rated 60V 50A max.80A@500ms | 19inch /22U |
| APG60C60 | Rated 60V 60A max.80A@500ms | 19inch /22U |
| APG60C80 | Rated 60V 80A max.150A@500ms | 19inch /22U |
| APG60C100.1 | Rated 60V 100A max.150A@500ms | 19inch /22U |
| APG60C100.2 | Rated 60V 100A max.200A@500ms | 19inch /22U |

# PAWG series arbitrary waveform generator

- To simulate arbitrary waveform in the similar power testing standard like ISO16750,LV124, etc
- Support 4 channels output at the same time, sync time adjustable
- Support ramps, triangle, sine, square, exponential wave edit arbitrarily, dynamic adjusting amplitude, offset and frequency
- Support *.csv file, e.g. waveform stored in oscilloscope or edited by excel
- fmax <= 500kHz
- DA trigger rate 25MSPS，waveforms with more accurate details because of this high trigger rate
- Trigger output signal can be set to be at any time, monitoring waveform details by oscilloscope.

# PAWG series arbitrary waveform generator

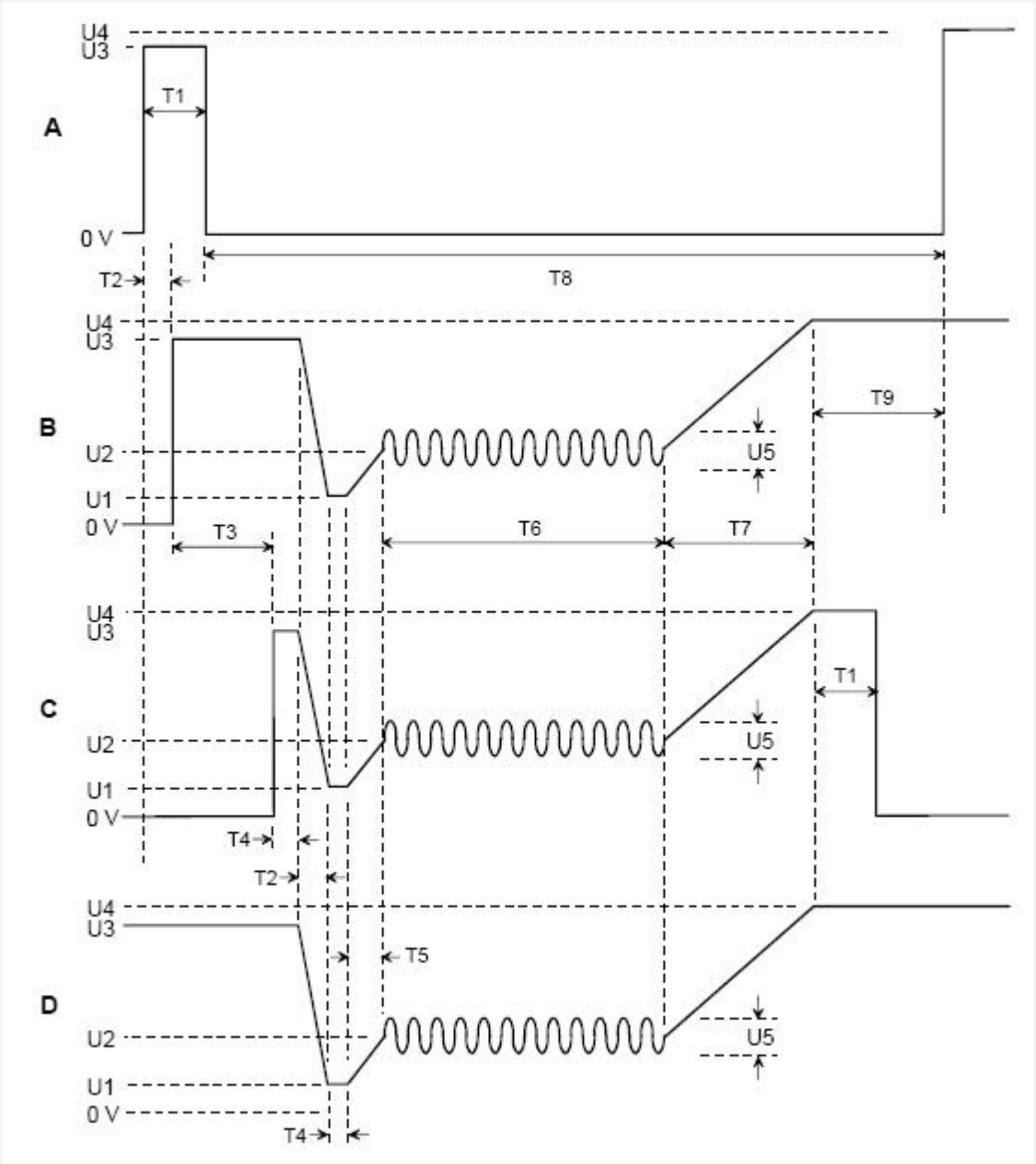




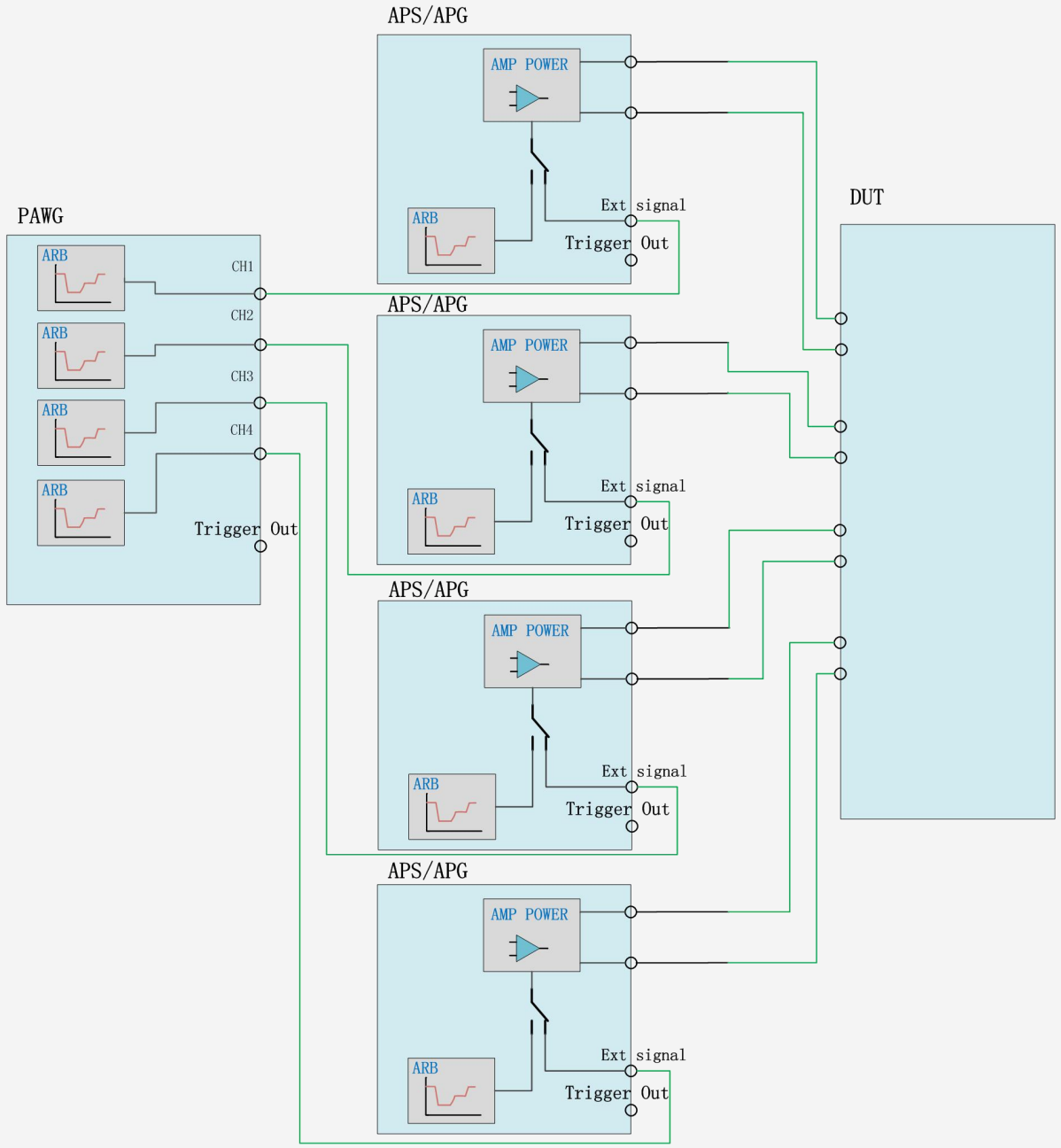
# PAWG series arbitrary waveform generator

Example：Setup of CI230 in Ford ES-XW7T-1A278-AC 2003

- Choose the standard in AutoLab library or edit needed waveform by yourself, confirm the correlation of sync time among 4 channels.
- APS/APG is needed for power output.
- Can set trigger point at any time of waveform in Channel 1 to observe waveform



# PAWG series arbitrary waveform generator




- For different DUT, additional auxiliary power supply or additional 1 PCS APS/APG is needed possibly.
- Output current and protection parameters depends on APS/APG.

## PAWG series

PAWG 100 D

D： 2 channels
F ： 4 channels

# PAWG series arbitrary waveform generator

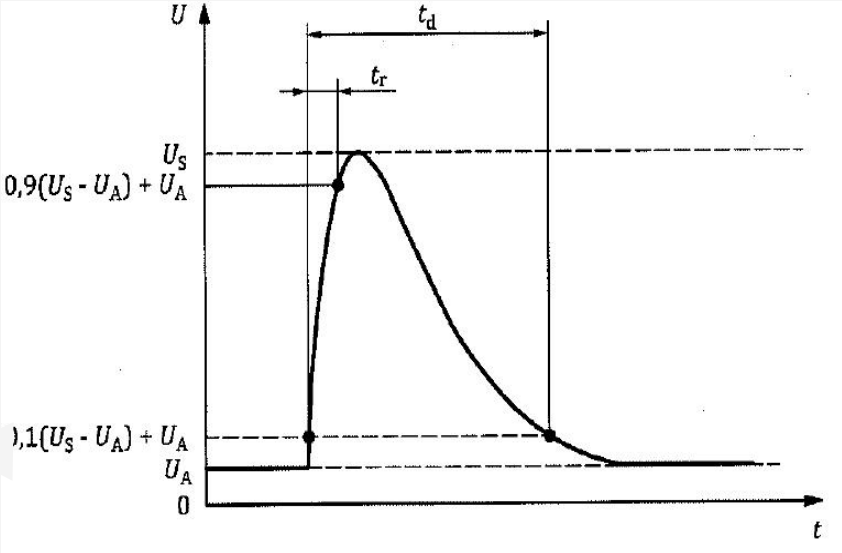
| | |
|---|---|
| Number of channels | 1ch~4ch |
| Sync | Sync accuracy among channels: less than1us , adjustable sync time 0.1-100us |
| Waveform type | Ramps, triangle, sine, square, exponential wave（oscilloscope stored or self-define file .csv） |
| Amplitude and offset | Static, linear |
| Frequency ramping | Static, linear, log(base 10) |
| Start/End phase angle | 0 ～ 359° 1°step |
| Rectification | None, positive, negative, bridge rectification |
| Frequency | 0.01 ～ 500kHz |
| Waveform trigger rate | 25MSPS per channel |
| Output voltage range | 0 ～ +/- 10V（with APS/APG, it depends on the amplification factor and range of APS/APG.) |
| rise/fall time | ≤100ns @20Vpp |
| Segments | ≤1000 |

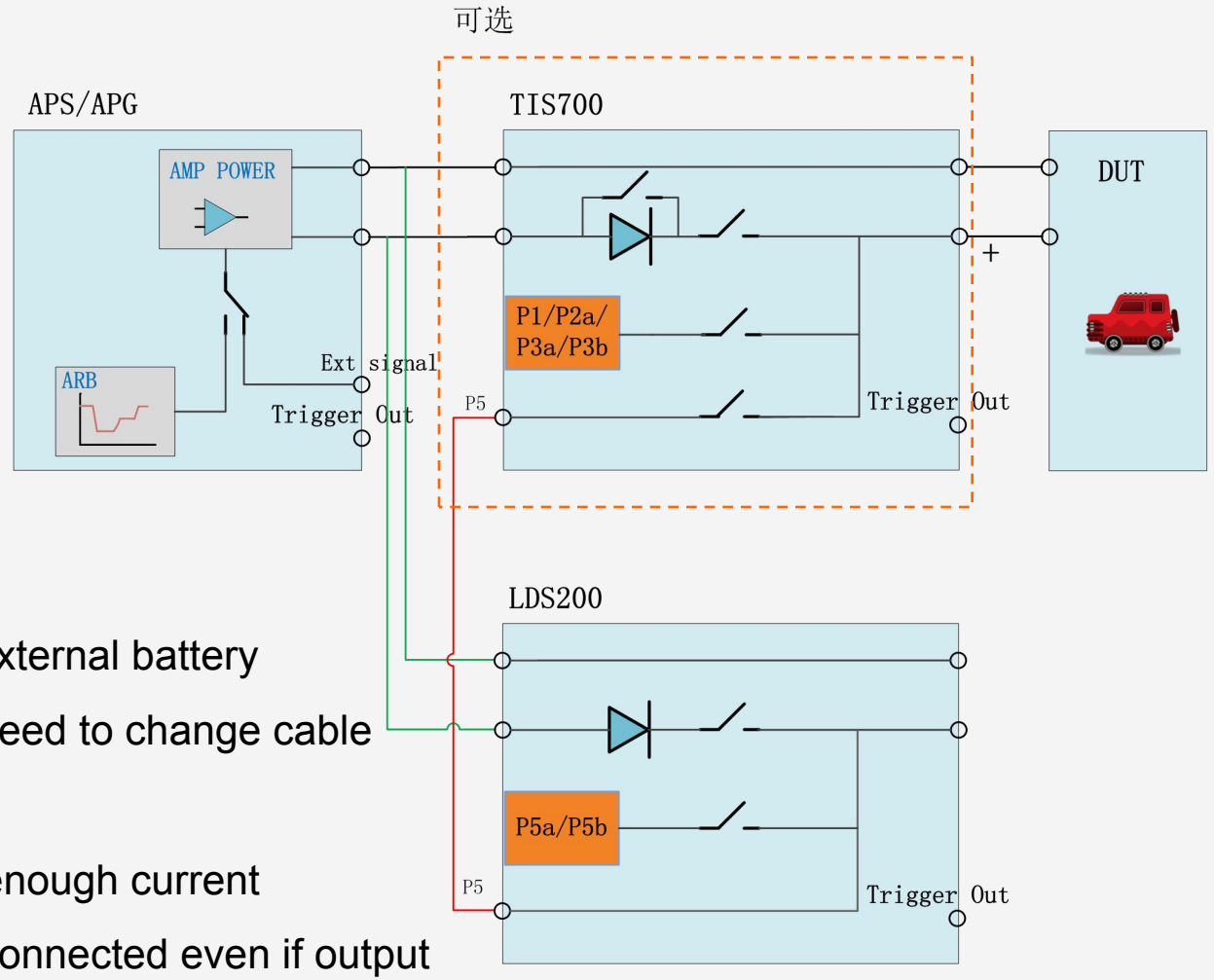
# LDS 200 series: automotive load dump immunity simulator


- To simulate load dump test like battery disconnected during engine running, e.g. ISO16750 load dump
- Internal 60V/30A CDN, up to 200A
- Meet rising edge ≤ 1us，10us ～ 10ms adjustable (especially for Japanese standard）
- Support +/- polarity waveform switching
- Pulse duration up to 1200ms
- Built-in load dump suppression waveform, e.g. P5b

# LDS 200 series: automotive load dump immunity simulator

**Example**：Load Dump Test Setup

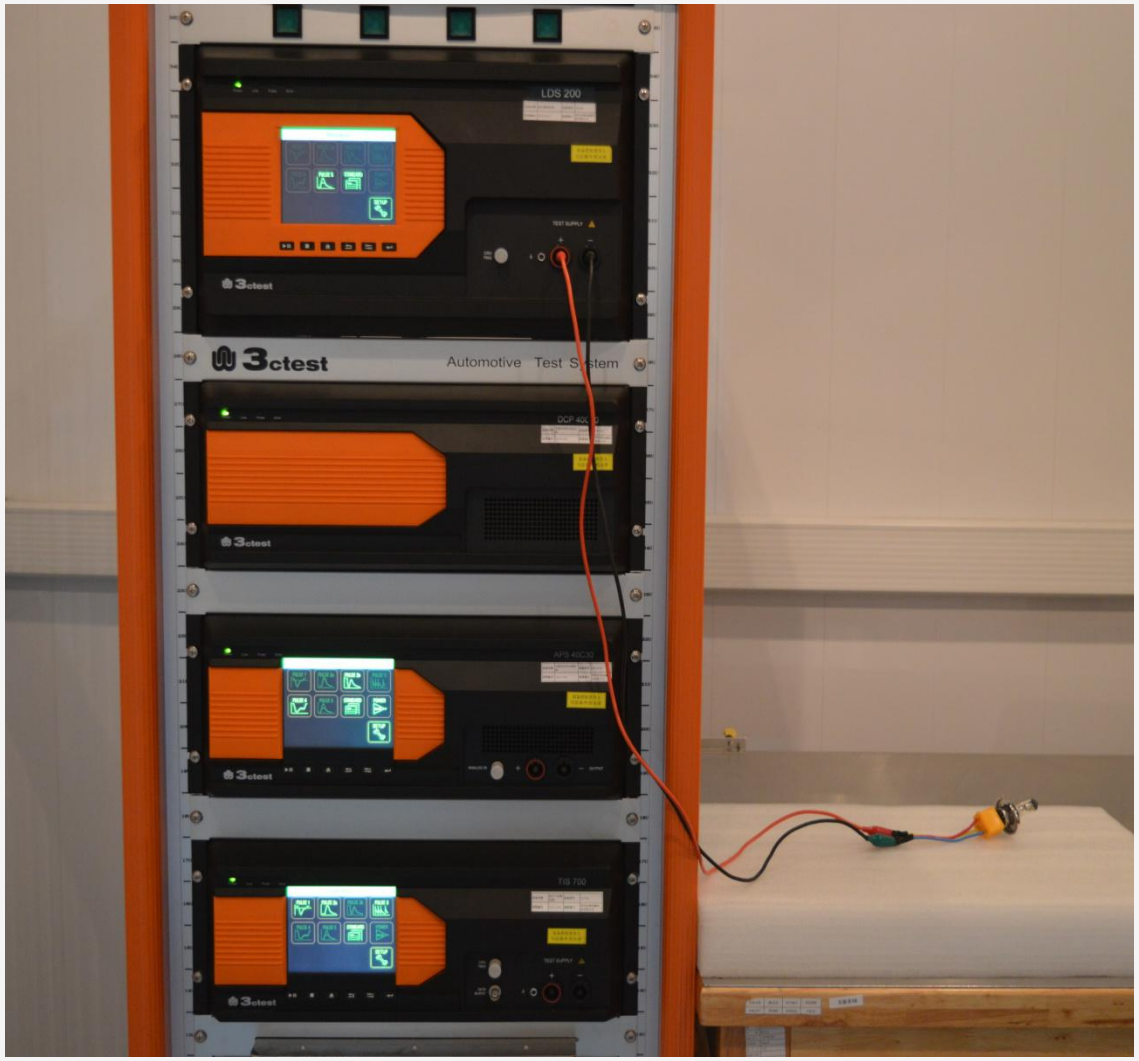



- APS/APG as DUT power source or using external battery
- Optional for output from TIS700 CDN (no need to change cable connections) or from its own CDN
- Choose proper models to make CDN has enough current
- DUT power supply on rear panel must be connected even if output from TIS700 CDN in order to test DUT voltage and superpose pulse waveform.

# LDS 200 series: automotive load dump immunity simulator

**Application 1：** Headlight bulb

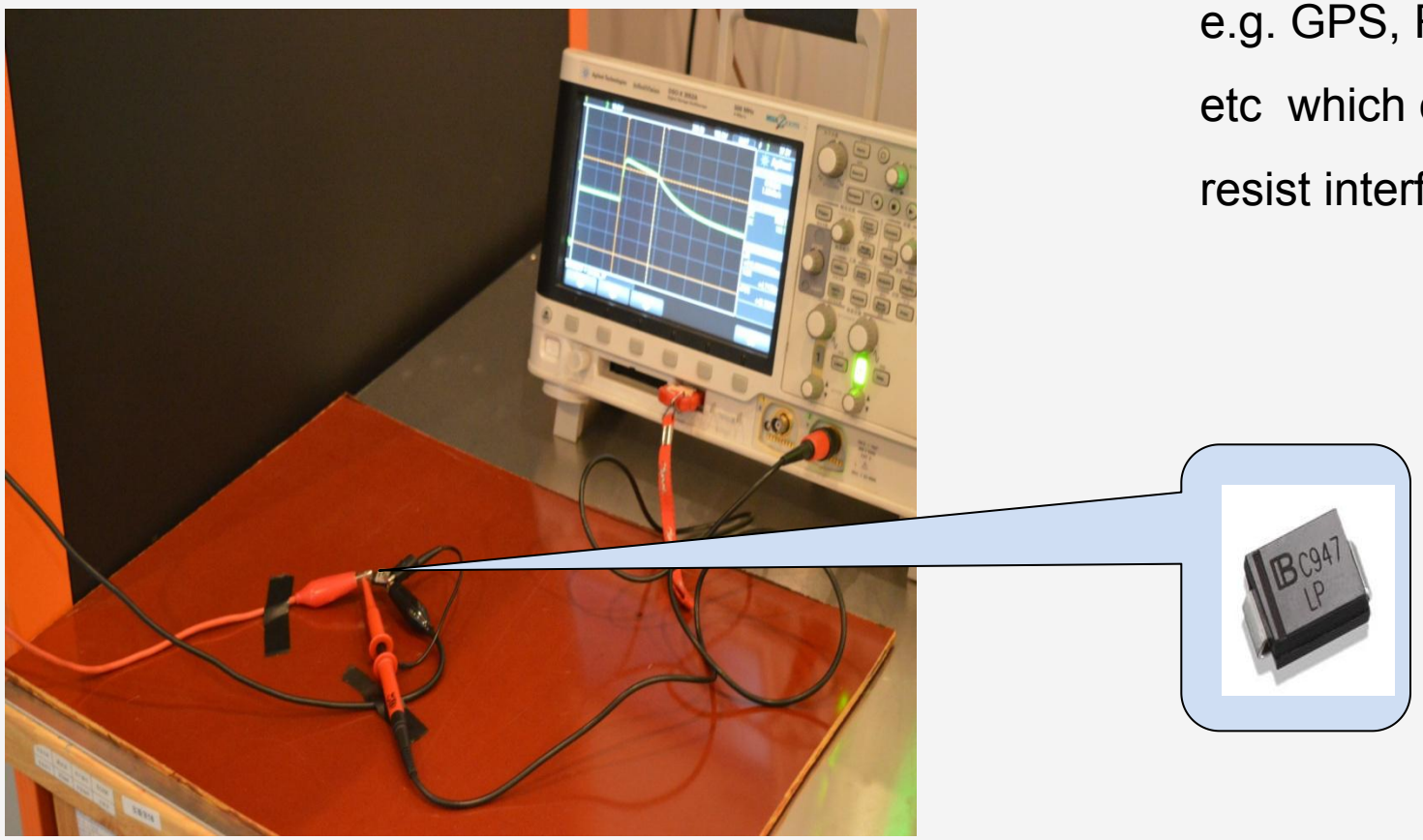



- While the electric generator charging to battery, the generator may produce a high energy pulse if battery is disconnected accidently which may cause the damage of automotive devices.

# LDS 200 series: automotive load dump immunity simulator

**Application 2：** Electronic components test

TVS is widely used as protection component in the electronic circuit design.




e.g. GPS, Rear view camera, etc which often use TVS to resist interference like P5 pulse.

# LDS 200 series: automotive load dump immunity simulator

LDS200 series

LDS 200 D N 30

None： ISO7637，ISO16750 load dump
Rising edge 5 ～10 ms

D: Rising edge ≤ 1us
10us ～10ms
+/- polarity switchable

None: CDN 30A
N30: CDN 30A
N50: CDN 50A
N100: CDN 100A
N200: CDN 200A

# LDS 200: automotive load dump immunity simulator

| LDS200N XX | |
|---|---|
| Standards complied with | ISO7637, ISO16750 |
| Pulse Amplitude | 30-210V, 0.1V steps |
| Clamping voltage | 15-200V, 0.1V steps |
| Impedance (Ri) | 0.5-8Ω, 0.5Ω adjustable |
| Rise time | 5-10ms |
| Duration time | 40-1200ms, 1ms adjustable |
| Output mode | Single, Continuous, Program control 1-9999 |
| Output | Can connect to TIS700 EFT/Burst Simulator |
| Coupling | Coupling to the positive polarity of battery |
| Decoupling | Built-in diode |
| Power of DUT | Max. 60V/200A |
| Trigger mode | Auto, Manual, Outside Trigger |

# LDS 200: automotive load dump immunity simulator

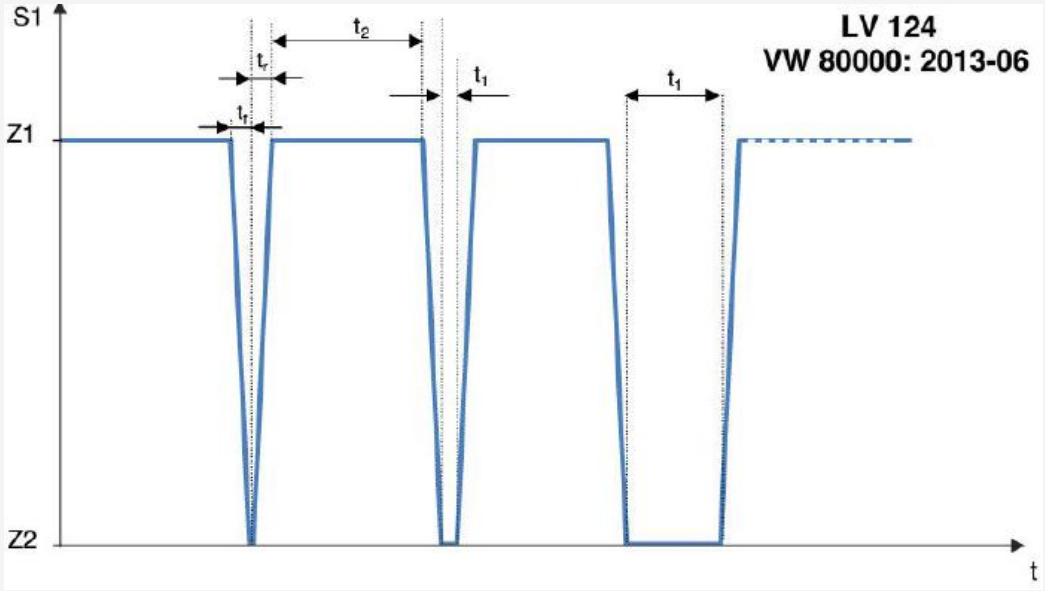
| LDS200D XX | |
|---|---|
| Standards complied with | ISO7637, ISO16750，JASO D1，SAE J1455 |
| Pulse Amplitude | 30-210V, 0.1V steps |
| Clamping voltage | 15-200V, 0.1V steps |
| Pulse polarity | + / - |
| Impedance (Ri) | 0.5-38Ω, 0.1Ω adjustable |
| Rise time | ≤1us , 10us～10ms adjustable |
| Duration time | 40-1200ms, 1ms adjustable |
| Output mode | Single, Continuous, Program control 1-9999 |
| Output | Can connect to TIS700 EFT/Burst Simulator |
| Coupling | Coupling to the positive polarity of battery |
| Decoupling | Built-in diode |
| Power of DUT | Max. 60V/200A |
| Trigger mode | Auto, Manual, Outside Trigger |

# PFS series – automotive power fail simulator

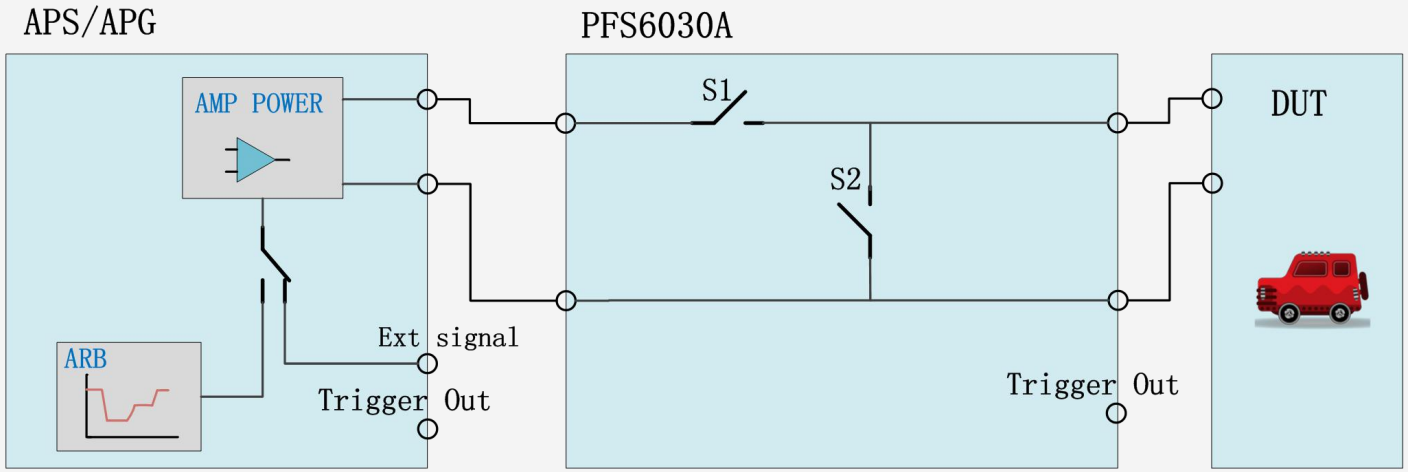
- To simulate voltage dips and interruption tests
- Internal 60V/30A CDN, up to 200A
- Meet rise/fall edge < 1us
- Output impedance, high resistance/low resistance switchable
- Applicable for AutoLab software, support many voltage dips and interruption standards

# PFS series – automotive power fail simulator

Example：LV124 E-10 Test Setup




- When t1 = 10us， tr/tf ≤ 0.1 * t1 = 1us, rise/fall edge is very demanding.
- When calibration with 1ohm resistance, confirm its power to avoid over current damage. Non-inductive resistance is needed.



# PFS series – automotive power fail simulator

## PFS60 series

PFS 60 30 A

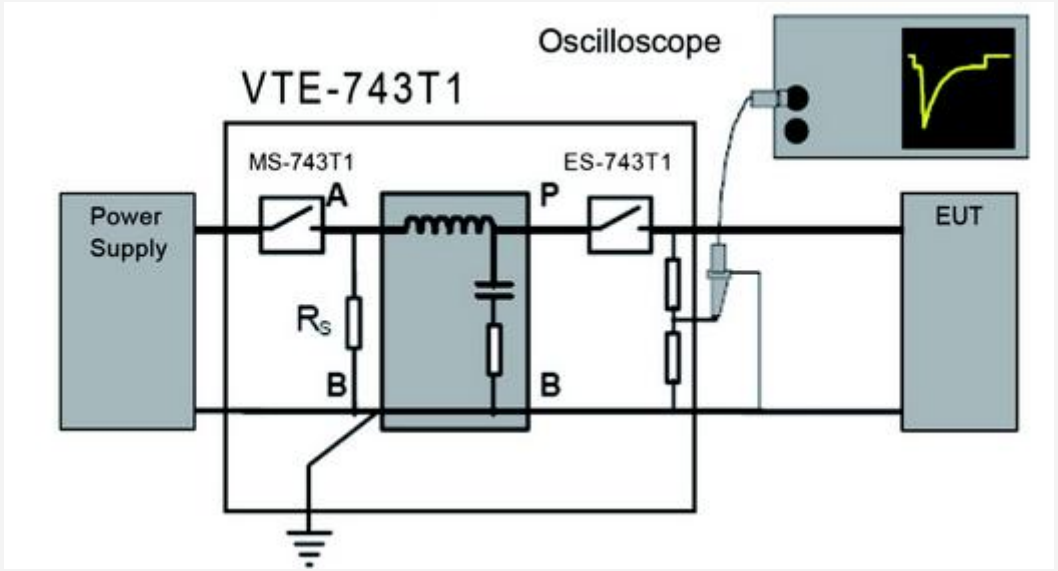
30: CDN 30A
50: CDN 50A
75: CDN 75A
100: CDN 100A
150: CDN 150A
200: CDN 200A

# PFS series – automotive power fail simulator

| PFS series | |
|---|---|
| Voltage scope | 1 - 60 V |
| Rising/falling time | 1ohm,10ohm pure resistive load < 1us<br>High resistance， 1kohm pure resistive load < 10us |
| Impedance (Ri) | High resistance / low resistance (<100mohm) |
| Numbers of pulse | 1 - 9999 |
| Power of EUT | Max.60V/200A |
| Trigger mode | Auto, Manual, Outside trigger |

# VTE 743T1: automotive transient conducted emission test device

- To simulate DUT transient emission waveform when power on or off randomly at DUT power supply
- Max.400V
- Internal 10ohm,20ohm,40ohm,120ohm, can be extended to be any external resistance



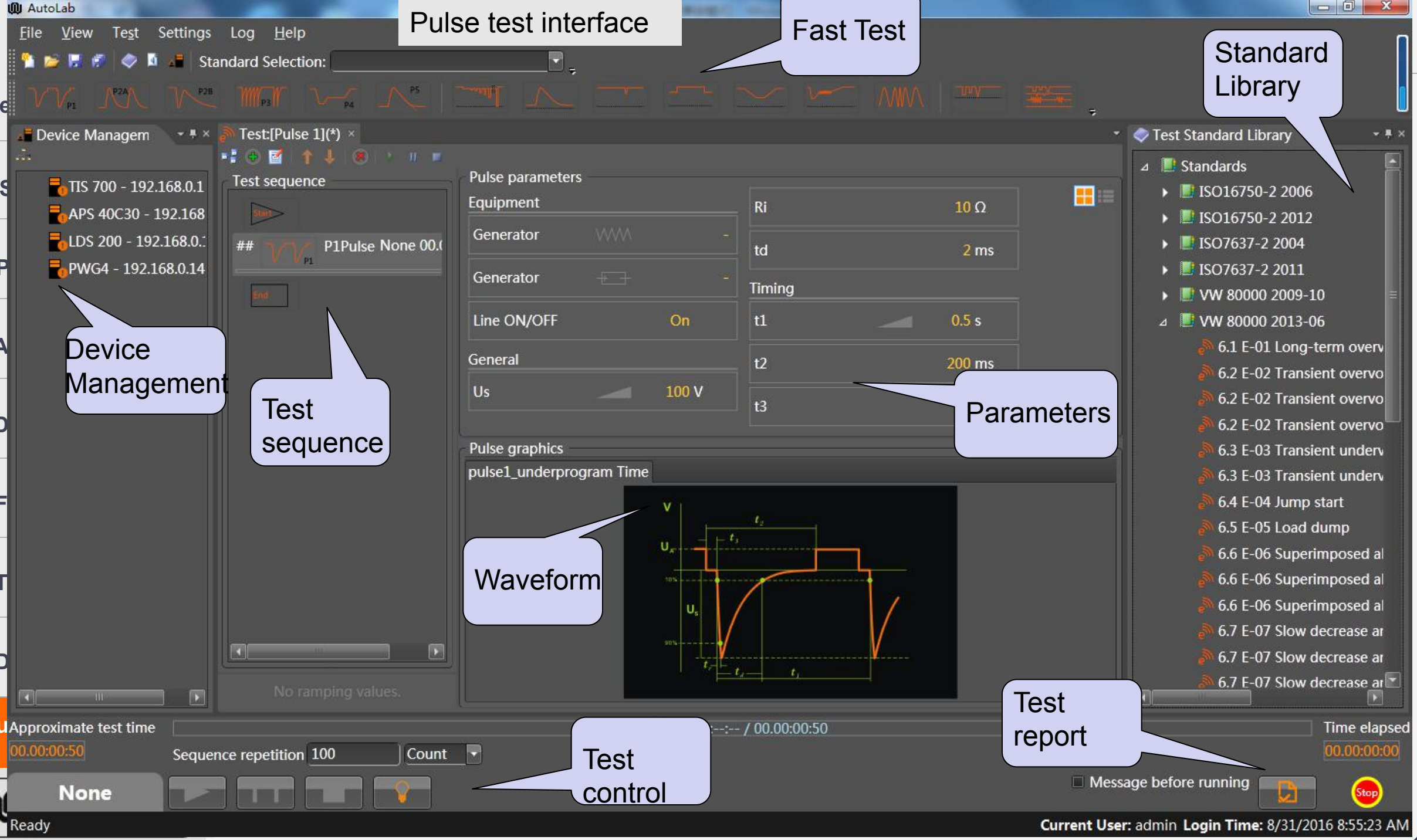
# EDS30V Electrostatic Discharge Simulator


- Test voltage: 1000V-30,000V
- RC modules: 150pF/2000Ω; 330pF/2000Ω; 150pF/330Ω; 330pF/330Ω
- Polarity: +/-
- LCD Touch screen operation
- As per ISO 10605
- With battery powered function

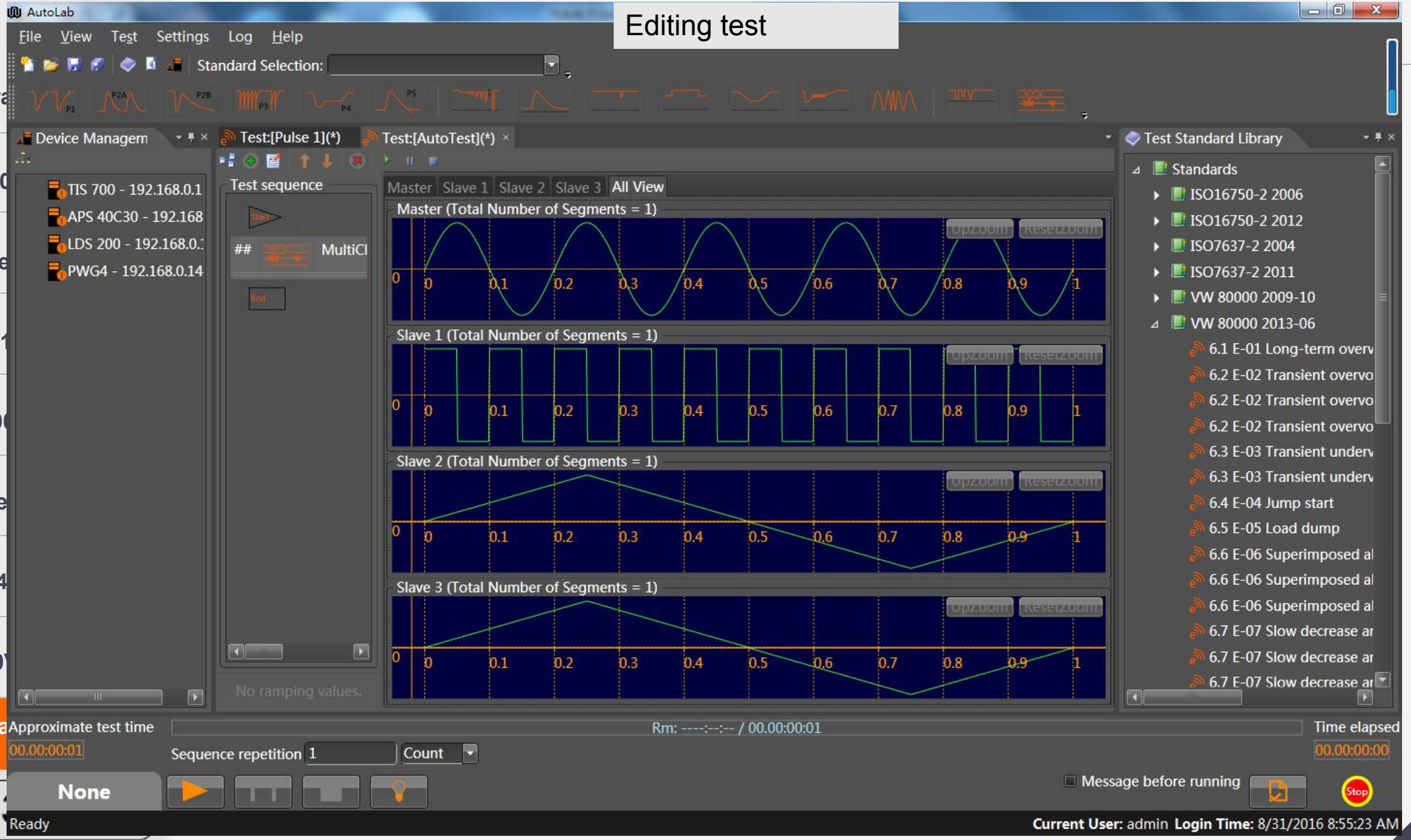
# AutoLabTM software

- Support the test control of all instruments in this system
- Fully standard library (international and manufacturer standards)
- Simple and easy, nearly complete tests with one-key after configuration
- Can record test data and print report
- Support user revise standards and save to improve tests conveniently
- Chinese/English switchable

Support Windows XP/7/8/10

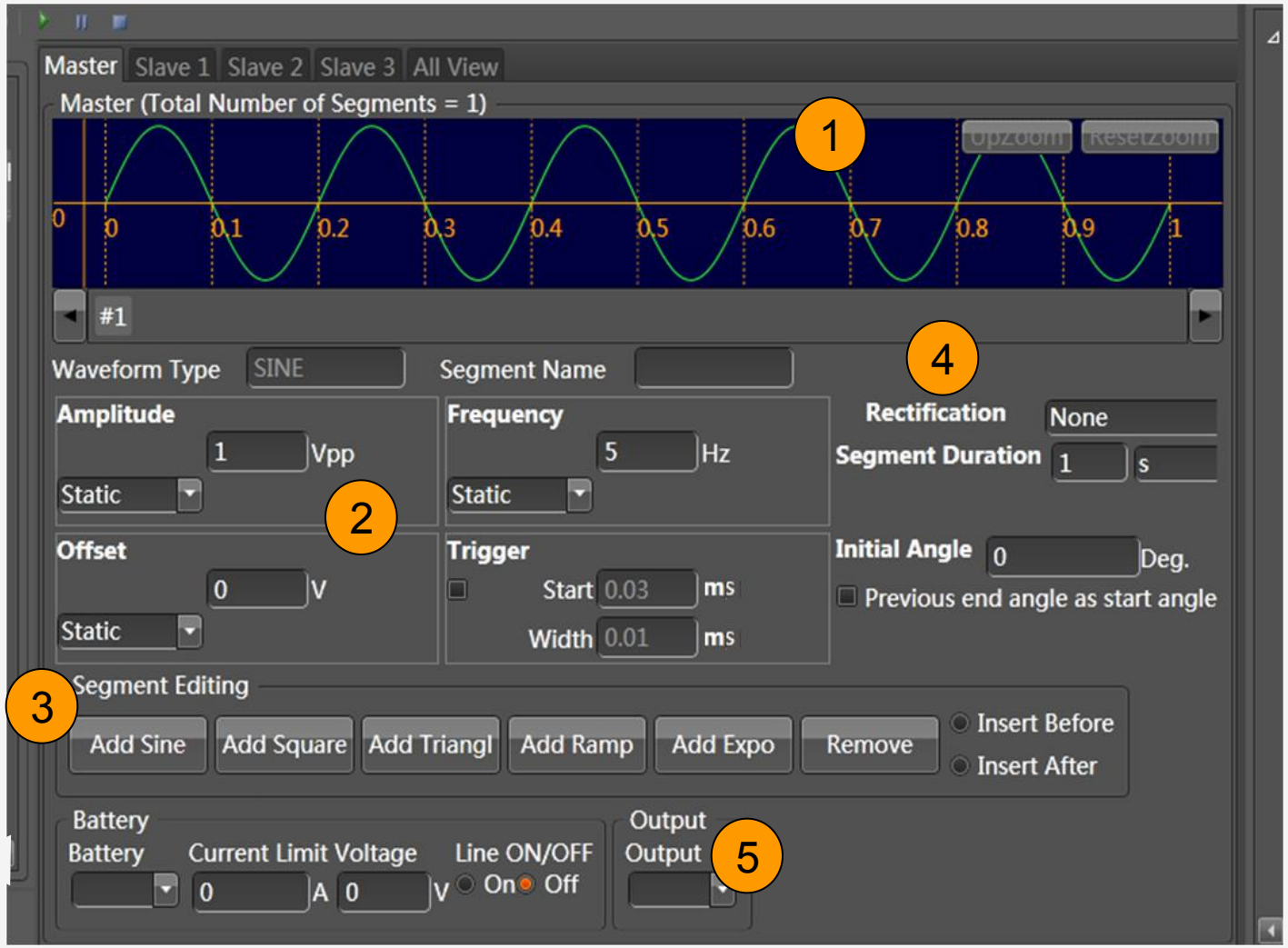

Pulse test interface
Fast Test
Standard Library
AutoLab
File View Test Settings Log Help
Standard Selection:
Device Managem
TIS 700 - 192.168.0.1
APS 40C30 - 192.168
LDS 200 - 192.168.0.
PWG4 - 192.168.0.14
Test:[Pulse 1](*)
Test sequence
P1Pulse None 00.
No ramping values.
Pulse parameters
Equipment
Generator
Generator
Line ON/OFF On
General
Us 100 V
Ri 10 Ω
td 2 ms
Timing
t1 0.5 s
t2 200 ms
t3
Pulse graphics
pulse1_underprogram Time
Test Standard Library
Standards
ISO16750-2 2006
ISO16750-2 2012
ISO7637-2 2004
ISO7637-2 2011
VW 80000 2009-10
VW 80000 2013-06
6.1 E-01 Long-term overv
6.2 E-02 Transient overvo
6.2 E-02 Transient overvo
6.2 E-02 Transient overvo
6.3 E-03 Transient underv
6.3 E-03 Transient underv
6.4 E-04 Jump start
6.5 E-05 Load dump
6.6 E-06 Superimposed al
6.6 E-06 Superimposed al
6.6 E-06 Superimposed al
6.7 E-07 Slow decrease ar
6.7 E-07 Slow decrease ar
6.7 E-07 Slow decrease ar
Device Management
Test sequence
Parameters
Waveform
Test report
Test control
Approximate test time
00.00:00:50
Sequence repetition 100 Count
None
--:-- / 00.00:00:50
Time elapsed
00.00:00:00
Message before running
Stop
Ready
Current User: admin Login Time: 8/31/2016 8:55:23 AM

# Editing test



# AutoLabTM software

## Arbitrary waveform editor




1.Waveform demonstration

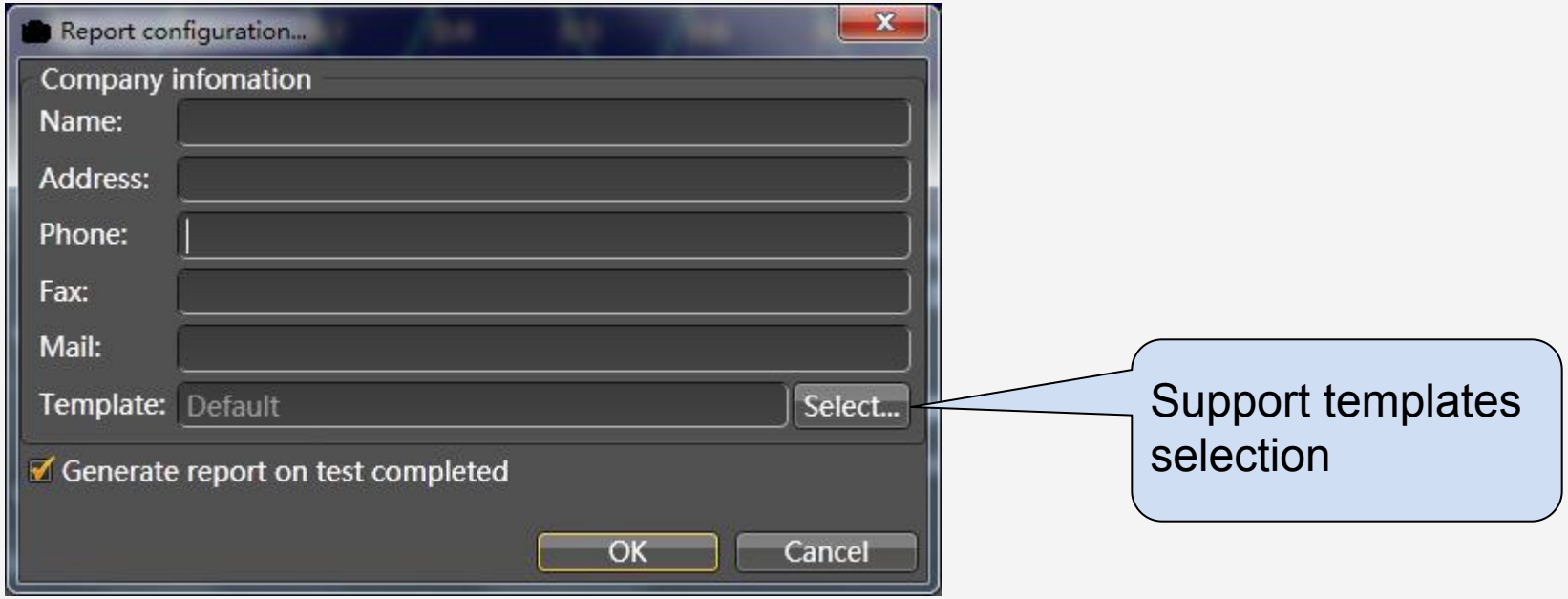
2.Parameters setting

3.Added waveform type

4.Rectification mode and starting angle setting

5.DUT setting, determine if output port is TIS700 or not

## Test Report



# THANK YOU

Company：3ctest　　Speaker：Mr. Zhang　　Time：2016/09/30